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BASIC NAVIGATION

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Introduction

Present book is written and designed to provide guidelines about basics of marine navigation, which is prepared mainly on board. Topics are taken from author's personal professional experience and are in consistency with international regulations of marine navigation which is mandatory for all deck officers.

Book consists of practical and theoretical exercises which will assist officers/trainees to learn the basic techniques of navigation developed by seafarers over centuries. Any student who seek to obtain their professional license as a marine navigator will find the most necessary and useful information in this field. Author has drawn up various diagrams with special care. Reader will also find simple explanations of essential points of marine navigation so that it will be well understood by any beginner in this field.

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1. Introduction and definition some important points

Navigation at sea is a movement one port to another, (from one place to another), where there is a direction and destination, it can verify vessel's position, speed, direction, external factors, vessel's condition effect, situation, ETA, Etc.,

Safe navigation is professional knowledge using of navigation equipment, instruments, systems, proper timely and accurate action as require for safe navigation.

IMO - International Maritime Organization.

MARPOL - The international convention prevention pollution from ship (Presented with 6 Annexes)

Annex-1; Regulation for the prevention of pollution by oil and oily water.

Annex-2; Regulation for the control of pollution by noxious liquid substances in balk.

Annex-3; Regulation for the prevention pollution by harmful substances carried by sea in packaged form.

Annex-4; Regulation for the prevention of pollution by sewage from ship.

Annex-5; Regulation for the prevention of pollution by garbage from ship.

Annex-6; Regulation for the prevention of air pollution from ship.

SOLAS - The international convention safety of life at sea (Presented with 14 Chapters)

Chapter-1; General provisions.

Chapter-2.1; Construction – Subdivision and stability, machinery and electrical installations.

Chapter-2.2; Fire protection, fire detection and fire extinction.

Chapter-3; Life-saving appliances and arrangements.

Chapter-4; Radio communications.

Chapter-5; Safety of navigation.

Chapter-6; Carriage of Cargoes.

Chapter-7; Carriage of dangerous goods.

Chapter-8; Nuclear ships.

Chapter-9; Management for the Safe Operation of Ships.

Chapter-10; Safety measures for high-speed craft.

Chapter-11.1.2; Special measures to enhance maritime safety.

Chapter-12; Additional safety measures for bulk carriers.

Chapter-13; Verification of Compliance.

Chapter-14; Safety Measures for Ships Operating in Polar Waters.

ISPS Code - The International Ship and Port Facility Security Code.

ISPS is under SOLAS Chapter XI Special measures to enhance maritime safety.

The ISPS applies one of the important and critical document which is calling SSP (Ship's security plan) document, this documents is kept under designated person on board at all times.

The SSP documents which consists security of the ship, cargo, personals, etc., where is written procedure against the security risks. It's forbidden to share with others, the document must be follow as require.

The SSP document is divided with-3 different Security levels;

Level-1; This is the normal level with no any special measurement should be taken, at all times minimum security procedure to be follow as require SSP.

Level-2; This is the highest level compared with the normal security level-1, there is accordingly additional protective security measures should be follow as per SSP, there can be imminent risk of security incident.

Level-3; Security Level 3 is the highest level compare to security Level-2, this level is raised when receiving information about the security incident probable or imminent, there is require specific protective measurement as per SSP procedure against the risk, possibility that specific target cannot be verify, security level-3 can set for that period before target is verify and well clear.

ISM - International Safety Management.

COLREG - The international regulation prevention collision at sea (Presented with 41 Rules)

STCW - The International Convention on Standards of Training, Certification and Watch keeping for Seafarers.

ILO - The International Labor Organization.

IBC Code - International Bulk Chemical Code.

IMDG Code -International Maritime Dangerous Goods Code.

ISGOT- International Safety Guide for oil Tankers and Terminals.

IALA - International Association of Lighthouse Authorities.

ADP - Admiralty Digital Publication.

ASD - Admiralty Sailing Direction.

ADLL - Admiralty Digital List of Lights.

ADRS - Admiralty Digital Radio Signals.

ADC - Admiralty Digital Catalogue.

RADAR - Radio Detection and Ranging.

AIS - Automatic identification System.

ECDIS - Electronic Charts Display and Information System.

GMDSS - Global Maritime Distress and Safety System.

VHF - Very High Frequency.

MF/HF - Medium Frequency / High Frequency.

DSC - Digital Selective Calling.

INMARSAT - International Maritime Satellite Organization.

EPIRB - Emergency Position Indicate Radio Beacon.

SART-Search and Rescue Transponder.

ETA – Estimate time of arrival.

ETD- Estimate time of departure.

ETC- Estimate time of completion.

COSP- Commence of sea passage.

EOSP- End of sea passage.

NOR- Notice of readiness.

2. Conversion Table

Convention table may use for measuring same quantity by different units, below are introduced some of the main conversion table:

1 Metric Tons = 1000 Kilograms

1 Long Tons/Imperial Ton = 1016.05 Kilograms

1 Short Tons/US Ton=907.185 Kilometers

Degree Celsius to Fahrenheit Using formula; (0℃ × 9/5) + 32 = 32℉

1 Bar=14.5038 PSI (Pound-Force per square inch)

1 Bar = 1.197.16 mm H2O (Water Gauge)

1 Nm = 1852 Meters

1 Nm = 1.852 Kilometer

1 Nm = 10 Cables

1 Cable = 185.2 Meters

1 Kilometers = 0.54 Nm

1 Meter = 3.28 Feet

1 Fathom = 1.829 Meters

15 Fathom = 1 Shackles

1 Shackles = 27.43 Meter

1 Shackles = 90.0 Feet

1 Kilowatts = 1.34 Horse Power (Mechanical)

1 Bar = 100 Kilopascal

1 Statute Mile = 1609.344 Meters

1 Degree = 60 Minutes

1 Degree = 3600 Seconds

At Equator, the circumference of earth is 24901 Nautical miles

“One degree (°) is equal to 60 minutes (') and equal to 3600 seconds (")”

Density/Mass/Volume, P-Density, M-Mass,

V-Volume, Formula; P=M/V,

Note: The **Density Calculator** uses the **formula** p=m/V, or **density** (p) is equal to mass (m) divided by **volume** (V). The **calculator** can use any two of the values to **calculate** the third. **Density** is defined as mass per unit **volume**.

Distance Time and Speed calculation

S-speed, D-Distance, T-Time.

Formulas as follows:

Speed = Distance / Time

Distance=Speed x Time

Time = Distance / Speed

In ship speed is usually termed as Knots, Distance is Nautical Miles, Time in Hours

Simple Exercise:

Question 1 - A vessel was travelling at a speed of 14 Knots, how much time it will take to cover 280 Nm?

Answer: Time = Distance / Speed

Time = 280 / 14

Time = 20 Hours

Question 2 - A vessel was travelling at a speed of 14 Knots how much time it will take to cover 286 Nm?

The Answer:

Time = Distance / Speed

Time = 286 / 14

Time=20.4285 Hrs.

0.4285 Hrs. = 25.71 Minutes (x60)

0.71Sec = 42.6 Seconds (x60)

3. Introduction of Measurement instrument

Marine transportation is the cheapest and the most efficient method to transport goods from one part of the world to other.

Marine Navigation is the technique to take a ship through an ocean or sea towards its destination safely. When talking about Navigation the first and the most thing to understand is “the position.”

The position and Time in “The Universe” are only relative. The Earth is negligibly small part of the Universe and Hence we can Measure Time and position of earth, just like we are using a calendar and a Clock using to Measure the TIME, we can measure position too. Position is nothing but it’s the answer of the question “WHERE WE ARE ON THIS WORLD”. For example, If Someone asks you, where do you live? You can answer with the Name of your place or land marks leading to there or based on direction and distance from a Land mark. But how Someone Can Get a Land mark or distance in a vast ocean of 5000 Miles? The Answer is still we have

two imaginary Land Marks called the EQUATOR and the GREENWHICH MERIDIAN. All the position of EARTH is made on a basis of Distance from Equator and Distance from Greenwich Meridian in Terms of Degrees Minutes and Seconds. We are using some celestial objects or manmade satellites to find it out.

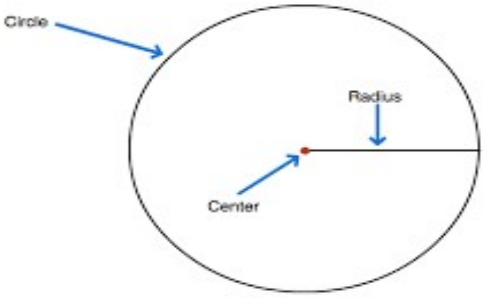
In Short, the study of Entire Marine Navigation is Just the study of three things;

1) Where are you now? (Position)
2) Where You Want to go? (Destination)
3) How you will go safely? (Navigation)

Normal instruments plotting positions on chart

Mariners are the one who are operating in the largest transportable units in the world. Sometimes, as a mariner you may operate huge ships with 450,000 Ton. Operating such a huge unit through the vastest ocean is challenging and a call for some hard work. So there is a necessity of precise knowledge about the surface of ocean and navigational techniques. Before starting the study of navigation, I advise you to refresh some basic

mathematics from your school days such as Trigonometry and some basic Geometry such as Circles, angles and Arcs.

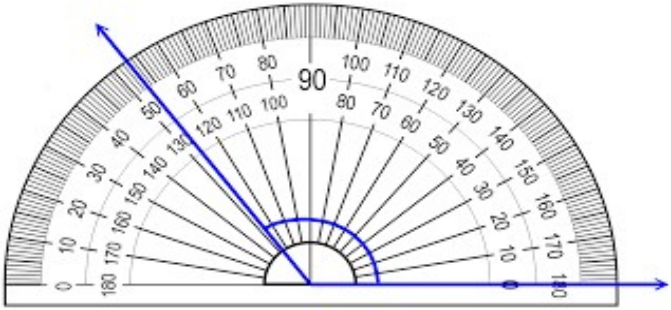


A circle is a simple closed shape. It is the set of all points in a plane that are at a given distance from a given point.

The Centre equivalently it is the curve traced out by a point that

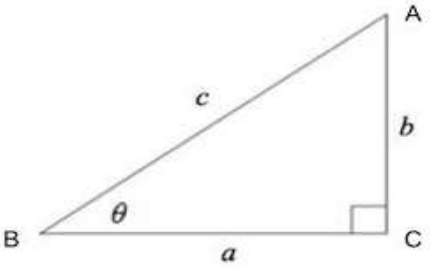
moves in a plane so that its distance from a given point is constant.

In plane geometry, an angle is the figure formed by two rays, called the sides of the angle, sharing a common endpoint, called the vertex of the angle.



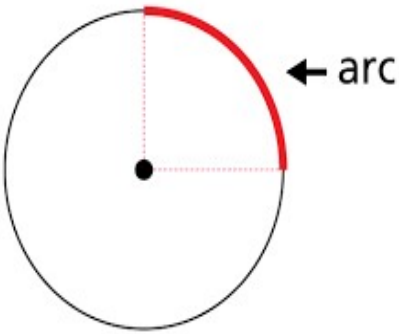
Angles formed by two rays lie in a plane, but this plane does not have to be a Euclidean plane.

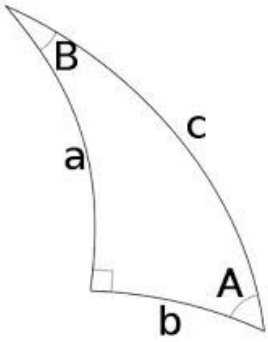
Trigonometry is a branch of mathematics that studies relationships between side lengths and angles of triangles.



Arc is a part of circle as it is marked on the picture.

A triangle form edges by three arcs of great circles on a sphere.

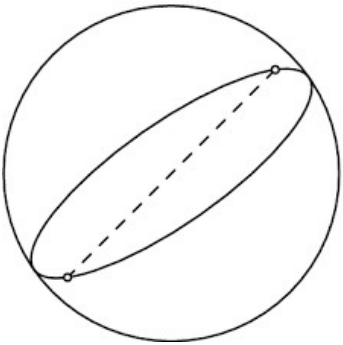




4. GREAT CIRCLE

A great circle is a circle passing on the surface of a sphere and its plane cuts the center of the sphere.

In Simple words the great circle is any circle on the surface of a sphere and its center and circle's center are the same.

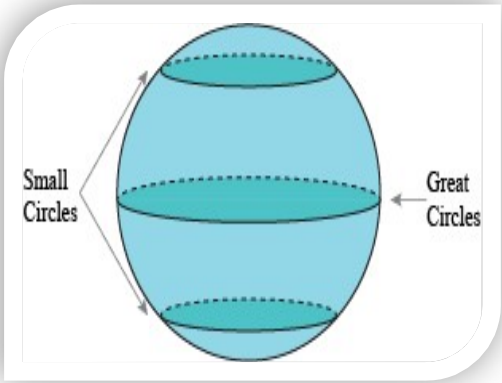


An Arc of Great circle is the shortest distance between two points on the surface of sphere.

SMALL CIRCLE

Small circle is a circle on the surface of sphere and its plane never cuts the center of the sphere.

Pictures are given as great as small circles.



SHAPE OF EARTH

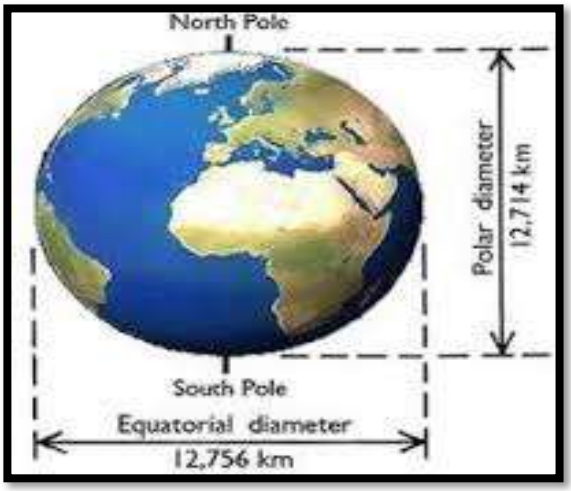
Earth is an **oblate spheroid**. This means it is **spherical** in shape, but not perfectly round. It has a slightly greater radius at the Equator, the imaginary line running horizontally around the middle of the planet. In addition

to bulging in the middle, Earth's poles are slightly flattened.

Actually world/Earth is not sphere but for navigation as navigators' calculation considering as sphere.

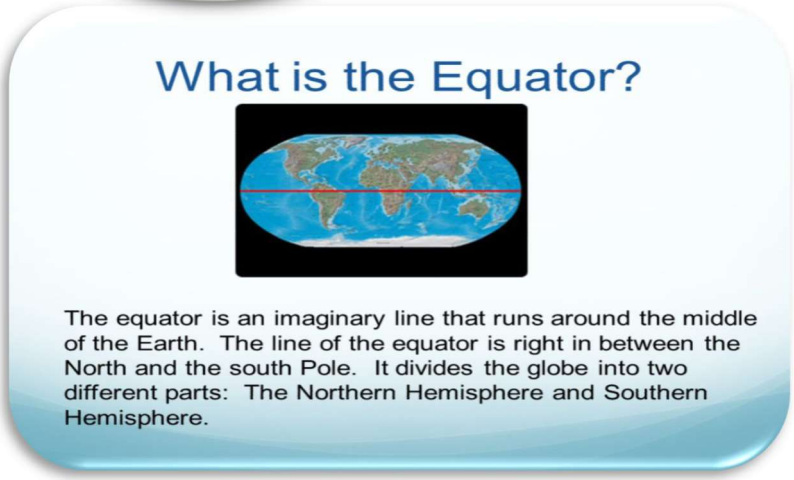
World/Earth Polar diameter is 12,714 Km

World/Earth Equatorial diameter 12756 Km



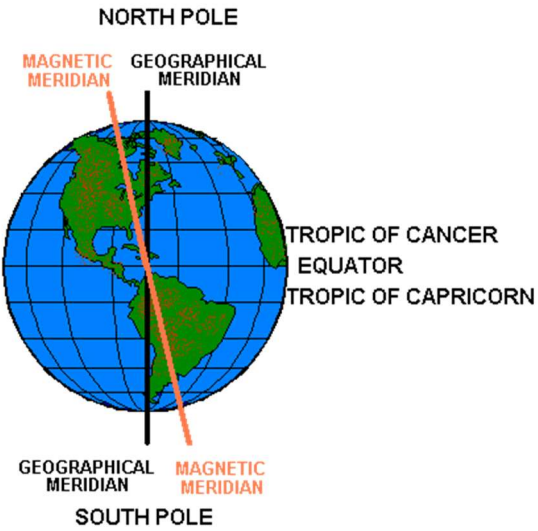
5. EQUATOR, POLE

EQUATOR is an imaginary GREAT CIRCLE on the surface of the earth and it run on east-west direction. Equator makes Zero Degree angle with the center of earth and make 90 degree angles with both the poles. Equator can cut earth with to two hemispheres, NORTHERN HEMISPHERE and SOUTHERN HEMISPHERE.



POLES

Earth have two poles North Pole and South Pole. North Pole is the northern Tip of the earth and South Pole is southern Tip of the earth.



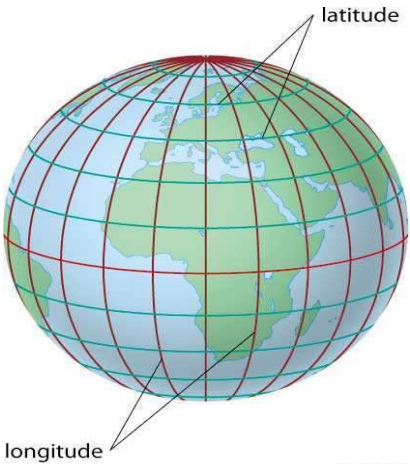
A **geographical pole** is either of two points on the surface of a rotating planet. It is the place where the axis of rotation meets the surface of the planet.

The north **geographical pole** of a body is 90 degrees north of the equator. The south **geographical pole** lies 90 degrees south of the equator.

The North Magnetic Pole is the wandering point on the surface of Earth's Northern Hemisphere at which the planet's magnetic field points vertically downwards. There is only one location where this occurs, near the Geographic North Pole and the Geomagnetic North Pole.

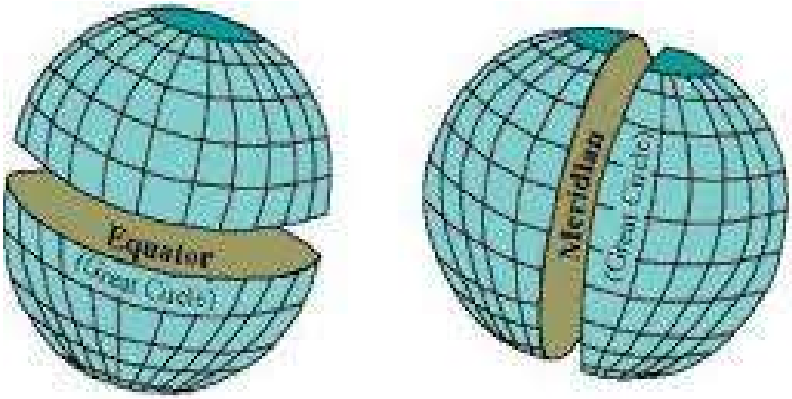
6. LATITUDE

LATITUDE is a SMALL CIRCLE parallel to Equator towards Poles. LATITUDE is measure by the angle at the center of earth between equator and the latitude or the ARC at the surface of earth between equator and present latitude, its named BY North or South Depending on Which Hemisphere it is located (Both are same value). Value of Latitudes are from Zero degree to 90 Degrees to North or South.



MERIDIAN

A (geographic) **meridian** (or line of longitude) is the half of an imaginary great circle on the **Earth's** surface, terminated by the North Pole and the South Pole, connecting points of equal longitude, as measured in angular degrees east or west of the Prime **Meridian**.

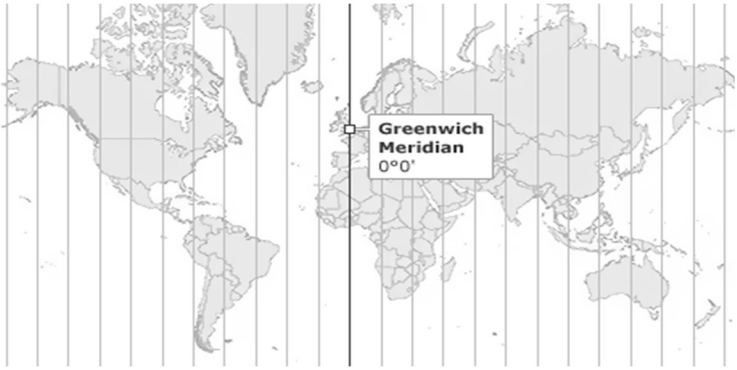


MERIDIANS are Imaginary SEMI GREAT CIRCLES run between poles.

GREENWICH MERIDIAN AND LONGITUDE

GREENWICH is a place in ENGLAND and the Greenwich meridian is the imaginary meridian passing through the Greenwich. Greenwich Meridian is the reference point to measure longitude and it is considering as Zero Degree LONGITUDE. Longitude is Named East of West depending on, which side of Greenwich it lies. That is if it lies west of Greenwich or East of Greenwich. Its value can be Zero degree to 180-degree East or West.

Longitude is measured as the Angle at the center of the earth between current meridian and the Greenwich meridian or it is the arc at surface of the earth between current Meridian and Greenwich Meridian;

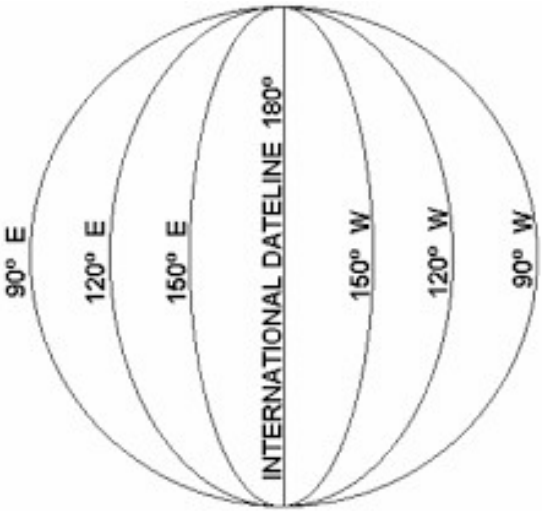


Greenwich, England is called the **Greenwich Meridian**. This **line** is the starting point for longitudinal **lines** that run north-south and converge at the poles.

The angular distance of a place east or west of the meridian at Greenwich, England, or west of the standard meridian of a celestial object, usually expressed in degrees and minutes.

7. Understanding of longitude Exercise

Sample refer international dateline is given on earth as it drawn.



Questions;

1) The vessel is at a longitude of 150 E and if she has sailed 40 degrees more towards and Eastward then what is the present Longitude of the Vessel?

In this case if vessel is sailing to eastern direction so we have to add from 150 E 40 Degree to east, we will get 170 Degree West.

2) The vessel is at a longitude of 175 E and if she has sailed 20 degrees more towards Eastward then what is the present Longitude of the Vessel?

In this case if vessel is sailing to eastern direction so we have to add from 175 E 20 Degree to east, we will get 165 degree west.

3) The vessel is at a longitude of 155 W and if she has sailed 60 degrees more towards Westerly, what is the present Longitude of the Vessel?

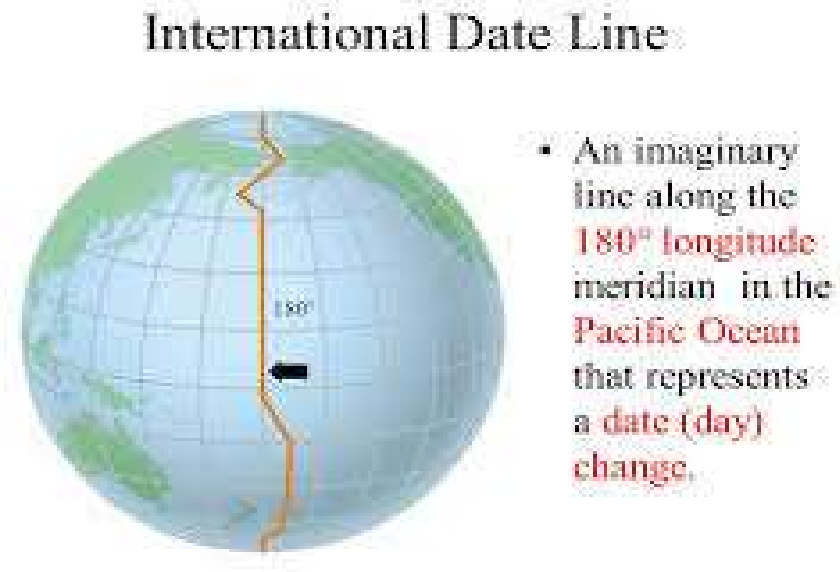
In this case if vessel is sailing to eastern direction so we have to add from 155 W 60 Degree to West, we will get 145 Degree East.

4) The vessel is at a longitude of 177 W longitude and if it has sailed 12 degrees more towards Westerly then what is the present Longitude of the Vessel?

In this case if vessel is sailing to eastern direction so we have to add from 177 W 12 Degree to West we will get 171 Degree East.

The International Date Line sits on the 180º line of longitude in the middle of the **Pacific** Ocean, and is the imaginary line that separates two consecutive calendar days.

It functions as a pointer to "magnetic north", the local magnetic meridian.



Today all navigators should be well familiar basic requirement according trade and region changing of ship's time, normal practice is to maintain arrival/departure in ports with local time that all records ship/shore be same time and date at all times.

8. Introduction of Navigation instruments/Equipment

Magnetic Compass

The magnetic compass is the main and important navigation equipment on board, this is the instruments which is showing on board vessel's direction and using in navigation as main compass.

It functions as a pointer to "Magnetic north" the local magnetic meridian, the equipment equipped with compass rose which is showing North, East, South and West on compass face. Magnetic compass not require any electrically power.

On board additional stored spare Magnetic Compass and refill compass liquid.

Gyro Compass

The Gyro compass is using on board widely for navigation compass is also to show direction of vessel but system is not working without electrically power. One of the important component contained gyrocompass is a Gyroscope motor that register the direction of true north along the surface of the earth and it does not depend on magnetism.

Normally place in metal Box; Gyro Repeater;

Sextant;

A sextant is a doubly reflecting navigation instrument that measures the angular distance between two visible objects. The primary use of a sextant is to measure the angle between an

astronomical object and the horizon for the purposes of celestial navigation.

Barometers

A barometer is a scientific instrument that is used to measure air pressure in a certain environment. Pressure tendency can forecast short term changes in the weather. Many measurements of air pressure are used within surface weather analysis to help find surface troughs, pressure systems and frontal boundaries.

All navigators should be take into account also during using barometer there is correction factor, factors is calculating as follow height in meter where actually taken reading from sea level and present temperature.

Table for reference only

Correction of Barometer Reading for Height Above Sea Level

All barometers. All values positive.

Height in Feet	Outside temperature in degrees Fahrenheit													Height in Feet
	– 20°	– 10°	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°	
	Inches	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	
5	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	5
10	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	10
15	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	15
20	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	20
25	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	25
30	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	30
35	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	35
40	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	40

Chronometer

An instrument for measuring time, especially one designed to keep accurate time in spite of motion or variations in temperature, humidity, and air pressure. Chronometers were first developed for marine navigation, being used in conjunction with astronomical observation to determine longitude.

Anemometer

Anemometer is one of the useful navigation equipment which used to measure wind speed and direction of wind, there are two type of anemometer one of them is fixed anemometer and other is potable anemometer (Hand anemometer, both of them has same function.

Whenever using paper chart for navigation without ECDIS we have to calculate from relative to true wind direction and speed and when vessel equipped with ECDIS anemometer reading we can get directly as both of them as relative as true.

There are different type of anemometer one of them

Looks like this as that is fixed normally on the bridge (Wheelhouse).

The air flow past the cups in any horizontal direction turned the shaft at a rate that was roughly proportional to the wind speed.

Anemometer device getting reading from anemometer cup which is placed outside accommodation normally that is placed on Monkey Island, on cup flowing air cup is turning as a propeller by rotation of cup generated speed and direction of wind which will display on anemometer device.

Rate of turn indicator

On board the vessel the one of the important instrument is rate of turn indicator, which is displayed on the bridge (Wheelhouse) on visible place close to steering stand.

Rate of turn indicator is instrument which is showing rate a ship is turning in degree per minutes, very useful instrument during maneuvering of vessel to monitor in time movement of the vessel.

Rudder Angle Indicator

The Rudder angle indicator is one of the important device in navigation, that is placed normally on the Bridge (Wheelhouse) on bridge wings Port and Starboard and engine room (Steering Platform) that is placed on visible place for rechecking by master or Navigators helmsman following order as it given. Rudder angle indicator is showing how much is putted rudder blade port or starboard.

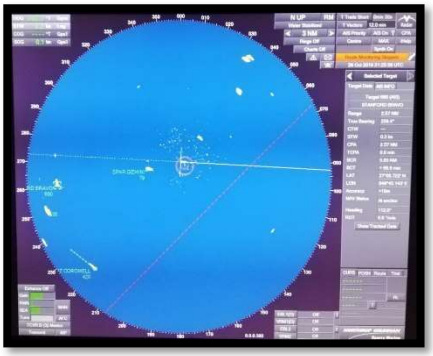
Steering gear system

Steering gear system is one of the important system on board in navigation, this system gives for navigators' when vessel underway Steer turn port or starboard side, steering gear effect is when vessel underway, otherwise system is not effect.

Steering gear system that is starting from steering stand (Location Bridge) to rudder (location aft in sea) by movement of rudder vessel will get force to turn accordingly.

Radars

All sea going vessel using X-Band and S-band radar on board for navigation.



Radar can detect target on the screen floating objects and give us information as the distance to the targets, land, Etc., to avoid collision. Radar has his rotating antenna which discovers the surrounding area of the ship.

Few Full forms:

CPA- Close point of approach

TCPA-Time to close point of approach

BCR- Bow crossing (Target will cross ahead)

BCT- Bow crossing time

CTW- Course through water

STW- Speed trough water

COG-Course over ground

SOG-Speed over ground

Automatic Identification system (AIS)

AIS is the one system for navigation which helps seafarers for navigation to find the location of the targets/Vessels.

AIS system updating own ship's data as require, including navigation status.

Global Position System (GPS)

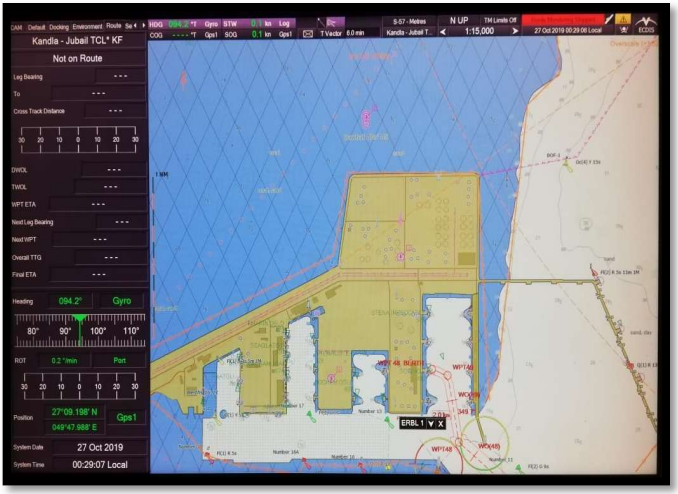
GPS is one of the main equipment which is receiving and displaing on screen vessel's position/location latitude,longitude, this equipment deeply using for navigation.

Electronic Chart Display Information System (ECDIS)

An Electronic Chart Display and Information System (**ECDIS**) is the system as an alternative to paper charts.

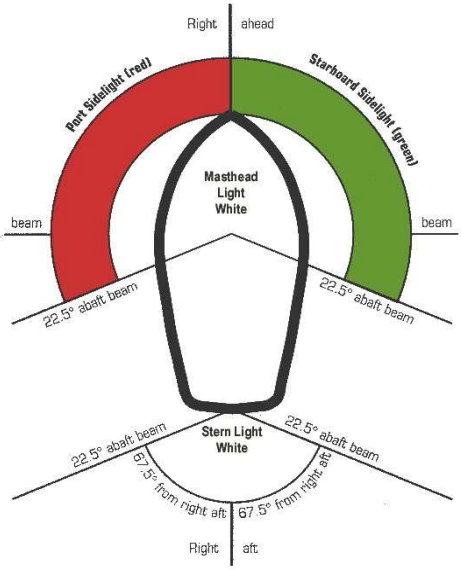
The ECDIS in navigation become easier compare to paper charts, as on ECDIS require less time to work then on paper nautical chart for ship's navigating Officers.

Picture ECDIS Sperry Marine



Navigation Lights

All Vessels/Boats requested to show Navigation or other lights depends of situation but all of them must be complied with COLREG in all-weather condition.



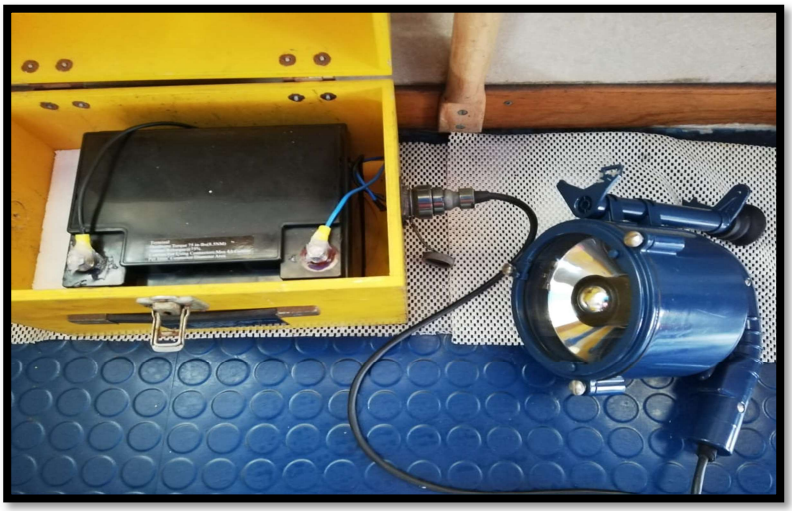
At least daily base should be check and test navigation and other lights, also all watch keeping officer should be check before takeover watch correct using of navigation or other lights according weather condition and navigation status.

Ship Whistle

Ship's whistle/Horn on board provide to attract attention other vessels/targets whenever it requested, like in bad weather, fog, poor visibility, high traffic etc., also to attract attention ship's crew in emergency. Ship's whistle/Horn must be used with complied COLREG (as per rules) or whenever in emergency requested, any whistle should not be mistaken when in use for others. The whistle should be both manually and electrically operational from the bridge (Wheelhouse).

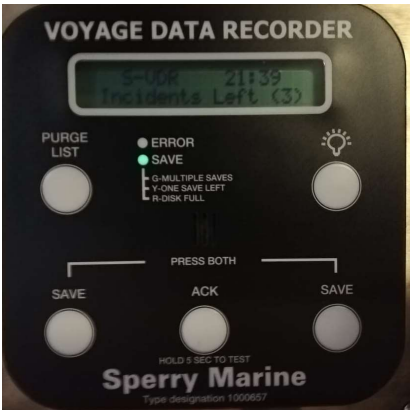
Daylight Signaling Lamp

Daylight signalling lamp and emergency signalling device is used in the day time and also be used during night, emergency signalling lamp is also one of the instrument for ship's navigating officers/Crew, The energy source for lamp can be provide from battery or can be directly connected with main supply, the lamp should be enclosure weather and seawater proof material, should be provide with spare bulbs and battery charger cable with adaptor.



Voyage Data Recorder (VDR)

The voyage data recorder VDR is an equipment which is installed on the bridge (Wheelhouse), the system VDR recording various data Voyage details and vital information in case accident investigation, it is contains a voice recording system for a period of at least 12 Hours, Navigating officers and master must be know how to save data before overrating any data from VDR, the clear working instruction on VDR should be display to work easily whenever it requested.



Echo Sounder

The Echo sounder is one of the navigating instrument which is installed on board, display on the bridge (Wheelhouse). The instrument measure the depth of water under keel/below the ship's bottom, Echo sounder working principle is transmission of sound waves and an audio pulse which will bounce off a reflecting layer, returning as an echo to the source. It can be provide with printer and minimum require memory record at least last 24 hours.

A*uto Pilot*

An autopilot is on board the vessel steering system which without helmsmen can maintain

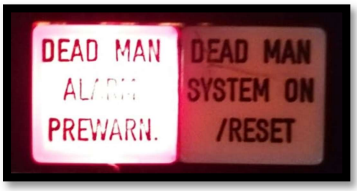
predetermined (Set) course, it is controlling from Navigation Bridge (Wheelhouse).

Bridge Navigation Watch Alarm System (BNWAS)

A Bridge Navigational Watch Alarm System, this is the automatic system which give sound signal if ship's officer during the navigation, watch falls asleep or absent for that time period which is exceed that period whichever time is set and active in BNWAS.

The purpose for BNWAS is to safe watch keeping at all times on the bridge during Navigation/Bridge watch and in case Officer/Operator not alerted on time to reset alarm, then alarm will alert other officer and Master.

Reset Button



Speed Log

Speed log is one of the navigation equipment which give us information about the ground speed reference how water flowing by hull.

The speed log working Principe is deep water STW- Speed through water and shallow water mainly SOG-speed over ground.

The Global Maritime Distress and Safety System (GMDSS)

Very high frequency; (VHF)

Very high frequency (**VHF**) in navigation use for radio communication ship to ship or to shore station and broadcast messages whenever is requested in

vicinity, Normal signal transmitting range in normal weather condition approximately is 60 nautical Mile.

- Channel 16 (156.800 MHz) – Distress, safety and calling.
- Channel 13 (156.650 MHz) – Internship navigation (bridge-to-bridge)
- Channel 70 (156.525 MHz) – Digital Selective Calling.

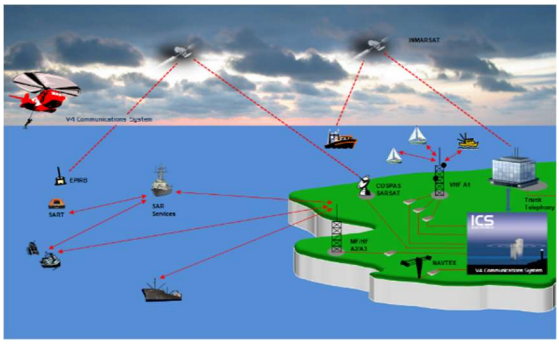
MF/HF Radio station small introduction;

The MF/HF station/system's primary purpose is to improve communication for the world shipping industry ship to ship to shore and vice versa, whenever need any assistance/help vessel in

distress, rescue operation, etc., broadcast information in long range voice broadcast.

GMDSS Radio station MF/HF is equipped with transmitting-receiving system Tx/Rx system,

Which allows the operator to either transmit or receive information by voice or send DSC (Digital selecting Calling) with digital code on the MF/HF various frequencies, select nature of message in case of the time allows before sending any alert, it will be easy for receiver operator for understanding,



This transmitted signal will automatic ring to another MF/HF radio station with allocated MMSI number accordingly operator can verify nature of message and some minimum information, like Position, MMSI number, Type of

Broadcast, etc., operator can act accordingly as requested final decision with master in case need to deviate from current passage and taking part some like SAR (search and rescue operation) and so on.

For Reference only
RT FREQUENCY
4207,5 kHz
6312,0 kHz
8414,5 kHz
12577,0 kHz
16804,5 kHz

Navigation Telex (NAVTEX)

Navigation Telex (NAVTEX) this is the one of the navigation equipment which allows to receive in range like Navigation, Meteorological warnings and forecasts, also urgent, safety and distress messages on international frequency 518 KHz and also Local 490 KHz.

The NAVTEX system should be selected and activate according NAVAREA region NAVTEX station (Refer ALRS) and in order should be on auto mode that all messages to print as soon as it is received, OOW all messages should be act accordingly.

Inmarsat-C

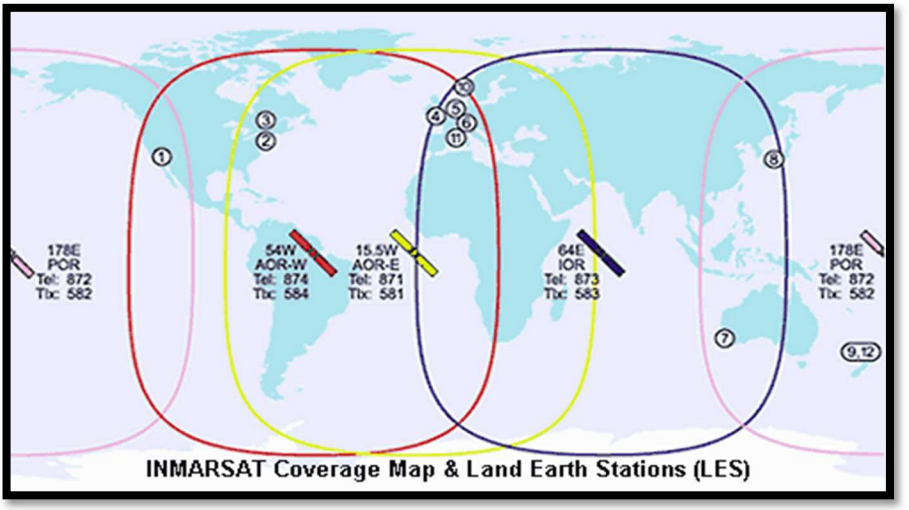
Inmarsat C is a two-way store and forward communication system that transmits messages in data packets in ship-to-shore, shore-to-ship and ship-to-ship direction.

Inmarsat-C has transmitter and receiver unit, distress function – destress button to activate destress alert to protect crew and Vessel, whenever

activating distress button (Press distress button and hold) it is taking 1-4 second to transmit alert.

Basic messages, Enhanced Group Calls (ECG), maritime safety information, weather reports, Piracy messages, Navarea messages, Etc.,

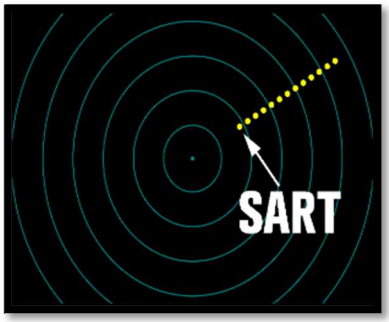
As per area on Inm-C satellite and Navarea region must be selected and force/Act accordingly by operator.



Search and rescue transponder; (SART)

A **search and rescue transponder** (SART this is an electronic device automatically react only on X-Band (3-cm a 9 GHz) Radar and it will detect on screen 12 Dots, SART transponder used to easy the search ship in distress or a life raft.

The S-Band radar (10 cm) can't detect SART. Normal transmit ion range is approximately 8.0 Nm from SART.



Emergency position indicate radio beacon (EPIRB)

The EPIRB is one of the main equipment in case of emergency, normal frequency for EPIRB is 406 MHz.

Emergency indicate radio beacon (EPIRB) can provide hydrostatic release unit mechanize this case EPIRB will activate automatically when vessel will go down 2-4 meter in water or can activate manual whenever requested.

There are three types of messages:

During GMDSS communication according to the situation and condition should use different type of messages for Sending/Notification.

•Distress-Mayday
•Urgency-Pan-Pan
• Safety- Security

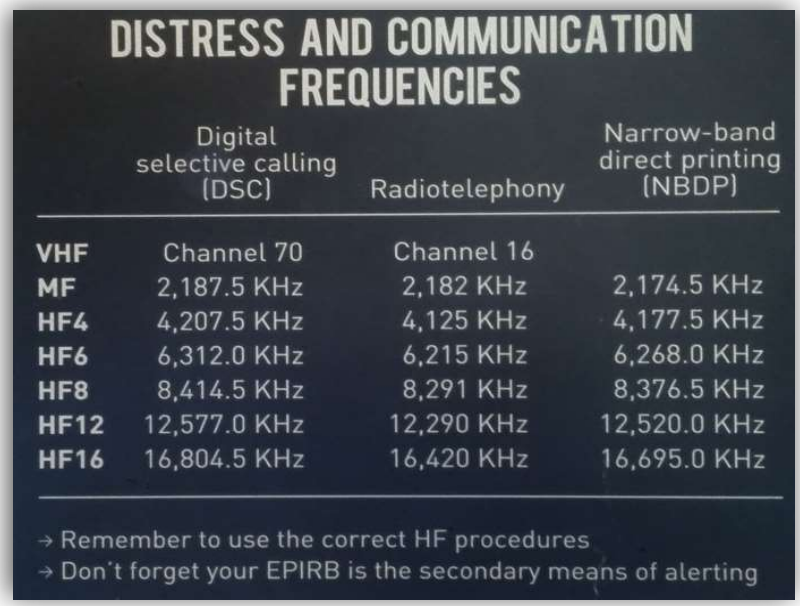
Safety, Urgency, Distress Message;

Safety

Safety message is knowns as a Security Call.

A security message contains information associated with the safety of vessels at sea.

Safety message is to draw attention to others about navigation warnings, gales warning Etc.,



DISTRESS AND COMMUNICATION FREQUENCIES

	Digital selective calling (DSC)	Radiotelephony	Narrow-band direct printing (NBDP)
VHF	Channel 70	Channel 16	
MF	2,187.5 KHz	2,182 KHz	2,174.5 KHz
HF4	4,207.5 KHz	4,125 KHz	4,177.5 KHz
HF6	6,312.0 KHz	6,215 KHz	6,268.0 KHz
HF8	8,414.5 KHz	8,291 KHz	8,376.5 KHz
HF12	12,577.0 KHz	12,290 KHz	12,520.0 KHz
HF16	16,804.5 KHz	16,420 KHz	16,695.0 KHz

→ Remember to use the correct HF procedures
→ Don't forget your EPIRB is the secondary means of alerting

Urgency

An Urgency message known as a Pan Pan Call.

"When the station has an urgent message to transmit concerning the safety of the ship, aircraft or person. It is used where there is no imminent danger to the ship or person and immediate assistance is NOT required.

Distress

Distress message is known as May Day call.

A distress call is the most serious level of emergency. It applies to any situation where a person is threatened by grave and imminent danger and requires immediate assistance.

9. Primary and secondary method of position fixing

This is the most important element for passage planning for safe navigation position fixing on each leg Primary and secondary method on Chart/ECDIS;

There should always be at least two method of position fixing.

It means that during position fixing we should avoid Error/Mistake whenever plotting position on Chart/ECDIS and plotting position should be checked by other source, primary with secondary method.

In open sea primary method of position fixing is GPS as we can't see fixed object in open sea to use other method of position fix and Secondary method we can use "Celestial fix"

In coastal navigation, where fix object is visible, primary method of fix position will be "Visual Fix" and Secondary Method "Radar Fix"

Main idea is that "Visual Fix is more priority in navigation than Radar Fix.

If In coastal verify Radar conspicuous Object so primary fix position will be “Radar Fix” and Secondary Method should be “GPS” fix position.

In this case “Radar Fix” is more priority in navigation than “GPS fix”

Normal order primary method position fixing in coastal navigation where posibile for reference.

Visual

Radar

GPS

Normal order primary method position fixing in open sea/ocean passage.

GPS

Celestial observetion/Fix

10. Various Position fix method and intervals

For passage planning most important element is position fixed interval.

There are many of position fixed method on chart or on ECDIS, some of which are:

1. -Celestial fix by using Sextant
2. -Visual fix
3. -Radar Fix
4. -GPS
5. -Parallel Indexing
6. -DR Dead reckoning
7. -By two/Three bearing
8. -LOP Line of position
9. -Running fix

- Frequency of position fixing, all navigation officer must use at least two methods as possible which can be rechecked, position are plotted correct/source giving are reading correct or not.

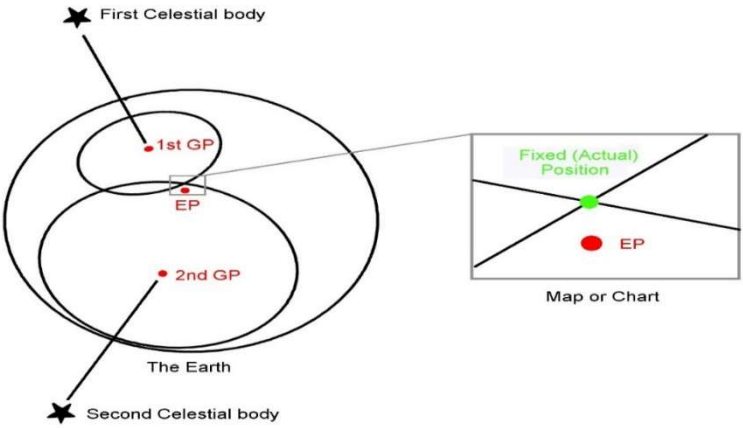
-Very important for navigation is that between of two plotting Position vessel do not have to reach dangerous point/area.

Basic Symbols for Position Fixing as follow for reference only

SYMBOL	DESCRIPTIVE LABEL	MEANING
	FIX	AN ACCURATE POSITION DETERMINED WITHOUT REFERENCE TO ANY PREVIOUS POSITION. ESTABLISHED BY VISUAL OR CELESTIAL OBSERVATIONS.
	FIX	A RELATIVELY ACCURATE POSITION, DETERMINED BY ELECTRONIC MEANS. THIS SYMBOL IS ALSO USED FOR A FIX WHEN SIMULTANEOUSLY FIXING BY TWO MEANS, e.g., VISUAL AND RADAR; SOMETIMES USED FOR RADIO/NAVIGATION FIXES, WITHOUT REFERENCE TO ANY FORMER POSITION.
	DR	DEAD RECKON POSITION. ADVANCED FROM A PREVIOUS KNOWN POSITION OR FIX. COURSE AND SPEED ARE RECKONED WITHOUT ALLOWANCE FOR WIND OR CURRENT.
	EP	ESTIMATED POSITION. IS THE MOST PROBABLE POSITION OF A VESSEL, DETERMINED FROM DATA OF QUESTIONABLE ACCURACY, SUCH AS APPLYING ESTIMATED CURRENT AND WIND CORRECTIONS TO A DR POSITION.

10.1. - Celestial fix by using sextant

Celestial Navigation is one of the oldest method for navigation, there are require navigators to use instrument which is calling Sextant, to find the angle between a Star/Planet and the horizon, by



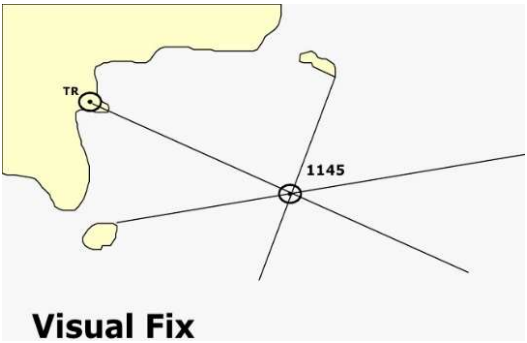
sextant altitude of celestial body. Navigators respective should know how to use almanac and Norie's nautical table.

(Almanac and Norie's table some pages for exercise purpose refer end of this book)

10.2. - Visual fix

A visual fix is one of the important method in navigation in order to verify and fix vessel's position, to fix position using compass with azimuth ring and taking bearing on two or more object same plotting on chart where there are crossing each other this is visual fix position of the vessel.

- Take at least two bearing on different fixed objects by repeater and plot on Chart/ECDIS where



there will crossed each other we can verify vessel's position actually on chart.

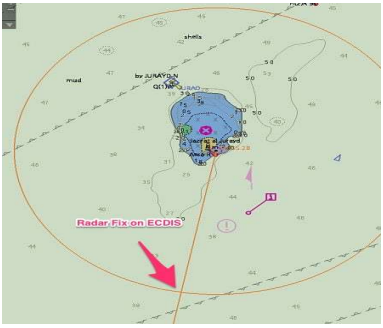
- Visual position can verify by Two/three or more bearing and on crossing point we will be getting own ships position.

Note- never take bearing on floating objects like Buoys, etc.

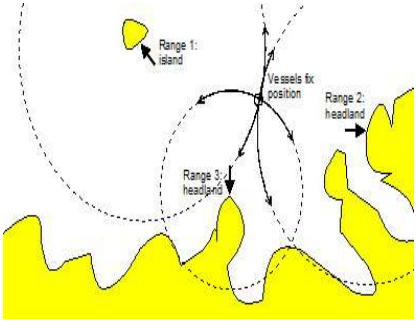
10.3. - Radar Fix

Radar fix position is using radar for position fixing which can verify on radar by using bearing line and distance, or two/three bearing, two/three range where there crossing each other, etc.,

Range and bearing



Three range fixed position.



An unestablished radar is the best when using three ranges to fix you position.

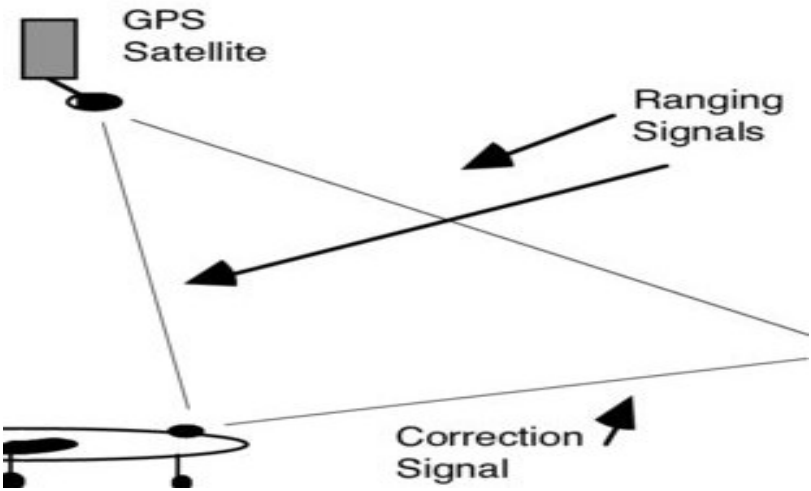
In case ECDIS fitted with radar overlay- then navigators can use with switching on function overlay and verify and plot directly from ECDIS radar fix position.

10.4. - GPS

The global navigation satellite system (GNSS) positioning for receiver's position is derived through the calculation steps, or algorithm, given below. In essence, a GNSS receiver measures the transmitting time of GNSS signals emitted from four or more GNSS satellites (giving the pseud orange) and these measurements are used to obtain its position.

Actually now days, normally at sea vessel's using GPS, still other systems are under constructions.

GPS normally using WGS-84 Datum.



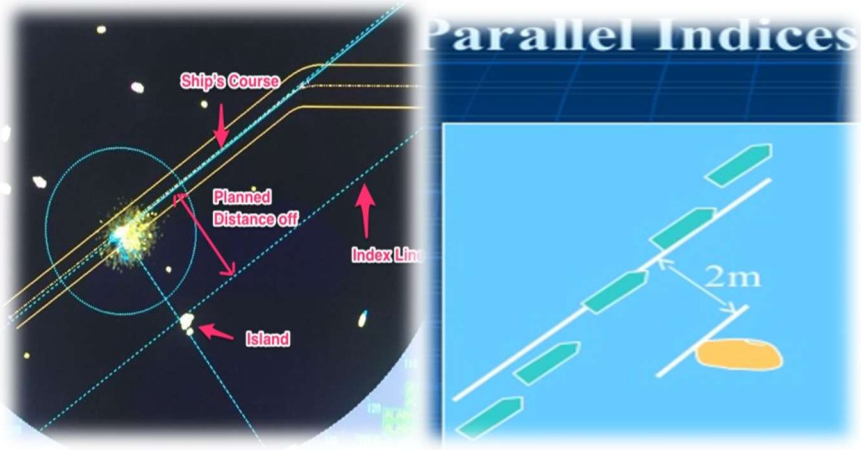
- **Sources of Error in GPS**
  - **Obstructions -** Buildings & Tunnels, Metallic Structures, Dense Foliage, Terrain
  - **Environment -** Atmosphere & Weather (minor effects)
  - **Selective Availability -** Intentional errors by DoD (disabled May 1, 2000)
  - **Multipath -** GPS signals reflect off of structures causing timing errors

DGPS (Differential **GPS**) is essentially a system to provide positional **corrections** to **GPS signals**. DGPS uses a fixed, known position to adjust real time **GPS signals** to eliminate pseud orange errors. An important point to note is that DGPS **corrections** improves the accuracy of position data only.

Whenever we are close to land or DGPS station we receive an additional correction signal from DGPS Station which make our position fix more accurate.

10.5. - Parallel Indexing

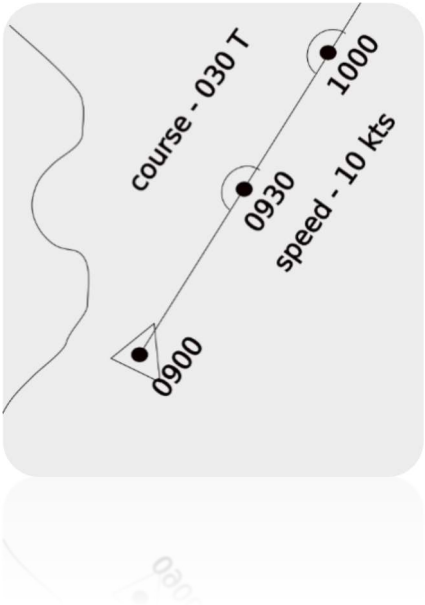
Parallel indexing is one of the important method used as a measure to monitor the progress of a vessel on the track and to minimize the cross track distance and to keep vessel at a safe distance from the shoreline or rock etc., Thus parallel indexing is a method to alert Mariner that he has come close to a navigational Hazard.



10.6. - DR Dead reckoning

In navigation, dead reckoning is the process of calculating one's current position by using a previously determined position, or fix, and

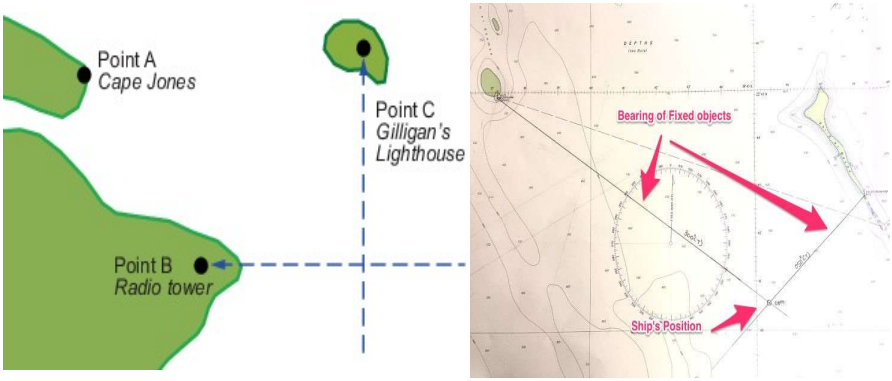
advancing that position based upon known or estimated speeds over elapsed time and course.



Note - whenever plotting position Dead reckoning should be take into consideration that factors such as wind, current and etc., which will effect mainly in navigation can't clarify properly if in plotting time we will not calculate, so we must be as much as possible and more carefully whenever using dead reckoning plotting position.

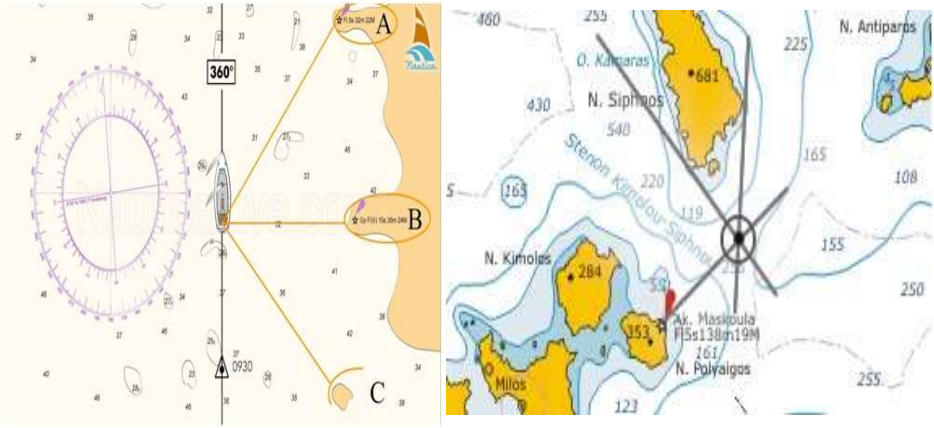
10.7. - Position Fixed by Two Bearing;

To plot the position by using bearings of two objects, take the bearings of both the objects simultaneously. Now draw the bearing of these objects on the charts. The point where these two bearings (position lines) where crossing will be the ship's position.



10.7. - Position Fixed by Three Bearing

When compass bearings are taken of three marks, where all three line crossing at one point when plotting on Chart/ECDIS this crossing point will be ship's position using by three bearing.

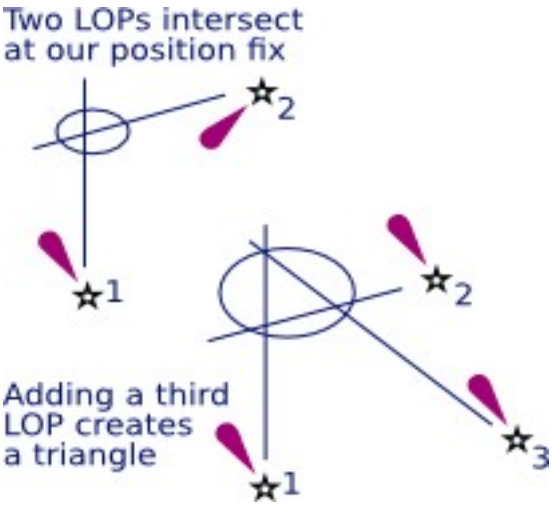


10.8. LOP Fixed

The use of LOPs of several navigational aids to obtain a position fix.

Line Of Position (LOP): we can use two/three LOP to fixed LOP fix position, for position fixing LOP using on ECDIS, if ECDIS is activating with Radar overlay we can directly take Two/Three LOP and fix position or we have to transfer data (Note down) from radar to ECDIS and plot LOP.

We can use for LOP fix position by two/Three Bearing or distance etc., to fixed position.



10.9. - Running Fix in Navigation

In this case it is possible to obtain a useful fix using two position lines taken at different times on the same mark, known as a navigational running fix or a transferred position line.

The sequence to plot a running fix for real is as follows.

1. Take the first bearing, note the time and log reading (distance run). Plot this first bearing on the chart.

2. Sail for a set time on a steady course, 1 hour is common.

3. At the end of the hour take a second bearing, note the time and log reading again.

4. Plot this second bearing on the chart.

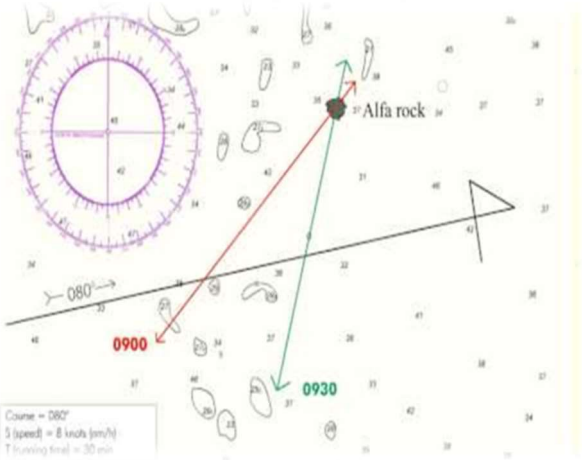
5. Chose any point along the first position line, and plot a line to represent the distance and direction the vessel has travelled (the Water Track). You can draw this line from any point on the first bearing because if you chose two different places on the bearing and plotted the water track they would both end on a line that is parallel to the first bearing.

6. At the end of this Water Track draw a line that represents the distance and direction that the tide has carried the vessel (the Tidal Vector).

7. Crossing the end of the Tidal Vector, plot a line parallel to the first position line, the vessel is now on this line. As it is also on the second position line where the two position lines cross is the vessel's position.

Running Fix / RF Position Problem/Exercise

Example steering 080 degree Speed is 8.0 Knots, take on Alfa rock bearing 045 Degree and plot on the chart at 0900 hours local time, after 30 minutes at 0930 hours local time take new bearing on same Alfa rock 15 degree and plot on chart, so now calculate distance vessel sailed from 0900 to 09:30 hour Local Time.



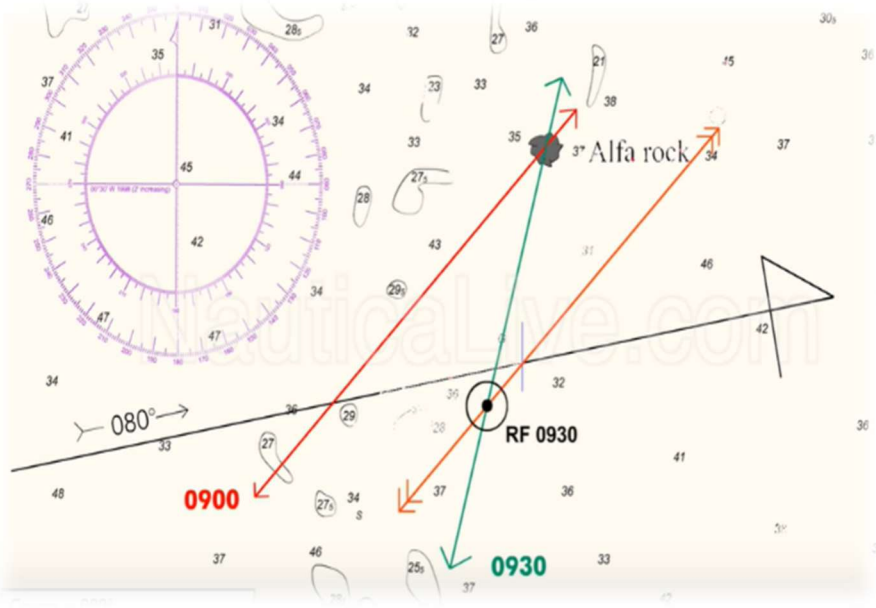
There is formula **D=S X T / 60**

D is distance in nautical miles.

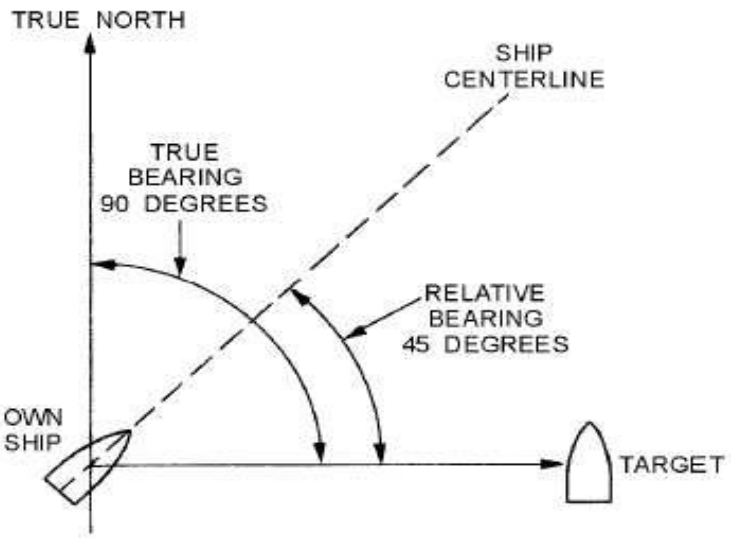
S is Ship's speed

T is time in minutes

Calculation; **D= S 8 Knots x 30 T minutes / 60 minutes,** D is equal **4.0** Nautical Miles. Measure on chart Lat scale 4 nautical mile and mark on chart 4.0 Nautical mile. From 09:00 hour Local Time use the parallel and transfer LOP where this second bearing and transfer LOP crossing each other's we are getting running fix RF position use by one fixed object.



11. True and Relative Bearing



In Navigation relative bearing is angle clockwise from vessel's heading to object.

In navigation True bearing is angle which is measured clockwise from true north.

This case vessel's heading is 45 degree, relative bearing is 45 degree on target and true bearing is 90 degree as picture is shown.

There are simple formula for calculation true and relative bearing;

Convention of bearing.

True bearing=Relative bearing + True Heading

(Subtract 360 degree if sum is greater than 360 degree)

Example:

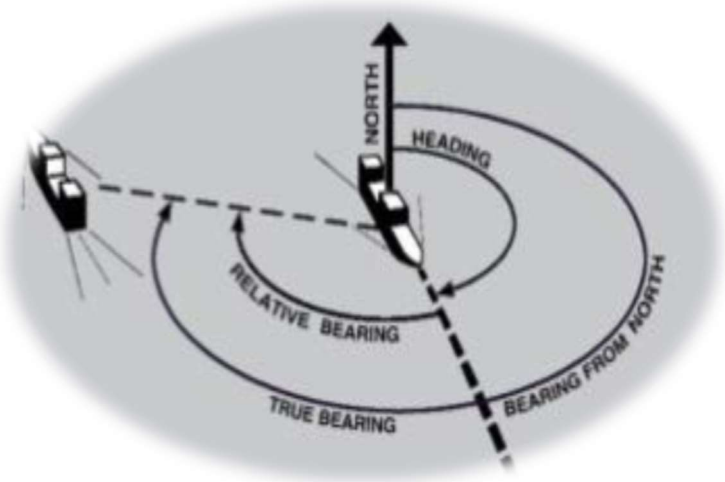
Relative bearing = 210 degree

True course= 250 degree

True bearing=460 degree

-360 degree

True bearing=100 degree



Relative bearing in navigation normally using for collision avoidance to verify location of target from own vessel.

Example we are sailing with heading 090 Degree on our starboard side noted buoy on bearing (Relative bearing) 135 Degree calculation true bearing

True bearing=Ship's heading + Relative bearing
True bearing=90+135
True bearing=225 Degree

We can calculate with same formula if we know True bearing and ships heading so calculation:
Relative bearing=True bearing-Ship's Heading
Relative bearing=225-090
Relative bearing=135 Degree

12. True Wind calculation

The pressure difference between two locations is called a pressure gradient.

The force that actually moves air as wind is called the pressure gradient force.

Example true wind calculation;

Wind Speed on anemometer-8.0 Knots on port side-100 degree

Vessel's course-108 degree

Vessel's Speed-11.0 knots

Take chart and on compass rose draw 108 degree direction our vector/Course and measure 11.0 Nautical mile as vessel speed is 11.0 Knots and give name example point (A)

When wind on anemometer is from port side so our course is 108 degree, minus 100 degree

We are getting 008 degree vector on compass rose mark direction of vector and point (B) on 8.0 Nautical mile from compass rose.

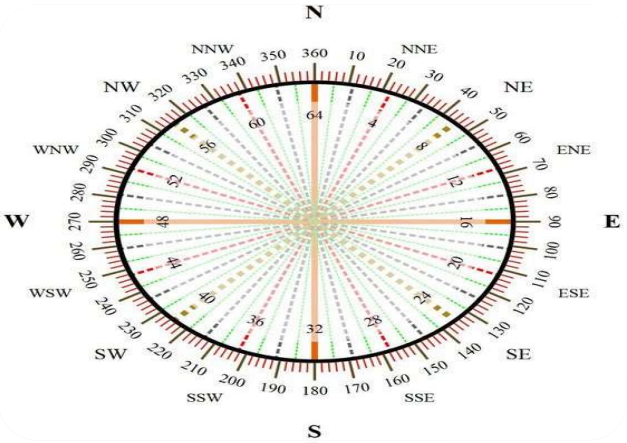
Now true wind vector join from point (B) to Point (A) and transfer this vector parallel by ruler to center of compass rose and check degree direction of true wind and calculate by divider how much true wind speed, we are getting around 135 degree true wind coming from NW and Speed 14 Knots.

When on anemometer that is from starboard side this case course plus anemometer reading in degree.

- Direction of wind calculated from 0-360 Degree
- Normally at sea saying that wind flowing to compass
- On board the vessel have normally fix anemometer or manual anemometer
- In case we have calculated in meter second we have to convert in knots so 1 Knots equal to 0.5144 meter per second (mps)
- Example 29 knots = 15 mps

After calculation we can use normal beau fort scale to check wind force as bellow sample;

Compass rose for reference only



The Beaufort Scale

This scale of wind speeds devised in 1805 by Sir Francis Beaufort is still in use today.

Force	Speed		Conditions
	knots	km/h	
0	<1	<1	Calm, sea like a mirror.
1	1-3	1-5	Light air, ripples only.
2	4-6	6-11	Light breeze, small wavelets (0.2m). Crests have a glassy appearance.
3	7-10	12-19	Gentle breeze, large wavelets (0.6m), crests begin to break.
4	11-16	20-29	Moderate breeze, small waves (1m), some white horses.
5	17-21	30-39	Fresh breeze, moderate waves (1.8m), many white horses.
6	22-27	40-50	Strong breeze, large waves (3m), probably some spray.
7	28-33	51-61	Near gale, mounting sea (4m) with foam blown in streaks downwind.
8	34-40	62-74	Gale, moderately high waves (5.5m), crests break into spindrift.
9	41-47	76-87	Strong gale, high waves (7m), dense foam, visibility affected.
10	48-55	88-102	Storm, very high waves (9m), heavy sea roll, visibility impaired. Surface generally white.
11	56-63	103-118	Violent storm, exceptionally high waves (11m), visibility poor.
12	64+	119	Hurricane, 14m waves, air filled with foam and spray, visibility bad.

Wave heights quoted are approximately those that may be expected in the open sea. In enclosed waters the waves will be smaller and steeper. Fetch, depth, swell, heavy rain and tide will also affect their height, and there will also usually be a time lag between any increase in the wind and the consequent increase in the sea.

13. Set and Drift

The term "Set and Drift" this is the external forces which is effect the vessel and deviating from intending true course which vessel is steer, this means that external factors affecting on vessel pushing various side or direction and we have to deeply clarify as navigator about this problem. Starting time we have to understand what is the current? What is the ocean current, ocean current is horizontal movement of water movement from one place/Location to another.

This is happening by: meteorological effect, wind, temperature different, etc.

Marines all times must be monitor set and drift in navigation. **Set is the current direction.**

Drift is current speed.

With simple explanation if vesel speed is 9.0 knots through the water traweling with same direction of current 2.0 knots, then speed over ground is 9.0 knots + 2.0 knots and vessel's true speed is 11.0 knots.

The speed of the vessel and speed of the current can be added or subtracted from each other.

14. Exercise Set and Drift CMG, SMG, DR

The steps for using a chart to fix your position, determine the dead reckoning, finding set and drift, course made good, and speed made good.

Fixed your position on chart at 0700 Hours Local Time, Course 090 Degree True,

Speed 5.0 Knots.

We need to verify at 0745 Hours local time vessel's position as Dead Reckoning (DR) Position?

D=S x T/60

D=5 Knots X 45 / 60

D=3.75 Nautical Mile

We verify from departure last known position from 0700 Hours Local time vessel travel to 3.75 Nautical Mile.

This DR position we can mark on chart at 0745 hour Local time.

As we have plotted DR Position at 0745 hours local time same time we have fixed actual by other method used example Visual, Radar, GPS, Etc., and plotted on chart at 0745 hours local time, Now we

have got that really vessel position and found different between DR and actual plotting fixed position at 0745 hours local time, this case have to join position from DR to new position and check this direction on compass rose found direction is 161 Degree this is calling **"Set"** distance from DR to new position we can measure and found **"Drift"**

Formula; S=D/T S=1.2/0.45 S= 1.2/0.75 S=1.6 Knots

Set all times in degree and drift all times knots;

Set=161 Degree

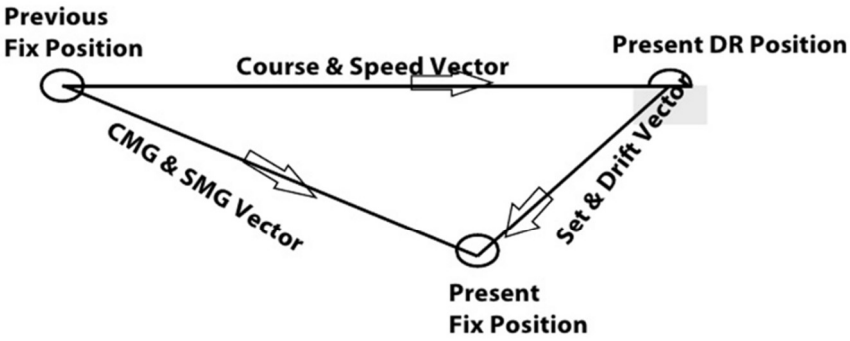
Drift=1.6 knots

Now we can found how actually vessel travels on which direction we can connect first fixed position which we plotted at 0700 hours local time to last fixed position which we fixed from one of the source on chart and check direction on compass rose, we can verify Course Made Good "CMG" this case 107 degree, next we can verify Speed Made Good "SMG" how fast we actually travel measure distance on this leg from 0700 to 0745 hours local time this found D=4.4 Nautical Miles.

Formula; S=D/T S= 4.4 / 0.75 S= 5.8666 Knots SMG = Around 5.9 knots

CMG=107 degree

SMG=5.9 Knots



Actual Current Triangle

Simple dead reckoning calculation;

Calculate dead reckoning first of all plot/fix position with time 1000 hours local time by some source example use Visual, Radar, GPS etc.,

-We know our speed example 10.0 knots

-We know our course is 145 Degree true

-We have to verify vessel's position by dead reckoning at 1045 hours local time?

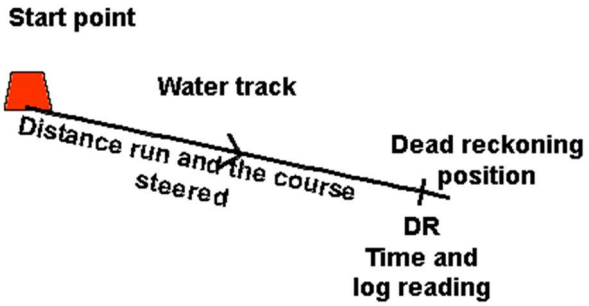
So we will draw course from our fix position 145 degree true,

We will calculate distance how much vessel can passed in 45 minutes as formula

D=S x T/60 D=10x45/60 D=7.5 Nautical Mile

We will measure start point distance from 1000 hours local time and fix position (DR) to 7.5 nautical mile with time 1045 Hours Local time on our Leg.

Picture for reference purpose only



15. Passage Plan, ECDIS Safety Settings

Passage planning / voyage planning is procedure to develop a complete description of a vessel's voyage from start to finish. The plan includes leaving the dock and harbor area, the en route portion of a voyage, approaching the destination, and mooring, the industry term for this is 'berth to berth'.

Everyday mariners are planning deep sea voyages along major trade routes, sometimes under harsh weather conditions, ice hazards and other environmental features. This is another article in our Bridge Procedure Series, aiming to give bridge crews and shore based staff a greater understanding of an efficient passage planning across the busiest trade routes and new route additions.

There are 4 actual stages to be followed when preparing a passage plan

1st stage: Appraisal

2nd stage: Planning

3rd stage: Execution

4th stage: Monitoring

1st stage: Appraisal

Appraisal is the initial process during which the risks are identified and assessed, to ensure that the vessel passage plan is safe. Amongst the factors that should be considered during the appraisal of a passage plan is navigation, berthing requirements, mooring and tug operations, port entry requirements, security and anti-piracy measures, strength and stability, MARPOL Special Areas, national or regional requirements, passage plan amendments etc.

2nd stage: Planning

There should be undertaken a planning for any one section of the vessel passage plan using either all electronic or all paper charts rather than a mixture of chart types. Whether planning using paper chats or ECDIS, the plotting of the route should follow established conventions and include the pilotage phase, the ocean phase and coastal phase.

3rd stage: Execution

During this stage it is recommended that the Bridge Team get in touch with the passage plan and make sure that the ship would navigate in accordance with the developed plan. Moreover, there should be taken some actions, as long as the ship departs. Firstly, the speed should be adjusted based on the ETA and the expected weather and oceanographic conditions, in order to be on time at its port of destination. Additionally, there must be taken into account the availability of water and fuel on board, for the prevention of any shortage during the voyage. In case the ship uses ECDIS, there must be set the appropriate limits regarding the safety settings.

4th stage: Monitoring

It takes part throughout the voyage trying to check the position of the vessel, to ensure that it remains within the safe distance from any danger areas. The voyage is always safer when there is conducting a continuous monitoring of the ship's progress along the pre-planned schedule. In case of any emergency situation, if the navigation officer

feel it is necessary to deviate from plan, he should inform the master and take any action he think is better for both the ship and its crew. As in this stage of vessel passage plan all deck officers contribute their part in the plan, they must indicate personal characteristics such as good seamanship, experience and personal judgement.

15.1 ECDIS Safety Settings

The ECDIS today is one of the important system on board for navigation, at least on board there are two independent ECDIS, some of vessel we can find Except Two additional ECDIS as it will be provide for passage planning purpose (Working ECDIS) important thing is that each leg should be set parameters as it calls ECDIS settings which is verify during passage plan by Navigation officer with Master before voyage will start, there are main four Setting, which are Calling; **Shallow Contour, Safety Contour, Safety depth, Deep Contour.**

This setting during voyage as per passage plan will change with permission of master and follow as require.

Different shipping company has mainly same setting requirement as it is minimum standard requirement, but we can find out some company where there making setting more than basic requirement (Meaning increasing settings on best side) purpose to avoid in some circumstances critical situation that was not late attention and all navigation officer to be in advance attack attention in time by alarm or warning signals which will appears/ (give us) ECDIS due to crossing or approaching some of the inserted contours in ECDIS to pay attention and act accordingly.

Shallow Contour; This setting does not trigger the alarm on ECDIS it is normally equal the ship's static draft or it can be set less than draft where vessel on this setting can run aground.

Safety Contour, Safety Depth; This setting (Safety Contour) give alarm warning signal on ECDIS this is the meaning that vessel entering this Contour, This setting is calculated as safety depth we can say and can enter same value for safety depth, where vessel with her static draft can

navigate safely, that setting we can call also maximum calculation draft.

Safety Contour, Safety Depth=Vessel draft (Static Draft) + squat+ allowance external factors (Wind age + Trim + Heel, Etc.) + (Company UKC Policy).

Note; One of the important point is for calculation of Safety Contour, Safety Depth, if calculated value is less than Static Draft + CATZOC so in this case take consider for inserting ECDIS setting Safety Contour, Safety Depth will be value (Static Draft + CATZOC) Only.

Deep contour; this setting does not trigger the alarm on ECDIS, setting can set twice of maximum calculation draft of the vessel or four times of maximum calculation draft, some of the company has requirement that deep contour setting to set as maximum calculation depth of water where vessel can anchor safely.

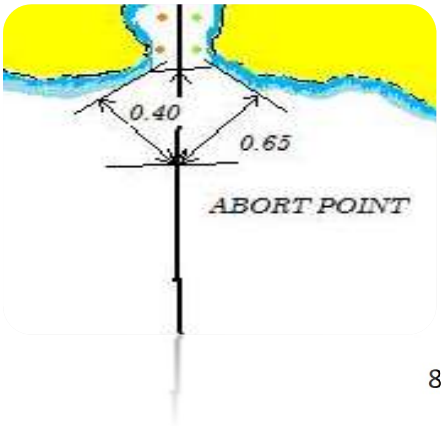
16. Abort Point

Abort Point, Contingency anchorage, Anchor swinging circule, Wheel over point, No Go Area.

During passage plan one of the important element is abort point which should be plan in advance and marked accordingly on the chart/ECDIS same should be mention in passage plan.

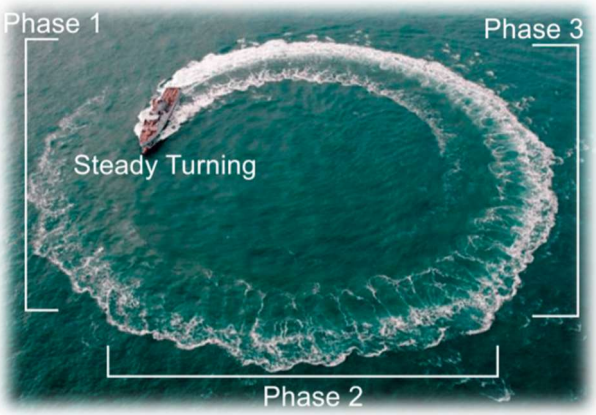
Abort point normally used before entering port channel congested waters etc., that is depends safe sea room, safe depth of water, where vessel can turn back from last know position which will be calculated in advance.

There are for all vessel's maneuvering characteristic which is normally display on the bridge (Wheelhouse) where we can find in ballast or laden condition how much sea room require for vessel to turn back on various speed, abort point calculation recommended on worse condition.

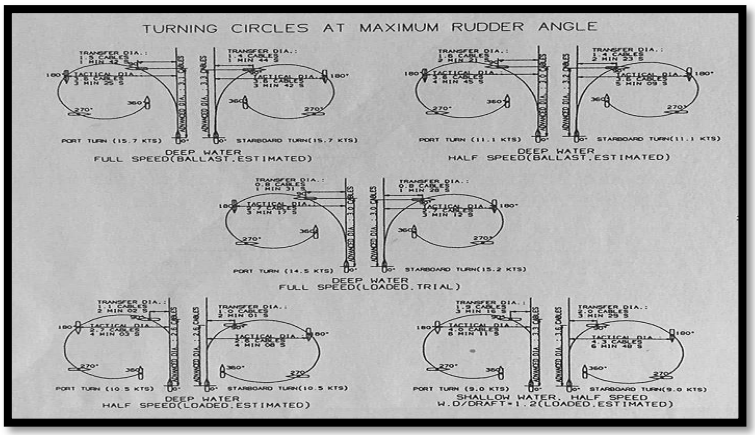


Abort point is the position/Point where after this point there is not sufficient sea room for the vessel to turn around and return back.

Turn For reference only;



Picture turning circles looks as shown for reference



16.1 Contingency anchorage;

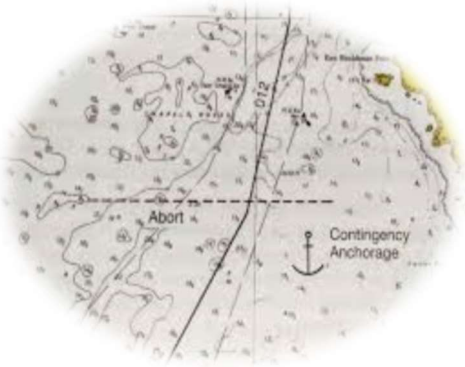
One of the important element during passage planning is contingency anchorage, contingency anchorage is the same as abort point should be mark on chart and same must be mention in passage plan.

During passage can be use many of contingency anchorage.

Contingency anchorage normally verify and marked on chart in channel entering port congested water, navigation in TSS, Etc.,

Purpose for contingency anchorage mainly is in case of engine failure, black out, Etc., that vessel can safely anchor during voyage.

Picture contingency anchorage for reference



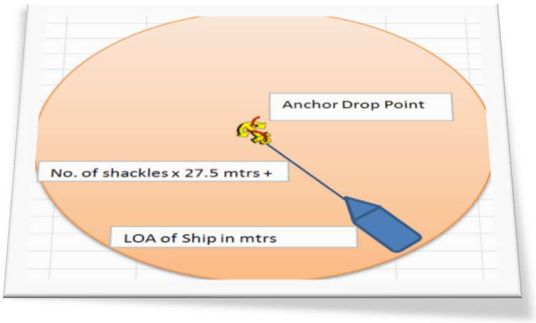
Contingency anchorage is the safe anchorage place where vessel can anchor safely during the Voyage/Maneuvering.

According vessel's dimension all vessels' have their characteristic about the how many shackles safely can use in ballast or laden condition, this is depends of many factors, example; Capacity of winch, time movement of anchor system, due to many factors calculation making safe side in worse case maximum water depth for safe anchorage.

16.2 Anchor swinging circule

In advance, planning to anchor and after drop anchor should be calculate swinging circule where vessel safely can swing around the anchor due to changing current direction, wind, Etc., there is simple formula to calculate swinging radius.

Picture for reference only.



Swinging Circle/Radius =

No.Of shackles x Length of shackle + Vessel's length over all (LOA)

Example-Exercise:

No. Of Shackles Used – 5

Normally one shackle=27.5 meters

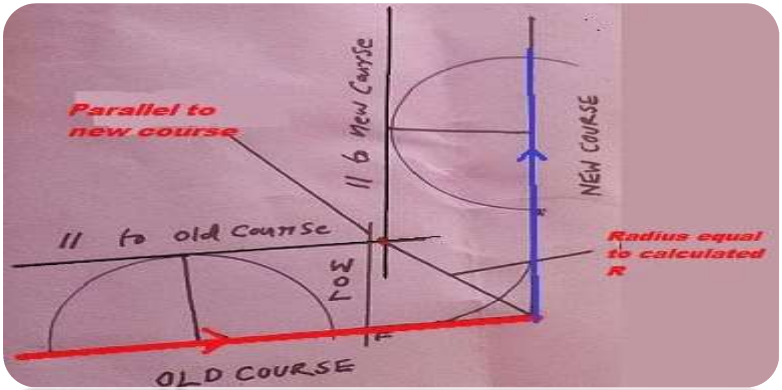
Taken this case LOA-183 meters

5 x 27.5 + 183 = 320.5 meters

To convert in cable 320.5 / 185.0 = 1.73 cable will be swinging circle from ship's anchor drop position.

16.3 Wheel over point; During passage plan should be pay attention wheel over point, this is one of the important element during passage planning during drawing the course that vessel do not move in dangerous or shallow water when vessel altering course to join next course/Leg safely.

Pictures is only for reference



Wheel over point is the point where vessel can start turn to join next course safely, especially must be take into account when there is major alteration of course.

There is formula to calculate wheel over point

Radius = average speed x 0.96 /ROT

Where 0.96 is fix value

Where ROT and speed can be taken as per the Particular ship's maneuvering characteristics and speed in advance we know as per charterer's request and Master's decision.

Introduction of one of the marking wheel over point is as follows:

1. Measure by divider radius as per formula and draw one arc old and one arc on new course from point of alteration course around on distance around one nautical mile depends of leg length.

2. Make parallel line one from old course and one on new course on that point where arc is rounded off.

3. We are getting center of new and old course where this parallel line crossing each other and by divider measure distance will be same make new arc this arc will touch one old and one new course

4. Now on old course where arc is touch add our ship's LOA we and mark point.

5. Transfer from new course parallel line on marking point which is wheel over line "WOL"

Exercise;

Radius = average speed x 0.96 / ROT
Radius=13 x 0.96 / 20
Radius=0.624 Nautical Mile

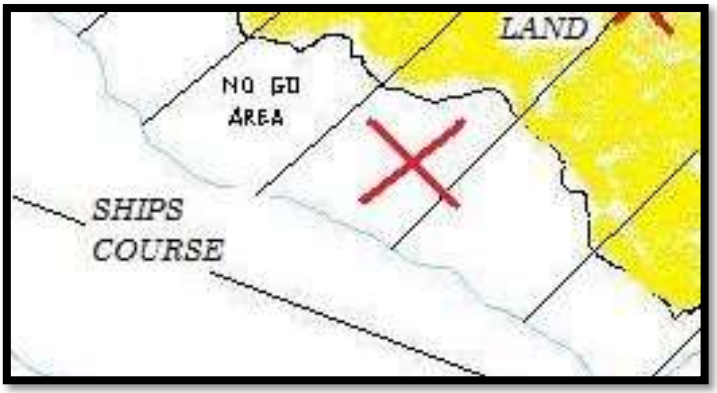
16.4 NO GO AREA

One of the important element during passage planning is to draw on chart NGA.

No go area is the water/place/area where vessel do not have to go due to shallow water or place where not safe navigable water.

During passage plan we have to calculate safe water for vessel in ballast or laden condition and accordingly we can verify safe water depth and consider which will be NGA.

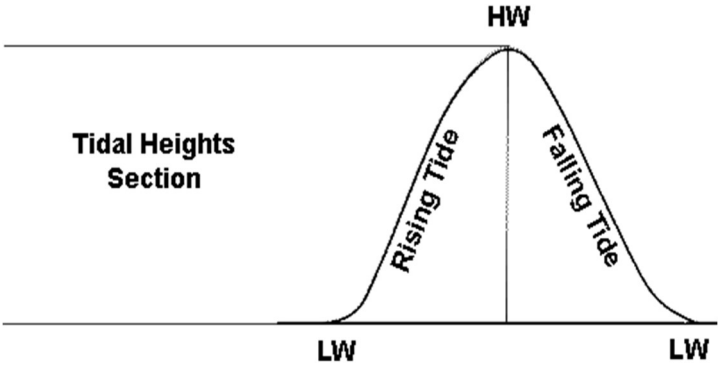
Picture shown NGA for reference



17. Introduction of Tide

Tide is the periodical rise and fall in the level of seas.

In navigation middle of ocean there are large depth of water and tide range is small, horizontal movement of water is very small.

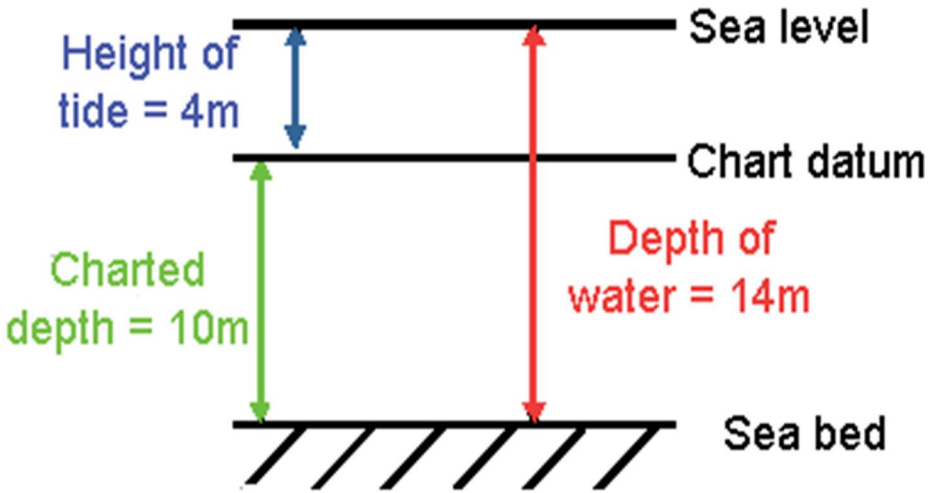


There are high tide and low tide which in navigation call tidal range.

Today in marine industry for navigators' provide ATT (admiralty tide table) where we can found easily every hours where applicable tidal stream tide level and can calculate depth of water on various time and place, tide is important in navigation during under keel clearance calculation whenever

not enough depth of water as charted for safe navigation.

Picture shown example for reference

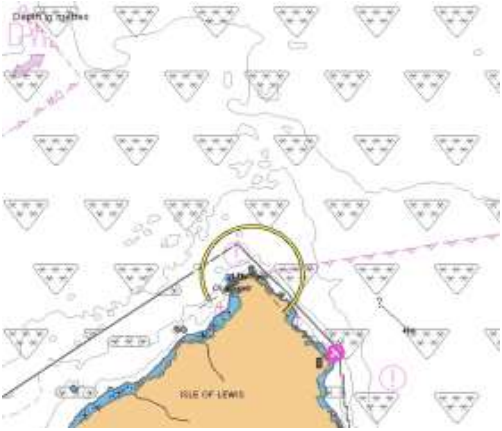


18. ECDIS work, CATZOC, abbreviations, Symbols

The ECDIS today almost for all vessel is primary purpose for navigation, one of the important element is that all navigation officer should know what is the CATZOC and how to calculate on different depth CATZOC;

CATZOC is accuracy of the chart.

Picture from ECDIS for reference only



During passage plan navigation officer must check CATZOC on each leg and verify with master if all legs complying with UKC policy under ZOC where vessel intending to pass/Navigate.

Picture for ZOC calculation reference

Zone of Confidence (ECDIS Symbol)	Position Accuracy	Depth Accuracy
A1 	5 Meters	0.5 Meters + 1% of Depth
A2 	20 Meters	1.0 Meters + 2% of Depth
B 	50 Meters	1.0 Meters + 2% of Depth
C 	500 Meters	2.0 Meters + 5% of Depth
D 	More than 500 Meters	More Than 2.0 Meters + 5% of Depth
U 	Not Assessed	Not Assessed

On ECDIS this function during normal navigation is off, but whenever requested all bridge team personal should be know how to check and get on. all navigators before takeover/handing over watch should make sure there are safe navigable water on planning course/ahead, calculation for UKC should be base on ZOC or squat with company policy whichever is greater.

Example ecdis picture is showing when ZOC is on in this area with 5 Star where we are indtending to pass water depth is 12.0 meteres we have to calculate ZOC on pointed depth.

1+(12x2%)=1.24 Meters

ZOC=1.24 Meters

one of the important thing in navigation is that at all time on ECDIS msut be set compliance scale for safe navigation, scale frequanctly must be check by duty officer and make sure following procedure.

Scale for reference on ECDIS

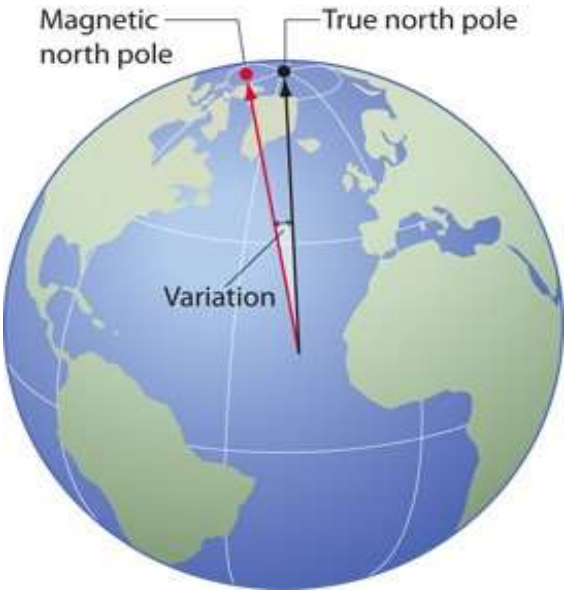
Usage Band	Name	Scale Range	Available Compilation Scales
1	Overview	<1:1499999	3000000 1500000
2	General	1:180000 – 1:1499999	700000 350000 180000
3	Coastal	1:45000 – 1:179999	90000 45000
4	Approach	1:22000 – 1:44999	22000
5	Harbour	1:4000 – 1:21999	12000 8000
6	Berthing	> 1:4000	4000 and larger

Abbreviations for seabed as follows

CHART SEABED ABBREVIATIONS		
Bottom Type	**Bottom Texture**	**Color/Contrast**
S—Sand	*f* or *fne*—fine	*wh*—white
M—Mud	*bk* or *brk*—broken	*bl* or *bk*—black
Cl or *Cy*—Clay	*sy* or *stk*—sticky	*bu*—blue
Sh—Shells	*so* or *sft*—soft	*gn*—green
Grs—Grass	*h* or *hrd*—hard	*yl*—yellow
K—Kelp		*gy*—gray
Rk or *Rky*—Rocky		*br*—brown
Co—Coral		*lt*—light
Co Hd—Coral Head		*dk*—dark
Blds—Boulders		
Oys—Oysters		
Ms—Mussels		

19. Magnetic Variation

Magnetic variation, is the angle on the horizontal plane between magnetic north and true north. This angle varies depending on position on the Earth's surface and changes over time.



To **find** the **variation** for any given year we need the **variation** from the compass rose and the year for which it was correct, then add or subtract the annual change. This would be rounded up or down to the nearest whole degree for practical use.

Example: if variation is calculated for year 2015 15 degrees West annual change

0 Degree.6 minutes east.

So magnetic variation 2019 is 14.6 Degree West

Annual Changes as Follows;

2015	15.0 W
2016	14.9 W
2017	14.8 W
2018	14.7 W
2019	14.6 W
2020	14.5 W

Magnetic Deviation;

It refers to the error in a **compass** reading induced by nearby metallic objects, such as iron on board a **ship,**

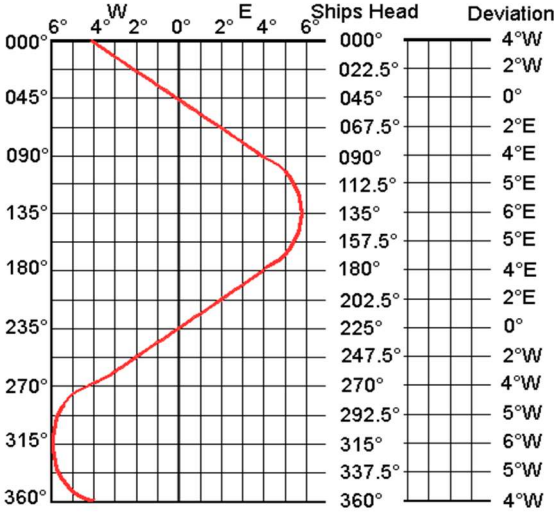
Compass Deviation is caused by local **magnetic** effects. On **ships** the difference between North indicated by the **compass**, "**Compass** North" and "**Magnetic** North" (i.e. the

direction of the **Magnetic** North Pole) is called **Deviation**.

Magnetic deviation is different for different ships.

On same ship on different heading deviation will be different.

Sample for deviation card on board.



This is calculated for every vessel and available on board, deviation card different for every vessel.

For vessel Calculated yearly on board by ships staff and by shore service will be carried out

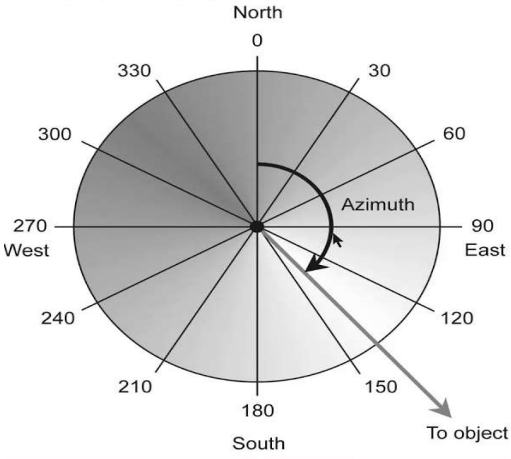
calculation as major different will be pointed actual calculation time.

Local Magnetic Anomaly;

Magnetic anomaly is a local variation in the Earth's magnetic field resulting from variations in the chemistry or magnetism of the rocks.

20. Azimuth, LHA, GHA, Declination

This is the direction of a celestial object, measured clockwise around the observer's horizon from north. So an object due north has an **azimuth** of 0°, one due east 90°, south 180° and west 270°.



Azimuth is measuring on compass using azimuth circle from north 000 degree to 360 Degree.

20.2 Local Hour Angle (LHA)

Local Hour Angle or LHA is the angle between an observer and celestial body measuring westwards.

LHA = GHA + Longitude (When observer is at East of Greenwich meridian)

LHA= GHA- Longitude (When observer is at west of Greenwich meridian)

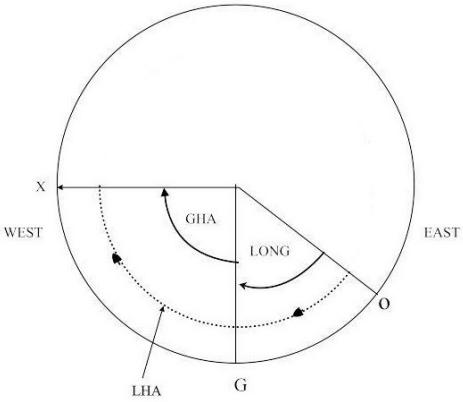
Where;

O is observer.

G is Greenwich

X is Celestial Body

20.3 GHA OF CELESTIAL BODIES;



GHA Is the Greenwich Hour Angle of celestial body. It is the angle between Greenwich meridian and the meridian of celestial Object measuring westwards.

Only measuring to direction of clockwise

POSITION OF A CELESTIAL BODY IS ITS DECLINATION AND GHA IN CELESTIAL SPHERE, JUST LIKE WE ARE USING LATITUDE AND LONGITUDE ON CELESTIAL SPHERE.

20.4 DECLINATION OF CELESTIAL BODIES;

In astronomy, declination is one of the two angles that locate a point on the celestial sphere in the equatorial coordinate system, the other being hour angle. Declination's angle is measured north or south of the celestial equator, along the hour circle passing through the point in question.

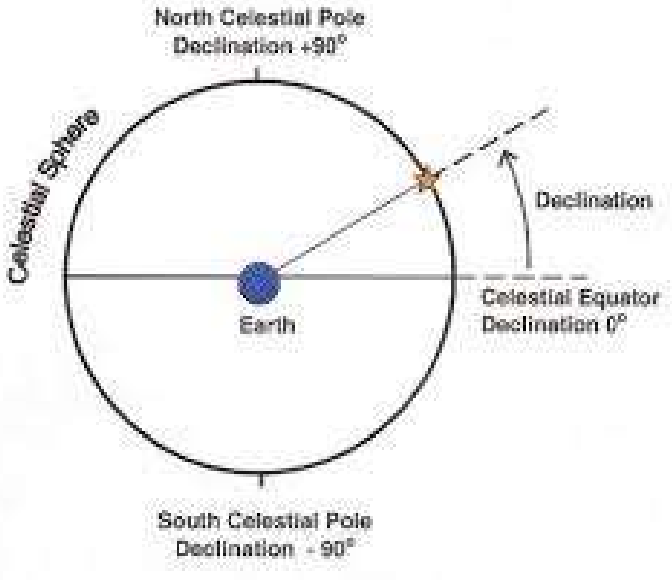
Declination of celestial bodies is the angle at the center of celestial sphere between the equinox and celestial body. It is nothing but **Latitude of Celestial body in celestial sphere.**

21. Compass error calculation

Compass error can be determining from mainly three methods

1) By Azimuth of Celestial Bodies
2) By Amplitude of Celestial Bodies
3) By Bearing of known shore objects

21.1 AZIMUTH OF CELESTIAL BODIES



Sun, Moon, Bright stars, Venus, Mars are usually using for finding compass error.

Step by step procedure:

Step 1

Take the Azimuth of celestial body from your gyro compass by using Azimuth ring and note the time with accuracy of 1 second by using a stop watch. Note Position and heading of Gyro Compass and Magnetic Compass

Step 2

Find out the GHA and Declination of Celestial object from Nautical Almanac

Step 3

Find out LHA

LHA = GHA + Longitude (When observer is at East of Greenwich meridian)

LHA= GHA- Longitude (When observer is at west of Greenwich meridian)

Step 4

Enter norie's Table

Find out **A** by using LHA and your Latitude

(A is name N or S depending on your LHA and LATITUDE, named opposite to Latitude, Except when the L.H.A is between 090 and 270 degree

Find out **B** by using your LHA and Declination

(B is name N or S depending on Declination of celestial body, B is given same name as of declination.

C = A+B

If A and B have same name add both and give same name

If A and B have different name subtract least value from highest value and give the name of highest

After got C find out azimuth by using C and your latitude

Azimuth to name by using name of C and LHA

Prefix of Azimuth is North or south depending name of same as that of C

And Affix depend on LHA, name west if LHA is between 0-180 degree and name east if LHA is between 180-360 degree.

Example: S 80 E = (180-80) 100 degree

S 80 W = (180+80) 260 degree

Step 5

Compare between calculated and actual Azimuth. It is the value of compass error.

21.2 AMPLITUDE OF CELESTIAL BODIES

Amplitude is the azimuth of Rising and setting of Celestial bodies (True Zenith distance is 90 degrees)

There are many errors in Atmosphere itself, so measure the bearing when the object is half its Diameter above the Visible Horizon.

Note the Time

Find out the Declination

Then enter the table, True Azimuth of rising and setting can get from the tables. Apply correction to Azimuth according to the correction table

Name North or south depending on Declination, (Same name as declination)

Name East or west depending Rising or setting, for rising Name east and for setting name west.

21.3 BEARING

Bearing of light houses or shore objects can use for finding compass error. The best Shore object is Leading light, where its transit bearing is available on Chart.

1. On 5TH of July 2019 ,At position 16 19.3'N 054 13.0'W ,observed Azimuth of SUN using ships Gyro compass repeater port side was 073 degrees at GMT time 114103.Ship's Heading was and variation of the area marked on chart as follow,

Gyro heading = 081 (Gyro No 2)

Magnetic heading = 096

Magnetic variation =16 W on 2015

Annual change in variation = 00 01’ E

Find the Compass error and deviation?

GHA	343 51.4’
INC	010 15.8’
GHA	354 07.2’
LONGITUDE	054 13.0’ W
LHA	299 54.2
DEC	22 47.1’ N
D(-0.2)	00 0.1’
DEC	22 47.0 N

Steps as follows;

Almanac according date and time Almanac Increment and correction Pages Longitude Took from GPS

LHA=GHA+-Long (Depends on Long Direction)

“D” Correction for Dec. Almanac Increment and correction Pages (+-Depends D increasing or decreasing)

Dec = Dec+-D corrected declination.

A	0.17 S
B	0.49 N
C	0.32 N
AZIMUTH (VALUE+DIRECTION)	N 72.9 E
VALUEOF ZIMUTH	72.9

A Norrie's nautical table-A by LHA against Latitude

B Norrie's nautical table-B by LHA against Declination

C=A+B (A, B is different Sign Subtracted Smallest digit from biggest and give sign of biggest)

C Norrie's Nautical Table-C, Azimuth by C against Latitude

Name azimuth north or south according to the name of C (Same name of C)

East or west Depending LHA (If LHA between 0-180 name West, If LHA is between 180-360, Name East.

2. On 5TH of July 2019 ,At position 56 12.62' N 022 52.7' W ,observed Azimuth of MOON using ships Gyro compass repeater starboard side was 279 degrees at GMT time 224103 .Ship's Heading was and variation of the area marked on chart as follow,

Gyro heading = 331 (Gyro No1)

Magnetic heading = 339

Magnetic variation =11 W, on 2015

Annual change in variation = 00 12' E

Find the Compass error and deviation?

GHA	104 07.2’
INC	009 47.7’
V (6.8)	000 4.7’
GHA	113 59.6’
LONGITUDE	022 52.7’ W
LHA	091 06.9’
DEC	15 55.2’ N
D(+10.2)	00 07.1
DEC	16 02.3 N

Almanac according date and time

Almanac Increment and correction Pages

V is given next to GHA and value of V to find from Increment and correction page.

(V correction always need to add to GHA)

Longitude from GPS

LHA=GHA+-Long (Depends on Long Direction)

“D” Correction for dec. Almanac Increment and correction Pages (+-Depends D increasing or decreasing) Dec = Dec+-D corrected declination

A	0.03 N
B	0.29 N
C	0.32 N
AZIMUTH (VALUE+DIRECTION)	N 79.9 W
VALUE OF AZIMUTH	280.1

A Norrie's nautical table-A by LHA against Latitude

B Norrie's nautical table-A by LHA against Declination

C=A+B (A, B is different Sign Subtracted Smallest digit from biggest and give sign of biggest) C Norrie's Nautical Table, Azimuth by C against Latitude

Name azimuth North or south according to the name of C (Same name of C)

East or west Depending LHA (If LHA between 0-180 named west, if LHA is between 180-360, Name East.

3. On 5TH of July 2019 ,At position 39 10.16' N 014 00' E ,observed Azimuth of SPICA using ships Gyro compass repeater port side was 175 degrees at GMT time 172244 .Ship's Heading was and variation of the area marked on chart as follow,

Gyro heading = 211 (Gyro No1)

Magnetic heading = 209

Magnetic variation =01 33 E, on 1995

Annual change in variation = 00 07' E

Find the Compass error and deviation?

GHA Aries	178 24.0'
INC	005 41.9'
GHA Aries	184 05.9'
SHA SPICA	158 26.8'
GHA SPICA	342 32.7'
LONGITUDE	014 00 E
LHA	356 32.7
DEC	11 15.7 S

Find the Compass error and deviation in almanac GHA of stars not given so find GHA of Aries and add

SHA of star to get GHA of star.

Almanac according date and time

Almanac Increment and correction Pages

Almanac Star Section

GHA Spica=GHA Aries+SHA Spica

Long Took From GPS

LHA=GHA Spica+ or – Long (depending of the direction) in this case + due to Longitude is East)

Dec in almanac star section.

A	13.6 S
B	3.28 N
C	10.32 S
AZIMUTH (VALUE+DIRECTION)	S 7.1 E
VALUE OF AZIMUTH	172.9

A Norrie's nautical table-A by LHA against Latitude

B Norrie's nautical table-A by LHA against Declination

C=A+B (A, B is different Sign Subtracted Smallest digit from biggest and give sign of biggest)

C Norrie's Nautical Table, Azimuth by C against Latitude

Name azimuth north or south according to the name of C (Same name of C)

East or west Depending LHA (If LHA between 0-180 name

West, If LHA is between 180-360, Name East.

4. On 5TH of July 2019 ,At position 07 35.6' N 104 40.4' W ,observed Azimuth of DUBHE using ships Gyro compass repeater starboard side was 337 degrees at GMT time 023056 .Ship's Heading was and variation of the area marked on chart as follow,

Gyro heading = 187 (Gyro No2)

Magnetic heading = 176

Magnetic variation = 07 W, on 2015

Annual change in variation = 00 05’ E

Find the Compass error and deviation?

GHA Aries	312 47.0’
INC	007 45.3’
GHA Aries	320 32.3’
SHA DUBHE	193 47.0
GHA DUBHE	154 19.3
LONGITUDE	104 40.4 W
LHA	049 38.9
DEC	61 39.1 N

Almanac according date and time

Almanac Increment and correction Pages

Almanac Star Section

GHA Dubhe=GHA Aries+SHA Spica

Long Took From GPS

LHA=GHA Dubhe+ or – Long (depending of the direction) in this case -due to Longitude is West)

Dec in almanac star section

A	0.12 S
B	2.46 N
C	2.34 N
AZIMUTH (VALUE+DIRECTION)	N 23.3W
VALUE OF AZIMUTH	336.7

A Norrie's nautical table-A by LHA against Latitude

B Norrie's nautical table-A by LHA against Declination

C=A+B (A, B is different Sign Subtracted Smallest digit from biggest and give sign of biggest)

C Norrie's Nautical Table, Azimuth by C against Latitude Name azimuth north or south according to the name of C (Same name of C)

East or west Depending LHA (If LHA between 0-180 name West, If LHA is between 180-360, Name East

5. On 5TH of July 2019 ,At position 02 14.3'S 034 54.0'W ,observed Azimuth of SUN using ships Gyro compass repeater port side was 065 degrees at GMT time 093800.Ship's Heading was and variation of the area marked on chart as follow,

Gyro heading = 094 (Gyro No 2)

Magnetic heading = 110

Magnetic variation =20 W on 2015

Annual change in variation = 00 03' E

Find the Compass error and deviation?

GHA	313 51.6'
INC	009 30.0 '
GHA	323 21.6'
LONGITUDE	034 54.0 W
LHA	288 27.6
DEC	22 47.6 N
D(-0.2)	00 0.1
DEC	22 47.5 N

Almanac according date and time

Almanac Increment and correction Pages

Longitude Took from GPS

HA=GHA+-Long (Depends on Long Direction)

"D" Correction for dec. Almanac Increment and correction Pages (+-Depends D increasing or decreasing)

Dec = Dec+-D corrected declination.

A	0.01 N
B	0.45 N
C	0.46 N
AZIMUTH (VALUE+DIRECTION)	N 65.3 E
VALUE OF AZIMUTH	65.3

A Norrie's nautical table-A by LHA against Latitude

B Norrie's nautical table-A by LHA against Declination

C=A+B (A, B is different Sign Subtracted Smallest digit from biggest and give sign of biggest)

C Norrie's Nautical Table, Azimuth by C against Latitude

Name azimuth North or south according to the name of C (Same name of C)

East or west Depending LHA (If LHA between 0-180 name

West, If LHA is between 180-360, Name East

6. On 8TH of July 2019 ,At position 26 08.3'N 037 36.7'W ,observed Amplitude of Setting SUN using ships Gyro compass repeater port side was 295 degrees at GMT time 212400.Ship's Heading was and variation of the area marked on chart as follow,

Gyro Heading = 060 (Gyro No 2)

Magnetic heading = 0722

Magnetic variation =13 W on 2015

Annual change in variation = 00 07' E

Find the Compass error and deviation?

Dec	022 25.60 N
D(-0.3)	00 0.1’
Dec	022 25.50 N
AMPLITUDE (VALUE+DIRECTION)	N64.8W
VALUE OF AMLITUDE	295.2

Almanac according date and time

D” Correction for dec. Almanac Increment and correction Pages (+-Depends D increasing or decreasing)

Dec = Dec+-D corrected declination

Amplitude from Norie’s table (True azimuth at rising and setting)

Name amplitude north or south depending on name of declination (same Name) east or west depending whether it is rising or setting. (E if rising and west if setting)

22. The nautical almanac-2019 request pages for exercise

UT	ARIES	VENUS −3·9		MARS +1·8		JUPITER −2·6		SATURN +0·1		STARS			
	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Name	SHA	Dec	
d h	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′		° ′	° ′	
3 00	280 43.8	191 34.8	N23 19.8	157 35.8	N21 09.5	25 01.9	S22 15.3	351 35.2	S21 56.4	Acamar	315 15.4	S40 13.5	
01	295 46.3	206 33.9	19.9	172 36.6	09.2	40 04.7	15.3	6 37.9	56.4	Achernar	335 23.8	S57 08.1	
02	310 48.7	221 33.1	20.0	187 37.4	08.8	55 07.4	15.3	21 40.5	56.4	Acrux	173 04.7	S63 12.6	
03	325 51.2	236 32.2	20.1	202 38.2	08.5	70 10.2	15.2	36 43.2	56.4	Adhara	255 09.7	S29 00.0	
04	340 53.7	251 31.3	20.3	217 39.0	08.1	85 12.9	15.2	51 45.8	56.5	Aldebaran	290 44.9	N16 32.7	
05	355 56.1	266 30.5	20.4	232 39.8	07.8	100 15.7	15.2	66 48.5	56.5				
06	10 58.6	281 29.6	N23 20.5	247 40.6	N21 07.4	115 18.4	S22 15.2	81 51.2	S21 56.5	Alioth	166 17.0	N55 51.7	
W 07	26 01.0	296 28.7	20.6	262 41.4	07.1	130 21.2	15.2	96 53.8	56.6	Alkaid	152 55.5	N49 13.4	
E 08	41 03.5	311 27.8	20.7	277 42.2	06.7	145 23.9	15.1	111 56.5	56.6	Alnair	27 38.2	S46 51.8	
D 09	56 06.0	326 27.0	20.8	292 43.0	06.4	160 26.7	15.1	126 59.1	56.6	Alnilam	275 42.5	S 1 11.5	
N 10	71 08.4	341 26.1	20.9	307 43.8	06.0	175 29.4	15.1	142 01.8	56.6	Alphard	217 52.3	S 8 44.6	
E 11	86 10.9	356 25.2	21.0	322 44.6	05.7	190 32.2	15.1	157 04.5	56.7				
S 12	101 13.4	11 24.4	N23 21.1	337 45.4	N21 05.3	205 34.9	S22 15.1	172 07.1	S21 56.7	Alphecca	126 07.2	N26 39.2	
D 13	116 15.8	26 23.5	21.2	352 46.2	05.0	220 37.7	15.0	187 09.8	56.7	Alpheratz	357 39.2	N29 11.6	
A 14	131 18.3	41 22.6	21.4	7 47.0	04.6	235 40.4	15.0	202 12.4	56.7	Altair	62 03.9	N 8 55.3	
Y 15	146 20.8	56 21.8	21.5	22 47.8	04.3	250 43.2	15.0	217 15.1	56.8	Ankaa	353 11.6	S42 11.9	
16	161 23.2	71 20.9	21.6	37 48.6	03.9	265 45.9	15.0	232 17.7	56.8	Antares	112 20.9	S26 28.4	
17	176 25.7	86 20.0	21.7	52 49.4	03.6	280 48.7	15.0	247 20.4	56.8				
18	191 28.2	101 19.2	N23 21.8	67 50.2	N21 03.2	295 51.4	S22 15.0	262 23.1	S21 56.9	Arcturus	145 51.8	N19 05.1	
19	206 30.6	116 18.3	21.9	82 51.0	02.9	310 54.2	14.9	277 25.7	56.9	Atria	107 18.4	S69 03.7	
20	221 33.1	131 17.4	22.0	97 51.8	02.5	325 56.9	14.9	292 28.4	56.9	Avior	234 17.0	S59 34.5	
21	236 35.5	146 16.5	22.1	112 52.6	02.2	340 59.6	14.9	307 31.0	56.9	Bellatrix	278 27.9	N 6 21.9	
22	251 38.0	161 15.7	22.1	127 53.4	01.8	356 02.4	14.9	322 33.7	57.0	Betelgeuse	270 57.2	N 7 24.5	
23	266 40.5	176 14.8	22.2	142 54.2	01.5	11 05.1	14.9	337 36.4	57.0				
4 00	281 42.9	191 13.9	N23 22.3	157 55.0	N21 01.1	26 07.9	S22 14.8	352 39.0	S21 57.0	Canopus	263 54.9	S52 42.4	
01	296 45.4	206 13.1	22.4	172 55.8	00.8	41 10.6	14.8	7 41.7	57.0	Capella	280 28.8	N46 00.8	
02	311 47.9	221 12.2	22.5	187 56.6	00.4	56 13.4	14.8	22 44.3	57.1	Deneb	49 28.2	N45 20.9	
03	326 50.3	236 11.3	22.6	202 57.4	21 00.1	71 16.1	14.8	37 47.0	57.1	Denebola	182 29.5	N14 28.0	
04	341 52.8	251 10.4	22.7	217 58.2	20 59.7	86 18.9	14.8	52 49.7	57.1	Diphda	348 51.7	S17 52.8	
05	356 55.3	266 09.6	22.8	232 59.0	59.4	101 21.6	14.7	67 52.3	57.1				
06	11 57.7	281 08.7	N23 22.9	247 59.8	N20 59.0	116 24.4	S22 14.7	82 55.0	S21 57.2	Dubhe	193 47.0	N61 39.1	
T 07	27 00.2	296 07.8	22.9	263 00.6	58.7	131 27.1	14.7	97 57.6	57.2	Elnath	278 07.8	N28 37.2	
H 08	42 02.6	311 07.0	23.0	278 01.4	58.3	146 29.9	14.7	113 00.3	57.2	Eltanin	90 43.7	N51 29.4	
U 09	57 05.1	326 06.1	23.1	293 02.2	58.0	161 32.6	14.7	128 03.0	57.3	Enif	33 42.8	N 9 57.8	
R 10	72 07.6	341 05.2	23.2	308 03.0	57.6	176 35.3	14.7	143 05.6	57.3	Fomalhaut	15 19.2	S29 31.0	
S 11	87 10.0	356 04.4	23.3	323 03.8	57.2	191 38.1	14.6	158 08.3	57.3				
D 12	102 12.5	11 03.5	N23 23.3	338 04.7	N20 56.9	206 40.8	S22 14.6	173 10.9	S21 57.3	Gacrux	171 56.3	S57 13.5	
A 13	117 15.0	26 02.6	23.4	353 05.5	56.5	221 43.6	14.6	188 13.6	57.4	Gienah	175 48.1	S17 39.0	
Y 14	132 17.4	41 01.7	23.5	8 06.3	56.2	236 46.3	14.6	203 16.3	57.4	Hadar	148 41.8	S60 28.1	
15	147 19.9	56 00.9	23.6	23 07.1	55.8	251 49.1	14.6	218 18.9	57.4	Hamal	327 56.2	N23 33.0	
16	162 22.4	71 00.0	23.6	38 07.9	55.5	266 51.8	14.5	233 21.6	57.4	Kaus Aust.	83 37.9	S34 22.4	
17	177 24.8	85 59.1	23.7	53 08.7	55.1	281 54.6	14.5	248 24.2	57.5				
18	192 27.3	100 58.2	N23 23.8	68 09.5	N20 54.8	296 57.3	S22 14.5	263 26.9	S21 57.5	Kochab	137 19.5	N74 04.9	
19	207 29.8	115 57.4	23.9	83 10.3	54.4	312 00.0	14.5	278 29.5	57.5	Markab	13 34.1	N15 18.5	
20	222 32.2	130 56.5	23.9	98 11.1	54.0	327 02.8	14.5	293 32.2	57.6	Menkar	314 10.9	N 4 09.8	
21	237 34.7	145 55.6	24.0	113 11.9	53.7	342 05.5	14.4	308 34.9	57.6	Menkent	148 02.5	S36 27.9	
22	252 37.1	160 54.8	24.1	128 12.7	53.3	357 08.3	14.4	323 37.5	57.6	Miaplacidus	221 39.6	S69 48.0	
23	267 39.6	175 53.9	24.1	143 13.5	53.0	12 11.0	14.4	338 40.2	57.6				
5 00	282 42.1	190 53.0	N23 24.2	158 14.3	N20 52.6	27 13.8	S22 14.4	353 42.8	S21 57.7	Mirfak	308 34.8	N49 55.5	
01	297 44.5	205 52.1	24.3	173 15.1	52.3	42 16.5	14.4	8 45.5	57.7	Nunki	75 52.8	S26 16.2	
02	312 47.0	220 51.3	24.3	188 15.9	51.9	57 19.2	14.4	23 48.2	57.7	Peacock	53 12.2	S56 40.1	
03	327 49.5	235 50.4	24.4	203 16.7	51.5	72 22.0	14.3	38 50.8	57.7	Pollux	243 23.1	N27 58.7	
04	342 51.9	250 49.5	24.4	218 17.6	51.2	87 24.7	14.3	53 53.5	57.8	Procyon	244 55.8	N 5 10.4	
05	357 54.4	265 48.6	24.5	233 18.4	50.8	102 27.5	14.3	68 56.1	57.8				
06	12 56.9	280 47.8	N23 24.6	248 19.2	N20 50.5	117 30.2	S22 14.3	83 58.8	S21 57.8	Rasalhague	96 02.3	N12 32.9	
07	27 59.3	295 46.9	24.6	263 20.0	50.1	132 32.9	14.3	99 01.5	57.9	Regulus	207 39.3	N11 52.4	
08	43 01.8	310 46.0	24.7	278 20.8	49.7	147 35.7	14.2	114 04.1	57.9	Rigel	281 08.4	S 8 10.9	
F 09	58 04.3	325 45.2	24.7	293 21.6	49.4	162 38.4	14.2	129 06.8	57.9	Rigil Kent.	139 45.8	S60 55.0	
R 10	73 06.7	340 44.3	24.8	308 22.4	49.0	177 41.2	14.2	144 09.4	57.9	Sabik	102 07.5	S15 44.8	
I 11	88 09.2	355 43.4	24.8	323 23.2	48.7	192 43.9	14.2	159 12.1	58.0				
D 12	103 11.6	10 42.5	N23 24.9	338 24.0	N20 48.3	207 46.6	S22 14.2	174 14.8	S21 58.0	Schedar	349 35.8	N56 38.3	
A 13	118 14.1	25 41.7	24.9	353 24.8	47.9	222 49.4	14.2	189 17.4	58.0	Shaula	96 15.9	S37 06.9	
Y 14	133 16.6	40 40.8	25.0	8 25.6	47.6	237 52.1	14.1	204 20.1	58.0	Sirius	258 30.4	S16 44.7	
15	148 19.0	55 39.9	25.0	23 26.4	47.2	252 54.9	14.1	219 22.7	58.1	Spica	158 26.8	S11 15.7	
16	163 21.5	70 39.0	25.1	38 27.2	46.8	267 57.6	14.1	234 25.4	58.1	Suhail	222 49.8	S43 30.8	
17	178 24.0	85 38.2	25.1	53 28.1	46.5	283 00.3	14.1	249 28.1	58.1				
18	193 26.4	100 37.3	N23 25.1	68 28.9	N20 46.1	298 03.1	S22 14.1	264 30.7	S21 58.2	Vega	80 35.7	N38 48.2	
19	208 28.9	115 36.4	25.2	83 29.7	45.8	313 05.8	14.0	279 33.4	58.2	Zuben'ubi	137 00.7	S16 07.2	
20	223 31.4	130 35.5	25.2	98 30.5	45.4	328 08.5	14.0	294 36.0	58.2		SHA	Mer.Pass.	
21	238 33.8	145 34.7	25.3	113 31.3	45.0	343 11.3	14.0	309 38.7	58.2		° ′	h m	
22	253 36.3	160 33.8	25.3	128 32.1	44.7	358 14.0	14.0	324 41.4	58.3	Venus	269 31.0	11 16	
23	268 38.8	175 32.9	25.3	143 32.9	44.3	13 16.8	14.0	339 44.0	58.3	Mars	236 12.1	13 28	
	h m									Jupiter	104 25.0	22 11	
Mer.Pass.	5 12.3	v −0.9	d 0.1	v 0.8	d 0.4	v 2.7	d 0.0	v 2.7	d 0.0	Saturn	70 56.1	0 29	

UT d	UT h	SUN GHA ° ′	SUN Dec ° ′	MOON GHA ° ′	v ′	MOON Dec ° ′	d ′	HP ′
3 WEDNESDAY	00	178 58.1	N22 59.7	176 08.9	4.3	N22 22.4	0.4	59.7
	01	193 58.0	59.5	190 32.2	4.3	22 22.0	0.5	59.7
	02	208 57.9	59.3	204 55.5	4.3	22 21.5	0.7	59.8
	03	223 57.8	. . 59.1	219 18.8	4.3	22 20.8	0.8	59.8
	04	238 57.7	58.9	233 42.1	4.2	22 20.0	1.0	59.8
	05	253 57.5	58.7	248 05.3	4.2	22 19.0	1.2	59.8
	06	268 57.4	N22 58.6	262 28.5	4.2	N22 17.8	1.3	59.8
	07	283 57.3	58.4	276 51.7	4.3	22 16.5	1.5	59.9
	08	298 57.2	58.2	291 15.0	4.1	22 15.0	1.7	59.9
	09	313 57.1	. . 58.0	305 38.1	4.2	22 13.3	1.8	59.9
	10	328 57.0	57.8	320 01.3	4.2	22 11.5	1.9	59.9
	11	343 56.8	57.6	334 24.5	4.2	22 09.6	2.1	59.9
	12	358 56.7	N22 57.4	348 47.7	4.2	N22 07.5	2.3	60.0
	13	13 56.6	57.2	3 10.9	4.2	22 05.2	2.4	60.0
	14	28 56.5	56.9	17 34.1	4.2	22 02.8	2.6	60.0
	15	43 56.4	. . 56.7	31 57.3	4.2	22 00.2	2.8	60.0
	16	58 56.3	56.5	46 20.5	4.2	21 57.4	2.9	60.0
	17	73 56.1	56.3	60 43.7	4.2	21 54.5	3.0	60.0
	18	88 56.0	N22 56.1	75 06.9	4.2	N21 51.5	3.3	60.0
	19	103 55.9	55.9	89 30.1	4.2	21 48.2	3.3	60.1
	20	118 55.8	55.7	103 53.3	4.3	21 44.9	3.6	60.1
	21	133 55.7	. . 55.5	118 16.6	4.3	21 41.3	3.6	60.1
	22	148 55.6	55.3	132 39.9	4.3	21 37.7	3.9	60.1
	23	163 55.4	55.1	147 03.2	4.3	21 33.8	4.0	60.1
4 THURSDAY	00	178 55.3	N22 54.9	161 26.5	4.3	N21 29.8	4.1	60.1
	01	193 55.2	54.7	175 49.8	4.4	21 25.7	4.3	60.1
	02	208 55.1	54.5	190 13.2	4.4	21 21.4	4.4	60.1
	03	223 55.0	. . 54.3	204 36.6	4.4	21 17.0	4.6	60.2
	04	238 54.9	54.0	219 00.0	4.4	21 12.4	4.8	60.2
	05	253 54.8	53.8	233 23.4	4.5	21 07.6	4.9	60.2
	06	268 54.7	N22 53.6	247 46.9	4.5	N21 02.7	5.0	60.2
	07	283 54.5	53.4	262 10.4	4.5	20 57.7	5.2	60.2
	08	298 54.4	53.2	276 33.9	4.6	20 52.5	5.4	60.2
	09	313 54.3	. . 53.0	290 57.5	4.6	20 47.1	5.5	60.2
	10	328 54.2	52.8	305 21.1	4.7	20 41.6	5.6	60.2
	11	343 54.1	52.5	319 44.8	4.7	20 36.0	5.8	60.2
	12	358 54.0	N22 52.3	334 08.5	4.7	N20 30.2	5.9	60.2
	13	13 53.9	52.1	348 32.2	4.8	20 24.3	6.1	60.2
	14	28 53.7	51.9	2 56.0	4.8	20 18.2	6.2	60.2
	15	43 53.6	. . 51.7	17 19.8	4.9	20 12.0	6.4	60.2
	16	58 53.5	51.4	31 43.7	4.9	20 05.6	6.5	60.3
	17	73 53.4	51.2	46 07.6	5.0	19 59.1	6.6	60.3
	18	88 53.3	N22 51.0	60 31.6	5.0	N19 52.5	6.8	60.3
	19	103 53.2	50.8	74 55.6	5.1	19 45.7	6.9	60.3
	20	118 53.1	50.6	89 19.7	5.1	19 38.8	7.0	60.3
	21	133 53.0	. . 50.3	103 43.8	5.2	19 31.8	7.2	60.3
	22	148 52.9	50.1	118 08.0	5.3	19 24.6	7.3	60.3
	23	163 52.7	49.9	132 32.3	5.3	19 17.3	7.5	60.3
5 FRIDAY	00	178 52.6	N22 49.7	146 56.6	5.3	N19 09.8	7.5	60.3
	01	193 52.5	49.4	161 20.9	5.4	19 02.3	7.7	60.3
	02	208 52.4	49.2	175 45.3	5.5	18 54.6	7.9	60.3
	03	223 52.3	. . 49.0	190 09.8	5.5	18 46.7	7.9	60.3
	04	238 52.2	48.7	204 34.3	5.6	18 38.8	8.1	60.3
	05	253 52.1	48.5	218 58.9	5.7	18 30.7	8.2	60.3
	06	268 52.0	N22 48.3	233 23.6	5.7	N18 22.5	8.4	60.3
	07	283 51.9	48.0	247 48.3	5.8	18 14.1	8.4	60.3
	08	298 51.7	47.8	262 13.1	5.9	18 05.7	8.6	60.3
	09	313 51.6	. . 47.6	276 38.0	5.9	17 57.1	8.7	60.3
	10	328 51.5	47.4	291 02.9	6.0	17 48.4	8.8	60.3
	11	343 51.4	47.1	305 27.9	6.0	17 39.6	9.0	60.3
	12	358 51.3	N22 46.9	319 52.9	6.1	N17 30.6	9.0	60.3
	13	13 51.2	46.6	334 18.0	6.2	17 21.6	9.2	60.3
	14	28 51.1	46.4	348 43.2	6.3	17 12.4	9.3	60.3
	15	43 51.0	. . 46.2	3 08.5	6.3	17 03.1	9.4	60.3
	16	58 50.9	45.9	17 33.8	6.4	16 53.7	9.5	60.3
	17	73 50.8	45.7	31 59.2	6.4	16 44.2	9.6	60.3
	18	88 50.7	N22 45.5	46 24.6	6.6	N16 34.6	9.7	60.3
	19	103 50.5	45.2	60 50.2	6.6	16 24.9	9.8	60.2
	20	118 50.4	45.0	75 15.8	6.6	16 15.1	9.9	60.2
	21	133 50.3	. . 44.7	89 41.4	6.8	16 05.2	10.0	60.2
	22	148 50.2	44.5	104 07.2	6.8	15 55.2	10.2	60.2
	23	163 50.1	44.3	118 33.0	6.9	N15 45.0	10.2	60.2
		SD 15.8	*d* 0.2	SD 16.3		16.4		16.4

Lat.	Twilight Naut. h m	Twilight Civil h m	Sunrise h m	Moonrise 3 h m	Moonrise 4 h m	Moonrise 5 h m	Moonrise 6 h m
N 72	□	□	□	□	□	□	05 53
N 70	□	□	□	□	□	03 55	06 25
68	□	□	□	□	02 27	04 42	06 48
66	////	////	00 40	01 54	03 22	05 13	07 06
64	////	////	01 46	02 35	03 56	05 35	07 21
62	////	////	02 21	03 03	04 20	05 53	07 33
60	////	01 10	02 45	03 24	04 39	06 08	07 43
N 58	////	01 53	03 05	03 42	04 55	06 21	07 52
56	////	02 20	03 21	03 57	05 09	06 32	08 00
54	01 04	02 41	03 34	04 09	05 20	06 41	08 06
52	01 44	02 58	03 46	04 21	05 31	06 50	08 13
50	02 09	03 13	03 57	04 30	05 40	06 57	08 18
45	02 53	03 42	04 19	04 51	05 59	07 14	08 30
N 40	03 22	04 04	04 36	05 08	06 15	07 27	08 40
35	03 45	04 21	04 51	05 23	06 29	07 38	08 48
30	04 03	04 36	05 04	05 35	06 40	07 48	08 56
20	04 32	05 01	05 25	05 56	07 00	08 05	09 09
N 10	04 54	05 21	05 44	06 15	07 17	08 19	09 20
0	05 12	05 38	06 01	06 32	07 33	08 33	09 30
S 10	05 29	05 55	06 18	06 49	07 49	08 47	09 40
20	05 45	06 12	06 36	07 08	08 07	09 01	09 51
30	06 01	06 30	06 56	07 29	08 26	09 18	10 04
35	06 09	06 41	07 09	07 42	08 38	09 28	10 11
40	06 18	06 52	07 22	07 56	08 51	09 39	10 19
45	06 28	07 05	07 39	08 13	09 07	09 52	10 29
S 50	06 39	07 21	07 59	08 34	09 26	10 07	10 41
52	06 44	07 28	08 08	08 44	09 35	10 14	10 46
54	06 50	07 36	08 19	08 56	09 45	10 23	10 52
56	06 56	07 44	08 31	09 08	09 56	10 32	10 58
58	07 02	07 54	08 45	09 23	10 09	10 42	11 05
S 60	07 09	08 05	09 02	09 41	10 24	10 54	11 14

Lat.	Sunset h m	Twilight Civil h m	Twilight Naut. h m	Moonset 3 h m	Moonset 4 h m	Moonset 5 h m	Moonset 6 h m
N 72	□	□	□	□	□	□	00 58
N 70	□	□	□	□	□	00 54	00 25
68	□	□	□	□	00 15	00 06	{00 00 / 23 55}
66	23 24	////	////	23 19	23 35	23 41	23 44
64	22 21	////	////	22 45	23 11	23 25	23 34
62	21 47	////	////	22 21	22 52	23 12	23 26
60	21 23	22 56	////	22 01	22 37	23 01	23 19
N 58	21 03	22 15	////	21 45	22 24	22 52	23 12
56	20 47	21 48	////	21 31	22 12	22 43	23 07
54	20 34	21 27	23 02	21 19	22 02	22 35	23 02
52	20 22	21 10	22 24	21 08	21 53	22 29	22 57
50	20 12	20 55	21 59	20 59	21 45	22 22	22 53
45	19 50	20 27	21 15	20 39	21 28	22 09	22 44
N 40	19 32	20 05	20 46	20 23	21 14	21 58	22 36
35	19 18	19 47	20 24	20 09	21 02	21 48	22 30
30	19 05	19 32	20 05	19 57	20 51	21 40	22 24
20	18 44	19 08	19 37	19 36	20 33	21 25	22 14
N 10	18 25	18 48	19 15	19 18	20 17	21 13	22 05
0	18 08	18 30	18 57	19 01	20 02	21 01	21 56
S 10	17 51	18 14	18 40	18 44	19 47	20 48	21 48
20	17 33	17 57	18 24	18 26	19 31	20 35	21 38
30	17 12	17 39	18 08	18 05	19 12	20 20	21 28
35	17 00	17 28	18 00	17 53	19 01	20 12	21 22
40	16 47	17 17	17 51	17 39	18 49	20 01	21 15
45	16 30	17 04	17 41	17 22	18 34	19 50	21 06
S 50	16 10	16 48	17 30	17 01	18 15	19 35	20 56
52	16 01	16 41	17 25	16 51	18 07	19 28	20 52
54	15 50	16 33	17 19	16 40	17 57	19 21	20 47
56	15 38	16 25	17 13	16 28	17 46	19 12	20 41
58	15 24	16 15	17 07	16 13	17 33	19 03	20 35
S 60	15 07	16 04	17 00	15 55	17 19	18 52	20 27

Day	SUN Eqn. of Time 00h m s	SUN Eqn. of Time 12h m s	SUN Mer. Pass. h m	MOON Mer. Pass. Upper h m	MOON Mer. Pass. Lower h m	Age d	%	Phase
3	04 07	04 13	12 04	12 47	00 16	01	1	●
4	04 18	04 24	12 04	13 48	01 17	02	4	
5	04 29	04 35	12 05	14 47	02 18	03	10	

UT	ARIES	VENUS −3·9		MARS +1·8		JUPITER −2·6		SATURN +0·1	
	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
d h	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
6 00	283 41.2	190 32.0	N23 25.4	158 33.7	N20 43.9	28 19.5	S22 14.0	354 46.7	S21 58.3
01	298 43.7	205 31.2	25.4	173 34.5	43.6	43 22.2	13.9	9 49.3	58.3
02	313 46.1	220 30.3	25.4	188 35.3	43.2	58 25.0	13.9	24 52.0	58.4
03	328 48.6	235 29.4	25.5	203 36.2	42.8	73 27.7	13.9	39 54.7	58.4
04	343 51.1	250 28.5	25.5	218 37.0	42.5	88 30.4	13.9	54 57.3	58.4
05	358 53.5	265 27.7	25.5	233 37.8	42.1	103 33.2	13.9	70 00.0	58.5
06	13 56.0	280 26.8	N23 25.6	248 38.6	N20 41.7	118 35.9	S22 13.8	85 02.6	S21 58.5
07	28 58.5	295 25.9	25.6	263 39.4	41.4	133 38.6	13.8	100 05.3	58.5
S 08	44 00.9	310 25.1	25.6	278 40.2	41.0	148 41.4	13.8	115 08.0	58.5
A 09	59 03.4	325 24.2	25.6	293 41.0	40.6	163 44.1	13.8	130 10.6	58.6
T 10	74 05.9	340 23.3	25.7	308 41.8	40.3	178 46.8	13.8	145 13.3	58.6
U 11	89 08.3	355 22.4	25.7	323 42.6	39.9	193 49.6	13.8	160 15.9	58.6
R 12	104 10.8	10 21.6	N23 25.7	338 43.5	N20 39.5	208 52.3	S22 13.7	175 18.6	S21 58.6
D 13	119 13.2	25 20.7	25.7	353 44.3	39.2	223 55.0	13.7	190 21.3	58.7
A 14	134 15.7	40 19.8	25.7	8 45.1	38.8	238 57.8	13.7	205 23.9	58.7
Y 15	149 18.2	55 18.9	25.8	23 45.9	38.4	254 00.5	13.7	220 26.6	58.7
16	164 20.6	70 18.1	25.8	38 46.7	38.1	269 03.2	13.7	235 29.2	58.8
17	179 23.1	85 17.2	25.8	53 47.5	37.7	284 06.0	13.7	250 31.9	58.8
18	194 25.6	100 16.3	N23 25.8	68 48.3	N20 37.3	299 08.7	S22 13.6	265 34.6	S21 58.8
19	209 28.0	115 15.4	25.8	83 49.1	37.0	314 11.4	13.6	280 37.2	58.8
20	224 30.5	130 14.6	25.8	98 50.0	36.6	329 14.2	13.6	295 39.9	58.9
21	239 33.0	145 13.7	25.8	113 50.8	36.2	344 16.9	13.6	310 42.5	58.9
22	254 35.4	160 12.8	25.8	128 51.6	35.9	359 19.6	13.6	325 45.2	58.9
23	269 37.9	175 11.9	25.9	143 52.4	35.5	14 22.4	13.5	340 47.9	58.9
7 00	284 40.4	190 11.0	N23 25.9	158 53.2	N20 35.1	29 25.1	S22 13.5	355 50.5	S21 59.0
01	299 42.8	205 10.2	25.9	173 54.0	34.8	44 27.8	13.5	10 53.2	59.0
02	314 45.3	220 09.3	25.9	188 54.8	34.4	59 30.6	13.5	25 55.9	59.0
03	329 47.7	235 08.4	25.9	203 55.7	34.0	74 33.3	13.5	40 58.5	59.1
04	344 50.2	250 07.5	25.9	218 56.5	33.6	89 36.0	13.5	56 01.2	59.1
05	359 52.7	265 06.7	25.9	233 57.3	33.3	104 38.7	13.4	71 03.8	59.1
06	14 55.1	280 05.8	N23 25.9	248 58.1	N20 32.9	119 41.5	S22 13.4	86 06.5	S21 59.1
07	29 57.6	295 04.9	25.9	263 58.9	32.5	134 44.2	13.4	101 09.2	59.2
08	45 00.1	310 04.0	25.9	278 59.7	32.1	149 46.9	13.4	116 11.8	59.2
S 09	60 02.5	325 03.2	25.9	294 00.5	31.8	164 49.7	13.4	131 14.5	59.2
U 10	75 05.0	340 02.3	25.9	309 01.4	31.4	179 52.4	13.4	146 17.1	59.2
N 11	90 07.5	355 01.4	25.9	324 02.2	31.0	194 55.1	13.3	161 19.8	59.3
D 12	105 09.9	10 00.5	N23 25.8	339 03.0	N20 30.7	209 57.8	S22 13.3	176 22.5	S21 59.3
A 13	120 12.4	24 59.7	25.8	354 03.8	30.3	225 00.6	13.3	191 25.1	59.3
Y 14	135 14.9	39 58.8	25.8	9 04.6	29.9	240 03.3	13.3	206 27.8	59.4
15	150 17.3	54 57.9	25.8	24 05.4	29.5	255 06.0	13.3	221 30.4	59.4
16	165 19.8	69 57.0	25.8	39 06.2	29.2	270 08.8	13.2	236 33.1	59.4
17	180 22.2	84 56.2	25.8	54 07.1	28.8	285 11.5	13.2	251 35.8	59.4
18	195 24.7	99 55.3	N23 25.8	69 07.9	N20 28.4	300 14.2	S22 13.2	266 38.4	S21 59.5
19	210 27.2	114 54.4	25.8	84 08.7	28.0	315 16.9	13.2	281 41.1	59.5
20	225 29.6	129 53.5	25.7	99 09.5	27.7	330 19.7	13.2	296 43.7	59.5
21	240 32.1	144 52.7	25.7	114 10.3	27.3	345 22.4	13.2	311 46.4	59.5
22	255 34.6	159 51.8	25.7	129 11.1	26.9	0 25.1	13.1	326 49.1	59.6
23	270 37.0	174 50.9	25.7	144 12.0	26.5	15 27.8	13.1	341 51.7	59.6
8 00	285 39.5	189 50.0	N23 25.7	159 12.8	N20 26.2	30 30.6	S22 13.1	356 54.4	S21 59.6
01	300 42.0	204 49.2	25.6	174 13.6	25.8	45 33.3	13.1	11 57.0	59.7
02	315 44.4	219 48.3	25.6	189 14.4	25.4	60 36.0	13.1	26 59.7	59.7
03	330 46.9	234 47.4	25.6	204 15.2	25.0	75 38.7	13.1	42 02.4	59.7
04	345 49.3	249 46.5	25.6	219 16.0	24.7	90 41.5	13.0	57 05.0	59.7
05	0 51.8	264 45.7	25.5	234 16.9	24.3	105 44.2	13.0	72 07.7	59.8
06	15 54.3	279 44.8	N23 25.5	249 17.7	N20 23.9	120 46.9	S22 13.0	87 10.3	S21 59.8
07	30 56.7	294 43.9	25.5	264 18.5	23.5	135 49.6	13.0	102 13.0	59.8
08	45 59.2	309 43.0	25.4	279 19.3	23.1	150 52.4	13.0	117 15.7	59.8
M 09	61 01.7	324 42.2	25.4	294 20.1	22.8	165 55.1	13.0	132 18.3	59.9
O 10	76 04.1	339 41.3	25.4	309 21.0	22.4	180 57.8	12.9	147 21.0	59.9
N 11	91 06.6	354 40.4	25.3	324 21.8	22.0	196 00.5	12.9	162 23.7	59.9
D 12	106 09.1	9 39.5	N23 25.3	339 22.6	N20 21.6	211 03.2	S22 12.9	177 26.3	S21 59.9
A 13	121 11.5	24 38.6	25.3	354 23.4	21.2	226 06.0	12.9	192 29.0	22 00.0
Y 14	136 14.0	39 37.8	25.2	9 24.2	20.9	241 08.7	12.9	207 31.6	00.0
15	151 16.5	54 36.9	25.2	24 25.0	20.5	256 11.4	12.8	222 34.3	00.0
16	166 18.9	69 36.0	25.1	39 25.9	20.1	271 14.1	12.8	237 37.0	00.1
17	181 21.4	84 35.1	25.1	54 26.7	19.7	286 16.9	12.8	252 39.6	00.1
18	196 23.8	99 34.3	N23 25.1	69 27.5	N20 19.3	301 19.6	S22 12.8	267 42.3	S22 00.1
19	211 26.3	114 33.4	25.0	84 28.3	19.0	316 22.3	12.8	282 44.9	00.1
20	226 28.8	129 32.5	25.0	99 29.1	18.6	331 25.0	12.8	297 47.6	00.2
21	241 31.2	144 31.6	24.9	114 30.0	18.2	346 27.7	12.7	312 50.3	00.2
22	256 33.7	159 30.8	24.9	129 30.8	17.8	1 30.5	12.7	327 52.9	00.2
23	271 36.2	174 29.9	24.8	144 31.6	17.4	16 33.2	12.7	342 55.6	00.2
	h m								
Mer. Pass.	5 00.5	v −0.9	d 0.0	v 0.8	d 0.4	v 2.7	d 0.0	v 2.7	d 0.0

STARS		
Name	SHA	Dec
	° ′	° ′
Acamar	315 15.4	S40 13.5
Achernar	335 23.8	S57 08.1
Acrux	173 04.7	S63 12.6
Adhara	255 09.7	S29 00.0
Aldebaran	290 44.9	N16 32.7
Alioth	166 17.0	N55 51.7
Alkaid	152 55.5	N49 13.4
Alnair	27 38.2	S46 51.8
Alnilam	275 42.5	S 1 11.5
Alphard	217 52.3	S 8 44.6
Alphecca	126 07.3	N26 39.3
Alpheratz	357 39.1	N29 11.7
Altair	62 03.9	N 8 55.3
Ankaa	353 11.5	S42 11.9
Antares	112 20.9	S26 28.4
Arcturus	145 51.8	N19 05.1
Atria	107 18.4	S69 03.7
Avior	234 17.0	S59 34.4
Bellatrix	278 27.9	N 6 21.9
Betelgeuse	270 57.1	N 7 24.5
Canopus	263 54.9	S52 42.4
Capella	280 28.8	N46 00.8
Deneb	49 28.2	N45 20.9
Denebola	182 29.5	N14 28.0
Diphda	348 51.7	S17 52.8
Dubhe	193 47.0	N61 39.1
Elnath	278 07.7	N28 37.2
Eltanin	90 43.7	N51 29.4
Enif	33 42.8	N 9 57.9
Fomalhaut	15 19.2	S29 31.0
Gacrux	171 56.3	S57 13.5
Gienah	175 48.1	S17 39.0
Hadar	148 41.8	S60 28.1
Hamal	327 56.2	N23 33.0
Kaus Aust.	83 37.9	S34 22.4
Kochab	137 19.5	N74 04.9
Markab	13 34.0	N15 18.5
Menkar	314 10.9	N 4 09.8
Menkent	148 02.6	S36 27.9
Miaplacidus	221 39.6	S69 48.0
Mirfak	308 34.7	N49 55.5
Nunki	75 52.8	S26 16.2
Peacock	53 12.2	S56 40.1
Pollux	243 23.1	N27 58.7
Procyon	244 55.7	N 5 10.5
Rasalhague	96 02.3	N12 33.0
Regulus	207 39.4	N11 52.4
Rigel	281 08.4	S 8 10.8
Rigil Kent.	139 45.8	S60 55.0
Sabik	102 07.5	S15 44.8
Schedar	349 35.8	N56 38.3
Shaula	96 15.9	S37 06.9
Sirius	258 30.4	S16 44.6
Spica	158 26.8	S11 15.7
Suhail	222 49.8	S43 30.8
Vega	80 35.7	N38 48.3
Zuben'ubi	137 00.7	S16 07.2

	SHA	Mer. Pass.
	° ′	h m
Venus	265 30.7	11 20
Mars	234 12.9	13 24
Jupiter	104 44.7	21 58
Saturn	71 10.2	0 17

UT	SUN GHA	SUN Dec	MOON GHA	MOON v	MOON Dec	MOON d	MOON HP
d h	° ′	° ′	° ′	′	° ′	′	′
6 00	178 50.0	N22 44.0	132 58.9	6.9	N15 34.8	10.3	60.2
01	193 49.9	43.8	147 24.8	7.1	15 24.5	10.4	60.2
02	208 49.8	43.5	161 50.9	7.1	15 14.1	10.5	60.2
03	223 49.7	. . 43.3	176 17.0	7.2	15 03.6	10.6	60.2
04	238 49.6	43.0	190 43.2	7.2	14 53.0	10.7	60.2
05	253 49.5	42.8	205 09.4	7.3	14 42.3	10.8	60.2
06	268 49.4	N22 42.5	219 35.7	7.4	N14 31.5	10.9	60.2
07	283 49.3	42.3	234 02.1	7.5	14 20.6	10.9	60.2
08	298 49.2	42.1	248 28.6	7.5	14 09.7	11.1	60.2
09	313 49.1	. . 41.8	262 55.1	7.6	13 58.6	11.1	60.1
10	328 48.9	41.6	277 21.7	7.7	13 47.5	11.2	60.1
11	343 48.8	41.3	291 48.4	7.8	13 36.3	11.3	60.1
12	358 48.7	N22 41.1	306 15.2	7.8	N13 25.0	11.3	60.1
13	13 48.6	40.8	320 42.0	7.9	13 13.7	11.5	60.1
14	28 48.5	40.5	335 08.9	7.9	13 02.2	11.5	60.1
15	43 48.4	. . 40.3	349 35.8	8.1	12 50.7	11.6	60.1
16	58 48.3	40.0	4 02.9	8.1	12 39.1	11.7	60.1
17	73 48.2	39.8	18 30.0	8.2	12 27.4	11.7	60.1
18	88 48.1	N22 39.5	32 57.2	8.2	N12 15.7	11.8	60.0
19	103 48.0	39.3	47 24.4	8.3	12 03.9	11.9	60.0
20	118 47.9	39.0	61 51.7	8.4	11 52.0	11.9	60.0
21	133 47.8	. . 38.8	76 19.1	8.4	11 40.1	12.0	60.0
22	148 47.7	38.5	90 46.5	8.6	11 28.1	12.1	60.0
23	163 47.6	38.2	105 14.1	8.6	11 16.0	12.1	60.0
7 00	178 47.5	N22 38.0	119 41.7	8.6	N11 03.9	12.2	60.0
01	193 47.4	37.7	134 09.3	8.7	10 51.7	12.2	59.9
02	208 47.3	37.5	148 37.0	8.8	10 39.5	12.3	59.9
03	223 47.2	. . 37.2	163 04.8	8.9	10 27.2	12.4	59.9
04	238 47.1	36.9	177 32.7	8.9	10 14.8	12.4	59.9
05	253 47.0	36.7	192 00.6	9.0	10 02.4	12.5	59.9
06	268 46.9	N22 36.4	206 28.6	9.0	N 9 49.9	12.5	59.9
07	283 46.8	36.2	220 56.6	9.1	9 37.4	12.6	59.9
08	298 46.7	35.9	235 24.7	9.2	9 24.8	12.6	59.8
09	313 46.6	. . 35.6	249 52.9	9.2	9 12.2	12.6	59.8
10	328 46.5	35.4	264 21.1	9.3	8 59.6	12.7	59.8
11	343 46.4	35.1	278 49.4	9.4	8 46.9	12.8	59.8
12	358 46.3	N22 34.8	293 17.8	9.4	N 8 34.1	12.8	59.8
13	13 46.2	34.6	307 46.2	9.5	8 21.3	12.8	59.8
14	28 46.1	34.3	322 14.7	9.5	8 08.5	12.9	59.7
15	43 46.0	. . 34.0	336 43.2	9.6	7 55.6	12.9	59.7
16	58 45.9	33.8	351 11.8	9.6	7 42.7	12.9	59.7
17	73 45.8	33.5	5 40.4	9.7	7 29.8	13.0	59.7
18	88 45.7	N22 33.2	20 09.1	9.8	N 7 16.8	13.0	59.7
19	103 45.6	32.9	34 37.9	9.8	7 03.8	13.0	59.6
20	118 45.5	32.7	49 06.7	9.8	6 50.8	13.1	59.6
21	133 45.4	. . 32.4	63 35.5	9.9	6 37.7	13.1	59.6
22	148 45.3	32.1	78 04.4	10.0	6 24.6	13.1	59.6
23	163 45.2	31.8	92 33.4	10.0	6 11.5	13.2	59.6
8 00	178 45.1	N22 31.6	107 02.4	10.1	N 5 58.3	13.2	59.6
01	193 45.0	31.3	121 31.5	10.1	5 45.1	13.2	59.5
02	208 44.9	31.0	136 00.6	10.2	5 31.9	13.2	59.5
03	223 44.8	. . 30.7	150 29.8	10.2	5 18.7	13.2	59.5
04	238 44.7	30.5	164 59.0	10.2	5 05.5	13.3	59.5
05	253 44.6	30.2	179 28.2	10.4	4 52.2	13.2	59.5
06	268 44.5	N22 29.9	193 57.6	10.3	N 4 39.0	13.3	59.4
07	283 44.4	29.6	208 26.9	10.4	4 25.7	13.4	59.4
08	298 44.3	29.3	222 56.3	10.4	4 12.3	13.3	59.4
09	313 44.2	. . 29.1	237 25.7	10.5	3 59.0	13.3	59.4
10	328 44.1	28.8	251 55.2	10.5	3 45.7	13.4	59.3
11	343 44.0	28.5	266 24.7	10.6	3 32.3	13.3	59.3
12	358 43.9	N22 28.2	280 54.3	10.6	N 3 19.0	13.4	59.3
13	13 43.8	27.9	295 23.9	10.6	3 05.6	13.3	59.3
14	28 43.7	27.6	309 53.5	10.7	2 52.3	13.4	59.3
15	43 43.6	. . 27.4	324 23.2	10.7	2 38.9	13.4	59.2
16	58 43.5	27.1	338 52.9	10.8	2 25.5	13.4	59.2
17	73 43.4	26.8	353 22.7	10.7	2 12.1	13.4	59.2
18	88 43.3	N22 26.5	7 52.4	10.8	N 1 58.7	13.3	59.2
19	103 43.2	26.2	22 22.2	10.9	1 45.4	13.4	59.2
20	118 43.1	25.9	36 52.1	10.9	1 32.0	13.4	59.1
21	133 43.0	. . 25.6	51 22.0	10.9	1 18.6	13.4	59.1
22	148 42.9	25.3	65 51.9	10.9	1 05.2	13.4	59.1
23	163 42.8	25.1	80 21.8	11.0	N 0 51.8	13.3	59.1
	SD 15.8	d 0.3	SD	16.4		16.3	16.2

Lat.	Twilight Naut.	Twilight Civil	Sunrise	Moonrise 6	Moonrise 7	Moonrise 8	Moonrise 9
°	h m	h m	h m	h m	h m	h m	h m
N 72				05 53	08 20	10 30	12 34
N 70				06 25	08 35	10 35	12 31
68				06 48	08 47	10 39	12 28
66	////	////	00 56	07 06	08 57	10 43	12 26
64	////	////	01 53	07 21	09 05	10 46	12 24
62	////	////	02 26	07 33	09 12	10 48	12 22
60	////	01 19	02 49	07 43	09 18	10 50	12 21
N 58	////	01 58	03 08	07 52	09 23	10 52	12 20
56	////	02 24	03 24	08 00	09 28	10 54	12 18
54	01 12	02 45	03 37	08 06	09 32	10 56	12 17
52	01 49	03 02	03 49	08 13	09 36	10 57	12 17
50	02 13	03 16	03 59	08 18	09 39	10 58	12 16
45	02 56	03 44	04 21	08 30	09 46	11 01	12 14
N 40	03 25	04 06	04 38	08 40	09 53	11 03	12 13
35	03 47	04 23	04 52	08 48	09 58	11 05	12 11
30	04 05	04 38	05 05	08 56	10 02	11 07	12 10
20	04 33	05 02	05 26	09 09	10 10	11 10	12 08
N 10	04 55	05 21	05 44	09 20	10 18	11 13	12 07
0	05 13	05 39	06 01	09 30	10 24	11 15	12 05
S 10	05 29	05 55	06 18	09 40	10 31	11 18	12 04
20	05 45	06 12	06 36	09 51	10 38	11 21	12 02
30	06 00	06 30	06 56	10 04	10 46	11 24	12 00
35	06 09	06 40	07 08	10 11	10 50	11 26	11 59
40	06 18	06 51	07 22	10 19	10 55	11 28	11 58
45	06 27	07 04	07 38	10 29	11 01	11 30	11 57
S 50	06 38	07 20	07 57	10 41	11 08	11 33	11 56
52	06 43	07 27	08 07	10 46	11 12	11 34	11 55
54	06 49	07 34	08 17	10 52	11 15	11 35	11 54
56	06 54	07 43	08 29	10 58	11 19	11 37	11 53
58	07 01	07 52	08 43	11 05	11 23	11 39	11 53
S 60	07 08	08 03	08 59	11 14	11 28	11 40	11 52

Lat.	Sunset	Twilight Civil	Twilight Naut.	Moonset 6	Moonset 7	Moonset 8	Moonset 9
°	h m	h m	h m	h m	h m	h m	h m
N 72				00 58	00 26 (23 53)	(23 25) 23 25	23 29
N 70				00 25	(23 53) 23 27	23 46	23 35
68				(23 53) 23 54	23 50	23 45	23 40
66	23 09	////	////	23 44	23 45	23 45	23 45
64	22 15	////	////	23 34	23 40	23 44	23 49
62	21 43	////	////	23 26	23 36	23 44	23 52
60	21 19	22 49	////	23 19	23 32	23 44	23 55
N 58	21 01	22 10	////	23 12	23 29	23 43	23 57
56	20 45	21 44	////	23 07	23 26	23 43	24 00
54	20 32	21 24	22 55	23 02	23 23	23 43	24 02
52	20 20	21 08	22 20	22 57	23 21	23 43	24 04
50	20 10	20 53	21 56	22 53	23 19	23 42	24 05
45	19 49	20 25	21 14	22 44	23 14	23 42	24 09
N 40	19 32	20 04	20 45	22 36	23 10	23 42	24 12
35	19 17	19 47	20 23	22 30	23 07	23 41	24 15
30	19 05	19 32	20 05	22 24	23 04	23 41	24 17
20	18 44	19 08	19 37	22 14	22 58	23 40	24 21
N 10	18 25	18 48	19 15	22 05	22 53	23 40	24 25
0	18 09	18 31	18 57	21 56	22 49	23 39	24 29
S 10	17 52	18 15	18 41	21 48	22 44	23 39	24 32
20	17 34	17 58	18 25	21 38	22 39	23 38	24 36
30	17 14	17 40	18 10	21 28	22 34	23 37	24 40
35	17 02	17 30	18 01	21 22	22 30	23 37	24 42
40	16 48	17 19	17 52	21 15	22 26	23 37	24 45
45	16 32	17 06	17 43	21 06	22 22	23 36	24 48
S 50	16 13	16 51	17 32	20 56	22 17	23 35	24 52
52	16 03	16 44	17 27	20 52	22 14	23 35	24 54
54	15 53	16 36	17 21	20 47	22 12	23 35	24 56
56	15 41	16 27	17 16	20 41	22 09	23 34	24 58
58	15 27	16 18	17 09	20 35	22 05	23 34	25 00
S 60	15 11	16 07	17 02	20 27	22 02	23 33	25 03

Day	SUN Eqn. of Time 00h	SUN Eqn. of Time 12h	SUN Mer. Pass.	MOON Mer. Pass. Upper	MOON Mer. Pass. Lower	MOON Age	MOON Phase
d	m s	m s	h m	h m	h m	d	%
6	04 40	04 45	12 05	15 43	03 15	04	18
7	04 50	04 55	12 05	16 36	04 10	05	28
8	05 00	05 04	12 05	17 27	05 02	06	39

0m INCREMENTS AND CORRECTIONS 1m

m 0	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	0 00·0	0 00·0	0 00·0	0·0	0·0	6·0	0·1	12·0	0·1
01	0 00·3	0 00·3	0 00·2	0·1	0·0	6·1	0·1	12·1	0·1
02	0 00·5	0 00·5	0 00·5	0·2	0·0	6·2	0·1	12·2	0·1
03	0 00·8	0 00·8	0 00·7	0·3	0·0	6·3	0·1	12·3	0·1
04	0 01·0	0 01·0	0 01·0	0·4	0·0	6·4	0·1	12·4	0·1
05	0 01·3	0 01·3	0 01·2	0·5	0·0	6·5	0·1	12·5	0·1
06	0 01·5	0 01·5	0 01·4	0·6	0·0	6·6	0·1	12·6	0·1
07	0 01·8	0 01·8	0 01·7	0·7	0·0	6·7	0·1	12·7	0·1
08	0 02·0	0 02·0	0 01·9	0·8	0·0	6·8	0·1	12·8	0·1
09	0 02·3	0 02·3	0 02·1	0·9	0·0	6·9	0·1	12·9	0·1
10	0 02·5	0 02·5	0 02·4	1·0	0·0	7·0	0·1	13·0	0·1
11	0 02·8	0 02·8	0 02·6	1·1	0·0	7·1	0·1	13·1	0·1
12	0 03·0	0 03·0	0 02·9	1·2	0·0	7·2	0·1	13·2	0·1
13	0 03·3	0 03·3	0 03·1	1·3	0·0	7·3	0·1	13·3	0·1
14	0 03·5	0 03·5	0 03·3	1·4	0·0	7·4	0·1	13·4	0·1
15	0 03·8	0 03·8	0 03·6	1·5	0·0	7·5	0·1	13·5	0·1
16	0 04·0	0 04·0	0 03·8	1·6	0·0	7·6	0·1	13·6	0·1
17	0 04·3	0 04·3	0 04·1	1·7	0·0	7·7	0·1	13·7	0·1
18	0 04·5	0 04·5	0 04·3	1·8	0·0	7·8	0·1	13·8	0·1
19	0 04·8	0 04·8	0 04·5	1·9	0·0	7·9	0·1	13·9	0·1
20	0 05·0	0 05·0	0 04·8	2·0	0·0	8·0	0·1	14·0	0·1
21	0 05·3	0 05·3	0 05·0	2·1	0·0	8·1	0·1	14·1	0·1
22	0 05·5	0 05·5	0 05·2	2·2	0·0	8·2	0·1	14·2	0·1
23	0 05·8	0 05·8	0 05·5	2·3	0·0	8·3	0·1	14·3	0·1
24	0 06·0	0 06·0	0 05·7	2·4	0·0	8·4	0·1	14·4	0·1
25	0 06·3	0 06·3	0 06·0	2·5	0·0	8·5	0·1	14·5	0·1
26	0 06·5	0 06·5	0 06·2	2·6	0·0	8·6	0·1	14·6	0·1
27	0 06·8	0 06·8	0 06·4	2·7	0·0	8·7	0·1	14·7	0·1
28	0 07·0	0 07·0	0 06·7	2·8	0·0	8·8	0·1	14·8	0·1
29	0 07·3	0 07·3	0 06·9	2·9	0·0	8·9	0·1	14·9	0·1
30	0 07·5	0 07·5	0 07·2	3·0	0·0	9·0	0·1	15·0	0·1
31	0 07·8	0 07·8	0 07·4	3·1	0·0	9·1	0·1	15·1	0·1
32	0 08·0	0 08·0	0 07·6	3·2	0·0	9·2	0·1	15·2	0·1
33	0 08·3	0 08·3	0 07·9	3·3	0·0	9·3	0·1	15·3	0·1
34	0 08·5	0 08·5	0 08·1	3·4	0·0	9·4	0·1	15·4	0·1
35	0 08·8	0 08·8	0 08·4	3·5	0·0	9·5	0·1	15·5	0·1
36	0 09·0	0 09·0	0 08·6	3·6	0·0	9·6	0·1	15·6	0·1
37	0 09·3	0 09·3	0 08·8	3·7	0·0	9·7	0·1	15·7	0·1
38	0 09·5	0 09·5	0 09·1	3·8	0·0	9·8	0·1	15·8	0·1
39	0 09·8	0 09·8	0 09·3	3·9	0·0	9·9	0·1	15·9	0·1
40	0 10·0	0 10·0	0 09·5	4·0	0·0	10·0	0·1	16·0	0·1
41	0 10·3	0 10·3	0 09·8	4·1	0·0	10·1	0·1	16·1	0·1
42	0 10·5	0 10·5	0 10·0	4·2	0·0	10·2	0·1	16·2	0·1
43	0 10·8	0 10·8	0 10·3	4·3	0·0	10·3	0·1	16·3	0·1
44	0 11·0	0 11·0	0 10·5	4·4	0·0	10·4	0·1	16·4	0·1
45	0 11·3	0 11·3	0 10·7	4·5	0·0	10·5	0·1	16·5	0·1
46	0 11·5	0 11·5	0 11·0	4·6	0·0	10·6	0·1	16·6	0·1
47	0 11·8	0 11·8	0 11·2	4·7	0·0	10·7	0·1	16·7	0·1
48	0 12·0	0 12·0	0 11·5	4·8	0·0	10·8	0·1	16·8	0·1
49	0 12·3	0 12·3	0 11·7	4·9	0·0	10·9	0·1	16·9	0·1
50	0 12·5	0 12·5	0 11·9	5·0	0·0	11·0	0·1	17·0	0·1
51	0 12·8	0 12·8	0 12·2	5·1	0·0	11·1	0·1	17·1	0·1
52	0 13·0	0 13·0	0 12·4	5·2	0·0	11·2	0·1	17·2	0·1
53	0 13·3	0 13·3	0 12·6	5·3	0·0	11·3	0·1	17·3	0·1
54	0 13·5	0 13·5	0 12·9	5·4	0·0	11·4	0·1	17·4	0·1
55	0 13·8	0 13·8	0 13·1	5·5	0·0	11·5	0·1	17·5	0·1
56	0 14·0	0 14·0	0 13·4	5·6	0·0	11·6	0·1	17·6	0·1
57	0 14·3	0 14·3	0 13·6	5·7	0·0	11·7	0·1	17·7	0·1
58	0 14·5	0 14·5	0 13·8	5·8	0·0	11·8	0·1	17·8	0·1
59	0 14·8	0 14·8	0 14·1	5·9	0·0	11·9	0·1	17·9	0·1
60	0 15·0	0 15·0	0 14·3	6·0	0·1	12·0	0·1	18·0	0·2

m 1	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	0 15·0	0 15·0	0 14·3	0·0	0·0	6·0	0·2	12·0	0·3
01	0 15·3	0 15·3	0 14·6	0·1	0·0	6·1	0·2	12·1	0·3
02	0 15·5	0 15·5	0 14·8	0·2	0·0	6·2	0·2	12·2	0·3
03	0 15·8	0 15·8	0 15·0	0·3	0·0	6·3	0·2	12·3	0·3
04	0 16·0	0 16·0	0 15·3	0·4	0·0	6·4	0·2	12·4	0·3
05	0 16·3	0 16·3	0 15·5	0·5	0·0	6·5	0·2	12·5	0·3
06	0 16·5	0 16·5	0 15·7	0·6	0·0	6·6	0·2	12·6	0·3
07	0 16·8	0 16·8	0 16·0	0·7	0·0	6·7	0·2	12·7	0·3
08	0 17·0	0 17·0	0 16·2	0·8	0·0	6·8	0·2	12·8	0·3
09	0 17·3	0 17·3	0 16·5	0·9	0·0	6·9	0·2	12·9	0·3
10	0 17·5	0 17·5	0 16·7	1·0	0·0	7·0	0·2	13·0	0·3
11	0 17·8	0 17·8	0 16·9	1·1	0·0	7·1	0·2	13·1	0·3
12	0 18·0	0 18·0	0 17·2	1·2	0·0	7·2	0·2	13·2	0·3
13	0 18·3	0 18·3	0 17·4	1·3	0·0	7·3	0·2	13·3	0·3
14	0 18·5	0 18·6	0 17·7	1·4	0·0	7·4	0·2	13·4	0·3
15	0 18·8	0 18·8	0 17·9	1·5	0·0	7·5	0·2	13·5	0·3
16	0 19·0	0 19·1	0 18·1	1·6	0·0	7·6	0·2	13·6	0·3
17	0 19·3	0 19·3	0 18·4	1·7	0·0	7·7	0·2	13·7	0·3
18	0 19·5	0 19·6	0 18·6	1·8	0·0	7·8	0·2	13·8	0·3
19	0 19·8	0 19·8	0 18·9	1·9	0·0	7·9	0·2	13·9	0·3
20	0 20·0	0 20·1	0 19·1	2·0	0·1	8·0	0·2	14·0	0·4
21	0 20·3	0 20·3	0 19·3	2·1	0·1	8·1	0·2	14·1	0·4
22	0 20·5	0 20·6	0 19·6	2·2	0·1	8·2	0·2	14·2	0·4
23	0 20·8	0 20·8	0 19·8	2·3	0·1	8·3	0·2	14·3	0·4
24	0 21·0	0 21·1	0 20·0	2·4	0·1	8·4	0·2	14·4	0·4
25	0 21·3	0 21·3	0 20·3	2·5	0·1	8·5	0·2	14·5	0·4
26	0 21·5	0 21·6	0 20·5	2·6	0·1	8·6	0·2	14·6	0·4
27	0 21·8	0 21·8	0 20·8	2·7	0·1	8·7	0·2	14·7	0·4
28	0 22·0	0 22·1	0 21·0	2·8	0·1	8·8	0·2	14·8	0·4
29	0 22·3	0 22·3	0 21·2	2·9	0·1	8·9	0·2	14·9	0·4
30	0 22·5	0 22·6	0 21·5	3·0	0·1	9·0	0·2	15·0	0·4
31	0 22·8	0 22·8	0 21·7	3·1	0·1	9·1	0·2	15·1	0·4
32	0 23·0	0 23·1	0 22·0	3·2	0·1	9·2	0·2	15·2	0·4
33	0 23·3	0 23·3	0 22·2	3·3	0·1	9·3	0·2	15·3	0·4
34	0 23·5	0 23·6	0 22·4	3·4	0·1	9·4	0·2	15·4	0·4
35	0 23·8	0 23·8	0 22·7	3·5	0·1	9·5	0·2	15·5	0·4
36	0 24·0	0 24·1	0 22·9	3·6	0·1	9·6	0·2	15·6	0·4
37	0 24·3	0 24·3	0 23·1	3·7	0·1	9·7	0·2	15·7	0·4
38	0 24·5	0 24·6	0 23·4	3·8	0·1	9·8	0·2	15·8	0·4
39	0 24·8	0 24·8	0 23·6	3·9	0·1	9·9	0·2	15·9	0·4
40	0 25·0	0 25·1	0 23·9	4·0	0·1	10·0	0·3	16·0	0·4
41	0 25·3	0 25·3	0 24·1	4·1	0·1	10·1	0·3	16·1	0·4
42	0 25·5	0 25·6	0 24·3	4·2	0·1	10·2	0·3	16·2	0·4
43	0 25·8	0 25·8	0 24·6	4·3	0·1	10·3	0·3	16·3	0·4
44	0 26·0	0 26·1	0 24·8	4·4	0·1	10·4	0·3	16·4	0·4
45	0 26·3	0 26·3	0 25·1	4·5	0·1	10·5	0·3	16·5	0·4
46	0 26·5	0 26·6	0 25·3	4·6	0·1	10·6	0·3	16·6	0·4
47	0 26·8	0 26·8	0 25·5	4·7	0·1	10·7	0·3	16·7	0·4
48	0 27·0	0 27·1	0 25·8	4·8	0·1	10·8	0·3	16·8	0·4
49	0 27·3	0 27·3	0 26·0	4·9	0·1	10·9	0·3	16·9	0·4
50	0 27·5	0 27·6	0 26·2	5·0	0·1	11·0	0·3	17·0	0·4
51	0 27·8	0 27·8	0 26·5	5·1	0·1	11·1	0·3	17·1	0·4
52	0 28·0	0 28·1	0 26·7	5·2	0·1	11·2	0·3	17·2	0·4
53	0 28·3	0 28·3	0 27·0	5·3	0·1	11·3	0·3	17·3	0·4
54	0 28·5	0 28·6	0 27·2	5·4	0·1	11·4	0·3	17·4	0·4
55	0 28·8	0 28·8	0 27·4	5·5	0·1	11·5	0·3	17·5	0·4
56	0 29·0	0 29·1	0 27·7	5·6	0·1	11·6	0·3	17·6	0·4
57	0 29·3	0 29·3	0 27·9	5·7	0·1	11·7	0·3	17·7	0·4
58	0 29·5	0 29·6	0 28·2	5·8	0·1	11·8	0·3	17·8	0·4
59	0 29·8	0 29·8	0 28·4	5·9	0·1	11·9	0·3	17·9	0·4
60	0 30·0	0 30·1	0 28·6	6·0	0·2	12·0	0·3	18·0	0·5

m 2	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	0 30·0	0 30·1	0 28·6	0·0	0·0	6·0	0·3	12·0	0·5
01	0 30·3	0 30·3	0 28·9	0·1	0·0	6·1	0·3	12·1	0·5
02	0 30·5	0 30·6	0 29·1	0·2	0·0	6·2	0·3	12·2	0·5
03	0 30·8	0 30·8	0 29·3	0·3	0·0	6·3	0·3	12·3	0·5
04	0 31·0	0 31·1	0 29·6	0·4	0·0	6·4	0·3	12·4	0·5
05	0 31·3	0 31·3	0 29·8	0·5	0·0	6·5	0·3	12·5	0·5
06	0 31·5	0 31·6	0 30·1	0·6	0·0	6·6	0·3	12·6	0·5
07	0 31·8	0 31·8	0 30·3	0·7	0·0	6·7	0·3	12·7	0·5
08	0 32·0	0 32·1	0 30·5	0·8	0·0	6·8	0·3	12·8	0·5
09	0 32·3	0 32·3	0 30·8	0·9	0·0	6·9	0·3	12·9	0·5
10	0 32·5	0 32·6	0 31·0	1·0	0·0	7·0	0·3	13·0	0·5
11	0 32·8	0 32·8	0 31·3	1·1	0·0	7·1	0·3	13·1	0·5
12	0 33·0	0 33·1	0 31·5	1·2	0·1	7·2	0·3	13·2	0·6
13	0 33·3	0 33·3	0 31·7	1·3	0·1	7·3	0·3	13·3	0·6
14	0 33·5	0 33·6	0 32·0	1·4	0·1	7·4	0·3	13·4	0·6
15	0 33·8	0 33·8	0 32·2	1·5	0·1	7·5	0·3	13·5	0·6
16	0 34·0	0 34·1	0 32·5	1·6	0·1	7·6	0·3	13·6	0·6
17	0 34·3	0 34·3	0 32·7	1·7	0·1	7·7	0·3	13·7	0·6
18	0 34·5	0 34·6	0 32·9	1·8	0·1	7·8	0·3	13·8	0·6
19	0 34·8	0 34·8	0 33·2	1·9	0·1	7·9	0·3	13·9	0·6
20	0 35·0	0 35·1	0 33·4	2·0	0·1	8·0	0·3	14·0	0·6
21	0 35·3	0 35·3	0 33·6	2·1	0·1	8·1	0·3	14·1	0·6
22	0 35·5	0 35·6	0 33·9	2·2	0·1	8·2	0·3	14·2	0·6
23	0 35·8	0 35·8	0 34·1	2·3	0·1	8·3	0·3	14·3	0·6
24	0 36·0	0 36·1	0 34·4	2·4	0·1	8·4	0·4	14·4	0·6
25	0 36·3	0 36·3	0 34·6	2·5	0·1	8·5	0·4	14·5	0·6
26	0 36·5	0 36·6	0 34·8	2·6	0·1	8·6	0·4	14·6	0·6
27	0 36·8	0 36·9	0 35·1	2·7	0·1	8·7	0·4	14·7	0·6
28	0 37·0	0 37·1	0 35·3	2·8	0·1	8·8	0·4	14·8	0·6
29	0 37·3	0 37·4	0 35·6	2·9	0·1	8·9	0·4	14·9	0·6
30	0 37·5	0 37·6	0 35·8	3·0	0·1	9·0	0·4	15·0	0·6
31	0 37·8	0 37·9	0 36·0	3·1	0·1	9·1	0·4	15·1	0·6
32	0 38·0	0 38·1	0 36·3	3·2	0·1	9·2	0·4	15·2	0·6
33	0 38·3	0 38·4	0 36·5	3·3	0·1	9·3	0·4	15·3	0·6
34	0 38·5	0 38·6	0 36·7	3·4	0·1	9·4	0·4	15·4	0·6
35	0 38·8	0 38·9	0 37·0	3·5	0·1	9·5	0·4	15·5	0·6
36	0 39·0	0 39·1	0 37·2	3·6	0·2	9·6	0·4	15·6	0·7
37	0 39·3	0 39·4	0 37·5	3·7	0·2	9·7	0·4	15·7	0·7
38	0 39·5	0 39·6	0 37·7	3·8	0·2	9·8	0·4	15·8	0·7
39	0 39·8	0 39·9	0 37·9	3·9	0·2	9·9	0·4	15·9	0·7
40	0 40·0	0 40·1	0 38·2	4·0	0·2	10·0	0·4	16·0	0·7
41	0 40·3	0 40·4	0 38·4	4·1	0·2	10·1	0·4	16·1	0·7
42	0 40·5	0 40·6	0 38·7	4·2	0·2	10·2	0·4	16·2	0·7
43	0 40·8	0 40·9	0 38·9	4·3	0·2	10·3	0·4	16·3	0·7
44	0 41·0	0 41·1	0 39·1	4·4	0·2	10·4	0·4	16·4	0·7
45	0 41·3	0 41·4	0 39·4	4·5	0·2	10·5	0·4	16·5	0·7
46	0 41·5	0 41·6	0 39·6	4·6	0·2	10·6	0·4	16·6	0·7
47	0 41·8	0 41·9	0 39·8	4·7	0·2	10·7	0·4	16·7	0·7
48	0 42·0	0 42·1	0 40·1	4·8	0·2	10·8	0·5	16·8	0·7
49	0 42·3	0 42·4	0 40·3	4·9	0·2	10·9	0·5	16·9	0·7
50	0 42·5	0 42·6	0 40·6	5·0	0·2	11·0	0·5	17·0	0·7
51	0 42·8	0 42·9	0 40·8	5·1	0·2	11·1	0·5	17·1	0·7
52	0 43·0	0 43·1	0 41·0	5·2	0·2	11·2	0·5	17·2	0·7
53	0 43·3	0 43·4	0 41·3	5·3	0·2	11·3	0·5	17·3	0·7
54	0 43·5	0 43·6	0 41·5	5·4	0·2	11·4	0·5	17·4	0·7
55	0 43·8	0 43·9	0 41·8	5·5	0·2	11·5	0·5	17·5	0·7
56	0 44·0	0 44·1	0 42·0	5·6	0·2	11·6	0·5	17·6	0·7
57	0 44·3	0 44·4	0 42·2	5·7	0·2	11·7	0·5	17·7	0·7
58	0 44·5	0 44·6	0 42·5	5·8	0·2	11·8	0·5	17·8	0·7
59	0 44·8	0 44·9	0 42·7	5·9	0·2	11·9	0·5	17·9	0·7
60	0 45·0	0 45·1	0 43·0	6·0	0·3	12·0	0·5	18·0	0·8

m 3	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	0 45·0	0 45·1	0 43·0	0·0	0·0	6·0	0·4	12·0	0·7
01	0 45·3	0 45·4	0 43·2	0·1	0·0	6·1	0·4	12·1	0·7
02	0 45·5	0 45·6	0 43·4	0·2	0·0	6·2	0·4	12·2	0·7
03	0 45·8	0 45·9	0 43·7	0·3	0·0	6·3	0·4	12·3	0·7
04	0 46·0	0 46·1	0 43·9	0·4	0·0	6·4	0·4	12·4	0·7
05	0 46·3	0 46·4	0 44·1	0·5	0·0	6·5	0·4	12·5	0·7
06	0 46·5	0 46·6	0 44·4	0·6	0·0	6·6	0·4	12·6	0·7
07	0 46·8	0 46·9	0 44·6	0·7	0·0	6·7	0·4	12·7	0·7
08	0 47·0	0 47·1	0 44·9	0·8	0·0	6·8	0·4	12·8	0·7
09	0 47·3	0 47·4	0 45·1	0·9	0·1	6·9	0·4	12·9	0·8
10	0 47·5	0 47·6	0 45·3	1·0	0·1	7·0	0·4	13·0	0·8
11	0 47·8	0 47·9	0 45·6	1·1	0·1	7·1	0·4	13·1	0·8
12	0 48·0	0 48·1	0 45·8	1·2	0·1	7·2	0·4	13·2	0·8
13	0 48·3	0 48·4	0 46·1	1·3	0·1	7·3	0·4	13·3	0·8
14	0 48·5	0 48·6	0 46·3	1·4	0·1	7·4	0·4	13·4	0·8
15	0 48·8	0 48·9	0 46·5	1·5	0·1	7·5	0·4	13·5	0·8
16	0 49·0	0 49·1	0 46·8	1·6	0·1	7·6	0·4	13·6	0·8
17	0 49·3	0 49·4	0 47·0	1·7	0·1	7·7	0·4	13·7	0·8
18	0 49·5	0 49·6	0 47·2	1·8	0·1	7·8	0·5	13·8	0·8
19	0 49·8	0 49·9	0 47·5	1·9	0·1	7·9	0·5	13·9	0·8
20	0 50·0	0 50·1	0 47·7	2·0	0·1	8·0	0·5	14·0	0·8
21	0 50·3	0 50·4	0 48·0	2·1	0·1	8·1	0·5	14·1	0·8
22	0 50·5	0 50·6	0 48·2	2·2	0·1	8·2	0·5	14·2	0·8
23	0 50·8	0 50·9	0 48·4	2·3	0·1	8·3	0·5	14·3	0·8
24	0 51·0	0 51·1	0 48·7	2·4	0·1	8·4	0·5	14·4	0·8
25	0 51·3	0 51·4	0 48·9	2·5	0·1	8·5	0·5	14·5	0·8
26	0 51·5	0 51·6	0 49·2	2·6	0·2	8·6	0·5	14·6	0·9
27	0 51·8	0 51·9	0 49·4	2·7	0·2	8·7	0·5	14·7	0·9
28	0 52·0	0 52·1	0 49·6	2·8	0·2	8·8	0·5	14·8	0·9
29	0 52·3	0 52·4	0 49·9	2·9	0·2	8·9	0·5	14·9	0·9
30	0 52·5	0 52·6	0 50·1	3·0	0·2	9·0	0·5	15·0	0·9
31	0 52·8	0 52·9	0 50·3	3·1	0·2	9·1	0·5	15·1	0·9
32	0 53·0	0 53·1	0 50·6	3·2	0·2	9·2	0·5	15·2	0·9
33	0 53·3	0 53·4	0 50·8	3·3	0·2	9·3	0·5	15·3	0·9
34	0 53·5	0 53·6	0 51·1	3·4	0·2	9·4	0·5	15·4	0·9
35	0 53·8	0 53·9	0 51·3	3·5	0·2	9·5	0·6	15·5	0·9
36	0 54·0	0 54·1	0 51·5	3·6	0·2	9·6	0·6	15·6	0·9
37	0 54·3	0 54·4	0 51·8	3·7	0·2	9·7	0·6	15·7	0·9
38	0 54·5	0 54·6	0 52·0	3·8	0·2	9·8	0·6	15·8	0·9
39	0 54·8	0 54·9	0 52·3	3·9	0·2	9·9	0·6	15·9	0·9
40	0 55·0	0 55·2	0 52·5	4·0	0·2	10·0	0·6	16·0	0·9
41	0 55·3	0 55·4	0 52·7	4·1	0·2	10·1	0·6	16·1	0·9
42	0 55·5	0 55·7	0 53·0	4·2	0·2	10·2	0·6	16·2	0·9
43	0 55·8	0 55·9	0 53·2	4·3	0·3	10·3	0·6	16·3	1·0
44	0 56·0	0 56·2	0 53·4	4·4	0·3	10·4	0·6	16·4	1·0
45	0 56·3	0 56·4	0 53·7	4·5	0·3	10·5	0·6	16·5	1·0
46	0 56·5	0 56·7	0 53·9	4·6	0·3	10·6	0·6	16·6	1·0
47	0 56·8	0 56·9	0 54·2	4·7	0·3	10·7	0·6	16·7	1·0
48	0 57·0	0 57·2	0 54·4	4·8	0·3	10·8	0·6	16·8	1·0
49	0 57·3	0 57·4	0 54·6	4·9	0·3	10·9	0·6	16·9	1·0
50	0 57·5	0 57·7	0 54·9	5·0	0·3	11·0	0·6	17·0	1·0
51	0 57·8	0 57·9	0 55·1	5·1	0·3	11·1	0·6	17·1	1·0
52	0 58·0	0 58·2	0 55·4	5·2	0·3	11·2	0·7	17·2	1·0
53	0 58·3	0 58·4	0 55·6	5·3	0·3	11·3	0·7	17·3	1·0
54	0 58·5	0 58·7	0 55·8	5·4	0·3	11·4	0·7	17·4	1·0
55	0 58·8	0 58·9	0 56·1	5·5	0·3	11·5	0·7	17·5	1·0
56	0 59·0	0 59·2	0 56·3	5·6	0·3	11·6	0·7	17·6	1·0
57	0 59·3	0 59·4	0 56·6	5·7	0·3	11·7	0·7	17·7	1·0
58	0 59·5	0 59·7	0 56·8	5·8	0·3	11·8	0·7	17·8	1·0
59	0 59·8	0 59·9	0 57·0	5·9	0·3	11·9	0·7	17·9	1·0
60	1 00·0	1 00·2	0 57·3	6·0	0·4	12·0	0·7	18·0	1·1

m 4	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	1 00·0	1 00·2	0 57·3	0·0	0·0	6·0	0·5	12·0	0·9
01	1 00·3	1 00·4	0 57·5	0·1	0·0	6·1	0·5	12·1	0·9
02	1 00·5	1 00·7	0 57·7	0·2	0·0	6·2	0·5	12·2	0·9
03	1 00·8	1 00·9	0 58·0	0·3	0·0	6·3	0·5	12·3	0·9
04	1 01·0	1 01·2	0 58·2	0·4	0·0	6·4	0·5	12·4	0·9
05	1 01·3	1 01·4	0 58·5	0·5	0·0	6·5	0·5	12·5	0·9
06	1 01·5	1 01·7	0 58·7	0·6	0·0	6·6	0·5	12·6	0·9
07	1 01·8	1 01·9	0 58·9	0·7	0·1	6·7	0·5	12·7	1·0
08	1 02·0	1 02·2	0 59·2	0·8	0·1	6·8	0·5	12·8	1·0
09	1 02·3	1 02·4	0 59·4	0·9	0·1	6·9	0·5	12·9	1·0
10	1 02·5	1 02·7	0 59·7	1·0	0·1	7·0	0·5	13·0	1·0
11	1 02·8	1 02·9	0 59·9	1·1	0·1	7·1	0·5	13·1	1·0
12	1 03·0	1 03·2	1 00·1	1·2	0·1	7·2	0·5	13·2	1·0
13	1 03·3	1 03·4	1 00·4	1·3	0·1	7·3	0·5	13·3	1·0
14	1 03·5	1 03·7	1 00·6	1·4	0·1	7·4	0·6	13·4	1·0
15	1 03·8	1 03·9	1 00·8	1·5	0·1	7·5	0·6	13·5	1·0
16	1 04·0	1 04·2	1 01·1	1·6	0·1	7·6	0·6	13·6	1·0
17	1 04·3	1 04·4	1 01·3	1·7	0·1	7·7	0·6	13·7	1·0
18	1 04·5	1 04·7	1 01·6	1·8	0·1	7·8	0·6	13·8	1·0
19	1 04·8	1 04·9	1 01·8	1·9	0·1	7·9	0·6	13·9	1·0
20	1 05·0	1 05·2	1 02·0	2·0	0·2	8·0	0·6	14·0	1·1
21	1 05·3	1 05·4	1 02·3	2·1	0·2	8·1	0·6	14·1	1·1
22	1 05·5	1 05·7	1 02·5	2·2	0·2	8·2	0·6	14·2	1·1
23	1 05·8	1 05·9	1 02·8	2·3	0·2	8·3	0·6	14·3	1·1
24	1 06·0	1 06·2	1 03·0	2·4	0·2	8·4	0·6	14·4	1·1
25	1 06·3	1 06·4	1 03·2	2·5	0·2	8·5	0·6	14·5	1·1
26	1 06·5	1 06·7	1 03·5	2·6	0·2	8·6	0·6	14·6	1·1
27	1 06·8	1 06·9	1 03·7	2·7	0·2	8·7	0·7	14·7	1·1
28	1 07·0	1 07·2	1 03·9	2·8	0·2	8·8	0·7	14·8	1·1
29	1 07·3	1 07·4	1 04·2	2·9	0·2	8·9	0·7	14·9	1·1
30	1 07·5	1 07·7	1 04·4	3·0	0·2	9·0	0·7	15·0	1·1
31	1 07·8	1 07·9	1 04·7	3·1	0·2	9·1	0·7	15·1	1·1
32	1 08·0	1 08·2	1 04·9	3·2	0·2	9·2	0·7	15·2	1·1
33	1 08·3	1 08·4	1 05·1	3·3	0·2	9·3	0·7	15·3	1·1
34	1 08·5	1 08·7	1 05·4	3·4	0·3	9·4	0·7	15·4	1·2
35	1 08·8	1 08·9	1 05·6	3·5	0·3	9·5	0·7	15·5	1·2
36	1 09·0	1 09·2	1 05·9	3·6	0·3	9·6	0·7	15·6	1·2
37	1 09·3	1 09·4	1 06·1	3·7	0·3	9·7	0·7	15·7	1·2
38	1 09·5	1 09·7	1 06·3	3·8	0·3	9·8	0·7	15·8	1·2
39	1 09·8	1 09·9	1 06·6	3·9	0·3	9·9	0·7	15·9	1·2
40	1 10·0	1 10·2	1 06·8	4·0	0·3	10·0	0·8	16·0	1·2
41	1 10·3	1 10·4	1 07·0	4·1	0·3	10·1	0·8	16·1	1·2
42	1 10·5	1 10·7	1 07·3	4·2	0·3	10·2	0·8	16·2	1·2
43	1 10·8	1 10·9	1 07·5	4·3	0·3	10·3	0·8	16·3	1·2
44	1 11·0	1 11·2	1 07·8	4·4	0·3	10·4	0·8	16·4	1·2
45	1 11·3	1 11·4	1 08·0	4·5	0·3	10·5	0·8	16·5	1·2
46	1 11·5	1 11·7	1 08·2	4·6	0·3	10·6	0·8	16·6	1·2
47	1 11·8	1 11·9	1 08·5	4·7	0·4	10·7	0·8	16·7	1·3
48	1 12·0	1 12·2	1 08·7	4·8	0·4	10·8	0·8	16·8	1·3
49	1 12·3	1 12·4	1 09·0	4·9	0·4	10·9	0·8	16·9	1·3
50	1 12·5	1 12·7	1 09·2	5·0	0·4	11·0	0·8	17·0	1·3
51	1 12·8	1 12·9	1 09·4	5·1	0·4	11·1	0·8	17·1	1·3
52	1 13·0	1 13·2	1 09·7	5·2	0·4	11·2	0·8	17·2	1·3
53	1 13·3	1 13·5	1 09·9	5·3	0·4	11·3	0·8	17·3	1·3
54	1 13·5	1 13·7	1 10·2	5·4	0·4	11·4	0·9	17·4	1·3
55	1 13·8	1 14·0	1 10·4	5·5	0·4	11·5	0·9	17·5	1·3
56	1 14·0	1 14·2	1 10·6	5·6	0·4	11·6	0·9	17·6	1·3
57	1 14·3	1 14·5	1 10·9	5·7	0·4	11·7	0·9	17·7	1·3
58	1 14·5	1 14·7	1 11·1	5·8	0·4	11·8	0·9	17·8	1·3
59	1 14·8	1 15·0	1 11·3	5·9	0·4	11·9	0·9	17·9	1·3
60	1 15·0	1 15·2	1 11·6	6·0	0·5	12·0	0·9	18·0	1·4

m 5	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	1 15·0	1 15·2	1 11·6	0·0	0·0	6·0	0·6	12·0	1·1
01	1 15·3	1 15·5	1 11·8	0·1	0·0	6·1	0·6	12·1	1·1
02	1 15·5	1 15·7	1 12·1	0·2	0·0	6·2	0·6	12·2	1·1
03	1 15·8	1 16·0	1 12·3	0·3	0·0	6·3	0·6	12·3	1·1
04	1 16·0	1 16·2	1 12·5	0·4	0·0	6·4	0·6	12·4	1·1
05	1 16·3	1 16·5	1 12·8	0·5	0·0	6·5	0·6	12·5	1·1
06	1 16·5	1 16·7	1 13·0	0·6	0·1	6·6	0·6	12·6	1·2
07	1 16·8	1 17·0	1 13·3	0·7	0·1	6·7	0·6	12·7	1·2
08	1 17·0	1 17·2	1 13·5	0·8	0·1	6·8	0·6	12·8	1·2
09	1 17·3	1 17·5	1 13·7	0·9	0·1	6·9	0·6	12·9	1·2
10	1 17·5	1 17·7	1 14·0	1·0	0·1	7·0	0·6	13·0	1·2
11	1 17·8	1 18·0	1 14·2	1·1	0·1	7·1	0·7	13·1	1·2
12	1 18·0	1 18·2	1 14·4	1·2	0·1	7·2	0·7	13·2	1·2
13	1 18·3	1 18·5	1 14·7	1·3	0·1	7·3	0·7	13·3	1·2
14	1 18·5	1 18·7	1 14·9	1·4	0·1	7·4	0·7	13·4	1·2
15	1 18·8	1 19·0	1 15·2	1·5	0·1	7·5	0·7	13·5	1·2
16	1 19·0	1 19·2	1 15·4	1·6	0·1	7·6	0·7	13·6	1·2
17	1 19·3	1 19·5	1 15·6	1·7	0·2	7·7	0·7	13·7	1·3
18	1 19·5	1 19·7	1 15·9	1·8	0·2	7·8	0·7	13·8	1·3
19	1 19·8	1 20·0	1 16·1	1·9	0·2	7·9	0·7	13·9	1·3
20	1 20·0	1 20·2	1 16·4	2·0	0·2	8·0	0·7	14·0	1·3
21	1 20·3	1 20·5	1 16·6	2·1	0·2	8·1	0·7	14·1	1·3
22	1 20·5	1 20·7	1 16·8	2·2	0·2	8·2	0·8	14·2	1·3
23	1 20·8	1 21·0	1 17·1	2·3	0·2	8·3	0·8	14·3	1·3
24	1 21·0	1 21·2	1 17·3	2·4	0·2	8·4	0·8	14·4	1·3
25	1 21·3	1 21·5	1 17·5	2·5	0·2	8·5	0·8	14·5	1·3
26	1 21·5	1 21·7	1 17·8	2·6	0·2	8·6	0·8	14·6	1·3
27	1 21·8	1 22·0	1 18·0	2·7	0·2	8·7	0·8	14·7	1·3
28	1 22·0	1 22·2	1 18·3	2·8	0·3	8·8	0·8	14·8	1·4
29	1 22·3	1 22·5	1 18·5	2·9	0·3	8·9	0·8	14·9	1·4
30	1 22·5	1 22·7	1 18·7	3·0	0·3	9·0	0·8	15·0	1·4
31	1 22·8	1 23·0	1 19·0	3·1	0·3	9·1	0·8	15·1	1·4
32	1 23·0	1 23·2	1 19·2	3·2	0·3	9·2	0·8	15·2	1·4
33	1 23·3	1 23·5	1 19·5	3·3	0·3	9·3	0·9	15·3	1·4
34	1 23·5	1 23·7	1 19·7	3·4	0·3	9·4	0·9	15·4	1·4
35	1 23·8	1 24·0	1 19·9	3·5	0·3	9·5	0·9	15·5	1·4
36	1 24·0	1 24·2	1 20·2	3·6	0·3	9·6	0·9	15·6	1·4
37	1 24·3	1 24·5	1 20·4	3·7	0·3	9·7	0·9	15·7	1·4
38	1 24·5	1 24·7	1 20·7	3·8	0·3	9·8	0·9	15·8	1·4
39	1 24·8	1 25·0	1 20·9	3·9	0·4	9·9	0·9	15·9	1·5
40	1 25·0	1 25·2	1 21·1	4·0	0·4	10·0	0·9	16·0	1·5
41	1 25·3	1 25·5	1 21·4	4·1	0·4	10·1	0·9	16·1	1·5
42	1 25·5	1 25·7	1 21·6	4·2	0·4	10·2	0·9	16·2	1·5
43	1 25·8	1 26·0	1 21·8	4·3	0·4	10·3	0·9	16·3	1·5
44	1 26·0	1 26·2	1 22·1	4·4	0·4	10·4	1·0	16·4	1·5
45	1 26·3	1 26·5	1 22·3	4·5	0·4	10·5	1·0	16·5	1·5
46	1 26·5	1 26·7	1 22·6	4·6	0·4	10·6	1·0	16·6	1·5
47	1 26·8	1 27·0	1 22·8	4·7	0·4	10·7	1·0	16·7	1·5
48	1 27·0	1 27·2	1 23·0	4·8	0·4	10·8	1·0	16·8	1·5
49	1 27·3	1 27·5	1 23·3	4·9	0·4	10·9	1·0	16·9	1·5
50	1 27·5	1 27·7	1 23·5	5·0	0·5	11·0	1·0	17·0	1·6
51	1 27·8	1 28·0	1 23·8	5·1	0·5	11·1	1·0	17·1	1·6
52	1 28·0	1 28·2	1 24·0	5·2	0·5	11·2	1·0	17·2	1·6
53	1 28·3	1 28·5	1 24·2	5·3	0·5	11·3	1·0	17·3	1·6
54	1 28·5	1 28·7	1 24·5	5·4	0·5	11·4	1·0	17·4	1·6
55	1 28·8	1 29·0	1 24·7	5·5	0·5	11·5	1·1	17·5	1·6
56	1 29·0	1 29·2	1 24·9	5·6	0·5	11·6	1·1	17·6	1·6
57	1 29·3	1 29·5	1 25·2	5·7	0·5	11·7	1·1	17·7	1·6
58	1 29·5	1 29·7	1 25·4	5·8	0·5	11·8	1·1	17·8	1·6
59	1 29·8	1 30·0	1 25·7	5·9	0·5	11·9	1·1	17·9	1·6
60	1 30·0	1 30·2	1 25·9	6·0	0·6	12·0	1·1	18·0	1·7

m 6	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	1 30·0	1 30·2	1 25·9	0·0	0·0	6·0	0·7	12·0	1·3
01	1 30·3	1 30·5	1 26·1	0·1	0·0	6·1	0·7	12·1	1·3
02	1 30·5	1 30·7	1 26·4	0·2	0·0	6·2	0·7	12·2	1·3
03	1 30·8	1 31·0	1 26·6	0·3	0·0	6·3	0·7	12·3	1·3
04	1 31·0	1 31·2	1 26·9	0·4	0·0	6·4	0·7	12·4	1·3
05	1 31·3	1 31·5	1 27·1	0·5	0·1	6·5	0·7	12·5	1·4
06	1 31·5	1 31·8	1 27·3	0·6	0·1	6·6	0·7	12·6	1·4
07	1 31·8	1 32·0	1 27·6	0·7	0·1	6·7	0·7	12·7	1·4
08	1 32·0	1 32·3	1 27·8	0·8	0·1	6·8	0·7	12·8	1·4
09	1 32·3	1 32·5	1 28·0	0·9	0·1	6·9	0·7	12·9	1·4
10	1 32·5	1 32·8	1 28·3	1·0	0·1	7·0	0·8	13·0	1·4
11	1 32·8	1 33·0	1 28·5	1·1	0·1	7·1	0·8	13·1	1·4
12	1 33·0	1 33·3	1 28·8	1·2	0·1	7·2	0·8	13·2	1·4
13	1 33·3	1 33·5	1 29·0	1·3	0·1	7·3	0·8	13·3	1·4
14	1 33·5	1 33·8	1 29·2	1·4	0·2	7·4	0·8	13·4	1·5
15	1 33·8	1 34·0	1 29·5	1·5	0·2	7·5	0·8	13·5	1·5
16	1 34·0	1 34·3	1 29·7	1·6	0·2	7·6	0·8	13·6	1·5
17	1 34·3	1 34·5	1 30·0	1·7	0·2	7·7	0·8	13·7	1·5
18	1 34·5	1 34·8	1 30·2	1·8	0·2	7·8	0·8	13·8	1·5
19	1 34·8	1 35·0	1 30·4	1·9	0·2	7·9	0·9	13·9	1·5
20	1 35·0	1 35·3	1 30·7	2·0	0·2	8·0	0·9	14·0	1·5
21	1 35·3	1 35·5	1 30·9	2·1	0·2	8·1	0·9	14·1	1·5
22	1 35·5	1 35·8	1 31·1	2·2	0·2	8·2	0·9	14·2	1·5
23	1 35·8	1 36·0	1 31·4	2·3	0·2	8·3	0·9	14·3	1·5
24	1 36·0	1 36·3	1 31·6	2·4	0·3	8·4	0·9	14·4	1·6
25	1 36·3	1 36·5	1 31·9	2·5	0·3	8·5	0·9	14·5	1·6
26	1 36·5	1 36·8	1 32·1	2·6	0·3	8·6	0·9	14·6	1·6
27	1 36·8	1 37·0	1 32·3	2·7	0·3	8·7	0·9	14·7	1·6
28	1 37·0	1 37·3	1 32·6	2·8	0·3	8·8	1·0	14·8	1·6
29	1 37·3	1 37·5	1 32·8	2·9	0·3	8·9	1·0	14·9	1·6
30	1 37·5	1 37·8	1 33·1	3·0	0·3	9·0	1·0	15·0	1·6
31	1 37·8	1 38·0	1 33·3	3·1	0·3	9·1	1·0	15·1	1·6
32	1 38·0	1 38·3	1 33·5	3·2	0·3	9·2	1·0	15·2	1·6
33	1 38·3	1 38·5	1 33·8	3·3	0·4	9·3	1·0	15·3	1·7
34	1 38·5	1 38·8	1 34·0	3·4	0·4	9·4	1·0	15·4	1·7
35	1 38·8	1 39·0	1 34·3	3·5	0·4	9·5	1·0	15·5	1·7
36	1 39·0	1 39·3	1 34·5	3·6	0·4	9·6	1·0	15·6	1·7
37	1 39·3	1 39·5	1 34·7	3·7	0·4	9·7	1·1	15·7	1·7
38	1 39·5	1 39·8	1 35·0	3·8	0·4	9·8	1·1	15·8	1·7
39	1 39·8	1 40·0	1 35·2	3·9	0·4	9·9	1·1	15·9	1·7
40	1 40·0	1 40·3	1 35·4	4·0	0·4	10·0	1·1	16·0	1·7
41	1 40·3	1 40·5	1 35·7	4·1	0·4	10·1	1·1	16·1	1·7
42	1 40·5	1 40·8	1 35·9	4·2	0·5	10·2	1·1	16·2	1·8
43	1 40·8	1 41·0	1 36·2	4·3	0·5	10·3	1·1	16·3	1·8
44	1 41·0	1 41·3	1 36·4	4·4	0·5	10·4	1·1	16·4	1·8
45	1 41·3	1 41·5	1 36·6	4·5	0·5	10·5	1·1	16·5	1·8
46	1 41·5	1 41·8	1 36·9	4·6	0·5	10·6	1·1	16·6	1·8
47	1 41·8	1 42·0	1 37·1	4·7	0·5	10·7	1·2	16·7	1·8
48	1 42·0	1 42·3	1 37·4	4·8	0·5	10·8	1·2	16·8	1·8
49	1 42·3	1 42·5	1 37·6	4·9	0·5	10·9	1·2	16·9	1·8
50	1 42·5	1 42·8	1 37·8	5·0	0·5	11·0	1·2	17·0	1·8
51	1 42·8	1 43·0	1 38·1	5·1	0·6	11·1	1·2	17·1	1·9
52	1 43·0	1 43·3	1 38·3	5·2	0·6	11·2	1·2	17·2	1·9
53	1 43·3	1 43·5	1 38·5	5·3	0·6	11·3	1·2	17·3	1·9
54	1 43·5	1 43·8	1 38·8	5·4	0·6	11·4	1·2	17·4	1·9
55	1 43·8	1 44·0	1 39·0	5·5	0·6	11·5	1·2	17·5	1·9
56	1 44·0	1 44·3	1 39·3	5·6	0·6	11·6	1·3	17·6	1·9
57	1 44·3	1 44·5	1 39·5	5·7	0·6	11·7	1·3	17·7	1·9
58	1 44·5	1 44·8	1 39·7	5·8	0·6	11·8	1·3	17·8	1·9
59	1 44·8	1 45·0	1 40·0	5·9	0·6	11·9	1·3	17·9	1·9
60	1 45·0	1 45·3	1 40·2	6·0	0·7	12·0	1·3	18·0	2·0

m 7	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	1 45·0	1 45·3	1 40·2	0·0	0·0	6·0	0·8	12·0	1·5
01	1 45·3	1 45·5	1 40·5	0·1	0·0	6·1	0·8	12·1	1·5
02	1 45·5	1 45·8	1 40·7	0·2	0·0	6·2	0·8	12·2	1·5
03	1 45·8	1 46·0	1 40·9	0·3	0·0	6·3	0·8	12·3	1·5
04	1 46·0	1 46·3	1 41·2	0·4	0·1	6·4	0·8	12·4	1·6
05	1 46·3	1 46·5	1 41·4	0·5	0·1	6·5	0·8	12·5	1·6
06	1 46·5	1 46·8	1 41·6	0·6	0·1	6·6	0·8	12·6	1·6
07	1 46·8	1 47·0	1 41·9	0·7	0·1	6·7	0·8	12·7	1·6
08	1 47·0	1 47·3	1 42·1	0·8	0·1	6·8	0·9	12·8	1·6
09	1 47·3	1 47·5	1 42·4	0·9	0·1	6·9	0·9	12·9	1·6
10	1 47·5	1 47·8	1 42·6	1·0	0·1	7·0	0·9	13·0	1·6
11	1 47·8	1 48·0	1 42·8	1·1	0·1	7·1	0·9	13·1	1·6
12	1 48·0	1 48·3	1 43·1	1·2	0·2	7·2	0·9	13·2	1·7
13	1 48·3	1 48·5	1 43·3	1·3	0·2	7·3	0·9	13·3	1·7
14	1 48·5	1 48·8	1 43·6	1·4	0·2	7·4	0·9	13·4	1·7
15	1 48·8	1 49·0	1 43·8	1·5	0·2	7·5	0·9	13·5	1·7
16	1 49·0	1 49·3	1 44·0	1·6	0·2	7·6	1·0	13·6	1·7
17	1 49·3	1 49·5	1 44·3	1·7	0·2	7·7	1·0	13·7	1·7
18	1 49·5	1 49·8	1 44·5	1·8	0·2	7·8	1·0	13·8	1·7
19	1 49·8	1 50·1	1 44·8	1·9	0·2	7·9	1·0	13·9	1·7
20	1 50·0	1 50·3	1 45·0	2·0	0·3	8·0	1·0	14·0	1·8
21	1 50·3	1 50·6	1 45·2	2·1	0·3	8·1	1·0	14·1	1·8
22	1 50·5	1 50·8	1 45·5	2·2	0·3	8·2	1·0	14·2	1·8
23	1 50·8	1 51·1	1 45·7	2·3	0·3	8·3	1·0	14·3	1·8
24	1 51·0	1 51·3	1 45·9	2·4	0·3	8·4	1·1	14·4	1·8
25	1 51·3	1 51·6	1 46·2	2·5	0·3	8·5	1·1	14·5	1·8
26	1 51·5	1 51·8	1 46·4	2·6	0·3	8·6	1·1	14·6	1·8
27	1 51·8	1 52·1	1 46·7	2·7	0·3	8·7	1·1	14·7	1·8
28	1 52·0	1 52·3	1 46·9	2·8	0·4	8·8	1·1	14·8	1·9
29	1 52·3	1 52·6	1 47·1	2·9	0·4	8·9	1·1	14·9	1·9
30	1 52·5	1 52·8	1 47·4	3·0	0·4	9·0	1·1	15·0	1·9
31	1 52·8	1 53·1	1 47·6	3·1	0·4	9·1	1·1	15·1	1·9
32	1 53·0	1 53·3	1 47·9	3·2	0·4	9·2	1·2	15·2	1·9
33	1 53·3	1 53·6	1 48·1	3·3	0·4	9·3	1·2	15·3	1·9
34	1 53·5	1 53·8	1 48·3	3·4	0·4	9·4	1·2	15·4	1·9
35	1 53·8	1 54·1	1 48·6	3·5	0·4	9·5	1·2	15·5	1·9
36	1 54·0	1 54·3	1 48·8	3·6	0·5	9·6	1·2	15·6	2·0
37	1 54·3	1 54·6	1 49·0	3·7	0·5	9·7	1·2	15·7	2·0
38	1 54·5	1 54·8	1 49·3	3·8	0·5	9·8	1·2	15·8	2·0
39	1 54·8	1 55·1	1 49·5	3·9	0·5	9·9	1·2	15·9	2·0
40	1 55·0	1 55·3	1 49·8	4·0	0·5	10·0	1·3	16·0	2·0
41	1 55·3	1 55·6	1 50·0	4·1	0·5	10·1	1·3	16·1	2·0
42	1 55·5	1 55·8	1 50·2	4·2	0·5	10·2	1·3	16·2	2·0
43	1 55·8	1 56·1	1 50·5	4·3	0·5	10·3	1·3	16·3	2·0
44	1 56·0	1 56·3	1 50·7	4·4	0·6	10·4	1·3	16·4	2·1
45	1 56·3	1 56·6	1 51·0	4·5	0·6	10·5	1·3	16·5	2·1
46	1 56·5	1 56·8	1 51·2	4·6	0·6	10·6	1·3	16·6	2·1
47	1 56·8	1 57·1	1 51·4	4·7	0·6	10·7	1·3	16·7	2·1
48	1 57·0	1 57·3	1 51·7	4·8	0·6	10·8	1·4	16·8	2·1
49	1 57·3	1 57·6	1 51·9	4·9	0·6	10·9	1·4	16·9	2·1
50	1 57·5	1 57·8	1 52·1	5·0	0·6	11·0	1·4	17·0	2·1
51	1 57·8	1 58·1	1 52·4	5·1	0·6	11·1	1·4	17·1	2·1
52	1 58·0	1 58·3	1 52·6	5·2	0·7	11·2	1·4	17·2	2·2
53	1 58·3	1 58·6	1 52·9	5·3	0·7	11·3	1·4	17·3	2·2
54	1 58·5	1 58·8	1 53·1	5·4	0·7	11·4	1·4	17·4	2·2
55	1 58·8	1 59·1	1 53·3	5·5	0·7	11·5	1·4	17·5	2·2
56	1 59·0	1 59·3	1 53·6	5·6	0·7	11·6	1·5	17·6	2·2
57	1 59·3	1 59·6	1 53·8	5·7	0·7	11·7	1·5	17·7	2·2
58	1 59·5	1 59·8	1 54·1	5·8	0·7	11·8	1·5	17·8	2·2
59	1 59·8	2 00·1	1 54·3	5·9	0·7	11·9	1·5	17·9	2·2
60	2 00·0	2 00·3	1 54·5	6·0	0·8	12·0	1·5	18·0	2·3

m 8	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	2 00·0	2 00·3	1 54·5	0·0	0·0	6·0	0·9	12·0	1·7
01	2 00·3	2 00·6	1 54·8	0·1	0·0	6·1	0·9	12·1	1·7
02	2 00·5	2 00·8	1 55·0	0·2	0·0	6·2	0·9	12·2	1·7
03	2 00·8	2 01·1	1 55·2	0·3	0·0	6·3	0·9	12·3	1·7
04	2 01·0	2 01·3	1 55·5	0·4	0·1	6·4	0·9	12·4	1·8
05	2 01·3	2 01·6	1 55·7	0·5	0·1	6·5	0·9	12·5	1·8
06	2 01·5	2 01·8	1 56·0	0·6	0·1	6·6	0·9	12·6	1·8
07	2 01·8	2 02·1	1 56·2	0·7	0·1	6·7	0·9	12·7	1·8
08	2 02·0	2 02·3	1 56·4	0·8	0·1	6·8	1·0	12·8	1·8
09	2 02·3	2 02·6	1 56·7	0·9	0·1	6·9	1·0	12·9	1·8
10	2 02·5	2 02·8	1 56·9	1·0	0·1	7·0	1·0	13·0	1·8
11	2 02·8	2 03·1	1 57·2	1·1	0·2	7·1	1·0	13·1	1·9
12	2 03·0	2 03·3	1 57·4	1·2	0·2	7·2	1·0	13·2	1·9
13	2 03·3	2 03·6	1 57·6	1·3	0·2	7·3	1·0	13·3	1·9
14	2 03·5	2 03·8	1 57·9	1·4	0·2	7·4	1·0	13·4	1·9
15	2 03·8	2 04·1	1 58·1	1·5	0·2	7·5	1·1	13·5	1·9
16	2 04·0	2 04·3	1 58·4	1·6	0·2	7·6	1·1	13·6	1·9
17	2 04·3	2 04·6	1 58·6	1·7	0·2	7·7	1·1	13·7	1·9
18	2 04·5	2 04·8	1 58·8	1·8	0·3	7·8	1·1	13·8	2·0
19	2 04·8	2 05·1	1 59·1	1·9	0·3	7·9	1·1	13·9	2·0
20	2 05·0	2 05·3	1 59·3	2·0	0·3	8·0	1·1	14·0	2·0
21	2 05·3	2 05·6	1 59·5	2·1	0·3	8·1	1·1	14·1	2·0
22	2 05·5	2 05·8	1 59·8	2·2	0·3	8·2	1·2	14·2	2·0
23	2 05·8	2 06·1	2 00·0	2·3	0·3	8·3	1·2	14·3	2·0
24	2 06·0	2 06·3	2 00·3	2·4	0·3	8·4	1·2	14·4	2·0
25	2 06·3	2 06·6	2 00·5	2·5	0·4	8·5	1·2	14·5	2·1
26	2 06·5	2 06·8	2 00·7	2·6	0·4	8·6	1·2	14·6	2·1
27	2 06·8	2 07·1	2 01·0	2·7	0·4	8·7	1·2	14·7	2·1
28	2 07·0	2 07·3	2 01·2	2·8	0·4	8·8	1·2	14·8	2·1
29	2 07·3	2 07·6	2 01·5	2·9	0·4	8·9	1·3	14·9	2·1
30	2 07·5	2 07·8	2 01·7	3·0	0·4	9·0	1·3	15·0	2·1
31	2 07·8	2 08·1	2 01·9	3·1	0·4	9·1	1·3	15·1	2·1
32	2 08·0	2 08·4	2 02·2	3·2	0·5	9·2	1·3	15·2	2·2
33	2 08·3	2 08·6	2 02·4	3·3	0·5	9·3	1·3	15·3	2·2
34	2 08·5	2 08·9	2 02·6	3·4	0·5	9·4	1·3	15·4	2·2
35	2 08·8	2 09·1	2 02·9	3·5	0·5	9·5	1·3	15·5	2·2
36	2 09·0	2 09·4	2 03·1	3·6	0·5	9·6	1·4	15·6	2·2
37	2 09·3	2 09·6	2 03·4	3·7	0·5	9·7	1·4	15·7	2·2
38	2 09·5	2 09·9	2 03·6	3·8	0·5	9·8	1·4	15·8	2·2
39	2 09·8	2 10·1	2 03·8	3·9	0·6	9·9	1·4	15·9	2·3
40	2 10·0	2 10·4	2 04·1	4·0	0·6	10·0	1·4	16·0	2·3
41	2 10·3	2 10·6	2 04·3	4·1	0·6	10·1	1·4	16·1	2·3
42	2 10·5	2 10·9	2 04·6	4·2	0·6	10·2	1·4	16·2	2·3
43	2 10·8	2 11·1	2 04·8	4·3	0·6	10·3	1·5	16·3	2·3
44	2 11·0	2 11·4	2 05·0	4·4	0·6	10·4	1·5	16·4	2·3
45	2 11·3	2 11·6	2 05·3	4·5	0·6	10·5	1·5	16·5	2·3
46	2 11·5	2 11·9	2 05·5	4·6	0·7	10·6	1·5	16·6	2·4
47	2 11·8	2 12·1	2 05·7	4·7	0·7	10·7	1·5	16·7	2·4
48	2 12·0	2 12·4	2 06·0	4·8	0·7	10·8	1·5	16·8	2·4
49	2 12·3	2 12·6	2 06·2	4·9	0·7	10·9	1·5	16·9	2·4
50	2 12·5	2 12·9	2 06·5	5·0	0·7	11·0	1·6	17·0	2·4
51	2 12·8	2 13·1	2 06·7	5·1	0·7	11·1	1·6	17·1	2·4
52	2 13·0	2 13·4	2 06·9	5·2	0·7	11·2	1·6	17·2	2·4
53	2 13·3	2 13·6	2 07·2	5·3	0·8	11·3	1·6	17·3	2·5
54	2 13·5	2 13·9	2 07·4	5·4	0·8	11·4	1·6	17·4	2·5
55	2 13·8	2 14·1	2 07·7	5·5	0·8	11·5	1·6	17·5	2·5
56	2 14·0	2 14·4	2 07·9	5·6	0·8	11·6	1·6	17·6	2·5
57	2 14·3	2 14·6	2 08·1	5·7	0·8	11·7	1·7	17·7	2·5
58	2 14·5	2 14·9	2 08·4	5·8	0·8	11·8	1·7	17·8	2·5
59	2 14·8	2 15·1	2 08·6	5·9	0·8	11·9	1·7	17·9	2·5
60	2 15·0	2 15·4	2 08·9	6·0	0·9	12·0	1·7	18·0	2·6

m 9	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	2 15·0	2 15·4	2 08·9	0·0	0·0	6·0	1·0	12·0	1·9
01	2 15·3	2 15·6	2 09·1	0·1	0·0	6·1	1·0	12·1	1·9
02	2 15·5	2 15·9	2 09·3	0·2	0·0	6·2	1·0	12·2	1·9
03	2 15·8	2 16·1	2 09·6	0·3	0·0	6·3	1·0	12·3	1·9
04	2 16·0	2 16·4	2 09·8	0·4	0·1	6·4	1·0	12·4	2·0
05	2 16·3	2 16·6	2 10·0	0·5	0·1	6·5	1·0	12·5	2·0
06	2 16·5	2 16·9	2 10·3	0·6	0·1	6·6	1·0	12·6	2·0
07	2 16·8	2 17·1	2 10·5	0·7	0·1	6·7	1·1	12·7	2·0
08	2 17·0	2 17·4	2 10·8	0·8	0·1	6·8	1·1	12·8	2·0
09	2 17·3	2 17·6	2 11·0	0·9	0·1	6·9	1·1	12·9	2·0
10	2 17·5	2 17·9	2 11·2	1·0	0·2	7·0	1·1	13·0	2·1
11	2 17·8	2 18·1	2 11·5	1·1	0·2	7·1	1·1	13·1	2·1
12	2 18·0	2 18·4	2 11·7	1·2	0·2	7·2	1·1	13·2	2·1
13	2 18·3	2 18·6	2 12·0	1·3	0·2	7·3	1·2	13·3	2·1
14	2 18·5	2 18·9	2 12·2	1·4	0·2	7·4	1·2	13·4	2·1
15	2 18·8	2 19·1	2 12·4	1·5	0·2	7·5	1·2	13·5	2·1
16	2 19·0	2 19·4	2 12·7	1·6	0·3	7·6	1·2	13·6	2·2
17	2 19·3	2 19·6	2 12·9	1·7	0·3	7·7	1·2	13·7	2·2
18	2 19·5	2 19·9	2 13·1	1·8	0·3	7·8	1·2	13·8	2·2
19	2 19·8	2 20·1	2 13·4	1·9	0·3	7·9	1·3	13·9	2·2
20	2 20·0	2 20·4	2 13·6	2·0	0·3	8·0	1·3	14·0	2·2
21	2 20·3	2 20·6	2 13·9	2·1	0·3	8·1	1·3	14·1	2·2
22	2 20·5	2 20·9	2 14·1	2·2	0·3	8·2	1·3	14·2	2·2
23	2 20·8	2 21·1	2 14·3	2·3	0·4	8·3	1·3	14·3	2·3
24	2 21·0	2 21·4	2 14·6	2·4	0·4	8·4	1·3	14·4	2·3
25	2 21·3	2 21·6	2 14·8	2·5	0·4	8·5	1·3	14·5	2·3
26	2 21·5	2 21·9	2 15·1	2·6	0·4	8·6	1·4	14·6	2·3
27	2 21·8	2 22·1	2 15·3	2·7	0·4	8·7	1·4	14·7	2·3
28	2 22·0	2 22·4	2 15·5	2·8	0·4	8·8	1·4	14·8	2·3
29	2 22·3	2 22·6	2 15·8	2·9	0·5	8·9	1·4	14·9	2·4
30	2 22·5	2 22·9	2 16·0	3·0	0·5	9·0	1·4	15·0	2·4
31	2 22·8	2 23·1	2 16·2	3·1	0·5	9·1	1·4	15·1	2·4
32	2 23·0	2 23·4	2 16·5	3·2	0·5	9·2	1·5	15·2	2·4
33	2 23·3	2 23·6	2 16·7	3·3	0·5	9·3	1·5	15·3	2·4
34	2 23·5	2 23·9	2 17·0	3·4	0·5	9·4	1·5	15·4	2·4
35	2 23·8	2 24·1	2 17·2	3·5	0·6	9·5	1·5	15·5	2·5
36	2 24·0	2 24·4	2 17·4	3·6	0·6	9·6	1·5	15·6	2·5
37	2 24·3	2 24·6	2 17·7	3·7	0·6	9·7	1·5	15·7	2·5
38	2 24·5	2 24·9	2 17·9	3·8	0·6	9·8	1·6	15·8	2·5
39	2 24·8	2 25·1	2 18·2	3·9	0·6	9·9	1·6	15·9	2·5
40	2 25·0	2 25·4	2 18·4	4·0	0·6	10·0	1·6	16·0	2·5
41	2 25·3	2 25·6	2 18·6	4·1	0·6	10·1	1·6	16·1	2·5
42	2 25·5	2 25·9	2 18·9	4·2	0·7	10·2	1·6	16·2	2·6
43	2 25·8	2 26·1	2 19·1	4·3	0·7	10·3	1·6	16·3	2·6
44	2 26·0	2 26·4	2 19·3	4·4	0·7	10·4	1·6	16·4	2·6
45	2 26·3	2 26·7	2 19·6	4·5	0·7	10·5	1·7	16·5	2·6
46	2 26·5	2 26·9	2 19·8	4·6	0·7	10·6	1·7	16·6	2·6
47	2 26·8	2 27·2	2 20·1	4·7	0·7	10·7	1·7	16·7	2·6
48	2 27·0	2 27·4	2 20·3	4·8	0·8	10·8	1·7	16·8	2·7
49	2 27·3	2 27·7	2 20·5	4·9	0·8	10·9	1·7	16·9	2·7
50	2 27·5	2 27·9	2 20·8	5·0	0·8	11·0	1·7	17·0	2·7
51	2 27·8	2 28·2	2 21·0	5·1	0·8	11·1	1·8	17·1	2·7
52	2 28·0	2 28·4	2 21·3	5·2	0·8	11·2	1·8	17·2	2·7
53	2 28·3	2 28·7	2 21·5	5·3	0·8	11·3	1·8	17·3	2·7
54	2 28·5	2 28·9	2 21·7	5·4	0·9	11·4	1·8	17·4	2·8
55	2 28·8	2 29·2	2 22·0	5·5	0·9	11·5	1·8	17·5	2·8
56	2 29·0	2 29·4	2 22·2	5·6	0·9	11·6	1·8	17·6	2·8
57	2 29·3	2 29·7	2 22·5	5·7	0·9	11·7	1·9	17·7	2·8
58	2 29·5	2 29·9	2 22·7	5·8	0·9	11·8	1·9	17·8	2·8
59	2 29·8	2 30·2	2 22·9	5·9	0·9	11·9	1·9	17·9	2·8
60	2 30·0	2 30·4	2 23·2	6·0	1·0	12·0	1·9	18·0	2·9

10m INCREMENTS AND CORRECTIONS 11m

m 10	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	2 30·0	2 30·4	2 23·2	0·0	0·0	6·0	1·1	12·0	2·1
01	2 30·3	2 30·7	2 23·4	0·1	0·0	6·1	1·1	12·1	2·1
02	2 30·5	2 30·9	2 23·6	0·2	0·0	6·2	1·1	12·2	2·1
03	2 30·8	2 31·2	2 23·9	0·3	0·1	6·3	1·1	12·3	2·2
04	2 31·0	2 31·4	2 24·1	0·4	0·1	6·4	1·1	12·4	2·2
05	2 31·3	2 31·7	2 24·4	0·5	0·1	6·5	1·1	12·5	2·2
06	2 31·5	2 31·9	2 24·6	0·6	0·1	6·6	1·2	12·6	2·2
07	2 31·8	2 32·2	2 24·8	0·7	0·1	6·7	1·2	12·7	2·2
08	2 32·0	2 32·4	2 25·1	0·8	0·1	6·8	1·2	12·8	2·2
09	2 32·3	2 32·7	2 25·3	0·9	0·2	6·9	1·2	12·9	2·3
10	2 32·5	2 32·9	2 25·6	1·0	0·2	7·0	1·2	13·0	2·3
11	2 32·8	2 33·2	2 25·8	1·1	0·2	7·1	1·2	13·1	2·3
12	2 33·0	2 33·4	2 26·0	1·2	0·2	7·2	1·3	13·2	2·3
13	2 33·3	2 33·7	2 26·3	1·3	0·2	7·3	1·3	13·3	2·3
14	2 33·5	2 33·9	2 26·5	1·4	0·2	7·4	1·3	13·4	2·3
15	2 33·8	2 34·2	2 26·7	1·5	0·3	7·5	1·3	13·5	2·4
16	2 34·0	2 34·4	2 27·0	1·6	0·3	7·6	1·3	13·6	2·4
17	2 34·3	2 34·7	2 27·2	1·7	0·3	7·7	1·3	13·7	2·4
18	2 34·5	2 34·9	2 27·5	1·8	0·3	7·8	1·4	13·8	2·4
19	2 34·8	2 35·2	2 27·7	1·9	0·3	7·9	1·4	13·9	2·4
20	2 35·0	2 35·4	2 27·9	2·0	0·4	8·0	1·4	14·0	2·5
21	2 35·3	2 35·7	2 28·2	2·1	0·4	8·1	1·4	14·1	2·5
22	2 35·5	2 35·9	2 28·4	2·2	0·4	8·2	1·4	14·2	2·5
23	2 35·8	2 36·2	2 28·7	2·3	0·4	8·3	1·5	14·3	2·5
24	2 36·0	2 36·4	2 28·9	2·4	0·4	8·4	1·5	14·4	2·5
25	2 36·3	2 36·7	2 29·1	2·5	0·4	8·5	1·5	14·5	2·5
26	2 36·5	2 36·9	2 29·4	2·6	0·5	8·6	1·5	14·6	2·6
27	2 36·8	2 37·2	2 29·6	2·7	0·5	8·7	1·5	14·7	2·6
28	2 37·0	2 37·4	2 29·8	2·8	0·5	8·8	1·5	14·8	2·6
29	2 37·3	2 37·7	2 30·1	2·9	0·5	8·9	1·6	14·9	2·6
30	2 37·5	2 37·9	2 30·3	3·0	0·5	9·0	1·6	15·0	2·6
31	2 37·8	2 38·2	2 30·6	3·1	0·5	9·1	1·6	15·1	2·6
32	2 38·0	2 38·4	2 30·8	3·2	0·6	9·2	1·6	15·2	2·7
33	2 38·3	2 38·7	2 31·0	3·3	0·6	9·3	1·6	15·3	2·7
34	2 38·5	2 38·9	2 31·3	3·4	0·6	9·4	1·6	15·4	2·7
35	2 38·8	2 39·2	2 31·5	3·5	0·6	9·5	1·7	15·5	2·7
36	2 39·0	2 39·4	2 31·8	3·6	0·6	9·6	1·7	15·6	2·7
37	2 39·3	2 39·7	2 32·0	3·7	0·6	9·7	1·7	15·7	2·7
38	2 39·5	2 39·9	2 32·2	3·8	0·7	9·8	1·7	15·8	2·8
39	2 39·8	2 40·2	2 32·5	3·9	0·7	9·9	1·7	15·9	2·8
40	2 40·0	2 40·4	2 32·7	4·0	0·7	10·0	1·8	16·0	2·8
41	2 40·3	2 40·7	2 32·9	4·1	0·7	10·1	1·8	16·1	2·8
42	2 40·5	2 40·9	2 33·2	4·2	0·7	10·2	1·8	16·2	2·8
43	2 40·8	2 41·2	2 33·4	4·3	0·8	10·3	1·8	16·3	2·9
44	2 41·0	2 41·4	2 33·7	4·4	0·8	10·4	1·8	16·4	2·9
45	2 41·3	2 41·7	2 33·9	4·5	0·8	10·5	1·8	16·5	2·9
46	2 41·5	2 41·9	2 34·1	4·6	0·8	10·6	1·9	16·6	2·9
47	2 41·8	2 42·2	2 34·4	4·7	0·8	10·7	1·9	16·7	2·9
48	2 42·0	2 42·4	2 34·6	4·8	0·8	10·8	1·9	16·8	2·9
49	2 42·3	2 42·7	2 34·9	4·9	0·9	10·9	1·9	16·9	3·0
50	2 42·5	2 42·9	2 35·1	5·0	0·9	11·0	1·9	17·0	3·0
51	2 42·8	2 43·2	2 35·3	5·1	0·9	11·1	1·9	17·1	3·0
52	2 43·0	2 43·4	2 35·6	5·2	0·9	11·2	2·0	17·2	3·0
53	2 43·3	2 43·7	2 35·8	5·3	0·9	11·3	2·0	17·3	3·0
54	2 43·5	2 43·9	2 36·1	5·4	0·9	11·4	2·0	17·4	3·0
55	2 43·8	2 44·2	2 36·3	5·5	1·0	11·5	2·0	17·5	3·1
56	2 44·0	2 44·4	2 36·5	5·6	1·0	11·6	2·0	17·6	3·1
57	2 44·3	2 44·7	2 36·8	5·7	1·0	11·7	2·0	17·7	3·1
58	2 44·5	2 45·0	2 37·0	5·8	1·0	11·8	2·1	17·8	3·1
59	2 44·8	2 45·2	2 37·2	5·9	1·0	11·9	2·1	17·9	3·1
60	2 45·0	2 45·5	2 37·5	6·0	1·1	12·0	2·1	18·0	3·2

m 11	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	2 45·0	2 45·5	2 37·5	0·0	0·0	6·0	1·2	12·0	2·3
01	2 45·3	2 45·7	2 37·7	0·1	0·0	6·1	1·2	12·1	2·3
02	2 45·5	2 46·0	2 38·0	0·2	0·0	6·2	1·2	12·2	2·3
03	2 45·8	2 46·2	2 38·2	0·3	0·1	6·3	1·2	12·3	2·4
04	2 46·0	2 46·5	2 38·4	0·4	0·1	6·4	1·2	12·4	2·4
05	2 46·3	2 46·7	2 38·7	0·5	0·1	6·5	1·2	12·5	2·4
06	2 46·5	2 47·0	2 38·9	0·6	0·1	6·6	1·3	12·6	2·4
07	2 46·8	2 47·2	2 39·2	0·7	0·1	6·7	1·3	12·7	2·4
08	2 47·0	2 47·5	2 39·4	0·8	0·2	6·8	1·3	12·8	2·5
09	2 47·3	2 47·7	2 39·6	0·9	0·2	6·9	1·3	12·9	2·5
10	2 47·5	2 48·0	2 39·9	1·0	0·2	7·0	1·3	13·0	2·5
11	2 47·8	2 48·2	2 40·1	1·1	0·2	7·1	1·4	13·1	2·5
12	2 48·0	2 48·5	2 40·3	1·2	0·2	7·2	1·4	13·2	2·5
13	2 48·3	2 48·7	2 40·6	1·3	0·2	7·3	1·4	13·3	2·5
14	2 48·5	2 49·0	2 40·8	1·4	0·3	7·4	1·4	13·4	2·6
15	2 48·8	2 49·2	2 41·1	1·5	0·3	7·5	1·4	13·5	2·6
16	2 49·0	2 49·5	2 41·3	1·6	0·3	7·6	1·5	13·6	2·6
17	2 49·3	2 49·7	2 41·5	1·7	0·3	7·7	1·5	13·7	2·6
18	2 49·5	2 50·0	2 41·8	1·8	0·3	7·8	1·5	13·8	2·6
19	2 49·8	2 50·2	2 42·0	1·9	0·4	7·9	1·5	13·9	2·7
20	2 50·0	2 50·5	2 42·3	2·0	0·4	8·0	1·5	14·0	2·7
21	2 50·3	2 50·7	2 42·5	2·1	0·4	8·1	1·6	14·1	2·7
22	2 50·5	2 51·0	2 42·7	2·2	0·4	8·2	1·6	14·2	2·7
23	2 50·8	2 51·2	2 43·0	2·3	0·4	8·3	1·6	14·3	2·7
24	2 51·0	2 51·5	2 43·2	2·4	0·5	8·4	1·6	14·4	2·8
25	2 51·3	2 51·7	2 43·4	2·5	0·5	8·5	1·6	14·5	2·8
26	2 51·5	2 52·0	2 43·7	2·6	0·5	8·6	1·6	14·6	2·8
27	2 51·8	2 52·2	2 43·9	2·7	0·5	8·7	1·7	14·7	2·8
28	2 52·0	2 52·5	2 44·2	2·8	0·5	8·8	1·7	14·8	2·8
29	2 52·3	2 52·7	2 44·4	2·9	0·6	8·9	1·7	14·9	2·9
30	2 52·5	2 53·0	2 44·6	3·0	0·6	9·0	1·7	15·0	2·9
31	2 52·8	2 53·2	2 44·9	3·1	0·6	9·1	1·7	15·1	2·9
32	2 53·0	2 53·5	2 45·1	3·2	0·6	9·2	1·8	15·2	2·9
33	2 53·3	2 53·7	2 45·4	3·3	0·6	9·3	1·8	15·3	2·9
34	2 53·5	2 54·0	2 45·6	3·4	0·7	9·4	1·8	15·4	3·0
35	2 53·8	2 54·2	2 45·8	3·5	0·7	9·5	1·8	15·5	3·0
36	2 54·0	2 54·5	2 46·1	3·6	0·7	9·6	1·8	15·6	3·0
37	2 54·3	2 54·7	2 46·3	3·7	0·7	9·7	1·9	15·7	3·0
38	2 54·5	2 55·0	2 46·6	3·8	0·7	9·8	1·9	15·8	3·0
39	2 54·8	2 55·2	2 46·8	3·9	0·7	9·9	1·9	15·9	3·0
40	2 55·0	2 55·5	2 47·0	4·0	0·8	10·0	1·9	16·0	3·1
41	2 55·3	2 55·7	2 47·3	4·1	0·8	10·1	1·9	16·1	3·1
42	2 55·5	2 56·0	2 47·5	4·2	0·8	10·2	2·0	16·2	3·1
43	2 55·8	2 56·2	2 47·7	4·3	0·8	10·3	2·0	16·3	3·1
44	2 56·0	2 56·5	2 48·0	4·4	0·8	10·4	2·0	16·4	3·1
45	2 56·3	2 56·7	2 48·2	4·5	0·9	10·5	2·0	16·5	3·2
46	2 56·5	2 57·0	2 48·5	4·6	0·9	10·6	2·0	16·6	3·2
47	2 56·8	2 57·2	2 48·7	4·7	0·9	10·7	2·1	16·7	3·2
48	2 57·0	2 57·5	2 48·9	4·8	0·9	10·8	2·1	16·8	3·2
49	2 57·3	2 57·7	2 49·2	4·9	0·9	10·9	2·1	16·9	3·2
50	2 57·5	2 58·0	2 49·4	5·0	1·0	11·0	2·1	17·0	3·3
51	2 57·8	2 58·2	2 49·7	5·1	1·0	11·1	2·1	17·1	3·3
52	2 58·0	2 58·5	2 49·9	5·2	1·0	11·2	2·1	17·2	3·3
53	2 58·3	2 58·7	2 50·1	5·3	1·0	11·3	2·2	17·3	3·3
54	2 58·5	2 59·0	2 50·4	5·4	1·0	11·4	2·2	17·4	3·3
55	2 58·8	2 59·2	2 50·6	5·5	1·1	11·5	2·2	17·5	3·4
56	2 59·0	2 59·5	2 50·8	5·6	1·1	11·6	2·2	17·6	3·4
57	2 59·3	2 59·7	2 51·1	5·7	1·1	11·7	2·2	17·7	3·4
58	2 59·5	3 00·0	2 51·3	5·8	1·1	11·8	2·3	17·8	3·4
59	2 59·8	3 00·2	2 51·6	5·9	1·1	11·9	2·3	17·9	3·4
60	3 00·0	3 00·5	2 51·8	6·0	1·2	12·0	2·3	18·0	3·5

m 12	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	3 00·0	3 00·5	2 51·8	0·0	0·0	6·0	1·3	12·0	2·5
01	3 00·3	3 00·7	2 52·0	0·1	0·0	6·1	1·3	12·1	2·5
02	3 00·5	3 01·0	2 52·3	0·2	0·0	6·2	1·3	12·2	2·5
03	3 00·8	3 01·2	2 52·5	0·3	0·1	6·3	1·3	12·3	2·6
04	3 01·0	3 01·5	2 52·8	0·4	0·1	6·4	1·3	12·4	2·6
05	3 01·3	3 01·7	2 53·0	0·5	0·1	6·5	1·4	12·5	2·6
06	3 01·5	3 02·0	2 53·2	0·6	0·1	6·6	1·4	12·6	2·6
07	3 01·8	3 02·2	2 53·5	0·7	0·1	6·7	1·4	12·7	2·6
08	3 02·0	3 02·5	2 53·7	0·8	0·2	6·8	1·4	12·8	2·7
09	3 02·3	3 02·7	2 53·9	0·9	0·2	6·9	1·4	12·9	2·7
10	3 02·5	3 03·0	2 54·2	1·0	0·2	7·0	1·5	13·0	2·7
11	3 02·8	3 03·3	2 54·4	1·1	0·2	7·1	1·5	13·1	2·7
12	3 03·0	3 03·5	2 54·7	1·2	0·3	7·2	1·5	13·2	2·8
13	3 03·3	3 03·8	2 54·9	1·3	0·3	7·3	1·5	13·3	2·8
14	3 03·5	3 04·0	2 55·1	1·4	0·3	7·4	1·5	13·4	2·8
15	3 03·8	3 04·3	2 55·4	1·5	0·3	7·5	1·6	13·5	2·8
16	3 04·0	3 04·5	2 55·6	1·6	0·3	7·6	1·6	13·6	2·8
17	3 04·3	3 04·8	2 55·9	1·7	0·4	7·7	1·6	13·7	2·9
18	3 04·5	3 05·0	2 56·1	1·8	0·4	7·8	1·6	13·8	2·9
19	3 04·8	3 05·3	2 56·3	1·9	0·4	7·9	1·6	13·9	2·9
20	3 05·0	3 05·5	2 56·6	2·0	0·4	8·0	1·7	14·0	2·9
21	3 05·3	3 05·8	2 56·8	2·1	0·4	8·1	1·7	14·1	2·9
22	3 05·5	3 06·0	2 57·0	2·2	0·5	8·2	1·7	14·2	3·0
23	3 05·8	3 06·3	2 57·3	2·3	0·5	8·3	1·7	14·3	3·0
24	3 06·0	3 06·5	2 57·5	2·4	0·5	8·4	1·8	14·4	3·0
25	3 06·3	3 06·8	2 57·8	2·5	0·5	8·5	1·8	14·5	3·0
26	3 06·5	3 07·0	2 58·0	2·6	0·5	8·6	1·8	14·6	3·0
27	3 06·8	3 07·3	2 58·2	2·7	0·6	8·7	1·8	14·7	3·1
28	3 07·0	3 07·5	2 58·5	2·8	0·6	8·8	1·8	14·8	3·1
29	3 07·3	3 07·8	2 58·7	2·9	0·6	8·9	1·9	14·9	3·1
30	3 07·5	3 08·0	2 59·0	3·0	0·6	9·0	1·9	15·0	3·1
31	3 07·8	3 08·3	2 59·2	3·1	0·6	9·1	1·9	15·1	3·1
32	3 08·0	3 08·5	2 59·4	3·2	0·7	9·2	1·9	15·2	3·2
33	3 08·3	3 08·8	2 59·7	3·3	0·7	9·3	1·9	15·3	3·2
34	3 08·5	3 09·0	2 59·9	3·4	0·7	9·4	2·0	15·4	3·2
35	3 08·8	3 09·3	3 00·2	3·5	0·7	9·5	2·0	15·5	3·2
36	3 09·0	3 09·5	3 00·4	3·6	0·8	9·6	2·0	15·6	3·3
37	3 09·3	3 09·8	3 00·6	3·7	0·8	9·7	2·0	15·7	3·3
38	3 09·5	3 10·0	3 00·9	3·8	0·8	9·8	2·0	15·8	3·3
39	3 09·8	3 10·3	3 01·1	3·9	0·8	9·9	2·1	15·9	3·3
40	3 10·0	3 10·5	3 01·3	4·0	0·8	10·0	2·1	16·0	3·3
41	3 10·3	3 10·8	3 01·6	4·1	0·9	10·1	2·1	16·1	3·4
42	3 10·5	3 11·0	3 01·8	4·2	0·9	10·2	2·1	16·2	3·4
43	3 10·8	3 11·3	3 02·1	4·3	0·9	10·3	2·1	16·3	3·4
44	3 11·0	3 11·5	3 02·3	4·4	0·9	10·4	2·2	16·4	3·4
45	3 11·3	3 11·8	3 02·5	4·5	0·9	10·5	2·2	16·5	3·4
46	3 11·5	3 12·0	3 02·8	4·6	1·0	10·6	2·2	16·6	3·5
47	3 11·8	3 12·3	3 03·0	4·7	1·0	10·7	2·2	16·7	3·5
48	3 12·0	3 12·5	3 03·3	4·8	1·0	10·8	2·3	16·8	3·5
49	3 12·3	3 12·8	3 03·5	4·9	1·0	10·9	2·3	16·9	3·5
50	3 12·5	3 13·0	3 03·7	5·0	1·0	11·0	2·3	17·0	3·5
51	3 12·8	3 13·3	3 04·0	5·1	1·1	11·1	2·3	17·1	3·6
52	3 13·0	3 13·5	3 04·2	5·2	1·1	11·2	2·3	17·2	3·6
53	3 13·3	3 13·8	3 04·4	5·3	1·1	11·3	2·4	17·3	3·6
54	3 13·5	3 14·0	3 04·7	5·4	1·1	11·4	2·4	17·4	3·6
55	3 13·8	3 14·3	3 04·9	5·5	1·1	11·5	2·4	17·5	3·6
56	3 14·0	3 14·5	3 05·2	5·6	1·2	11·6	2·4	17·6	3·7
57	3 14·3	3 14·8	3 05·4	5·7	1·2	11·7	2·4	17·7	3·7
58	3 14·5	3 15·0	3 05·6	5·8	1·2	11·8	2·5	17·8	3·7
59	3 14·8	3 15·3	3 05·9	5·9	1·2	11·9	2·5	17·9	3·7
60	3 15·0	3 15·5	3 06·1	6·0	1·3	12·0	2·5	18·0	3·8

m 13	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	3 15·0	3 15·5	3 06·1	0·0	0·0	6·0	1·4	12·0	2·7
01	3 15·3	3 15·8	3 06·4	0·1	0·0	6·1	1·4	12·1	2·7
02	3 15·5	3 16·0	3 06·6	0·2	0·0	6·2	1·4	12·2	2·7
03	3 15·8	3 16·3	3 06·8	0·3	0·1	6·3	1·4	12·3	2·8
04	3 16·0	3 16·5	3 07·1	0·4	0·1	6·4	1·4	12·4	2·8
05	3 16·3	3 16·8	3 07·3	0·5	0·1	6·5	1·5	12·5	2·8
06	3 16·5	3 17·0	3 07·5	0·6	0·1	6·6	1·5	12·6	2·8
07	3 16·8	3 17·3	3 07·8	0·7	0·2	6·7	1·5	12·7	2·9
08	3 17·0	3 17·5	3 08·0	0·8	0·2	6·8	1·5	12·8	2·9
09	3 17·3	3 17·8	3 08·3	0·9	0·2	6·9	1·6	12·9	2·9
10	3 17·5	3 18·0	3 08·5	1·0	0·2	7·0	1·6	13·0	2·9
11	3 17·8	3 18·3	3 08·7	1·1	0·2	7·1	1·6	13·1	2·9
12	3 18·0	3 18·5	3 09·0	1·2	0·3	7·2	1·6	13·2	3·0
13	3 18·3	3 18·8	3 09·2	1·3	0·3	7·3	1·6	13·3	3·0
14	3 18·5	3 19·0	3 09·5	1·4	0·3	7·4	1·7	13·4	3·0
15	3 18·8	3 19·3	3 09·7	1·5	0·3	7·5	1·7	13·5	3·0
16	3 19·0	3 19·5	3 09·9	1·6	0·4	7·6	1·7	13·6	3·1
17	3 19·3	3 19·8	3 10·2	1·7	0·4	7·7	1·7	13·7	3·1
18	3 19·5	3 20·0	3 10·4	1·8	0·4	7·8	1·8	13·8	3·1
19	3 19·8	3 20·3	3 10·7	1·9	0·4	7·9	1·8	13·9	3·1
20	3 20·0	3 20·5	3 10·9	2·0	0·5	8·0	1·8	14·0	3·2
21	3 20·3	3 20·8	3 11·1	2·1	0·5	8·1	1·8	14·1	3·2
22	3 20·5	3 21·0	3 11·4	2·2	0·5	8·2	1·8	14·2	3·2
23	3 20·8	3 21·3	3 11·6	2·3	0·5	8·3	1·9	14·3	3·2
24	3 21·0	3 21·6	3 11·8	2·4	0·5	8·4	1·9	14·4	3·2
25	3 21·3	3 21·8	3 12·1	2·5	0·6	8·5	1·9	14·5	3·3
26	3 21·5	3 22·1	3 12·3	2·6	0·6	8·6	1·9	14·6	3·3
27	3 21·8	3 22·3	3 12·6	2·7	0·6	8·7	2·0	14·7	3·3
28	3 22·0	3 22·6	3 12·8	2·8	0·6	8·8	2·0	14·8	3·3
29	3 22·3	3 22·8	3 13·0	2·9	0·7	8·9	2·0	14·9	3·4
30	3 22·5	3 23·1	3 13·3	3·0	0·7	9·0	2·0	15·0	3·4
31	3 22·8	3 23·3	3 13·5	3·1	0·7	9·1	2·0	15·1	3·4
32	3 23·0	3 23·6	3 13·8	3·2	0·7	9·2	2·1	15·2	3·4
33	3 23·3	3 23·8	3 14·0	3·3	0·7	9·3	2·1	15·3	3·4
34	3 23·5	3 24·1	3 14·2	3·4	0·8	9·4	2·1	15·4	3·5
35	3 23·8	3 24·3	3 14·5	3·5	0·8	9·5	2·1	15·5	3·5
36	3 24·0	3 24·6	3 14·7	3·6	0·8	9·6	2·2	15·6	3·5
37	3 24·3	3 24·8	3 14·9	3·7	0·8	9·7	2·2	15·7	3·5
38	3 24·5	3 25·1	3 15·2	3·8	0·9	9·8	2·2	15·8	3·6
39	3 24·8	3 25·3	3 15·4	3·9	0·9	9·9	2·2	15·9	3·6
40	3 25·0	3 25·6	3 15·7	4·0	0·9	10·0	2·3	16·0	3·6
41	3 25·3	3 25·8	3 15·9	4·1	0·9	10·1	2·3	16·1	3·6
42	3 25·5	3 26·1	3 16·1	4·2	0·9	10·2	2·3	16·2	3·6
43	3 25·8	3 26·3	3 16·4	4·3	1·0	10·3	2·3	16·3	3·7
44	3 26·0	3 26·6	3 16·6	4·4	1·0	10·4	2·3	16·4	3·7
45	3 26·3	3 26·8	3 16·9	4·5	1·0	10·5	2·4	16·5	3·7
46	3 26·5	3 27·1	3 17·1	4·6	1·0	10·6	2·4	16·6	3·7
47	3 26·8	3 27·3	3 17·3	4·7	1·1	10·7	2·4	16·7	3·8
48	3 27·0	3 27·6	3 17·6	4·8	1·1	10·8	2·4	16·8	3·8
49	3 27·3	3 27·8	3 17·8	4·9	1·1	10·9	2·5	16·9	3·8
50	3 27·5	3 28·1	3 18·0	5·0	1·1	11·0	2·5	17·0	3·8
51	3 27·8	3 28·3	3 18·3	5·1	1·1	11·1	2·5	17·1	3·8
52	3 28·0	3 28·6	3 18·5	5·2	1·2	11·2	2·5	17·2	3·9
53	3 28·3	3 28·8	3 18·8	5·3	1·2	11·3	2·5	17·3	3·9
54	3 28·5	3 29·1	3 19·0	5·4	1·2	11·4	2·6	17·4	3·9
55	3 28·8	3 29·3	3 19·2	5·5	1·2	11·5	2·6	17·5	3·9
56	3 29·0	3 29·6	3 19·5	5·6	1·3	11·6	2·6	17·6	4·0
57	3 29·3	3 29·8	3 19·7	5·7	1·3	11·7	2·6	17·7	4·0
58	3 29·5	3 30·1	3 20·0	5·8	1·3	11·8	2·7	17·8	4·0
59	3 29·8	3 30·3	3 20·2	5·9	1·3	11·9	2·7	17·9	4·0
60	3 30·0	3 30·6	3 20·4	6·0	1·4	12·0	2·7	18·0	4·1

m 14	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	3 30·0	3 30·6	3 20·4	0·0	0·0	6·0	1·5	12·0	2·9
01	3 30·3	3 30·8	3 20·7	0·1	0·0	6·1	1·5	12·1	2·9
02	3 30·5	3 31·1	3 20·9	0·2	0·0	6·2	1·5	12·2	2·9
03	3 30·8	3 31·3	3 21·1	0·3	0·1	6·3	1·5	12·3	3·0
04	3 31·0	3 31·6	3 21·4	0·4	0·1	6·4	1·5	12·4	3·0
05	3 31·3	3 31·8	3 21·6	0·5	0·1	6·5	1·6	12·5	3·0
06	3 31·5	3 32·1	3 21·9	0·6	0·1	6·6	1·6	12·6	3·0
07	3 31·8	3 32·3	3 22·1	0·7	0·2	6·7	1·6	12·7	3·1
08	3 32·0	3 32·6	3 22·3	0·8	0·2	6·8	1·6	12·8	3·1
09	3 32·3	3 32·8	3 22·6	0·9	0·2	6·9	1·7	12·9	3·1
10	3 32·5	3 33·1	3 22·8	1·0	0·2	7·0	1·7	13·0	3·1
11	3 32·8	3 33·3	3 23·1	1·1	0·3	7·1	1·7	13·1	3·2
12	3 33·0	3 33·6	3 23·3	1·2	0·3	7·2	1·7	13·2	3·2
13	3 33·3	3 33·8	3 23·5	1·3	0·3	7·3	1·8	13·3	3·2
14	3 33·5	3 34·1	3 23·8	1·4	0·3	7·4	1·8	13·4	3·2
15	3 33·8	3 34·3	3 24·0	1·5	0·4	7·5	1·8	13·5	3·3
16	3 34·0	3 34·6	3 24·3	1·6	0·4	7·6	1·8	13·6	3·3
17	3 34·3	3 34·8	3 24·5	1·7	0·4	7·7	1·9	13·7	3·3
18	3 34·5	3 35·1	3 24·7	1·8	0·4	7·8	1·9	13·8	3·3
19	3 34·8	3 35·3	3 25·0	1·9	0·5	7·9	1·9	13·9	3·4
20	3 35·0	3 35·6	3 25·2	2·0	0·5	8·0	1·9	14·0	3·4
21	3 35·3	3 35·8	3 25·4	2·1	0·5	8·1	2·0	14·1	3·4
22	3 35·5	3 36·1	3 25·7	2·2	0·5	8·2	2·0	14·2	3·4
23	3 35·8	3 36·3	3 25·9	2·3	0·6	8·3	2·0	14·3	3·5
24	3 36·0	3 36·6	3 26·2	2·4	0·6	8·4	2·0	14·4	3·5
25	3 36·3	3 36·8	3 26·4	2·5	0·6	8·5	2·1	14·5	3·5
26	3 36·5	3 37·1	3 26·6	2·6	0·6	8·6	2·1	14·6	3·5
27	3 36·8	3 37·3	3 26·9	2·7	0·7	8·7	2·1	14·7	3·6
28	3 37·0	3 37·6	3 27·1	2·8	0·7	8·8	2·1	14·8	3·6
29	3 37·3	3 37·8	3 27·4	2·9	0·7	8·9	2·2	14·9	3·6
30	3 37·5	3 38·1	3 27·6	3·0	0·7	9·0	2·2	15·0	3·6
31	3 37·8	3 38·3	3 27·8	3·1	0·7	9·1	2·2	15·1	3·6
32	3 38·0	3 38·6	3 28·1	3·2	0·8	9·2	2·2	15·2	3·7
33	3 38·3	3 38·8	3 28·3	3·3	0·8	9·3	2·2	15·3	3·7
34	3 38·5	3 39·1	3 28·5	3·4	0·8	9·4	2·3	15·4	3·7
35	3 38·8	3 39·3	3 28·8	3·5	0·8	9·5	2·3	15·5	3·7
36	3 39·0	3 39·6	3 29·0	3·6	0·9	9·6	2·3	15·6	3·8
37	3 39·3	3 39·9	3 29·3	3·7	0·9	9·7	2·3	15·7	3·8
38	3 39·5	3 40·1	3 29·5	3·8	0·9	9·8	2·4	15·8	3·8
39	3 39·8	3 40·4	3 29·7	3·9	0·9	9·9	2·4	15·9	3·8
40	3 40·0	3 40·6	3 30·0	4·0	1·0	10·0	2·4	16·0	3·9
41	3 40·3	3 40·9	3 30·2	4·1	1·0	10·1	2·4	16·1	3·9
42	3 40·5	3 41·1	3 30·5	4·2	1·0	10·2	2·5	16·2	3·9
43	3 40·8	3 41·4	3 30·7	4·3	1·0	10·3	2·5	16·3	3·9
44	3 41·0	3 41·6	3 30·9	4·4	1·1	10·4	2·5	16·4	4·0
45	3 41·3	3 41·9	3 31·2	4·5	1·1	10·5	2·5	16·5	4·0
46	3 41·5	3 42·1	3 31·4	4·6	1·1	10·6	2·6	16·6	4·0
47	3 41·8	3 42·4	3 31·6	4·7	1·1	10·7	2·6	16·7	4·0
48	3 42·0	3 42·6	3 31·9	4·8	1·2	10·8	2·6	16·8	4·1
49	3 42·3	3 42·9	3 32·1	4·9	1·2	10·9	2·6	16·9	4·1
50	3 42·5	3 43·1	3 32·4	5·0	1·2	11·0	2·7	17·0	4·1
51	3 42·8	3 43·4	3 32·6	5·1	1·2	11·1	2·7	17·1	4·1
52	3 43·0	3 43·6	3 32·8	5·2	1·3	11·2	2·7	17·2	4·2
53	3 43·3	3 43·9	3 33·1	5·3	1·3	11·3	2·7	17·3	4·2
54	3 43·5	3 44·1	3 33·3	5·4	1·3	11·4	2·8	17·4	4·2
55	3 43·8	3 44·4	3 33·6	5·5	1·3	11·5	2·8	17·5	4·2
56	3 44·0	3 44·6	3 33·8	5·6	1·4	11·6	2·8	17·6	4·3
57	3 44·3	3 44·9	3 34·0	5·7	1·4	11·7	2·8	17·7	4·3
58	3 44·5	3 45·1	3 34·3	5·8	1·4	11·8	2·9	17·8	4·3
59	3 44·8	3 45·4	3 34·5	5·9	1·4	11·9	2·9	17·9	4·3
60	3 45·0	3 45·6	3 34·8	6·0	1·5	12·0	2·9	18·0	4·4

m 15	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	3 45·0	3 45·6	3 34·8	0·0	0·0	6·0	1·6	12·0	3·1
01	3 45·3	3 45·9	3 35·0	0·1	0·0	6·1	1·6	12·1	3·1
02	3 45·5	3 46·1	3 35·2	0·2	0·1	6·2	1·6	12·2	3·2
03	3 45·8	3 46·4	3 35·5	0·3	0·1	6·3	1·6	12·3	3·2
04	3 46·0	3 46·6	3 35·7	0·4	0·1	6·4	1·7	12·4	3·2
05	3 46·3	3 46·9	3 35·9	0·5	0·1	6·5	1·7	12·5	3·2
06	3 46·5	3 47·1	3 36·2	0·6	0·2	6·6	1·7	12·6	3·3
07	3 46·8	3 47·4	3 36·4	0·7	0·2	6·7	1·7	12·7	3·3
08	3 47·0	3 47·6	3 36·7	0·8	0·2	6·8	1·8	12·8	3·3
09	3 47·3	3 47·9	3 36·9	0·9	0·2	6·9	1·8	12·9	3·3
10	3 47·5	3 48·1	3 37·1	1·0	0·3	7·0	1·8	13·0	3·4
11	3 47·8	3 48·4	3 37·4	1·1	0·3	7·1	1·8	13·1	3·4
12	3 48·0	3 48·6	3 37·6	1·2	0·3	7·2	1·9	13·2	3·4
13	3 48·3	3 48·9	3 37·9	1·3	0·3	7·3	1·9	13·3	3·4
14	3 48·5	3 49·1	3 38·1	1·4	0·4	7·4	1·9	13·4	3·5
15	3 48·8	3 49·4	3 38·3	1·5	0·4	7·5	1·9	13·5	3·5
16	3 49·0	3 49·6	3 38·6	1·6	0·4	7·6	2·0	13·6	3·5
17	3 49·3	3 49·9	3 38·8	1·7	0·4	7·7	2·0	13·7	3·5
18	3 49·5	3 50·1	3 39·0	1·8	0·5	7·8	2·0	13·8	3·6
19	3 49·8	3 50·4	3 39·3	1·9	0·5	7·9	2·0	13·9	3·6
20	3 50·0	3 50·6	3 39·5	2·0	0·5	8·0	2·1	14·0	3·6
21	3 50·3	3 50·9	3 39·8	2·1	0·5	8·1	2·1	14·1	3·6
22	3 50·5	3 51·1	3 40·0	2·2	0·6	8·2	2·1	14·2	3·7
23	3 50·8	3 51·4	3 40·2	2·3	0·6	8·3	2·1	14·3	3·7
24	3 51·0	3 51·6	3 40·5	2·4	0·6	8·4	2·2	14·4	3·7
25	3 51·3	3 51·9	3 40·7	2·5	0·6	8·5	2·2	14·5	3·7
26	3 51·5	3 52·1	3 41·0	2·6	0·7	8·6	2·2	14·6	3·8
27	3 51·8	3 52·4	3 41·2	2·7	0·7	8·7	2·2	14·7	3·8
28	3 52·0	3 52·6	3 41·4	2·8	0·7	8·8	2·3	14·8	3·8
29	3 52·3	3 52·9	3 41·7	2·9	0·7	8·9	2·3	14·9	3·8
30	3 52·5	3 53·1	3 41·9	3·0	0·8	9·0	2·3	15·0	3·9
31	3 52·8	3 53·4	3 42·1	3·1	0·8	9·1	2·4	15·1	3·9
32	3 53·0	3 53·6	3 42·4	3·2	0·8	9·2	2·4	15·2	3·9
33	3 53·3	3 53·9	3 42·6	3·3	0·9	9·3	2·4	15·3	4·0
34	3 53·5	3 54·1	3 42·9	3·4	0·9	9·4	2·4	15·4	4·0
35	3 53·8	3 54·4	3 43·1	3·5	0·9	9·5	2·5	15·5	4·0
36	3 54·0	3 54·6	3 43·3	3·6	0·9	9·6	2·5	15·6	4·0
37	3 54·3	3 54·9	3 43·6	3·7	1·0	9·7	2·5	15·7	4·1
38	3 54·5	3 55·1	3 43·8	3·8	1·0	9·8	2·5	15·8	4·1
39	3 54·8	3 55·4	3 44·1	3·9	1·0	9·9	2·6	15·9	4·1
40	3 55·0	3 55·6	3 44·3	4·0	1·0	10·0	2·6	16·0	4·1
41	3 55·3	3 55·9	3 44·5	4·1	1·1	10·1	2·6	16·1	4·2
42	3 55·5	3 56·1	3 44·8	4·2	1·1	10·2	2·6	16·2	4·2
43	3 55·8	3 56·4	3 45·0	4·3	1·1	10·3	2·7	16·3	4·2
44	3 56·0	3 56·6	3 45·2	4·4	1·1	10·4	2·7	16·4	4·2
45	3 56·3	3 56·9	3 45·5	4·5	1·2	10·5	2·7	16·5	4·3
46	3 56·5	3 57·1	3 45·7	4·6	1·2	10·6	2·7	16·6	4·3
47	3 56·8	3 57·4	3 46·0	4·7	1·2	10·7	2·8	16·7	4·3
48	3 57·0	3 57·6	3 46·2	4·8	1·2	10·8	2·8	16·8	4·3
49	3 57·3	3 57·9	3 46·4	4·9	1·3	10·9	2·8	16·9	4·4
50	3 57·5	3 58·2	3 46·7	5·0	1·3	11·0	2·8	17·0	4·4
51	3 57·8	3 58·4	3 46·9	5·1	1·3	11·1	2·9	17·1	4·4
52	3 58·0	3 58·7	3 47·2	5·2	1·3	11·2	2·9	17·2	4·4
53	3 58·3	3 58·9	3 47·4	5·3	1·4	11·3	2·9	17·3	4·5
54	3 58·5	3 59·2	3 47·6	5·4	1·4	11·4	2·9	17·4	4·5
55	3 58·8	3 59·4	3 47·9	5·5	1·4	11·5	3·0	17·5	4·5
56	3 59·0	3 59·7	3 48·1	5·6	1·4	11·6	3·0	17·6	4·5
57	3 59·3	3 59·9	3 48·4	5·7	1·5	11·7	3·0	17·7	4·6
58	3 59·5	4 00·2	3 48·6	5·8	1·5	11·8	3·0	17·8	4·6
59	3 59·8	4 00·4	3 48·8	5·9	1·5	11·9	3·1	17·9	4·6
60	4 00·0	4 00·7	3 49·1	6·0	1·6	12·0	3·1	18·0	4·7

16m INCREMENTS AND CORRECTIONS 17m

m 16	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	4 00·0	4 00·7	3 49·1	0·0	0·0	6·0	1·7	12·0	3·3
01	4 00·3	4 00·9	3 49·3	0·1	0·0	6·1	1·7	12·1	3·3
02	4 00·5	4 01·2	3 49·5	0·2	0·1	6·2	1·7	12·2	3·4
03	4 00·8	4 01·4	3 49·8	0·3	0·1	6·3	1·7	12·3	3·4
04	4 01·0	4 01·7	3 50·0	0·4	0·1	6·4	1·8	12·4	3·4
05	4 01·3	4 01·9	3 50·3	0·5	0·1	6·5	1·8	12·5	3·4
06	4 01·5	4 02·2	3 50·5	0·6	0·2	6·6	1·8	12·6	3·5
07	4 01·8	4 02·4	3 50·7	0·7	0·2	6·7	1·8	12·7	3·5
08	4 02·0	4 02·7	3 51·0	0·8	0·2	6·8	1·9	12·8	3·5
09	4 02·3	4 02·9	3 51·2	0·9	0·2	6·9	1·9	12·9	3·5
10	4 02·5	4 03·2	3 51·5	1·0	0·3	7·0	1·9	13·0	3·6
11	4 02·8	4 03·4	3 51·7	1·1	0·3	7·1	2·0	13·1	3·6
12	4 03·0	4 03·7	3 51·9	1·2	0·3	7·2	2·0	13·2	3·6
13	4 03·3	4 03·9	3 52·2	1·3	0·4	7·3	2·0	13·3	3·7
14	4 03·5	4 04·2	3 52·4	1·4	0·4	7·4	2·0	13·4	3·7
15	4 03·8	4 04·4	3 52·6	1·5	0·4	7·5	2·1	13·5	3·7
16	4 04·0	4 04·7	3 52·9	1·6	0·4	7·6	2·1	13·6	3·7
17	4 04·3	4 04·9	3 53·1	1·7	0·5	7·7	2·1	13·7	3·8
18	4 04·5	4 05·2	3 53·4	1·8	0·5	7·8	2·1	13·8	3·8
19	4 04·8	4 05·4	3 53·6	1·9	0·5	7·9	2·2	13·9	3·8
20	4 05·0	4 05·7	3 53·8	2·0	0·6	8·0	2·2	14·0	3·9
21	4 05·3	4 05·9	3 54·1	2·1	0·6	8·1	2·2	14·1	3·9
22	4 05·5	4 06·2	3 54·3	2·2	0·6	8·2	2·3	14·2	3·9
23	4 05·8	4 06·4	3 54·6	2·3	0·6	8·3	2·3	14·3	3·9
24	4 06·0	4 06·7	3 54·8	2·4	0·7	8·4	2·3	14·4	4·0
25	4 06·3	4 06·9	3 55·0	2·5	0·7	8·5	2·3	14·5	4·0
26	4 06·5	4 07·2	3 55·3	2·6	0·7	8·6	2·4	14·6	4·0
27	4 06·8	4 07·4	3 55·5	2·7	0·7	8·7	2·4	14·7	4·0
28	4 07·0	4 07·7	3 55·7	2·8	0·8	8·8	2·4	14·8	4·1
29	4 07·3	4 07·9	3 56·0	2·9	0·8	8·9	2·4	14·9	4·1
30	4 07·5	4 08·2	3 56·2	3·0	0·8	9·0	2·5	15·0	4·1
31	4 07·8	4 08·4	3 56·5	3·1	0·9	9·1	2·5	15·1	4·2
32	4 08·0	4 08·7	3 56·7	3·2	0·9	9·2	2·5	15·2	4·2
33	4 08·3	4 08·9	3 56·9	3·3	0·9	9·3	2·6	15·3	4·2
34	4 08·5	4 09·2	3 57·2	3·4	0·9	9·4	2·6	15·4	4·2
35	4 08·8	4 09·4	3 57·4	3·5	1·0	9·5	2·6	15·5	4·3
36	4 09·0	4 09·7	3 57·7	3·6	1·0	9·6	2·6	15·6	4·3
37	4 09·3	4 09·9	3 57·9	3·7	1·0	9·7	2·7	15·7	4·3
38	4 09·5	4 10·2	3 58·1	3·8	1·0	9·8	2·7	15·8	4·3
39	4 09·8	4 10·4	3 58·4	3·9	1·1	9·9	2·7	15·9	4·4
40	4 10·0	4 10·7	3 58·6	4·0	1·1	10·0	2·8	16·0	4·4
41	4 10·3	4 10·9	3 58·8	4·1	1·1	10·1	2·8	16·1	4·4
42	4 10·5	4 11·2	3 59·1	4·2	1·2	10·2	2·8	16·2	4·5
43	4 10·8	4 11·4	3 59·3	4·3	1·2	10·3	2·8	16·3	4·5
44	4 11·0	4 11·7	3 59·6	4·4	1·2	10·4	2·9	16·4	4·5
45	4 11·3	4 11·9	3 59·8	4·5	1·2	10·5	2·9	16·5	4·5
46	4 11·5	4 12·2	4 00·0	4·6	1·3	10·6	2·9	16·6	4·6
47	4 11·8	4 12·4	4 00·3	4·7	1·3	10·7	2·9	16·7	4·6
48	4 12·0	4 12·7	4 00·5	4·8	1·3	10·8	3·0	16·8	4·6
49	4 12·3	4 12·9	4 00·8	4·9	1·3	10·9	3·0	16·9	4·6
50	4 12·5	4 13·2	4 01·0	5·0	1·4	11·0	3·0	17·0	4·7
51	4 12·8	4 13·4	4 01·2	5·1	1·4	11·1	3·1	17·1	4·7
52	4 13·0	4 13·7	4 01·5	5·2	1·4	11·2	3·1	17·2	4·7
53	4 13·3	4 13·9	4 01·7	5·3	1·5	11·3	3·1	17·3	4·8
54	4 13·5	4 14·2	4 02·0	5·4	1·5	11·4	3·1	17·4	4·8
55	4 13·8	4 14·4	4 02·2	5·5	1·5	11·5	3·2	17·5	4·8
56	4 14·0	4 14·7	4 02·4	5·6	1·5	11·6	3·2	17·6	4·8
57	4 14·3	4 14·9	4 02·7	5·7	1·6	11·7	3·2	17·7	4·9
58	4 14·5	4 15·2	4 02·9	5·8	1·6	11·8	3·2	17·8	4·9
59	4 14·8	4 15·4	4 03·1	5·9	1·6	11·9	3·3	17·9	4·9
60	4 15·0	4 15·7	4 03·4	6·0	1·7	12·0	3·3	18·0	5·0

m 17	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	4 15·0	4 15·7	4 03·4	0·0	0·0	6·0	1·8	12·0	3·5
01	4 15·3	4 15·9	4 03·6	0·1	0·0	6·1	1·8	12·1	3·5
02	4 15·5	4 16·2	4 03·9	0·2	0·1	6·2	1·8	12·2	3·6
03	4 15·8	4 16·5	4 04·1	0·3	0·1	6·3	1·8	12·3	3·6
04	4 16·0	4 16·7	4 04·3	0·4	0·1	6·4	1·9	12·4	3·6
05	4 16·3	4 17·0	4 04·6	0·5	0·1	6·5	1·9	12·5	3·6
06	4 16·5	4 17·2	4 04·8	0·6	0·2	6·6	1·9	12·6	3·7
07	4 16·8	4 17·5	4 05·1	0·7	0·2	6·7	2·0	12·7	3·7
08	4 17·0	4 17·7	4 05·3	0·8	0·2	6·8	2·0	12·8	3·7
09	4 17·3	4 18·0	4 05·5	0·9	0·3	6·9	2·0	12·9	3·8
10	4 17·5	4 18·2	4 05·8	1·0	0·3	7·0	2·0	13·0	3·8
11	4 17·8	4 18·5	4 06·0	1·1	0·3	7·1	2·1	13·1	3·8
12	4 18·0	4 18·7	4 06·2	1·2	0·4	7·2	2·1	13·2	3·9
13	4 18·3	4 19·0	4 06·5	1·3	0·4	7·3	2·1	13·3	3·9
14	4 18·5	4 19·2	4 06·7	1·4	0·4	7·4	2·2	13·4	3·9
15	4 18·8	4 19·5	4 07·0	1·5	0·4	7·5	2·2	13·5	3·9
16	4 19·0	4 19·7	4 07·2	1·6	0·5	7·6	2·2	13·6	4·0
17	4 19·3	4 20·0	4 07·4	1·7	0·5	7·7	2·2	13·7	4·0
18	4 19·5	4 20·2	4 07·7	1·8	0·5	7·8	2·3	13·8	4·0
19	4 19·8	4 20·5	4 07·9	1·9	0·6	7·9	2·3	13·9	4·1
20	4 20·0	4 20·7	4 08·2	2·0	0·6	8·0	2·3	14·0	4·1
21	4 20·3	4 21·0	4 08·4	2·1	0·6	8·1	2·4	14·1	4·1
22	4 20·5	4 21·2	4 08·6	2·2	0·6	8·2	2·4	14·2	4·1
23	4 20·8	4 21·5	4 08·9	2·3	0·7	8·3	2·4	14·3	4·2
24	4 21·0	4 21·7	4 09·1	2·4	0·7	8·4	2·5	14·4	4·2
25	4 21·3	4 22·0	4 09·3	2·5	0·7	8·5	2·5	14·5	4·2
26	4 21·5	4 22·2	4 09·6	2·6	0·8	8·6	2·5	14·6	4·3
27	4 21·8	4 22·5	4 09·8	2·7	0·8	8·7	2·5	14·7	4·3
28	4 22·0	4 22·7	4 10·1	2·8	0·8	8·8	2·6	14·8	4·3
29	4 22·3	4 23·0	4 10·3	2·9	0·8	8·9	2·6	14·9	4·3
30	4 22·5	4 23·2	4 10·5	3·0	0·9	9·0	2·6	15·0	4·4
31	4 22·8	4 23·5	4 10·8	3·1	0·9	9·1	2·7	15·1	4·4
32	4 23·0	4 23·7	4 11·0	3·2	0·9	9·2	2·7	15·2	4·4
33	4 23·3	4 24·0	4 11·3	3·3	1·0	9·3	2·7	15·3	4·5
34	4 23·5	4 24·2	4 11·5	3·4	1·0	9·4	2·7	15·4	4·5
35	4 23·8	4 24·5	4 11·7	3·5	1·0	9·5	2·8	15·5	4·5
36	4 24·0	4 24·7	4 12·0	3·6	1·1	9·6	2·8	15·6	4·6
37	4 24·3	4 25·0	4 12·2	3·7	1·1	9·7	2·8	15·7	4·6
38	4 24·5	4 25·2	4 12·5	3·8	1·1	9·8	2·9	15·8	4·6
39	4 24·8	4 25·5	4 12·7	3·9	1·1	9·9	2·9	15·9	4·6
40	4 25·0	4 25·7	4 12·9	4·0	1·2	10·0	2·9	16·0	4·7
41	4 25·3	4 26·0	4 13·2	4·1	1·2	10·1	2·9	16·1	4·7
42	4 25·5	4 26·2	4 13·4	4·2	1·2	10·2	3·0	16·2	4·7
43	4 25·8	4 26·5	4 13·6	4·3	1·3	10·3	3·0	16·3	4·8
44	4 26·0	4 26·7	4 13·9	4·4	1·3	10·4	3·0	16·4	4·8
45	4 26·3	4 27·0	4 14·1	4·5	1·3	10·5	3·1	16·5	4·8
46	4 26·5	4 27·2	4 14·4	4·6	1·3	10·6	3·1	16·6	4·8
47	4 26·8	4 27·5	4 14·6	4·7	1·4	10·7	3·1	16·7	4·9
48	4 27·0	4 27·7	4 14·8	4·8	1·4	10·8	3·2	16·8	4·9
49	4 27·3	4 28·0	4 15·1	4·9	1·4	10·9	3·2	16·9	4·9
50	4 27·5	4 28·2	4 15·3	5·0	1·5	11·0	3·2	17·0	5·0
51	4 27·8	4 28·5	4 15·6	5·1	1·5	11·1	3·2	17·1	5·0
52	4 28·0	4 28·7	4 15·8	5·2	1·5	11·2	3·3	17·2	5·0
53	4 28·3	4 29·0	4 16·0	5·3	1·5	11·3	3·3	17·3	5·0
54	4 28·5	4 29·2	4 16·3	5·4	1·6	11·4	3·3	17·4	5·1
55	4 28·8	4 29·5	4 16·5	5·5	1·6	11·5	3·4	17·5	5·1
56	4 29·0	4 29·7	4 16·7	5·6	1·6	11·6	3·4	17·6	5·1
57	4 29·3	4 30·0	4 17·0	5·7	1·7	11·7	3·4	17·7	5·2
58	4 29·5	4 30·2	4 17·2	5·8	1·7	11·8	3·4	17·8	5·2
59	4 29·8	4 30·5	4 17·5	5·9	1·7	11·9	3·5	17·9	5·2
60	4 30·0	4 30·7	4 17·7	6·0	1·8	12·0	3·5	18·0	5·3

m 18	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	4 30·0	4 30·7	4 17·7	0·0	0·0	6·0	1·9	12·0	3·7
01	4 30·3	4 31·0	4 17·9	0·1	0·0	6·1	1·9	12·1	3·7
02	4 30·5	4 31·2	4 18·2	0·2	0·1	6·2	1·9	12·2	3·8
03	4 30·8	4 31·5	4 18·4	0·3	0·1	6·3	1·9	12·3	3·8
04	4 31·0	4 31·7	4 18·7	0·4	0·1	6·4	2·0	12·4	3·8
05	4 31·3	4 32·0	4 18·9	0·5	0·2	6·5	2·0	12·5	3·9
06	4 31·5	4 32·2	4 19·1	0·6	0·2	6·6	2·0	12·6	3·9
07	4 31·8	4 32·5	4 19·4	0·7	0·2	6·7	2·1	12·7	3·9
08	4 32·0	4 32·7	4 19·6	0·8	0·2	6·8	2·1	12·8	3·9
09	4 32·3	4 33·0	4 19·8	0·9	0·3	6·9	2·1	12·9	4·0
10	4 32·5	4 33·2	4 20·1	1·0	0·3	7·0	2·2	13·0	4·0
11	4 32·8	4 33·5	4 20·3	1·1	0·3	7·1	2·2	13·1	4·0
12	4 33·0	4 33·7	4 20·6	1·2	0·4	7·2	2·2	13·2	4·1
13	4 33·3	4 34·0	4 20·8	1·3	0·4	7·3	2·3	13·3	4·1
14	4 33·5	4 34·2	4 21·0	1·4	0·4	7·4	2·3	13·4	4·1
15	4 33·8	4 34·5	4 21·3	1·5	0·5	7·5	2·3	13·5	4·2
16	4 34·0	4 34·8	4 21·5	1·6	0·5	7·6	2·3	13·6	4·2
17	4 34·3	4 35·0	4 21·8	1·7	0·5	7·7	2·4	13·7	4·2
18	4 34·5	4 35·3	4 22·0	1·8	0·6	7·8	2·4	13·8	4·3
19	4 34·8	4 35·5	4 22·2	1·9	0·6	7·9	2·4	13·9	4·3
20	4 35·0	4 35·8	4 22·5	2·0	0·6	8·0	2·5	14·0	4·3
21	4 35·3	4 36·0	4 22·7	2·1	0·6	8·1	2·5	14·1	4·3
22	4 35·5	4 36·3	4 22·9	2·2	0·7	8·2	2·5	14·2	4·4
23	4 35·8	4 36·5	4 23·2	2·3	0·7	8·3	2·6	14·3	4·4
24	4 36·0	4 36·8	4 23·4	2·4	0·7	8·4	2·6	14·4	4·4
25	4 36·3	4 37·0	4 23·7	2·5	0·8	8·5	2·6	14·5	4·5
26	4 36·5	4 37·3	4 23·9	2·6	0·8	8·6	2·7	14·6	4·5
27	4 36·8	4 37·5	4 24·1	2·7	0·8	8·7	2·7	14·7	4·5
28	4 37·0	4 37·8	4 24·4	2·8	0·9	8·8	2·7	14·8	4·6
29	4 37·3	4 38·0	4 24·6	2·9	0·9	8·9	2·7	14·9	4·6
30	4 37·5	4 38·3	4 24·9	3·0	0·9	9·0	2·8	15·0	4·6
31	4 37·8	4 38·5	4 25·1	3·1	1·0	9·1	2·8	15·1	4·7
32	4 38·0	4 38·8	4 25·3	3·2	1·0	9·2	2·8	15·2	4·7
33	4 38·3	4 39·0	4 25·6	3·3	1·0	9·3	2·9	15·3	4·7
34	4 38·5	4 39·3	4 25·8	3·4	1·0	9·4	2·9	15·4	4·7
35	4 38·8	4 39·5	4 26·1	3·5	1·1	9·5	2·9	15·5	4·8
36	4 39·0	4 39·8	4 26·3	3·6	1·1	9·6	3·0	15·6	4·8
37	4 39·3	4 40·0	4 26·5	3·7	1·1	9·7	3·0	15·7	4·8
38	4 39·5	4 40·3	4 26·8	3·8	1·2	9·8	3·0	15·8	4·9
39	4 39·8	4 40·5	4 27·0	3·9	1·2	9·9	3·1	15·9	4·9
40	4 40·0	4 40·8	4 27·2	4·0	1·2	10·0	3·1	16·0	4·9
41	4 40·3	4 41·0	4 27·5	4·1	1·3	10·1	3·1	16·1	5·0
42	4 40·5	4 41·3	4 27·7	4·2	1·3	10·2	3·1	16·2	5·0
43	4 40·8	4 41·5	4 28·0	4·3	1·3	10·3	3·2	16·3	5·0
44	4 41·0	4 41·8	4 28·2	4·4	1·4	10·4	3·2	16·4	5·1
45	4 41·3	4 42·0	4 28·4	4·5	1·4	10·5	3·2	16·5	5·1
46	4 41·5	4 42·3	4 28·7	4·6	1·4	10·6	3·3	16·6	5·1
47	4 41·8	4 42·5	4 28·9	4·7	1·4	10·7	3·3	16·7	5·1
48	4 42·0	4 42·8	4 29·2	4·8	1·5	10·8	3·3	16·8	5·2
49	4 42·3	4 43·0	4 29·4	4·9	1·5	10·9	3·4	16·9	5·2
50	4 42·5	4 43·3	4 29·6	5·0	1·5	11·0	3·4	17·0	5·2
51	4 42·8	4 43·5	4 29·9	5·1	1·6	11·1	3·4	17·1	5·3
52	4 43·0	4 43·8	4 30·1	5·2	1·6	11·2	3·5	17·2	5·3
53	4 43·3	4 44·0	4 30·3	5·3	1·6	11·3	3·5	17·3	5·3
54	4 43·5	4 44·3	4 30·6	5·4	1·7	11·4	3·5	17·4	5·4
55	4 43·8	4 44·5	4 30·8	5·5	1·7	11·5	3·5	17·5	5·4
56	4 44·0	4 44·8	4 31·1	5·6	1·7	11·6	3·6	17·6	5·4
57	4 44·3	4 45·0	4 31·3	5·7	1·8	11·7	3·6	17·7	5·5
58	4 44·5	4 45·3	4 31·5	5·8	1·8	11·8	3·6	17·8	5·5
59	4 44·8	4 45·5	4 31·8	5·9	1·8	11·9	3·7	17·9	5·5
60	4 45·0	4 45·8	4 32·0	6·0	1·9	12·0	3·7	18·0	5·6

m 19	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	4 45·0	4 45·8	4 32·0	0·0	0·0	6·0	2·0	12·0	3·9
01	4 45·3	4 46·0	4 32·3	0·1	0·0	6·1	2·0	12·1	3·9
02	4 45·5	4 46·3	4 32·5	0·2	0·1	6·2	2·0	12·2	4·0
03	4 45·8	4 46·5	4 32·7	0·3	0·1	6·3	2·0	12·3	4·0
04	4 46·0	4 46·8	4 33·0	0·4	0·1	6·4	2·1	12·4	4·0
05	4 46·3	4 47·0	4 33·2	0·5	0·2	6·5	2·1	12·5	4·1
06	4 46·5	4 47·3	4 33·4	0·6	0·2	6·6	2·1	12·6	4·1
07	4 46·8	4 47·5	4 33·7	0·7	0·2	6·7	2·2	12·7	4·1
08	4 47·0	4 47·8	4 33·9	0·8	0·3	6·8	2·2	12·8	4·2
09	4 47·3	4 48·0	4 34·2	0·9	0·3	6·9	2·2	12·9	4·2
10	4 47·5	4 48·3	4 34·4	1·0	0·3	7·0	2·3	13·0	4·2
11	4 47·8	4 48·5	4 34·6	1·1	0·4	7·1	2·3	13·1	4·3
12	4 48·0	4 48·8	4 34·9	1·2	0·4	7·2	2·3	13·2	4·3
13	4 48·3	4 49·0	4 35·1	1·3	0·4	7·3	2·4	13·3	4·3
14	4 48·5	4 49·3	4 35·4	1·4	0·5	7·4	2·4	13·4	4·4
15	4 48·8	4 49·5	4 35·6	1·5	0·5	7·5	2·4	13·5	4·4
16	4 49·0	4 49·8	4 35·8	1·6	0·5	7·6	2·5	13·6	4·4
17	4 49·3	4 50·0	4 36·1	1·7	0·6	7·7	2·5	13·7	4·5
18	4 49·5	4 50·3	4 36·3	1·8	0·6	7·8	2·5	13·8	4·5
19	4 49·8	4 50·5	4 36·6	1·9	0·6	7·9	2·6	13·9	4·5
20	4 50·0	4 50·8	4 36·8	2·0	0·7	8·0	2·6	14·0	4·6
21	4 50·3	4 51·0	4 37·0	2·1	0·7	8·1	2·6	14·1	4·6
22	4 50·5	4 51·3	4 37·3	2·2	0·7	8·2	2·7	14·2	4·6
23	4 50·8	4 51·5	4 37·5	2·3	0·7	8·3	2·7	14·3	4·6
24	4 51·0	4 51·8	4 37·7	2·4	0·8	8·4	2·7	14·4	4·7
25	4 51·3	4 52·0	4 38·0	2·5	0·8	8·5	2·8	14·5	4·7
26	4 51·5	4 52·3	4 38·2	2·6	0·8	8·6	2·8	14·6	4·7
27	4 51·8	4 52·5	4 38·5	2·7	0·9	8·7	2·8	14·7	4·8
28	4 52·0	4 52·8	4 38·7	2·8	0·9	8·8	2·9	14·8	4·8
29	4 52·3	4 53·1	4 38·9	2·9	0·9	8·9	2·9	14·9	4·8
30	4 52·5	4 53·3	4 39·2	3·0	1·0	9·0	2·9	15·0	4·9
31	4 52·8	4 53·6	4 39·4	3·1	1·0	9·1	3·0	15·1	4·9
32	4 53·0	4 53·8	4 39·7	3·2	1·0	9·2	3·0	15·2	4·9
33	4 53·3	4 54·1	4 39·9	3·3	1·1	9·3	3·0	15·3	5·0
34	4 53·5	4 54·3	4 40·1	3·4	1·1	9·4	3·1	15·4	5·0
35	4 53·8	4 54·6	4 40·4	3·5	1·1	9·5	3·1	15·5	5·0
36	4 54·0	4 54·8	4 40·6	3·6	1·2	9·6	3·1	15·6	5·1
37	4 54·3	4 55·1	4 40·8	3·7	1·2	9·7	3·2	15·7	5·1
38	4 54·5	4 55·3	4 41·1	3·8	1·2	9·8	3·2	15·8	5·1
39	4 54·8	4 55·6	4 41·3	3·9	1·3	9·9	3·2	15·9	5·2
40	4 55·0	4 55·8	4 41·6	4·0	1·3	10·0	3·3	16·0	5·2
41	4 55·3	4 56·1	4 41·8	4·1	1·3	10·1	3·3	16·1	5·2
42	4 55·5	4 56·3	4 42·0	4·2	1·4	10·2	3·3	16·2	5·3
43	4 55·8	4 56·6	4 42·3	4·3	1·4	10·3	3·3	16·3	5·3
44	4 56·0	4 56·8	4 42·5	4·4	1·4	10·4	3·4	16·4	5·3
45	4 56·3	4 57·1	4 42·8	4·5	1·5	10·5	3·4	16·5	5·4
46	4 56·5	4 57·3	4 43·0	4·6	1·5	10·6	3·4	16·6	5·4
47	4 56·8	4 57·6	4 43·2	4·7	1·5	10·7	3·5	16·7	5·4
48	4 57·0	4 57·8	4 43·5	4·8	1·6	10·8	3·5	16·8	5·5
49	4 57·3	4 58·1	4 43·7	4·9	1·6	10·9	3·5	16·9	5·5
50	4 57·5	4 58·3	4 43·9	5·0	1·6	11·0	3·6	17·0	5·5
51	4 57·8	4 58·6	4 44·2	5·1	1·7	11·1	3·6	17·1	5·6
52	4 58·0	4 58·8	4 44·4	5·2	1·7	11·2	3·6	17·2	5·6
53	4 58·3	4 59·1	4 44·7	5·3	1·7	11·3	3·7	17·3	5·6
54	4 58·5	4 59·3	4 44·9	5·4	1·8	11·4	3·7	17·4	5·7
55	4 58·8	4 59·6	4 45·1	5·5	1·8	11·5	3·7	17·5	5·7
56	4 59·0	4 59·8	4 45·4	5·6	1·8	11·6	3·8	17·6	5·7
57	4 59·3	5 00·1	4 45·6	5·7	1·9	11·7	3·8	17·7	5·8
58	4 59·5	5 00·3	4 45·9	5·8	1·9	11·8	3·8	17·8	5·8
59	4 59·8	5 00·6	4 46·1	5·9	1·9	11·9	3·9	17·9	5·8
60	5 00·0	5 00·8	4 46·3	6·0	2·0	12·0	3·9	18·0	5·9

m 20	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	5 00·0	5 00·8	4 46·3	0·0	0·0	6·0	2·1	12·0	4·1
01	5 00·3	5 01·1	4 46·6	0·1	0·0	6·1	2·1	12·1	4·1
02	5 00·5	5 01·3	4 46·8	0·2	0·1	6·2	2·1	12·2	4·2
03	5 00·8	5 01·6	4 47·0	0·3	0·1	6·3	2·2	12·3	4·2
04	5 01·0	5 01·8	4 47·3	0·4	0·1	6·4	2·2	12·4	4·2
05	5 01·3	5 02·1	4 47·5	0·5	0·2	6·5	2·2	12·5	4·3
06	5 01·5	5 02·3	4 47·8	0·6	0·2	6·6	2·3	12·6	4·3
07	5 01·8	5 02·6	4 48·0	0·7	0·2	6·7	2·3	12·7	4·3
08	5 02·0	5 02·8	4 48·2	0·8	0·3	6·8	2·3	12·8	4·4
09	5 02·3	5 03·1	4 48·5	0·9	0·3	6·9	2·4	12·9	4·4
10	5 02·5	5 03·3	4 48·7	1·0	0·3	7·0	2·4	13·0	4·4
11	5 02·8	5 03·6	4 49·0	1·1	0·4	7·1	2·4	13·1	4·5
12	5 03·0	5 03·8	4 49·2	1·2	0·4	7·2	2·5	13·2	4·5
13	5 03·3	5 04·1	4 49·4	1·3	0·4	7·3	2·5	13·3	4·5
14	5 03·5	5 04·3	4 49·7	1·4	0·5	7·4	2·5	13·4	4·6
15	5 03·8	5 04·6	4 49·9	1·5	0·5	7·5	2·6	13·5	4·6
16	5 04·0	5 04·8	4 50·2	1·6	0·5	7·6	2·6	13·6	4·6
17	5 04·3	5 05·1	4 50·4	1·7	0·6	7·7	2·6	13·7	4·7
18	5 04·5	5 05·3	4 50·6	1·8	0·6	7·8	2·7	13·8	4·7
19	5 04·8	5 05·6	4 50·9	1·9	0·6	7·9	2·7	13·9	4·7
20	5 05·0	5 05·8	4 51·1	2·0	0·7	8·0	2·7	14·0	4·8
21	5 05·3	5 06·1	4 51·3	2·1	0·7	8·1	2·8	14·1	4·8
22	5 05·5	5 06·3	4 51·6	2·2	0·8	8·2	2·8	14·2	4·9
23	5 05·8	5 06·6	4 51·8	2·3	0·8	8·3	2·8	14·3	4·9
24	5 06·0	5 06·8	4 52·1	2·4	0·8	8·4	2·9	14·4	4·9
25	5 06·3	5 07·1	4 52·3	2·5	0·9	8·5	2·9	14·5	5·0
26	5 06·5	5 07·3	4 52·5	2·6	0·9	8·6	2·9	14·6	5·0
27	5 06·8	5 07·6	4 52·8	2·7	0·9	8·7	3·0	14·7	5·0
28	5 07·0	5 07·8	4 53·0	2·8	1·0	8·8	3·0	14·8	5·1
29	5 07·3	5 08·1	4 53·3	2·9	1·0	8·9	3·0	14·9	5·1
30	5 07·5	5 08·3	4 53·5	3·0	1·0	9·0	3·1	15·0	5·1
31	5 07·8	5 08·6	4 53·7	3·1	1·1	9·1	3·1	15·1	5·2
32	5 08·0	5 08·8	4 54·0	3·2	1·1	9·2	3·1	15·2	5·2
33	5 08·3	5 09·1	4 54·2	3·3	1·1	9·3	3·2	15·3	5·2
34	5 08·5	5 09·3	4 54·4	3·4	1·2	9·4	3·2	15·4	5·3
35	5 08·8	5 09·6	4 54·7	3·5	1·2	9·5	3·2	15·5	5·3
36	5 09·0	5 09·8	4 54·9	3·6	1·2	9·6	3·3	15·6	5·3
37	5 09·3	5 10·1	4 55·2	3·7	1·3	9·7	3·3	15·7	5·4
38	5 09·5	5 10·3	4 55·4	3·8	1·3	9·8	3·3	15·8	5·4
39	5 09·8	5 10·6	4 55·6	3·9	1·3	9·9	3·4	15·9	5·4
40	5 10·0	5 10·8	4 55·9	4·0	1·4	10·0	3·4	16·0	5·5
41	5 10·3	5 11·1	4 56·1	4·1	1·4	10·1	3·5	16·1	5·5
42	5 10·5	5 11·4	4 56·4	4·2	1·4	10·2	3·5	16·2	5·5
43	5 10·8	5 11·6	4 56·6	4·3	1·5	10·3	3·5	16·3	5·6
44	5 11·0	5 11·9	4 56·8	4·4	1·5	10·4	3·6	16·4	5·6
45	5 11·3	5 12·1	4 57·1	4·5	1·5	10·5	3·6	16·5	5·6
46	5 11·5	5 12·4	4 57·3	4·6	1·6	10·6	3·6	16·6	5·7
47	5 11·8	5 12·6	4 57·5	4·7	1·6	10·7	3·7	16·7	5·7
48	5 12·0	5 12·9	4 57·8	4·8	1·6	10·8	3·7	16·8	5·7
49	5 12·3	5 13·1	4 58·0	4·9	1·7	10·9	3·7	16·9	5·8
50	5 12·5	5 13·4	4 58·3	5·0	1·7	11·0	3·8	17·0	5·8
51	5 12·8	5 13·6	4 58·5	5·1	1·7	11·1	3·8	17·1	5·8
52	5 13·0	5 13·9	4 58·7	5·2	1·8	11·2	3·8	17·2	5·9
53	5 13·3	5 14·1	4 59·0	5·3	1·8	11·3	3·9	17·3	5·9
54	5 13·5	5 14·4	4 59·2	5·4	1·8	11·4	3·9	17·4	5·9
55	5 13·8	5 14·6	4 59·5	5·5	1·9	11·5	3·9	17·5	6·0
56	5 14·0	5 14·9	4 59·7	5·6	1·9	11·6	4·0	17·6	6·0
57	5 14·3	5 15·1	4 59·9	5·7	1·9	11·7	4·0	17·7	6·0
58	5 14·5	5 15·4	5 00·2	5·8	2·0	11·8	4·0	17·8	6·1
59	5 14·8	5 15·6	5 00·4	5·9	2·0	11·9	4·1	17·9	6·1
60	5 15·0	5 15·9	5 00·7	6·0	2·1	12·0	4·1	18·0	6·2

m 21	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	5 15·0	5 15·9	5 00·7	0·0	0·0	6·0	2·2	12·0	4·3
01	5 15·3	5 16·1	5 00·9	0·1	0·0	6·1	2·2	12·1	4·3
02	5 15·5	5 16·4	5 01·1	0·2	0·1	6·2	2·2	12·2	4·4
03	5 15·8	5 16·6	5 01·4	0·3	0·1	6·3	2·3	12·3	4·4
04	5 16·0	5 16·9	5 01·6	0·4	0·1	6·4	2·3	12·4	4·4
05	5 16·3	5 17·1	5 01·8	0·5	0·2	6·5	2·3	12·5	4·5
06	5 16·5	5 17·4	5 02·1	0·6	0·2	6·6	2·4	12·6	4·5
07	5 16·8	5 17·6	5 02·3	0·7	0·3	6·7	2·4	12·7	4·6
08	5 17·0	5 17·9	5 02·6	0·8	0·3	6·8	2·4	12·8	4·6
09	5 17·3	5 18·1	5 02·8	0·9	0·3	6·9	2·5	12·9	4·6
10	5 17·5	5 18·4	5 03·0	1·0	0·4	7·0	2·5	13·0	4·7
11	5 17·8	5 18·6	5 03·3	1·1	0·4	7·1	2·5	13·1	4·7
12	5 18·0	5 18·9	5 03·5	1·2	0·4	7·2	2·6	13·2	4·7
13	5 18·3	5 19·1	5 03·8	1·3	0·5	7·3	2·6	13·3	4·8
14	5 18·5	5 19·4	5 04·0	1·4	0·5	7·4	2·7	13·4	4·8
15	5 18·8	5 19·6	5 04·2	1·5	0·5	7·5	2·7	13·5	4·8
16	5 19·0	5 19·9	5 04·5	1·6	0·6	7·6	2·7	13·6	4·9
17	5 19·3	5 20·1	5 04·7	1·7	0·6	7·7	2·8	13·7	4·9
18	5 19·5	5 20·4	5 04·9	1·8	0·6	7·8	2·8	13·8	4·9
19	5 19·8	5 20·6	5 05·2	1·9	0·7	7·9	2·8	13·9	5·0
20	5 20·0	5 20·9	5 05·4	2·0	0·7	8·0	2·9	14·0	5·0
21	5 20·3	5 21·1	5 05·7	2·1	0·8	8·1	2·9	14·1	5·1
22	5 20·5	5 21·4	5 05·9	2·2	0·8	8·2	2·9	14·2	5·1
23	5 20·8	5 21·6	5 06·1	2·3	0·8	8·3	3·0	14·3	5·1
24	5 21·0	5 21·9	5 06·4	2·4	0·9	8·4	3·0	14·4	5·2
25	5 21·3	5 22·1	5 06·6	2·5	0·9	8·5	3·0	14·5	5·2
26	5 21·5	5 22·4	5 06·9	2·6	0·9	8·6	3·1	14·6	5·2
27	5 21·8	5 22·6	5 07·1	2·7	1·0	8·7	3·1	14·7	5·3
28	5 22·0	5 22·9	5 07·3	2·8	1·0	8·8	3·2	14·8	5·3
29	5 22·3	5 23·1	5 07·6	2·9	1·0	8·9	3·2	14·9	5·3
30	5 22·5	5 23·4	5 07·8	3·0	1·1	9·0	3·2	15·0	5·4
31	5 22·8	5 23·6	5 08·0	3·1	1·1	9·1	3·3	15·1	5·4
32	5 23·0	5 23·9	5 08·3	3·2	1·1	9·2	3·3	15·2	5·4
33	5 23·3	5 24·1	5 08·5	3·3	1·2	9·3	3·3	15·3	5·5
34	5 23·5	5 24·4	5 08·8	3·4	1·2	9·4	3·4	15·4	5·5
35	5 23·8	5 24·6	5 09·0	3·5	1·3	9·5	3·4	15·5	5·6
36	5 24·0	5 24·9	5 09·2	3·6	1·3	9·6	3·4	15·6	5·6
37	5 24·3	5 25·1	5 09·5	3·7	1·3	9·7	3·5	15·7	5·6
38	5 24·5	5 25·4	5 09·7	3·8	1·4	9·8	3·5	15·8	5·7
39	5 24·8	5 25·6	5 10·0	3·9	1·4	9·9	3·5	15·9	5·7
40	5 25·0	5 25·9	5 10·2	4·0	1·4	10·0	3·6	16·0	5·7
41	5 25·3	5 26·1	5 10·4	4·1	1·5	10·1	3·6	16·1	5·8
42	5 25·5	5 26·4	5 10·7	4·2	1·5	10·2	3·7	16·2	5·8
43	5 25·8	5 26·6	5 10·9	4·3	1·5	10·3	3·7	16·3	5·8
44	5 26·0	5 26·9	5 11·1	4·4	1·6	10·4	3·7	16·4	5·9
45	5 26·3	5 27·1	5 11·4	4·5	1·6	10·5	3·8	16·5	5·9
46	5 26·5	5 27·4	5 11·6	4·6	1·6	10·6	3·8	16·6	5·9
47	5 26·8	5 27·6	5 11·9	4·7	1·7	10·7	3·8	16·7	6·0
48	5 27·0	5 27·9	5 12·1	4·8	1·7	10·8	3·9	16·8	6·0
49	5 27·3	5 28·1	5 12·3	4·9	1·8	10·9	3·9	16·9	6·1
50	5 27·5	5 28·4	5 12·6	5·0	1·8	11·0	3·9	17·0	6·1
51	5 27·8	5 28·6	5 12·8	5·1	1·8	11·1	4·0	17·1	6·1
52	5 28·0	5 28·9	5 13·1	5·2	1·9	11·2	4·0	17·2	6·2
53	5 28·3	5 29·1	5 13·3	5·3	1·9	11·3	4·0	17·3	6·2
54	5 28·5	5 29·4	5 13·5	5·4	1·9	11·4	4·1	17·4	6·2
55	5 28·8	5 29·7	5 13·8	5·5	2·0	11·5	4·1	17·5	6·3
56	5 29·0	5 29·9	5 14·0	5·6	2·0	11·6	4·2	17·6	6·3
57	5 29·3	5 30·2	5 14·3	5·7	2·0	11·7	4·2	17·7	6·3
58	5 29·5	5 30·4	5 14·5	5·8	2·1	11·8	4·2	17·8	6·4
59	5 29·8	5 30·7	5 14·7	5·9	2·1	11·9	4·3	17·9	6·4
60	5 30·0	5 30·9	5 15·0	6·0	2·2	12·0	4·3	18·0	6·5

22m	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	5 30·0	5 30·9	5 15·0	0·0	0·0	6·0	2·3	12·0	4·5
01	5 30·3	5 31·2	5 15·2	0·1	0·0	6·1	2·3	12·1	4·5
02	5 30·5	5 31·4	5 15·4	0·2	0·1	6·2	2·3	12·2	4·6
03	5 30·8	5 31·7	5 15·7	0·3	0·1	6·3	2·4	12·3	4·6
04	5 31·0	5 31·9	5 15·9	0·4	0·2	6·4	2·4	12·4	4·7
05	5 31·3	5 32·2	5 16·2	0·5	0·2	6·5	2·4	12·5	4·7
06	5 31·5	5 32·4	5 16·4	0·6	0·2	6·6	2·5	12·6	4·7
07	5 31·8	5 32·7	5 16·6	0·7	0·3	6·7	2·5	12·7	4·8
08	5 32·0	5 32·9	5 16·9	0·8	0·3	6·8	2·6	12·8	4·8
09	5 32·3	5 33·2	5 17·1	0·9	0·3	6·9	2·6	12·9	4·8
10	5 32·5	5 33·4	5 17·4	1·0	0·4	7·0	2·6	13·0	4·9
11	5 32·8	5 33·7	5 17·6	1·1	0·4	7·1	2·7	13·1	4·9
12	5 33·0	5 33·9	5 17·8	1·2	0·5	7·2	2·7	13·2	5·0
13	5 33·3	5 34·2	5 18·1	1·3	0·5	7·3	2·7	13·3	5·0
14	5 33·5	5 34·4	5 18·3	1·4	0·5	7·4	2·8	13·4	5·0
15	5 33·8	5 34·7	5 18·5	1·5	0·6	7·5	2·8	13·5	5·1
16	5 34·0	5 34·9	5 18·8	1·6	0·6	7·6	2·9	13·6	5·1
17	5 34·3	5 35·2	5 19·0	1·7	0·6	7·7	2·9	13·7	5·1
18	5 34·5	5 35·4	5 19·3	1·8	0·7	7·8	2·9	13·8	5·2
19	5 34·8	5 35·7	5 19·5	1·9	0·7	7·9	3·0	13·9	5·2
20	5 35·0	5 35·9	5 19·7	2·0	0·8	8·0	3·0	14·0	5·3
21	5 35·3	5 36·2	5 20·0	2·1	0·8	8·1	3·0	14·1	5·3
22	5 35·5	5 36·4	5 20·2	2·2	0·8	8·2	3·1	14·2	5·3
23	5 35·8	5 36·7	5 20·5	2·3	0·9	8·3	3·1	14·3	5·4
24	5 36·0	5 36·9	5 20·7	2·4	0·9	8·4	3·2	14·4	5·4
25	5 36·3	5 37·2	5 20·9	2·5	0·9	8·5	3·2	14·5	5·4
26	5 36·5	5 37·4	5 21·2	2·6	1·0	8·6	3·2	14·6	5·5
27	5 36·8	5 37·7	5 21·4	2·7	1·0	8·7	3·3	14·7	5·5
28	5 37·0	5 37·9	5 21·6	2·8	1·0	8·8	3·3	14·8	5·6
29	5 37·3	5 38·2	5 21·9	2·9	1·1	8·9	3·3	14·9	5·6
30	5 37·5	5 38·4	5 22·1	3·0	1·1	9·0	3·4	15·0	5·6
31	5 37·8	5 38·7	5 22·4	3·1	1·2	9·1	3·4	15·1	5·7
32	5 38·0	5 38·9	5 22·6	3·2	1·2	9·2	3·5	15·2	5·7
33	5 38·3	5 39·2	5 22·8	3·3	1·2	9·3	3·5	15·3	5·7
34	5 38·5	5 39·4	5 23·1	3·4	1·3	9·4	3·5	15·4	5·8
35	5 38·8	5 39·7	5 23·3	3·5	1·3	9·5	3·6	15·5	5·8
36	5 39·0	5 39·9	5 23·6	3·6	1·4	9·6	3·6	15·6	5·9
37	5 39·3	5 40·2	5 23·8	3·7	1·4	9·7	3·6	15·7	5·9
38	5 39·5	5 40·4	5 24·0	3·8	1·4	9·8	3·7	15·8	5·9
39	5 39·8	5 40·7	5 24·3	3·9	1·5	9·9	3·7	15·9	6·0
40	5 40·0	5 40·9	5 24·5	4·0	1·5	10·0	3·8	16·0	6·0
41	5 40·3	5 41·2	5 24·7	4·1	1·5	10·1	3·8	16·1	6·0
42	5 40·5	5 41·4	5 25·0	4·2	1·6	10·2	3·8	16·2	6·1
43	5 40·8	5 41·7	5 25·2	4·3	1·6	10·3	3·9	16·3	6·1
44	5 41·0	5 41·9	5 25·5	4·4	1·7	10·4	3·9	16·4	6·1
45	5 41·3	5 42·2	5 25·7	4·5	1·7	10·5	3·9	16·5	6·2
46	5 41·5	5 42·4	5 25·9	4·6	1·7	10·6	4·0	16·6	6·2
47	5 41·8	5 42·7	5 26·2	4·7	1·8	10·7	4·0	16·7	6·3
48	5 42·0	5 42·9	5 26·4	4·8	1·8	10·8	4·1	16·8	6·3
49	5 42·3	5 43·2	5 26·7	4·9	1·8	10·9	4·1	16·9	6·3
50	5 42·5	5 43·4	5 26·9	5·0	1·9	11·0	4·1	17·0	6·4
51	5 42·8	5 43·7	5 27·1	5·1	1·9	11·1	4·2	17·1	6·4
52	5 43·0	5 43·9	5 27·4	5·2	2·0	11·2	4·2	17·2	6·5
53	5 43·3	5 44·2	5 27·6	5·3	2·0	11·3	4·2	17·3	6·5
54	5 43·5	5 44·4	5 27·9	5·4	2·0	11·4	4·3	17·4	6·5
55	5 43·8	5 44·7	5 28·1	5·5	2·1	11·5	4·3	17·5	6·6
56	5 44·0	5 44·9	5 28·3	5·6	2·1	11·6	4·4	17·6	6·6
57	5 44·3	5 45·2	5 28·6	5·7	2·1	11·7	4·4	17·7	6·6
58	5 44·5	5 45·4	5 28·8	5·8	2·2	11·8	4·4	17·8	6·7
59	5 44·8	5 45·7	5 29·0	5·9	2·2	11·9	4·5	17·9	6·7
60	5 45·0	5 45·9	5 29·3	6·0	2·3	12·0	4·5	18·0	6·8

23m	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	5 45·0	5 45·9	5 29·3	0·0	0·0	6·0	2·4	12·0	4·7
01	5 45·3	5 46·2	5 29·5	0·1	0·0	6·1	2·4	12·1	4·7
02	5 45·5	5 46·4	5 29·8	0·2	0·1	6·2	2·4	12·2	4·8
03	5 45·8	5 46·7	5 30·0	0·3	0·1	6·3	2·5	12·3	4·8
04	5 46·0	5 46·9	5 30·2	0·4	0·2	6·4	2·5	12·4	4·9
05	5 46·3	5 47·2	5 30·5	0·5	0·2	6·5	2·5	12·5	4·9
06	5 46·5	5 47·4	5 30·7	0·6	0·2	6·6	2·6	12·6	4·9
07	5 46·8	5 47·7	5 31·0	0·7	0·3	6·7	2·6	12·7	5·0
08	5 47·0	5 48·0	5 31·2	0·8	0·3	6·8	2·7	12·8	5·0
09	5 47·3	5 48·2	5 31·4	0·9	0·4	6·9	2·7	12·9	5·1
10	5 47·5	5 48·5	5 31·7	1·0	0·4	7·0	2·7	13·0	5·1
11	5 47·8	5 48·7	5 31·9	1·1	0·4	7·1	2·8	13·1	5·1
12	5 48·0	5 49·0	5 32·1	1·2	0·5	7·2	2·8	13·2	5·2
13	5 48·3	5 49·2	5 32·4	1·3	0·5	7·3	2·9	13·3	5·2
14	5 48·5	5 49·5	5 32·6	1·4	0·5	7·4	2·9	13·4	5·2
15	5 48·8	5 49·7	5 32·9	1·5	0·6	7·5	2·9	13·5	5·3
16	5 49·0	5 50·0	5 33·1	1·6	0·6	7·6	3·0	13·6	5·3
17	5 49·3	5 50·2	5 33·3	1·7	0·7	7·7	3·0	13·7	5·4
18	5 49·5	5 50·5	5 33·6	1·8	0·7	7·8	3·1	13·8	5·4
19	5 49·8	5 50·7	5 33·8	1·9	0·7	7·9	3·1	13·9	5·4
20	5 50·0	5 51·0	5 34·1	2·0	0·8	8·0	3·1	14·0	5·5
21	5 50·3	5 51·2	5 34·3	2·1	0·8	8·1	3·2	14·1	5·5
22	5 50·5	5 51·5	5 34·5	2·2	0·9	8·2	3·2	14·2	5·6
23	5 50·8	5 51·7	5 34·8	2·3	0·9	8·3	3·3	14·3	5·6
24	5 51·0	5 52·0	5 35·0	2·4	0·9	8·4	3·3	14·4	5·6
25	5 51·3	5 52·2	5 35·2	2·5	1·0	8·5	3·3	14·5	5·7
26	5 51·5	5 52·5	5 35·5	2·6	1·0	8·6	3·4	14·6	5·7
27	5 51·8	5 52·7	5 35·7	2·7	1·1	8·7	3·4	14·7	5·8
28	5 52·0	5 53·0	5 36·0	2·8	1·1	8·8	3·4	14·8	5·8
29	5 52·3	5 53·2	5 36·2	2·9	1·1	8·9	3·5	14·9	5·8
30	5 52·5	5 53·5	5 36·4	3·0	1·2	9·0	3·5	15·0	5·9
31	5 52·8	5 53·7	5 36·7	3·1	1·2	9·1	3·6	15·1	5·9
32	5 53·0	5 54·0	5 36·9	3·2	1·3	9·2	3·6	15·2	6·0
33	5 53·3	5 54·2	5 37·2	3·3	1·3	9·3	3·6	15·3	6·0
34	5 53·5	5 54·5	5 37·4	3·4	1·3	9·4	3·7	15·4	6·0
35	5 53·8	5 54·7	5 37·6	3·5	1·4	9·5	3·7	15·5	6·1
36	5 54·0	5 55·0	5 37·9	3·6	1·4	9·6	3·8	15·6	6·1
37	5 54·3	5 55·2	5 38·1	3·7	1·4	9·7	3·8	15·7	6·1
38	5 54·5	5 55·5	5 38·4	3·8	1·5	9·8	3·8	15·8	6·2
39	5 54·8	5 55·7	5 38·6	3·9	1·5	9·9	3·9	15·9	6·2
40	5 55·0	5 56·0	5 38·8	4·0	1·6	10·0	3·9	16·0	6·3
41	5 55·3	5 56·2	5 39·1	4·1	1·6	10·1	4·0	16·1	6·3
42	5 55·5	5 56·5	5 39·3	4·2	1·6	10·2	4·0	16·2	6·3
43	5 55·8	5 56·7	5 39·5	4·3	1·7	10·3	4·0	16·3	6·4
44	5 56·0	5 57·0	5 39·8	4·4	1·7	10·4	4·1	16·4	6·4
45	5 56·3	5 57·2	5 40·0	4·5	1·8	10·5	4·1	16·5	6·5
46	5 56·5	5 57·5	5 40·3	4·6	1·8	10·6	4·2	16·6	6·5
47	5 56·8	5 57·7	5 40·5	4·7	1·8	10·7	4·2	16·7	6·5
48	5 57·0	5 58·0	5 40·7	4·8	1·9	10·8	4·2	16·8	6·6
49	5 57·3	5 58·2	5 41·0	4·9	1·9	10·9	4·3	16·9	6·6
50	5 57·5	5 58·5	5 41·2	5·0	2·0	11·0	4·3	17·0	6·7
51	5 57·8	5 58·7	5 41·5	5·1	2·0	11·1	4·3	17·1	6·7
52	5 58·0	5 59·0	5 41·7	5·2	2·0	11·2	4·4	17·2	6·7
53	5 58·3	5 59·2	5 41·9	5·3	2·1	11·3	4·4	17·3	6·8
54	5 58·5	5 59·5	5 42·2	5·4	2·1	11·4	4·5	17·4	6·8
55	5 58·8	5 59·7	5 42·4	5·5	2·2	11·5	4·5	17·5	6·9
56	5 59·0	6 00·0	5 42·6	5·6	2·2	11·6	4·5	17·6	6·9
57	5 59·3	6 00·2	5 42·9	5·7	2·2	11·7	4·6	17·7	6·9
58	5 59·5	6 00·5	5 43·1	5·8	2·3	11·8	4·6	17·8	7·0
59	5 59·8	6 00·7	5 43·4	5·9	2·3	11·9	4·7	17·9	7·0
60	6 00·0	6 01·0	5 43·6	6·0	2·4	12·0	4·7	18·0	7·1

24m INCREMENTS AND CORRECTIONS 25m

m 24 s	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
	° ′	° ′	° ′	′	′	′	′	′	′
00	6 00·0	6 01·0	5 43·6	0·0	0·0	6·0	2·5	12·0	4·9
01	6 00·3	6 01·2	5 43·8	0·1	0·0	6·1	2·5	12·1	4·9
02	6 00·5	6 01·5	5 44·1	0·2	0·1	6·2	2·5	12·2	5·0
03	6 00·8	6 01·7	5 44·3	0·3	0·1	6·3	2·6	12·3	5·0
04	6 01·0	6 02·0	5 44·6	0·4	0·2	6·4	2·6	12·4	5·1
05	6 01·3	6 02·2	5 44·8	0·5	0·2	6·5	2·7	12·5	5·1
06	6 01·5	6 02·5	5 45·0	0·6	0·2	6·6	2·7	12·6	5·1
07	6 01·8	6 02·7	5 45·3	0·7	0·3	6·7	2·7	12·7	5·2
08	6 02·0	6 03·0	5 45·5	0·8	0·3	6·8	2·8	12·8	5·2
09	6 02·3	6 03·2	5 45·7	0·9	0·4	6·9	2·8	12·9	5·3
10	6 02·5	6 03·5	5 46·0	1·0	0·4	7·0	2·9	13·0	5·3
11	6 02·8	6 03·7	5 46·2	1·1	0·4	7·1	2·9	13·1	5·3
12	6 03·0	6 04·0	5 46·5	1·2	0·5	7·2	2·9	13·2	5·4
13	6 03·3	6 04·2	5 46·7	1·3	0·5	7·3	3·0	13·3	5·4
14	6 03·5	6 04·5	5 46·9	1·4	0·6	7·4	3·0	13·4	5·5
15	6 03·8	6 04·7	5 47·2	1·5	0·6	7·5	3·1	13·5	5·5
16	6 04·0	6 05·0	5 47·4	1·6	0·7	7·6	3·1	13·6	5·6
17	6 04·3	6 05·2	5 47·7	1·7	0·7	7·7	3·1	13·7	5·6
18	6 04·5	6 05·5	5 47·9	1·8	0·7	7·8	3·2	13·8	5·6
19	6 04·8	6 05·7	5 48·1	1·9	0·8	7·9	3·2	13·9	5·7
20	6 05·0	6 06·0	5 48·4	2·0	0·8	8·0	3·3	14·0	5·7
21	6 05·3	6 06·3	5 48·6	2·1	0·9	8·1	3·3	14·1	5·8
22	6 05·5	6 06·5	5 48·8	2·2	0·9	8·2	3·3	14·2	5·8
23	6 05·8	6 06·8	5 49·1	2·3	0·9	8·3	3·4	14·3	5·8
24	6 06·0	6 07·0	5 49·3	2·4	1·0	8·4	3·4	14·4	5·9
25	6 06·3	6 07·3	5 49·6	2·5	1·0	8·5	3·5	14·5	5·9
26	6 06·5	6 07·5	5 49·8	2·6	1·1	8·6	3·5	14·6	6·0
27	6 06·8	6 07·8	5 50·0	2·7	1·1	8·7	3·6	14·7	6·0
28	6 07·0	6 08·0	5 50·3	2·8	1·1	8·8	3·6	14·8	6·0
29	6 07·3	6 08·3	5 50·5	2·9	1·2	8·9	3·6	14·9	6·1
30	6 07·5	6 08·5	5 50·8	3·0	1·2	9·0	3·7	15·0	6·1
31	6 07·8	6 08·8	5 51·0	3·1	1·3	9·1	3·7	15·1	6·2
32	6 08·0	6 09·0	5 51·2	3·2	1·3	9·2	3·8	15·2	6·2
33	6 08·3	6 09·3	5 51·5	3·3	1·3	9·3	3·8	15·3	6·2
34	6 08·5	6 09·5	5 51·7	3·4	1·4	9·4	3·8	15·4	6·3
35	6 08·8	6 09·8	5 52·0	3·5	1·4	9·5	3·9	15·5	6·3
36	6 09·0	6 10·0	5 52·2	3·6	1·5	9·6	3·9	15·6	6·4
37	6 09·3	6 10·3	5 52·4	3·7	1·5	9·7	4·0	15·7	6·4
38	6 09·5	6 10·5	5 52·7	3·8	1·6	9·8	4·0	15·8	6·5
39	6 09·8	6 10·8	5 52·9	3·9	1·6	9·9	4·0	15·9	6·5
40	6 10·0	6 11·0	5 53·1	4·0	1·6	10·0	4·1	16·0	6·5
41	6 10·3	6 11·3	5 53·4	4·1	1·7	10·1	4·1	16·1	6·6
42	6 10·5	6 11·5	5 53·6	4·2	1·7	10·2	4·2	16·2	6·6
43	6 10·8	6 11·8	5 53·9	4·3	1·8	10·3	4·2	16·3	6·7
44	6 11·0	6 12·0	5 54·1	4·4	1·8	10·4	4·2	16·4	6·7
45	6 11·3	6 12·3	5 54·3	4·5	1·8	10·5	4·3	16·5	6·7
46	6 11·5	6 12·5	5 54·6	4·6	1·9	10·6	4·3	16·6	6·8
47	6 11·8	6 12·8	5 54·8	4·7	1·9	10·7	4·4	16·7	6·8
48	6 12·0	6 13·0	5 55·1	4·8	2·0	10·8	4·4	16·8	6·9
49	6 12·3	6 13·3	5 55·3	4·9	2·0	10·9	4·5	16·9	6·9
50	6 12·5	6 13·5	5 55·5	5·0	2·0	11·0	4·5	17·0	6·9
51	6 12·8	6 13·8	5 55·8	5·1	2·1	11·1	4·5	17·1	7·0
52	6 13·0	6 14·0	5 56·0	5·2	2·1	11·2	4·6	17·2	7·0
53	6 13·3	6 14·3	5 56·2	5·3	2·2	11·3	4·6	17·3	7·1
54	6 13·5	6 14·5	5 56·5	5·4	2·2	11·4	4·7	17·4	7·1
55	6 13·8	6 14·8	5 56·7	5·5	2·2	11·5	4·7	17·5	7·1
56	6 14·0	6 15·0	5 57·0	5·6	2·3	11·6	4·7	17·6	7·2
57	6 14·3	6 15·3	5 57·2	5·7	2·3	11·7	4·8	17·7	7·2
58	6 14·5	6 15·5	5 57·4	5·8	2·4	11·8	4·8	17·8	7·3
59	6 14·8	6 15·8	5 57·7	5·9	2·4	11·9	4·9	17·9	7·3
60	6 15·0	6 16·0	5 57·9	6·0	2·5	12·0	4·9	18·0	7·4

m 25 s	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
	° ′	° ′	° ′	′	′	′	′	′	′
00	6 15·0	6 16·0	5 57·9	0·0	0·0	6·0	2·6	12·0	5·1
01	6 15·3	6 16·3	5 58·2	0·1	0·0	6·1	2·6	12·1	5·1
02	6 15·5	6 16·5	5 58·4	0·2	0·1	6·2	2·6	12·2	5·2
03	6 15·8	6 16·8	5 58·6	0·3	0·1	6·3	2·7	12·3	5·2
04	6 16·0	6 17·0	5 58·9	0·4	0·2	6·4	2·7	12·4	5·3
05	6 16·3	6 17·3	5 59·1	0·5	0·2	6·5	2·8	12·5	5·3
06	6 16·5	6 17·5	5 59·3	0·6	0·3	6·6	2·8	12·6	5·4
07	6 16·8	6 17·8	5 59·6	0·7	0·3	6·7	2·8	12·7	5·4
08	6 17·0	6 18·0	5 59·8	0·8	0·3	6·8	2·9	12·8	5·4
09	6 17·3	6 18·3	6 00·1	0·9	0·4	6·9	2·9	12·9	5·5
10	6 17·5	6 18·5	6 00·3	1·0	0·4	7·0	3·0	13·0	5·5
11	6 17·8	6 18·8	6 00·5	1·1	0·5	7·1	3·0	13·1	5·6
12	6 18·0	6 19·0	6 00·8	1·2	0·5	7·2	3·1	13·2	5·6
13	6 18·3	6 19·3	6 01·0	1·3	0·6	7·3	3·1	13·3	5·7
14	6 18·5	6 19·5	6 01·3	1·4	0·6	7·4	3·1	13·4	5·7
15	6 18·8	6 19·8	6 01·5	1·5	0·6	7·5	3·2	13·5	5·7
16	6 19·0	6 20·0	6 01·7	1·6	0·7	7·6	3·2	13·6	5·8
17	6 19·3	6 20·3	6 02·0	1·7	0·7	7·7	3·3	13·7	5·8
18	6 19·5	6 20·5	6 02·2	1·8	0·8	7·8	3·3	13·8	5·9
19	6 19·8	6 20·8	6 02·5	1·9	0·8	7·9	3·4	13·9	5·9
20	6 20·0	6 21·0	6 02·7	2·0	0·9	8·0	3·4	14·0	6·0
21	6 20·3	6 21·3	6 02·9	2·1	0·9	8·1	3·4	14·1	6·0
22	6 20·5	6 21·5	6 03·2	2·2	0·9	8·2	3·5	14·2	6·0
23	6 20·8	6 21·8	6 03·4	2·3	1·0	8·3	3·5	14·3	6·1
24	6 21·0	6 22·0	6 03·6	2·4	1·0	8·4	3·6	14·4	6·1
25	6 21·3	6 22·3	6 03·9	2·5	1·1	8·5	3·6	14·5	6·2
26	6 21·5	6 22·5	6 04·1	2·6	1·1	8·6	3·7	14·6	6·2
27	6 21·8	6 22·8	6 04·4	2·7	1·1	8·7	3·7	14·7	6·2
28	6 22·0	6 23·0	6 04·6	2·8	1·2	8·8	3·7	14·8	6·3
29	6 22·3	6 23·3	6 04·8	2·9	1·2	8·9	3·8	14·9	6·3
30	6 22·5	6 23·5	6 05·1	3·0	1·3	9·0	3·8	15·0	6·4
31	6 22·8	6 23·8	6 05·3	3·1	1·3	9·1	3·9	15·1	6·4
32	6 23·0	6 24·0	6 05·6	3·2	1·4	9·2	3·9	15·2	6·5
33	6 23·3	6 24·3	6 05·8	3·3	1·4	9·3	4·0	15·3	6·5
34	6 23·5	6 24·5	6 06·0	3·4	1·4	9·4	4·0	15·4	6·5
35	6 23·8	6 24·8	6 06·3	3·5	1·5	9·5	4·0	15·5	6·6
36	6 24·0	6 25·1	6 06·5	3·6	1·5	9·6	4·1	15·6	6·6
37	6 24·3	6 25·3	6 06·7	3·7	1·6	9·7	4·1	15·7	6·7
38	6 24·5	6 25·6	6 07·0	3·8	1·6	9·8	4·2	15·8	6·7
39	6 24·8	6 25·8	6 07·2	3·9	1·7	9·9	4·2	15·9	6·8
40	6 25·0	6 26·1	6 07·5	4·0	1·7	10·0	4·3	16·0	6·8
41	6 25·3	6 26·3	6 07·7	4·1	1·7	10·1	4·3	16·1	6·8
42	6 25·5	6 26·6	6 07·9	4·2	1·8	10·2	4·3	16·2	6·9
43	6 25·8	6 26·8	6 08·2	4·3	1·8	10·3	4·4	16·3	6·9
44	6 26·0	6 27·1	6 08·4	4·4	1·9	10·4	4·4	16·4	7·0
45	6 26·3	6 27·3	6 08·7	4·5	1·9	10·5	4·5	16·5	7·0
46	6 26·5	6 27·6	6 08·9	4·6	2·0	10·6	4·5	16·6	7·1
47	6 26·8	6 27·8	6 09·1	4·7	2·0	10·7	4·5	16·7	7·1
48	6 27·0	6 28·1	6 09·4	4·8	2·0	10·8	4·6	16·8	7·1
49	6 27·3	6 28·3	6 09·6	4·9	2·1	10·9	4·6	16·9	7·2
50	6 27·5	6 28·6	6 09·8	5·0	2·1	11·0	4·7	17·0	7·2
51	6 27·8	6 28·8	6 10·1	5·1	2·2	11·1	4·7	17·1	7·3
52	6 28·0	6 29·1	6 10·3	5·2	2·2	11·2	4·8	17·2	7·3
53	6 28·3	6 29·3	6 10·6	5·3	2·3	11·3	4·8	17·3	7·4
54	6 28·5	6 29·6	6 10·8	5·4	2·3	11·4	4·8	17·4	7·4
55	6 28·8	6 29·8	6 11·0	5·5	2·3	11·5	4·9	17·5	7·4
56	6 29·0	6 30·1	6 11·3	5·6	2·4	11·6	4·9	17·6	7·5
57	6 29·3	6 30·3	6 11·5	5·7	2·4	11·7	5·0	17·7	7·5
58	6 29·5	6 30·6	6 11·8	5·8	2·5	11·8	5·0	17·8	7·6
59	6 29·8	6 30·8	6 12·0	5·9	2·5	11·9	5·1	17·9	7·6
60	6 30·0	6 31·1	6 12·2	6·0	2·6	12·0	5·1	18·0	7·7

m 26	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	6 30·0	6 31·1	6 12·2	0·0	0·0	6·0	2·7	12·0	5·3
01	6 30·3	6 31·3	6 12·5	0·1	0·0	6·1	2·7	12·1	5·3
02	6 30·5	6 31·6	6 12·7	0·2	0·1	6·2	2·7	12·2	5·4
03	6 30·8	6 31·8	6 12·9	0·3	0·1	6·3	2·8	12·3	5·4
04	6 31·0	6 32·1	6 13·2	0·4	0·2	6·4	2·8	12·4	5·5
05	6 31·3	6 32·3	6 13·4	0·5	0·2	6·5	2·9	12·5	5·5
06	6 31·5	6 32·6	6 13·7	0·6	0·3	6·6	2·9	12·6	5·6
07	6 31·8	6 32·8	6 13·9	0·7	0·3	6·7	3·0	12·7	5·6
08	6 32·0	6 33·1	6 14·1	0·8	0·4	6·8	3·0	12·8	5·7
09	6 32·3	6 33·3	6 14·4	0·9	0·4	6·9	3·0	12·9	5·7
10	6 32·5	6 33·6	6 14·6	1·0	0·4	7·0	3·1	13·0	5·7
11	6 32·8	6 33·8	6 14·9	1·1	0·5	7·1	3·1	13·1	5·8
12	6 33·0	6 34·1	6 15·1	1·2	0·5	7·2	3·2	13·2	5·8
13	6 33·3	6 34·3	6 15·3	1·3	0·6	7·3	3·2	13·3	5·9
14	6 33·5	6 34·6	6 15·6	1·4	0·6	7·4	3·3	13·4	5·9
15	6 33·8	6 34·8	6 15·8	1·5	0·7	7·5	3·3	13·5	6·0
16	6 34·0	6 35·1	6 16·1	1·6	0·7	7·6	3·4	13·6	6·0
17	6 34·3	6 35·3	6 16·3	1·7	0·8	7·7	3·4	13·7	6·1
18	6 34·5	6 35·6	6 16·5	1·8	0·8	7·8	3·4	13·8	6·1
19	6 34·8	6 35·8	6 16·8	1·9	0·8	7·9	3·5	13·9	6·1
20	6 35·0	6 36·1	6 17·0	2·0	0·9	8·0	3·5	14·0	6·2
21	6 35·3	6 36·3	6 17·2	2·1	0·9	8·1	3·6	14·1	6·2
22	6 35·5	6 36·6	6 17·5	2·2	1·0	8·2	3·6	14·2	6·3
23	6 35·8	6 36·8	6 17·7	2·3	1·0	8·3	3·7	14·3	6·3
24	6 36·0	6 37·1	6 18·0	2·4	1·1	8·4	3·7	14·4	6·4
25	6 36·3	6 37·3	6 18·2	2·5	1·1	8·5	3·8	14·5	6·4
26	6 36·5	6 37·6	6 18·4	2·6	1·1	8·6	3·8	14·6	6·4
27	6 36·8	6 37·8	6 18·7	2·7	1·2	8·7	3·8	14·7	6·5
28	6 37·0	6 38·1	6 18·9	2·8	1·2	8·8	3·9	14·8	6·5
29	6 37·3	6 38·3	6 19·2	2·9	1·3	8·9	3·9	14·9	6·6
30	6 37·5	6 38·6	6 19·4	3·0	1·3	9·0	4·0	15·0	6·6
31	6 37·8	6 38·8	6 19·6	3·1	1·4	9·1	4·0	15·1	6·7
32	6 38·0	6 39·1	6 19·9	3·2	1·4	9·2	4·1	15·2	6·7
33	6 38·3	6 39·3	6 20·1	3·3	1·5	9·3	4·1	15·3	6·8
34	6 38·5	6 39·6	6 20·3	3·4	1·5	9·4	4·2	15·4	6·8
35	6 38·8	6 39·8	6 20·6	3·5	1·5	9·5	4·2	15·5	6·8
36	6 39·0	6 40·1	6 20·8	3·6	1·6	9·6	4·2	15·6	6·9
37	6 39·3	6 40·3	6 21·1	3·7	1·6	9·7	4·3	15·7	6·9
38	6 39·5	6 40·6	6 21·3	3·8	1·7	9·8	4·3	15·8	7·0
39	6 39·8	6 40·8	6 21·5	3·9	1·7	9·9	4·4	15·9	7·0
40	6 40·0	6 41·1	6 21·8	4·0	1·8	10·0	4·4	16·0	7·1
41	6 40·3	6 41·3	6 22·0	4·1	1·8	10·1	4·5	16·1	7·1
42	6 40·5	6 41·6	6 22·3	4·2	1·9	10·2	4·5	16·2	7·2
43	6 40·8	6 41·8	6 22·5	4·3	1·9	10·3	4·5	16·3	7·2
44	6 41·0	6 42·1	6 22·7	4·4	1·9	10·4	4·6	16·4	7·2
45	6 41·3	6 42·3	6 23·0	4·5	2·0	10·5	4·6	16·5	7·3
46	6 41·5	6 42·6	6 23·2	4·6	2·0	10·6	4·7	16·6	7·3
47	6 41·8	6 42·8	6 23·4	4·7	2·1	10·7	4·7	16·7	7·4
48	6 42·0	6 43·1	6 23·7	4·8	2·1	10·8	4·8	16·8	7·4
49	6 42·3	6 43·4	6 23·9	4·9	2·2	10·9	4·8	16·9	7·5
50	6 42·5	6 43·6	6 24·2	5·0	2·2	11·0	4·9	17·0	7·5
51	6 42·8	6 43·9	6 24·4	5·1	2·3	11·1	4·9	17·1	7·6
52	6 43·0	6 44·1	6 24·6	5·2	2·3	11·2	4·9	17·2	7·6
53	6 43·3	6 44·4	6 24·9	5·3	2·3	11·3	5·0	17·3	7·6
54	6 43·5	6 44·6	6 25·1	5·4	2·4	11·4	5·0	17·4	7·7
55	6 43·8	6 44·9	6 25·4	5·5	2·4	11·5	5·1	17·5	7·7
56	6 44·0	6 45·1	6 25·6	5·6	2·5	11·6	5·1	17·6	7·8
57	6 44·3	6 45·4	6 25·8	5·7	2·5	11·7	5·2	17·7	7·8
58	6 44·5	6 45·6	6 26·1	5·8	2·6	11·8	5·2	17·8	7·9
59	6 44·8	6 45·9	6 26·3	5·9	2·6	11·9	5·3	17·9	7·9
60	6 45·0	6 46·1	6 26·6	6·0	2·7	12·0	5·3	18·0	8·0

m 27	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	6 45·0	6 46·1	6 26·6	0·0	0·0	6·0	2·8	12·0	5·5
01	6 45·3	6 46·4	6 26·8	0·1	0·0	6·1	2·8	12·1	5·5
02	6 45·5	6 46·6	6 27·0	0·2	0·1	6·2	2·8	12·2	5·6
03	6 45·8	6 46·9	6 27·3	0·3	0·1	6·3	2·9	12·3	5·6
04	6 46·0	6 47·1	6 27·5	0·4	0·2	6·4	2·9	12·4	5·7
05	6 46·3	6 47·4	6 27·7	0·5	0·2	6·5	3·0	12·5	5·7
06	6 46·5	6 47·6	6 28·0	0·6	0·3	6·6	3·0	12·6	5·8
07	6 46·8	6 47·9	6 28·2	0·7	0·3	6·7	3·1	12·7	5·8
08	6 47·0	6 48·1	6 28·5	0·8	0·4	6·8	3·1	12·8	5·9
09	6 47·3	6 48·4	6 28·7	0·9	0·4	6·9	3·2	12·9	5·9
10	6 47·5	6 48·6	6 28·9	1·0	0·5	7·0	3·2	13·0	6·0
11	6 47·8	6 48·9	6 29·2	1·1	0·5	7·1	3·3	13·1	6·0
12	6 48·0	6 49·1	6 29·4	1·2	0·6	7·2	3·3	13·2	6·1
13	6 48·3	6 49·4	6 29·7	1·3	0·6	7·3	3·3	13·3	6·1
14	6 48·5	6 49·6	6 29·9	1·4	0·6	7·4	3·4	13·4	6·1
15	6 48·8	6 49·9	6 30·1	1·5	0·7	7·5	3·4	13·5	6·2
16	6 49·0	6 50·1	6 30·4	1·6	0·7	7·6	3·5	13·6	6·2
17	6 49·3	6 50·4	6 30·6	1·7	0·8	7·7	3·5	13·7	6·3
18	6 49·5	6 50·6	6 30·8	1·8	0·8	7·8	3·6	13·8	6·3
19	6 49·8	6 50·9	6 31·1	1·9	0·9	7·9	3·6	13·9	6·4
20	6 50·0	6 51·1	6 31·3	2·0	0·9	8·0	3·7	14·0	6·4
21	6 50·3	6 51·4	6 31·6	2·1	1·0	8·1	3·7	14·1	6·5
22	6 50·5	6 51·6	6 31·8	2·2	1·0	8·2	3·8	14·2	6·5
23	6 50·8	6 51·9	6 32·0	2·3	1·1	8·3	3·8	14·3	6·6
24	6 51·0	6 52·1	6 32·3	2·4	1·1	8·4	3·9	14·4	6·6
25	6 51·3	6 52·4	6 32·5	2·5	1·1	8·5	3·9	14·5	6·6
26	6 51·5	6 52·6	6 32·8	2·6	1·2	8·6	3·9	14·6	6·7
27	6 51·8	6 52·9	6 33·0	2·7	1·2	8·7	4·0	14·7	6·7
28	6 52·0	6 53·1	6 33·2	2·8	1·3	8·8	4·0	14·8	6·8
29	6 52·3	6 53·4	6 33·5	2·9	1·3	8·9	4·1	14·9	6·8
30	6 52·5	6 53·6	6 33·7	3·0	1·4	9·0	4·1	15·0	6·9
31	6 52·8	6 53·9	6 33·9	3·1	1·4	9·1	4·2	15·1	6·9
32	6 53·0	6 54·1	6 34·2	3·2	1·5	9·2	4·2	15·2	7·0
33	6 53·3	6 54·4	6 34·4	3·3	1·5	9·3	4·3	15·3	7·0
34	6 53·5	6 54·6	6 34·7	3·4	1·6	9·4	4·3	15·4	7·1
35	6 53·8	6 54·9	6 34·9	3·5	1·6	9·5	4·4	15·5	7·1
36	6 54·0	6 55·1	6 35·1	3·6	1·7	9·6	4·4	15·6	7·2
37	6 54·3	6 55·4	6 35·4	3·7	1·7	9·7	4·4	15·7	7·2
38	6 54·5	6 55·6	6 35·6	3·8	1·7	9·8	4·5	15·8	7·2
39	6 54·8	6 55·9	6 35·9	3·9	1·8	9·9	4·5	15·9	7·3
40	6 55·0	6 56·1	6 36·1	4·0	1·8	10·0	4·6	16·0	7·3
41	6 55·3	6 56·4	6 36·3	4·1	1·9	10·1	4·6	16·1	7·4
42	6 55·5	6 56·6	6 36·6	4·2	1·9	10·2	4·7	16·2	7·4
43	6 55·8	6 56·9	6 36·8	4·3	2·0	10·3	4·7	16·3	7·5
44	6 56·0	6 57·1	6 37·0	4·4	2·0	10·4	4·8	16·4	7·5
45	6 56·3	6 57·4	6 37·3	4·5	2·1	10·5	4·8	16·5	7·6
46	6 56·5	6 57·6	6 37·5	4·6	2·1	10·6	4·9	16·6	7·6
47	6 56·8	6 57·9	6 37·8	4·7	2·2	10·7	4·9	16·7	7·7
48	6 57·0	6 58·1	6 38·0	4·8	2·2	10·8	5·0	16·8	7·7
49	6 57·3	6 58·4	6 38·2	4·9	2·2	10·9	5·0	16·9	7·7
50	6 57·5	6 58·6	6 38·5	5·0	2·3	11·0	5·0	17·0	7·8
51	6 57·8	6 58·9	6 38·7	5·1	2·3	11·1	5·1	17·1	7·8
52	6 58·0	6 59·1	6 39·0	5·2	2·4	11·2	5·1	17·2	7·9
53	6 58·3	6 59·4	6 39·2	5·3	2·4	11·3	5·2	17·3	7·9
54	6 58·5	6 59·6	6 39·4	5·4	2·5	11·4	5·2	17·4	8·0
55	6 58·8	6 59·9	6 39·7	5·5	2·5	11·5	5·3	17·5	8·0
56	6 59·0	7 00·1	6 39·9	5·6	2·6	11·6	5·3	17·6	8·1
57	6 59·3	7 00·4	6 40·2	5·7	2·6	11·7	5·4	17·7	8·1
58	6 59·5	7 00·6	6 40·4	5·8	2·7	11·8	5·4	17·8	8·2
59	6 59·8	7 00·9	6 40·6	5·9	2·7	11·9	5·5	17·9	8·2
60	7 00·0	7 01·1	6 40·9	6·0	2·8	12·0	5·5	18·0	8·3

m 28	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	7 00·0	7 01·1	6 40·9	0·0	0·0	6·0	2·9	12·0	5·7
01	7 00·3	7 01·4	6 41·1	0·1	0·0	6·1	2·9	12·1	5·7
02	7 00·5	7 01·7	6 41·3	0·2	0·1	6·2	2·9	12·2	5·8
03	7 00·8	7 01·9	6 41·6	0·3	0·1	6·3	3·0	12·3	5·8
04	7 01·0	7 02·2	6 41·8	0·4	0·2	6·4	3·0	12·4	5·9
05	7 01·3	7 02·4	6 42·1	0·5	0·2	6·5	3·1	12·5	5·9
06	7 01·5	7 02·7	6 42·3	0·6	0·3	6·6	3·1	12·6	6·0
07	7 01·8	7 02·9	6 42·5	0·7	0·3	6·7	3·2	12·7	6·0
08	7 02·0	7 03·2	6 42·8	0·8	0·4	6·8	3·2	12·8	6·1
09	7 02·3	7 03·4	6 43·0	0·9	0·4	6·9	3·3	12·9	6·1
10	7 02·5	7 03·7	6 43·3	1·0	0·5	7·0	3·3	13·0	6·2
11	7 02·8	7 03·9	6 43·5	1·1	0·5	7·1	3·4	13·1	6·2
12	7 03·0	7 04·2	6 43·7	1·2	0·6	7·2	3·4	13·2	6·3
13	7 03·3	7 04·4	6 44·0	1·3	0·6	7·3	3·5	13·3	6·3
14	7 03·5	7 04·7	6 44·2	1·4	0·7	7·4	3·5	13·4	6·4
15	7 03·8	7 04·9	6 44·4	1·5	0·7	7·5	3·6	13·5	6·4
16	7 04·0	7 05·2	6 44·7	1·6	0·8	7·6	3·6	13·6	6·5
17	7 04·3	7 05·4	6 44·9	1·7	0·8	7·7	3·7	13·7	6·5
18	7 04·5	7 05·7	6 45·2	1·8	0·9	7·8	3·7	13·8	6·6
19	7 04·8	7 05·9	6 45·4	1·9	0·9	7·9	3·8	13·9	6·6
20	7 05·0	7 06·2	6 45·6	2·0	1·0	8·0	3·8	14·0	6·7
21	7 05·3	7 06·4	6 45·9	2·1	1·0	8·1	3·8	14·1	6·7
22	7 05·5	7 06·7	6 46·1	2·2	1·0	8·2	3·9	14·2	6·7
23	7 05·8	7 06·9	6 46·4	2·3	1·1	8·3	3·9	14·3	6·8
24	7 06·0	7 07·2	6 46·6	2·4	1·1	8·4	4·0	14·4	6·8
25	7 06·3	7 07·4	6 46·8	2·5	1·2	8·5	4·0	14·5	6·9
26	7 06·5	7 07·7	6 47·1	2·6	1·2	8·6	4·1	14·6	6·9
27	7 06·8	7 07·9	6 47·3	2·7	1·3	8·7	4·1	14·7	7·0
28	7 07·0	7 08·2	6 47·5	2·8	1·3	8·8	4·2	14·8	7·0
29	7 07·3	7 08·4	6 47·8	2·9	1·4	8·9	4·2	14·9	7·1
30	7 07·5	7 08·7	6 48·0	3·0	1·4	9·0	4·3	15·0	7·1
31	7 07·8	7 08·9	6 48·3	3·1	1·5	9·1	4·3	15·1	7·2
32	7 08·0	7 09·2	6 48·5	3·2	1·5	9·2	4·4	15·2	7·2
33	7 08·3	7 09·4	6 48·7	3·3	1·6	9·3	4·4	15·3	7·3
34	7 08·5	7 09·7	6 49·0	3·4	1·6	9·4	4·5	15·4	7·3
35	7 08·8	7 09·9	6 49·2	3·5	1·7	9·5	4·5	15·5	7·4
36	7 09·0	7 10·2	6 49·5	3·6	1·7	9·6	4·6	15·6	7·4
37	7 09·3	7 10·4	6 49·7	3·7	1·8	9·7	4·6	15·7	7·5
38	7 09·5	7 10·7	6 49·9	3·8	1·8	9·8	4·7	15·8	7·5
39	7 09·8	7 10·9	6 50·2	3·9	1·9	9·9	4·7	15·9	7·6
40	7 10·0	7 11·2	6 50·4	4·0	1·9	10·0	4·8	16·0	7·6
41	7 10·3	7 11·4	6 50·6	4·1	1·9	10·1	4·8	16·1	7·6
42	7 10·5	7 11·7	6 50·9	4·2	2·0	10·2	4·8	16·2	7·7
43	7 10·8	7 11·9	6 51·1	4·3	2·0	10·3	4·9	16·3	7·7
44	7 11·0	7 12·2	6 51·4	4·4	2·1	10·4	4·9	16·4	7·8
45	7 11·3	7 12·4	6 51·6	4·5	2·1	10·5	5·0	16·5	7·8
46	7 11·5	7 12·7	6 51·8	4·6	2·2	10·6	5·0	16·6	7·9
47	7 11·8	7 12·9	6 52·1	4·7	2·2	10·7	5·1	16·7	7·9
48	7 12·0	7 13·2	6 52·3	4·8	2·3	10·8	5·1	16·8	8·0
49	7 12·3	7 13·4	6 52·6	4·9	2·3	10·9	5·2	16·9	8·0
50	7 12·5	7 13·7	6 52·8	5·0	2·4	11·0	5·2	17·0	8·1
51	7 12·8	7 13·9	6 53·0	5·1	2·4	11·1	5·3	17·1	8·1
52	7 13·0	7 14·2	6 53·3	5·2	2·5	11·2	5·3	17·2	8·2
53	7 13·3	7 14·4	6 53·5	5·3	2·5	11·3	5·4	17·3	8·2
54	7 13·5	7 14·7	6 53·8	5·4	2·6	11·4	5·4	17·4	8·3
55	7 13·8	7 14·9	6 54·0	5·5	2·6	11·5	5·5	17·5	8·3
56	7 14·0	7 15·2	6 54·2	5·6	2·7	11·6	5·5	17·6	8·4
57	7 14·3	7 15·4	6 54·5	5·7	2·7	11·7	5·6	17·7	8·4
58	7 14·5	7 15·7	6 54·7	5·8	2·8	11·8	5·6	17·8	8·5
59	7 14·8	7 15·9	6 54·9	5·9	2·8	11·9	5·7	17·9	8·5
60	7 15·0	7 16·2	6 55·2	6·0	2·9	12·0	5·7	18·0	8·6

m 29	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	7 15·0	7 16·2	6 55·2	0·0	0·0	6·0	3·0	12·0	5·9
01	7 15·3	7 16·4	6 55·4	0·1	0·0	6·1	3·0	12·1	5·9
02	7 15·5	7 16·7	6 55·7	0·2	0·1	6·2	3·0	12·2	6·0
03	7 15·8	7 16·9	6 55·9	0·3	0·1	6·3	3·1	12·3	6·0
04	7 16·0	7 17·2	6 56·1	0·4	0·2	6·4	3·1	12·4	6·1
05	7 16·3	7 17·4	6 56·4	0·5	0·2	6·5	3·2	12·5	6·1
06	7 16·5	7 17·7	6 56·6	0·6	0·3	6·6	3·2	12·6	6·2
07	7 16·8	7 17·9	6 56·9	0·7	0·3	6·7	3·3	12·7	6·2
08	7 17·0	7 18·2	6 57·1	0·8	0·4	6·8	3·3	12·8	6·3
09	7 17·3	7 18·4	6 57·3	0·9	0·4	6·9	3·4	12·9	6·3
10	7 17·5	7 18·7	6 57·6	1·0	0·5	7·0	3·4	13·0	6·4
11	7 17·8	7 18·9	6 57·8	1·1	0·5	7·1	3·5	13·1	6·4
12	7 18·0	7 19·2	6 58·0	1·2	0·6	7·2	3·5	13·2	6·5
13	7 18·3	7 19·4	6 58·3	1·3	0·6	7·3	3·6	13·3	6·5
14	7 18·5	7 19·7	6 58·5	1·4	0·7	7·4	3·6	13·4	6·6
15	7 18·8	7 20·0	6 58·8	1·5	0·7	7·5	3·7	13·5	6·6
16	7 19·0	7 20·2	6 59·0	1·6	0·8	7·6	3·7	13·6	6·7
17	7 19·3	7 20·5	6 59·2	1·7	0·8	7·7	3·8	13·7	6·7
18	7 19·5	7 20·7	6 59·5	1·8	0·9	7·8	3·8	13·8	6·8
19	7 19·8	7 21·0	6 59·7	1·9	0·9	7·9	3·9	13·9	6·8
20	7 20·0	7 21·2	7 00·0	2·0	1·0	8·0	3·9	14·0	6·9
21	7 20·3	7 21·5	7 00·2	2·1	1·0	8·1	4·0	14·1	6·9
22	7 20·5	7 21·7	7 00·4	2·2	1·1	8·2	4·0	14·2	7·0
23	7 20·8	7 22·0	7 00·7	2·3	1·1	8·3	4·1	14·3	7·0
24	7 21·0	7 22·2	7 00·9	2·4	1·2	8·4	4·1	14·4	7·1
25	7 21·3	7 22·5	7 01·1	2·5	1·2	8·5	4·2	14·5	7·1
26	7 21·5	7 22·7	7 01·4	2·6	1·3	8·6	4·2	14·6	7·2
27	7 21·8	7 23·0	7 01·6	2·7	1·3	8·7	4·3	14·7	7·2
28	7 22·0	7 23·2	7 01·9	2·8	1·4	8·8	4·3	14·8	7·3
29	7 22·3	7 23·5	7 02·1	2·9	1·4	8·9	4·4	14·9	7·3
30	7 22·5	7 23·7	7 02·3	3·0	1·5	9·0	4·4	15·0	7·4
31	7 22·8	7 24·0	7 02·6	3·1	1·5	9·1	4·5	15·1	7·4
32	7 23·0	7 24·2	7 02·8	3·2	1·6	9·2	4·5	15·2	7·5
33	7 23·3	7 24·5	7 03·1	3·3	1·6	9·3	4·6	15·3	7·5
34	7 23·5	7 24·7	7 03·3	3·4	1·7	9·4	4·6	15·4	7·6
35	7 23·8	7 25·0	7 03·5	3·5	1·7	9·5	4·7	15·5	7·6
36	7 24·0	7 25·2	7 03·8	3·6	1·8	9·6	4·7	15·6	7·7
37	7 24·3	7 25·5	7 04·0	3·7	1·8	9·7	4·8	15·7	7·7
38	7 24·5	7 25·7	7 04·3	3·8	1·9	9·8	4·8	15·8	7·8
39	7 24·8	7 26·0	7 04·5	3·9	1·9	9·9	4·9	15·9	7·8
40	7 25·0	7 26·2	7 04·7	4·0	2·0	10·0	4·9	16·0	7·9
41	7 25·3	7 26·5	7 05·0	4·1	2·0	10·1	5·0	16·1	7·9
42	7 25·5	7 26·7	7 05·2	4·2	2·1	10·2	5·0	16·2	8·0
43	7 25·8	7 27·0	7 05·4	4·3	2·1	10·3	5·1	16·3	8·0
44	7 26·0	7 27·2	7 05·7	4·4	2·2	10·4	5·1	16·4	8·1
45	7 26·3	7 27·5	7 05·9	4·5	2·2	10·5	5·2	16·5	8·1
46	7 26·5	7 27·7	7 06·2	4·6	2·3	10·6	5·2	16·6	8·2
47	7 26·8	7 28·0	7 06·4	4·7	2·3	10·7	5·3	16·7	8·2
48	7 27·0	7 28·2	7 06·6	4·8	2·4	10·8	5·3	16·8	8·3
49	7 27·3	7 28·5	7 06·9	4·9	2·4	10·9	5·4	16·9	8·3
50	7 27·5	7 28·7	7 07·1	5·0	2·5	11·0	5·4	17·0	8·4
51	7 27·8	7 29·0	7 07·4	5·1	2·5	11·1	5·5	17·1	8·4
52	7 28·0	7 29·2	7 07·6	5·2	2·6	11·2	5·5	17·2	8·5
53	7 28·3	7 29·5	7 07·8	5·3	2·6	11·3	5·6	17·3	8·5
54	7 28·5	7 29·7	7 08·1	5·4	2·7	11·4	5·6	17·4	8·6
55	7 28·8	7 30·0	7 08·3	5·5	2·7	11·5	5·7	17·5	8·6
56	7 29·0	7 30·2	7 08·5	5·6	2·8	11·6	5·7	17·6	8·7
57	7 29·3	7 30·5	7 08·8	5·7	2·8	11·7	5·8	17·7	8·7
58	7 29·5	7 30·7	7 09·0	5·8	2·9	11·8	5·8	17·8	8·8
59	7 29·8	7 31·0	7 09·3	5·9	2·9	11·9	5·9	17·9	8·8
60	7 30·0	7 31·2	7 09·5	6·0	3·0	12·0	5·9	18·0	8·9

m 30	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	7 30·0	7 31·2	7 09·5	0·0	0·0	6·0	3·1	12·0	6·1
01	7 30·3	7 31·5	7 09·7	0·1	0·1	6·1	3·1	12·1	6·2
02	7 30·5	7 31·7	7 10·0	0·2	0·1	6·2	3·2	12·2	6·2
03	7 30·8	7 32·0	7 10·2	0·3	0·2	6·3	3·2	12·3	6·3
04	7 31·0	7 32·2	7 10·5	0·4	0·2	6·4	3·3	12·4	6·3
05	7 31·3	7 32·5	7 10·7	0·5	0·3	6·5	3·3	12·5	6·4
06	7 31·5	7 32·7	7 10·9	0·6	0·3	6·6	3·4	12·6	6·4
07	7 31·8	7 33·0	7 11·2	0·7	0·4	6·7	3·4	12·7	6·5
08	7 32·0	7 33·2	7 11·4	0·8	0·4	6·8	3·5	12·8	6·5
09	7 32·3	7 33·5	7 11·6	0·9	0·5	6·9	3·5	12·9	6·6
10	7 32·5	7 33·7	7 11·9	1·0	0·5	7·0	3·6	13·0	6·6
11	7 32·8	7 34·0	7 12·1	1·1	0·6	7·1	3·6	13·1	6·7
12	7 33·0	7 34·2	7 12·4	1·2	0·6	7·2	3·7	13·2	6·7
13	7 33·3	7 34·5	7 12·6	1·3	0·7	7·3	3·7	13·3	6·8
14	7 33·5	7 34·7	7 12·8	1·4	0·7	7·4	3·8	13·4	6·8
15	7 33·8	7 35·0	7 13·1	1·5	0·8	7·5	3·8	13·5	6·9
16	7 34·0	7 35·2	7 13·3	1·6	0·8	7·6	3·9	13·6	6·9
17	7 34·3	7 35·5	7 13·6	1·7	0·9	7·7	3·9	13·7	7·0
18	7 34·5	7 35·7	7 13·8	1·8	0·9	7·8	4·0	13·8	7·0
19	7 34·8	7 36·0	7 14·0	1·9	1·0	7·9	4·0	13·9	7·1
20	7 35·0	7 36·2	7 14·3	2·0	1·0	8·0	4·1	14·0	7·1
21	7 35·3	7 36·5	7 14·5	2·1	1·1	8·1	4·1	14·1	7·2
22	7 35·5	7 36·7	7 14·7	2·2	1·1	8·2	4·2	14·2	7·2
23	7 35·8	7 37·0	7 15·0	2·3	1·2	8·3	4·2	14·3	7·3
24	7 36·0	7 37·2	7 15·2	2·4	1·2	8·4	4·3	14·4	7·3
25	7 36·3	7 37·5	7 15·5	2·5	1·3	8·5	4·3	14·5	7·4
26	7 36·5	7 37·7	7 15·7	2·6	1·3	8·6	4·4	14·6	7·4
27	7 36·8	7 38·0	7 15·9	2·7	1·4	8·7	4·4	14·7	7·5
28	7 37·0	7 38·3	7 16·2	2·8	1·4	8·8	4·5	14·8	7·5
29	7 37·3	7 38·5	7 16·4	2·9	1·5	8·9	4·5	14·9	7·6
30	7 37·5	7 38·8	7 16·7	3·0	1·5	9·0	4·6	15·0	7·6
31	7 37·8	7 39·0	7 16·9	3·1	1·6	9·1	4·6	15·1	7·7
32	7 38·0	7 39·3	7 17·1	3·2	1·6	9·2	4·7	15·2	7·7
33	7 38·3	7 39·5	7 17·4	3·3	1·7	9·3	4·7	15·3	7·8
34	7 38·5	7 39·8	7 17·6	3·4	1·7	9·4	4·8	15·4	7·8
35	7 38·8	7 40·0	7 17·9	3·5	1·8	9·5	4·8	15·5	7·9
36	7 39·0	7 40·3	7 18·1	3·6	1·8	9·6	4·9	15·6	7·9
37	7 39·3	7 40·5	7 18·3	3·7	1·9	9·7	4·9	15·7	8·0
38	7 39·5	7 40·8	7 18·6	3·8	1·9	9·8	5·0	15·8	8·0
39	7 39·8	7 41·0	7 18·8	3·9	2·0	9·9	5·0	15·9	8·1
40	7 40·0	7 41·3	7 19·0	4·0	2·0	10·0	5·1	16·0	8·1
41	7 40·3	7 41·5	7 19·3	4·1	2·1	10·1	5·1	16·1	8·2
42	7 40·5	7 41·8	7 19·5	4·2	2·1	10·2	5·2	16·2	8·2
43	7 40·8	7 42·0	7 19·8	4·3	2·2	10·3	5·2	16·3	8·3
44	7 41·0	7 42·3	7 20·0	4·4	2·2	10·4	5·3	16·4	8·3
45	7 41·3	7 42·5	7 20·2	4·5	2·3	10·5	5·3	16·5	8·4
46	7 41·5	7 42·8	7 20·5	4·6	2·3	10·6	5·4	16·6	8·4
47	7 41·8	7 43·0	7 20·7	4·7	2·4	10·7	5·4	16·7	8·5
48	7 42·0	7 43·3	7 21·0	4·8	2·4	10·8	5·5	16·8	8·5
49	7 42·3	7 43·5	7 21·2	4·9	2·5	10·9	5·5	16·9	8·6
50	7 42·5	7 43·8	7 21·4	5·0	2·5	11·0	5·6	17·0	8·6
51	7 42·8	7 44·0	7 21·7	5·1	2·6	11·1	5·6	17·1	8·7
52	7 43·0	7 44·3	7 21·9	5·2	2·6	11·2	5·7	17·2	8·7
53	7 43·3	7 44·5	7 22·1	5·3	2·7	11·3	5·7	17·3	8·8
54	7 43·5	7 44·8	7 22·4	5·4	2·7	11·4	5·8	17·4	8·8
55	7 43·8	7 45·0	7 22·6	5·5	2·8	11·5	5·8	17·5	8·9
56	7 44·0	7 45·3	7 22·9	5·6	2·8	11·6	5·9	17·6	8·9
57	7 44·3	7 45·5	7 23·1	5·7	2·9	11·7	5·9	17·7	9·0
58	7 44·5	7 45·8	7 23·3	5·8	2·9	11·8	6·0	17·8	9·0
59	7 44·8	7 46·0	7 23·6	5·9	3·0	11·9	6·0	17·9	9·1
60	7 45·0	7 46·3	7 23·8	6·0	3·1	12·0	6·1	18·0	9·2

m 31	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	7 45·0	7 46·3	7 23·8	0·0	0·0	6·0	3·2	12·0	6·3
01	7 45·3	7 46·5	7 24·1	0·1	0·1	6·1	3·2	12·1	6·4
02	7 45·5	7 46·8	7 24·3	0·2	0·1	6·2	3·3	12·2	6·4
03	7 45·8	7 47·0	7 24·5	0·3	0·2	6·3	3·3	12·3	6·5
04	7 46·0	7 47·3	7 24·8	0·4	0·2	6·4	3·4	12·4	6·5
05	7 46·3	7 47·5	7 25·0	0·5	0·3	6·5	3·4	12·5	6·6
06	7 46·5	7 47·8	7 25·2	0·6	0·3	6·6	3·5	12·6	6·6
07	7 46·8	7 48·0	7 25·5	0·7	0·4	6·7	3·5	12·7	6·7
08	7 47·0	7 48·3	7 25·7	0·8	0·4	6·8	3·6	12·8	6·7
09	7 47·3	7 48·5	7 26·0	0·9	0·5	6·9	3·6	12·9	6·8
10	7 47·5	7 48·8	7 26·2	1·0	0·5	7·0	3·7	13·0	6·8
11	7 47·8	7 49·0	7 26·4	1·1	0·6	7·1	3·7	13·1	6·9
12	7 48·0	7 49·3	7 26·7	1·2	0·6	7·2	3·8	13·2	6·9
13	7 48·3	7 49·5	7 26·9	1·3	0·7	7·3	3·8	13·3	7·0
14	7 48·5	7 49·8	7 27·2	1·4	0·7	7·4	3·9	13·4	7·0
15	7 48·8	7 50·0	7 27·4	1·5	0·8	7·5	3·9	13·5	7·1
16	7 49·0	7 50·3	7 27·6	1·6	0·8	7·6	4·0	13·6	7·1
17	7 49·3	7 50·5	7 27·9	1·7	0·9	7·7	4·0	13·7	7·2
18	7 49·5	7 50·8	7 28·1	1·8	0·9	7·8	4·1	13·8	7·2
19	7 49·8	7 51·0	7 28·4	1·9	1·0	7·9	4·1	13·9	7·3
20	7 50·0	7 51·3	7 28·6	2·0	1·1	8·0	4·2	14·0	7·4
21	7 50·3	7 51·5	7 28·8	2·1	1·1	8·1	4·3	14·1	7·4
22	7 50·5	7 51·8	7 29·1	2·2	1·2	8·2	4·3	14·2	7·5
23	7 50·8	7 52·0	7 29·3	2·3	1·2	8·3	4·4	14·3	7·5
24	7 51·0	7 52·3	7 29·5	2·4	1·3	8·4	4·4	14·4	7·6
25	7 51·3	7 52·5	7 29·8	2·5	1·3	8·5	4·5	14·5	7·6
26	7 51·5	7 52·8	7 30·0	2·6	1·4	8·6	4·5	14·6	7·7
27	7 51·8	7 53·0	7 30·3	2·7	1·4	8·7	4·6	14·7	7·7
28	7 52·0	7 53·3	7 30·5	2·8	1·5	8·8	4·6	14·8	7·8
29	7 52·3	7 53·5	7 30·7	2·9	1·5	8·9	4·7	14·9	7·8
30	7 52·5	7 53·8	7 31·0	3·0	1·6	9·0	4·7	15·0	7·9
31	7 52·8	7 54·0	7 31·2	3·1	1·6	9·1	4·8	15·1	7·9
32	7 53·0	7 54·3	7 31·5	3·2	1·7	9·2	4·8	15·2	8·0
33	7 53·3	7 54·5	7 31·7	3·3	1·7	9·3	4·9	15·3	8·0
34	7 53·5	7 54·8	7 31·9	3·4	1·8	9·4	4·9	15·4	8·1
35	7 53·8	7 55·0	7 32·2	3·5	1·8	9·5	5·0	15·5	8·1
36	7 54·0	7 55·3	7 32·4	3·6	1·9	9·6	5·0	15·6	8·2
37	7 54·3	7 55·5	7 32·6	3·7	1·9	9·7	5·1	15·7	8·2
38	7 54·5	7 55·8	7 32·9	3·8	2·0	9·8	5·1	15·8	8·3
39	7 54·8	7 56·0	7 33·1	3·9	2·0	9·9	5·2	15·9	8·3
40	7 55·0	7 56·3	7 33·4	4·0	2·1	10·0	5·3	16·0	8·4
41	7 55·3	7 56·6	7 33·6	4·1	2·2	10·1	5·3	16·1	8·5
42	7 55·5	7 56·8	7 33·8	4·2	2·2	10·2	5·4	16·2	8·5
43	7 55·8	7 57·1	7 34·1	4·3	2·3	10·3	5·4	16·3	8·6
44	7 56·0	7 57·3	7 34·3	4·4	2·3	10·4	5·5	16·4	8·6
45	7 56·3	7 57·6	7 34·6	4·5	2·4	10·5	5·5	16·5	8·7
46	7 56·5	7 57·8	7 34·8	4·6	2·4	10·6	5·6	16·6	8·7
47	7 56·8	7 58·1	7 35·0	4·7	2·5	10·7	5·6	16·7	8·8
48	7 57·0	7 58·3	7 35·3	4·8	2·5	10·8	5·7	16·8	8·8
49	7 57·3	7 58·6	7 35·5	4·9	2·6	10·9	5·7	16·9	8·9
50	7 57·5	7 58·8	7 35·7	5·0	2·6	11·0	5·8	17·0	8·9
51	7 57·8	7 59·1	7 36·0	5·1	2·7	11·1	5·8	17·1	9·0
52	7 58·0	7 59·3	7 36·2	5·2	2·7	11·2	5·9	17·2	9·0
53	7 58·3	7 59·6	7 36·5	5·3	2·8	11·3	5·9	17·3	9·1
54	7 58·5	7 59·8	7 36·7	5·4	2·8	11·4	6·0	17·4	9·1
55	7 58·8	8 00·1	7 36·9	5·5	2·9	11·5	6·0	17·5	9·2
56	7 59·0	8 00·3	7 37·2	5·6	2·9	11·6	6·1	17·6	9·2
57	7 59·3	8 00·6	7 37·4	5·7	3·0	11·7	6·1	17·7	9·3
58	7 59·5	8 00·8	7 37·7	5·8	3·0	11·8	6·2	17·8	9·3
59	7 59·8	8 01·1	7 37·9	5·9	3·1	11·9	6·2	17·9	9·4
60	8 00·0	8 01·3	7 38·1	6·0	3·2	12·0	6·3	18·0	9·5

32m	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	8 00·0	8 01·3	7 38·1	0·0	0·0	6·0	3·3	12·0	6·5
01	8 00·3	8 01·6	7 38·4	0·1	0·1	6·1	3·3	12·1	6·6
02	8 00·5	8 01·8	7 38·6	0·2	0·1	6·2	3·4	12·2	6·6
03	8 00·8	8 02·1	7 38·8	0·3	0·2	6·3	3·4	12·3	6·7
04	8 01·0	8 02·3	7 39·1	0·4	0·2	6·4	3·5	12·4	6·7
05	8 01·3	8 02·6	7 39·3	0·5	0·3	6·5	3·5	12·5	6·8
06	8 01·5	8 02·8	7 39·6	0·6	0·3	6·6	3·6	12·6	6·8
07	8 01·8	8 03·1	7 39·8	0·7	0·4	6·7	3·6	12·7	6·9
08	8 02·0	8 03·3	7 40·0	0·8	0·4	6·8	3·7	12·8	6·9
09	8 02·3	8 03·6	7 40·3	0·9	0·5	6·9	3·7	12·9	7·0
10	8 02·5	8 03·8	7 40·5	1·0	0·5	7·0	3·8	13·0	7·0
11	8 02·8	8 04·1	7 40·8	1·1	0·6	7·1	3·8	13·1	7·1
12	8 03·0	8 04·3	7 41·0	1·2	0·7	7·2	3·9	13·2	7·2
13	8 03·3	8 04·6	7 41·2	1·3	0·7	7·3	4·0	13·3	7·2
14	8 03·5	8 04·8	7 41·5	1·4	0·8	7·4	4·0	13·4	7·3
15	8 03·8	8 05·1	7 41·7	1·5	0·8	7·5	4·1	13·5	7·3
16	8 04·0	8 05·3	7 42·0	1·6	0·9	7·6	4·1	13·6	7·4
17	8 04·3	8 05·6	7 42·2	1·7	0·9	7·7	4·2	13·7	7·4
18	8 04·5	8 05·8	7 42·4	1·8	1·0	7·8	4·2	13·8	7·5
19	8 04·8	8 06·1	7 42·7	1·9	1·0	7·9	4·3	13·9	7·5
20	8 05·0	8 06·3	7 42·9	2·0	1·1	8·0	4·3	14·0	7·6
21	8 05·3	8 06·6	7 43·1	2·1	1·1	8·1	4·4	14·1	7·6
22	8 05·5	8 06·8	7 43·4	2·2	1·2	8·2	4·4	14·2	7·7
23	8 05·8	8 07·1	7 43·6	2·3	1·2	8·3	4·5	14·3	7·7
24	8 06·0	8 07·3	7 43·9	2·4	1·3	8·4	4·6	14·4	7·8
25	8 06·3	8 07·6	7 44·1	2·5	1·4	8·5	4·6	14·5	7·9
26	8 06·5	8 07·8	7 44·3	2·6	1·4	8·6	4·7	14·6	7·9
27	8 06·8	8 08·1	7 44·6	2·7	1·5	8·7	4·7	14·7	8·0
28	8 07·0	8 08·3	7 44·8	2·8	1·5	8·8	4·8	14·8	8·0
29	8 07·3	8 08·6	7 45·1	2·9	1·6	8·9	4·8	14·9	8·1
30	8 07·5	8 08·8	7 45·3	3·0	1·6	9·0	4·9	15·0	8·1
31	8 07·8	8 09·1	7 45·5	3·1	1·7	9·1	4·9	15·1	8·2
32	8 08·0	8 09·3	7 45·8	3·2	1·7	9·2	5·0	15·2	8·2
33	8 08·3	8 09·6	7 46·0	3·3	1·8	9·3	5·0	15·3	8·3
34	8 08·5	8 09·8	7 46·2	3·4	1·8	9·4	5·1	15·4	8·3
35	8 08·8	8 10·1	7 46·5	3·5	1·9	9·5	5·1	15·5	8·4
36	8 09·0	8 10·3	7 46·7	3·6	2·0	9·6	5·2	15·6	8·5
37	8 09·3	8 10·6	7 47·0	3·7	2·0	9·7	5·3	15·7	8·5
38	8 09·5	8 10·8	7 47·2	3·8	2·1	9·8	5·3	15·8	8·6
39	8 09·8	8 11·1	7 47·4	3·9	2·1	9·9	5·4	15·9	8·6
40	8 10·0	8 11·3	7 47·7	4·0	2·2	10·0	5·4	16·0	8·7
41	8 10·3	8 11·6	7 47·9	4·1	2·2	10·1	5·5	16·1	8·7
42	8 10·5	8 11·8	7 48·2	4·2	2·3	10·2	5·5	16·2	8·8
43	8 10·8	8 12·1	7 48·4	4·3	2·3	10·3	5·6	16·3	8·8
44	8 11·0	8 12·3	7 48·6	4·4	2·4	10·4	5·6	16·4	8·9
45	8 11·3	8 12·6	7 48·9	4·5	2·4	10·5	5·7	16·5	8·9
46	8 11·5	8 12·8	7 49·1	4·6	2·5	10·6	5·7	16·6	9·0
47	8 11·8	8 13·1	7 49·3	4·7	2·5	10·7	5·8	16·7	9·0
48	8 12·0	8 13·3	7 49·6	4·8	2·6	10·8	5·9	16·8	9·1
49	8 12·3	8 13·6	7 49·8	4·9	2·7	10·9	5·9	16·9	9·2
50	8 12·5	8 13·8	7 50·1	5·0	2·7	11·0	6·0	17·0	9·2
51	8 12·8	8 14·1	7 50·3	5·1	2·8	11·1	6·0	17·1	9·3
52	8 13·0	8 14·3	7 50·5	5·2	2·8	11·2	6·1	17·2	9·3
53	8 13·3	8 14·6	7 50·8	5·3	2·9	11·3	6·1	17·3	9·4
54	8 13·5	8 14·9	7 51·0	5·4	2·9	11·4	6·2	17·4	9·4
55	8 13·8	8 15·1	7 51·3	5·5	3·0	11·5	6·2	17·5	9·5
56	8 14·0	8 15·4	7 51·5	5·6	3·0	11·6	6·3	17·6	9·5
57	8 14·3	8 15·6	7 51·7	5·7	3·1	11·7	6·3	17·7	9·6
58	8 14·5	8 15·9	7 52·0	5·8	3·1	11·8	6·4	17·8	9·6
59	8 14·8	8 16·1	7 52·2	5·9	3·2	11·9	6·4	17·9	9·7
60	8 15·0	8 16·4	7 52·5	6·0	3·3	12·0	6·5	18·0	9·8

33m	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	8 15·0	8 16·4	7 52·5	0·0	0·0	6·0	3·4	12·0	6·7
01	8 15·3	8 16·6	7 52·7	0·1	0·1	6·1	3·4	12·1	6·8
02	8 15·5	8 16·9	7 52·9	0·2	0·1	6·2	3·5	12·2	6·8
03	8 15·8	8 17·1	7 53·2	0·3	0·2	6·3	3·5	12·3	6·9
04	8 16·0	8 17·4	7 53·4	0·4	0·2	6·4	3·6	12·4	6·9
05	8 16·3	8 17·6	7 53·6	0·5	0·3	6·5	3·6	12·5	7·0
06	8 16·5	8 17·9	7 53·9	0·6	0·3	6·6	3·7	12·6	7·0
07	8 16·8	8 18·1	7 54·1	0·7	0·4	6·7	3·7	12·7	7·1
08	8 17·0	8 18·4	7 54·4	0·8	0·4	6·8	3·8	12·8	7·1
09	8 17·3	8 18·6	7 54·6	0·9	0·5	6·9	3·9	12·9	7·2
10	8 17·5	8 18·9	7 54·8	1·0	0·6	7·0	3·9	13·0	7·3
11	8 17·8	8 19·1	7 55·1	1·1	0·6	7·1	4·0	13·1	7·3
12	8 18·0	8 19·4	7 55·3	1·2	0·7	7·2	4·0	13·2	7·4
13	8 18·3	8 19·6	7 55·6	1·3	0·7	7·3	4·1	13·3	7·4
14	8 18·5	8 19·9	7 55·8	1·4	0·8	7·4	4·1	13·4	7·5
15	8 18·8	8 20·1	7 56·0	1·5	0·8	7·5	4·2	13·5	7·5
16	8 19·0	8 20·4	7 56·3	1·6	0·9	7·6	4·2	13·6	7·6
17	8 19·3	8 20·6	7 56·5	1·7	0·9	7·7	4·3	13·7	7·6
18	8 19·5	8 20·9	7 56·7	1·8	1·0	7·8	4·4	13·8	7·7
19	8 19·8	8 21·1	7 57·0	1·9	1·1	7·9	4·4	13·9	7·8
20	8 20·0	8 21·4	7 57·2	2·0	1·1	8·0	4·5	14·0	7·8
21	8 20·3	8 21·6	7 57·5	2·1	1·2	8·1	4·5	14·1	7·9
22	8 20·5	8 21·9	7 57·7	2·2	1·2	8·2	4·6	14·2	7·9
23	8 20·8	8 22·1	7 57·9	2·3	1·3	8·3	4·6	14·3	8·0
24	8 21·0	8 22·4	7 58·2	2·4	1·3	8·4	4·7	14·4	8·0
25	8 21·3	8 22·6	7 58·4	2·5	1·4	8·5	4·7	14·5	8·1
26	8 21·5	8 22·9	7 58·7	2·6	1·5	8·6	4·8	14·6	8·2
27	8 21·8	8 23·1	7 58·9	2·7	1·5	8·7	4·9	14·7	8·2
28	8 22·0	8 23·4	7 59·1	2·8	1·6	8·8	4·9	14·8	8·3
29	8 22·3	8 23·6	7 59·4	2·9	1·6	8·9	5·0	14·9	8·3
30	8 22·5	8 23·9	7 59·6	3·0	1·7	9·0	5·0	15·0	8·4
31	8 22·8	8 24·1	7 59·8	3·1	1·7	9·1	5·1	15·1	8·4
32	8 23·0	8 24·4	8 00·1	3·2	1·8	9·2	5·1	15·2	8·5
33	8 23·3	8 24·6	8 00·3	3·3	1·8	9·3	5·2	15·3	8·5
34	8 23·5	8 24·9	8 00·6	3·4	1·9	9·4	5·2	15·4	8·6
35	8 23·8	8 25·1	8 00·8	3·5	2·0	9·5	5·3	15·5	8·7
36	8 24·0	8 25·4	8 01·0	3·6	2·0	9·6	5·4	15·6	8·7
37	8 24·3	8 25·6	8 01·3	3·7	2·1	9·7	5·4	15·7	8·8
38	8 24·5	8 25·9	8 01·5	3·8	2·1	9·8	5·5	15·8	8·8
39	8 24·8	8 26·1	8 01·8	3·9	2·2	9·9	5·5	15·9	8·9
40	8 25·0	8 26·4	8 02·0	4·0	2·2	10·0	5·6	16·0	8·9
41	8 25·3	8 26·6	8 02·2	4·1	2·3	10·1	5·6	16·1	9·0
42	8 25·5	8 26·9	8 02·5	4·2	2·3	10·2	5·7	16·2	9·0
43	8 25·8	8 27·1	8 02·7	4·3	2·4	10·3	5·8	16·3	9·1
44	8 26·0	8 27·4	8 02·9	4·4	2·5	10·4	5·8	16·4	9·2
45	8 26·3	8 27·6	8 03·2	4·5	2·5	10·5	5·9	16·5	9·2
46	8 26·5	8 27·9	8 03·4	4·6	2·6	10·6	5·9	16·6	9·3
47	8 26·8	8 28·1	8 03·7	4·7	2·6	10·7	6·0	16·7	9·3
48	8 27·0	8 28·4	8 03·9	4·8	2·7	10·8	6·0	16·8	9·4
49	8 27·3	8 28·6	8 04·1	4·9	2·7	10·9	6·1	16·9	9·4
50	8 27·5	8 28·9	8 04·4	5·0	2·8	11·0	6·1	17·0	9·5
51	8 27·8	8 29·1	8 04·6	5·1	2·8	11·1	6·2	17·1	9·5
52	8 28·0	8 29·4	8 04·9	5·2	2·9	11·2	6·3	17·2	9·6
53	8 28·3	8 29·6	8 05·1	5·3	3·0	11·3	6·3	17·3	9·7
54	8 28·5	8 29·9	8 05·3	5·4	3·0	11·4	6·4	17·4	9·7
55	8 28·8	8 30·1	8 05·6	5·5	3·1	11·5	6·4	17·5	9·8
56	8 29·0	8 30·4	8 05·8	5·6	3·1	11·6	6·5	17·6	9·8
57	8 29·3	8 30·6	8 06·1	5·7	3·2	11·7	6·5	17·7	9·9
58	8 29·5	8 30·9	8 06·3	5·8	3·2	11·8	6·6	17·8	9·9
59	8 29·8	8 31·1	8 06·5	5·9	3·3	11·9	6·6	17·9	10·0
60	8 30·0	8 31·4	8 06·8	6·0	3·4	12·0	6·7	18·0	10·1

m 34	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	8 30·0	8 31·4	8 06·8	0·0	0·0	6·0	3·5	12·0	6·9
01	8 30·3	8 31·6	8 07·0	0·1	0·1	6·1	3·5	12·1	7·0
02	8 30·5	8 31·9	8 07·2	0·2	0·1	6·2	3·6	12·2	7·0
03	8 30·8	8 32·1	8 07·5	0·3	0·2	6·3	3·6	12·3	7·1
04	8 31·0	8 32·4	8 07·7	0·4	0·2	6·4	3·7	12·4	7·1
05	8 31·3	8 32·6	8 08·0	0·5	0·3	6·5	3·7	12·5	7·2
06	8 31·5	8 32·9	8 08·2	0·6	0·3	6·6	3·8	12·6	7·2
07	8 31·8	8 33·2	8 08·4	0·7	0·4	6·7	3·9	12·7	7·3
08	8 32·0	8 33·4	8 08·7	0·8	0·5	6·8	3·9	12·8	7·4
09	8 32·3	8 33·7	8 08·9	0·9	0·5	6·9	4·0	12·9	7·4
10	8 32·5	8 33·9	8 09·2	1·0	0·6	7·0	4·0	13·0	7·5
11	8 32·8	8 34·2	8 09·4	1·1	0·6	7·1	4·1	13·1	7·5
12	8 33·0	8 34·4	8 09·6	1·2	0·7	7·2	4·1	13·2	7·6
13	8 33·3	8 34·7	8 09·9	1·3	0·7	7·3	4·2	13·3	7·6
14	8 33·5	8 34·9	8 10·1	1·4	0·8	7·4	4·3	13·4	7·7
15	8 33·8	8 35·2	8 10·3	1·5	0·9	7·5	4·3	13·5	7·8
16	8 34·0	8 35·4	8 10·6	1·6	0·9	7·6	4·4	13·6	7·8
17	8 34·3	8 35·7	8 10·8	1·7	1·0	7·7	4·4	13·7	7·9
18	8 34·5	8 35·9	8 11·1	1·8	1·0	7·8	4·5	13·8	7·9
19	8 34·8	8 36·2	8 11·3	1·9	1·1	7·9	4·5	13·9	8·0
20	8 35·0	8 36·4	8 11·5	2·0	1·2	8·0	4·6	14·0	8·1
21	8 35·3	8 36·7	8 11·8	2·1	1·2	8·1	4·7	14·1	8·1
22	8 35·5	8 36·9	8 12·0	2·2	1·3	8·2	4·7	14·2	8·2
23	8 35·8	8 37·2	8 12·3	2·3	1·3	8·3	4·8	14·3	8·2
24	8 36·0	8 37·4	8 12·5	2·4	1·4	8·4	4·8	14·4	8·3
25	8 36·3	8 37·7	8 12·7	2·5	1·4	8·5	4·9	14·5	8·3
26	8 36·5	8 37·9	8 13·0	2·6	1·5	8·6	4·9	14·6	8·4
27	8 36·8	8 38·2	8 13·2	2·7	1·6	8·7	5·0	14·7	8·5
28	8 37·0	8 38·4	8 13·4	2·8	1·6	8·8	5·1	14·8	8·5
29	8 37·3	8 38·7	8 13·7	2·9	1·7	8·9	5·1	14·9	8·6
30	8 37·5	8 38·9	8 13·9	3·0	1·7	9·0	5·2	15·0	8·6
31	8 37·8	8 39·2	8 14·2	3·1	1·8	9·1	5·2	15·1	8·7
32	8 38·0	8 39·4	8 14·4	3·2	1·8	9·2	5·3	15·2	8·7
33	8 38·3	8 39·7	8 14·6	3·3	1·9	9·3	5·3	15·3	8·8
34	8 38·5	8 39·9	8 14·9	3·4	2·0	9·4	5·4	15·4	8·9
35	8 38·8	8 40·2	8 15·1	3·5	2·0	9·5	5·5	15·5	8·9
36	8 39·0	8 40·4	8 15·4	3·6	2·1	9·6	5·5	15·6	9·0
37	8 39·3	8 40·7	8 15·6	3·7	2·1	9·7	5·6	15·7	9·0
38	8 39·5	8 40·9	8 15·8	3·8	2·2	9·8	5·6	15·8	9·1
39	8 39·8	8 41·2	8 16·1	3·9	2·2	9·9	5·7	15·9	9·1
40	8 40·0	8 41·4	8 16·3	4·0	2·3	10·0	5·8	16·0	9·2
41	8 40·3	8 41·7	8 16·5	4·1	2·4	10·1	5·8	16·1	9·3
42	8 40·5	8 41·9	8 16·8	4·2	2·4	10·2	5·9	16·2	9·3
43	8 40·8	8 42·2	8 17·0	4·3	2·5	10·3	5·9	16·3	9·4
44	8 41·0	8 42·4	8 17·3	4·4	2·5	10·4	6·0	16·4	9·4
45	8 41·3	8 42·7	8 17·5	4·5	2·6	10·5	6·0	16·5	9·5
46	8 41·5	8 42·9	8 17·7	4·6	2·6	10·6	6·1	16·6	9·5
47	8 41·8	8 43·2	8 18·0	4·7	2·7	10·7	6·2	16·7	9·6
48	8 42·0	8 43·4	8 18·2	4·8	2·8	10·8	6·2	16·8	9·7
49	8 42·3	8 43·7	8 18·5	4·9	2·8	10·9	6·3	16·9	9·7
50	8 42·5	8 43·9	8 18·7	5·0	2·9	11·0	6·3	17·0	9·8
51	8 42·8	8 44·2	8 18·9	5·1	2·9	11·1	6·4	17·1	9·8
52	8 43·0	8 44·4	8 19·2	5·2	3·0	11·2	6·4	17·2	9·9
53	8 43·3	8 44·7	8 19·4	5·3	3·0	11·3	6·5	17·3	9·9
54	8 43·5	8 44·9	8 19·7	5·4	3·1	11·4	6·6	17·4	10·0
55	8 43·8	8 45·2	8 19·9	5·5	3·2	11·5	6·6	17·5	10·1
56	8 44·0	8 45·4	8 20·1	5·6	3·2	11·6	6·7	17·6	10·1
57	8 44·3	8 45·7	8 20·4	5·7	3·3	11·7	6·7	17·7	10·2
58	8 44·5	8 45·9	8 20·6	5·8	3·3	11·8	6·8	17·8	10·2
59	8 44·8	8 46·2	8 20·8	5·9	3·4	11·9	6·8	17·9	10·3
60	8 45·0	8 46·4	8 21·1	6·0	3·5	12·0	6·9	18·0	10·4

m 35	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	8 45·0	8 46·4	8 21·1	0·0	0·0	6·0	3·6	12·0	7·1
01	8 45·3	8 46·7	8 21·3	0·1	0·1	6·1	3·6	12·1	7·2
02	8 45·5	8 46·9	8 21·6	0·2	0·1	6·2	3·7	12·2	7·2
03	8 45·8	8 47·2	8 21·8	0·3	0·2	6·3	3·7	12·3	7·3
04	8 46·0	8 47·4	8 22·0	0·4	0·2	6·4	3·8	12·4	7·3
05	8 46·3	8 47·7	8 22·3	0·5	0·3	6·5	3·8	12·5	7·4
06	8 46·5	8 47·9	8 22·5	0·6	0·4	6·6	3·9	12·6	7·5
07	8 46·8	8 48·2	8 22·8	0·7	0·4	6·7	4·0	12·7	7·5
08	8 47·0	8 48·4	8 23·0	0·8	0·5	6·8	4·0	12·8	7·6
09	8 47·3	8 48·7	8 23·2	0·9	0·5	6·9	4·1	12·9	7·6
10	8 47·5	8 48·9	8 23·5	1·0	0·6	7·0	4·1	13·0	7·7
11	8 47·8	8 49·2	8 23·7	1·1	0·7	7·1	4·2	13·1	7·8
12	8 48·0	8 49·4	8 23·9	1·2	0·7	7·2	4·3	13·2	7·8
13	8 48·3	8 49·7	8 24·2	1·3	0·8	7·3	4·3	13·3	7·9
14	8 48·5	8 49·9	8 24·4	1·4	0·8	7·4	4·4	13·4	7·9
15	8 48·8	8 50·2	8 24·7	1·5	0·9	7·5	4·4	13·5	8·0
16	8 49·0	8 50·4	8 24·9	1·6	0·9	7·6	4·5	13·6	8·0
17	8 49·3	8 50·7	8 25·1	1·7	1·0	7·7	4·6	13·7	8·1
18	8 49·5	8 50·9	8 25·4	1·8	1·1	7·8	4·6	13·8	8·2
19	8 49·8	8 51·2	8 25·6	1·9	1·1	7·9	4·7	13·9	8·2
20	8 50·0	8 51·5	8 25·9	2·0	1·2	8·0	4·7	14·0	8·3
21	8 50·3	8 51·7	8 26·1	2·1	1·2	8·1	4·8	14·1	8·3
22	8 50·5	8 52·0	8 26·3	2·2	1·3	8·2	4·9	14·2	8·4
23	8 50·8	8 52·2	8 26·6	2·3	1·4	8·3	4·9	14·3	8·5
24	8 51·0	8 52·5	8 26·8	2·4	1·4	8·4	5·0	14·4	8·5
25	8 51·3	8 52·7	8 27·0	2·5	1·5	8·5	5·0	14·5	8·6
26	8 51·5	8 53·0	8 27·3	2·6	1·5	8·6	5·1	14·6	8·6
27	8 51·8	8 53·2	8 27·5	2·7	1·6	8·7	5·1	14·7	8·7
28	8 52·0	8 53·5	8 27·8	2·8	1·7	8·8	5·2	14·8	8·8
29	8 52·3	8 53·7	8 28·0	2·9	1·7	8·9	5·3	14·9	8·8
30	8 52·5	8 54·0	8 28·2	3·0	1·8	9·0	5·3	15·0	8·9
31	8 52·8	8 54·2	8 28·5	3·1	1·8	9·1	5·4	15·1	8·9
32	8 53·0	8 54·5	8 28·7	3·2	1·9	9·2	5·4	15·2	9·0
33	8 53·3	8 54·7	8 29·0	3·3	2·0	9·3	5·5	15·3	9·1
34	8 53·5	8 55·0	8 29·2	3·4	2·0	9·4	5·6	15·4	9·1
35	8 53·8	8 55·2	8 29·4	3·5	2·1	9·5	5·6	15·5	9·2
36	8 54·0	8 55·5	8 29·7	3·6	2·1	9·6	5·7	15·6	9·2
37	8 54·3	8 55·7	8 29·9	3·7	2·2	9·7	5·7	15·7	9·3
38	8 54·5	8 56·0	8 30·2	3·8	2·2	9·8	5·8	15·8	9·3
39	8 54·8	8 56·2	8 30·4	3·9	2·3	9·9	5·9	15·9	9·4
40	8 55·0	8 56·5	8 30·6	4·0	2·4	10·0	5·9	16·0	9·5
41	8 55·3	8 56·7	8 30·9	4·1	2·4	10·1	6·0	16·1	9·5
42	8 55·5	8 57·0	8 31·1	4·2	2·5	10·2	6·0	16·2	9·6
43	8 55·8	8 57·2	8 31·3	4·3	2·5	10·3	6·1	16·3	9·6
44	8 56·0	8 57·5	8 31·6	4·4	2·6	10·4	6·2	16·4	9·7
45	8 56·3	8 57·7	8 31·8	4·5	2·7	10·5	6·2	16·5	9·8
46	8 56·5	8 58·0	8 32·1	4·6	2·7	10·6	6·3	16·6	9·8
47	8 56·8	8 58·2	8 32·3	4·7	2·8	10·7	6·3	16·7	9·9
48	8 57·0	8 58·5	8 32·5	4·8	2·8	10·8	6·4	16·8	9·9
49	8 57·3	8 58·7	8 32·8	4·9	2·9	10·9	6·4	16·9	10·0
50	8 57·5	8 59·0	8 33·0	5·0	3·0	11·0	6·5	17·0	10·1
51	8 57·8	8 59·2	8 33·3	5·1	3·0	11·1	6·6	17·1	10·1
52	8 58·0	8 59·5	8 33·5	5·2	3·1	11·2	6·6	17·2	10·2
53	8 58·3	8 59·7	8 33·7	5·3	3·1	11·3	6·7	17·3	10·2
54	8 58·5	9 00·0	8 34·0	5·4	3·2	11·4	6·7	17·4	10·3
55	8 58·8	9 00·2	8 34·2	5·5	3·3	11·5	6·8	17·5	10·4
56	8 59·0	9 00·5	8 34·4	5·6	3·3	11·6	6·9	17·6	10·4
57	8 59·3	9 00·7	8 34·7	5·7	3·4	11·7	6·9	17·7	10·5
58	8 59·5	9 01·0	8 34·9	5·8	3·4	11·8	7·0	17·8	10·5
59	8 59·8	9 01·2	8 35·2	5·9	3·5	11·9	7·0	17·9	10·6
60	9 00·0	9 01·5	8 35·4	6·0	3·6	12·0	7·1	18·0	10·7

m 36	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	9 00·0	9 01·5	8 35·4	0·0	0·0	6·0	3·7	12·0	7·3
01	9 00·3	9 01·7	8 35·6	0·1	0·1	6·1	3·7	12·1	7·4
02	9 00·5	9 02·0	8 35·9	0·2	0·1	6·2	3·8	12·2	7·4
03	9 00·8	9 02·2	8 36·1	0·3	0·2	6·3	3·8	12·3	7·5
04	9 01·0	9 02·5	8 36·4	0·4	0·2	6·4	3·9	12·4	7·5
05	9 01·3	9 02·7	8 36·6	0·5	0·3	6·5	4·0	12·5	7·6
06	9 01·5	9 03·0	8 36·8	0·6	0·4	6·6	4·0	12·6	7·7
07	9 01·8	9 03·2	8 37·1	0·7	0·4	6·7	4·1	12·7	7·7
08	9 02·0	9 03·5	8 37·3	0·8	0·5	6·8	4·1	12·8	7·8
09	9 02·3	9 03·7	8 37·5	0·9	0·5	6·9	4·2	12·9	7·8
10	9 02·5	9 04·0	8 37·8	1·0	0·6	7·0	4·3	13·0	7·9
11	9 02·8	9 04·2	8 38·0	1·1	0·7	7·1	4·3	13·1	8·0
12	9 03·0	9 04·5	8 38·3	1·2	0·7	7·2	4·4	13·2	8·0
13	9 03·3	9 04·7	8 38·5	1·3	0·8	7·3	4·4	13·3	8·1
14	9 03·5	9 05·0	8 38·7	1·4	0·9	7·4	4·5	13·4	8·2
15	9 03·8	9 05·2	8 39·0	1·5	0·9	7·5	4·6	13·5	8·2
16	9 04·0	9 05·5	8 39·2	1·6	1·0	7·6	4·6	13·6	8·3
17	9 04·3	9 05·7	8 39·5	1·7	1·0	7·7	4·7	13·7	8·3
18	9 04·5	9 06·0	8 39·7	1·8	1·1	7·8	4·7	13·8	8·4
19	9 04·8	9 06·2	8 39·9	1·9	1·2	7·9	4·8	13·9	8·5
20	9 05·0	9 06·5	8 40·2	2·0	1·2	8·0	4·9	14·0	8·5
21	9 05·3	9 06·7	8 40·4	2·1	1·3	8·1	4·9	14·1	8·6
22	9 05·5	9 07·0	8 40·6	2·2	1·3	8·2	5·0	14·2	8·6
23	9 05·8	9 07·2	8 40·9	2·3	1·4	8·3	5·0	14·3	8·7
24	9 06·0	9 07·5	8 41·1	2·4	1·5	8·4	5·1	14·4	8·8
25	9 06·3	9 07·7	8 41·4	2·5	1·5	8·5	5·2	14·5	8·8
26	9 06·5	9 08·0	8 41·6	2·6	1·6	8·6	5·2	14·6	8·9
27	9 06·8	9 08·2	8 41·8	2·7	1·6	8·7	5·3	14·7	8·9
28	9 07·0	9 08·5	8 42·1	2·8	1·7	8·8	5·4	14·8	9·0
29	9 07·3	9 08·7	8 42·3	2·9	1·8	8·9	5·4	14·9	9·1
30	9 07·5	9 09·0	8 42·6	3·0	1·8	9·0	5·5	15·0	9·1
31	9 07·8	9 09·2	8 42·8	3·1	1·9	9·1	5·5	15·1	9·2
32	9 08·0	9 09·5	8 43·0	3·2	1·9	9·2	5·6	15·2	9·2
33	9 08·3	9 09·8	8 43·3	3·3	2·0	9·3	5·7	15·3	9·3
34	9 08·5	9 10·0	8 43·5	3·4	2·1	9·4	5·7	15·4	9·4
35	9 08·8	9 10·3	8 43·8	3·5	2·1	9·5	5·8	15·5	9·4
36	9 09·0	9 10·5	8 44·0	3·6	2·2	9·6	5·8	15·6	9·5
37	9 09·3	9 10·8	8 44·2	3·7	2·3	9·7	5·9	15·7	9·6
38	9 09·5	9 11·0	8 44·5	3·8	2·3	9·8	6·0	15·8	9·6
39	9 09·8	9 11·3	8 44·7	3·9	2·4	9·9	6·0	15·9	9·7
40	9 10·0	9 11·5	8 44·9	4·0	2·4	10·0	6·1	16·0	9·7
41	9 10·3	9 11·8	8 45·2	4·1	2·5	10·1	6·1	16·1	9·8
42	9 10·5	9 12·0	8 45·4	4·2	2·6	10·2	6·2	16·2	9·9
43	9 10·8	9 12·3	8 45·7	4·3	2·6	10·3	6·3	16·3	9·9
44	9 11·0	9 12·5	8 45·9	4·4	2·7	10·4	6·3	16·4	10·0
45	9 11·3	9 12·8	8 46·1	4·5	2·7	10·5	6·4	16·5	10·0
46	9 11·5	9 13·0	8 46·4	4·6	2·8	10·6	6·4	16·6	10·1
47	9 11·8	9 13·3	8 46·6	4·7	2·9	10·7	6·5	16·7	10·2
48	9 12·0	9 13·5	8 46·9	4·8	2·9	10·8	6·6	16·8	10·2
49	9 12·3	9 13·8	8 47·1	4·9	3·0	10·9	6·6	16·9	10·3
50	9 12·5	9 14·0	8 47·3	5·0	3·0	11·0	6·7	17·0	10·3
51	9 12·8	9 14·3	8 47·6	5·1	3·1	11·1	6·8	17·1	10·4
52	9 13·0	9 14·5	8 47·8	5·2	3·2	11·2	6·8	17·2	10·5
53	9 13·3	9 14·8	8 48·0	5·3	3·2	11·3	6·9	17·3	10·5
54	9 13·5	9 15·0	8 48·3	5·4	3·3	11·4	6·9	17·4	10·6
55	9 13·8	9 15·3	8 48·5	5·5	3·3	11·5	7·0	17·5	10·6
56	9 14·0	9 15·5	8 48·8	5·6	3·4	11·6	7·1	17·6	10·7
57	9 14·3	9 15·8	8 49·0	5·7	3·5	11·7	7·1	17·7	10·8
58	9 14·5	9 16·0	8 49·2	5·8	3·5	11·8	7·2	17·8	10·8
59	9 14·8	9 16·3	8 49·5	5·9	3·6	11·9	7·2	17·9	10·9
60	9 15·0	9 16·5	8 49·7	6·0	3·7	12·0	7·3	18·0	11·0

m 37	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	9 15·0	9 16·5	8 49·7	0·0	0·0	6·0	3·8	12·0	7·5
01	9 15·3	9 16·8	8 50·0	0·1	0·1	6·1	3·8	12·1	7·6
02	9 15·5	9 17·0	8 50·2	0·2	0·1	6·2	3·9	12·2	7·6
03	9 15·8	9 17·3	8 50·4	0·3	0·2	6·3	3·9	12·3	7·7
04	9 16·0	9 17·5	8 50·7	0·4	0·3	6·4	4·0	12·4	7·8
05	9 16·3	9 17·8	8 50·9	0·5	0·3	6·5	4·1	12·5	7·8
06	9 16·5	9 18·0	8 51·1	0·6	0·4	6·6	4·1	12·6	7·9
07	9 16·8	9 18·3	8 51·4	0·7	0·4	6·7	4·2	12·7	7·9
08	9 17·0	9 18·5	8 51·6	0·8	0·5	6·8	4·3	12·8	8·0
09	9 17·3	9 18·8	8 51·9	0·9	0·6	6·9	4·3	12·9	8·1
10	9 17·5	9 19·0	8 52·1	1·0	0·6	7·0	4·4	13·0	8·1
11	9 17·8	9 19·3	8 52·3	1·1	0·7	7·1	4·4	13·1	8·2
12	9 18·0	9 19·5	8 52·6	1·2	0·8	7·2	4·5	13·2	8·3
13	9 18·3	9 19·8	8 52·8	1·3	0·8	7·3	4·6	13·3	8·3
14	9 18·5	9 20·0	8 53·1	1·4	0·9	7·4	4·6	13·4	8·4
15	9 18·8	9 20·3	8 53·3	1·5	0·9	7·5	4·7	13·5	8·4
16	9 19·0	9 20·5	8 53·5	1·6	1·0	7·6	4·8	13·6	8·5
17	9 19·3	9 20·8	8 53·8	1·7	1·1	7·7	4·8	13·7	8·6
18	9 19·5	9 21·0	8 54·0	1·8	1·1	7·8	4·9	13·8	8·6
19	9 19·8	9 21·3	8 54·3	1·9	1·2	7·9	4·9	13·9	8·7
20	9 20·0	9 21·5	8 54·5	2·0	1·3	8·0	5·0	14·0	8·8
21	9 20·3	9 21·8	8 54·7	2·1	1·3	8·1	5·1	14·1	8·8
22	9 20·5	9 22·0	8 55·0	2·2	1·4	8·2	5·1	14·2	8·9
23	9 20·8	9 22·3	8 55·2	2·3	1·4	8·3	5·2	14·3	8·9
24	9 21·0	9 22·5	8 55·4	2·4	1·5	8·4	5·3	14·4	9·0
25	9 21·3	9 22·8	8 55·7	2·5	1·6	8·5	5·3	14·5	9·1
26	9 21·5	9 23·0	8 55·9	2·6	1·6	8·6	5·4	14·6	9·1
27	9 21·8	9 23·3	8 56·2	2·7	1·7	8·7	5·4	14·7	9·2
28	9 22·0	9 23·5	8 56·4	2·8	1·8	8·8	5·5	14·8	9·3
29	9 22·3	9 23·8	8 56·6	2·9	1·8	8·9	5·6	14·9	9·3
30	9 22·5	9 24·0	8 56·9	3·0	1·9	9·0	5·6	15·0	9·4
31	9 22·8	9 24·3	8 57·1	3·1	1·9	9·1	5·7	15·1	9·4
32	9 23·0	9 24·5	8 57·4	3·2	2·0	9·2	5·8	15·2	9·5
33	9 23·3	9 24·8	8 57·6	3·3	2·1	9·3	5·8	15·3	9·6
34	9 23·5	9 25·0	8 57·8	3·4	2·1	9·4	5·9	15·4	9·6
35	9 23·8	9 25·3	8 58·1	3·5	2·2	9·5	5·9	15·5	9·7
36	9 24·0	9 25·5	8 58·3	3·6	2·3	9·6	6·0	15·6	9·8
37	9 24·3	9 25·8	8 58·5	3·7	2·3	9·7	6·1	15·7	9·8
38	9 24·5	9 26·0	8 58·8	3·8	2·4	9·8	6·1	15·8	9·9
39	9 24·8	9 26·3	8 59·0	3·9	2·4	9·9	6·2	15·9	9·9
40	9 25·0	9 26·5	8 59·3	4·0	2·5	10·0	6·3	16·0	10·0
41	9 25·3	9 26·8	8 59·5	4·1	2·6	10·1	6·3	16·1	10·1
42	9 25·5	9 27·0	8 59·7	4·2	2·6	10·2	6·4	16·2	10·1
43	9 25·8	9 27·3	9 00·0	4·3	2·7	10·3	6·4	16·3	10·2
44	9 26·0	9 27·5	9 00·2	4·4	2·8	10·4	6·5	16·4	10·3
45	9 26·3	9 27·8	9 00·5	4·5	2·8	10·5	6·6	16·5	10·3
46	9 26·5	9 28·1	9 00·7	4·6	2·9	10·6	6·6	16·6	10·4
47	9 26·8	9 28·3	9 00·9	4·7	2·9	10·7	6·7	16·7	10·4
48	9 27·0	9 28·6	9 01·2	4·8	3·0	10·8	6·8	16·8	10·5
49	9 27·3	9 28·8	9 01·4	4·9	3·1	10·9	6·8	16·9	10·6
50	9 27·5	9 29·1	9 01·6	5·0	3·1	11·0	6·9	17·0	10·6
51	9 27·8	9 29·3	9 01·9	5·1	3·2	11·1	6·9	17·1	10·7
52	9 28·0	9 29·6	9 02·1	5·2	3·3	11·2	7·0	17·2	10·8
53	9 28·3	9 29·8	9 02·4	5·3	3·3	11·3	7·1	17·3	10·8
54	9 28·5	9 30·1	9 02·6	5·4	3·4	11·4	7·1	17·4	10·9
55	9 28·8	9 30·3	9 02·8	5·5	3·4	11·5	7·2	17·5	10·9
56	9 29·0	9 30·6	9 03·1	5·6	3·5	11·6	7·3	17·6	11·0
57	9 29·3	9 30·8	9 03·3	5·7	3·6	11·7	7·3	17·7	11·1
58	9 29·5	9 31·1	9 03·6	5·8	3·6	11·8	7·4	17·8	11·1
59	9 29·8	9 31·3	9 03·8	5·9	3·7	11·9	7·4	17·9	11·2
60	9 30·0	9 31·6	9 04·0	6·0	3·8	12·0	7·5	18·0	11·3

m 38	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	9 30·0	9 31·6	9 04·0	0·0	0·0	6·0	3·9	12·0	7·7
01	9 30·3	9 31·8	9 04·3	0·1	0·1	6·1	3·9	12·1	7·8
02	9 30·5	9 32·1	9 04·5	0·2	0·1	6·2	4·0	12·2	7·8
03	9 30·8	9 32·3	9 04·7	0·3	0·2	6·3	4·0	12·3	7·9
04	9 31·0	9 32·6	9 05·0	0·4	0·3	6·4	4·1	12·4	8·0
05	9 31·3	9 32·8	9 05·2	0·5	0·3	6·5	4·2	12·5	8·0
06	9 31·5	9 33·1	9 05·5	0·6	0·4	6·6	4·2	12·6	8·1
07	9 31·8	9 33·3	9 05·7	0·7	0·4	6·7	4·3	12·7	8·1
08	9 32·0	9 33·6	9 05·9	0·8	0·5	6·8	4·4	12·8	8·2
09	9 32·3	9 33·8	9 06·2	0·9	0·6	6·9	4·4	12·9	8·3
10	9 32·5	9 34·1	9 06·4	1·0	0·6	7·0	4·5	13·0	8·3
11	9 32·8	9 34·3	9 06·7	1·1	0·7	7·1	4·6	13·1	8·4
12	9 33·0	9 34·6	9 06·9	1·2	0·8	7·2	4·6	13·2	8·5
13	9 33·3	9 34·8	9 07·1	1·3	0·8	7·3	4·7	13·3	8·5
14	9 33·5	9 35·1	9 07·4	1·4	0·9	7·4	4·7	13·4	8·6
15	9 33·8	9 35·3	9 07·6	1·5	1·0	7·5	4·8	13·5	8·7
16	9 34·0	9 35·6	9 07·9	1·6	1·0	7·6	4·9	13·6	8·7
17	9 34·3	9 35·8	9 08·1	1·7	1·1	7·7	4·9	13·7	8·8
18	9 34·5	9 36·1	9 08·3	1·8	1·2	7·8	5·0	13·8	8·9
19	9 34·8	9 36·3	9 08·6	1·9	1·2	7·9	5·1	13·9	8·9
20	9 35·0	9 36·6	9 08·8	2·0	1·3	8·0	5·1	14·0	9·0
21	9 35·3	9 36·8	9 09·0	2·1	1·3	8·1	5·2	14·1	9·0
22	9 35·5	9 37·1	9 09·3	2·2	1·4	8·2	5·3	14·2	9·1
23	9 35·8	9 37·3	9 09·5	2·3	1·5	8·3	5·3	14·3	9·2
24	9 36·0	9 37·6	9 09·8	2·4	1·5	8·4	5·4	14·4	9·2
25	9 36·3	9 37·8	9 10·0	2·5	1·6	8·5	5·5	14·5	9·3
26	9 36·5	9 38·1	9 10·2	2·6	1·7	8·6	5·5	14·6	9·4
27	9 36·8	9 38·3	9 10·5	2·7	1·7	8·7	5·6	14·7	9·4
28	9 37·0	9 38·6	9 10·7	2·8	1·8	8·8	5·6	14·8	9·5
29	9 37·3	9 38·8	9 11·0	2·9	1·9	8·9	5·7	14·9	9·6
30	9 37·5	9 39·1	9 11·2	3·0	1·9	9·0	5·8	15·0	9·6
31	9 37·8	9 39·3	9 11·4	3·1	2·0	9·1	5·8	15·1	9·7
32	9 38·0	9 39·6	9 11·7	3·2	2·1	9·2	5·9	15·2	9·8
33	9 38·3	9 39·8	9 11·9	3·3	2·1	9·3	6·0	15·3	9·8
34	9 38·5	9 40·1	9 12·1	3·4	2·2	9·4	6·0	15·4	9·9
35	9 38·8	9 40·3	9 12·4	3·5	2·2	9·5	6·1	15·5	9·9
36	9 39·0	9 40·6	9 12·6	3·6	2·3	9·6	6·2	15·6	10·0
37	9 39·3	9 40·8	9 12·9	3·7	2·4	9·7	6·2	15·7	10·1
38	9 39·5	9 41·1	9 13·1	3·8	2·4	9·8	6·3	15·8	10·1
39	9 39·8	9 41·3	9 13·3	3·9	2·5	9·9	6·4	15·9	10·2
40	9 40·0	9 41·6	9 13·6	4·0	2·6	10·0	6·4	16·0	10·3
41	9 40·3	9 41·8	9 13·8	4·1	2·6	10·1	6·5	16·1	10·3
42	9 40·5	9 42·1	9 14·1	4·2	2·7	10·2	6·5	16·2	10·4
43	9 40·8	9 42·3	9 14·3	4·3	2·8	10·3	6·6	16·3	10·5
44	9 41·0	9 42·6	9 14·5	4·4	2·8	10·4	6·7	16·4	10·5
45	9 41·3	9 42·8	9 14·8	4·5	2·9	10·5	6·7	16·5	10·6
46	9 41·5	9 43·1	9 15·0	4·6	3·0	10·6	6·8	16·6	10·7
47	9 41·8	9 43·3	9 15·2	4·7	3·0	10·7	6·9	16·7	10·7
48	9 42·0	9 43·6	9 15·5	4·8	3·1	10·8	6·9	16·8	10·8
49	9 42·3	9 43·8	9 15·7	4·9	3·1	10·9	7·0	16·9	10·8
50	9 42·5	9 44·1	9 16·0	5·0	3·2	11·0	7·1	17·0	10·9
51	9 42·8	9 44·3	9 16·2	5·1	3·3	11·1	7·1	17·1	11·0
52	9 43·0	9 44·6	9 16·4	5·2	3·3	11·2	7·2	17·2	11·0
53	9 43·3	9 44·8	9 16·7	5·3	3·4	11·3	7·3	17·3	11·1
54	9 43·5	9 45·1	9 16·9	5·4	3·5	11·4	7·3	17·4	11·2
55	9 43·8	9 45·3	9 17·2	5·5	3·5	11·5	7·4	17·5	11·2
56	9 44·0	9 45·6	9 17·4	5·6	3·6	11·6	7·4	17·6	11·3
57	9 44·3	9 45·8	9 17·6	5·7	3·7	11·7	7·5	17·7	11·4
58	9 44·5	9 46·1	9 17·9	5·8	3·7	11·8	7·6	17·8	11·4
59	9 44·8	9 46·4	9 18·1	5·9	3·8	11·9	7·6	17·9	11·5
60	9 45·0	9 46·6	9 18·4	6·0	3·9	12·0	7·7	18·0	11·6

m 39	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	9 45·0	9 46·6	9 18·4	0·0	0·0	6·0	4·0	12·0	7·9
01	9 45·3	9 46·9	9 18·6	0·1	0·1	6·1	4·0	12·1	8·0
02	9 45·5	9 47·1	9 18·8	0·2	0·1	6·2	4·1	12·2	8·0
03	9 45·8	9 47·4	9 19·1	0·3	0·2	6·3	4·1	12·3	8·1
04	9 46·0	9 47·6	9 19·3	0·4	0·3	6·4	4·2	12·4	8·2
05	9 46·3	9 47·9	9 19·5	0·5	0·3	6·5	4·3	12·5	8·2
06	9 46·5	9 48·1	9 19·8	0·6	0·4	6·6	4·3	12·6	8·3
07	9 46·8	9 48·4	9 20·0	0·7	0·5	6·7	4·4	12·7	8·4
08	9 47·0	9 48·6	9 20·3	0·8	0·5	6·8	4·5	12·8	8·4
09	9 47·3	9 48·9	9 20·5	0·9	0·6	6·9	4·5	12·9	8·5
10	9 47·5	9 49·1	9 20·7	1·0	0·7	7·0	4·6	13·0	8·6
11	9 47·8	9 49·4	9 21·0	1·1	0·7	7·1	4·7	13·1	8·6
12	9 48·0	9 49·6	9 21·2	1·2	0·8	7·2	4·7	13·2	8·7
13	9 48·3	9 49·9	9 21·5	1·3	0·9	7·3	4·8	13·3	8·8
14	9 48·5	9 50·1	9 21·7	1·4	0·9	7·4	4·9	13·4	8·8
15	9 48·8	9 50·4	9 21·9	1·5	1·0	7·5	4·9	13·5	8·9
16	9 49·0	9 50·6	9 22·2	1·6	1·1	7·6	5·0	13·6	9·0
17	9 49·3	9 50·9	9 22·4	1·7	1·1	7·7	5·1	13·7	9·0
18	9 49·5	9 51·1	9 22·6	1·8	1·2	7·8	5·1	13·8	9·1
19	9 49·8	9 51·4	9 22·9	1·9	1·3	7·9	5·2	13·9	9·2
20	9 50·0	9 51·6	9 23·1	2·0	1·3	8·0	5·3	14·0	9·2
21	9 50·3	9 51·9	9 23·4	2·1	1·4	8·1	5·3	14·1	9·3
22	9 50·5	9 52·1	9 23·6	2·2	1·4	8·2	5·4	14·2	9·3
23	9 50·8	9 52·4	9 23·8	2·3	1·5	8·3	5·5	14·3	9·4
24	9 51·0	9 52·6	9 24·1	2·4	1·6	8·4	5·5	14·4	9·5
25	9 51·3	9 52·9	9 24·3	2·5	1·6	8·5	5·6	14·5	9·5
26	9 51·5	9 53·1	9 24·6	2·6	1·7	8·6	5·7	14·6	9·6
27	9 51·8	9 53·4	9 24·8	2·7	1·8	8·7	5·7	14·7	9·7
28	9 52·0	9 53·6	9 25·0	2·8	1·8	8·8	5·8	14·8	9·7
29	9 52·3	9 53·9	9 25·3	2·9	1·9	8·9	5·9	14·9	9·8
30	9 52·5	9 54·1	9 25·5	3·0	2·0	9·0	5·9	15·0	9·9
31	9 52·8	9 54·4	9 25·7	3·1	2·0	9·1	6·0	15·1	9·9
32	9 53·0	9 54·6	9 26·0	3·2	2·1	9·2	6·1	15·2	10·0
33	9 53·3	9 54·9	9 26·2	3·3	2·2	9·3	6·1	15·3	10·1
34	9 53·5	9 55·1	9 26·5	3·4	2·2	9·4	6·2	15·4	10·1
35	9 53·8	9 55·4	9 26·7	3·5	2·3	9·5	6·3	15·5	10·2
36	9 54·0	9 55·6	9 26·9	3·6	2·4	9·6	6·3	15·6	10·3
37	9 54·3	9 55·9	9 27·2	3·7	2·4	9·7	6·4	15·7	10·3
38	9 54·5	9 56·1	9 27·4	3·8	2·5	9·8	6·5	15·8	10·4
39	9 54·8	9 56·4	9 27·7	3·9	2·6	9·9	6·5	15·9	10·5
40	9 55·0	9 56·6	9 27·9	4·0	2·6	10·0	6·6	16·0	10·5
41	9 55·3	9 56·9	9 28·1	4·1	2·7	10·1	6·6	16·1	10·6
42	9 55·5	9 57·1	9 28·4	4·2	2·8	10·2	6·7	16·2	10·7
43	9 55·8	9 57·4	9 28·6	4·3	2·8	10·3	6·8	16·3	10·7
44	9 56·0	9 57·6	9 28·8	4·4	2·9	10·4	6·8	16·4	10·8
45	9 56·3	9 57·9	9 29·1	4·5	3·0	10·5	6·9	16·5	10·9
46	9 56·5	9 58·1	9 29·3	4·6	3·0	10·6	7·0	16·6	10·9
47	9 56·8	9 58·4	9 29·6	4·7	3·1	10·7	7·0	16·7	11·0
48	9 57·0	9 58·6	9 29·8	4·8	3·2	10·8	7·1	16·8	11·1
49	9 57·3	9 58·9	9 30·0	4·9	3·2	10·9	7·2	16·9	11·1
50	9 57·5	9 59·1	9 30·3	5·0	3·3	11·0	7·2	17·0	11·2
51	9 57·8	9 59·4	9 30·5	5·1	3·4	11·1	7·3	17·1	11·3
52	9 58·0	9 59·6	9 30·8	5·2	3·4	11·2	7·4	17·2	11·3
53	9 58·3	9 59·9	9 31·0	5·3	3·5	11·3	7·4	17·3	11·4
54	9 58·5	10 00·1	9 31·2	5·4	3·6	11·4	7·5	17·4	11·5
55	9 58·8	10 00·4	9 31·5	5·5	3·6	11·5	7·6	17·5	11·5
56	9 59·0	10 00·6	9 31·7	5·6	3·7	11·6	7·6	17·6	11·6
57	9 59·3	10 00·9	9 32·0	5·7	3·8	11·7	7·7	17·7	11·7
58	9 59·5	10 01·1	9 32·2	5·8	3·8	11·8	7·8	17·8	11·7
59	9 59·8	10 01·4	9 32·4	5·9	3·9	11·9	7·8	17·9	11·8
60	10 00·0	10 01·6	9 32·7	6·0	4·0	12·0	7·9	18·0	11·9

m 40	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	10 00·0	10 01·6	9 32·7	0·0	0·0	6·0	4·1	12·0	8·1
01	10 00·3	10 01·9	9 32·9	0·1	0·1	6·1	4·1	12·1	8·2
02	10 00·5	10 02·1	9 33·1	0·2	0·1	6·2	4·2	12·2	8·2
03	10 00·8	10 02·4	9 33·4	0·3	0·2	6·3	4·3	12·3	8·3
04	10 01·0	10 02·6	9 33·6	0·4	0·3	6·4	4·3	12·4	8·4
05	10 01·3	10 02·9	9 33·9	0·5	0·3	6·5	4·4	12·5	8·4
06	10 01·5	10 03·1	9 34·1	0·6	0·4	6·6	4·5	12·6	8·5
07	10 01·8	10 03·4	9 34·3	0·7	0·5	6·7	4·5	12·7	8·6
08	10 02·0	10 03·6	9 34·6	0·8	0·5	6·8	4·6	12·8	8·6
09	10 02·3	10 03·9	9 34·8	0·9	0·6	6·9	4·7	12·9	8·7
10	10 02·5	10 04·1	9 35·1	1·0	0·7	7·0	4·7	13·0	8·8
11	10 02·8	10 04·4	9 35·3	1·1	0·7	7·1	4·8	13·1	8·8
12	10 03·0	10 04·7	9 35·5	1·2	0·8	7·2	4·9	13·2	8·9
13	10 03·3	10 04·9	9 35·8	1·3	0·9	7·3	4·9	13·3	9·0
14	10 03·5	10 05·2	9 36·0	1·4	0·9	7·4	5·0	13·4	9·0
15	10 03·8	10 05·4	9 36·2	1·5	1·0	7·5	5·1	13·5	9·1
16	10 04·0	10 05·7	9 36·5	1·6	1·1	7·6	5·1	13·6	9·2
17	10 04·3	10 05·9	9 36·7	1·7	1·1	7·7	5·2	13·7	9·2
18	10 04·5	10 06·2	9 37·0	1·8	1·2	7·8	5·3	13·8	9·3
19	10 04·8	10 06·4	9 37·2	1·9	1·3	7·9	5·3	13·9	9·4
20	10 05·0	10 06·7	9 37·4	2·0	1·4	8·0	5·4	14·0	9·5
21	10 05·3	10 06·9	9 37·7	2·1	1·4	8·1	5·5	14·1	9·5
22	10 05·5	10 07·2	9 37·9	2·2	1·5	8·2	5·5	14·2	9·6
23	10 05·8	10 07·4	9 38·2	2·3	1·6	8·3	5·6	14·3	9·7
24	10 06·0	10 07·7	9 38·4	2·4	1·6	8·4	5·7	14·4	9·7
25	10 06·3	10 07·9	9 38·6	2·5	1·7	8·5	5·7	14·5	9·8
26	10 06·5	10 08·2	9 38·9	2·6	1·8	8·6	5·8	14·6	9·9
27	10 06·8	10 08·4	9 39·1	2·7	1·8	8·7	5·9	14·7	9·9
28	10 07·0	10 08·7	9 39·3	2·8	1·9	8·8	5·9	14·8	10·0
29	10 07·3	10 08·9	9 39·6	2·9	2·0	8·9	6·0	14·9	10·1
30	10 07·5	10 09·2	9 39·8	3·0	2·0	9·0	6·1	15·0	10·1
31	10 07·8	10 09·4	9 40·1	3·1	2·1	9·1	6·1	15·1	10·2
32	10 08·0	10 09·7	9 40·3	3·2	2·2	9·2	6·2	15·2	10·3
33	10 08·3	10 09·9	9 40·5	3·3	2·2	9·3	6·3	15·3	10·3
34	10 08·5	10 10·2	9 40·8	3·4	2·3	9·4	6·3	15·4	10·4
35	10 08·8	10 10·4	9 41·0	3·5	2·4	9·5	6·4	15·5	10·5
36	10 09·0	10 10·7	9 41·3	3·6	2·4	9·6	6·5	15·6	10·5
37	10 09·3	10 10·9	9 41·5	3·7	2·5	9·7	6·5	15·7	10·6
38	10 09·5	10 11·2	9 41·7	3·8	2·6	9·8	6·6	15·8	10·7
39	10 09·8	10 11·4	9 42·0	3·9	2·6	9·9	6·7	15·9	10·7
40	10 10·0	10 11·7	9 42·2	4·0	2·7	10·0	6·8	16·0	10·8
41	10 10·3	10 11·9	9 42·4	4·1	2·8	10·1	6·8	16·1	10·9
42	10 10·5	10 12·2	9 42·7	4·2	2·8	10·2	6·9	16·2	10·9
43	10 10·8	10 12·4	9 42·9	4·3	2·9	10·3	7·0	16·3	11·0
44	10 11·0	10 12·7	9 43·2	4·4	3·0	10·4	7·0	16·4	11·1
45	10 11·3	10 12·9	9 43·4	4·5	3·0	10·5	7·1	16·5	11·1
46	10 11·5	10 13·2	9 43·6	4·6	3·1	10·6	7·2	16·6	11·2
47	10 11·8	10 13·4	9 43·9	4·7	3·2	10·7	7·2	16·7	11·3
48	10 12·0	10 13·7	9 44·1	4·8	3·2	10·8	7·3	16·8	11·3
49	10 12·3	10 13·9	9 44·4	4·9	3·3	10·9	7·4	16·9	11·4
50	10 12·5	10 14·2	9 44·6	5·0	3·4	11·0	7·4	17·0	11·5
51	10 12·8	10 14·4	9 44·8	5·1	3·4	11·1	7·5	17·1	11·5
52	10 13·0	10 14·7	9 45·1	5·2	3·5	11·2	7·6	17·2	11·6
53	10 13·3	10 14·9	9 45·3	5·3	3·6	11·3	7·6	17·3	11·7
54	10 13·5	10 15·2	9 45·6	5·4	3·6	11·4	7·7	17·4	11·7
55	10 13·8	10 15·4	9 45·8	5·5	3·7	11·5	7·8	17·5	11·8
56	10 14·0	10 15·7	9 46·0	5·6	3·8	11·6	7·8	17·6	11·9
57	10 14·3	10 15·9	9 46·3	5·7	3·8	11·7	7·9	17·7	11·9
58	10 14·5	10 16·2	9 46·5	5·8	3·9	11·8	8·0	17·8	12·0
59	10 14·8	10 16·4	9 46·7	5·9	4·0	11·9	8·0	17·9	12·1
60	10 15·0	10 16·7	9 47·0	6·0	4·1	12·0	8·1	18·0	12·2

m 41	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	10 15·0	10 16·7	9 47·0	0·0	0·0	6·0	4·2	12·0	8·3
01	10 15·3	10 16·9	9 47·2	0·1	0·1	6·1	4·2	12·1	8·4
02	10 15·5	10 17·2	9 47·5	0·2	0·1	6·2	4·3	12·2	8·4
03	10 15·8	10 17·4	9 47·7	0·3	0·2	6·3	4·4	12·3	8·5
04	10 16·0	10 17·7	9 47·9	0·4	0·3	6·4	4·4	12·4	8·6
05	10 16·3	10 17·9	9 48·2	0·5	0·3	6·5	4·5	12·5	8·6
06	10 16·5	10 18·2	9 48·4	0·6	0·4	6·6	4·6	12·6	8·7
07	10 16·8	10 18·4	9 48·7	0·7	0·5	6·7	4·6	12·7	8·8
08	10 17·0	10 18·7	9 48·9	0·8	0·6	6·8	4·7	12·8	8·9
09	10 17·3	10 18·9	9 49·1	0·9	0·6	6·9	4·8	12·9	8·9
10	10 17·5	10 19·2	9 49·4	1·0	0·7	7·0	4·8	13·0	9·0
11	10 17·8	10 19·4	9 49·6	1·1	0·8	7·1	4·9	13·1	9·1
12	10 18·0	10 19·7	9 49·8	1·2	0·8	7·2	5·0	13·2	9·1
13	10 18·3	10 19·9	9 50·1	1·3	0·9	7·3	5·0	13·3	9·2
14	10 18·5	10 20·2	9 50·3	1·4	1·0	7·4	5·1	13·4	9·3
15	10 18·8	10 20·4	9 50·6	1·5	1·0	7·5	5·2	13·5	9·3
16	10 19·0	10 20·7	9 50·8	1·6	1·1	7·6	5·3	13·6	9·4
17	10 19·3	10 20·9	9 51·0	1·7	1·2	7·7	5·3	13·7	9·5
18	10 19·5	10 21·2	9 51·3	1·8	1·2	7·8	5·4	13·8	9·5
19	10 19·8	10 21·4	9 51·5	1·9	1·3	7·9	5·5	13·9	9·6
20	10 20·0	10 21·7	9 51·8	2·0	1·4	8·0	5·5	14·0	9·7
21	10 20·3	10 21·9	9 52·0	2·1	1·5	8·1	5·6	14·1	9·8
22	10 20·5	10 22·2	9 52·2	2·2	1·5	8·2	5·7	14·2	9·8
23	10 20·8	10 22·4	9 52·5	2·3	1·6	8·3	5·7	14·3	9·9
24	10 21·0	10 22·7	9 52·7	2·4	1·7	8·4	5·8	14·4	10·0
25	10 21·3	10 23·0	9 52·9	2·5	1·7	8·5	5·9	14·5	10·0
26	10 21·5	10 23·2	9 53·2	2·6	1·8	8·6	5·9	14·6	10·1
27	10 21·8	10 23·5	9 53·4	2·7	1·9	8·7	6·0	14·7	10·2
28	10 22·0	10 23·7	9 53·7	2·8	1·9	8·8	6·1	14·8	10·2
29	10 22·3	10 24·0	9 53·9	2·9	2·0	8·9	6·2	14·9	10·3
30	10 22·5	10 24·2	9 54·1	3·0	2·1	9·0	6·2	15·0	10·4
31	10 22·8	10 24·5	9 54·4	3·1	2·1	9·1	6·3	15·1	10·4
32	10 23·0	10 24·7	9 54·6	3·2	2·2	9·2	6·4	15·2	10·5
33	10 23·3	10 25·0	9 54·9	3·3	2·3	9·3	6·4	15·3	10·6
34	10 23·5	10 25·2	9 55·1	3·4	2·4	9·4	6·5	15·4	10·7
35	10 23·8	10 25·5	9 55·3	3·5	2·4	9·5	6·6	15·5	10·7
36	10 24·0	10 25·7	9 55·6	3·6	2·5	9·6	6·6	15·6	10·8
37	10 24·3	10 26·0	9 55·8	3·7	2·6	9·7	6·7	15·7	10·9
38	10 24·5	10 26·2	9 56·1	3·8	2·6	9·8	6·8	15·8	10·9
39	10 24·8	10 26·5	9 56·3	3·9	2·7	9·9	6·8	15·9	11·0
40	10 25·0	10 26·7	9 56·5	4·0	2·8	10·0	6·9	16·0	11·1
41	10 25·3	10 27·0	9 56·8	4·1	2·8	10·1	7·0	16·1	11·1
42	10 25·5	10 27·2	9 57·0	4·2	2·9	10·2	7·1	16·2	11·2
43	10 25·8	10 27·5	9 57·2	4·3	3·0	10·3	7·1	16·3	11·3
44	10 26·0	10 27·7	9 57·5	4·4	3·0	10·4	7·2	16·4	11·3
45	10 26·3	10 28·0	9 57·7	4·5	3·1	10·5	7·3	16·5	11·4
46	10 26·5	10 28·2	9 58·0	4·6	3·2	10·6	7·3	16·6	11·5
47	10 26·8	10 28·5	9 58·2	4·7	3·3	10·7	7·4	16·7	11·6
48	10 27·0	10 28·7	9 58·4	4·8	3·3	10·8	7·5	16·8	11·6
49	10 27·3	10 29·0	9 58·7	4·9	3·4	10·9	7·5	16·9	11·7
50	10 27·5	10 29·2	9 58·9	5·0	3·5	11·0	7·6	17·0	11·8
51	10 27·8	10 29·5	9 59·2	5·1	3·5	11·1	7·7	17·1	11·8
52	10 28·0	10 29·7	9 59·4	5·2	3·6	11·2	7·7	17·2	11·9
53	10 28·3	10 30·0	9 59·6	5·3	3·7	11·3	7·8	17·3	12·0
54	10 28·5	10 30·2	9 59·9	5·4	3·7	11·4	7·9	17·4	12·0
55	10 28·8	10 30·5	10 00·1	5·5	3·8	11·5	8·0	17·5	12·1
56	10 29·0	10 30·7	10 00·3	5·6	3·9	11·6	8·0	17·6	12·2
57	10 29·3	10 31·0	10 00·6	5·7	3·9	11·7	8·1	17·7	12·2
58	10 29·5	10 31·2	10 00·8	5·8	4·0	11·8	8·2	17·8	12·3
59	10 29·8	10 31·5	10 01·1	5·9	4·1	11·9	8·2	17·9	12·4
60	10 30·0	10 31·7	10 01·3	6·0	4·2	12·0	8·3	18·0	12·5

m 42 s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corr^n ′	v or d ′	Corr^n ′	v or d ′	Corr^n ′
00	10 30·0	10 31·7	10 01·3	0·0	0·0	6·0	4·3	12·0	8·5
01	10 30·3	10 32·0	10 01·5	0·1	0·1	6·1	4·3	12·1	8·6
02	10 30·5	10 32·2	10 01·8	0·2	0·1	6·2	4·4	12·2	8·6
03	10 30·8	10 32·5	10 02·0	0·3	0·2	6·3	4·5	12·3	8·7
04	10 31·0	10 32·7	10 02·3	0·4	0·3	6·4	4·5	12·4	8·8
05	10 31·3	10 33·0	10 02·5	0·5	0·4	6·5	4·6	12·5	8·9
06	10 31·5	10 33·2	10 02·7	0·6	0·4	6·6	4·7	12·6	8·9
07	10 31·8	10 33·5	10 03·0	0·7	0·5	6·7	4·7	12·7	9·0
08	10 32·0	10 33·7	10 03·2	0·8	0·6	6·8	4·8	12·8	9·1
09	10 32·3	10 34·0	10 03·4	0·9	0·6	6·9	4·9	12·9	9·1
10	10 32·5	10 34·2	10 03·7	1·0	0·7	7·0	5·0	13·0	9·2
11	10 32·8	10 34·5	10 03·9	1·1	0·8	7·1	5·0	13·1	9·3
12	10 33·0	10 34·7	10 04·2	1·2	0·9	7·2	5·1	13·2	9·4
13	10 33·3	10 35·0	10 04·4	1·3	0·9	7·3	5·2	13·3	9·4
14	10 33·5	10 35·2	10 04·6	1·4	1·0	7·4	5·2	13·4	9·5
15	10 33·8	10 35·5	10 04·9	1·5	1·1	7·5	5·3	13·5	9·6
16	10 34·0	10 35·7	10 05·1	1·6	1·1	7·6	5·4	13·6	9·6
17	10 34·3	10 36·0	10 05·4	1·7	1·2	7·7	5·5	13·7	9·7
18	10 34·5	10 36·2	10 05·6	1·8	1·3	7·8	5·5	13·8	9·8
19	10 34·8	10 36·5	10 05·8	1·9	1·3	7·9	5·6	13·9	9·8
20	10 35·0	10 36·7	10 06·1	2·0	1·4	8·0	5·7	14·0	9·9
21	10 35·3	10 37·0	10 06·3	2·1	1·5	8·1	5·7	14·1	10·0
22	10 35·5	10 37·2	10 06·5	2·2	1·6	8·2	5·8	14·2	10·1
23	10 35·8	10 37·5	10 06·8	2·3	1·6	8·3	5·9	14·3	10·1
24	10 36·0	10 37·7	10 07·0	2·4	1·7	8·4	6·0	14·4	10·2
25	10 36·3	10 38·0	10 07·3	2·5	1·8	8·5	6·0	14·5	10·3
26	10 36·5	10 38·2	10 07·5	2·6	1·8	8·6	6·1	14·6	10·3
27	10 36·8	10 38·5	10 07·7	2·7	1·9	8·7	6·2	14·7	10·4
28	10 37·0	10 38·7	10 08·0	2·8	2·0	8·8	6·2	14·8	10·5
29	10 37·3	10 39·0	10 08·2	2·9	2·1	8·9	6·3	14·9	10·6
30	10 37·5	10 39·2	10 08·5	3·0	2·1	9·0	6·4	15·0	10·6
31	10 37·8	10 39·5	10 08·7	3·1	2·2	9·1	6·4	15·1	10·7
32	10 38·0	10 39·7	10 08·9	3·2	2·3	9·2	6·5	15·2	10·8
33	10 38·3	10 40·0	10 09·2	3·3	2·3	9·3	6·6	15·3	10·8
34	10 38·5	10 40·2	10 09·4	3·4	2·4	9·4	6·7	15·4	10·9
35	10 38·8	10 40·5	10 09·7	3·5	2·5	9·5	6·7	15·5	11·0
36	10 39·0	10 40·7	10 09·9	3·6	2·6	9·6	6·8	15·6	11·1
37	10 39·3	10 41·0	10 10·1	3·7	2·6	9·7	6·9	15·7	11·1
38	10 39·5	10 41·3	10 10·4	3·8	2·7	9·8	6·9	15·8	11·2
39	10 39·8	10 41·5	10 10·6	3·9	2·8	9·9	7·0	15·9	11·3
40	10 40·0	10 41·8	10 10·8	4·0	2·8	10·0	7·1	16·0	11·3
41	10 40·3	10 42·0	10 11·1	4·1	2·9	10·1	7·2	16·1	11·4
42	10 40·5	10 42·3	10 11·3	4·2	3·0	10·2	7·2	16·2	11·5
43	10 40·8	10 42·5	10 11·6	4·3	3·0	10·3	7·3	16·3	11·5
44	10 41·0	10 42·8	10 11·8	4·4	3·1	10·4	7·4	16·4	11·6
45	10 41·3	10 43·0	10 12·0	4·5	3·2	10·5	7·4	16·5	11·7
46	10 41·5	10 43·3	10 12·3	4·6	3·3	10·6	7·5	16·6	11·8
47	10 41·8	10 43·5	10 12·5	4·7	3·3	10·7	7·6	16·7	11·8
48	10 42·0	10 43·8	10 12·8	4·8	3·4	10·8	7·7	16·8	11·9
49	10 42·3	10 44·0	10 13·0	4·9	3·5	10·9	7·7	16·9	12·0
50	10 42·5	10 44·3	10 13·2	5·0	3·5	11·0	7·8	17·0	12·0
51	10 42·8	10 44·5	10 13·5	5·1	3·6	11·1	7·9	17·1	12·1
52	10 43·0	10 44·8	10 13·7	5·2	3·7	11·2	7·9	17·2	12·2
53	10 43·3	10 45·0	10 13·9	5·3	3·8	11·3	8·0	17·3	12·3
54	10 43·5	10 45·3	10 14·2	5·4	3·8	11·4	8·1	17·4	12·3
55	10 43·8	10 45·5	10 14·4	5·5	3·9	11·5	8·1	17·5	12·4
56	10 44·0	10 45·8	10 14·7	5·6	4·0	11·6	8·2	17·6	12·5
57	10 44·3	10 46·0	10 14·9	5·7	4·0	11·7	8·3	17·7	12·5
58	10 44·5	10 46·3	10 15·1	5·8	4·1	11·8	8·4	17·8	12·6
59	10 44·8	10 46·5	10 15·4	5·9	4·2	11·9	8·4	17·9	12·7
60	10 45·0	10 46·8	10 15·6	6·0	4·3	12·0	8·5	18·0	12·8

m 43 s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corr^n ′	v or d ′	Corr^n ′	v or d ′	Corr^n ′
00	10 45·0	10 46·8	10 15·6	0·0	0·0	6·0	4·4	12·0	8·7
01	10 45·3	10 47·0	10 15·9	0·1	0·1	6·1	4·4	12·1	8·8
02	10 45·5	10 47·3	10 16·1	0·2	0·1	6·2	4·5	12·2	8·8
03	10 45·8	10 47·5	10 16·3	0·3	0·2	6·3	4·6	12·3	8·9
04	10 46·0	10 47·8	10 16·6	0·4	0·3	6·4	4·6	12·4	9·0
05	10 46·3	10 48·0	10 16·8	0·5	0·4	6·5	4·7	12·5	9·1
06	10 46·5	10 48·3	10 17·0	0·6	0·4	6·6	4·8	12·6	9·1
07	10 46·8	10 48·5	10 17·3	0·7	0·5	6·7	4·9	12·7	9·2
08	10 47·0	10 48·8	10 17·5	0·8	0·6	6·8	4·9	12·8	9·3
09	10 47·3	10 49·0	10 17·8	0·9	0·7	6·9	5·0	12·9	9·4
10	10 47·5	10 49·3	10 18·0	1·0	0·7	7·0	5·1	13·0	9·4
11	10 47·8	10 49·5	10 18·2	1·1	0·8	7·1	5·1	13·1	9·5
12	10 48·0	10 49·8	10 18·5	1·2	0·9	7·2	5·2	13·2	9·6
13	10 48·3	10 50·0	10 18·7	1·3	0·9	7·3	5·3	13·3	9·6
14	10 48·5	10 50·3	10 19·0	1·4	1·0	7·4	5·4	13·4	9·7
15	10 48·8	10 50·5	10 19·2	1·5	1·1	7·5	5·4	13·5	9·8
16	10 49·0	10 50·8	10 19·4	1·6	1·2	7·6	5·5	13·6	9·9
17	10 49·3	10 51·0	10 19·7	1·7	1·2	7·7	5·6	13·7	9·9
18	10 49·5	10 51·3	10 19·9	1·8	1·3	7·8	5·7	13·8	10·0
19	10 49·8	10 51·5	10 20·2	1·9	1·4	7·9	5·7	13·9	10·1
20	10 50·0	10 51·8	10 20·4	2·0	1·5	8·0	5·8	14·0	10·2
21	10 50·3	10 52·0	10 20·6	2·1	1·5	8·1	5·9	14·1	10·2
22	10 50·5	10 52·3	10 20·9	2·2	1·6	8·2	5·9	14·2	10·3
23	10 50·8	10 52·5	10 21·1	2·3	1·7	8·3	6·0	14·3	10·4
24	10 51·0	10 52·8	10 21·3	2·4	1·7	8·4	6·1	14·4	10·4
25	10 51·3	10 53·0	10 21·6	2·5	1·8	8·5	6·2	14·5	10·5
26	10 51·5	10 53·3	10 21·8	2·6	1·9	8·6	6·2	14·6	10·6
27	10 51·8	10 53·5	10 22·1	2·7	2·0	8·7	6·3	14·7	10·7
28	10 52·0	10 53·8	10 22·3	2·8	2·0	8·8	6·4	14·8	10·7
29	10 52·3	10 54·0	10 22·5	2·9	2·1	8·9	6·5	14·9	10·8
30	10 52·5	10 54·3	10 22·8	3·0	2·2	9·0	6·5	15·0	10·9
31	10 52·8	10 54·5	10 23·0	3·1	2·2	9·1	6·6	15·1	10·9
32	10 53·0	10 54·8	10 23·3	3·2	2·3	9·2	6·7	15·2	11·0
33	10 53·3	10 55·0	10 23·5	3·3	2·4	9·3	6·7	15·3	11·1
34	10 53·5	10 55·3	10 23·7	3·4	2·5	9·4	6·8	15·4	11·2
35	10 53·8	10 55·5	10 24·0	3·5	2·5	9·5	6·9	15·5	11·2
36	10 54·0	10 55·8	10 24·2	3·6	2·6	9·6	7·0	15·6	11·3
37	10 54·3	10 56·0	10 24·4	3·7	2·7	9·7	7·0	15·7	11·4
38	10 54·5	10 56·3	10 24·7	3·8	2·8	9·8	7·1	15·8	11·5
39	10 54·8	10 56·5	10 24·9	3·9	2·8	9·9	7·2	15·9	11·5
40	10 55·0	10 56·8	10 25·2	4·0	2·9	10·0	7·3	16·0	11·6
41	10 55·3	10 57·0	10 25·4	4·1	3·0	10·1	7·3	16·1	11·7
42	10 55·5	10 57·3	10 25·6	4·2	3·0	10·2	7·4	16·2	11·7
43	10 55·8	10 57·5	10 25·9	4·3	3·1	10·3	7·5	16·3	11·8
44	10 56·0	10 57·8	10 26·1	4·4	3·2	10·4	7·5	16·4	11·9
45	10 56·3	10 58·0	10 26·4	4·5	3·3	10·5	7·6	16·5	12·0
46	10 56·5	10 58·3	10 26·6	4·6	3·3	10·6	7·7	16·6	12·0
47	10 56·8	10 58·5	10 26·8	4·7	3·4	10·7	7·8	16·7	12·1
48	10 57·0	10 58·8	10 27·1	4·8	3·5	10·8	7·8	16·8	12·2
49	10 57·3	10 59·0	10 27·3	4·9	3·6	10·9	7·9	16·9	12·3
50	10 57·5	10 59·3	10 27·5	5·0	3·6	11·0	8·0	17·0	12·3
51	10 57·8	10 59·6	10 27·8	5·1	3·7	11·1	8·0	17·1	12·4
52	10 58·0	10 59·8	10 28·0	5·2	3·8	11·2	8·1	17·2	12·5
53	10 58·3	11 00·1	10 28·3	5·3	3·8	11·3	8·2	17·3	12·5
54	10 58·5	11 00·3	10 28·5	5·4	3·9	11·4	8·3	17·4	12·6
55	10 58·8	11 00·6	10 28·7	5·5	4·0	11·5	8·3	17·5	12·7
56	10 59·0	11 00·8	10 29·0	5·6	4·1	11·6	8·4	17·6	12·8
57	10 59·3	11 01·1	10 29·2	5·7	4·1	11·7	8·5	17·7	12·8
58	10 59·5	11 01·3	10 29·5	5·8	4·2	11·8	8·6	17·8	12·9
59	10 59·8	11 01·6	10 29·7	5·9	4·3	11·9	8·6	17·9	13·0
60	11 00·0	11 01·8	10 29·9	6·0	4·4	12·0	8·7	18·0	13·1

44m INCREMENTS AND CORRECTIONS 45m

m 44	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	11 00·0	11 01·8	10 29·9	0·0	0·0	6·0	4·5	12·0	8·9
01	11 00·3	11 02·1	10 30·2	0·1	0·1	6·1	4·5	12·1	9·0
02	11 00·5	11 02·3	10 30·4	0·2	0·1	6·2	4·6	12·2	9·0
03	11 00·8	11 02·6	10 30·6	0·3	0·2	6·3	4·7	12·3	9·1
04	11 01·0	11 02·8	10 30·9	0·4	0·3	6·4	4·7	12·4	9·2
05	11 01·3	11 03·1	10 31·1	0·5	0·4	6·5	4·8	12·5	9·3
06	11 01·5	11 03·3	10 31·4	0·6	0·4	6·6	4·9	12·6	9·3
07	11 01·8	11 03·6	10 31·6	0·7	0·5	6·7	5·0	12·7	9·4
08	11 02·0	11 03·8	10 31·8	0·8	0·6	6·8	5·0	12·8	9·5
09	11 02·3	11 04·1	10 32·1	0·9	0·7	6·9	5·1	12·9	9·6
10	11 02·5	11 04·3	10 32·3	1·0	0·7	7·0	5·2	13·0	9·6
11	11 02·8	11 04·6	10 32·6	1·1	0·8	7·1	5·3	13·1	9·7
12	11 03·0	11 04·8	10 32·8	1·2	0·9	7·2	5·3	13·2	9·8
13	11 03·3	11 05·1	10 33·0	1·3	1·0	7·3	5·4	13·3	9·9
14	11 03·5	11 05·3	10 33·3	1·4	1·0	7·4	5·5	13·4	9·9
15	11 03·8	11 05·6	10 33·5	1·5	1·1	7·5	5·6	13·5	10·0
16	11 04·0	11 05·8	10 33·8	1·6	1·2	7·6	5·6	13·6	10·1
17	11 04·3	11 06·1	10 34·0	1·7	1·3	7·7	5·7	13·7	10·2
18	11 04·5	11 06·3	10 34·2	1·8	1·3	7·8	5·8	13·8	10·2
19	11 04·8	11 06·6	10 34·5	1·9	1·4	7·9	5·9	13·9	10·3
20	11 05·0	11 06·8	10 34·7	2·0	1·5	8·0	5·9	14·0	10·4
21	11 05·3	11 07·1	10 34·9	2·1	1·6	8·1	6·0	14·1	10·5
22	11 05·5	11 07·3	10 35·2	2·2	1·6	8·2	6·1	14·2	10·5
23	11 05·8	11 07·6	10 35·4	2·3	1·7	8·3	6·2	14·3	10·6
24	11 06·0	11 07·8	10 35·7	2·4	1·8	8·4	6·2	14·4	10·7
25	11 06·3	11 08·1	10 35·9	2·5	1·9	8·5	6·3	14·5	10·8
26	11 06·5	11 08·3	10 36·1	2·6	1·9	8·6	6·4	14·6	10·8
27	11 06·8	11 08·6	10 36·4	2·7	2·0	8·7	6·5	14·7	10·9
28	11 07·0	11 08·8	10 36·6	2·8	2·1	8·8	6·5	14·8	11·0
29	11 07·3	11 09·1	10 36·9	2·9	2·2	8·9	6·6	14·9	11·1
30	11 07·5	11 09·3	10 37·1	3·0	2·2	9·0	6·7	15·0	11·1
31	11 07·8	11 09·6	10 37·3	3·1	2·3	9·1	6·7	15·1	11·2
32	11 08·0	11 09·8	10 37·6	3·2	2·4	9·2	6·8	15·2	11·3
33	11 08·3	11 10·1	10 37·8	3·3	2·4	9·3	6·9	15·3	11·3
34	11 08·5	11 10·3	10 38·0	3·4	2·5	9·4	7·0	15·4	11·4
35	11 08·8	11 10·6	10 38·3	3·5	2·6	9·5	7·0	15·5	11·5
36	11 09·0	11 10·8	10 38·5	3·6	2·7	9·6	7·1	15·6	11·6
37	11 09·3	11 11·1	10 38·8	3·7	2·7	9·7	7·2	15·7	11·6
38	11 09·5	11 11·3	10 39·0	3·8	2·8	9·8	7·3	15·8	11·7
39	11 09·8	11 11·6	10 39·2	3·9	2·9	9·9	7·3	15·9	11·8
40	11 10·0	11 11·8	10 39·5	4·0	3·0	10·0	7·4	16·0	11·9
41	11 10·3	11 12·1	10 39·7	4·1	3·0	10·1	7·5	16·1	11·9
42	11 10·5	11 12·3	10 40·0	4·2	3·1	10·2	7·6	16·2	12·0
43	11 10·8	11 12·6	10 40·2	4·3	3·2	10·3	7·6	16·3	12·1
44	11 11·0	11 12·8	10 40·4	4·4	3·3	10·4	7·7	16·4	12·2
45	11 11·3	11 13·1	10 40·7	4·5	3·3	10·5	7·8	16·5	12·2
46	11 11·5	11 13·3	10 40·9	4·6	3·4	10·6	7·9	16·6	12·3
47	11 11·8	11 13·6	10 41·1	4·7	3·5	10·7	7·9	16·7	12·4
48	11 12·0	11 13·8	10 41·4	4·8	3·6	10·8	8·0	16·8	12·5
49	11 12·3	11 14·1	10 41·6	4·9	3·6	10·9	8·1	16·9	12·5
50	11 12·5	11 14·3	10 41·9	5·0	3·7	11·0	8·2	17·0	12·6
51	11 12·8	11 14·6	10 42·1	5·1	3·8	11·1	8·2	17·1	12·7
52	11 13·0	11 14·8	10 42·3	5·2	3·9	11·2	8·3	17·2	12·8
53	11 13·3	11 15·1	10 42·6	5·3	3·9	11·3	8·4	17·3	12·8
54	11 13·5	11 15·3	10 42·8	5·4	4·0	11·4	8·5	17·4	12·9
55	11 13·8	11 15·6	10 43·1	5·5	4·1	11·5	8·5	17·5	13·0
56	11 14·0	11 15·8	10 43·3	5·6	4·2	11·6	8·6	17·6	13·1
57	11 14·3	11 16·1	10 43·5	5·7	4·2	11·7	8·7	17·7	13·1
58	11 14·5	11 16·3	10 43·8	5·8	4·3	11·8	8·8	17·8	13·2
59	11 14·8	11 16·6	10 44·0	5·9	4·4	11·9	8·8	17·9	13·3
60	11 15·0	11 16·8	10 44·3	6·0	4·5	12·0	8·9	18·0	13·4

m 45	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	11 15·0	11 16·8	10 44·3	0·0	0·0	6·0	4·6	12·0	9·1
01	11 15·3	11 17·1	10 44·5	0·1	0·1	6·1	4·6	12·1	9·2
02	11 15·5	11 17·3	10 44·7	0·2	0·2	6·2	4·7	12·2	9·3
03	11 15·8	11 17·6	10 45·0	0·3	0·2	6·3	4·8	12·3	9·3
04	11 16·0	11 17·9	10 45·2	0·4	0·3	6·4	4·9	12·4	9·4
05	11 16·3	11 18·1	10 45·4	0·5	0·4	6·5	4·9	12·5	9·5
06	11 16·5	11 18·4	10 45·7	0·6	0·5	6·6	5·0	12·6	9·6
07	11 16·8	11 18·6	10 45·9	0·7	0·5	6·7	5·1	12·7	9·6
08	11 17·0	11 18·9	10 46·2	0·8	0·6	6·8	5·2	12·8	9·7
09	11 17·3	11 19·1	10 46·4	0·9	0·7	6·9	5·2	12·9	9·8
10	11 17·5	11 19·4	10 46·6	1·0	0·8	7·0	5·3	13·0	9·9
11	11 17·8	11 19·6	10 46·9	1·1	0·8	7·1	5·4	13·1	9·9
12	11 18·0	11 19·9	10 47·1	1·2	0·9	7·2	5·5	13·2	10·0
13	11 18·3	11 20·1	10 47·4	1·3	1·0	7·3	5·5	13·3	10·1
14	11 18·5	11 20·4	10 47·6	1·4	1·1	7·4	5·6	13·4	10·2
15	11 18·8	11 20·6	10 47·8	1·5	1·1	7·5	5·7	13·5	10·2
16	11 19·0	11 20·9	10 48·1	1·6	1·2	7·6	5·8	13·6	10·3
17	11 19·3	11 21·1	10 48·3	1·7	1·3	7·7	5·8	13·7	10·4
18	11 19·5	11 21·4	10 48·5	1·8	1·4	7·8	5·9	13·8	10·5
19	11 19·8	11 21·6	10 48·8	1·9	1·4	7·9	6·0	13·9	10·5
20	11 20·0	11 21·9	10 49·0	2·0	1·5	8·0	6·1	14·0	10·6
21	11 20·3	11 22·1	10 49·3	2·1	1·6	8·1	6·1	14·1	10·7
22	11 20·5	11 22·4	10 49·5	2·2	1·7	8·2	6·2	14·2	10·8
23	11 20·8	11 22·6	10 49·7	2·3	1·7	8·3	6·3	14·3	10·8
24	11 21·0	11 22·9	10 50·0	2·4	1·8	8·4	6·4	14·4	10·9
25	11 21·3	11 23·1	10 50·2	2·5	1·9	8·5	6·4	14·5	11·0
26	11 21·5	11 23·4	10 50·5	2·6	2·0	8·6	6·5	14·6	11·1
27	11 21·8	11 23·6	10 50·7	2·7	2·0	8·7	6·6	14·7	11·1
28	11 22·0	11 23·9	10 50·9	2·8	2·1	8·8	6·7	14·8	11·2
29	11 22·3	11 24·1	10 51·2	2·9	2·2	8·9	6·7	14·9	11·3
30	11 22·5	11 24·4	10 51·4	3·0	2·3	9·0	6·8	15·0	11·4
31	11 22·8	11 24·6	10 51·6	3·1	2·4	9·1	6·9	15·1	11·5
32	11 23·0	11 24·9	10 51·9	3·2	2·4	9·2	7·0	15·2	11·5
33	11 23·3	11 25·1	10 52·1	3·3	2·5	9·3	7·1	15·3	11·6
34	11 23·5	11 25·4	10 52·4	3·4	2·6	9·4	7·1	15·4	11·7
35	11 23·8	11 25·6	10 52·6	3·5	2·7	9·5	7·2	15·5	11·8
36	11 24·0	11 25·9	10 52·8	3·6	2·7	9·6	7·3	15·6	11·8
37	11 24·3	11 26·1	10 53·1	3·7	2·8	9·7	7·4	15·7	11·9
38	11 24·5	11 26·4	10 53·3	3·8	2·9	9·8	7·4	15·8	12·0
39	11 24·8	11 26·6	10 53·6	3·9	3·0	9·9	7·5	15·9	12·1
40	11 25·0	11 26·9	10 53·8	4·0	3·0	10·0	7·6	16·0	12·1
41	11 25·3	11 27·1	10 54·0	4·1	3·1	10·1	7·7	16·1	12·2
42	11 25·5	11 27·4	10 54·3	4·2	3·2	10·2	7·7	16·2	12·3
43	11 25·8	11 27·6	10 54·5	4·3	3·3	10·3	7·8	16·3	12·4
44	11 26·0	11 27·9	10 54·7	4·4	3·3	10·4	7·9	16·4	12·4
45	11 26·3	11 28·1	10 55·0	4·5	3·4	10·5	8·0	16·5	12·5
46	11 26·5	11 28·4	10 55·2	4·6	3·5	10·6	8·0	16·6	12·6
47	11 26·8	11 28·6	10 55·5	4·7	3·6	10·7	8·1	16·7	12·7
48	11 27·0	11 28·9	10 55·7	4·8	3·6	10·8	8·2	16·8	12·7
49	11 27·3	11 29·1	10 55·9	4·9	3·7	10·9	8·3	16·9	12·8
50	11 27·5	11 29·4	10 56·2	5·0	3·8	11·0	8·3	17·0	12·9
51	11 27·8	11 29·6	10 56·4	5·1	3·9	11·1	8·4	17·1	13·0
52	11 28·0	11 29·9	10 56·7	5·2	3·9	11·2	8·5	17·2	13·0
53	11 28·3	11 30·1	10 56·9	5·3	4·0	11·3	8·6	17·3	13·1
54	11 28·5	11 30·4	10 57·1	5·4	4·1	11·4	8·6	17·4	13·2
55	11 28·8	11 30·6	10 57·4	5·5	4·2	11·5	8·7	17·5	13·3
56	11 29·0	11 30·9	10 57·6	5·6	4·2	11·6	8·8	17·6	13·3
57	11 29·3	11 31·1	10 57·9	5·7	4·3	11·7	8·9	17·7	13·4
58	11 29·5	11 31·4	10 58·1	5·8	4·4	11·8	8·9	17·8	13·5
59	11 29·8	11 31·6	10 58·3	5·9	4·5	11·9	9·0	17·9	13·6
60	11 30·0	11 31·9	10 58·6	6·0	4·6	12·0	9·1	18·0	13·7

46m INCREMENTS AND CORRECTIONS 47m

46m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corr^n ′	v or d ′	Corr^n ′	v or d ′	Corr^n ′
00	11 30·0	11 31·9	10 58·6	0·0	0·0	6·0	4·7	12·0	9·3
01	11 30·3	11 32·1	10 58·8	0·1	0·1	6·1	4·7	12·1	9·4
02	11 30·5	11 32·4	10 59·0	0·2	0·2	6·2	4·8	12·2	9·5
03	11 30·8	11 32·6	10 59·3	0·3	0·2	6·3	4·9	12·3	9·5
04	11 31·0	11 32·9	10 59·5	0·4	0·3	6·4	5·0	12·4	9·6
05	11 31·3	11 33·1	10 59·8	0·5	0·4	6·5	5·0	12·5	9·7
06	11 31·5	11 33·4	11 00·0	0·6	0·5	6·6	5·1	12·6	9·8
07	11 31·8	11 33·6	11 00·2	0·7	0·5	6·7	5·2	12·7	9·8
08	11 32·0	11 33·9	11 00·5	0·8	0·6	6·8	5·3	12·8	9·9
09	11 32·3	11 34·1	11 00·7	0·9	0·7	6·9	5·3	12·9	10·0
10	11 32·5	11 34·4	11 01·0	1·0	0·8	7·0	5·4	13·0	10·1
11	11 32·8	11 34·6	11 01·2	1·1	0·9	7·1	5·5	13·1	10·2
12	11 33·0	11 34·9	11 01·4	1·2	0·9	7·2	5·6	13·2	10·2
13	11 33·3	11 35·1	11 01·7	1·3	1·0	7·3	5·7	13·3	10·3
14	11 33·5	11 35·4	11 01·9	1·4	1·1	7·4	5·7	13·4	10·4
15	11 33·8	11 35·6	11 02·1	1·5	1·2	7·5	5·8	13·5	10·5
16	11 34·0	11 35·9	11 02·4	1·6	1·2	7·6	5·9	13·6	10·5
17	11 34·3	11 36·2	11 02·6	1·7	1·3	7·7	6·0	13·7	10·6
18	11 34·5	11 36·4	11 02·9	1·8	1·4	7·8	6·0	13·8	10·7
19	11 34·8	11 36·7	11 03·1	1·9	1·5	7·9	6·1	13·9	10·8
20	11 35·0	11 36·9	11 03·3	2·0	1·6	8·0	6·2	14·0	10·9
21	11 35·3	11 37·2	11 03·6	2·1	1·6	8·1	6·3	14·1	10·9
22	11 35·5	11 37·4	11 03·8	2·2	1·7	8·2	6·4	14·2	11·0
23	11 35·8	11 37·7	11 04·1	2·3	1·8	8·3	6·4	14·3	11·1
24	11 36·0	11 37·9	11 04·3	2·4	1·9	8·4	6·5	14·4	11·2
25	11 36·3	11 38·2	11 04·5	2·5	1·9	8·5	6·6	14·5	11·2
26	11 36·5	11 38·4	11 04·8	2·6	2·0	8·6	6·7	14·6	11·3
27	11 36·8	11 38·7	11 05·0	2·7	2·1	8·7	6·7	14·7	11·4
28	11 37·0	11 38·9	11 05·2	2·8	2·2	8·8	6·8	14·8	11·5
29	11 37·3	11 39·2	11 05·5	2·9	2·2	8·9	6·9	14·9	11·5
30	11 37·5	11 39·4	11 05·7	3·0	2·3	9·0	7·0	15·0	11·6
31	11 37·8	11 39·7	11 06·0	3·1	2·4	9·1	7·1	15·1	11·7
32	11 38·0	11 39·9	11 06·2	3·2	2·5	9·2	7·1	15·2	11·8
33	11 38·3	11 40·2	11 06·4	3·3	2·6	9·3	7·2	15·3	11·9
34	11 38·5	11 40·4	11 06·7	3·4	2·6	9·4	7·3	15·4	11·9
35	11 38·8	11 40·7	11 06·9	3·5	2·7	9·5	7·4	15·5	12·0
36	11 39·0	11 40·9	11 07·2	3·6	2·8	9·6	7·4	15·6	12·1
37	11 39·3	11 41·2	11 07·4	3·7	2·9	9·7	7·5	15·7	12·2
38	11 39·5	11 41·4	11 07·6	3·8	2·9	9·8	7·6	15·8	12·2
39	11 39·8	11 41·7	11 07·9	3·9	3·0	9·9	7·7	15·9	12·3
40	11 40·0	11 41·9	11 08·1	4·0	3·1	10·0	7·8	16·0	12·4
41	11 40·3	11 42·2	11 08·3	4·1	3·2	10·1	7·8	16·1	12·5
42	11 40·5	11 42·4	11 08·6	4·2	3·3	10·2	7·9	16·2	12·6
43	11 40·8	11 42·7	11 08·8	4·3	3·3	10·3	8·0	16·3	12·6
44	11 41·0	11 42·9	11 09·1	4·4	3·4	10·4	8·1	16·4	12·7
45	11 41·3	11 43·2	11 09·3	4·5	3·5	10·5	8·1	16·5	12·8
46	11 41·5	11 43·4	11 09·5	4·6	3·6	10·6	8·2	16·6	12·9
47	11 41·8	11 43·7	11 09·8	4·7	3·6	10·7	8·3	16·7	12·9
48	11 42·0	11 43·9	11 10·0	4·8	3·7	10·8	8·4	16·8	13·0
49	11 42·3	11 44·2	11 10·3	4·9	3·8	10·9	8·4	16·9	13·1
50	11 42·5	11 44·4	11 10·5	5·0	3·9	11·0	8·5	17·0	13·2
51	11 42·8	11 44·7	11 10·7	5·1	4·0	11·1	8·6	17·1	13·3
52	11 43·0	11 44·9	11 11·0	5·2	4·0	11·2	8·7	17·2	13·3
53	11 43·3	11 45·2	11 11·2	5·3	4·1	11·3	8·8	17·3	13·4
54	11 43·5	11 45·4	11 11·5	5·4	4·2	11·4	8·8	17·4	13·5
55	11 43·8	11 45·7	11 11·7	5·5	4·3	11·5	8·9	17·5	13·6
56	11 44·0	11 45·9	11 11·9	5·6	4·3	11·6	9·0	17·6	13·6
57	11 44·3	11 46·2	11 12·2	5·7	4·4	11·7	9·1	17·7	13·7
58	11 44·5	11 46·4	11 12·4	5·8	4·5	11·8	9·1	17·8	13·8
59	11 44·8	11 46·7	11 12·6	5·9	4·6	11·9	9·2	17·9	13·9
60	11 45·0	11 46·9	11 12·9	6·0	4·7	12·0	9·3	18·0	14·0

47m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corr^n ′	v or d ′	Corr^n ′	v or d ′	Corr^n ′
00	11 45·0	11 46·9	11 12·9	0·0	0·0	6·0	4·8	12·0	9·5
01	11 45·3	11 47·2	11 13·1	0·1	0·1	6·1	4·8	12·1	9·6
02	11 45·5	11 47·4	11 13·4	0·2	0·2	6·2	4·9	12·2	9·7
03	11 45·8	11 47·7	11 13·6	0·3	0·2	6·3	5·0	12·3	9·7
04	11 46·0	11 47·9	11 13·8	0·4	0·3	6·4	5·1	12·4	9·8
05	11 46·3	11 48·2	11 14·1	0·5	0·4	6·5	5·1	12·5	9·9
06	11 46·5	11 48·4	11 14·3	0·6	0·5	6·6	5·2	12·6	10·0
07	11 46·8	11 48·7	11 14·6	0·7	0·6	6·7	5·3	12·7	10·1
08	11 47·0	11 48·9	11 14·8	0·8	0·6	6·8	5·4	12·8	10·1
09	11 47·3	11 49·2	11 15·0	0·9	0·7	6·9	5·5	12·9	10·2
10	11 47·5	11 49·4	11 15·3	1·0	0·8	7·0	5·5	13·0	10·3
11	11 47·8	11 49·7	11 15·5	1·1	0·9	7·1	5·6	13·1	10·4
12	11 48·0	11 49·9	11 15·7	1·2	1·0	7·2	5·7	13·2	10·5
13	11 48·3	11 50·2	11 16·0	1·3	1·0	7·3	5·8	13·3	10·5
14	11 48·5	11 50·4	11 16·2	1·4	1·1	7·4	5·9	13·4	10·6
15	11 48·8	11 50·7	11 16·5	1·5	1·2	7·5	5·9	13·5	10·7
16	11 49·0	11 50·9	11 16·7	1·6	1·3	7·6	6·0	13·6	10·8
17	11 49·3	11 51·2	11 16·9	1·7	1·3	7·7	6·1	13·7	10·8
18	11 49·5	11 51·4	11 17·2	1·8	1·4	7·8	6·2	13·8	10·9
19	11 49·8	11 51·7	11 17·4	1·9	1·5	7·9	6·3	13·9	11·0
20	11 50·0	11 51·9	11 17·7	2·0	1·6	8·0	6·3	14·0	11·1
21	11 50·3	11 52·2	11 17·9	2·1	1·7	8·1	6·4	14·1	11·2
22	11 50·5	11 52·4	11 18·1	2·2	1·7	8·2	6·5	14·2	11·2
23	11 50·8	11 52·7	11 18·4	2·3	1·8	8·3	6·6	14·3	11·3
24	11 51·0	11 52·9	11 18·6	2·4	1·9	8·4	6·7	14·4	11·4
25	11 51·3	11 53·2	11 18·8	2·5	2·0	8·5	6·7	14·5	11·5
26	11 51·5	11 53·4	11 19·1	2·6	2·1	8·6	6·8	14·6	11·6
27	11 51·8	11 53·7	11 19·3	2·7	2·1	8·7	6·9	14·7	11·6
28	11 52·0	11 53·9	11 19·6	2·8	2·2	8·8	7·0	14·8	11·7
29	11 52·3	11 54·2	11 19·8	2·9	2·3	8·9	7·0	14·9	11·8
30	11 52·5	11 54·5	11 20·0	3·0	2·4	9·0	7·1	15·0	11·9
31	11 52·8	11 54·7	11 20·3	3·1	2·5	9·1	7·2	15·1	12·0
32	11 53·0	11 55·0	11 20·5	3·2	2·5	9·2	7·3	15·2	12·0
33	11 53·3	11 55·2	11 20·8	3·3	2·6	9·3	7·4	15·3	12·1
34	11 53·5	11 55·5	11 21·0	3·4	2·7	9·4	7·4	15·4	12·2
35	11 53·8	11 55·7	11 21·2	3·5	2·8	9·5	7·5	15·5	12·3
36	11 54·0	11 56·0	11 21·5	3·6	2·9	9·6	7·6	15·6	12·4
37	11 54·3	11 56·2	11 21·7	3·7	2·9	9·7	7·7	15·7	12·4
38	11 54·5	11 56·5	11 22·0	3·8	3·0	9·8	7·8	15·8	12·5
39	11 54·8	11 56·7	11 22·2	3·9	3·1	9·9	7·8	15·9	12·6
40	11 55·0	11 57·0	11 22·4	4·0	3·2	10·0	7·9	16·0	12·7
41	11 55·3	11 57·2	11 22·7	4·1	3·2	10·1	8·0	16·1	12·7
42	11 55·5	11 57·5	11 22·9	4·2	3·3	10·2	8·1	16·2	12·8
43	11 55·8	11 57·7	11 23·1	4·3	3·4	10·3	8·2	16·3	12·9
44	11 56·0	11 58·0	11 23·4	4·4	3·5	10·4	8·2	16·4	13·0
45	11 56·3	11 58·2	11 23·6	4·5	3·6	10·5	8·3	16·5	13·1
46	11 56·5	11 58·5	11 23·9	4·6	3·6	10·6	8·4	16·6	13·1
47	11 56·8	11 58·7	11 24·1	4·7	3·7	10·7	8·5	16·7	13·2
48	11 57·0	11 59·0	11 24·3	4·8	3·8	10·8	8·6	16·8	13·3
49	11 57·3	11 59·2	11 24·6	4·9	3·9	10·9	8·6	16·9	13·4
50	11 57·5	11 59·5	11 24·8	5·0	4·0	11·0	8·7	17·0	13·5
51	11 57·8	11 59·7	11 25·1	5·1	4·0	11·1	8·8	17·1	13·5
52	11 58·0	12 00·0	11 25·3	5·2	4·1	11·2	8·9	17·2	13·6
53	11 58·3	12 00·2	11 25·5	5·3	4·2	11·3	8·9	17·3	13·7
54	11 58·5	12 00·5	11 25·8	5·4	4·3	11·4	9·0	17·4	13·8
55	11 58·8	12 00·7	11 26·0	5·5	4·4	11·5	9·1	17·5	13·9
56	11 59·0	12 01·0	11 26·2	5·6	4·4	11·6	9·2	17·6	13·9
57	11 59·3	12 01·2	11 26·5	5·7	4·5	11·7	9·3	17·7	14·0
58	11 59·5	12 01·5	11 26·7	5·8	4·6	11·8	9·3	17·8	14·1
59	11 59·8	12 01·7	11 27·0	5·9	4·7	11·9	9·4	17·9	14·2
60	12 00·0	12 02·0	11 27·2	6·0	4·8	12·0	9·5	18·0	14·3

48m INCREMENTS AND CORRECTIONS 49m

m 48	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	12 00·0	12 02·0	11 27·2	0·0	0·0	6·0	4·9	12·0	9·7
01	12 00·3	12 02·2	11 27·4	0·1	0·1	6·1	4·9	12·1	9·8
02	12 00·5	12 02·5	11 27·7	0·2	0·2	6·2	5·0	12·2	9·9
03	12 00·8	12 02·7	11 27·9	0·3	0·2	6·3	5·1	12·3	9·9
04	12 01·0	12 03·0	11 28·2	0·4	0·3	6·4	5·2	12·4	10·0
05	12 01·3	12 03·2	11 28·4	0·5	0·4	6·5	5·3	12·5	10·1
06	12 01·5	12 03·5	11 28·6	0·6	0·5	6·6	5·3	12·6	10·2
07	12 01·8	12 03·7	11 28·9	0·7	0·6	6·7	5·4	12·7	10·3
08	12 02·0	12 04·0	11 29·1	0·8	0·6	6·8	5·5	12·8	10·3
09	12 02·3	12 04·2	11 29·3	0·9	0·7	6·9	5·6	12·9	10·4
10	12 02·5	12 04·5	11 29·6	1·0	0·8	7·0	5·7	13·0	10·5
11	12 02·8	12 04·7	11 29·8	1·1	0·9	7·1	5·7	13·1	10·6
12	12 03·0	12 05·0	11 30·1	1·2	1·0	7·2	5·8	13·2	10·7
13	12 03·3	12 05·2	11 30·3	1·3	1·1	7·3	5·9	13·3	10·8
14	12 03·5	12 05·5	11 30·5	1·4	1·1	7·4	6·0	13·4	10·8
15	12 03·8	12 05·7	11 30·8	1·5	1·2	7·5	6·1	13·5	10·9
16	12 04·0	12 06·0	11 31·0	1·6	1·3	7·6	6·1	13·6	11·0
17	12 04·3	12 06·2	11 31·3	1·7	1·4	7·7	6·2	13·7	11·1
18	12 04·5	12 06·5	11 31·5	1·8	1·5	7·8	6·3	13·8	11·2
19	12 04·8	12 06·7	11 31·7	1·9	1·5	7·9	6·4	13·9	11·2
20	12 05·0	12 07·0	11 32·0	2·0	1·6	8·0	6·5	14·0	11·3
21	12 05·3	12 07·2	11 32·2	2·1	1·7	8·1	6·5	14·1	11·4
22	12 05·5	12 07·5	11 32·4	2·2	1·8	8·2	6·6	14·2	11·5
23	12 05·8	12 07·7	11 32·7	2·3	1·9	8·3	6·7	14·3	11·6
24	12 06·0	12 08·0	11 32·9	2·4	1·9	8·4	6·8	14·4	11·6
25	12 06·3	12 08·2	11 33·2	2·5	2·0	8·5	6·9	14·5	11·7
26	12 06·5	12 08·5	11 33·4	2·6	2·1	8·6	7·0	14·6	11·8
27	12 06·8	12 08·7	11 33·6	2·7	2·2	8·7	7·0	14·7	11·9
28	12 07·0	12 09·0	11 33·9	2·8	2·3	8·8	7·1	14·8	12·0
29	12 07·3	12 09·2	11 34·1	2·9	2·3	8·9	7·2	14·9	12·0
30	12 07·5	12 09·5	11 34·4	3·0	2·4	9·0	7·3	15·0	12·1
31	12 07·8	12 09·7	11 34·6	3·1	2·5	9·1	7·4	15·1	12·2
32	12 08·0	12 10·0	11 34·8	3·2	2·6	9·2	7·4	15·2	12·3
33	12 08·3	12 10·2	11 35·1	3·3	2·7	9·3	7·5	15·3	12·4
34	12 08·5	12 10·5	11 35·3	3·4	2·7	9·4	7·6	15·4	12·4
35	12 08·8	12 10·7	11 35·6	3·5	2·8	9·5	7·7	15·5	12·5
36	12 09·0	12 11·0	11 35·8	3·6	2·9	9·6	7·8	15·6	12·6
37	12 09·3	12 11·2	11 36·0	3·7	3·0	9·7	7·8	15·7	12·7
38	12 09·5	12 11·5	11 36·3	3·8	3·1	9·8	7·9	15·8	12·8
39	12 09·8	12 11·7	11 36·5	3·9	3·2	9·9	8·0	15·9	12·9
40	12 10·0	12 12·0	11 36·7	4·0	3·2	10·0	8·1	16·0	12·9
41	12 10·3	12 12·2	11 37·0	4·1	3·3	10·1	8·2	16·1	13·0
42	12 10·5	12 12·5	11 37·2	4·2	3·4	10·2	8·2	16·2	13·1
43	12 10·8	12 12·8	11 37·5	4·3	3·5	10·3	8·3	16·3	13·2
44	12 11·0	12 13·0	11 37·7	4·4	3·6	10·4	8·4	16·4	13·3
45	12 11·3	12 13·3	11 37·9	4·5	3·6	10·5	8·5	16·5	13·3
46	12 11·5	12 13·5	11 38·2	4·6	3·7	10·6	8·6	16·6	13·4
47	12 11·8	12 13·8	11 38·4	4·7	3·8	10·7	8·6	16·7	13·5
48	12 12·0	12 14·0	11 38·7	4·8	3·9	10·8	8·7	16·8	13·6
49	12 12·3	12 14·3	11 38·9	4·9	4·0	10·9	8·8	16·9	13·7
50	12 12·5	12 14·5	11 39·1	5·0	4·0	11·0	8·9	17·0	13·7
51	12 12·8	12 14·8	11 39·4	5·1	4·1	11·1	9·0	17·1	13·8
52	12 13·0	12 15·0	11 39·6	5·2	4·2	11·2	9·1	17·2	13·9
53	12 13·3	12 15·3	11 39·8	5·3	4·3	11·3	9·1	17·3	14·0
54	12 13·5	12 15·5	11 40·1	5·4	4·4	11·4	9·2	17·4	14·1
55	12 13·8	12 15·8	11 40·3	5·5	4·4	11·5	9·3	17·5	14·1
56	12 14·0	12 16·0	11 40·6	5·6	4·5	11·6	9·4	17·6	14·2
57	12 14·3	12 16·3	11 40·8	5·7	4·6	11·7	9·5	17·7	14·3
58	12 14·5	12 16·5	11 41·0	5·8	4·7	11·8	9·5	17·8	14·4
59	12 14·8	12 16·8	11 41·3	5·9	4·8	11·9	9·6	17·9	14·5
60	12 15·0	12 17·0	11 41·5	6·0	4·9	12·0	9·7	18·0	14·6

m 49	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	12 15·0	12 17·0	11 41·5	0·0	0·0	6·0	5·0	12·0	9·9
01	12 15·3	12 17·3	11 41·8	0·1	0·1	6·1	5·0	12·1	10·0
02	12 15·5	12 17·5	11 42·0	0·2	0·2	6·2	5·1	12·2	10·1
03	12 15·8	12 17·8	11 42·2	0·3	0·2	6·3	5·2	12·3	10·1
04	12 16·0	12 18·0	11 42·5	0·4	0·3	6·4	5·3	12·4	10·2
05	12 16·3	12 18·3	11 42·7	0·5	0·4	6·5	5·4	12·5	10·3
06	12 16·5	12 18·5	11 42·9	0·6	0·5	6·6	5·4	12·6	10·4
07	12 16·8	12 18·8	11 43·2	0·7	0·6	6·7	5·5	12·7	10·5
08	12 17·0	12 19·0	11 43·4	0·8	0·7	6·8	5·6	12·8	10·6
09	12 17·3	12 19·3	11 43·7	0·9	0·7	6·9	5·7	12·9	10·6
10	12 17·5	12 19·5	11 43·9	1·0	0·8	7·0	5·8	13·0	10·7
11	12 17·8	12 19·8	11 44·1	1·1	0·9	7·1	5·9	13·1	10·8
12	12 18·0	12 20·0	11 44·4	1·2	1·0	7·2	5·9	13·2	10·9
13	12 18·3	12 20·3	11 44·6	1·3	1·1	7·3	6·0	13·3	11·0
14	12 18·5	12 20·5	11 44·9	1·4	1·2	7·4	6·1	13·4	11·1
15	12 18·8	12 20·8	11 45·1	1·5	1·2	7·5	6·2	13·5	11·1
16	12 19·0	12 21·0	11 45·3	1·6	1·3	7·6	6·3	13·6	11·2
17	12 19·3	12 21·3	11 45·6	1·7	1·4	7·7	6·4	13·7	11·3
18	12 19·5	12 21·5	11 45·8	1·8	1·5	7·8	6·4	13·8	11·4
19	12 19·8	12 21·8	11 46·1	1·9	1·6	7·9	6·5	13·9	11·5
20	12 20·0	12 22·0	11 46·3	2·0	1·7	8·0	6·6	14·0	11·6
21	12 20·3	12 22·3	11 46·5	2·1	1·7	8·1	6·7	14·1	11·6
22	12 20·5	12 22·5	11 46·8	2·2	1·8	8·2	6·8	14·2	11·7
23	12 20·8	12 22·8	11 47·0	2·3	1·9	8·3	6·8	14·3	11·8
24	12 21·0	12 23·0	11 47·2	2·4	2·0	8·4	6·9	14·4	11·9
25	12 21·3	12 23·3	11 47·5	2·5	2·1	8·5	7·0	14·5	12·0
26	12 21·5	12 23·5	11 47·7	2·6	2·1	8·6	7·1	14·6	12·0
27	12 21·8	12 23·8	11 48·0	2·7	2·2	8·7	7·2	14·7	12·1
28	12 22·0	12 24·0	11 48·2	2·8	2·3	8·8	7·3	14·8	12·2
29	12 22·3	12 24·3	11 48·4	2·9	2·4	8·9	7·3	14·9	12·3
30	12 22·5	12 24·5	11 48·7	3·0	2·5	9·0	7·4	15·0	12·4
31	12 22·8	12 24·8	11 48·9	3·1	2·6	9·1	7·5	15·1	12·5
32	12 23·0	12 25·0	11 49·2	3·2	2·6	9·2	7·6	15·2	12·5
33	12 23·3	12 25·3	11 49·4	3·3	2·7	9·3	7·7	15·3	12·6
34	12 23·5	12 25·5	11 49·6	3·4	2·8	9·4	7·8	15·4	12·7
35	12 23·8	12 25·8	11 49·9	3·5	2·9	9·5	7·8	15·5	12·8
36	12 24·0	12 26·0	11 50·1	3·6	3·0	9·6	7·9	15·6	12·9
37	12 24·3	12 26·3	11 50·3	3·7	3·1	9·7	8·0	15·7	13·0
38	12 24·5	12 26·5	11 50·6	3·8	3·1	9·8	8·1	15·8	13·0
39	12 24·8	12 26·8	11 50·8	3·9	3·2	9·9	8·2	15·9	13·1
40	12 25·0	12 27·0	11 51·1	4·0	3·3	10·0	8·3	16·0	13·2
41	12 25·3	12 27·3	11 51·3	4·1	3·4	10·1	8·3	16·1	13·3
42	12 25·5	12 27·5	11 51·5	4·2	3·5	10·2	8·4	16·2	13·4
43	12 25·8	12 27·8	11 51·8	4·3	3·5	10·3	8·5	16·3	13·4
44	12 26·0	12 28·0	11 52·0	4·4	3·6	10·4	8·6	16·4	13·5
45	12 26·3	12 28·3	11 52·3	4·5	3·7	10·5	8·7	16·5	13·6
46	12 26·5	12 28·5	11 52·5	4·6	3·8	10·6	8·7	16·6	13·7
47	12 26·8	12 28·8	11 52·7	4·7	3·9	10·7	8·8	16·7	13·8
48	12 27·0	12 29·0	11 53·0	4·8	4·0	10·8	8·9	16·8	13·9
49	12 27·3	12 29·3	11 53·2	4·9	4·0	10·9	9·0	16·9	13·9
50	12 27·5	12 29·5	11 53·4	5·0	4·1	11·0	9·1	17·0	14·0
51	12 27·8	12 29·8	11 53·7	5·1	4·2	11·1	9·2	17·1	14·1
52	12 28·0	12 30·0	11 53·9	5·2	4·3	11·2	9·2	17·2	14·2
53	12 28·3	12 30·3	11 54·2	5·3	4·4	11·3	9·3	17·3	14·3
54	12 28·5	12 30·5	11 54·4	5·4	4·5	11·4	9·4	17·4	14·4
55	12 28·8	12 30·8	11 54·6	5·5	4·5	11·5	9·5	17·5	14·4
56	12 29·0	12 31·1	11 54·9	5·6	4·6	11·6	9·6	17·6	14·5
57	12 29·3	12 31·3	11 55·1	5·7	4·7	11·7	9·7	17·7	14·6
58	12 29·5	12 31·6	11 55·4	5·8	4·8	11·8	9·7	17·8	14·7
59	12 29·8	12 31·8	11 55·6	5·9	4·9	11·9	9·8	17·9	14·8
60	12 30·0	12 32·1	11 55·8	6·0	5·0	12·0	9·9	18·0	14·9

m 50	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	12 30·0	12 32·1	11 55·8	0·0	0·0	6·0	5·1	12·0	10·1
01	12 30·3	12 32·3	11 56·1	0·1	0·1	6·1	5·1	12·1	10·2
02	12 30·5	12 32·6	11 56·3	0·2	0·2	6·2	5·2	12·2	10·3
03	12 30·8	12 32·8	11 56·5	0·3	0·3	6·3	5·3	12·3	10·4
04	12 31·0	12 33·1	11 56·8	0·4	0·3	6·4	5·4	12·4	10·4
05	12 31·3	12 33·3	11 57·0	0·5	0·4	6·5	5·5	12·5	10·5
06	12 31·5	12 33·6	11 57·3	0·6	0·5	6·6	5·6	12·6	10·6
07	12 31·8	12 33·8	11 57·5	0·7	0·6	6·7	5·6	12·7	10·7
08	12 32·0	12 34·1	11 57·7	0·8	0·7	6·8	5·7	12·8	10·8
09	12 32·3	12 34·3	11 58·0	0·9	0·8	6·9	5·8	12·9	10·9
10	12 32·5	12 34·6	11 58·2	1·0	0·8	7·0	5·9	13·0	10·9
11	12 32·8	12 34·8	11 58·5	1·1	0·9	7·1	6·0	13·1	11·0
12	12 33·0	12 35·1	11 58·7	1·2	1·0	7·2	6·1	13·2	11·1
13	12 33·3	12 35·3	11 58·9	1·3	1·1	7·3	6·1	13·3	11·2
14	12 33·5	12 35·6	11 59·2	1·4	1·2	7·4	6·2	13·4	11·3
15	12 33·8	12 35·8	11 59·4	1·5	1·3	7·5	6·3	13·5	11·4
16	12 34·0	12 36·1	11 59·7	1·6	1·3	7·6	6·4	13·6	11·4
17	12 34·3	12 36·3	11 59·9	1·7	1·4	7·7	6·5	13·7	11·5
18	12 34·5	12 36·6	12 00·1	1·8	1·5	7·8	6·6	13·8	11·6
19	12 34·8	12 36·8	12 00·4	1·9	1·6	7·9	6·6	13·9	11·7
20	12 35·0	12 37·1	12 00·6	2·0	1·7	8·0	6·7	14·0	11·8
21	12 35·3	12 37·3	12 00·8	2·1	1·8	8·1	6·8	14·1	11·9
22	12 35·5	12 37·6	12 01·1	2·2	1·9	8·2	6·9	14·2	12·0
23	12 35·8	12 37·8	12 01·3	2·3	1·9	8·3	7·0	14·3	12·0
24	12 36·0	12 38·1	12 01·6	2·4	2·0	8·4	7·1	14·4	12·1
25	12 36·3	12 38·3	12 01·8	2·5	2·1	8·5	7·2	14·5	12·2
26	12 36·5	12 38·6	12 02·0	2·6	2·2	8·6	7·2	14·6	12·3
27	12 36·8	12 38·8	12 02·3	2·7	2·3	8·7	7·3	14·7	12·4
28	12 37·0	12 39·1	12 02·5	2·8	2·4	8·8	7·4	14·8	12·5
29	12 37·3	12 39·3	12 02·8	2·9	2·4	8·9	7·5	14·9	12·5
30	12 37·5	12 39·6	12 03·0	3·0	2·5	9·0	7·6	15·0	12·6
31	12 37·8	12 39·8	12 03·2	3·1	2·6	9·1	7·7	15·1	12·7
32	12 38·0	12 40·1	12 03·5	3·2	2·7	9·2	7·7	15·2	12·8
33	12 38·3	12 40·3	12 03·7	3·3	2·8	9·3	7·8	15·3	12·9
34	12 38·5	12 40·6	12 03·9	3·4	2·9	9·4	7·9	15·4	13·0
35	12 38·8	12 40·8	12 04·2	3·5	2·9	9·5	8·0	15·5	13·0
36	12 39·0	12 41·1	12 04·4	3·6	3·0	9·6	8·1	15·6	13·1
37	12 39·3	12 41·3	12 04·7	3·7	3·1	9·7	8·2	15·7	13·2
38	12 39·5	12 41·6	12 04·9	3·8	3·2	9·8	8·2	15·8	13·3
39	12 39·8	12 41·8	12 05·1	3·9	3·3	9·9	8·3	15·9	13·4
40	12 40·0	12 42·1	12 05·4	4·0	3·4	10·0	8·4	16·0	13·5
41	12 40·3	12 42·3	12 05·6	4·1	3·5	10·1	8·5	16·1	13·6
42	12 40·5	12 42·6	12 05·9	4·2	3·5	10·2	8·6	16·2	13·6
43	12 40·8	12 42·8	12 06·1	4·3	3·6	10·3	8·7	16·3	13·7
44	12 41·0	12 43·1	12 06·3	4·4	3·7	10·4	8·8	16·4	13·8
45	12 41·3	12 43·3	12 06·6	4·5	3·8	10·5	8·8	16·5	13·9
46	12 41·5	12 43·6	12 06·8	4·6	3·9	10·6	8·9	16·6	14·0
47	12 41·8	12 43·8	12 07·0	4·7	4·0	10·7	9·0	16·7	14·1
48	12 42·0	12 44·1	12 07·3	4·8	4·0	10·8	9·1	16·8	14·1
49	12 42·3	12 44·3	12 07·5	4·9	4·1	10·9	9·2	16·9	14·2
50	12 42·5	12 44·6	12 07·8	5·0	4·2	11·0	9·3	17·0	14·3
51	12 42·8	12 44·8	12 08·0	5·1	4·3	11·1	9·3	17·1	14·4
52	12 43·0	12 45·1	12 08·2	5·2	4·4	11·2	9·4	17·2	14·5
53	12 43·3	12 45·3	12 08·5	5·3	4·5	11·3	9·5	17·3	14·6
54	12 43·5	12 45·6	12 08·7	5·4	4·5	11·4	9·6	17·4	14·6
55	12 43·8	12 45·8	12 09·0	5·5	4·6	11·5	9·7	17·5	14·7
56	12 44·0	12 46·1	12 09·2	5·6	4·7	11·6	9·8	17·6	14·8
57	12 44·3	12 46·3	12 09·4	5·7	4·8	11·7	9·8	17·7	14·9
58	12 44·5	12 46·6	12 09·7	5·8	4·9	11·8	9·9	17·8	15·0
59	12 44·8	12 46·8	12 09·9	5·9	5·0	11·9	10·0	17·9	15·1
60	12 45·0	12 47·1	12 10·2	6·0	5·1	12·0	10·1	18·0	15·2

m 51	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	12 45·0	12 47·1	12 10·2	0·0	0·0	6·0	5·2	12·0	10·3
01	12 45·3	12 47·3	12 10·4	0·1	0·1	6·1	5·2	12·1	10·4
02	12 45·5	12 47·6	12 10·6	0·2	0·2	6·2	5·3	12·2	10·5
03	12 45·8	12 47·8	12 10·9	0·3	0·3	6·3	5·4	12·3	10·6
04	12 46·0	12 48·1	12 11·1	0·4	0·3	6·4	5·5	12·4	10·6
05	12 46·3	12 48·3	12 11·3	0·5	0·4	6·5	5·6	12·5	10·7
06	12 46·5	12 48·6	12 11·6	0·6	0·5	6·6	5·7	12·6	10·8
07	12 46·8	12 48·8	12 11·8	0·7	0·6	6·7	5·8	12·7	10·9
08	12 47·0	12 49·1	12 12·1	0·8	0·7	6·8	5·8	12·8	11·0
09	12 47·3	12 49·4	12 12·3	0·9	0·8	6·9	5·9	12·9	11·1
10	12 47·5	12 49·6	12 12·5	1·0	0·9	7·0	6·0	13·0	11·2
11	12 47·8	12 49·9	12 12·8	1·1	0·9	7·1	6·1	13·1	11·2
12	12 48·0	12 50·1	12 13·0	1·2	1·0	7·2	6·2	13·2	11·3
13	12 48·3	12 50·4	12 13·3	1·3	1·1	7·3	6·3	13·3	11·4
14	12 48·5	12 50·6	12 13·5	1·4	1·2	7·4	6·4	13·4	11·5
15	12 48·8	12 50·9	12 13·7	1·5	1·3	7·5	6·4	13·5	11·6
16	12 49·0	12 51·1	12 14·0	1·6	1·4	7·6	6·5	13·6	11·7
17	12 49·3	12 51·4	12 14·2	1·7	1·5	7·7	6·6	13·7	11·8
18	12 49·5	12 51·6	12 14·4	1·8	1·5	7·8	6·7	13·8	11·8
19	12 49·8	12 51·9	12 14·7	1·9	1·6	7·9	6·8	13·9	11·9
20	12 50·0	12 52·1	12 14·9	2·0	1·7	8·0	6·9	14·0	12·0
21	12 50·3	12 52·4	12 15·2	2·1	1·8	8·1	7·0	14·1	12·1
22	12 50·5	12 52·6	12 15·4	2·2	1·9	8·2	7·0	14·2	12·2
23	12 50·8	12 52·9	12 15·6	2·3	2·0	8·3	7·1	14·3	12·3
24	12 51·0	12 53·1	12 15·9	2·4	2·1	8·4	7·2	14·4	12·4
25	12 51·3	12 53·4	12 16·1	2·5	2·1	8·5	7·3	14·5	12·4
26	12 51·5	12 53·6	12 16·4	2·6	2·2	8·6	7·4	14·6	12·5
27	12 51·8	12 53·9	12 16·6	2·7	2·3	8·7	7·5	14·7	12·6
28	12 52·0	12 54·1	12 16·8	2·8	2·4	8·8	7·6	14·8	12·7
29	12 52·3	12 54·4	12 17·1	2·9	2·5	8·9	7·6	14·9	12·8
30	12 52·5	12 54·6	12 17·3	3·0	2·6	9·0	7·7	15·0	12·9
31	12 52·8	12 54·9	12 17·5	3·1	2·7	9·1	7·8	15·1	13·0
32	12 53·0	12 55·1	12 17·8	3·2	2·7	9·2	7·9	15·2	13·0
33	12 53·3	12 55·4	12 18·0	3·3	2·8	9·3	8·0	15·3	13·1
34	12 53·5	12 55·6	12 18·3	3·4	2·9	9·4	8·1	15·4	13·2
35	12 53·8	12 55·9	12 18·5	3·5	3·0	9·5	8·2	15·5	13·3
36	12 54·0	12 56·1	12 18·7	3·6	3·1	9·6	8·2	15·6	13·4
37	12 54·3	12 56·4	12 19·0	3·7	3·2	9·7	8·3	15·7	13·5
38	12 54·5	12 56·6	12 19·2	3·8	3·3	9·8	8·4	15·8	13·6
39	12 54·8	12 56·9	12 19·5	3·9	3·3	9·9	8·5	15·9	13·6
40	12 55·0	12 57·1	12 19·7	4·0	3·4	10·0	8·6	16·0	13·7
41	12 55·3	12 57·4	12 19·9	4·1	3·5	10·1	8·7	16·1	13·8
42	12 55·5	12 57·6	12 20·2	4·2	3·6	10·2	8·8	16·2	13·9
43	12 55·8	12 57·9	12 20·4	4·3	3·7	10·3	8·8	16·3	14·0
44	12 56·0	12 58·1	12 20·6	4·4	3·8	10·4	8·9	16·4	14·1
45	12 56·3	12 58·4	12 20·9	4·5	3·9	10·5	9·0	16·5	14·2
46	12 56·5	12 58·6	12 21·1	4·6	3·9	10·6	9·1	16·6	14·2
47	12 56·8	12 58·9	12 21·4	4·7	4·0	10·7	9·2	16·7	14·3
48	12 57·0	12 59·1	12 21·6	4·8	4·1	10·8	9·3	16·8	14·4
49	12 57·3	12 59·4	12 21·8	4·9	4·2	10·9	9·4	16·9	14·5
50	12 57·5	12 59·6	12 22·1	5·0	4·3	11·0	9·4	17·0	14·6
51	12 57·8	12 59·9	12 22·3	5·1	4·4	11·1	9·5	17·1	14·7
52	12 58·0	13 00·1	12 22·6	5·2	4·5	11·2	9·6	17·2	14·8
53	12 58·3	13 00·4	12 22·8	5·3	4·5	11·3	9·7	17·3	14·8
54	12 58·5	13 00·6	12 23·0	5·4	4·6	11·4	9·8	17·4	14·9
55	12 58·8	13 00·9	12 23·3	5·5	4·7	11·5	9·9	17·5	15·0
56	12 59·0	13 01·1	12 23·5	5·6	4·8	11·6	10·0	17·6	15·1
57	12 59·3	13 01·4	12 23·8	5·7	4·9	11·7	10·0	17·7	15·2
58	12 59·5	13 01·6	12 24·0	5·8	5·0	11·8	10·1	17·8	15·3
59	12 59·8	13 01·9	12 24·2	5·9	5·1	11·9	10·2	17·9	15·4
60	13 00·0	13 02·1	12 24·5	6·0	5·2	12·0	10·3	18·0	15·5

m 52 s	SUN PLANETS	ARIES	MOON	v or d	Corr n	v or d	Corr n	v or d	Corr n
	° ′	° ′	° ′	′	′	′	′	′	′
00	13 00·0	13 02·1	12 24·5	0·0	0·0	6·0	5·3	12·0	10·5
01	13 00·3	13 02·4	12 24·7	0·1	0·1	6·1	5·3	12·1	10·6
02	13 00·5	13 02·6	12 24·9	0·2	0·2	6·2	5·4	12·2	10·7
03	13 00·8	13 02·9	12 25·2	0·3	0·3	6·3	5·5	12·3	10·8
04	13 01·0	13 03·1	12 25·4	0·4	0·4	6·4	5·6	12·4	10·9
05	13 01·3	13 03·4	12 25·7	0·5	0·4	6·5	5·7	12·5	10·9
06	13 01·5	13 03·6	12 25·9	0·6	0·5	6·6	5·8	12·6	11·0
07	13 01·8	13 03·9	12 26·1	0·7	0·6	6·7	5·9	12·7	11·1
08	13 02·0	13 04·1	12 26·4	0·8	0·7	6·8	6·0	12·8	11·2
09	13 02·3	13 04·4	12 26·6	0·9	0·8	6·9	6·0	12·9	11·3
10	13 02·5	13 04·6	12 26·9	1·0	0·9	7·0	6·1	13·0	11·4
11	13 02·8	13 04·9	12 27·1	1·1	1·0	7·1	6·2	13·1	11·5
12	13 03·0	13 05·1	12 27·3	1·2	1·1	7·2	6·3	13·2	11·6
13	13 03·3	13 05·4	12 27·6	1·3	1·1	7·3	6·4	13·3	11·6
14	13 03·5	13 05·6	12 27·8	1·4	1·2	7·4	6·5	13·4	11·7
15	13 03·8	13 05·9	12 28·0	1·5	1·3	7·5	6·6	13·5	11·8
16	13 04·0	13 06·1	12 28·3	1·6	1·4	7·6	6·7	13·6	11·9
17	13 04·3	13 06·4	12 28·5	1·7	1·5	7·7	6·7	13·7	12·0
18	13 04·5	13 06·6	12 28·8	1·8	1·6	7·8	6·8	13·8	12·1
19	13 04·8	13 06·9	12 29·0	1·9	1·7	7·9	6·9	13·9	12·2
20	13 05·0	13 07·1	12 29·2	2·0	1·8	8·0	7·0	14·0	12·3
21	13 05·3	13 07·4	12 29·5	2·1	1·8	8·1	7·1	14·1	12·3
22	13 05·5	13 07·7	12 29·7	2·2	1·9	8·2	7·2	14·2	12·4
23	13 05·8	13 07·9	12 30·0	2·3	2·0	8·3	7·3	14·3	12·5
24	13 06·0	13 08·2	12 30·2	2·4	2·1	8·4	7·4	14·4	12·6
25	13 06·3	13 08·4	12 30·4	2·5	2·2	8·5	7·4	14·5	12·7
26	13 06·5	13 08·7	12 30·7	2·6	2·3	8·6	7·5	14·6	12·8
27	13 06·8	13 08·9	12 30·9	2·7	2·4	8·7	7·6	14·7	12·9
28	13 07·0	13 09·2	12 31·1	2·8	2·5	8·8	7·7	14·8	13·0
29	13 07·3	13 09·4	12 31·4	2·9	2·5	8·9	7·8	14·9	13·0
30	13 07·5	13 09·7	12 31·6	3·0	2·6	9·0	7·9	15·0	13·1
31	13 07·8	13 09·9	12 31·9	3·1	2·7	9·1	8·0	15·1	13·2
32	13 08·0	13 10·2	12 32·1	3·2	2·8	9·2	8·0	15·2	13·3
33	13 08·3	13 10·4	12 32·3	3·3	2·9	9·3	8·1	15·3	13·4
34	13 08·5	13 10·7	12 32·6	3·4	3·0	9·4	8·2	15·4	13·5
35	13 08·8	13 10·9	12 32·8	3·5	3·1	9·5	8·3	15·5	13·6
36	13 09·0	13 11·2	12 33·1	3·6	3·2	9·6	8·4	15·6	13·7
37	13 09·3	13 11·4	12 33·3	3·7	3·2	9·7	8·5	15·7	13·7
38	13 09·5	13 11·7	12 33·5	3·8	3·3	9·8	8·6	15·8	13·8
39	13 09·8	13 11·9	12 33·8	3·9	3·4	9·9	8·7	15·9	13·9
40	13 10·0	13 12·2	12 34·0	4·0	3·5	10·0	8·8	16·0	14·0
41	13 10·3	13 12·4	12 34·2	4·1	3·6	10·1	8·8	16·1	14·1
42	13 10·5	13 12·7	12 34·5	4·2	3·7	10·2	8·9	16·2	14·2
43	13 10·8	13 12·9	12 34·7	4·3	3·8	10·3	9·0	16·3	14·3
44	13 11·0	13 13·2	12 35·0	4·4	3·9	10·4	9·1	16·4	14·3
45	13 11·3	13 13·4	12 35·2	4·5	3·9	10·5	9·2	16·5	14·4
46	13 11·5	13 13·7	12 35·4	4·6	4·0	10·6	9·3	16·6	14·5
47	13 11·8	13 13·9	12 35·7	4·7	4·1	10·7	9·4	16·7	14·6
48	13 12·0	13 14·2	12 35·9	4·8	4·2	10·8	9·5	16·8	14·7
49	13 12·3	13 14·4	12 36·2	4·9	4·3	10·9	9·5	16·9	14·8
50	13 12·5	13 14·7	12 36·4	5·0	4·4	11·0	9·6	17·0	14·9
51	13 12·8	13 14·9	12 36·6	5·1	4·5	11·1	9·7	17·1	15·0
52	13 13·0	13 15·2	12 36·9	5·2	4·6	11·2	9·8	17·2	15·1
53	13 13·3	13 15·4	12 37·1	5·3	4·6	11·3	9·9	17·3	15·1
54	13 13·5	13 15·7	12 37·4	5·4	4·7	11·4	10·0	17·4	15·2
55	13 13·8	13 15·9	12 37·6	5·5	4·8	11·5	10·1	17·5	15·3
56	13 14·0	13 16·2	12 37·8	5·6	4·9	11·6	10·2	17·6	15·4
57	13 14·3	13 16·4	12 38·1	5·7	5·0	11·7	10·2	17·7	15·5
58	13 14·5	13 16·7	12 38·3	5·8	5·1	11·8	10·3	17·8	15·6
59	13 14·8	13 16·9	12 38·5	5·9	5·2	11·9	10·4	17·9	15·7
60	13 15·0	13 17·2	12 38·8	6·0	5·3	12·0	10·5	18·0	15·8

m 53 s	SUN PLANETS	ARIES	MOON	v or d	Corr n	v or d	Corr n	v or d	Corr n
	° ′	° ′	° ′	′	′	′	′	′	′
00	13 15·0	13 17·2	12 38·8	0·0	0·0	6·0	5·4	12·0	10·7
01	13 15·3	13 17·4	12 39·0	0·1	0·1	6·1	5·4	12·1	10·8
02	13 15·5	13 17·7	12 39·3	0·2	0·2	6·2	5·5	12·2	10·9
03	13 15·8	13 17·9	12 39·5	0·3	0·3	6·3	5·6	12·3	11·0
04	13 16·0	13 18·2	12 39·7	0·4	0·4	6·4	5·7	12·4	11·1
05	13 16·3	13 18·4	12 40·0	0·5	0·4	6·5	5·8	12·5	11·1
06	13 16·5	13 18·7	12 40·2	0·6	0·5	6·6	5·9	12·6	11·2
07	13 16·8	13 18·9	12 40·5	0·7	0·6	6·7	6·0	12·7	11·3
08	13 17·0	13 19·2	12 40·7	0·8	0·7	6·8	6·1	12·8	11·4
09	13 17·3	13 19·4	12 40·9	0·9	0·8	6·9	6·2	12·9	11·5
10	13 17·5	13 19·7	12 41·2	1·0	0·9	7·0	6·2	13·0	11·6
11	13 17·8	13 19·9	12 41·4	1·1	1·0	7·1	6·3	13·1	11·7
12	13 18·0	13 20·2	12 41·6	1·2	1·1	7·2	6·4	13·2	11·8
13	13 18·3	13 20·4	12 41·9	1·3	1·2	7·3	6·5	13·3	11·9
14	13 18·5	13 20·7	12 42·1	1·4	1·2	7·4	6·6	13·4	11·9
15	13 18·8	13 20·9	12 42·4	1·5	1·3	7·5	6·7	13·5	12·0
16	13 19·0	13 21·2	12 42·6	1·6	1·4	7·6	6·8	13·6	12·1
17	13 19·3	13 21·4	12 42·8	1·7	1·5	7·7	6·9	13·7	12·2
18	13 19·5	13 21·7	12 43·1	1·8	1·6	7·8	7·0	13·8	12·3
19	13 19·8	13 21·9	12 43·3	1·9	1·7	7·9	7·0	13·9	12·4
20	13 20·0	13 22·2	12 43·6	2·0	1·8	8·0	7·1	14·0	12·5
21	13 20·3	13 22·4	12 43·8	2·1	1·9	8·1	7·2	14·1	12·6
22	13 20·5	13 22·7	12 44·0	2·2	2·0	8·2	7·3	14·2	12·7
23	13 20·8	13 22·9	12 44·3	2·3	2·1	8·3	7·4	14·3	12·8
24	13 21·0	13 23·2	12 44·5	2·4	2·1	8·4	7·5	14·4	12·8
25	13 21·3	13 23·4	12 44·7	2·5	2·2	8·5	7·6	14·5	12·9
26	13 21·5	13 23·7	12 45·0	2·6	2·3	8·6	7·7	14·6	13·0
27	13 21·8	13 23·9	12 45·2	2·7	2·4	8·7	7·8	14·7	13·1
28	13 22·0	13 24·2	12 45·5	2·8	2·5	8·8	7·8	14·8	13·2
29	13 22·3	13 24·4	12 45·7	2·9	2·6	8·9	7·9	14·9	13·3
30	13 22·5	13 24·7	12 45·9	3·0	2·7	9·0	8·0	15·0	13·4
31	13 22·8	13 24·9	12 46·2	3·1	2·8	9·1	8·1	15·1	13·5
32	13 23·0	13 25·2	12 46·4	3·2	2·9	9·2	8·2	15·2	13·6
33	13 23·3	13 25·4	12 46·7	3·3	2·9	9·3	8·3	15·3	13·6
34	13 23·5	13 25·7	12 46·9	3·4	3·0	9·4	8·4	15·4	13·7
35	13 23·8	13 26·0	12 47·1	3·5	3·1	9·5	8·5	15·5	13·8
36	13 24·0	13 26·2	12 47·4	3·6	3·2	9·6	8·6	15·6	13·9
37	13 24·3	13 26·5	12 47·6	3·7	3·3	9·7	8·6	15·7	14·0
38	13 24·5	13 26·7	12 47·9	3·8	3·4	9·8	8·7	15·8	14·1
39	13 24·8	13 27·0	12 48·1	3·9	3·5	9·9	8·8	15·9	14·2
40	13 25·0	13 27·2	12 48·3	4·0	3·6	10·0	8·9	16·0	14·3
41	13 25·3	13 27·5	12 48·6	4·1	3·7	10·1	9·0	16·1	14·4
42	13 25·5	13 27·7	12 48·8	4·2	3·7	10·2	9·1	16·2	14·4
43	13 25·8	13 28·0	12 49·0	4·3	3·8	10·3	9·2	16·3	14·5
44	13 26·0	13 28·2	12 49·3	4·4	3·9	10·4	9·3	16·4	14·6
45	13 26·3	13 28·5	12 49·5	4·5	4·0	10·5	9·4	16·5	14·7
46	13 26·5	13 28·7	12 49·8	4·6	4·1	10·6	9·5	16·6	14·8
47	13 26·8	13 29·0	12 50·0	4·7	4·2	10·7	9·5	16·7	14·9
48	13 27·0	13 29·2	12 50·2	4·8	4·3	10·8	9·6	16·8	15·0
49	13 27·3	13 29·5	12 50·5	4·9	4·4	10·9	9·7	16·9	15·1
50	13 27·5	13 29·7	12 50·7	5·0	4·5	11·0	9·8	17·0	15·2
51	13 27·8	13 30·0	12 51·0	5·1	4·5	11·1	9·9	17·1	15·2
52	13 28·0	13 30·2	12 51·2	5·2	4·6	11·2	10·0	17·2	15·3
53	13 28·3	13 30·5	12 51·4	5·3	4·7	11·3	10·1	17·3	15·4
54	13 28·5	13 30·7	12 51·7	5·4	4·8	11·4	10·2	17·4	15·5
55	13 28·8	13 31·0	12 51·9	5·5	4·9	11·5	10·3	17·5	15·6
56	13 29·0	13 31·2	12 52·1	5·6	5·0	11·6	10·3	17·6	15·7
57	13 29·3	13 31·5	12 52·4	5·7	5·1	11·7	10·4	17·7	15·8
58	13 29·5	13 31·7	12 52·6	5·8	5·2	11·8	10·5	17·8	15·9
59	13 29·8	13 32·0	12 52·9	5·9	5·3	11·9	10·6	17·9	16·0
60	13 30·0	13 32·2	12 53·1	6·0	5·4	12·0	10·7	18·0	16·1

54m INCREMENTS AND CORRECTIONS 55m

54m	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	13 30·0	13 32·2	12 53·1	0·0	0·0	6·0	5·5	12·0	10·9
01	13 30·3	13 32·5	12 53·3	0·1	0·1	6·1	5·5	12·1	11·0
02	13 30·5	13 32·7	12 53·6	0·2	0·2	6·2	5·6	12·2	11·1
03	13 30·8	13 33·0	12 53·8	0·3	0·3	6·3	5·7	12·3	11·2
04	13 31·0	13 33·2	12 54·1	0·4	0·4	6·4	5·8	12·4	11·3
05	13 31·3	13 33·5	12 54·3	0·5	0·5	6·5	5·9	12·5	11·4
06	13 31·5	13 33·7	12 54·5	0·6	0·5	6·6	6·0	12·6	11·4
07	13 31·8	13 34·0	12 54·8	0·7	0·6	6·7	6·1	12·7	11·5
08	13 32·0	13 34·2	12 55·0	0·8	0·7	6·8	6·2	12·8	11·6
09	13 32·3	13 34·5	12 55·2	0·9	0·8	6·9	6·3	12·9	11·7
10	13 32·5	13 34·7	12 55·5	1·0	0·9	7·0	6·4	13·0	11·8
11	13 32·8	13 35·0	12 55·7	1·1	1·0	7·1	6·4	13·1	11·9
12	13 33·0	13 35·2	12 56·0	1·2	1·1	7·2	6·5	13·2	12·0
13	13 33·3	13 35·5	12 56·2	1·3	1·2	7·3	6·6	13·3	12·1
14	13 33·5	13 35·7	12 56·4	1·4	1·3	7·4	6·7	13·4	12·2
15	13 33·8	13 36·0	12 56·7	1·5	1·4	7·5	6·8	13·5	12·3
16	13 34·0	13 36·2	12 56·9	1·6	1·5	7·6	6·9	13·6	12·4
17	13 34·3	13 36·5	12 57·2	1·7	1·5	7·7	7·0	13·7	12·4
18	13 34·5	13 36·7	12 57·4	1·8	1·6	7·8	7·1	13·8	12·5
19	13 34·8	13 37·0	12 57·6	1·9	1·7	7·9	7·2	13·9	12·6
20	13 35·0	13 37·2	12 57·9	2·0	1·8	8·0	7·3	14·0	12·7
21	13 35·3	13 37·5	12 58·1	2·1	1·9	8·1	7·4	14·1	12·8
22	13 35·5	13 37·7	12 58·3	2·2	2·0	8·2	7·4	14·2	12·9
23	13 35·8	13 38·0	12 58·6	2·3	2·1	8·3	7·5	14·3	13·0
24	13 36·0	13 38·2	12 58·8	2·4	2·2	8·4	7·6	14·4	13·1
25	13 36·3	13 38·5	12 59·1	2·5	2·3	8·5	7·7	14·5	13·2
26	13 36·5	13 38·7	12 59·3	2·6	2·4	8·6	7·8	14·6	13·3
27	13 36·8	13 39·0	12 59·5	2·7	2·5	8·7	7·9	14·7	13·4
28	13 37·0	13 39·2	12 59·8	2·8	2·5	8·8	8·0	14·8	13·4
29	13 37·3	13 39·5	13 00·0	2·9	2·6	8·9	8·1	14·9	13·5
30	13 37·5	13 39·7	13 00·3	3·0	2·7	9·0	8·2	15·0	13·6
31	13 37·8	13 40·0	13 00·5	3·1	2·8	9·1	8·3	15·1	13·7
32	13 38·0	13 40·2	13 00·7	3·2	2·9	9·2	8·4	15·2	13·8
33	13 38·3	13 40·5	13 01·0	3·3	3·0	9·3	8·4	15·3	13·9
34	13 38·5	13 40·7	13 01·2	3·4	3·1	9·4	8·5	15·4	14·0
35	13 38·8	13 41·0	13 01·5	3·5	3·2	9·5	8·6	15·5	14·1
36	13 39·0	13 41·2	13 01·7	3·6	3·3	9·6	8·7	15·6	14·2
37	13 39·3	13 41·5	13 01·9	3·7	3·4	9·7	8·8	15·7	14·3
38	13 39·5	13 41·7	13 02·2	3·8	3·5	9·8	8·9	15·8	14·4
39	13 39·8	13 42·0	13 02·4	3·9	3·5	9·9	9·0	15·9	14·4
40	13 40·0	13 42·2	13 02·6	4·0	3·6	10·0	9·1	16·0	14·5
41	13 40·3	13 42·5	13 02·9	4·1	3·7	10·1	9·2	16·1	14·6
42	13 40·5	13 42·7	13 03·1	4·2	3·8	10·2	9·3	16·2	14·7
43	13 40·8	13 43·0	13 03·4	4·3	3·9	10·3	9·4	16·3	14·8
44	13 41·0	13 43·2	13 03·6	4·4	4·0	10·4	9·4	16·4	14·9
45	13 41·3	13 43·5	13 03·8	4·5	4·1	10·5	9·5	16·5	15·0
46	13 41·5	13 43·7	13 04·1	4·6	4·2	10·6	9·6	16·6	15·1
47	13 41·8	13 44·0	13 04·3	4·7	4·3	10·7	9·7	16·7	15·2
48	13 42·0	13 44·3	13 04·6	4·8	4·4	10·8	9·8	16·8	15·3
49	13 42·3	13 44·5	13 04·8	4·9	4·5	10·9	9·9	16·9	15·4
50	13 42·5	13 44·8	13 05·0	5·0	4·5	11·0	10·0	17·0	15·4
51	13 42·8	13 45·0	13 05·3	5·1	4·6	11·1	10·1	17·1	15·5
52	13 43·0	13 45·3	13 05·5	5·2	4·7	11·2	10·2	17·2	15·6
53	13 43·3	13 45·5	13 05·7	5·3	4·8	11·3	10·3	17·3	15·7
54	13 43·5	13 45·8	13 06·0	5·4	4·9	11·4	10·4	17·4	15·8
55	13 43·8	13 46·0	13 06·2	5·5	5·0	11·5	10·4	17·5	15·9
56	13 44·0	13 46·3	13 06·5	5·6	5·1	11·6	10·5	17·6	16·0
57	13 44·3	13 46·5	13 06·7	5·7	5·2	11·7	10·6	17·7	16·1
58	13 44·5	13 46·8	13 06·9	5·8	5·3	11·8	10·7	17·8	16·2
59	13 44·8	13 47·0	13 07·2	5·9	5·4	11·9	10·8	17·9	16·3
60	13 45·0	13 47·3	13 07·4	6·0	5·5	12·0	10·9	18·0	16·4

55m	SUN PLANETS	ARIES	MOON	v or d	Corr^n	v or d	Corr^n	v or d	Corr^n
s	° ′	° ′	° ′	′	′	′	′	′	′
00	13 45·0	13 47·3	13 07·4	0·0	0·0	6·0	5·6	12·0	11·1
01	13 45·3	13 47·5	13 07·7	0·1	0·1	6·1	5·6	12·1	11·2
02	13 45·5	13 47·8	13 07·9	0·2	0·2	6·2	5·7	12·2	11·3
03	13 45·8	13 48·0	13 08·1	0·3	0·3	6·3	5·8	12·3	11·4
04	13 46·0	13 48·3	13 08·4	0·4	0·4	6·4	5·9	12·4	11·5
05	13 46·3	13 48·5	13 08·6	0·5	0·5	6·5	6·0	12·5	11·6
06	13 46·5	13 48·8	13 08·8	0·6	0·6	6·6	6·1	12·6	11·7
07	13 46·8	13 49·0	13 09·1	0·7	0·6	6·7	6·2	12·7	11·7
08	13 47·0	13 49·3	13 09·3	0·8	0·7	6·8	6·3	12·8	11·8
09	13 47·3	13 49·5	13 09·6	0·9	0·8	6·9	6·4	12·9	11·9
10	13 47·5	13 49·8	13 09·8	1·0	0·9	7·0	6·5	13·0	12·0
11	13 47·8	13 50·0	13 10·0	1·1	1·0	7·1	6·6	13·1	12·1
12	13 48·0	13 50·3	13 10·3	1·2	1·1	7·2	6·7	13·2	12·2
13	13 48·3	13 50·5	13 10·5	1·3	1·2	7·3	6·8	13·3	12·3
14	13 48·5	13 50·8	13 10·8	1·4	1·3	7·4	6·8	13·4	12·4
15	13 48·8	13 51·0	13 11·0	1·5	1·4	7·5	6·9	13·5	12·5
16	13 49·0	13 51·3	13 11·2	1·6	1·5	7·6	7·0	13·6	12·6
17	13 49·3	13 51·5	13 11·5	1·7	1·6	7·7	7·1	13·7	12·7
18	13 49·5	13 51·8	13 11·7	1·8	1·7	7·8	7·2	13·8	12·8
19	13 49·8	13 52·0	13 12·0	1·9	1·8	7·9	7·3	13·9	12·9
20	13 50·0	13 52·3	13 12·2	2·0	1·9	8·0	7·4	14·0	13·0
21	13 50·3	13 52·5	13 12·4	2·1	1·9	8·1	7·5	14·1	13·0
22	13 50·5	13 52·8	13 12·7	2·2	2·0	8·2	7·6	14·2	13·1
23	13 50·8	13 53·0	13 12·9	2·3	2·1	8·3	7·7	14·3	13·2
24	13 51·0	13 53·3	13 13·1	2·4	2·2	8·4	7·8	14·4	13·3
25	13 51·3	13 53·5	13 13·4	2·5	2·3	8·5	7·9	14·5	13·4
26	13 51·5	13 53·8	13 13·6	2·6	2·4	8·6	8·0	14·6	13·5
27	13 51·8	13 54·0	13 13·9	2·7	2·5	8·7	8·0	14·7	13·6
28	13 52·0	13 54·3	13 14·1	2·8	2·6	8·8	8·1	14·8	13·7
29	13 52·3	13 54·5	13 14·3	2·9	2·7	8·9	8·2	14·9	13·8
30	13 52·5	13 54·8	13 14·6	3·0	2·8	9·0	8·3	15·0	13·9
31	13 52·8	13 55·0	13 14·8	3·1	2·9	9·1	8·4	15·1	14·0
32	13 53·0	13 55·3	13 15·1	3·2	3·0	9·2	8·5	15·2	14·1
33	13 53·3	13 55·5	13 15·3	3·3	3·1	9·3	8·6	15·3	14·2
34	13 53·5	13 55·8	13 15·5	3·4	3·1	9·4	8·7	15·4	14·2
35	13 53·8	13 56·0	13 15·8	3·5	3·2	9·5	8·8	15·5	14·3
36	13 54·0	13 56·3	13 16·0	3·6	3·3	9·6	8·9	15·6	14·4
37	13 54·3	13 56·5	13 16·2	3·7	3·4	9·7	9·0	15·7	14·5
38	13 54·5	13 56·8	13 16·5	3·8	3·5	9·8	9·1	15·8	14·6
39	13 54·8	13 57·0	13 16·7	3·9	3·6	9·9	9·2	15·9	14·7
40	13 55·0	13 57·3	13 17·0	4·0	3·7	10·0	9·3	16·0	14·8
41	13 55·3	13 57·5	13 17·2	4·1	3·8	10·1	9·3	16·1	14·9
42	13 55·5	13 57·8	13 17·4	4·2	3·9	10·2	9·4	16·2	15·0
43	13 55·8	13 58·0	13 17·7	4·3	4·0	10·3	9·5	16·3	15·1
44	13 56·0	13 58·3	13 17·9	4·4	4·1	10·4	9·6	16·4	15·2
45	13 56·3	13 58·5	13 18·2	4·5	4·2	10·5	9·7	16·5	15·3
46	13 56·5	13 58·8	13 18·4	4·6	4·3	10·6	9·8	16·6	15·4
47	13 56·8	13 59·0	13 18·6	4·7	4·3	10·7	9·9	16·7	15·4
48	13 57·0	13 59·3	13 18·9	4·8	4·4	10·8	10·0	16·8	15·5
49	13 57·3	13 59·5	13 19·1	4·9	4·5	10·9	10·1	16·9	15·6
50	13 57·5	13 59·8	13 19·3	5·0	4·6	11·0	10·2	17·0	15·7
51	13 57·8	14 00·0	13 19·6	5·1	4·7	11·1	10·3	17·1	15·8
52	13 58·0	14 00·3	13 19·8	5·2	4·8	11·2	10·4	17·2	15·9
53	13 58·3	14 00·5	13 20·1	5·3	4·9	11·3	10·5	17·3	16·0
54	13 58·5	14 00·8	13 20·3	5·4	5·0	11·4	10·5	17·4	16·1
55	13 58·8	14 01·0	13 20·5	5·5	5·1	11·5	10·6	17·5	16·2
56	13 59·0	14 01·3	13 20·8	5·6	5·2	11·6	10·7	17·6	16·3
57	13 59·3	14 01·5	13 21·0	5·7	5·3	11·7	10·8	17·7	16·4
58	13 59·5	14 01·8	13 21·3	5·8	5·4	11·8	10·9	17·8	16·5
59	13 59·8	14 02·0	13 21·5	5·9	5·5	11·9	11·0	17·9	16·6
60	14 00·0	14 02·3	13 21·7	6·0	5·6	12·0	11·1	18·0	16·7

m 56 s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corr^n ′	v or d ′	Corr^n ′	v or d ′	Corr^n ′
00	14 00·0	14 02·3	13 21·7	0·0	0·0	6·0	5·7	12·0	11·3
01	14 00·3	14 02·6	13 22·0	0·1	0·1	6·1	5·7	12·1	11·4
02	14 00·5	14 02·8	13 22·2	0·2	0·2	6·2	5·8	12·2	11·5
03	14 00·8	14 03·1	13 22·4	0·3	0·3	6·3	5·9	12·3	11·6
04	14 01·0	14 03·3	13 22·7	0·4	0·4	6·4	6·0	12·4	11·7
05	14 01·3	14 03·6	13 22·9	0·5	0·5	6·5	6·1	12·5	11·8
06	14 01·5	14 03·8	13 23·2	0·6	0·6	6·6	6·2	12·6	11·9
07	14 01·8	14 04·1	13 23·4	0·7	0·7	6·7	6·3	12·7	12·0
08	14 02·0	14 04·3	13 23·6	0·8	0·8	6·8	6·4	12·8	12·1
09	14 02·3	14 04·6	13 23·9	0·9	0·8	6·9	6·5	12·9	12·1
10	14 02·5	14 04·8	13 24·1	1·0	0·9	7·0	6·6	13·0	12·2
11	14 02·8	14 05·1	13 24·4	1·1	1·0	7·1	6·7	13·1	12·3
12	14 03·0	14 05·3	13 24·6	1·2	1·1	7·2	6·8	13·2	12·4
13	14 03·3	14 05·6	13 24·8	1·3	1·2	7·3	6·9	13·3	12·5
14	14 03·5	14 05·8	13 25·1	1·4	1·3	7·4	7·0	13·4	12·6
15	14 03·8	14 06·1	13 25·3	1·5	1·4	7·5	7·1	13·5	12·7
16	14 04·0	14 06·3	13 25·6	1·6	1·5	7·6	7·2	13·6	12·8
17	14 04·3	14 06·6	13 25·8	1·7	1·6	7·7	7·3	13·7	12·9
18	14 04·5	14 06·8	13 26·0	1·8	1·7	7·8	7·3	13·8	13·0
19	14 04·8	14 07·1	13 26·3	1·9	1·8	7·9	7·4	13·9	13·1
20	14 05·0	14 07·3	13 26·5	2·0	1·9	8·0	7·5	14·0	13·2
21	14 05·3	14 07·6	13 26·7	2·1	2·0	8·1	7·6	14·1	13·3
22	14 05·5	14 07·8	13 27·0	2·2	2·1	8·2	7·7	14·2	13·4
23	14 05·8	14 08·1	13 27·2	2·3	2·2	8·3	7·8	14·3	13·5
24	14 06·0	14 08·3	13 27·5	2·4	2·3	8·4	7·9	14·4	13·6
25	14 06·3	14 08·6	13 27·7	2·5	2·4	8·5	8·0	14·5	13·7
26	14 06·5	14 08·8	13 27·9	2·6	2·4	8·6	8·1	14·6	13·7
27	14 06·8	14 09·1	13 28·2	2·7	2·5	8·7	8·2	14·7	13·8
28	14 07·0	14 09·3	13 28·4	2·8	2·6	8·8	8·3	14·8	13·9
29	14 07·3	14 09·6	13 28·7	2·9	2·7	8·9	8·4	14·9	14·0
30	14 07·5	14 09·8	13 28·9	3·0	2·8	9·0	8·5	15·0	14·1
31	14 07·8	14 10·1	13 29·1	3·1	2·9	9·1	8·6	15·1	14·2
32	14 08·0	14 10·3	13 29·4	3·2	3·0	9·2	8·7	15·2	14·3
33	14 08·3	14 10·6	13 29·6	3·3	3·1	9·3	8·8	15·3	14·4
34	14 08·5	14 10·8	13 29·8	3·4	3·2	9·4	8·9	15·4	14·5
35	14 08·8	14 11·1	13 30·1	3·5	3·3	9·5	8·9	15·5	14·6
36	14 09·0	14 11·3	13 30·3	3·6	3·4	9·6	9·0	15·6	14·7
37	14 09·3	14 11·6	13 30·6	3·7	3·5	9·7	9·1	15·7	14·8
38	14 09·5	14 11·8	13 30·8	3·8	3·6	9·8	9·2	15·8	14·9
39	14 09·8	14 12·1	13 31·0	3·9	3·7	9·9	9·3	15·9	15·0
40	14 10·0	14 12·3	13 31·3	4·0	3·8	10·0	9·4	16·0	15·1
41	14 10·3	14 12·6	13 31·5	4·1	3·9	10·1	9·5	16·1	15·2
42	14 10·5	14 12·8	13 31·8	4·2	4·0	10·2	9·6	16·2	15·3
43	14 10·8	14 13·1	13 32·0	4·3	4·0	10·3	9·7	16·3	15·3
44	14 11·0	14 13·3	13 32·2	4·4	4·1	10·4	9·8	16·4	15·4
45	14 11·3	14 13·6	13 32·5	4·5	4·2	10·5	9·9	16·5	15·5
46	14 11·5	14 13·8	13 32·7	4·6	4·3	10·6	10·0	16·6	15·6
47	14 11·8	14 14·1	13 32·9	4·7	4·4	10·7	10·1	16·7	15·7
48	14 12·0	14 14·3	13 33·2	4·8	4·5	10·8	10·2	16·8	15·8
49	14 12·3	14 14·6	13 33·4	4·9	4·6	10·9	10·3	16·9	15·9
50	14 12·5	14 14·8	13 33·7	5·0	4·7	11·0	10·4	17·0	16·0
51	14 12·8	14 15·1	13 33·9	5·1	4·8	11·1	10·5	17·1	16·1
52	14 13·0	14 15·3	13 34·1	5·2	4·9	11·2	10·5	17·2	16·2
53	14 13·3	14 15·6	13 34·4	5·3	5·0	11·3	10·6	17·3	16·3
54	14 13·5	14 15·8	13 34·6	5·4	5·1	11·4	10·7	17·4	16·4
55	14 13·8	14 16·1	13 34·9	5·5	5·2	11·5	10·8	17·5	16·5
56	14 14·0	14 16·3	13 35·1	5·6	5·3	11·6	10·9	17·6	16·6
57	14 14·3	14 16·6	13 35·3	5·7	5·4	11·7	11·0	17·7	16·7
58	14 14·5	14 16·8	13 35·6	5·8	5·5	11·8	11·1	17·8	16·8
59	14 14·8	14 17·1	13 35·8	5·9	5·6	11·9	11·2	17·9	16·9
60	14 15·0	14 17·3	13 36·1	6·0	5·7	12·0	11·3	18·0	17·0

m 57 s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corr^n ′	v or d ′	Corr^n ′	v or d ′	Corr^n ′
00	14 15·0	14 17·3	13 36·1	0·0	0·0	6·0	5·8	12·0	11·5
01	14 15·3	14 17·6	13 36·3	0·1	0·1	6·1	5·8	12·1	11·6
02	14 15·5	14 17·8	13 36·5	0·2	0·2	6·2	5·9	12·2	11·7
03	14 15·8	14 18·1	13 36·8	0·3	0·3	6·3	6·0	12·3	11·8
04	14 16·0	14 18·3	13 37·0	0·4	0·4	6·4	6·1	12·4	11·9
05	14 16·3	14 18·6	13 37·2	0·5	0·5	6·5	6·2	12·5	12·0
06	14 16·5	14 18·8	13 37·5	0·6	0·6	6·6	6·3	12·6	12·1
07	14 16·8	14 19·1	13 37·7	0·7	0·7	6·7	6·4	12·7	12·2
08	14 17·0	14 19·3	13 38·0	0·8	0·8	6·8	6·5	12·8	12·3
09	14 17·3	14 19·6	13 38·2	0·9	0·9	6·9	6·6	12·9	12·4
10	14 17·5	14 19·8	13 38·4	1·0	1·0	7·0	6·7	13·0	12·5
11	14 17·8	14 20·1	13 38·7	1·1	1·1	7·1	6·8	13·1	12·6
12	14 18·0	14 20·3	13 38·9	1·2	1·2	7·2	6·9	13·2	12·7
13	14 18·3	14 20·6	13 39·2	1·3	1·2	7·3	7·0	13·3	12·7
14	14 18·5	14 20·9	13 39·4	1·4	1·3	7·4	7·1	13·4	12·8
15	14 18·8	14 21·1	13 39·6	1·5	1·4	7·5	7·2	13·5	12·9
16	14 19·0	14 21·4	13 39·9	1·6	1·5	7·6	7·3	13·6	13·0
17	14 19·3	14 21·6	13 40·1	1·7	1·6	7·7	7·4	13·7	13·1
18	14 19·5	14 21·9	13 40·3	1·8	1·7	7·8	7·5	13·8	13·2
19	14 19·8	14 22·1	13 40·6	1·9	1·8	7·9	7·6	13·9	13·3
20	14 20·0	14 22·4	13 40·8	2·0	1·9	8·0	7·7	14·0	13·4
21	14 20·3	14 22·6	13 41·1	2·1	2·0	8·1	7·8	14·1	13·5
22	14 20·5	14 22·9	13 41·3	2·2	2·1	8·2	7·9	14·2	13·6
23	14 20·8	14 23·1	13 41·5	2·3	2·2	8·3	8·0	14·3	13·7
24	14 21·0	14 23·4	13 41·8	2·4	2·3	8·4	8·1	14·4	13·8
25	14 21·3	14 23·6	13 42·0	2·5	2·4	8·5	8·1	14·5	13·9
26	14 21·5	14 23·9	13 42·3	2·6	2·5	8·6	8·2	14·6	14·0
27	14 21·8	14 24·1	13 42·5	2·7	2·6	8·7	8·3	14·7	14·1
28	14 22·0	14 24·4	13 42·7	2·8	2·7	8·8	8·4	14·8	14·2
29	14 22·3	14 24·6	13 43·0	2·9	2·8	8·9	8·5	14·9	14·3
30	14 22·5	14 24·9	13 43·2	3·0	2·9	9·0	8·6	15·0	14·4
31	14 22·8	14 25·1	13 43·4	3·1	3·0	9·1	8·7	15·1	14·5
32	14 23·0	14 25·4	13 43·7	3·2	3·1	9·2	8·8	15·2	14·6
33	14 23·3	14 25·6	13 43·9	3·3	3·2	9·3	8·9	15·3	14·7
34	14 23·5	14 25·9	13 44·2	3·4	3·3	9·4	9·0	15·4	14·8
35	14 23·8	14 26·1	13 44·4	3·5	3·4	9·5	9·1	15·5	14·9
36	14 24·0	14 26·4	13 44·6	3·6	3·5	9·6	9·2	15·6	15·0
37	14 24·3	14 26·6	13 44·9	3·7	3·5	9·7	9·3	15·7	15·0
38	14 24·5	14 26·9	13 45·1	3·8	3·6	9·8	9·4	15·8	15·1
39	14 24·8	14 27·1	13 45·4	3·9	3·7	9·9	9·5	15·9	15·2
40	14 25·0	14 27·4	13 45·6	4·0	3·8	10·0	9·6	16·0	15·3
41	14 25·3	14 27·6	13 45·8	4·1	3·9	10·1	9·7	16·1	15·4
42	14 25·5	14 27·9	13 46·1	4·2	4·0	10·2	9·8	16·2	15·5
43	14 25·8	14 28·1	13 46·3	4·3	4·1	10·3	9·9	16·3	15·6
44	14 26·0	14 28·4	13 46·5	4·4	4·2	10·4	10·0	16·4	15·7
45	14 26·3	14 28·6	13 46·8	4·5	4·3	10·5	10·1	16·5	15·8
46	14 26·5	14 28·9	13 47·0	4·6	4·4	10·6	10·2	16·6	15·9
47	14 26·8	14 29·1	13 47·3	4·7	4·5	10·7	10·3	16·7	16·0
48	14 27·0	14 29·4	13 47·5	4·8	4·6	10·8	10·4	16·8	16·1
49	14 27·3	14 29·6	13 47·7	4·9	4·7	10·9	10·4	16·9	16·2
50	14 27·5	14 29·9	13 48·0	5·0	4·8	11·0	10·5	17·0	16·3
51	14 27·8	14 30·1	13 48·2	5·1	4·9	11·1	10·6	17·1	16·4
52	14 28·0	14 30·4	13 48·5	5·2	5·0	11·2	10·7	17·2	16·5
53	14 28·3	14 30·6	13 48·7	5·3	5·1	11·3	10·8	17·3	16·6
54	14 28·5	14 30·9	13 48·9	5·4	5·2	11·4	10·9	17·4	16·7
55	14 28·8	14 31·1	13 49·2	5·5	5·3	11·5	11·0	17·5	16·8
56	14 29·0	14 31·4	13 49·4	5·6	5·4	11·6	11·1	17·6	16·9
57	14 29·3	14 31·6	13 49·7	5·7	5·5	11·7	11·2	17·7	17·0
58	14 29·5	14 31·9	13 49·9	5·8	5·6	11·8	11·3	17·8	17·1
59	14 29·8	14 32·1	13 50·1	5·9	5·7	11·9	11·4	17·9	17·2
60	14 30·0	14 32·4	13 50·4	6·0	5·8	12·0	11·5	18·0	17·3

m 58 s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d r	Corr^n r	v or d ′	Corr^n ′	v or d ′	Corr^n ′
00	14 30·0	14 32·4	13 50·4	0·0	0·0	6·0	5·9	12·0	11·7
01	14 30·3	14 32·6	13 50·6	0·1	0·1	6·1	5·9	12·1	11·8
02	14 30·5	14 32·9	13 50·8	0·2	0·2	6·2	6·0	12·2	11·9
03	14 30·8	14 33·1	13 51·1	0·3	0·3	6·3	6·1	12·3	12·0
04	14 31·0	14 33·4	13 51·3	0·4	0·4	6·4	6·2	12·4	12·1
05	14 31·3	14 33·6	13 51·6	0·5	0·5	6·5	6·3	12·5	12·2
06	14 31·5	14 33·9	13 51·8	0·6	0·6	6·6	6·4	12·6	12·3
07	14 31·8	14 34·1	13 52·0	0·7	0·7	6·7	6·5	12·7	12·4
08	14 32·0	14 34·4	13 52·3	0·8	0·8	6·8	6·6	12·8	12·5
09	14 32·3	14 34·6	13 52·5	0·9	0·9	6·9	6·7	12·9	12·6
10	14 32·5	14 34·9	13 52·8	1·0	1·0	7·0	6·8	13·0	12·7
11	14 32·8	14 35·1	13 53·0	1·1	1·1	7·1	6·9	13·1	12·8
12	14 33·0	14 35·4	13 53·2	1·2	1·2	7·2	7·0	13·2	12·9
13	14 33·3	14 35·6	13 53·5	1·3	1·3	7·3	7·1	13·3	13·0
14	14 33·5	14 35·9	13 53·7	1·4	1·4	7·4	7·2	13·4	13·1
15	14 33·8	14 36·1	13 53·9	1·5	1·5	7·5	7·3	13·5	13·2
16	14 34·0	14 36·4	13 54·2	1·6	1·6	7·6	7·4	13·6	13·3
17	14 34·3	14 36·6	13 54·4	1·7	1·7	7·7	7·5	13·7	13·4
18	14 34·5	14 36·9	13 54·7	1·8	1·8	7·8	7·6	13·8	13·5
19	14 34·8	14 37·1	13 54·9	1·9	1·9	7·9	7·7	13·9	13·6
20	14 35·0	14 37·4	13 55·1	2·0	2·0	8·0	7·8	14·0	13·7
21	14 35·3	14 37·6	13 55·4	2·1	2·0	8·1	7·9	14·1	13·7
22	14 35·5	14 37·9	13 55·6	2·2	2·1	8·2	8·0	14·2	13·8
23	14 35·8	14 38·1	13 55·9	2·3	2·2	8·3	8·1	14·3	13·9
24	14 36·0	14 38·4	13 56·1	2·4	2·3	8·4	8·2	14·4	14·0
25	14 36·3	14 38·6	13 56·3	2·5	2·4	8·5	8·3	14·5	14·1
26	14 36·5	14 38·9	13 56·6	2·6	2·5	8·6	8·4	14·6	14·2
27	14 36·8	14 39·2	13 56·8	2·7	2·6	8·7	8·5	14·7	14·3
28	14 37·0	14 39·4	13 57·0	2·8	2·7	8·8	8·6	14·8	14·4
29	14 37·3	14 39·7	13 57·3	2·9	2·8	8·9	8·7	14·9	14·5
30	14 37·5	14 39·9	13 57·5	3·0	2·9	9·0	8·8	15·0	14·6
31	14 37·8	14 40·2	13 57·8	3·1	3·0	9·1	8·9	15·1	14·7
32	14 38·0	14 40·4	13 58·0	3·2	3·1	9·2	9·0	15·2	14·8
33	14 38·3	14 40·7	13 58·2	3·3	3·2	9·3	9·1	15·3	14·9
34	14 38·5	14 40·9	13 58·5	3·4	3·3	9·4	9·2	15·4	15·0
35	14 38·8	14 41·2	13 58·7	3·5	3·4	9·5	9·3	15·5	15·1
36	14 39·0	14 41·4	13 59·0	3·6	3·5	9·6	9·4	15·6	15·2
37	14 39·3	14 41·7	13 59·2	3·7	3·6	9·7	9·5	15·7	15·3
38	14 39·5	14 41·9	13 59·4	3·8	3·7	9·8	9·6	15·8	15·4
39	14 39·8	14 42·2	13 59·7	3·9	3·8	9·9	9·7	15·9	15·5
40	14 40·0	14 42·4	13 59·9	4·0	3·9	10·0	9·8	16·0	15·6
41	14 40·3	14 42·7	14 00·1	4·1	4·0	10·1	9·8	16·1	15·7
42	14 40·5	14 42·9	14 00·4	4·2	4·1	10·2	9·9	16·2	15·8
43	14 40·8	14 43·2	14 00·6	4·3	4·2	10·3	10·0	16·3	15·9
44	14 41·0	14 43·4	14 00·9	4·4	4·3	10·4	10·1	16·4	16·0
45	14 41·3	14 43·7	14 01·1	4·5	4·4	10·5	10·2	16·5	16·1
46	14 41·5	14 43·9	14 01·3	4·6	4·5	10·6	10·3	16·6	16·2
47	14 41·8	14 44·2	14 01·6	4·7	4·6	10·7	10·4	16·7	16·3
48	14 42·0	14 44·4	14 01·8	4·8	4·7	10·8	10·5	16·8	16·4
49	14 42·3	14 44·7	14 02·1	4·9	4·8	10·9	10·6	16·9	16·5
50	14 42·5	14 44·9	14 02·3	5·0	4·9	11·0	10·7	17·0	16·6
51	14 42·8	14 45·2	14 02·5	5·1	5·0	11·1	10·8	17·1	16·7
52	14 43·0	14 45·4	14 02·8	5·2	5·1	11·2	10·9	17·2	16·8
53	14 43·3	14 45·7	14 03·0	5·3	5·2	11·3	11·0	17·3	16·9
54	14 43·5	14 45·9	14 03·3	5·4	5·3	11·4	11·1	17·4	17·0
55	14 43·8	14 46·2	14 03·5	5·5	5·4	11·5	11·2	17·5	17·1
56	14 44·0	14 46·4	14 03·7	5·6	5·5	11·6	11·3	17·6	17·2
57	14 44·3	14 46·7	14 04·0	5·7	5·6	11·7	11·4	17·7	17·3
58	14 44·5	14 46·9	14 04·2	5·8	5·7	11·8	11·5	17·8	17·4
59	14 44·8	14 47·2	14 04·4	5·9	5·8	11·9	11·6	17·9	17·5
60	14 45·0	14 47·4	14 04·7	6·0	5·9	12·0	11·7	18·0	17·6

m 59 s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d r	Corr^n r	v or d ′	Corr^n ′	v or d ′	Corr^n ′
00	14 45·0	14 47·4	14 04·7	0·0	0·0	6·0	6·0	12·0	11·9
01	14 45·3	14 47·7	14 04·9	0·1	0·1	6·1	6·0	12·1	12·0
02	14 45·5	14 47·9	14 05·2	0·2	0·2	6·2	6·1	12·2	12·1
03	14 45·8	14 48·2	14 05·4	0·3	0·3	6·3	6·2	12·3	12·2
04	14 46·0	14 48·4	14 05·6	0·4	0·4	6·4	6·3	12·4	12·3
05	14 46·3	14 48·7	14 05·9	0·5	0·5	6·5	6·4	12·5	12·4
06	14 46·5	14 48·9	14 06·1	0·6	0·6	6·6	6·5	12·6	12·5
07	14 46·8	14 49·2	14 06·4	0·7	0·7	6·7	6·6	12·7	12·6
08	14 47·0	14 49·4	14 06·6	0·8	0·8	6·8	6·7	12·8	12·7
09	14 47·3	14 49·7	14 06·8	0·9	0·9	6·9	6·8	12·9	12·8
10	14 47·5	14 49·9	14 07·1	1·0	1·0	7·0	6·9	13·0	12·9
11	14 47·8	14 50·2	14 07·3	1·1	1·1	7·1	7·0	13·1	13·0
12	14 48·0	14 50·4	14 07·5	1·2	1·2	7·2	7·1	13·2	13·1
13	14 48·3	14 50·7	14 07·8	1·3	1·3	7·3	7·2	13·3	13·2
14	14 48·5	14 50·9	14 08·0	1·4	1·4	7·4	7·3	13·4	13·3
15	14 48·8	14 51·2	14 08·3	1·5	1·5	7·5	7·4	13·5	13·4
16	14 49·0	14 51·4	14 08·5	1·6	1·6	7·6	7·5	13·6	13·5
17	14 49·3	14 51·7	14 08·7	1·7	1·7	7·7	7·6	13·7	13·6
18	14 49·5	14 51·9	14 09·0	1·8	1·8	7·8	7·7	13·8	13·7
19	14 49·8	14 52·2	14 09·2	1·9	1·9	7·9	7·8	13·9	13·8
20	14 50·0	14 52·4	14 09·5	2·0	2·0	8·0	7·9	14·0	13·9
21	14 50·3	14 52·7	14 09·7	2·1	2·1	8·1	8·0	14·1	14·0
22	14 50·5	14 52·9	14 09·9	2·2	2·2	8·2	8·1	14·2	14·1
23	14 50·8	14 53·2	14 10·2	2·3	2·3	8·3	8·2	14·3	14·2
24	14 51·0	14 53·4	14 10·4	2·4	2·4	8·4	8·3	14·4	14·3
25	14 51·3	14 53·7	14 10·6	2·5	2·5	8·5	8·4	14·5	14·4
26	14 51·5	14 53·9	14 10·9	2·6	2·6	8·6	8·5	14·6	14·5
27	14 51·8	14 54·2	14 11·1	2·7	2·7	8·7	8·6	14·7	14·6
28	14 52·0	14 54·4	14 11·4	2·8	2·8	8·8	8·7	14·8	14·7
29	14 52·3	14 54·7	14 11·6	2·9	2·9	8·9	8·8	14·9	14·8
30	14 52·5	14 54·9	14 11·8	3·0	3·0	9·0	8·9	15·0	14·9
31	14 52·8	14 55·2	14 12·1	3·1	3·1	9·1	9·0	15·1	15·0
32	14 53·0	14 55·4	14 12·3	3·2	3·2	9·2	9·1	15·2	15·1
33	14 53·3	14 55·7	14 12·6	3·3	3·3	9·3	9·2	15·3	15·2
34	14 53·5	14 55·9	14 12·8	3·4	3·4	9·4	9·3	15·4	15·3
35	14 53·8	14 56·2	14 13·0	3·5	3·5	9·5	9·4	15·5	15·4
36	14 54·0	14 56·4	14 13·3	3·6	3·6	9·6	9·5	15·6	15·5
37	14 54·3	14 56·7	14 13·5	3·7	3·7	9·7	9·6	15·7	15·6
38	14 54·5	14 56·9	14 13·8	3·8	3·8	9·8	9·7	15·8	15·7
39	14 54·8	14 57·2	14 14·0	3·9	3·9	9·9	9·8	15·9	15·8
40	14 55·0	14 57·5	14 14·2	4·0	4·0	10·0	9·9	16·0	15·9
41	14 55·3	14 57·7	14 14·5	4·1	4·1	10·1	10·0	16·1	16·0
42	14 55·5	14 58·0	14 14·7	4·2	4·2	10·2	10·1	16·2	16·1
43	14 55·8	14 58·2	14 14·9	4·3	4·3	10·3	10·2	16·3	16·2
44	14 56·0	14 58·5	14 15·2	4·4	4·4	10·4	10·3	16·4	16·3
45	14 56·3	14 58·7	14 15·4	4·5	4·5	10·5	10·4	16·5	16·4
46	14 56·5	14 59·0	14 15·7	4·6	4·6	10·6	10·5	16·6	16·5
47	14 56·8	14 59·2	14 15·9	4·7	4·7	10·7	10·6	16·7	16·6
48	14 57·0	14 59·5	14 16·1	4·8	4·8	10·8	10·7	16·8	16·7
49	14 57·3	14 59·7	14 16·4	4·9	4·9	10·9	10·8	16·9	16·8
50	14 57·5	15 00·0	14 16·6	5·0	5·0	11·0	10·9	17·0	16·9
51	14 57·8	15 00·2	14 16·9	5·1	5·1	11·1	11·0	17·1	17·0
52	14 58·0	15 00·5	14 17·1	5·2	5·2	11·2	11·1	17·2	17·1
53	14 58·3	15 00·7	14 17·3	5·3	5·3	11·3	11·2	17·3	17·2
54	14 58·5	15 01·0	14 17·6	5·4	5·4	11·4	11·3	17·4	17·3
55	14 58·8	15 01·2	14 17·8	5·5	5·5	11·5	11·4	17·5	17·4
56	14 59·0	15 01·5	14 18·0	5·6	5·6	11·6	11·5	17·6	17·5
57	14 59·3	15 01·7	14 18·3	5·7	5·7	11·7	11·6	17·7	17·6
58	14 59·5	15 02·0	14 18·5	5·8	5·8	11·8	11·7	17·8	17·7
59	14 59·8	15 02·2	14 18·8	5·9	5·9	11·9	11·8	17·9	17·8
60	15 00·0	15 02·5	14 19·0	6·0	6·0	12·0	11·9	18·0	17·9

23. Norie's nautical table-2019 pages for 1 to 6 problem, exercises

Norie's nautical Table, ABC tables for Problem-1 calculation

Norie's Nautical Table for ABC calculation.

ABC method is to calculate the Azimuth.

A=LHA against to Latitude

B=LHA against to Declination

C=A+B (As normal mathematic) (C-Table)

C=(C-Table entry) C against to Latitude

Name azimuth north or south according to the name of C (Same name of C)

East or west Depending LHA (If LHA between 0-180 name

West, If LHA is between 180-360, Name East.

Table A

Local Hour Angle

Lat.	58° 00′	59° 00′	60° 00′	61° 00′	62° 00′	63° 00′	64° 00′	65° 00′	66° 00′	67° 00′	68° 00′	69° 00′	70° 00′	71° 00′	72° 00′	73° 00′	74° 00′	Lat.
°	302° 00′	301° 00′	300° 00′	299° 00′	298° 00′	297° 00′	296° 00′	295° 00′	294° 00′	293° 00′	292° 00′	291° 00′	290° 00′	289° 00′	288° 00′	287° 00′	286° 00′	°
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	1
2	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	2
3	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	3
4	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	4
5	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	5
6	0.07	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	6
7	0.08	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	7
8	0.09	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.04	0.04	8
9	0.10	0.10	0.09	0.09	0.08	0.08	0.08	0.07	0.07	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.05	9
10	0.11	0.11	0.10	0.10	0.09	0.09	0.09	0.08	0.08	0.07	0.07	0.07	0.06	0.06	0.06	0.05	0.05	10
11	0.12	0.12	0.11	0.11	0.10	0.10	0.09	0.09	0.09	0.08	0.08	0.07	0.07	0.07	0.06	0.06	0.06	11
12	0.13	0.13	0.12	0.12	0.11	0.11	0.10	0.10	0.09	0.09	0.09	0.08	0.08	0.07	0.07	0.06	0.06	12
13	0.14	0.14	0.13	0.13	0.12	0.12	0.11	0.11	0.10	0.10	0.09	0.09	0.08	0.08	0.08	0.07	0.07	13
14	0.16	0.15	0.14	0.14	0.13	0.13	0.12	0.12	0.11	0.11	0.10	0.10	0.09	0.09	0.08	0.08	0.07	14
15	0.17	0.16	0.15	0.15	0.14	0.14	0.13	0.12	0.12	0.11	0.11	0.10	0.10	0.09	0.09	0.08	0.08	15
16	0.18	0.17	0.17	0.16	0.15	0.15	0.14	0.13	0.13	0.12	0.12	0.11	0.10	0.10	0.09	0.09	0.08	16
17	0.19	0.18	0.18	0.17	0.16	0.16	0.15	0.14	0.14	0.13	0.12	0.12	0.11	0.11	0.10	0.09	0.09	17
18	0.20	0.20	0.19	0.18	0.17	0.17	0.16	0.15	0.14	0.14	0.13	0.12	0.12	0.11	0.11	0.10	0.09	18
19	0.22	0.21	0.20	0.19	0.18	0.18	0.17	0.16	0.15	0.15	0.14	0.13	0.13	0.12	0.11	0.11	0.10	19
20	0.23	0.22	0.21	0.20	0.19	0.19	0.18	0.17	0.16	0.15	0.15	0.14	0.13	0.13	0.12	0.11	0.10	20
21	0.24	0.23	0.22	0.21	0.20	0.20	0.19	0.18	0.17	0.16	0.16	0.15	0.14	0.13	0.12	0.12	0.11	21
22	0.25	0.24	0.23	0.22	0.21	0.21	0.20	0.19	0.18	0.17	0.16	0.16	0.15	0.14	0.13	0.12	0.12	22
23	0.27	0.26	0.25	0.24	0.23	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.15	0.14	0.13	0.12	23
24	0.28	0.27	0.26	0.25	0.24	0.23	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.14	0.13	24
25	0.29	0.28	0.27	0.26	0.25	0.24	0.23	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	25
26	0.30	0.29	0.28	0.27	0.26	0.25	0.24	0.23	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	26
27	0.32	0.31	0.29	0.28	0.27	0.26	0.25	0.24	0.23	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	27
28	0.33	0.32	0.31	0.29	0.28	0.27	0.26	0.25	0.24	0.23	0.21	0.20	0.19	0.18	0.17	0.16	0.15	28
29	0.35	0.33	0.32	0.31	0.29	0.28	0.27	0.26	0.25	0.24	0.22	0.21	0.20	0.19	0.18	0.17	0.16	29
30	0.36	0.35	0.33	0.32	0.31	0.29	0.28	0.27	0.26	0.25	0.23	0.22	0.21	0.20	0.19	0.18	0.17	30
31	0.38	0.36	0.35	0.33	0.32	0.31	0.29	0.28	0.27	0.26	0.24	0.23	0.22	0.21	0.20	0.18	0.17	31
32	0.39	0.38	0.36	0.35	0.33	0.32	0.30	0.29	0.28	0.27	0.25	0.24	0.23	0.22	0.20	0.19	0.18	32
33	0.41	0.39	0.37	0.36	0.35	0.33	0.32	0.30	0.29	0.28	0.26	0.25	0.24	0.22	0.21	0.20	0.19	33
34	0.42	0.41	0.39	0.37	0.36	0.34	0.33	0.31	0.30	0.29	0.27	0.26	0.25	0.23	0.22	0.21	0.19	34
35	0.44	0.42	0.40	0.39	0.37	0.36	0.34	0.33	0.31	0.30	0.28	0.27	0.25	0.24	0.23	0.21	0.20	35
36	0.45	0.44	0.42	0.40	0.39	0.37	0.35	0.34	0.32	0.31	0.29	0.28	0.26	0.25	0.24	0.22	0.21	36
37	0.47	0.45	0.44	0.42	0.40	0.38	0.37	0.35	0.34	0.32	0.30	0.29	0.27	0.26	0.24	0.23	0.22	37
38	0.49	0.47	0.45	0.43	0.42	0.40	0.38	0.36	0.35	0.33	0.32	0.30	0.28	0.27	0.25	0.24	0.22	38
39	0.51	0.49	0.47	0.45	0.43	0.41	0.39	0.38	0.36	0.34	0.33	0.31	0.29	0.28	0.26	0.25	0.23	39
40	0.52	0.50	0.48	0.47	0.45	0.43	0.41	0.39	0.37	0.36	0.34	0.32	0.31	0.29	0.27	0.26	0.24	40
41	0.54	0.52	0.50	0.48	0.46	0.44	0.42	0.41	0.39	0.37	0.35	0.33	0.32	0.30	0.28	0.27	0.25	41
42	0.56	0.54	0.52	0.50	0.48	0.46	0.44	0.42	0.40	0.38	0.36	0.35	0.33	0.31	0.29	0.28	0.26	42
43	0.58	0.56	0.54	0.52	0.50	0.48	0.45	0.43	0.42	0.40	0.38	0.36	0.34	0.32	0.30	0.29	0.27	43
44	0.60	0.58	0.56	0.54	0.51	0.49	0.47	0.45	0.43	0.41	0.39	0.37	0.35	0.33	0.31	0.30	0.28	44
45	0.62	0.60	0.58	0.55	0.53	0.51	0.49	0.47	0.45	0.42	0.40	0.38	0.36	0.34	0.32	0.31	0.29	45
46	0.65	0.62	0.60	0.57	0.55	0.53	0.51	0.48	0.46	0.44	0.42	0.40	0.38	0.36	0.34	0.32	0.30	46
47	0.67	0.64	0.62	0.59	0.57	0.55	0.52	0.50	0.48	0.46	0.43	0.41	0.39	0.37	0.35	0.33	0.31	47
48	0.69	0.67	0.64	0.62	0.59	0.57	0.54	0.52	0.49	0.47	0.45	0.43	0.40	0.38	0.36	0.34	0.32	48
49	0.72	0.69	0.66	0.64	0.61	0.59	0.56	0.54	0.51	0.49	0.46	0.44	0.42	0.40	0.37	0.35	0.33	49
50	0.74	0.72	0.69	0.66	0.63	0.61	0.58	0.56	0.53	0.51	0.48	0.46	0.43	0.41	0.39	0.36	0.34	50
51	0.77	0.74	0.71	0.68	0.66	0.63	0.60	0.58	0.55	0.52	0.50	0.47	0.45	0.43	0.40	0.38	0.35	51
52	0.80	0.77	0.74	0.71	0.68	0.65	0.62	0.60	0.57	0.54	0.52	0.49	0.47	0.44	0.42	0.39	0.37	52
53	0.83	0.80	0.77	0.74	0.71	0.68	0.65	0.62	0.59	0.56	0.54	0.51	0.48	0.46	0.43	0.41	0.38	53
54	0.86	0.83	0.79	0.76	0.73	0.70	0.67	0.64	0.61	0.58	0.56	0.53	0.50	0.47	0.45	0.42	0.39	54
55	0.89	0.86	0.82	0.79	0.76	0.73	0.70	0.67	0.64	0.61	0.58	0.55	0.52	0.49	0.46	0.44	0.41	55
56	0.93	0.89	0.86	0.82	0.79	0.76	0.72	0.69	0.66	0.63	0.60	0.57	0.54	0.51	0.48	0.45	0.43	56
57	0.96	0.93	0.89	0.85	0.82	0.78	0.75	0.72	0.69	0.65	0.62	0.59	0.56	0.53	0.50	0.47	0.44	57
58	1.00	0.96	0.92	0.89	0.85	0.82	0.78	0.75	0.71	0.68	0.65	0.61	0.58	0.55	0.52	0.49	0.46	58
59	1.04	1.00	0.96	0.92	0.88	0.85	0.81	0.78	0.74	0.71	0.67	0.64	0.61	0.57	0.54	0.51	0.48	59
60	1.08	1.04	1.00	0.96	0.92	0.88	0.84	0.81	0.77	0.74	0.70	0.66	0.63	0.60	0.56	0.53	0.50	60
°	122° 00′	121° 00′	120° 00′	119° 00′	118° 00′	117° 00′	116° 00′	115° 00′	114° 00′	113° 00′	112° 00′	111° 00′	110° 00′	109° 00′	108° 00′	107° 00′	106° 00′	°
Lat.	238° 00′	239° 00′	240° 00′	241° 00′	242° 00′	243° 00′	244° 00′	245° 00′	246° 00′	247° 00′	248° 00′	249° 00′	250° 00′	251° 00′	252° 00′	253° 00′	254° 00′	Lat.

Local Hour Angle

Named opposite to the Latitude, except when the L.H.A. is between 90° and 270°.

Table B

Local Hour Angle

Dec.	58° 00′	59° 00′	60° 00′	61° 00′	62° 00′	63° 00′	64° 00′	65° 00′	66° 00′	67° 00′	68° 00′	69° 00′	70° 00′	71° 00′	72° 00′	73° 00′	74° 00′	Dec.
°	302° 00′	301° 00′	300° 00′	299° 00′	298° 00′	297° 00′	296° 00′	295° 00′	294° 00′	293° 00′	292° 00′	291° 00′	290° 00′	289° 00′	288° 00′	287° 00′	286° 00′	°
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
1	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	1
2	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	2
3	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.05	3
4	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	4
5	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.09	0.09	0.09	0.09	0.09	0.09	0.09	5
6	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	6
7	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	7
8	0.17	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	8
9	0.19	0.18	0.18	0.18	0.18	0.18	0.18	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.16	9
10	0.21	0.21	0.20	0.20	0.20	0.20	0.20	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.18	0.18	10
11	0.23	0.23	0.22	0.22	0.22	0.22	0.22	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.20	0.20	0.20	11
12	0.25	0.25	0.25	0.24	0.24	0.24	0.24	0.23	0.23	0.23	0.23	0.23	0.23	0.22	0.22	0.22	0.22	12
13	0.27	0.27	0.27	0.26	0.26	0.26	0.26	0.25	0.25	0.25	0.25	0.25	0.25	0.24	0.24	0.24	0.24	13
14	0.29	0.29	0.29	0.28	0.28	0.28	0.28	0.28	0.27	0.27	0.27	0.27	0.27	0.26	0.26	0.26	0.26	14
15	0.32	0.31	0.31	0.31	0.30	0.30	0.30	0.30	0.29	0.29	0.29	0.29	0.29	0.28	0.28	0.28	0.28	15
16	0.34	0.33	0.33	0.33	0.32	0.32	0.32	0.32	0.31	0.31	0.31	0.31	0.31	0.30	0.30	0.30	0.30	16
17	0.36	0.36	0.35	0.35	0.35	0.34	0.34	0.34	0.33	0.33	0.33	0.33	0.33	0.32	0.32	0.32	0.32	17
18	0.38	0.38	0.38	0.37	0.37	0.36	0.36	0.36	0.36	0.35	0.35	0.35	0.35	0.34	0.34	0.34	0.34	18
19	0.41	0.40	0.40	0.39	0.39	0.39	0.38	0.38	0.38	0.37	0.37	0.37	0.37	0.36	0.36	0.36	0.36	19
20	0.43	0.42	0.42	0.42	0.41	0.41	0.40	0.40	0.40	0.40	0.39	0.39	0.39	0.38	0.38	0.38	0.38	20
21	0.45	0.45	0.44	0.44	0.43	0.43	0.43	0.42	0.42	0.42	0.41	0.41	0.41	0.41	0.40	0.40	0.40	21
22	0.48	0.47	0.47	0.46	0.46	0.45	0.45	0.45	0.44	0.44	0.44	0.43	0.43	0.43	0.42	0.42	0.42	22
23	0.50	0.50	0.49	0.49	0.48	0.48	0.47	0.47	0.46	0.46	0.46	0.45	0.45	0.45	0.45	0.44	0.44	23
24	0.53	0.52	0.51	0.51	0.50	0.50	0.50	0.49	0.49	0.48	0.48	0.48	0.47	0.47	0.47	0.47	0.46	24
25	0.55	0.54	0.54	0.53	0.53	0.52	0.52	0.51	0.51	0.51	0.50	0.50	0.50	0.49	0.49	0.49	0.49	25
26	0.58	0.57	0.56	0.56	0.55	0.55	0.54	0.54	0.53	0.53	0.53	0.52	0.52	0.52	0.51	0.51	0.51	26
27	0.60	0.59	0.59	0.58	0.58	0.57	0.57	0.56	0.56	0.55	0.55	0.55	0.54	0.54	0.54	0.53	0.53	27
28	0.63	0.62	0.61	0.61	0.60	0.60	0.59	0.59	0.58	0.58	0.57	0.57	0.57	0.56	0.56	0.56	0.55	28
29	0.65	0.65	0.64	0.63	0.63	0.62	0.62	0.61	0.61	0.60	0.60	0.59	0.59	0.59	0.58	0.58	0.58	29
30	0.68	0.67	0.67	0.66	0.65	0.65	0.64	0.64	0.63	0.63	0.62	0.62	0.61	0.61	0.61	0.60	0.60	30
31	0.71	0.70	0.69	0.69	0.68	0.67	0.67	0.66	0.66	0.65	0.65	0.64	0.64	0.64	0.63	0.63	0.63	31
32	0.74	0.73	0.72	0.71	0.71	0.70	0.70	0.69	0.68	0.68	0.67	0.67	0.66	0.66	0.66	0.65	0.65	32
33	0.77	0.76	0.75	0.74	0.74	0.73	0.72	0.72	0.71	0.71	0.70	0.70	0.69	0.69	0.68	0.68	0.68	33
34	0.80	0.79	0.78	0.77	0.76	0.76	0.75	0.74	0.74	0.73	0.73	0.72	0.72	0.71	0.71	0.71	0.70	34
35	0.83	0.82	0.81	0.80	0.79	0.79	0.78	0.77	0.77	0.76	0.76	0.75	0.75	0.74	0.74	0.73	0.73	35
36	0.86	0.85	0.84	0.83	0.82	0.82	0.81	0.80	0.80	0.79	0.78	0.78	0.77	0.77	0.76	0.76	0.76	36
37	0.89	0.88	0.87	0.86	0.85	0.85	0.84	0.83	0.82	0.82	0.81	0.81	0.80	0.80	0.79	0.79	0.78	37
38	0.92	0.91	0.90	0.89	0.88	0.88	0.87	0.86	0.86	0.85	0.84	0.84	0.83	0.83	0.82	0.82	0.81	38
39	0.95	0.94	0.94	0.93	0.92	0.91	0.90	0.89	0.89	0.88	0.87	0.87	0.86	0.86	0.85	0.85	0.84	39
40	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.93	0.92	0.91	0.90	0.90	0.89	0.89	0.88	0.88	0.87	40
41	1.03	1.01	1.00	0.99	0.98	0.98	0.97	0.96	0.95	0.94	0.94	0.93	0.93	0.92	0.91	0.91	0.90	41
42	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.99	0.98	0.97	0.96	0.96	0.95	0.95	0.94	0.94	42
43	1.10	1.09	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.01	1.00	0.99	0.99	0.98	0.98	0.97	43
44	1.14	1.13	1.12	1.10	1.09	1.08	1.07	1.07	1.06	1.05	1.04	1.03	1.03	1.02	1.02	1.01	1.00	44
45	1.18	1.17	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.09	1.08	1.07	1.06	1.06	1.05	1.05	1.04	45
46	1.22	1.21	1.20	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.12	1.11	1.10	1.10	1.09	1.08	1.08	46
47	1.26	1.25	1.24	1.23	1.21	1.20	1.19	1.18	1.17	1.16	1.16	1.15	1.14	1.13	1.13	1.12	1.12	47
48	1.31	1.30	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.17	1.16	1.16	48
49	1.36	1.34	1.33	1.32	1.30	1.29	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.22	1.21	1.20	1.20	49
50	1.41	1.39	1.38	1.36	1.35	1.34	1.33	1.31	1.30	1.29	1.29	1.28	1.27	1.26	1.25	1.25	1.24	50
51	1.46	1.44	1.43	1.41	1.40	1.39	1.37	1.36	1.35	1.34	1.33	1.32	1.31	1.31	1.30	1.29	1.28	51
52	1.51	1.49	1.48	1.46	1.45	1.44	1.42	1.41	1.40	1.39	1.38	1.37	1.36	1.35	1.35	1.34	1.33	52
53	1.56	1.55	1.53	1.52	1.50	1.49	1.48	1.46	1.45	1.44	1.43	1.42	1.41	1.40	1.40	1.39	1.38	53
54	1.62	1.61	1.59	1.57	1.56	1.54	1.53	1.52	1.51	1.50	1.48	1.47	1.46	1.46	1.45	1.44	1.43	54
55	1.68	1.67	1.65	1.63	1.62	1.60	1.59	1.58	1.56	1.55	1.54	1.53	1.52	1.51	1.50	1.49	1.49	55
56	1.75	1.73	1.71	1.70	1.68	1.66	1.65	1.64	1.62	1.61	1.60	1.59	1.58	1.57	1.56	1.55	1.54	56
57	1.82	1.80	1.78	1.76	1.74	1.73	1.71	1.70	1.69	1.67	1.66	1.65	1.64	1.63	1.62	1.61	1.60	57
58	1.89	1.87	1.85	1.83	1.81	1.80	1.78	1.77	1.75	1.74	1.73	1.71	1.70	1.69	1.68	1.67	1.66	58
59	1.96	1.94	1.92	1.90	1.88	1.87	1.85	1.84	1.82	1.81	1.79	1.78	1.77	1.76	1.75	1.74	1.73	59
60	2.04	2.02	2.00	1.98	1.96	1.94	1.93	1.91	1.90	1.88	1.87	1.86	1.84	1.83	1.82	1.81	1.80	60
°	122° 00′	121° 00′	120° 00′	119° 00′	118° 00′	117° 00′	116° 00′	115° 00′	114° 00′	113° 00′	112° 00′	111° 00′	110° 00′	109° 00′	108° 00′	107° 00′	106° 00′	°
Dec.	238° 00′	239° 00′	240° 00′	241° 00′	242° 00′	243° 00′	244° 00′	245° 00′	246° 00′	247° 00′	248° 00′	249° 00′	250° 00′	251° 00′	252° 00′	253° 00′	254° 00′	Dec.

Local Hour Angle

Always named the same as the Declination.

Table C

Lat	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.40	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	Lat
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
0	72.3	71.7	71.2	70.7	70.2	69.7	69.2	68.7	68.2	67.7	67.2	66.7	66.3	65.8	65.3	64.8	64.4	0
8	72.4	71.9	71.4	70.9	70.4	69.9	69.4	68.9	68.4	67.9	67.4	66.9	66.5	66.0	65.5	65.0	64.6	8
12	72.6	72.1	71.6	71.1	70.6	70.1	69.6	69.1	68.6	68.1	67.7	67.2	66.7	66.2	65.8	65.3	64.8	12
14	72.8	72.2	71.7	71.2	70.7	70.3	69.8	69.3	68.8	68.3	67.8	67.4	66.9	66.4	65.9	65.5	65.0	14
16	72.9	72.4	71.9	71.4	70.9	70.4	69.9	69.4	69.0	68.5	68.0	67.5	67.1	66.6	66.1	65.7	65.2	16
18	73.1	72.6	72.1	71.6	71.1	70.6	70.1	69.6	69.2	68.7	68.2	67.8	67.3	66.8	66.4	65.9	65.5	18
20	73.3	72.8	72.3	71.8	71.3	70.8	70.3	69.9	69.4	68.9	68.5	68.0	67.5	67.1	66.6	66.2	65.7	20
22	73.5	73.0	72.5	72.0	71.5	71.1	70.6	70.1	69.7	69.2	68.7	68.3	67.8	67.4	66.9	66.5	66.0	22
24	73.7	73.2	72.7	72.3	71.8	71.3	70.9	70.4	69.9	69.5	69.0	68.6	68.1	67.7	67.2	66.8	66.3	24
25	73.8	73.3	72.9	72.4	71.9	71.5	71.0	70.5	70.1	69.6	69.2	68.7	68.3	67.8	67.4	66.9	66.5	25
26	74.0	73.5	73.0	72.5	72.1	71.6	71.1	70.7	70.2	69.8	69.3	68.9	68.4	68.0	67.5	67.1	66.7	26
27	74.1	73.6	73.1	72.7	72.2	71.8	71.3	70.8	70.4	69.9	69.5	69.0	68.6	68.2	67.7	67.3	66.8	27
28	74.2	73.8	73.3	72.8	72.4	71.9	71.5	71.0	70.5	70.1	69.7	69.2	68.8	68.3	67.9	67.5	67.0	28
29	74.4	73.9	73.4	73.0	72.5	72.1	71.6	71.2	70.7	70.3	69.8	69.4	69.0	68.5	68.1	67.7	67.2	29
30	74.5	74.1	73.6	73.1	72.7	72.2	71.8	71.3	70.9	70.5	70.0	69.6	69.1	68.7	68.3	67.9	67.4	30
31	74.7	74.2	73.8	73.3	72.9	72.4	72.0	71.5	71.1	70.6	70.2	69.8	69.3	68.9	68.5	68.1	67.6	31
32	74.8	74.4	73.9	73.5	73.0	72.6	72.1	71.7	71.3	70.8	70.4	70.0	69.5	69.1	68.7	68.3	67.9	32
33	75.0	74.5	74.1	73.6	73.2	72.8	72.3	71.9	71.5	71.0	70.6	70.2	69.7	69.3	68.9	68.5	68.1	33
34	75.1	74.7	74.3	73.8	73.4	72.9	72.5	72.1	71.7	71.2	70.8	70.4	70.0	69.5	69.1	68.7	68.3	34
35	75.3	74.9	74.4	74.0	73.6	73.1	72.7	72.3	71.9	71.4	71.0	70.6	70.2	69.8	69.4	68.9	68.5	35
36	75.5	75.1	74.6	74.2	73.8	73.3	72.9	72.5	72.1	71.6	71.2	70.8	70.4	70.0	69.6	69.2	68.8	36
37	75.7	75.2	74.8	74.4	74.0	73.5	73.1	72.7	72.3	71.9	71.5	71.0	70.6	70.2	69.8	69.4	69.0	37
38	75.8	75.4	75.0	74.6	74.2	73.7	73.3	72.9	72.5	72.1	71.7	71.3	70.9	70.5	70.1	69.7	69.3	38
39	76.0	75.6	75.2	74.8	74.4	74.0	73.5	73.1	72.7	72.3	71.9	71.5	71.1	70.7	70.3	69.9	69.5	39
40	76.2	75.8	75.4	75.0	74.6	74.2	73.8	73.4	73.0	72.6	72.2	71.8	71.4	71.0	70.6	70.2	69.8	40
41	76.4	76.0	75.6	75.2	74.8	74.4	74.0	73.6	73.2	72.8	72.4	72.0	71.6	71.2	70.9	70.5	70.1	41
42	76.6	76.2	75.8	75.4	75.0	74.6	74.2	73.8	73.4	73.1	72.7	72.3	71.9	71.5	71.1	70.7	70.4	42
43	76.8	76.4	76.0	75.6	75.2	74.9	74.5	74.1	73.7	73.3	72.9	72.5	72.2	71.8	71.4	71.0	70.7	43
44	77.0	76.6	76.3	75.9	75.5	75.1	74.7	74.3	73.9	73.6	73.2	72.8	72.4	72.1	71.7	71.3	71.0	44
45	77.3	76.9	76.5	76.1	75.7	75.3	75.0	74.6	74.2	73.8	73.5	73.1	72.7	72.3	72.0	71.6	71.3	45
46	77.5	77.1	76.7	76.3	76.0	75.6	75.2	74.8	74.5	74.1	73.7	73.4	73.0	72.6	72.3	71.9	71.6	46
47	77.7	77.3	76.9	76.6	76.2	75.8	75.5	75.1	74.7	74.4	74.0	73.7	73.3	72.9	72.6	72.2	71.9	47
48	77.9	77.5	77.2	76.8	76.5	76.1	75.7	75.4	75.0	74.7	74.3	73.9	73.6	73.2	72.9	72.5	72.2	48
49	78.1	77.8	77.4	77.1	76.7	76.4	76.0	75.6	75.3	74.9	74.6	74.2	73.9	73.6	73.2	72.9	72.5	49
50	78.4	78.0	77.7	77.3	77.0	76.6	76.3	75.9	75.6	75.2	74.9	74.5	74.2	73.9	73.5	73.2	72.9	50
51	78.6	78.3	77.9	77.6	77.2	76.9	76.6	76.2	75.9	75.5	75.2	74.9	74.5	74.2	73.9	73.5	73.2	51
52	78.9	78.5	78.2	77.8	77.5	77.2	76.8	76.5	76.2	75.8	75.5	75.2	74.8	74.5	74.2	73.9	73.5	52
53	79.1	78.8	78.4	78.1	77.8	77.4	77.1	76.8	76.5	76.1	75.8	75.5	75.2	74.8	74.5	74.2	73.9	53
54	79.3	79.0	78.7	78.4	78.1	77.7	77.4	77.1	76.8	76.5	76.1	75.8	75.5	75.2	74.9	74.6	74.2	54
55	79.6	79.3	79.0	78.6	78.3	78.0	77.7	77.4	77.1	76.8	76.5	76.1	75.8	75.5	75.2	74.9	74.6	55
56	79.9	79.5	79.2	78.9	78.6	78.3	78.0	77.7	77.4	77.1	76.8	76.5	76.2	75.9	75.6	75.3	75.0	56
57	80.1	79.8	79.5	79.2	78.9	78.6	78.3	78.0	77.7	77.4	77.1	76.8	76.5	76.2	75.9	75.6	75.3	57
58	80.4	80.1	79.8	79.5	79.2	78.9	78.6	78.3	78.0	77.7	77.5	77.2	76.9	76.6	76.3	76.0	75.7	58
59	80.6	80.4	80.1	79.8	79.5	79.2	78.9	78.6	78.4	78.1	77.8	77.5	77.2	77.0	76.7	76.4	76.1	59
60	80.9	80.6	80.4	80.1	79.8	79.5	79.2	79.0	78.7	78.4	78.1	77.9	77.6	77.3	77.0	76.8	76.5	60
61	81.2	80.9	80.6	80.4	80.1	79.8	79.6	79.3	79.0	78.8	78.5	78.2	78.0	77.7	77.4	77.2	76.9	61
62	81.5	81.2	80.9	80.7	80.4	80.1	79.9	79.6	79.4	79.1	78.8	78.6	78.3	78.1	77.8	77.6	77.3	62
63	81.7	81.5	81.2	81.0	80.7	80.5	80.2	80.0	79.7	79.5	79.2	79.0	78.7	78.5	78.2	78.0	77.7	63
64	82.0	81.8	81.5	81.3	81.0	80.8	80.5	80.3	80.1	79.8	79.6	79.3	79.1	78.8	78.6	78.4	78.1	64
65	82.3	82.1	81.8	81.6	81.3	81.1	80.9	80.6	80.4	80.2	79.9	79.7	79.5	79.2	79.0	78.8	78.5	65
66	82.6	82.4	82.1	81.9	81.7	81.4	81.2	81.0	80.8	80.5	80.3	80.1	79.9	79.6	79.4	79.2	79.0	66
67	82.9	82.7	82.4	82.2	82.0	81.8	81.6	81.3	81.1	80.9	80.7	80.5	80.2	80.0	79.8	79.6	79.4	67
68	83.2	83.0	82.7	82.5	82.3	82.1	81.9	81.7	81.5	81.3	81.1	80.8	80.6	80.4	80.2	80.0	79.8	68
69	83.5	83.3	83.1	82.9	82.6	82.4	82.2	82.0	81.8	81.6	81.4	81.2	81.0	80.8	80.6	80.4	80.2	69
70	83.8	83.6	83.4	83.2	83.0	82.8	82.6	82.4	82.2	82.0	81.8	81.6	81.4	81.3	81.1	80.9	80.7	70
71	84.1	83.9	83.7	83.5	83.3	83.1	82.9	82.8	82.6	82.4	82.2	82.0	81.8	81.7	81.5	81.3	81.1	71
72	84.4	84.2	84.0	83.8	83.7	83.5	83.3	83.1	83.0	82.8	82.6	82.4	82.3	82.1	81.9	81.7	81.6	72
73	84.7	84.5	84.3	84.2	84.0	83.8	83.7	83.5	83.3	83.2	83.0	82.8	82.7	82.5	82.3	82.2	82.0	73
74	85.0	84.8	84.6	84.5	84.3	84.2	84.0	83.9	83.7	83.6	83.4	83.2	83.1	82.9	82.8	82.6	82.5	74
75	85.3	85.1	85.0	84.8	84.7	84.5	84.4	84.2	84.1	83.9	83.8	83.6	83.5	83.4	83.2	83.1	82.9	75
76	85.6	85.4	85.3	85.2	85.0	84.9	84.7	84.6	84.5	84.3	84.2	84.1	83.9	83.8	83.7	83.5	83.4	76
77	85.9	85.8	85.6	85.5	85.4	85.2	85.1	85.0	84.9	84.7	84.6	84.5	84.3	84.2	84.1	84.0	83.8	77
78	86.2	86.1	86.0	85.8	85.7	85.6	85.5	85.4	85.2	85.1	85.0	84.9	84.8	84.7	84.5	84.4	84.3	78
79	86.5	86.4	86.3	86.2	86.1	86.0	85.9	85.7	85.6	85.5	85.4	85.3	85.2	85.1	85.0	84.9	84.8	79
80	86.8	86.7	86.6	86.5	86.4	86.3	86.2	86.1	86.0	85.9	85.8	85.7	85.6	85.5	85.4	85.3	85.2	80

If A & B have the SAME name :- C = (A + B) and C takes the name of A & B.

If A & B have DIFFERENT names :- C = (A ~ B) and C takes the name of A or B, whichever is the larger.

The Azimuth is N or S depending on the name of C and E or W depending on the value of the L.H.A.

(E. if the L.H.A. is between 180° and 360°, W. if the L.H.A. is between 0° and 180°)

Norie's nautical Table, ABC tables for Problem-2 calculation

Norie's Nautical Table for ABC calculation.

ABC method is to calculate the Azimuth.

A=LHA against to Latitude

B=LHA against to Declination

C=A+B (As normal mathematic) (C-Table)

C=(C-Table entry) C against to Latitude

Name azimuth north or south according to the name of C (Same name of C)

East or west Depending LHA (If LHA between 0-180 name will be west, If LHA is between 180-360, name will be east.

Table A

Local Hour Angle

Lat.	74° 00′	75° 00′	76° 00′	77° 00′	78° 00′	79° 00′	80° 00′	81° 00′	82° 00′	83° 00′	84° 00′	85° 00′	86° 00′	87° 00′	88° 00′	89° 00′	90° 00′	Lat.
°	286° 00′	285° 00′	284° 00′	283° 00′	282° 00′	281° 00′	280° 00′	279° 00′	278° 00′	277° 00′	276° 00′	275° 00′	274° 00′	273° 00′	272° 00′	271° 00′	270° 00′	°
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
1	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1
2	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2
3	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	3
4	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	4
5	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	5
6	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	6
7	0.04	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	7
8	0.04	0.04	0.04	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	8
9	0.05	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.00	0.00	9
10	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.00	0.00	10
11	0.06	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.00	0.00	11
12	0.06	0.06	0.05	0.05	0.05	0.04	0.04	0.03	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.00	0.00	12
13	0.07	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.00	0.00	13
14	0.07	0.07	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.02	0.02	0.01	0.01	0.00	0.00	14
15	0.08	0.07	0.07	0.06	0.06	0.05	0.05	0.04	0.04	0.03	0.03	0.02	0.02	0.01	0.01	0.00	0.00	15
16	0.08	0.08	0.07	0.07	0.06	0.06	0.05	0.05	0.04	0.04	0.03	0.03	0.02	0.02	0.01	0.01	0.00	16
17	0.09	0.08	0.08	0.07	0.06	0.06	0.05	0.05	0.04	0.04	0.03	0.03	0.02	0.02	0.01	0.01	0.00	17
18	0.09	0.09	0.08	0.08	0.07	0.06	0.06	0.05	0.05	0.04	0.03	0.03	0.02	0.02	0.01	0.01	0.00	18
19	0.10	0.09	0.09	0.08	0.07	0.07	0.06	0.05	0.05	0.04	0.04	0.03	0.02	0.02	0.01	0.01	0.00	19
20	0.10	0.10	0.09	0.08	0.08	0.07	0.06	0.06	0.05	0.04	0.04	0.03	0.03	0.02	0.01	0.01	0.00	20
21	0.11	0.10	0.10	0.09	0.08	0.07	0.07	0.06	0.05	0.05	0.04	0.03	0.03	0.02	0.01	0.01	0.00	21
22	0.12	0.11	0.10	0.09	0.09	0.08	0.07	0.06	0.06	0.05	0.04	0.04	0.03	0.02	0.01	0.01	0.00	22
23	0.12	0.11	0.11	0.10	0.09	0.08	0.07	0.07	0.06	0.05	0.04	0.04	0.03	0.02	0.01	0.01	0.00	23
24	0.13	0.12	0.11	0.10	0.09	0.09	0.08	0.07	0.06	0.05	0.05	0.04	0.03	0.02	0.02	0.01	0.00	24
25	0.13	0.12	0.12	0.11	0.10	0.09	0.08	0.07	0.07	0.06	0.05	0.04	0.03	0.02	0.02	0.01	0.00	25
26	0.14	0.13	0.12	0.11	0.10	0.09	0.09	0.08	0.07	0.06	0.05	0.04	0.03	0.03	0.02	0.01	0.00	26
27	0.15	0.14	0.13	0.12	0.11	0.10	0.09	0.08	0.07	0.06	0.05	0.04	0.04	0.03	0.02	0.01	0.00	27
28	0.15	0.14	0.13	0.12	0.11	0.10	0.09	0.08	0.07	0.07	0.06	0.05	0.04	0.03	0.02	0.01	0.00	28
29	0.16	0.15	0.14	0.13	0.12	0.11	0.10	0.09	0.08	0.07	0.06	0.05	0.04	0.03	0.02	0.01	0.00	29
30	0.17	0.15	0.14	0.13	0.12	0.11	0.10	0.09	0.08	0.07	0.06	0.05	0.04	0.03	0.02	0.01	0.00	30
31	0.17	0.16	0.15	0.14	0.13	0.12	0.11	0.10	0.08	0.07	0.06	0.05	0.04	0.03	0.02	0.01	0.00	31
32	0.18	0.17	0.16	0.14	0.13	0.12	0.11	0.10	0.09	0.08	0.07	0.05	0.04	0.03	0.02	0.01	0.00	32
33	0.19	0.17	0.16	0.15	0.14	0.13	0.11	0.10	0.09	0.08	0.07	0.06	0.05	0.03	0.02	0.01	0.00	33
34	0.19	0.18	0.17	0.16	0.14	0.13	0.12	0.11	0.09	0.08	0.07	0.06	0.05	0.04	0.02	0.01	0.00	34
35	0.20	0.19	0.17	0.16	0.15	0.14	0.12	0.11	0.10	0.09	0.07	0.06	0.05	0.04	0.02	0.01	0.00	35
36	0.21	0.19	0.18	0.17	0.15	0.14	0.13	0.12	0.10	0.09	0.08	0.06	0.05	0.04	0.03	0.01	0.00	36
37	0.22	0.20	0.19	0.17	0.16	0.15	0.13	0.12	0.11	0.09	0.08	0.07	0.05	0.04	0.03	0.01	0.00	37
38	0.22	0.21	0.19	0.18	0.17	0.15	0.14	0.12	0.11	0.10	0.08	0.07	0.05	0.04	0.03	0.01	0.00	38
39	0.23	0.22	0.20	0.19	0.17	0.16	0.14	0.13	0.11	0.10	0.09	0.07	0.06	0.04	0.03	0.01	0.00	39
40	0.24	0.22	0.21	0.19	0.18	0.16	0.15	0.13	0.12	0.10	0.09	0.07	0.06	0.04	0.03	0.01	0.00	40
41	0.25	0.23	0.22	0.20	0.18	0.17	0.15	0.14	0.12	0.11	0.09	0.08	0.06	0.05	0.03	0.02	0.00	41
42	0.26	0.24	0.22	0.21	0.19	0.18	0.16	0.14	0.13	0.11	0.09	0.08	0.06	0.05	0.03	0.02	0.00	42
43	0.27	0.25	0.23	0.22	0.20	0.18	0.16	0.15	0.13	0.11	0.10	0.08	0.07	0.05	0.03	0.02	0.00	43
44	0.28	0.26	0.24	0.22	0.21	0.19	0.17	0.15	0.14	0.12	0.10	0.08	0.07	0.05	0.03	0.02	0.00	44
45	0.29	0.27	0.25	0.23	0.21	0.19	0.18	0.16	0.14	0.12	0.11	0.09	0.07	0.05	0.03	0.02	0.00	45
46	0.30	0.28	0.26	0.24	0.22	0.20	0.18	0.16	0.15	0.13	0.11	0.09	0.07	0.05	0.04	0.02	0.00	46
47	0.31	0.29	0.27	0.25	0.23	0.21	0.19	0.17	0.15	0.13	0.11	0.09	0.07	0.06	0.04	0.02	0.00	47
48	0.32	0.30	0.28	0.26	0.24	0.22	0.20	0.18	0.16	0.14	0.12	0.10	0.08	0.06	0.04	0.02	0.00	48
49	0.33	0.31	0.29	0.27	0.24	0.22	0.20	0.18	0.16	0.14	0.12	0.10	0.08	0.06	0.04	0.02	0.00	49
50	0.34	0.32	0.30	0.28	0.25	0.23	0.21	0.19	0.17	0.15	0.13	0.10	0.08	0.06	0.04	0.02	0.00	50
51	0.35	0.33	0.31	0.29	0.26	0.24	0.22	0.20	0.17	0.15	0.13	0.11	0.09	0.06	0.04	0.02	0.00	51
52	0.37	0.34	0.32	0.30	0.27	0.25	0.23	0.20	0.18	0.16	0.13	0.11	0.09	0.07	0.04	0.02	0.00	52
53	0.38	0.36	0.33	0.31	0.28	0.26	0.23	0.21	0.19	0.16	0.14	0.12	0.09	0.07	0.05	0.02	0.00	53
54	0.39	0.37	0.34	0.32	0.29	0.27	0.24	0.22	0.19	0.17	0.14	0.12	0.10	0.07	0.05	0.02	0.00	54
55	0.41	0.38	0.36	0.33	0.30	0.28	0.25	0.23	0.20	0.18	0.15	0.12	0.10	0.07	0.05	0.02	0.00	55
56	0.43	0.40	0.37	0.34	0.32	0.29	0.26	0.23	0.21	0.18	0.16	0.13	0.10	0.08	0.05	0.03	0.00	56
57	0.44	0.41	0.38	0.36	0.33	0.30	0.27	0.24	0.22	0.19	0.16	0.13	0.11	0.08	0.05	0.03	0.00	57
58	0.46	0.43	0.40	0.37	0.34	0.31	0.28	0.25	0.22	0.20	0.17	0.14	0.11	0.08	0.06	0.03	0.00	58
59	0.48	0.45	0.41	0.38	0.35	0.32	0.29	0.26	0.23	0.20	0.17	0.15	0.12	0.09	0.06	0.03	0.00	59
60	0.50	0.46	0.43	0.40	0.37	0.34	0.31	0.27	0.24	0.21	0.18	0.15	0.12	0.09	0.06	0.03	0.00	60
°	106° 00′	105° 00′	104° 00′	103° 00′	102° 00′	101° 00′	100° 00′	99° 00′	98° 00′	97° 00′	96° 00′	95° 00′	94° 00′	93° 00′	92° 00′	91° 00′	90° 00′	°
Lat.	254° 00′	255° 00′	256° 00′	257° 00′	258° 00′	259° 00′	260° 00′	261° 00′	262° 00′	263° 00′	264° 00′	265° 00′	266° 00′	267° 00′	268° 00′	269° 00′	270° 00′	Lat

Local Hour Angle

Named opposite to the Latitude, except when the L.H.A. is between 90° and 270°.

Table B

Dec.	Local Hour Angle 74° 00′	75° 00′	76° 00′	77° 00′	78° 00′	79° 00′	80° 00′	81° 00′	82° 00′	83° 00′	84° 00′	85° 00′	86° 00′	87° 00′	88° 00′	89° 00′	90° 00′	Dec.
	286° 00′	285° 00′	284° 00′	283° 00′	282° 00′	281° 00′	280° 00′	279° 00′	278° 00′	277° 00′	276° 00′	275° 00′	274° 00′	273° 00′	272° 00′	271° 00′	270° 00′	
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
1	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	1
2	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	2
3	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	3
4	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	4
5	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	5
6	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	6
7	0.13	0.13	0.13	0.13	0.13	0.13	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	7
8	0.15	0.15	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	8
9	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	9
10	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	10
11	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.19	0.19	0.19	0.19	0.19	11
12	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	12
13	0.24	0.24	0.24	0.24	0.24	0.24	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	13
14	0.26	0.26	0.26	0.26	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	14
15	0.28	0.28	0.28	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	15
16	0.30	0.30	0.30	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	16
17	0.32	0.32	0.32	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	17
18	0.34	0.34	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.32	0.32	18
19	0.36	0.36	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.34	0.34	0.34	0.34	19
20	0.38	0.38	0.38	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.36	0.36	0.36	0.36	0.36	20
21	0.40	0.40	0.40	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.38	0.38	0.38	0.38	0.38	21
22	0.42	0.42	0.42	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.40	0.40	0.40	0.40	22
23	0.44	0.44	0.44	0.44	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.42	0.42	0.42	23
24	0.46	0.46	0.46	0.46	0.46	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	24
25	0.49	0.48	0.48	0.48	0.48	0.48	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	25
26	0.51	0.50	0.50	0.50	0.50	0.50	0.50	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	26
27	0.53	0.53	0.53	0.52	0.52	0.52	0.52	0.52	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	27
28	0.55	0.55	0.55	0.55	0.54	0.54	0.54	0.54	0.54	0.54	0.53	0.53	0.53	0.53	0.53	0.53	0.53	28
29	0.58	0.57	0.57	0.57	0.57	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.55	0.55	0.55	29
30	0.60	0.60	0.60	0.59	0.59	0.59	0.59	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	30
31	0.63	0.62	0.62	0.62	0.61	0.61	0.61	0.61	0.61	0.61	0.60	0.60	0.60	0.60	0.60	0.60	0.60	31
32	0.65	0.65	0.64	0.64	0.64	0.64	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.62	0.62	32
33	0.68	0.67	0.67	0.67	0.66	0.66	0.66	0.66	0.66	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	33
34	0.70	0.70	0.70	0.69	0.69	0.69	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.67	0.67	0.67	34
35	0.73	0.72	0.72	0.72	0.72	0.71	0.71	0.71	0.71	0.71	0.70	0.70	0.70	0.70	0.70	0.70	0.70	35
36	0.76	0.75	0.75	0.75	0.74	0.74	0.74	0.74	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	36
37	0.78	0.78	0.78	0.77	0.77	0.77	0.77	0.76	0.76	0.76	0.76	0.76	0.76	0.75	0.75	0.75	0.75	37
38	0.81	0.81	0.81	0.80	0.80	0.80	0.79	0.79	0.79	0.79	0.79	0.79	0.78	0.78	0.78	0.78	0.78	38
39	0.84	0.84	0.83	0.83	0.83	0.82	0.82	0.82	0.82	0.82	0.81	0.81	0.81	0.81	0.81	0.81	0.81	39
40	0.87	0.87	0.86	0.86	0.86	0.85	0.85	0.85	0.85	0.85	0.84	0.84	0.84	0.84	0.84	0.84	0.84	40
41	0.90	0.90	0.90	0.89	0.89	0.89	0.88	0.88	0.88	0.88	0.87	0.87	0.87	0.87	0.87	0.87	0.87	41
42	0.94	0.93	0.93	0.92	0.92	0.92	0.91	0.91	0.91	0.91	0.91	0.90	0.90	0.90	0.90	0.90	0.90	42
43	0.97	0.97	0.96	0.96	0.95	0.95	0.95	0.94	0.94	0.94	0.94	0.94	0.93	0.93	0.93	0.93	0.93	43
44	1.00	1.00	1.00	0.99	0.99	0.98	0.98	0.98	0.98	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	44
45	1.04	1.04	1.03	1.03	1.02	1.02	1.02	1.01	1.01	1.01	1.01	1.00	1.00	1.00	1.00	1.00	1.00	45
46	1.08	1.07	1.07	1.06	1.06	1.05	1.05	1.05	1.05	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	46
47	1.12	1.11	1.11	1.10	1.10	1.09	1.09	1.09	1.08	1.08	1.08	1.08	1.07	1.07	1.07	1.07	1.07	47
48	1.16	1.15	1.14	1.14	1.14	1.13	1.13	1.12	1.12	1.12	1.12	1.11	1.11	1.11	1.11	1.11	1.11	48
49	1.20	1.19	1.19	1.18	1.18	1.17	1.17	1.16	1.16	1.16	1.16	1.15	1.15	1.15	1.15	1.15	1.15	49
50	1.24	1.23	1.23	1.22	1.22	1.21	1.21	1.21	1.20	1.20	1.20	1.20	1.19	1.19	1.19	1.19	1.19	50
51	1.28	1.28	1.27	1.27	1.26	1.26	1.25	1.25	1.25	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.23	51
52	1.33	1.33	1.32	1.31	1.31	1.30	1.30	1.30	1.29	1.29	1.29	1.28	1.28	1.28	1.28	1.28	1.28	52
53	1.38	1.37	1.37	1.36	1.36	1.35	1.35	1.34	1.34	1.34	1.33	1.33	1.33	1.33	1.33	1.33	1.33	53
54	1.43	1.42	1.42	1.41	1.41	1.40	1.40	1.39	1.39	1.39	1.38	1.38	1.38	1.38	1.38	1.38	1.38	54
55	1.49	1.48	1.47	1.47	1.46	1.45	1.45	1.45	1.44	1.44	1.44	1.43	1.43	1.43	1.43	1.43	1.43	55
56	1.54	1.53	1.53	1.52	1.52	1.51	1.51	1.50	1.50	1.49	1.49	1.49	1.49	1.48	1.48	1.48	1.48	56
57	1.60	1.59	1.59	1.58	1.57	1.57	1.56	1.56	1.55	1.55	1.55	1.55	1.54	1.54	1.54	1.54	1.54	57
58	1.66	1.66	1.65	1.64	1.64	1.63	1.63	1.62	1.62	1.61	1.61	1.61	1.60	1.60	1.60	1.60	1.60	58
59	1.73	1.72	1.72	1.71	1.70	1.70	1.69	1.69	1.68	1.68	1.67	1.67	1.67	1.67	1.67	1.66	1.66	59
60	1.80	1.79	1.79	1.78	1.77	1.76	1.76	1.75	1.75	1.75	1.74	1.74	1.74	1.73	1.73	1.73	1.73	60
°	106° 00′	105° 00′	104° 00′	103° 00′	102° 00′	101° 00′	100° 00′	99° 00′	98° 00′	97° 00′	96° 00′	95° 00′	94° 00′	93° 00′	92° 00′	91° 00′	90° 00′	°
Dec.	254° 00′	255° 00′	256° 00′	257° 00′	258° 00′	259° 00′	260° 00′	261° 00′	262° 00′	263° 00′	264° 00′	265° 00′	266° 00′	267° 00′	268° 00′	269° 00′	270° 00′	Dec.
	Local Hour Angle																	

Always named the same as the Declination.

Table C

Lat	0.16	0.17	0.18	0.19	0.20	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.30	0.31	0.32	Lat
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
0	80.9	80.4	79.8	79.2	78.7	78.1	77.6	77.0	76.5	76.0	75.4	74.9	74.4	73.8	73.3	72.8	72.3	0
8	81.0	80.4	79.9	79.3	78.8	78.3	77.7	77.2	76.6	76.1	75.6	75.0	74.5	74.0	73.5	72.9	72.4	8
12	81.1	80.6	80.0	79.5	78.9	78.4	77.9	77.3	76.8	76.3	75.7	75.2	74.7	74.2	73.6	73.1	72.6	12
14	81.2	80.6	80.1	79.6	79.0	78.5	78.0	77.4	76.9	76.4	75.8	75.3	74.8	74.3	73.8	73.3	72.8	14
16	81.3	80.7	80.2	79.6	79.1	78.6	78.1	77.5	77.0	76.5	76.0	75.5	74.9	74.4	73.9	73.4	72.9	16
18	81.3	80.8	80.3	79.8	79.2	78.7	78.2	77.7	77.1	76.6	76.1	75.6	75.1	74.6	74.1	73.6	73.1	18
20	81.4	80.9	80.4	79.9	79.4	78.8	78.3	77.8	77.3	76.8	76.3	75.8	75.3	74.8	74.3	73.8	73.3	20
22	81.6	81.0	80.5	80.0	79.5	79.0	78.5	78.0	77.5	76.9	76.4	75.9	75.4	75.0	74.5	74.0	73.5	22
24	81.7	81.2	80.7	80.2	79.6	79.1	78.6	78.1	77.6	77.1	76.6	76.1	75.7	75.2	74.7	74.2	73.7	24
25	81.7	81.2	80.7	80.2	79.7	79.2	78.7	78.2	77.7	77.2	76.7	76.2	75.8	75.3	74.8	74.3	73.8	25
26	81.8	81.3	80.8	80.3	79.8	79.3	78.8	78.3	77.8	77.3	76.8	76.4	75.9	75.4	74.9	74.4	74.0	26
27	81.9	81.4	80.9	80.4	79.9	79.4	78.9	78.4	77.9	77.4	77.0	76.5	76.0	75.5	75.0	74.6	74.1	27
28	82.0	81.5	81.0	80.5	80.0	79.5	79.0	78.5	78.0	77.6	77.1	76.6	76.1	75.6	75.2	74.7	74.2	28
29	82.0	81.5	81.1	80.6	80.1	79.6	79.1	78.6	78.1	77.7	77.2	76.7	76.2	75.8	75.3	74.8	74.4	29
30	82.1	81.6	81.1	80.7	80.2	79.7	79.2	78.7	78.3	77.8	77.3	76.8	76.4	75.9	75.4	75.0	74.5	30
31	82.2	81.7	81.2	80.7	80.3	79.8	79.3	78.8	78.4	77.9	77.4	77.0	76.5	76.0	75.6	75.1	74.7	31
32	82.3	81.8	81.3	80.8	80.4	79.9	79.4	79.0	78.5	78.0	77.6	77.1	76.6	76.2	75.7	75.3	74.8	32
33	82.4	81.9	81.4	80.9	80.5	80.0	79.5	79.1	78.6	78.2	77.7	77.2	76.8	76.3	75.9	75.4	75.0	33
34	82.4	82.0	81.5	81.0	80.6	80.1	79.7	79.2	78.7	78.3	77.8	77.4	76.9	76.5	76.0	75.6	75.1	34
35	82.5	82.1	81.6	81.2	80.7	80.2	79.8	79.3	78.9	78.4	78.0	77.5	77.1	76.6	76.2	75.8	75.3	35
36	82.6	82.2	81.7	81.3	80.8	80.4	79.9	79.5	79.0	78.6	78.1	77.7	77.2	76.8	76.4	75.9	75.5	36
37	82.7	82.3	81.8	81.4	80.9	80.5	80.0	79.6	79.1	78.7	78.3	77.8	77.4	77.0	76.5	76.1	75.7	37
38	82.8	82.4	81.9	81.5	81.0	80.6	80.2	79.7	79.3	78.9	78.4	78.0	77.6	77.1	76.7	76.3	75.8	38
39	82.9	82.5	82.0	81.6	81.2	80.7	80.3	79.9	79.4	79.0	78.6	78.1	77.7	77.3	76.9	76.5	76.0	39
40	83.0	82.6	82.1	81.7	81.3	80.9	80.4	80.0	79.6	79.2	78.7	78.3	77.9	77.5	77.1	76.6	76.2	40
41	83.1	82.7	82.3	81.8	81.4	81.0	80.6	80.2	79.7	79.3	78.9	78.5	78.1	77.7	77.2	76.8	76.4	41
42	83.2	82.8	82.4	82.0	81.5	81.1	80.7	80.3	79.9	79.5	79.1	78.7	78.2	77.8	77.4	77.0	76.6	42
43	83.3	82.9	82.5	82.1	81.7	81.3	80.9	80.5	80.0	79.6	79.2	78.8	78.4	78.0	77.6	77.2	76.8	43
44	83.4	83.0	82.6	82.2	81.8	81.4	81.0	80.6	80.2	79.8	79.4	79.0	78.6	78.2	77.8	77.4	77.0	44
45	83.5	83.1	82.7	82.3	82.0	81.6	81.2	80.8	80.4	80.0	79.6	79.2	78.8	78.4	78.0	77.6	77.3	45
46	83.7	83.3	82.9	82.5	82.1	81.7	81.3	80.9	80.5	80.1	79.8	79.4	79.0	78.6	78.2	77.8	77.5	46
47	83.8	83.4	83.0	82.6	82.2	81.8	81.5	81.1	80.7	80.3	79.9	79.6	79.2	78.8	78.4	78.1	77.7	47
48	83.9	83.5	83.1	82.8	82.4	82.0	81.6	81.3	80.9	80.5	80.1	79.8	79.4	79.0	78.6	78.3	77.9	48
49	84.0	83.6	83.3	82.9	82.5	82.2	81.8	81.4	81.1	80.7	80.3	80.0	79.6	79.2	78.9	78.5	78.1	49
50	84.1	83.8	83.4	83.0	82.7	82.3	82.0	81.6	81.2	80.9	80.5	80.2	79.8	79.4	79.1	78.7	78.4	50
51	84.3	83.9	83.5	83.2	82.8	82.5	82.1	81.8	81.4	81.1	80.7	80.4	80.0	79.7	79.3	79.0	78.6	51
52	84.4	84.0	83.7	83.3	83.0	82.6	82.3	81.9	81.6	81.2	80.9	80.6	80.2	79.9	79.5	79.2	78.9	52
53	84.5	84.2	83.8	83.5	83.1	82.8	82.5	82.1	81.8	81.4	81.1	80.8	80.4	80.1	79.8	79.4	79.1	53
54	84.6	84.3	84.0	83.6	83.3	83.0	82.6	82.3	82.0	81.6	81.3	81.0	80.7	80.3	80.0	79.7	79.3	54
55	84.8	84.4	84.1	83.8	83.5	83.1	82.8	82.5	82.2	81.8	81.5	81.2	80.9	80.6	80.2	79.9	79.6	55
56	84.9	84.6	84.3	83.9	83.6	83.3	83.0	82.7	82.4	82.0	81.7	81.4	81.1	80.8	80.5	80.2	79.9	56
57	85.0	84.7	84.4	84.1	83.8	83.5	83.2	82.9	82.6	82.2	81.9	81.6	81.3	81.0	80.7	80.4	80.1	57
58	85.2	84.9	84.6	84.3	84.0	83.7	83.4	83.1	82.8	82.5	82.2	81.9	81.6	81.3	81.0	80.7	80.4	58
59	85.3	85.0	84.7	84.4	84.1	83.8	83.5	83.2	83.0	82.7	82.4	82.1	81.8	81.5	81.2	80.9	80.6	59
60	85.4	85.1	84.9	84.6	84.3	84.0	83.7	83.4	83.2	82.9	82.6	82.3	82.0	81.7	81.5	81.2	80.9	60
61	85.6	85.3	85.0	84.7	84.5	84.2	83.9	83.6	83.4	83.1	82.8	82.5	82.3	82.0	81.7	81.5	81.2	61
62	85.7	85.4	85.2	84.9	84.6	84.4	84.1	83.8	83.6	83.3	83.0	82.8	82.5	82.2	82.0	81.7	81.5	62
63	85.8	85.6	85.3	85.1	84.8	84.6	84.3	84.0	83.8	83.5	83.3	83.0	82.8	82.5	82.2	82.0	81.7	63
64	86.0	85.7	85.5	85.2	85.0	84.7	84.5	84.2	84.0	83.7	83.5	83.2	83.0	82.8	82.5	82.3	82.0	64
65	86.1	85.9	85.6	85.4	85.2	84.9	84.7	84.4	84.2	84.0	83.7	83.5	83.3	83.0	82.8	82.5	82.3	65
66	86.3	86.0	85.8	85.6	85.3	85.1	84.9	84.7	84.4	84.2	84.0	83.7	83.5	83.3	83.0	82.8	82.6	66
67	86.4	86.2	86.0	85.8	85.5	85.3	85.1	84.9	84.6	84.4	84.2	84.0	83.8	83.5	83.3	83.1	82.9	67
68	86.6	86.4	86.1	85.9	85.7	85.5	85.3	85.1	84.9	84.6	84.4	84.2	84.0	83.8	83.6	83.4	83.2	68
69	86.7	86.5	86.3	86.1	85.9	85.7	85.5	85.3	85.1	84.9	84.7	84.5	84.3	84.1	83.9	83.7	83.5	69
70	86.9	86.7	86.5	86.3	86.1	85.9	85.7	85.5	85.3	85.1	84.9	84.7	84.5	84.3	84.1	83.9	83.8	70
71	87.0	86.8	86.6	86.5	86.3	86.1	85.9	85.7	85.5	85.3	85.2	85.0	84.8	84.6	84.4	84.2	84.1	71
72	87.2	87.0	86.8	86.6	86.5	86.3	86.1	85.9	85.8	85.6	85.4	85.2	85.1	84.9	84.7	84.5	84.4	72
73	87.3	87.2	87.0	86.8	86.7	86.5	86.3	86.2	86.0	85.8	85.7	85.5	85.3	85.2	85.0	84.8	84.7	73
74	87.5	87.3	87.2	87.0	86.8	86.7	86.5	86.4	86.2	86.1	85.9	85.7	85.6	85.4	85.3	85.1	85.0	74
75	87.6	87.5	87.3	87.2	87.0	86.9	86.7	86.6	86.4	86.3	86.2	86.0	85.9	85.7	85.6	85.4	85.3	75
76	87.8	87.6	87.5	87.4	87.2	87.1	87.0	86.8	86.7	86.5	86.4	86.3	86.1	86.0	85.8	85.7	85.6	76
77	87.9	87.8	87.7	87.6	87.4	87.3	87.2	87.0	86.9	86.8	86.7	86.5	86.4	86.3	86.1	86.0	85.9	77
78	88.1	88.0	87.9	87.7	87.6	87.5	87.4	87.3	87.1	87.0	86.9	86.8	86.7	86.5	86.4	86.3	86.2	78
79	88.3	88.1	88.0	87.9	87.8	87.7	87.6	87.5	87.4	87.3	87.2	87.1	86.9	86.8	86.7	86.6	86.5	79
80	88.4	88.3	88.2	88.1	88.0	87.9	87.8	87.7	87.6	87.5	87.4	87.3	87.2	87.1	87.0	86.9	86.8	80

If A & B have the SAME name :- C = (A + B) and C takes the name of A & B.

If A & B have DIFFERENT names :- C = (A − B) and C takes the name of A or B, whichever is the larger.

The Azimuth is N or S depending on the name of C and E or W depending on the value of the L.H.A.

(E. if the L.H.A. is between 180° and 360°, W. if the L.H.A. is between 0° and 180°)

Norie's nautical Table, ABC tables for Problem-3 calculation

Norie's Nautical Table for ABC calculation.

ABC method is to calculate the Azimuth.

A=LHA against to Latitude

B=LHA against to Declination

C=A+B (As normal mathematic) (C-Table)

C=(C-Table entry) C against to Latitude

Name azimuth north or south according to the name of C (Same name of C)

East or west Depending LHA (If LHA between 0-180 name

West, If LHA is between 180-360, Name East.

Table A

Local Hour Angle

Lat.	3° 24′	3° 36′	3° 48′	4° 00′	4° 12′	4° 24′	4° 36′	4° 48′	5° 00′	5° 12′	5° 24′	5° 36′	5° 48′	6° 00′	6° 12′	6° 24′	6° 36′	Lat.
°	356° 36′	356° 24′	356° 12′	356° 00′	355° 48′	355° 36′	355° 24′	355° 12′	355° 00′	354° 48′	354° 36′	354° 24′	354° 12′	354° 00′	353° 48′	353° 36′	353° 24′	°
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
1	0.29	0.28	0.26	0.25	0.24	0.23	0.22	0.21	0.20	0.19	0.18	0.18	0.17	0.17	0.16	0.16	0.15	1
2	0.59	0.56	0.53	0.50	0.48	0.45	0.43	0.42	0.40	0.38	0.37	0.36	0.34	0.33	0.32	0.31	0.30	2
3	0.88	0.83	0.79	0.75	0.71	0.68	0.65	0.62	0.60	0.58	0.55	0.53	0.52	0.50	0.48	0.47	0.45	3
4	1.18	1.11	1.05	1.00	0.95	0.91	0.87	0.83	0.80	0.77	0.74	0.71	0.69	0.67	0.64	0.62	0.60	4
5	1.47	1.39	1.32	1.25	1.19	1.14	1.09	1.04	1.00	0.96	0.93	0.89	0.86	0.83	0.81	0.78	0.76	5
6	1.77	1.67	1.58	1.50	1.43	1.37	1.31	1.25	1.20	1.15	1.11	1.07	1.03	1.00	0.97	0.94	0.91	6
7	2.07	1.95	1.85	1.76	1.67	1.60	1.53	1.46	1.40	1.35	1.30	1.25	1.21	1.17	1.13	1.09	1.06	7
8	2.37	2.23	2.12	2.01	1.91	1.83	1.75	1.67	1.61	1.54	1.49	1.43	1.38	1.34	1.29	1.25	1.21	8
9	2.67	2.52	2.38	2.27	2.16	2.06	1.97	1.89	1.81	1.74	1.68	1.62	1.56	1.51	1.46	1.41	1.37	9
10	2.97	2.80	2.65	2.52	2.40	2.29	2.19	2.10	2.02	1.94	1.87	1.80	1.74	1.68	1.62	1.57	1.52	10
11	3.27	3.09	2.93	2.78	2.65	2.53	2.42	2.31	2.22	2.14	2.06	1.98	1.91	1.85	1.79	1.73	1.68	11
12	3.58	3.38	3.20	3.04	2.89	2.76	2.64	2.53	2.43	2.34	2.25	2.17	2.09	2.02	1.96	1.89	1.84	12
13	3.89	3.67	3.48	3.30	3.14	3.00	2.87	2.75	2.64	2.54	2.44	2.35	2.27	2.20	2.13	2.06	2.00	13
14	4.20	3.96	3.75	3.57	3.40	3.24	3.10	2.97	2.85	2.74	2.64	2.54	2.45	2.37	2.30	2.22	2.15	14
15	4.51	4.26	4.03	3.83	3.65	3.48	3.33	3.19	3.06	2.94	2.83	2.73	2.64	2.55	2.47	2.39	2.32	15
16	4.83	4.56	4.32	4.10	3.90	3.73	3.56	3.41	3.28	3.15	3.03	2.92	2.82	2.73	2.64	2.56	2.48	16
17	5.15	4.86	4.60	4.37	4.16	3.97	3.80	3.64	3.49	3.36	3.23	3.12	3.01	2.91	2.81	2.73	2.64	17
18	5.47	5.16	4.89	4.65	4.42	4.22	4.04	3.87	3.71	3.57	3.44	3.31	3.20	3.09	2.99	2.90	2.81	18
19	5.80	5.47	5.18	4.92	4.69	4.47	4.28	4.10	3.94	3.78	3.64	3.51	3.39	3.28	3.17	3.07	2.98	19
20	6.13	5.79	5.48	5.21	4.96	4.73	4.52	4.33	4.16	4.00	3.85	3.71	3.58	3.46	3.35	3.24	3.15	20
21	6.46	6.10	5.78	5.49	5.23	4.99	4.77	4.57	4.39	4.22	4.06	3.91	3.78	3.65	3.53	3.42	3.32	21
22	6.80	6.42	6.08	5.78	5.50	5.25	5.02	4.81	4.62	4.44	4.27	4.12	3.98	3.84	3.72	3.60	3.49	22
23	7.14	6.75	6.39	6.07	5.78	5.52	5.28	5.05	4.85	4.66	4.49	4.33	4.18	4.04	3.91	3.78	3.67	23
24	7.49	7.08	6.70	6.37	6.06	5.79	5.53	5.30	5.09	4.89	4.71	4.54	4.38	4.24	4.10	3.97	3.85	24
25	7.85	7.41	7.02	6.67	6.35	6.06	5.80	5.55	5.33	5.12	4.93	4.76	4.59	4.44	4.29	4.16	4.03	25
26	8.21	7.75	7.34	6.97	6.64	6.34	6.06	5.81	5.57	5.36	5.16	4.97	4.80	4.64	4.49	4.35	4.22	26
27	8.58	8.10	7.67	7.29	6.94	6.62	6.33	6.07	5.82	5.60	5.39	5.20	5.02	4.85	4.69	4.54	4.40	27
28	8.95	8.45	8.01	7.60	7.24	6.91	6.61	6.33	6.08	5.84	5.62	5.42	5.23	5.06	4.89	4.74	4.60	28
29	9.33	8.81	8.35	7.93	7.55	7.20	6.89	6.60	6.34	6.09	5.86	5.65	5.46	5.27	5.10	4.94	4.79	29
30	9.72	9.18	8.69	8.26	7.86	7.50	7.18	6.88	6.60	6.34	6.11	5.89	5.68	5.49	5.31	5.15	4.99	30
31	10.1	9.55	9.05	8.59	8.18	7.81	7.47	7.16	6.87	6.60	6.36	6.13	5.92	5.72	5.53	5.36	5.19	31
32	10.5	9.93	9.41	8.94	8.51	8.12	7.77	7.44	7.14	6.87	6.61	6.37	6.15	5.95	5.75	5.57	5.40	32
33	10.9	10.3	9.78	9.29	8.84	8.44	8.07	7.73	7.42	7.14	6.87	6.62	6.39	6.18	5.98	5.79	5.61	33
34	11.4	10.7	10.2	9.65	9.19	8.77	8.38	8.03	7.71	7.41	7.14	6.88	6.64	6.42	6.21	6.01	5.83	34
35	11.8	11.1	10.5	10.0	9.54	9.10	8.70	8.34	8.00	7.69	7.41	7.14	6.89	6.66	6.45	6.24	6.05	35
36	12.2	11.5	10.9	10.4	9.89	9.44	9.03	8.65	8.30	7.98	7.69	7.41	7.15	6.91	6.69	6.48	6.28	36
37	12.7	12.0	11.3	10.8	10.3	9.79	9.37	8.97	8.61	8.28	7.97	7.69	7.42	7.17	6.94	6.72	6.51	37
38	13.2	12.4	11.8	11.2	10.6	10.2	9.71	9.30	8.93	8.58	8.27	7.97	7.69	7.43	7.19	6.97	6.75	38
39	13.6	12.9	12.2	11.6	11.0	10.5	10.1	9.64	9.26	8.90	8.57	8.26	7.97	7.70	7.45	7.22	7.00	39
40	14.1	13.3	12.6	12.0	11.4	10.9	10.4	9.99	9.59	9.22	8.88	8.56	8.26	7.98	7.72	7.48	7.25	40
41	14.6	13.8	13.1	12.4	11.8	11.3	10.8	10.4	9.94	9.55	9.20	8.87	8.56	8.27	8.00	7.75	7.51	41
42	15.2	14.3	13.6	12.9	12.3	11.7	11.2	10.7	10.3	9.89	9.53	9.18	8.86	8.57	8.29	8.03	7.78	42
43	15.7	14.8	14.0	13.3	12.7	12.1	11.6	11.1	10.7	10.2	9.86	9.51	9.18	8.87	8.58	8.31	8.06	43
44	16.3	15.3	14.5	13.8	13.2	12.6	12.0	11.5	11.0	10.6	10.2	9.85	9.51	9.19	8.89	8.61	8.35	44
45	16.8	15.9	15.1	14.3	13.6	13.0	12.4	11.9	11.4	11.0	10.6	10.2	9.84	9.51	9.21	8.92	8.64	45
46	17.4	16.5	15.6	14.8	14.1	13.5	12.9	12.3	11.8	11.4	11.0	10.6	10.2	9.85	9.53	9.23	8.95	46
47	18.1	17.0	16.1	15.3	14.6	13.9	13.3	12.8	12.3	11.8	11.3	10.9	10.6	10.2	9.87	9.56	9.27	47
48	18.7	17.7	16.7	15.9	15.1	14.4	13.8	13.2	12.7	12.2	11.7	11.3	10.9	10.6	10.2	9.90	9.60	48
49	19.4	18.3	17.3	16.5	15.7	15.0	14.3	13.7	13.1	12.6	12.2	11.7	11.3	10.9	10.6	10.3	9.94	49
50	20.1	18.9	17.9	17.0	16.2	15.5	14.8	14.2	13.6	13.1	12.6	12.2	11.7	11.3	11.0	10.6	10.3	50
51	20.8	19.6	18.6	17.7	16.8	16.0	15.3	14.7	14.1	13.6	13.1	12.6	12.2	11.7	11.4	11.0	10.7	51
52	21.5	20.3	19.3	18.3	17.4	16.6	15.9	15.2	14.6	14.1	13.5	13.1	12.6	12.2	11.8	11.4	11.1	52
53	22.3	21.1	20.0	19.0	18.1	17.2	16.5	15.8	15.2	14.6	14.0	13.5	13.1	12.6	12.2	11.8	11.5	53
54	23.2	21.9	20.7	19.7	18.7	17.9	17.1	16.4	15.7	15.1	14.6	14.0	13.6	13.1	12.7	12.3	11.9	54
55	24.0	22.7	21.5	20.4	19.4	18.6	17.8	17.0	16.3	15.7	15.1	14.6	14.1	13.6	13.1	12.7	12.3	55
56	25.0	23.6	22.3	21.2	20.2	19.3	18.4	17.7	16.9	16.3	15.7	15.1	14.6	14.1	13.6	13.2	12.8	56
57	25.9	24.5	23.2	22.0	21.0	20.0	19.1	18.3	17.6	16.9	16.3	15.7	15.2	14.7	14.2	13.7	13.3	57
58	26.9	25.4	24.1	22.9	21.8	20.8	19.9	19.1	18.3	17.6	16.9	16.3	15.8	15.2	14.7	14.3	13.8	58
59	28.0	26.5	25.1	23.8	22.7	21.6	20.7	19.8	19.0	18.3	17.6	17.0	16.4	15.8	15.3	14.8	14.4	59
60	29.2	27.5	26.1	24.8	23.6	22.5	21.5	20.6	19.8	19.0	18.3	17.7	17.1	16.5	15.9	15.4	15.0	60
°	176° 36′	176° 24′	176° 12′	176° 00′	175° 48′	175° 36′	175° 24′	175° 12′	175° 00′	174° 48′	174° 36′	174° 24′	174° 12′	174° 00′	173° 48′	173° 36′	173° 24′	°
Lat.	183° 24′	183° 36′	183° 48′	184° 00′	184° 12′	184° 24′	184° 36′	184° 48′	185° 00′	185° 12′	185° 24′	185° 36′	185° 48′	186° 00′	186° 12′	186° 24′	186° 36′	Lat.

Local Hour Angle

Named opposite to the Latitude, except when the L.H.A. is between 90° and 270°.

Table B

Local Hour Angle

Dec.	3° 24′	3° 36′	3° 48′	4° 00′	4° 12′	4° 24′	4° 36′	4° 48′	5° 00′	5° 12′	5° 24′	5° 36′	5° 48′	6° 00′	6° 12′	6° 24′	6° 36′	Dec.
°	356° 36′	356° 24′	356° 12′	356° 00′	355° 48′	355° 36′	355° 24′	355° 12′	355° 00′	354° 48′	354° 36′	354° 24′	354° 12′	354° 00′	353° 48′	353° 36′	353° 24′	°
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
1	0.29	0.28	0.26	0.25	0.24	0.23	0.22	0.21	0.20	0.19	0.19	0.18	0.17	0.17	0.16	0.16	0.15	1
2	0.59	0.56	0.53	0.50	0.48	0.46	0.44	0.42	0.40	0.39	0.37	0.36	0.35	0.33	0.32	0.31	0.30	2
3	0.88	0.83	0.79	0.75	0.72	0.68	0.65	0.63	0.60	0.58	0.56	0.54	0.52	0.50	0.49	0.47	0.46	3
4	1.18	1.11	1.06	1.00	0.95	0.91	0.87	0.84	0.80	0.77	0.74	0.72	0.69	0.67	0.65	0.63	0.61	4
5	1.48	1.39	1.32	1.25	1.19	1.14	1.09	1.05	1.00	0.97	0.93	0.90	0.87	0.84	0.81	0.78	0.76	5
6	1.77	1.67	1.59	1.51	1.44	1.37	1.31	1.26	1.21	1.16	1.12	1.08	1.04	1.01	0.97	0.94	0.91	6
7	2.07	1.96	1.85	1.76	1.68	1.60	1.53	1.47	1.41	1.35	1.30	1.26	1.22	1.17	1.14	1.10	1.07	7
8	2.37	2.24	2.12	2.01	1.92	1.83	1.75	1.68	1.61	1.55	1.49	1.44	1.39	1.34	1.30	1.26	1.22	8
9	2.67	2.52	2.39	2.27	2.16	2.06	1.97	1.89	1.82	1.75	1.68	1.62	1.57	1.52	1.47	1.42	1.38	9
10	2.97	2.81	2.66	2.53	2.41	2.30	2.20	2.11	2.02	1.95	1.87	1.81	1.74	1.69	1.63	1.58	1.53	10
11	3.28	3.10	2.93	2.79	2.65	2.53	2.42	2.32	2.23	2.14	2.07	1.99	1.92	1.86	1.80	1.74	1.69	11
12	3.58	3.39	3.21	3.05	2.90	2.77	2.65	2.54	2.44	2.35	2.26	2.18	2.10	2.03	1.97	1.91	1.85	12
13	3.89	3.68	3.48	3.31	3.15	3.01	2.88	2.76	2.65	2.55	2.45	2.37	2.28	2.21	2.14	2.07	2.01	13
14	4.20	3.97	3.76	3.57	3.40	3.25	3.11	2.98	2.86	2.75	2.65	2.56	2.47	2.39	2.31	2.24	2.17	14
15	4.52	4.27	4.04	3.84	3.66	3.49	3.34	3.20	3.07	2.96	2.85	2.75	2.65	2.56	2.48	2.40	2.33	15
16	4.83	4.57	4.33	4.11	3.92	3.74	3.58	3.43	3.29	3.16	3.05	2.94	2.84	2.74	2.66	2.57	2.49	16
17	5.16	4.87	4.61	4.38	4.17	3.99	3.81	3.65	3.51	3.37	3.25	3.13	3.03	2.92	2.83	2.74	2.66	17
18	5.48	5.17	4.90	4.66	4.44	4.24	4.05	3.88	3.73	3.59	3.45	3.33	3.22	3.11	3.01	2.91	2.83	18
19	5.81	5.48	5.20	4.94	4.70	4.49	4.29	4.11	3.95	3.80	3.66	3.53	3.41	3.29	3.19	3.09	3.00	19
20	6.14	5.80	5.49	5.22	4.97	4.74	4.54	4.35	4.18	4.02	3.87	3.73	3.60	3.48	3.37	3.27	3.17	20
21	6.47	6.11	5.79	5.50	5.24	5.00	4.79	4.59	4.40	4.24	4.08	3.93	3.80	3.67	3.55	3.44	3.34	21
22	6.81	6.43	6.10	5.79	5.52	5.27	5.04	4.83	4.64	4.46	4.29	4.14	4.00	3.87	3.74	3.62	3.52	22
23	7.16	6.76	6.40	6.09	5.80	5.53	5.29	5.07	4.87	4.68	4.51	4.35	4.20	4.06	3.93	3.81	3.69	23
24	7.51	7.09	6.72	6.38	6.08	5.80	5.55	5.32	5.11	4.91	4.73	4.56	4.41	4.26	4.12	3.99	3.87	24
25	7.86	7.43	7.04	6.68	6.37	6.08	5.81	5.57	5.35	5.15	4.96	4.78	4.61	4.46	4.32	4.18	4.06	25
26	8.22	7.77	7.36	6.99	6.66	6.36	6.08	5.83	5.60	5.38	5.18	5.00	4.83	4.67	4.52	4.38	4.24	26
27	8.59	8.11	7.69	7.30	6.96	6.64	6.35	6.09	5.85	5.62	5.41	5.22	5.04	4.87	4.72	4.57	4.43	27
28	8.97	8.47	8.02	7.62	7.26	6.93	6.63	6.35	6.10	5.87	5.65	5.45	5.26	5.09	4.92	4.77	4.63	28
29	9.35	8.83	8.36	7.95	7.57	7.23	6.91	6.62	6.36	6.12	5.89	5.68	5.49	5.30	5.13	4.97	4.82	29
30	9.74	9.19	8.71	8.28	7.88	7.53	7.20	6.90	6.62	6.37	6.13	5.92	5.71	5.52	5.35	5.18	5.02	30
31	10.1	9.57	9.07	8.61	8.20	7.83	7.49	7.18	6.89	6.63	6.38	6.16	5.95	5.75	5.56	5.39	5.23	31
32	10.5	9.95	9.43	8.96	8.53	8.14	7.79	7.47	7.17	6.89	6.64	6.40	6.18	5.98	5.79	5.61	5.44	32
33	11.0	10.3	9.80	9.31	8.87	8.46	8.10	7.76	7.45	7.17	6.90	6.65	6.43	6.21	6.01	5.83	5.65	33
34	11.4	10.7	10.2	9.67	9.21	8.79	8.41	8.06	7.74	7.44	7.17	6.91	6.67	6.45	6.25	6.05	5.87	34
35	11.8	11.2	10.6	10.0	9.56	9.13	8.73	8.37	8.03	7.73	7.44	7.18	6.93	6.70	6.48	6.28	6.09	35
36	12.3	11.6	11.0	10.4	9.92	9.47	9.06	8.68	8.34	8.02	7.72	7.45	7.19	6.95	6.73	6.52	6.32	36
37	12.7	12.0	11.4	10.8	10.3	9.82	9.40	9.01	8.65	8.31	8.01	7.72	7.46	7.21	6.98	6.76	6.56	37
38	13.2	12.4	11.8	11.2	10.7	10.2	9.74	9.34	8.96	8.62	8.30	8.01	7.73	7.47	7.23	7.01	6.80	38
39	13.7	12.9	12.2	11.6	11.1	10.6	10.1	9.68	9.29	8.93	8.60	8.30	8.01	7.75	7.50	7.26	7.05	39
40	14.1	13.4	12.7	12.0	11.5	10.9	10.5	10.0	9.63	9.26	8.92	8.60	8.30	8.03	7.77	7.53	7.30	40
41	14.7	13.8	13.1	12.5	11.9	11.3	10.8	10.4	9.97	9.59	9.24	8.91	8.60	8.32	8.05	7.80	7.56	41
42	15.2	14.3	13.6	12.9	12.3	11.7	11.2	10.8	10.3	9.93	9.57	9.23	8.91	8.61	8.34	8.08	7.83	42
43	15.7	14.9	14.1	13.4	12.7	12.2	11.6	11.1	10.7	10.3	9.91	9.56	9.23	8.92	8.63	8.37	8.11	43
44	16.3	15.4	14.6	13.8	13.2	12.6	12.0	11.5	11.1	10.7	10.3	9.90	9.56	9.24	8.94	8.66	8.40	44
45	16.9	15.9	15.1	14.3	13.7	13.0	12.5	12.0	11.5	11.0	10.6	10.2	9.90	9.57	9.26	8.97	8.70	45
46	17.5	16.5	15.6	14.8	14.1	13.5	12.9	12.4	11.9	11.4	11.0	10.6	10.2	9.91	9.59	9.29	9.01	46
47	18.1	17.1	16.2	15.4	14.6	14.0	13.4	12.8	12.3	11.8	11.4	11.0	10.6	10.3	9.93	9.62	9.33	47
48	18.7	17.7	16.8	15.9	15.2	14.5	13.8	13.3	12.7	12.3	11.8	11.4	11.0	10.6	10.3	9.96	9.66	48
49	19.4	18.3	17.4	16.5	15.7	15.0	14.3	13.7	13.2	12.7	12.2	11.8	11.4	11.0	10.7	10.3	10.0	49
50	20.1	19.0	18.0	17.1	16.3	15.5	14.9	14.2	13.7	13.1	12.7	12.2	11.8	11.4	11.0	10.7	10.4	50
51	20.8	19.7	18.6	17.7	16.9	16.1	15.4	14.8	14.2	13.6	13.1	12.7	12.2	11.8	11.4	11.1	10.7	51
52	21.6	20.4	19.3	18.3	17.5	16.7	16.0	15.3	14.7	14.1	13.6	13.1	12.7	12.2	11.9	11.5	11.1	52
53	22.4	21.1	20.0	19.0	18.1	17.3	16.5	15.9	15.2	14.6	14.1	13.6	13.1	12.7	12.3	11.9	11.5	53
54	23.2	21.9	20.8	19.7	18.8	17.9	17.2	16.4	15.8	15.2	14.6	14.1	13.6	13.2	12.7	12.3	12.0	54
55	24.1	22.7	21.5	20.5	19.5	18.6	17.8	17.1	16.4	15.8	15.2	14.6	14.1	13.7	13.2	12.8	12.4	55
56	25.0	23.6	22.4	21.3	20.2	19.3	18.5	17.7	17.0	16.4	15.8	15.2	14.7	14.2	13.7	13.3	12.9	56
57	26.0	24.5	23.2	22.1	21.0	20.1	19.2	18.4	17.7	17.0	16.4	15.8	15.2	14.7	14.3	13.8	13.4	57
58	27.0	25.5	24.1	22.9	21.9	20.9	20.0	19.1	18.4	17.7	17.0	16.4	15.8	15.3	14.8	14.4	13.9	58
59	28.1	26.5	25.1	23.9	22.7	21.7	20.8	19.9	19.1	18.4	17.7	17.1	16.5	15.9	15.4	14.9	14.5	59
60	29.2	27.6	26.1	24.8	23.6	22.6	21.6	20.7	19.9	19.1	18.4	17.7	17.1	16.6	16.0	15.5	15.1	60
°	176° 36′	176° 24′	176° 12′	176° 00′	175° 48′	175° 36′	175° 24′	175° 12′	175° 00′	174° 48′	174° 36′	174° 24′	174° 12′	174° 00′	173° 48′	173° 36′	173° 24′	°
Dec.	183° 24′	183° 36′	183° 48′	184° 00′	184° 12′	184° 24′	184° 36′	184° 48′	185° 00′	185° 12′	185° 24′	185° 36′	185° 48′	186° 00′	186° 12′	186° 24′	186° 36′	Dec.

Local Hour Angle

Always named the same as the Declination.

Table C

Lat	7.00	7.20	7.40	7.60	7.80	8.00	8.20	8.40	8.60	8.80	9.00	9.30	9.60	10.0	10.3	10.6	11.0	Lat
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
0	8.1	7.9	7.7	7.5	7.3	7.1	7.0	6.8	6.6	6.5	6.3	6.1	5.9	5.7	5.5	5.4	5.2	0
8	8.2	8.0	7.8	7.6	7.4	7.2	7.0	6.9	6.7	6.5	6.4	6.2	6.0	5.8	5.6	5.4	5.2	8
12	8.3	8.1	7.9	7.7	7.5	7.3	7.1	6.9	6.8	6.6	6.5	6.3	6.1	5.8	5.7	5.5	5.3	12
14	8.4	8.1	7.9	7.7	7.5	7.3	7.2	7.0	6.8	6.7	6.5	6.3	6.1	5.9	5.7	5.6	5.4	14
16	8.5	8.2	8.0	7.8	7.6	7.4	7.2	7.1	6.9	6.7	6.6	6.4	6.2	5.9	5.8	5.6	5.4	16
18	8.5	8.3	8.1	7.9	7.7	7.5	7.3	7.1	7.0	6.8	6.7	6.5	6.3	6.0	5.8	5.7	5.5	18
20	8.6	8.4	8.2	8.0	7.8	7.6	7.4	7.2	7.1	6.9	6.7	6.5	6.3	6.1	5.9	5.7	5.5	20
22	8.8	8.5	8.3	8.1	7.9	7.7	7.5	7.3	7.1	7.0	6.8	6.6	6.4	6.2	6.0	5.8	5.6	22
24	8.9	8.6	8.4	8.2	8.0	7.8	7.6	7.4	7.3	7.1	6.9	6.7	6.5	6.2	6.1	5.9	5.7	24
25	9.0	8.7	8.5	8.3	8.1	7.9	7.7	7.5	7.3	7.1	7.0	6.8	6.6	6.3	6.1	5.9	5.7	25
26	9.0	8.8	8.6	8.3	8.1	7.9	7.7	7.5	7.4	7.2	7.0	6.8	6.6	6.3	6.2	6.0	5.8	26
27	9.1	8.9	8.6	8.4	8.2	8.0	7.8	7.6	7.4	7.3	7.1	6.9	6.7	6.4	6.2	6.0	5.8	27
28	9.2	8.9	8.7	8.5	8.3	8.1	7.9	7.7	7.5	7.3	7.2	6.9	6.7	6.5	6.3	6.1	5.9	28
29	9.3	9.0	8.8	8.6	8.3	8.1	7.9	7.8	7.6	7.4	7.2	7.0	6.8	6.5	6.3	6.2	5.9	29
30	9.4	9.1	8.9	8.6	8.4	8.2	8.0	7.8	7.6	7.5	7.3	7.1	6.9	6.6	6.4	6.2	6.0	30
31	9.5	9.2	9.0	8.7	8.5	8.3	8.1	7.9	7.7	7.6	7.4	7.2	6.9	6.7	6.5	6.3	6.1	31
32	9.6	9.3	9.1	8.8	8.6	8.4	8.2	8.0	7.8	7.6	7.5	7.2	7.0	6.7	6.5	6.3	6.1	32
33	9.7	9.4	9.2	8.9	8.7	8.5	8.3	8.1	7.9	7.7	7.5	7.3	7.1	6.8	6.6	6.4	6.2	33
34	9.8	9.5	9.3	9.0	8.8	8.6	8.4	8.2	8.0	7.8	7.6	7.4	7.2	6.9	6.7	6.5	6.3	34
35	9.9	9.6	9.4	9.1	8.9	8.7	8.5	8.3	8.1	7.9	7.7	7.5	7.2	7.0	6.8	6.6	6.3	35
36	10.0	9.7	9.5	9.2	9.0	8.8	8.6	8.4	8.2	8.0	7.8	7.6	7.3	7.0	6.8	6.7	6.4	36
37	10.1	9.9	9.6	9.4	9.1	8.9	8.7	8.5	8.3	8.1	7.9	7.7	7.4	7.1	6.9	6.7	6.5	37
38	10.3	10.0	9.7	9.5	9.2	9.0	8.8	8.6	8.4	8.2	8.0	7.8	7.5	7.2	7.0	6.8	6.6	38
39	10.4	10.1	9.9	9.6	9.4	9.1	8.9	8.7	8.5	8.3	8.1	7.9	7.6	7.3	7.1	6.9	6.7	39
40	10.6	10.3	10.0	9.7	9.5	9.3	9.0	8.8	8.6	8.4	8.3	8.0	7.7	7.4	7.2	7.0	6.8	40
41	10.7	10.4	10.2	9.9	9.6	9.4	9.2	9.0	8.8	8.6	8.4	8.1	7.9	7.5	7.3	7.1	6.9	41
42	10.9	10.6	10.3	10.0	9.8	9.5	9.3	9.1	8.9	8.7	8.5	8.2	8.0	7.7	7.4	7.2	7.0	42
43	11.1	10.8	10.5	10.2	9.9	9.7	9.5	9.2	9.0	8.8	8.6	8.4	8.1	7.8	7.6	7.4	7.1	43
44	11.2	10.9	10.6	10.4	10.1	9.9	9.6	9.4	9.2	9.0	8.8	8.5	8.2	7.9	7.7	7.5	7.2	44
45	11.4	11.1	10.8	10.5	10.3	10.0	9.8	9.6	9.3	9.1	8.9	8.6	8.4	8.0	7.8	7.6	7.3	45
46	11.6	11.3	11.0	10.7	10.5	10.2	10.0	9.7	9.5	9.3	9.1	8.8	8.5	8.2	8.0	7.7	7.5	46
47	11.8	11.5	11.2	10.9	10.6	10.4	10.1	9.9	9.7	9.5	9.3	9.0	8.7	8.3	8.1	7.9	7.6	47
48	12.1	11.7	11.4	11.1	10.8	10.6	10.3	10.1	9.9	9.6	9.4	9.1	8.8	8.5	8.3	8.0	7.7	48
49	12.3	12.0	11.6	11.3	11.1	10.8	10.5	10.3	10.1	9.8	9.6	9.3	9.0	8.7	8.4	8.2	7.9	49
50	12.5	12.2	11.9	11.6	11.3	11.0	10.7	10.5	10.3	10.0	9.8	9.5	9.2	8.8	8.6	8.3	8.0	50
51	12.8	12.4	12.1	11.8	11.5	11.2	11.0	10.7	10.5	10.2	10.0	9.7	9.4	9.0	8.8	8.5	8.2	51
52	13.1	12.7	12.4	12.1	11.8	11.5	11.2	10.9	10.7	10.5	10.2	9.9	9.6	9.2	9.0	8.7	8.4	52
53	13.4	13.0	12.7	12.3	12.0	11.7	11.5	11.2	10.9	10.7	10.5	10.1	9.8	9.4	9.2	8.9	8.6	53
54	13.7	13.3	12.9	12.6	12.3	12.0	11.7	11.4	11.2	10.9	10.7	10.4	10.0	9.7	9.4	9.1	8.8	54
55	14.0	13.6	13.3	12.9	12.6	12.3	12.0	11.7	11.5	11.2	11.0	10.6	10.3	9.9	9.6	9.3	9.0	55
56	14.3	13.9	13.6	13.2	12.9	12.6	12.3	12.0	11.7	11.5	11.2	10.9	10.6	10.1	9.8	9.6	9.2	56
57	14.7	14.3	13.9	13.6	13.2	12.9	12.6	12.3	12.1	11.8	11.5	11.2	10.8	10.4	10.1	9.8	9.5	57
58	15.1	14.7	14.3	13.9	13.6	13.3	13.0	12.7	12.4	12.1	11.8	11.5	11.1	10.7	10.4	10.1	9.7	58
59	15.5	15.1	14.7	14.3	14.0	13.6	13.3	13.0	12.7	12.4	12.2	11.8	11.4	11.0	10.7	10.4	10.0	59
60	15.9	15.5	15.1	14.7	14.4	14.0	13.7	13.4	13.1	12.8	12.5	12.1	11.8	11.3	11.0	10.7	10.3	60
61	16.4	16.0	15.6	15.2	14.8	14.5	14.1	13.8	13.5	13.2	12.9	12.5	12.1	11.7	11.3	11.0	10.6	61
62	16.9	16.5	16.1	15.7	15.3	14.9	14.6	14.2	13.9	13.6	13.3	12.9	12.5	12.0	11.7	11.4	11.0	62
63	17.5	17.0	16.6	16.2	15.8	15.4	15.0	14.7	14.4	14.1	13.8	13.3	12.9	12.4	12.1	11.7	11.3	63
64	18.0	17.6	17.1	16.7	16.3	15.9	15.5	15.2	14.9	14.5	14.2	13.8	13.4	12.9	12.5	12.1	11.7	64
65	18.7	18.2	17.7	17.3	16.9	16.5	16.1	15.7	15.4	15.1	14.7	14.3	13.8	13.3	12.9	12.6	12.1	65
66	19.4	18.9	18.4	17.9	17.5	17.1	16.7	16.3	16.0	15.6	15.3	14.8	14.4	13.8	13.4	13.1	12.6	66
67	20.1	19.6	19.1	18.6	18.2	17.7	17.3	16.9	16.6	16.2	15.9	15.4	14.9	14.4	14.0	13.6	13.1	67
68	20.9	20.3	19.8	19.4	18.9	18.5	18.0	17.6	17.2	16.9	16.5	16.0	15.5	14.9	14.5	14.1	13.6	68
69	21.7	21.2	20.7	20.2	19.7	19.2	18.8	18.4	18.0	17.6	17.2	16.7	16.2	15.6	15.2	14.7	14.2	69
70	22.7	22.1	21.6	21.0	20.5	20.1	19.6	19.2	18.8	18.4	18.0	17.5	16.9	16.3	15.8	15.4	14.9	70
71	23.7	23.1	22.5	22.0	21.5	21.0	20.5	20.1	19.7	19.2	18.8	18.3	17.7	17.1	16.6	16.2	15.6	71
72	24.8	24.2	23.6	23.1	22.5	22.0	21.5	21.1	20.6	20.2	19.8	19.2	18.6	17.9	17.4	17.0	16.4	72
73	26.0	25.4	24.8	24.2	23.7	23.1	22.6	22.2	21.7	21.2	20.8	20.2	19.6	18.9	18.4	17.9	17.3	73
74	27.4	26.7	26.1	25.5	24.9	24.4	23.9	23.4	22.9	22.4	22.0	21.3	20.7	19.9	19.4	18.9	18.3	74
75	28.9	28.2	27.6	26.9	26.4	25.8	25.2	24.7	24.2	23.7	23.2	22.6	21.9	21.1	20.6	20.0	19.4	75
76	30.6	29.9	29.2	28.5	27.9	27.3	26.8	26.2	25.7	25.2	24.7	24.0	23.3	22.5	21.9	21.3	20.6	76
77	32.4	31.7	31.0	30.3	29.7	29.1	28.5	27.9	27.3	26.8	26.3	25.5	24.8	24.0	23.3	22.8	22.0	77
78	34.5	33.7	33.0	32.3	31.7	31.0	30.4	29.8	29.2	28.7	28.1	27.3	26.6	25.7	25.0	24.4	23.6	78
79	36.8	36.1	35.3	34.6	33.9	33.2	32.6	32.0	31.4	30.8	30.2	29.4	28.6	27.7	27.0	26.3	25.5	79
80	39.4	38.7	37.9	37.2	36.4	35.7	35.1	34.4	33.8	33.2	32.6	31.8	31.0	29.9	29.2	28.5	27.6	80

If A & B have the SAME name :- C = (A + B) and C takes the name of A & B.

If A & B have DIFFERENT names :- C = (A ~ B) and C takes the name of A or B, whichever is the larger.

The Azimuth is N or S depending on the name of C and E or W depending on the value of the L.H.A.

(E. if the L.H.A. is between 180° and 360°, W. if the L.H.A. is between 0° and 180°)

Norie's Nautical Table for ABC problem-4 calculation.

ABC method is to calculate the Azimuth.

A=LHA against to Latitude

B=LHA against to Declination

C=A+B (As normal mathematic) (C-Table)

C=(C-Table entry) C against to Latitude

Name azimuth north or south according to the name of C (Same name of C)

East or west Depending LHA (If LHA between 0-180 name

West, If LHA is between 180-360, Name East.

Table A

Lat.	Local Hour Angle																	Lat.
	45° 30'	46° 00'	46° 30'	47° 00'	47° 30'	48° 00'	48° 30'	49° 00'	50° 00'	51° 00'	52° 00'	53° 00'	54° 00'	55° 00'	56° 00'	57° 00'	58° 00'	
	314° 30'	314° 00'	313° 30'	313° 00'	312° 30'	312° 00'	311° 30'	311° 00'	310° 00'	309° 00'	308° 00'	307° 00'	306° 00'	305° 00'	304° 00'	303° 00'	302° 00'	
°																		°
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
1	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	1
2	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	2
3	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	3
4	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.04	4
5	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.05	5
6	0.10	0.10	0.10	0.10	0.10	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.07	0.07	0.07	0.07	6
7	0.12	0.12	0.12	0.11	0.11	0.11	0.11	0.11	0.10	0.10	0.10	0.09	0.09	0.09	0.08	0.08	0.08	7
8	0.14	0.14	0.13	0.13	0.13	0.13	0.12	0.12	0.12	0.11	0.11	0.11	0.10	0.10	0.09	0.09	0.09	8
9	0.16	0.15	0.15	0.15	0.15	0.14	0.14	0.14	0.13	0.13	0.12	0.12	0.12	0.11	0.11	0.10	0.10	9
10	0.17	0.17	0.17	0.16	0.16	0.16	0.16	0.15	0.15	0.14	0.14	0.13	0.13	0.12	0.12	0.11	0.11	10
11	0.19	0.19	0.18	0.18	0.18	0.18	0.17	0.17	0.16	0.16	0.15	0.15	0.14	0.14	0.13	0.13	0.12	11
12	0.21	0.21	0.20	0.20	0.19	0.19	0.19	0.18	0.18	0.17	0.17	0.16	0.15	0.15	0.14	0.14	0.13	12
13	0.23	0.22	0.22	0.22	0.21	0.21	0.20	0.20	0.19	0.19	0.18	0.17	0.17	0.16	0.16	0.15	0.14	13
14	0.25	0.24	0.24	0.23	0.23	0.22	0.22	0.22	0.21	0.20	0.19	0.19	0.18	0.17	0.17	0.16	0.16	14
15	0.26	0.26	0.25	0.25	0.25	0.24	0.24	0.23	0.22	0.22	0.21	0.20	0.19	0.19	0.18	0.17	0.17	15
16	0.28	0.28	0.27	0.27	0.26	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.20	0.19	0.19	0.18	16
17	0.30	0.30	0.29	0.29	0.28	0.28	0.27	0.27	0.26	0.25	0.24	0.23	0.22	0.21	0.21	0.20	0.19	17
18	0.32	0.31	0.31	0.30	0.30	0.29	0.29	0.28	0.27	0.26	0.25	0.24	0.24	0.23	0.22	0.21	0.20	18
19	0.34	0.33	0.33	0.32	0.32	0.31	0.30	0.30	0.29	0.28	0.27	0.26	0.26	0.24	0.23	0.22	0.22	19
20	0.36	0.35	0.35	0.34	0.33	0.33	0.32	0.32	0.31	0.29	0.28	0.27	0.26	0.25	0.25	0.24	0.23	20
21	0.38	0.37	0.36	0.36	0.35	0.35	0.34	0.33	0.32	0.31	0.30	0.29	0.28	0.27	0.26	0.25	0.24	21
22	0.40	0.39	0.38	0.38	0.37	0.36	0.36	0.35	0.34	0.33	0.32	0.30	0.29	0.28	0.27	0.26	0.25	22
23	0.42	0.41	0.40	0.40	0.39	0.38	0.38	0.37	0.36	0.34	0.33	0.32	0.31	0.30	0.29	0.28	0.27	23
24	0.44	0.43	0.42	0.42	0.41	0.40	0.39	0.39	0.37	0.36	0.35	0.34	0.32	0.31	0.30	0.29	0.28	24
25	0.46	0.45	0.44	0.43	0.43	0.42	0.41	0.41	0.39	0.38	0.36	0.35	0.34	0.33	0.31	0.30	0.29	25
26	0.48	0.47	0.46	0.45	0.45	0.44	0.43	0.42	0.41	0.39	0.38	0.37	0.35	0.34	0.33	0.32	0.30	26
27	0.50	0.49	0.48	0.48	0.47	0.46	0.45	0.44	0.43	0.41	0.40	0.38	0.37	0.36	0.34	0.33	0.32	27
28	0.52	0.51	0.50	0.50	0.49	0.48	0.47	0.46	0.45	0.43	0.42	0.40	0.39	0.37	0.36	0.35	0.33	28
29	0.54	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.45	0.43	0.42	0.40	0.39	0.37	0.36	0.35	29
30	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.48	0.47	0.45	0.44	0.42	0.40	0.39	0.37	0.36	30
31	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.50	0.49	0.47	0.45	0.44	0.42	0.41	0.39	0.38	31
32	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.52	0.51	0.49	0.47	0.45	0.44	0.42	0.41	0.39	32
33	0.64	0.63	0.62	0.61	0.60	0.58	0.57	0.56	0.54	0.53	0.51	0.49	0.47	0.45	0.44	0.42	0.41	33
34	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.57	0.55	0.53	0.51	0.49	0.47	0.45	0.44	0.42	34
35	0.69	0.68	0.66	0.65	0.64	0.63	0.62	0.61	0.59	0.57	0.55	0.53	0.51	0.49	0.47	0.45	0.44	35
36	0.71	0.70	0.69	0.68	0.67	0.65	0.64	0.63	0.61	0.59	0.57	0.55	0.53	0.51	0.49	0.47	0.45	36
37	0.74	0.73	0.72	0.70	0.69	0.68	0.67	0.66	0.63	0.61	0.59	0.57	0.55	0.53	0.51	0.49	0.47	37
38	0.77	0.75	0.74	0.73	0.72	0.70	0.69	0.68	0.66	0.63	0.61	0.59	0.57	0.55	0.53	0.51	0.49	38
39	0.80	0.78	0.77	0.76	0.74	0.73	0.72	0.70	0.68	0.66	0.63	0.61	0.59	0.57	0.55	0.53	0.51	39
40	0.82	0.81	0.80	0.78	0.77	0.76	0.74	0.73	0.70	0.68	0.66	0.63	0.61	0.59	0.57	0.54	0.52	40
41	0.85	0.84	0.82	0.81	0.80	0.78	0.77	0.76	0.73	0.70	0.68	0.66	0.63	0.61	0.59	0.56	0.54	41
42	0.88	0.87	0.85	0.84	0.83	0.81	0.80	0.78	0.76	0.73	0.70	0.68	0.65	0.63	0.61	0.58	0.56	42
43	0.92	0.90	0.88	0.87	0.85	0.84	0.83	0.81	0.78	0.76	0.73	0.70	0.68	0.65	0.63	0.61	0.58	43
44	0.95	0.93	0.92	0.90	0.88	0.87	0.85	0.84	0.81	0.78	0.75	0.73	0.70	0.68	0.65	0.63	0.60	44
45	0.98	0.97	0.95	0.93	0.92	0.90	0.88	0.87	0.84	0.81	0.78	0.75	0.73	0.70	0.67	0.65	0.62	45
46	1.02	1.00	0.98	0.97	0.95	0.93	0.92	0.90	0.87	0.84	0.81	0.78	0.75	0.73	0.70	0.67	0.65	46
47	1.05	1.04	1.02	1.00	0.98	0.97	0.95	0.93	0.90	0.87	0.84	0.81	0.78	0.75	0.72	0.70	0.67	47
48	1.09	1.07	1.05	1.04	1.02	1.00	0.98	0.97	0.93	0.90	0.87	0.84	0.81	0.78	0.75	0.72	0.69	48
49	1.13	1.11	1.09	1.07	1.05	1.04	1.02	1.00	0.97	0.93	0.90	0.87	0.84	0.81	0.78	0.75	0.72	49
50	1.17	1.15	1.13	1.11	1.09	1.07	1.05	1.04	1.00	0.97	0.93	0.90	0.87	0.83	0.80	0.77	0.74	50
51	1.21	1.19	1.17	1.15	1.13	1.11	1.09	1.07	1.04	1.00	0.96	0.93	0.90	0.86	0.83	0.80	0.77	51
52	1.26	1.24	1.21	1.19	1.17	1.15	1.13	1.11	1.07	1.04	1.00	0.96	0.93	0.90	0.86	0.83	0.80	52
53	1.30	1.28	1.26	1.24	1.22	1.19	1.17	1.15	1.11	1.07	1.04	1.00	0.96	0.93	0.90	0.86	0.83	53
54	1.35	1.33	1.31	1.28	1.26	1.24	1.22	1.20	1.15	1.11	1.08	1.04	1.00	0.96	0.93	0.89	0.86	54
55	1.40	1.38	1.36	1.33	1.31	1.29	1.26	1.24	1.20	1.16	1.12	1.08	1.04	1.00	0.96	0.93	0.89	55
56	1.46	1.43	1.41	1.38	1.36	1.33	1.31	1.29	1.24	1.20	1.16	1.12	1.08	1.04	1.00	0.96	0.93	56
57	1.51	1.49	1.46	1.44	1.41	1.39	1.36	1.34	1.29	1.25	1.20	1.16	1.12	1.08	1.04	1.00	0.96	57
58	1.57	1.55	1.52	1.49	1.47	1.44	1.42	1.39	1.34	1.30	1.25	1.21	1.16	1.12	1.08	1.04	1.00	58
59	1.64	1.61	1.58	1.55	1.53	1.50	1.47	1.45	1.40	1.35	1.30	1.25	1.21	1.17	1.12	1.08	1.04	59
60	1.70	1.67	1.64	1.62	1.59	1.56	1.53	1.51	1.45	1.40	1.35	1.31	1.26	1.21	1.17	1.12	1.08	60
°	134° 30'	134° 00'	133° 30'	133° 00'	132° 30'	132° 00'	131° 30'	131° 00'	130° 00'	129° 00'	128° 00'	127° 00'	126° 00'	125° 00'	124° 00'	123° 00'	122° 00'	°
Lat.	225° 30'	226° 00'	226° 30'	227° 00'	227° 30'	228° 00'	228° 30'	229° 00'	230° 00'	231° 00'	232° 00'	233° 00'	234° 00'	235° 00'	236° 00'	237° 00'	238° 00'	Lat.
	Local Hour Angle																	

Named opposite to the Latitude, except when the L.H.A. is between 90° and 270°.

Table B

Local Hour Angle

Dec.	45° 30′	46° 00′	46° 30′	47° 00′	47° 30′	48° 00′	48° 30′	49° 00′	50° 00′	51° 00′	52° 00′	53° 00′	54° 00′	55° 00′	56° 00′	57° 00′	58° 00′	Dec.
°	314° 30′	314° 00′	313° 30′	313° 00′	312° 30′	312° 00′	311° 30′	311° 00′	310° 00′	309° 00′	308° 00′	307° 00′	306° 00′	305° 00′	304° 00′	303° 00′	302° 00′	°
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
1	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	1
2	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	2
3	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	3
4	0.10	0.10	0.10	0.10	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.08	4
5	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.10	0.10	5
6	0.15	0.15	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.13	0.13	0.12	6
7	0.17	0.17	0.17	0.17	0.17	0.17	0.16	0.16	0.16	0.16	0.16	0.15	0.15	0.15	0.15	0.15	0.14	7
8	0.20	0.20	0.19	0.19	0.19	0.19	0.19	0.19	0.18	0.18	0.18	0.18	0.17	0.17	0.17	0.17	0.17	8
9	0.22	0.22	0.22	0.22	0.21	0.21	0.21	0.21	0.21	0.20	0.20	0.20	0.20	0.19	0.19	0.19	0.19	9
10	0.25	0.25	0.24	0.24	0.24	0.24	0.24	0.23	0.23	0.23	0.22	0.22	0.22	0.22	0.21	0.21	0.21	10
11	0.27	0.27	0.27	0.27	0.26	0.26	0.26	0.26	0.25	0.25	0.25	0.24	0.24	0.24	0.23	0.23	0.23	11
12	0.30	0.30	0.29	0.29	0.29	0.28	0.28	0.28	0.27	0.27	0.27	0.27	0.26	0.26	0.25	0.25	0.25	12
13	0.32	0.32	0.32	0.32	0.31	0.31	0.31	0.31	0.30	0.30	0.29	0.29	0.29	0.28	0.28	0.28	0.27	13
14	0.35	0.35	0.34	0.34	0.34	0.34	0.33	0.33	0.33	0.32	0.32	0.31	0.31	0.30	0.30	0.30	0.29	14
15	0.38	0.37	0.37	0.37	0.36	0.36	0.36	0.36	0.35	0.34	0.34	0.34	0.33	0.33	0.32	0.32	0.32	15
16	0.40	0.40	0.40	0.39	0.39	0.39	0.38	0.38	0.37	0.37	0.36	0.36	0.35	0.35	0.35	0.34	0.34	16
17	0.43	0.43	0.42	0.42	0.41	0.41	0.41	0.41	0.40	0.39	0.39	0.38	0.38	0.37	0.37	0.36	0.36	17
18	0.46	0.45	0.45	0.44	0.44	0.44	0.43	0.43	0.42	0.42	0.41	0.41	0.40	0.40	0.39	0.39	0.38	18
19	0.48	0.48	0.47	0.47	0.46	0.46	0.46	0.46	0.45	0.44	0.44	0.43	0.43	0.42	0.42	0.41	0.41	19
20	0.51	0.51	0.50	0.50	0.49	0.49	0.49	0.48	0.48	0.47	0.46	0.46	0.45	0.44	0.44	0.43	0.43	20
21	0.54	0.53	0.53	0.52	0.52	0.52	0.51	0.51	0.50	0.49	0.49	0.48	0.47	0.47	0.46	0.46	0.45	21
22	0.57	0.56	0.56	0.55	0.55	0.54	0.54	0.54	0.53	0.52	0.51	0.51	0.50	0.49	0.49	0.48	0.48	22
23	0.60	0.59	0.59	0.58	0.58	0.57	0.57	0.56	0.55	0.55	0.54	0.53	0.52	0.52	0.51	0.51	0.50	23
24	0.62	0.62	0.61	0.61	0.60	0.60	0.59	0.59	0.58	0.57	0.57	0.56	0.55	0.54	0.54	0.53	0.53	24
25	0.65	0.65	0.64	0.64	0.63	0.63	0.62	0.62	0.61	0.60	0.59	0.58	0.58	0.57	0.56	0.56	0.55	25
26	0.68	0.68	0.67	0.67	0.66	0.66	0.65	0.65	0.64	0.63	0.62	0.61	0.60	0.60	0.59	0.58	0.58	26
27	0.71	0.71	0.70	0.70	0.69	0.69	0.68	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.61	0.60	27
28	0.75	0.74	0.73	0.73	0.72	0.72	0.71	0.70	0.69	0.68	0.67	0.67	0.66	0.65	0.64	0.63	0.63	28
29	0.78	0.77	0.76	0.76	0.75	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.69	0.68	0.67	0.66	0.65	29
30	0.81	0.80	0.80	0.79	0.78	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.70	0.69	0.68	30
31	0.84	0.84	0.83	0.82	0.81	0.81	0.80	0.80	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.72	0.71	31
32	0.88	0.87	0.86	0.85	0.85	0.84	0.83	0.83	0.82	0.80	0.79	0.78	0.77	0.76	0.75	0.75	0.74	32
33	0.91	0.90	0.90	0.89	0.88	0.87	0.87	0.86	0.85	0.84	0.82	0.81	0.80	0.79	0.78	0.77	0.77	33
34	0.95	0.94	0.93	0.92	0.91	0.91	0.90	0.89	0.88	0.87	0.86	0.84	0.83	0.82	0.81	0.80	0.80	34
35	0.98	0.97	0.97	0.96	0.95	0.94	0.93	0.93	0.91	0.90	0.89	0.88	0.87	0.85	0.84	0.83	0.83	35
36	1.02	1.01	1.00	0.99	0.99	0.98	0.97	0.96	0.95	0.93	0.92	0.91	0.90	0.89	0.88	0.87	0.86	36
37	1.06	1.05	1.04	1.03	1.02	1.01	1.01	1.00	0.98	0.97	0.96	0.94	0.93	0.92	0.91	0.90	0.89	37
38	1.10	1.09	1.08	1.07	1.06	1.05	1.04	1.04	1.02	1.01	0.99	0.98	0.97	0.95	0.94	0.93	0.92	38
39	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.06	1.04	1.03	1.01	1.00	0.99	0.98	0.97	0.95	39
40	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.08	1.06	1.05	1.04	1.02	1.01	1.00	0.99	40
41	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.13	1.12	1.10	1.09	1.07	1.06	1.05	1.04	1.03	41
42	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.16	1.14	1.13	1.11	1.10	1.09	1.07	1.06	42
43	1.31	1.30	1.29	1.28	1.26	1.25	1.25	1.24	1.22	1.20	1.18	1.17	1.15	1.14	1.12	1.11	1.10	43
44	1.35	1.34	1.33	1.32	1.31	1.30	1.29	1.28	1.26	1.24	1.23	1.21	1.19	1.18	1.16	1.15	1.14	44
45	1.40	1.39	1.38	1.37	1.36	1.35	1.34	1.33	1.31	1.29	1.27	1.25	1.24	1.22	1.21	1.19	1.18	45
46	1.45	1.44	1.43	1.42	1.40	1.39	1.38	1.37	1.35	1.33	1.31	1.30	1.28	1.26	1.25	1.23	1.22	46
47	1.50	1.49	1.48	1.47	1.45	1.44	1.43	1.42	1.40	1.38	1.36	1.34	1.33	1.31	1.29	1.28	1.26	47
48	1.56	1.54	1.53	1.52	1.51	1.49	1.48	1.47	1.45	1.43	1.41	1.39	1.37	1.36	1.34	1.32	1.31	48
49	1.61	1.60	1.59	1.57	1.56	1.55	1.54	1.52	1.50	1.48	1.46	1.44	1.42	1.40	1.39	1.37	1.36	49
50	1.67	1.66	1.64	1.63	1.62	1.60	1.59	1.58	1.56	1.53	1.51	1.49	1.47	1.45	1.44	1.42	1.41	50
51	1.73	1.72	1.70	1.69	1.67	1.66	1.65	1.64	1.61	1.59	1.57	1.55	1.53	1.51	1.49	1.47	1.46	51
52	1.79	1.78	1.76	1.75	1.74	1.72	1.71	1.70	1.67	1.65	1.62	1.60	1.58	1.56	1.54	1.53	1.51	52
53	1.86	1.84	1.83	1.81	1.80	1.79	1.77	1.76	1.73	1.71	1.68	1.66	1.64	1.62	1.60	1.58	1.56	53
54	1.93	1.91	1.90	1.88	1.87	1.85	1.84	1.82	1.80	1.77	1.75	1.72	1.70	1.68	1.66	1.64	1.62	54
55	2.00	1.99	1.97	1.95	1.94	1.92	1.91	1.89	1.86	1.84	1.81	1.79	1.77	1.74	1.72	1.70	1.68	55
56	2.08	2.06	2.04	2.03	2.01	1.99	1.98	1.96	1.94	1.91	1.88	1.86	1.83	1.81	1.79	1.77	1.75	56
57	2.16	2.14	2.12	2.11	2.09	2.07	2.06	2.04	2.01	1.98	1.95	1.93	1.90	1.88	1.86	1.84	1.82	57
58	2.24	2.22	2.21	2.19	2.17	2.15	2.14	2.12	2.09	2.06	2.03	2.00	1.98	1.95	1.93	1.91	1.89	58
59	2.33	2.31	2.29	2.28	2.26	2.24	2.22	2.21	2.17	2.14	2.11	2.08	2.06	2.03	2.01	1.98	1.96	59
60	2.43	2.41	2.39	2.37	2.35	2.33	2.31	2.29	2.26	2.23	2.20	2.17	2.14	2.11	2.09	2.07	2.04	60
°	134° 30′	134° 00′	133° 30′	133° 00′	132° 30′	132° 00′	131° 30′	131° 00′	130° 00′	129° 00′	128° 00′	127° 00′	126° 00′	125° 00′	124° 00′	123° 00′	122° 00′	°
Dec.	225° 30′	226° 00′	226° 30′	227° 00′	227° 30′	228° 00′	228° 30′	229° 00′	230° 00′	231° 00′	232° 00′	233° 00′	234° 00′	235° 00′	236° 00′	237° 00′	238° 00′	Dec.

Local Hour Angle

Always named the same as the Declination.

A, B AND C AZIMUTH TABLES

Table B

Dec.	Local Hour Angle															
	45° 30′	46° 00′	46° 30′	47° 00′	47° 30′	48° 00′	48° 30′	49° 00′	50° 00′	51° 00′	52° 00′	53° 00′	54° 00′	55° 00′	56° 00′	57° 00′	58° 00′
°	314° 30′	314° 00′	313° 30′	313° 00′	312° 30′	312° 00′	311° 30′	311° 00′	310° 00′	309° 00′	308° 00′	307° 00′	306° 00′	305° 00′	304° 00′	303° 00′	302° 00′
60	2.43	2.41	2.39	2.37	2.35	2.33	2.31	2.29	2.26	2.23	2.20	2.17	2.14	2.11	2.09	2.07	2.04
61	2.53	2.51	2.49	2.47	2.45	2.43	2.41	2.39	2.36	2.32	2.29	2.26	2.23	2.20	2.18	2.15	2.13
62	2.64	2.61	2.59	2.57	2.55	2.53	2.51	2.49	2.46	2.42	2.39	2.35	2.32	2.30	2.27	2.24	2.22
63	2.75	2.73	2.71	2.68	2.66	2.64	2.62	2.60	2.56	2.53	2.49	2.46	2.43	2.40	2.37	2.34	2.31
64	2.87	2.85	2.83	2.80	2.78	2.76	2.74	2.72	2.68	2.64	2.60	2.57	2.53	2.50	2.47	2.44	2.42
65	3.01	2.98	2.96	2.93	2.91	2.89	2.86	2.84	2.80	2.76	2.72	2.69	2.65	2.62	2.59	2.56	2.53
66	3.15	3.12	3.10	3.07	3.05	3.02	3.00	2.98	2.93	2.89	2.85	2.81	2.78	2.74	2.71	2.68	2.65
67	3.30	3.28	3.25	3.22	3.20	3.17	3.15	3.12	3.08	3.03	2.99	2.95	2.91	2.88	2.84	2.81	2.78
68	3.47	3.44	3.41	3.38	3.36	3.33	3.30	3.28	3.23	3.18	3.14	3.10	3.06	3.02	2.99	2.95	2.92
69	3.65	3.62	3.59	3.56	3.53	3.51	3.48	3.45	3.40	3.35	3.31	3.26	3.22	3.18	3.14	3.11	3.07
70	3.85	3.82	3.79	3.76	3.73	3.70	3.67	3.64	3.59	3.54	3.49	3.44	3.40	3.35	3.31	3.28	3.24
71	4.07	4.04	4.00	3.97	3.94	3.91	3.88	3.85	3.79	3.74	3.69	3.64	3.59	3.55	3.50	3.46	3.42
72	4.32	4.28	4.24	4.21	4.17	4.14	4.11	4.08	4.02	3.96	3.91	3.85	3.80	3.76	3.71	3.67	3.63
73	4.59	4.55	4.51	4.47	4.44	4.40	4.37	4.33	4.27	4.21	4.15	4.10	4.04	3.99	3.95	3.90	3.86
74	4.89	4.85	4.81	4.77	4.73	4.69	4.66	4.62	4.55	4.49	4.43	4.37	4.31	4.26	4.21	4.16	4.11
75	5.23	5.19	5.14	5.10	5.06	5.02	4.98	4.95	4.87	4.80	4.74	4.67	4.61	4.56	4.50	4.45	4.40
°	134° 30′	134° 00′	133° 30′	133° 00′	132° 30′	132° 00′	131° 30′	131° 00′	130° 00′	129° 00′	128° 00′	127° 00′	126° 00′	125° 00′	124° 00′	123° 00′	122° 00′
Dec.	225° 30′	226° 00′	226° 30′	227° 00′	227° 30′	228° 00′	228° 30′	229° 00′	230° 00′	231° 00′	232° 00′	233° 00′	234° 00′	235° 00′	236° 00′	237° 00′	238° 00′

Local Hour Angle

Always named the same as the Declination

Table C

Lat	2.20	2.23	2.26	2.29	2.32	2.35	2.38	2.41	2.44	2.47	2.50	2.53	2.56	2.59	2.62	2.65	2.68	Lat
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
0	24.4	24.2	23.9	23.6	23.3	23.1	22.8	22.5	22.3	22.0	21.8	21.6	21.3	21.1	20.9	20.7	20.5	0
8	24.7	24.4	24.1	23.8	23.5	23.3	23.0	22.7	22.5	22.2	22.0	21.8	21.5	21.3	21.1	20.9	20.6	8
12	24.9	24.6	24.3	24.1	23.8	23.5	23.2	23.0	22.7	22.5	22.2	22.0	21.8	21.5	21.3	21.1	20.9	12
14	25.1	24.8	24.5	24.2	24.0	23.7	23.4	23.2	22.9	22.6	22.4	22.2	21.9	21.7	21.5	21.3	21.0	14
16	25.3	25.0	24.7	24.4	24.2	23.9	23.6	23.3	23.1	22.8	22.6	22.4	22.1	21.9	21.7	21.4	21.2	16
18	25.5	25.2	25.0	24.7	24.4	24.1	23.8	23.6	23.3	23.1	22.8	22.6	22.3	22.1	21.9	21.6	21.4	18
20	25.8	25.5	25.2	24.9	24.6	24.4	24.1	23.8	23.6	23.3	23.1	22.8	22.6	22.3	22.1	21.9	21.7	20
22	26.1	25.8	25.5	25.2	24.9	24.7	24.4	24.1	23.8	23.6	23.3	23.1	22.8	22.6	22.4	22.1	21.9	22
24	26.5	26.1	25.8	25.5	25.3	25.0	24.7	24.4	24.2	23.9	23.6	23.4	23.2	22.9	22.7	22.4	22.2	24
25	26.6	26.3	26.0	25.7	25.4	25.2	24.9	24.6	24.3	24.1	23.8	23.6	23.3	23.1	22.8	22.6	22.4	25
26	26.8	26.5	26.2	25.9	25.6	25.3	25.1	24.8	24.5	24.2	24.0	23.7	23.5	23.2	23.0	22.8	22.5	26
27	27.0	26.7	26.4	26.1	25.8	25.5	25.2	25.0	24.7	24.4	24.2	23.9	23.7	23.4	23.2	23.0	22.7	27
28	27.2	26.9	26.6	26.3	26.0	25.7	25.4	25.2	24.9	24.6	24.4	24.1	23.9	23.6	23.4	23.1	22.9	28
29	27.5	27.1	26.8	26.5	26.2	25.9	25.7	25.4	25.1	24.8	24.6	24.3	24.1	23.8	23.6	23.3	23.1	29
30	27.7	27.4	27.1	26.8	26.5	26.2	25.9	25.6	25.3	25.1	24.8	24.5	24.3	24.0	23.8	23.5	23.3	30
31	27.9	27.6	27.3	27.0	26.7	26.4	26.1	25.8	25.6	25.3	25.0	24.8	24.5	24.2	24.0	23.8	23.5	31
32	28.2	27.9	27.6	27.2	26.9	26.6	26.4	26.1	25.8	25.5	25.3	25.0	24.7	24.5	24.2	24.0	23.7	32
33	28.5	28.1	27.8	27.5	27.2	26.9	26.6	26.3	26.0	25.8	25.5	25.2	25.0	24.7	24.5	24.2	24.0	33
34	28.7	28.4	28.1	27.8	27.5	27.2	26.9	26.6	26.3	26.0	25.8	25.5	25.2	25.0	24.7	24.5	24.2	34
35	29.0	28.7	28.4	28.1	27.8	27.5	27.2	26.9	26.6	26.3	26.0	25.8	25.5	25.2	25.0	24.7	24.5	35
36	29.3	29.0	28.7	28.4	28.0	27.7	27.4	27.2	26.9	26.6	26.3	26.0	25.8	25.5	25.3	25.0	24.8	36
37	29.6	29.3	29.0	28.7	28.4	28.0	27.7	27.5	27.2	26.9	26.6	26.3	26.1	25.8	25.5	25.3	25.0	37
38	30.0	29.6	29.3	29.0	28.7	28.4	28.1	27.8	27.5	27.2	26.9	26.6	26.4	26.1	25.8	25.6	25.3	38
39	30.3	30.0	29.7	29.3	29.0	28.7	28.4	28.1	27.8	27.5	27.2	27.0	26.7	26.4	26.2	25.9	25.6	39
40	30.7	30.3	30.0	29.7	29.4	29.1	28.7	28.4	28.1	27.9	27.6	27.3	27.0	26.7	26.5	26.2	26.0	40
41	31.1	30.7	30.4	30.1	29.7	29.4	29.1	28.8	28.5	28.2	27.9	27.6	27.4	27.1	26.8	26.6	26.3	41
42	31.5	31.1	30.8	30.4	30.1	29.8	29.5	29.2	28.9	28.6	28.3	28.0	27.7	27.5	27.2	26.9	26.7	42
43	31.9	31.5	31.2	30.8	30.5	30.2	29.9	29.6	29.3	29.0	28.7	28.4	28.1	27.8	27.6	27.3	27.0	43
44	32.3	31.9	31.6	31.3	30.9	30.6	30.3	30.0	29.7	29.4	29.1	28.8	28.5	28.2	28.0	27.7	27.4	44
45	32.7	32.4	32.0	31.7	31.4	31.0	30.7	30.4	30.1	29.8	29.5	29.2	28.9	28.6	28.4	28.1	27.8	45
46	33.2	32.8	32.5	32.2	31.8	31.5	31.2	30.9	30.5	30.2	29.9	29.6	29.4	29.1	28.8	28.5	28.2	46
47	33.7	33.3	33.0	32.6	32.3	32.0	31.6	31.3	31.0	30.7	30.4	30.1	29.8	29.5	29.2	29.0	28.7	47
48	34.2	33.8	33.5	33.1	32.8	32.5	32.1	31.8	31.5	31.2	30.9	30.6	30.3	30.0	29.7	29.4	29.1	48
49	34.7	34.4	34.0	33.6	33.3	33.0	32.6	32.3	32.0	31.7	31.4	31.1	30.8	30.5	30.2	29.9	29.6	49
50	35.3	34.9	34.5	34.2	33.8	33.5	33.2	32.8	32.5	32.2	31.9	31.6	31.3	31.0	30.7	30.4	30.1	50
51	35.8	35.5	35.1	34.8	34.4	34.1	33.7	33.4	33.1	32.8	32.4	32.1	31.8	31.5	31.2	30.9	30.7	51
52	36.4	36.1	35.7	35.3	35.0	34.7	34.3	34.0	33.7	33.3	33.0	32.7	32.4	32.1	31.8	31.5	31.2	52
53	37.1	36.7	36.3	36.0	35.6	35.3	34.9	34.6	34.3	33.9	33.6	33.3	33.0	32.7	32.4	32.1	31.8	53
54	37.7	37.3	37.0	36.6	36.3	35.9	35.6	35.2	34.9	34.6	34.2	33.9	33.6	33.3	33.0	32.7	32.4	54
55	38.4	38.0	37.6	37.3	36.9	36.6	36.2	35.9	35.5	35.2	34.9	34.6	34.3	33.9	33.6	33.3	33.0	55
56	39.1	38.7	38.4	38.0	37.6	37.3	36.9	36.6	36.2	35.9	35.6	35.3	34.9	34.6	34.3	34.0	33.7	56
57	39.8	39.5	39.1	38.7	38.4	38.0	37.6	37.3	37.0	36.6	36.3	36.0	35.6	35.3	35.0	34.7	34.4	57
58	40.6	40.2	39.9	39.5	39.1	38.8	38.4	38.1	37.7	37.4	37.0	36.7	36.4	36.1	35.8	35.5	35.2	58
59	41.4	41.0	40.7	40.3	39.9	39.6	39.2	38.9	38.5	38.2	37.8	37.5	37.2	36.9	36.5	36.2	35.9	59
60	42.3	41.9	41.5	41.1	40.8	40.4	40.0	39.7	39.3	39.0	38.7	38.3	38.0	37.7	37.4	37.0	36.7	60
61	43.2	42.8	42.4	42.0	41.6	41.3	40.9	40.6	40.2	39.9	39.5	39.2	38.9	38.5	38.2	37.9	37.6	61
62	44.1	43.7	43.3	42.9	42.6	42.2	41.8	41.5	41.1	40.8	40.4	40.1	39.8	39.4	39.1	38.8	38.5	62
63	45.0	44.6	44.3	43.9	43.5	43.1	42.8	42.4	42.1	41.7	41.4	41.0	40.7	40.4	40.1	39.7	39.4	63
64	46.0	45.6	45.3	44.9	44.5	44.1	43.8	43.4	43.1	42.7	42.4	42.0	41.7	41.4	41.0	40.7	40.4	64
65	47.1	46.7	46.3	45.9	45.6	45.2	44.8	44.5	44.1	43.8	43.4	43.1	42.7	42.4	42.1	41.8	41.4	65
66	48.2	47.8	47.4	47.0	46.7	46.3	45.9	45.6	45.2	44.9	44.5	44.2	43.8	43.5	43.2	42.9	42.5	66
67	49.3	48.9	48.6	48.2	47.8	47.4	47.1	46.7	46.4	46.0	45.7	45.3	45.0	44.7	44.3	44.0	43.7	67
68	50.5	50.1	49.7	49.4	49.0	48.6	48.3	47.9	47.6	47.2	46.9	46.5	46.2	45.9	45.5	45.2	44.9	68
69	51.7	51.4	51.0	50.6	50.3	49.9	49.5	49.2	48.8	48.5	48.1	47.8	47.5	47.1	46.8	46.5	46.2	69
70	53.0	52.7	52.3	51.9	51.6	51.2	50.9	50.5	50.2	49.8	49.5	49.1	48.8	48.5	48.1	47.8	47.5	70
71	54.4	54.0	53.7	53.3	52.9	52.6	52.2	51.9	51.5	51.2	50.9	50.5	50.2	49.9	49.5	49.2	48.9	71
72	55.8	55.4	55.1	54.7	54.4	54.0	53.7	53.3	53.0	52.6	52.3	52.0	51.7	51.3	51.0	50.7	50.4	72
73	57.3	56.9	56.5	56.2	55.9	55.5	55.2	54.8	54.5	54.2	53.8	53.5	53.2	52.9	52.5	52.2	51.9	73
74	58.8	58.4	58.1	57.7	57.4	57.1	56.7	56.4	56.1	55.8	55.4	55.1	54.8	54.5	54.2	53.9	53.5	74
75	60.3	60.0	59.7	59.3	59.0	58.7	58.4	58.0	57.7	57.4	57.1	56.8	56.5	56.2	55.9	55.6	55.3	75
76	62.0	61.7	61.3	61.0	60.7	60.4	60.1	59.8	59.4	59.1	58.8	58.5	58.2	57.9	57.6	57.3	57.0	76
77	63.7	63.4	63.1	62.7	62.4	62.1	61.8	61.5	61.2	60.9	60.6	60.4	60.1	59.8	59.5	59.2	58.9	77
78	65.4	65.1	64.8	64.5	64.2	64.0	63.7	63.4	63.1	62.8	62.5	62.3	62.0	61.7	61.4	61.1	60.9	78
79	67.2	67.0	66.7	66.4	66.1	65.8	65.6	65.3	65.0	64.8	64.5	64.2	64.0	63.7	63.4	63.2	62.9	79
80	69.1	68.8	68.6	68.3	68.1	67.8	67.5	67.3	67.0	66.8	66.5	66.3	66.0	65.8	65.5	65.3	65.0	80

If A & B have the SAME name :- C = (A + B) and C takes the name of A & B.

If A & B have DIFFERENT names :- C = (A ~ B) and C takes the name of A or B, whichever is the larger.

The Azimuth is N or S depending on the name of C and E or W depending on the value of the L.H.A.

(E. if the L.H.A. is between 180° and 360°, W. if the L.H.A. is between 0° and 180°)

Norie's nautical Table, ABC tables for Problem-5 Calculation

Norie's Nautical Table for ABC calculation.

ABC method is to calculate the Azimuth.

A=LHA against to Latitude

B=LHA against to Declination

C=A+B (As normal mathematic) (C-Table)

C=(C-Table entry) C against to Latitude

Name azimuth north or south according to the name of C (Same name of C)

East or west Depending LHA (If LHA between 0-180 name

West, If LHA is between 180-360, Name East.

Table A

Local Hour Angle

Lat.	58° 00′	59° 00′	60° 00′	61° 00′	62° 00′	63° 00′	64° 00′	65° 00′	66° 00′	67° 00′	68° 00′	69° 00′	70° 00′	71° 00′	72° 00′	73° 00′	74° 00′	Lat.
°	302° 00′	301° 00′	300° 00′	299° 00′	298° 00′	297° 00′	296° 00′	295° 00′	294° 00′	293° 00′	292° 00′	291° 00′	290° 00′	289° 00′	288° 00′	287° 00′	286° 00′	°
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	1
2	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	2
3	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	3
4	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	4
5	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	5
6	0.07	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	6
7	0.08	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	7
8	0.09	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.04	0.04	8
9	0.10	0.10	0.09	0.09	0.08	0.08	0.08	0.07	0.07	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.05	9
10	0.11	0.11	0.10	0.10	0.09	0.09	0.09	0.08	0.08	0.07	0.07	0.07	0.06	0.06	0.06	0.05	0.05	10
11	0.12	0.12	0.11	0.11	0.10	0.10	0.09	0.09	0.09	0.08	0.08	0.07	0.07	0.07	0.06	0.06	0.06	11
12	0.13	0.13	0.12	0.12	0.11	0.11	0.10	0.10	0.09	0.09	0.09	0.08	0.08	0.07	0.07	0.06	0.06	12
13	0.14	0.14	0.13	0.13	0.12	0.12	0.11	0.11	0.10	0.10	0.09	0.09	0.08	0.08	0.08	0.07	0.07	13
14	0.16	0.15	0.14	0.14	0.13	0.13	0.12	0.12	0.11	0.11	0.10	0.10	0.09	0.09	0.08	0.08	0.07	14
15	0.17	0.16	0.15	0.15	0.14	0.14	0.13	0.12	0.12	0.11	0.11	0.10	0.10	0.09	0.09	0.08	0.08	15
16	0.18	0.17	0.17	0.16	0.15	0.15	0.14	0.13	0.13	0.12	0.12	0.11	0.10	0.10	0.09	0.09	0.08	16
17	0.19	0.18	0.18	0.17	0.16	0.16	0.15	0.14	0.14	0.13	0.12	0.12	0.11	0.11	0.10	0.09	0.09	17
18	0.20	0.20	0.19	0.18	0.17	0.17	0.16	0.15	0.14	0.14	0.13	0.12	0.12	0.11	0.11	0.10	0.09	18
19	0.22	0.21	0.20	0.19	0.18	0.18	0.17	0.16	0.15	0.15	0.14	0.13	0.13	0.12	0.11	0.11	0.10	19
20	0.23	0.22	0.21	0.20	0.19	0.19	0.18	0.17	0.16	0.15	0.15	0.14	0.13	0.13	0.12	0.11	0.10	20
21	0.24	0.23	0.22	0.21	0.20	0.20	0.19	0.18	0.17	0.16	0.16	0.15	0.14	0.13	0.12	0.12	0.11	21
22	0.25	0.24	0.23	0.22	0.21	0.21	0.20	0.19	0.18	0.17	0.16	0.16	0.15	0.14	0.13	0.12	0.12	22
23	0.27	0.26	0.25	0.24	0.23	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.15	0.14	0.13	0.12	23
24	0.28	0.27	0.26	0.25	0.24	0.23	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.14	0.13	24
25	0.29	0.28	0.27	0.26	0.25	0.24	0.23	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	25
26	0.30	0.29	0.28	0.27	0.26	0.25	0.24	0.23	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	26
27	0.32	0.31	0.29	0.28	0.27	0.26	0.25	0.24	0.23	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	27
28	0.33	0.32	0.31	0.29	0.28	0.27	0.26	0.25	0.24	0.23	0.21	0.20	0.19	0.18	0.17	0.16	0.15	28
29	0.35	0.33	0.32	0.31	0.29	0.28	0.27	0.26	0.25	0.24	0.22	0.21	0.20	0.19	0.18	0.17	0.16	29
30	0.36	0.35	0.33	0.32	0.31	0.29	0.28	0.27	0.26	0.25	0.23	0.22	0.21	0.20	0.19	0.18	0.17	30
31	0.38	0.36	0.35	0.33	0.32	0.31	0.29	0.28	0.27	0.26	0.24	0.23	0.22	0.21	0.20	0.18	0.17	31
32	0.39	0.38	0.36	0.35	0.33	0.32	0.30	0.29	0.28	0.27	0.25	0.24	0.23	0.22	0.20	0.19	0.18	32
33	0.41	0.39	0.37	0.36	0.35	0.33	0.32	0.30	0.29	0.28	0.26	0.25	0.24	0.22	0.21	0.20	0.19	33
34	0.42	0.41	0.39	0.37	0.36	0.34	0.33	0.31	0.30	0.29	0.27	0.26	0.25	0.23	0.22	0.21	0.19	34
35	0.44	0.42	0.40	0.39	0.37	0.36	0.34	0.33	0.31	0.30	0.28	0.27	0.25	0.24	0.23	0.21	0.20	35
36	0.45	0.44	0.42	0.40	0.39	0.37	0.35	0.34	0.32	0.31	0.29	0.28	0.26	0.25	0.24	0.22	0.21	36
37	0.47	0.45	0.44	0.42	0.40	0.38	0.37	0.35	0.34	0.32	0.30	0.29	0.27	0.26	0.24	0.23	0.22	37
38	0.49	0.47	0.45	0.43	0.42	0.40	0.38	0.36	0.35	0.33	0.32	0.30	0.28	0.27	0.25	0.24	0.22	38
39	0.51	0.49	0.47	0.45	0.43	0.41	0.39	0.38	0.36	0.34	0.33	0.31	0.29	0.28	0.26	0.25	0.23	39
40	0.52	0.50	0.48	0.47	0.45	0.43	0.41	0.39	0.37	0.36	0.34	0.32	0.31	0.29	0.27	0.26	0.24	40
41	0.54	0.52	0.50	0.48	0.46	0.44	0.42	0.41	0.39	0.37	0.35	0.33	0.32	0.30	0.28	0.27	0.25	41
42	0.56	0.54	0.52	0.50	0.48	0.46	0.44	0.42	0.40	0.38	0.36	0.35	0.33	0.31	0.29	0.28	0.26	42
43	0.58	0.56	0.54	0.52	0.50	0.48	0.45	0.43	0.42	0.40	0.38	0.36	0.34	0.32	0.30	0.29	0.27	43
44	0.60	0.58	0.56	0.54	0.51	0.49	0.47	0.45	0.43	0.41	0.39	0.37	0.35	0.33	0.31	0.30	0.28	44
45	0.62	0.60	0.58	0.55	0.53	0.51	0.49	0.47	0.45	0.42	0.40	0.38	0.36	0.34	0.32	0.31	0.29	45
46	0.65	0.62	0.60	0.57	0.55	0.53	0.51	0.48	0.46	0.44	0.42	0.40	0.38	0.36	0.34	0.32	0.30	46
47	0.67	0.64	0.62	0.59	0.57	0.55	0.52	0.50	0.48	0.46	0.43	0.41	0.39	0.37	0.35	0.33	0.31	47
48	0.69	0.67	0.64	0.62	0.59	0.57	0.54	0.52	0.49	0.47	0.45	0.43	0.40	0.38	0.36	0.34	0.32	48
49	0.72	0.69	0.66	0.64	0.61	0.59	0.56	0.54	0.51	0.49	0.46	0.44	0.42	0.40	0.37	0.35	0.33	49
50	0.74	0.72	0.69	0.66	0.63	0.61	0.58	0.56	0.53	0.51	0.48	0.46	0.43	0.41	0.39	0.36	0.34	50
51	0.77	0.74	0.71	0.68	0.66	0.63	0.60	0.58	0.55	0.52	0.50	0.47	0.45	0.43	0.40	0.38	0.35	51
52	0.80	0.77	0.74	0.71	0.68	0.65	0.62	0.60	0.57	0.54	0.52	0.49	0.47	0.44	0.42	0.39	0.37	52
53	0.83	0.80	0.77	0.74	0.71	0.68	0.65	0.62	0.59	0.56	0.54	0.51	0.48	0.46	0.43	0.41	0.38	53
54	0.86	0.83	0.79	0.76	0.73	0.70	0.67	0.64	0.61	0.58	0.56	0.53	0.50	0.47	0.45	0.42	0.39	54
55	0.89	0.86	0.82	0.79	0.76	0.73	0.70	0.67	0.64	0.61	0.58	0.55	0.52	0.49	0.46	0.44	0.41	55
56	0.93	0.89	0.86	0.82	0.79	0.76	0.72	0.69	0.66	0.63	0.60	0.57	0.54	0.51	0.48	0.45	0.43	56
57	0.96	0.93	0.89	0.85	0.82	0.78	0.75	0.72	0.69	0.65	0.62	0.59	0.56	0.53	0.50	0.47	0.44	57
58	1.00	0.96	0.92	0.89	0.85	0.82	0.78	0.75	0.71	0.68	0.65	0.61	0.58	0.55	0.52	0.49	0.46	58
59	1.04	1.00	0.96	0.92	0.88	0.85	0.81	0.78	0.74	0.71	0.67	0.64	0.61	0.57	0.54	0.51	0.48	59
60	1.08	1.04	1.00	0.96	0.92	0.88	0.84	0.81	0.77	0.74	0.70	0.66	0.63	0.60	0.56	0.53	0.50	60
°	122° 00′	121° 00′	120° 00′	119° 00′	118° 00′	117° 00′	116° 00′	115° 00′	114° 00′	113° 00′	112° 00′	111° 00′	110° 00′	109° 00′	108° 00′	107° 00′	106° 00′	°
Lat.	238° 00′	239° 00′	240° 00′	241° 00′	242° 00′	243° 00′	244° 00′	245° 00′	246° 00′	247° 00′	248° 00′	249° 00′	250° 00′	251° 00′	252° 00′	253° 00′	254° 00′	Lat.

Local Hour Angle

Named opposite to the Latitude, except when the L.H.A. is between 90° and 270°.

Table B

Local Hour Angle

Dec.	58° 00′	59° 00′	60° 00′	61° 00′	62° 00′	63° 00′	64° 00′	65° 00′	66° 00′	67° 00′	68° 00′	69° 00′	70° 00′	71° 00′	72° 00′	73° 00′	74° 00′	Dec.
°	302° 00′	301° 00′	300° 00′	299° 00′	298° 00′	297° 00′	296° 00′	295° 00′	294° 00′	293° 00′	292° 00′	291° 00′	290° 00′	289° 00′	288° 00′	287° 00′	286° 00′	°
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
1	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	1
2	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	2
3	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	3
4	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	4
5	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.09	0.09	0.09	0.09	0.09	0.09	0.09	5
6	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	6
7	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	7
8	0.17	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	8
9	0.19	0.18	0.18	0.18	0.18	0.18	0.18	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.16	9
10	0.21	0.21	0.20	0.20	0.20	0.20	0.20	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.18	0.18	10
11	0.23	0.23	0.22	0.22	0.22	0.22	0.22	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.20	0.20	0.20	11
12	0.25	0.25	0.25	0.24	0.24	0.24	0.24	0.23	0.23	0.23	0.23	0.23	0.23	0.22	0.22	0.22	0.22	12
13	0.27	0.27	0.27	0.26	0.26	0.26	0.26	0.25	0.25	0.25	0.25	0.25	0.25	0.24	0.24	0.24	0.24	13
14	0.29	0.29	0.29	0.29	0.28	0.28	0.28	0.28	0.27	0.27	0.27	0.27	0.27	0.26	0.26	0.26	0.26	14
15	0.32	0.31	0.31	0.31	0.30	0.30	0.30	0.30	0.29	0.29	0.29	0.29	0.29	0.28	0.28	0.28	0.28	15
16	0.34	0.33	0.33	0.33	0.32	0.32	0.32	0.32	0.31	0.31	0.31	0.31	0.31	0.30	0.30	0.30	0.30	16
17	0.36	0.36	0.35	0.35	0.35	0.34	0.34	0.34	0.33	0.33	0.33	0.33	0.33	0.32	0.32	0.32	0.32	17
18	0.38	0.38	0.38	0.37	0.37	0.36	0.36	0.36	0.36	0.35	0.35	0.35	0.35	0.34	0.34	0.34	0.34	18
19	0.41	0.40	0.40	0.39	0.39	0.39	0.38	0.38	0.38	0.37	0.37	0.37	0.37	0.36	0.36	0.36	0.36	19
20	0.43	0.42	0.42	0.42	0.41	0.41	0.40	0.40	0.40	0.40	0.39	0.39	0.39	0.38	0.38	0.38	0.38	20
21	0.45	0.45	0.44	0.44	0.43	0.43	0.43	0.42	0.42	0.42	0.41	0.41	0.41	0.41	0.40	0.40	0.40	21
22	0.48	0.47	0.47	0.46	0.46	0.45	0.45	0.45	0.44	0.44	0.44	0.43	0.43	0.43	0.42	0.42	0.42	22
23	0.50	0.50	0.49	0.49	0.48	0.48	0.47	0.47	0.46	0.46	0.46	0.45	0.45	0.45	0.45	0.44	0.44	23
24	0.53	0.52	0.51	0.51	0.50	0.50	0.50	0.49	0.49	0.48	0.48	0.48	0.47	0.47	0.47	0.47	0.46	24
25	0.55	0.54	0.54	0.53	0.53	0.52	0.52	0.51	0.51	0.51	0.50	0.50	0.50	0.49	0.49	0.49	0.49	25
26	0.58	0.57	0.56	0.56	0.55	0.55	0.54	0.54	0.53	0.53	0.53	0.52	0.52	0.52	0.51	0.51	0.51	26
27	0.60	0.59	0.59	0.58	0.58	0.57	0.57	0.56	0.56	0.55	0.55	0.55	0.54	0.54	0.54	0.53	0.53	27
28	0.63	0.62	0.61	0.61	0.60	0.60	0.59	0.59	0.58	0.58	0.57	0.57	0.57	0.56	0.56	0.56	0.55	28
29	0.65	0.65	0.64	0.63	0.63	0.62	0.62	0.61	0.61	0.60	0.60	0.59	0.59	0.59	0.58	0.58	0.58	29
30	0.68	0.67	0.67	0.66	0.65	0.65	0.64	0.64	0.63	0.63	0.62	0.62	0.61	0.61	0.61	0.60	0.60	30
31	0.71	0.70	0.69	0.69	0.68	0.67	0.67	0.66	0.66	0.65	0.65	0.64	0.64	0.64	0.63	0.63	0.63	31
32	0.74	0.73	0.72	0.71	0.71	0.70	0.70	0.69	0.68	0.68	0.67	0.67	0.66	0.66	0.66	0.65	0.65	32
33	0.77	0.76	0.75	0.74	0.74	0.73	0.72	0.72	0.71	0.71	0.70	0.70	0.69	0.69	0.68	0.68	0.68	33
34	0.80	0.79	0.78	0.77	0.76	0.76	0.75	0.74	0.74	0.73	0.73	0.72	0.72	0.71	0.71	0.71	0.70	34
35	0.83	0.82	0.81	0.80	0.79	0.79	0.78	0.77	0.77	0.76	0.76	0.75	0.75	0.74	0.74	0.73	0.73	35
36	0.86	0.85	0.84	0.83	0.82	0.82	0.81	0.80	0.80	0.79	0.78	0.78	0.77	0.77	0.76	0.76	0.76	36
37	0.89	0.88	0.87	0.86	0.85	0.85	0.84	0.83	0.82	0.82	0.81	0.81	0.80	0.80	0.79	0.79	0.78	37
38	0.92	0.91	0.90	0.89	0.88	0.88	0.87	0.86	0.86	0.85	0.84	0.84	0.83	0.83	0.82	0.82	0.81	38
39	0.95	0.94	0.94	0.93	0.92	0.91	0.90	0.89	0.89	0.88	0.87	0.87	0.86	0.86	0.85	0.85	0.84	39
40	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.93	0.92	0.91	0.90	0.90	0.89	0.89	0.88	0.88	0.87	40
41	1.03	1.01	1.00	0.99	0.98	0.98	0.97	0.96	0.95	0.94	0.94	0.93	0.93	0.92	0.91	0.91	0.90	41
42	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.99	0.98	0.97	0.96	0.96	0.95	0.95	0.94	0.94	42
43	1.10	1.09	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.01	1.00	0.99	0.99	0.98	0.98	0.97	43
44	1.14	1.13	1.12	1.10	1.09	1.08	1.07	1.07	1.06	1.05	1.04	1.03	1.03	1.02	1.02	1.01	1.00	44
45	1.18	1.17	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.09	1.08	1.07	1.06	1.06	1.05	1.05	1.04	45
46	1.22	1.21	1.20	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.12	1.11	1.10	1.10	1.09	1.08	1.08	46
47	1.26	1.25	1.24	1.23	1.21	1.20	1.19	1.18	1.17	1.16	1.16	1.15	1.14	1.13	1.13	1.12	1.12	47
48	1.31	1.30	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.17	1.16	1.16	48
49	1.36	1.34	1.33	1.32	1.30	1.29	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.22	1.21	1.20	1.20	49
50	1.41	1.39	1.38	1.36	1.35	1.34	1.33	1.31	1.30	1.29	1.29	1.28	1.27	1.26	1.25	1.25	1.24	50
51	1.46	1.44	1.43	1.41	1.40	1.39	1.37	1.36	1.35	1.34	1.33	1.32	1.31	1.31	1.30	1.29	1.28	51
52	1.51	1.49	1.48	1.46	1.45	1.44	1.42	1.41	1.40	1.39	1.38	1.37	1.36	1.35	1.35	1.34	1.33	52
53	1.56	1.55	1.53	1.52	1.50	1.49	1.48	1.46	1.45	1.44	1.43	1.42	1.41	1.40	1.40	1.39	1.38	53
54	1.62	1.61	1.59	1.57	1.56	1.54	1.53	1.52	1.51	1.50	1.48	1.47	1.46	1.46	1.45	1.44	1.43	54
55	1.68	1.67	1.65	1.63	1.62	1.60	1.59	1.58	1.56	1.55	1.54	1.53	1.52	1.51	1.50	1.49	1.49	55
56	1.75	1.73	1.71	1.70	1.68	1.66	1.65	1.64	1.63	1.61	1.60	1.59	1.58	1.57	1.56	1.55	1.54	56
57	1.82	1.80	1.78	1.76	1.74	1.73	1.71	1.70	1.69	1.67	1.66	1.65	1.64	1.63	1.62	1.61	1.60	57
58	1.89	1.87	1.85	1.83	1.81	1.80	1.78	1.77	1.75	1.74	1.73	1.71	1.70	1.69	1.68	1.67	1.66	58
59	1.96	1.94	1.92	1.90	1.88	1.87	1.85	1.84	1.82	1.81	1.79	1.78	1.77	1.76	1.75	1.74	1.73	59
60	2.04	2.02	2.00	1.98	1.96	1.94	1.93	1.91	1.90	1.88	1.87	1.86	1.84	1.83	1.82	1.81	1.80	60
°	122° 00′	121° 00′	120° 00′	119° 00′	118° 00′	117° 00′	116° 00′	115° 00′	114° 00′	113° 00′	112° 00′	111° 00′	110° 00′	109° 00′	108° 00′	107° 00′	106° 00′	°
Dec.	238° 00′	239° 00′	240° 00′	241° 00′	242° 00′	243° 00′	244° 00′	245° 00′	246° 00′	247° 00′	248° 00′	249° 00′	250° 00′	251° 00′	252° 00′	253° 00′	254° 00′	Dec.

Local Hour Angle

Always named the same as the Declination.

Table C

Lat	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.40	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	Lat
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
0	72.3	71.7	71.2	70.7	70.2	69.7	69.2	68.7	68.2	67.7	67.2	66.7	66.3	65.8	65.3	64.8	64.4	0
8	72.4	71.9	71.4	70.9	70.4	69.9	69.4	68.9	68.4	67.9	67.4	66.9	66.5	66.0	65.5	65.0	64.6	8
12	72.6	72.1	71.6	71.1	70.6	70.1	69.6	69.1	68.6	68.1	67.7	67.2	66.7	66.2	65.8	65.3	64.8	12
14	72.8	72.2	71.7	71.2	70.7	70.3	69.8	69.3	68.8	68.3	67.8	67.4	66.9	66.4	65.9	65.5	65.0	14
16	72.9	72.4	71.9	71.4	70.9	70.4	69.9	69.4	69.0	68.5	68.0	67.5	67.1	66.6	66.1	65.7	65.2	16
18	73.1	72.6	72.1	71.6	71.1	70.6	70.1	69.6	69.2	68.7	68.2	67.8	67.3	66.8	66.4	65.9	65.5	18
20	73.3	72.8	72.3	71.8	71.3	70.8	70.3	69.9	69.4	68.9	68.5	68.0	67.5	67.1	66.6	66.2	65.7	20
22	73.5	73.0	72.5	72.0	71.5	71.1	70.6	70.1	69.7	69.2	68.7	68.3	67.8	67.4	66.9	66.5	66.0	22
24	73.7	73.2	72.7	72.3	71.8	71.3	70.9	70.4	69.9	69.5	69.0	68.6	68.1	67.7	67.2	66.8	66.3	24
25	73.8	73.3	72.9	72.4	71.9	71.5	71.0	70.5	70.1	69.6	69.2	68.7	68.3	67.8	67.4	66.9	66.5	25
26	74.0	73.5	73.0	72.5	72.1	71.6	71.1	70.7	70.2	69.8	69.3	68.9	68.4	68.0	67.5	67.1	66.7	26
27	74.1	73.6	73.1	72.7	72.2	71.8	71.3	70.8	70.4	69.9	69.5	69.0	68.6	68.2	67.7	67.3	66.8	27
28	74.2	73.8	73.3	72.8	72.4	71.9	71.5	71.0	70.5	70.1	69.7	69.2	68.8	68.3	67.9	67.5	67.0	28
29	74.4	73.9	73.4	73.0	72.5	72.1	71.6	71.2	70.7	70.3	69.8	69.4	69.0	68.5	68.1	67.7	67.2	29
30	74.5	74.1	73.6	73.1	72.7	72.2	71.8	71.3	70.9	70.5	70.0	69.6	69.1	68.7	68.3	67.9	67.4	30
31	74.7	74.2	73.8	73.3	72.9	72.4	72.0	71.5	71.1	70.6	70.2	69.8	69.3	68.9	68.5	68.1	67.6	31
32	74.8	74.4	73.9	73.5	73.0	72.6	72.1	71.7	71.3	70.8	70.4	70.0	69.5	69.1	68.7	68.3	67.9	32
33	75.0	74.5	74.1	73.6	73.2	72.8	72.3	71.9	71.5	71.0	70.6	70.2	69.7	69.3	68.9	68.5	68.1	33
34	75.1	74.7	74.3	73.8	73.4	72.9	72.5	72.1	71.7	71.2	70.8	70.4	70.0	69.5	69.1	68.7	68.3	34
35	75.3	74.9	74.4	74.0	73.6	73.1	72.7	72.3	71.9	71.4	71.0	70.6	70.2	69.8	69.4	68.9	68.5	35
36	75.5	75.1	74.6	74.2	73.8	73.3	72.9	72.5	72.1	71.6	71.2	70.8	70.4	70.0	69.6	69.2	68.8	36
37	75.7	75.2	74.8	74.4	74.0	73.5	73.1	72.7	72.3	71.9	71.5	71.0	70.6	70.2	69.8	69.4	69.0	37
38	75.8	75.4	75.0	74.6	74.2	73.7	73.3	72.9	72.5	72.1	71.7	71.3	70.9	70.5	70.1	69.7	69.3	38
39	76.0	75.6	75.2	74.8	74.4	74.0	73.5	73.1	72.7	72.3	71.9	71.5	71.1	70.7	70.3	69.9	69.5	39
40	76.2	75.8	75.4	75.0	74.6	74.2	73.8	73.4	73.0	72.6	72.2	71.8	71.4	71.0	70.6	70.2	69.8	40
41	76.4	76.0	75.6	75.2	74.8	74.4	74.0	73.6	73.2	72.8	72.4	72.0	71.6	71.2	70.9	70.5	70.1	41
42	76.6	76.2	75.8	75.4	75.0	74.6	74.2	73.8	73.4	73.1	72.7	72.3	71.9	71.5	71.1	70.7	70.4	42
43	76.8	76.4	76.0	75.6	75.2	74.9	74.5	74.1	73.7	73.3	72.9	72.5	72.2	71.8	71.4	71.0	70.7	43
44	77.0	76.6	76.3	75.9	75.5	75.1	74.7	74.3	73.9	73.6	73.2	72.8	72.4	72.1	71.7	71.3	71.0	44
45	77.3	76.9	76.5	76.1	75.7	75.3	75.0	74.6	74.2	73.8	73.5	73.1	72.7	72.3	72.0	71.6	71.3	45
46	77.5	77.1	76.7	76.3	76.0	75.6	75.2	74.8	74.5	74.1	73.7	73.4	73.0	72.6	72.3	71.9	71.6	46
47	77.7	77.3	76.9	76.6	76.2	75.8	75.5	75.1	74.7	74.4	74.0	73.7	73.3	72.9	72.6	72.2	71.9	47
48	77.9	77.5	77.2	76.8	76.5	76.1	75.7	75.4	75.0	74.7	74.3	73.9	73.6	73.2	72.9	72.5	72.2	48
49	78.1	77.8	77.4	77.1	76.7	76.4	76.0	75.6	75.3	74.9	74.6	74.2	73.9	73.6	73.2	72.9	72.5	49
50	78.4	78.0	77.7	77.3	77.0	76.6	76.3	75.9	75.6	75.2	74.9	74.5	74.2	73.9	73.5	73.2	72.9	50
51	78.6	78.3	77.9	77.6	77.2	76.9	76.6	76.2	75.9	75.5	75.2	74.9	74.5	74.2	73.9	73.5	73.2	51
52	78.9	78.5	78.2	77.8	77.5	77.2	76.8	76.5	76.2	75.8	75.5	75.2	74.8	74.5	74.2	73.9	73.5	52
53	79.1	78.8	78.4	78.1	77.8	77.4	77.1	76.8	76.5	76.1	75.8	75.5	75.2	74.8	74.5	74.2	73.9	53
54	79.3	79.0	78.7	78.4	78.1	77.7	77.4	77.1	76.8	76.5	76.1	75.8	75.5	75.2	74.9	74.6	74.2	54
55	79.6	79.3	79.0	78.6	78.3	78.0	77.7	77.4	77.1	76.8	76.5	76.1	75.8	75.5	75.2	74.9	74.6	55
56	79.9	79.5	79.2	78.9	78.6	78.3	78.0	77.7	77.4	77.1	76.8	76.5	76.2	75.9	75.6	75.3	75.0	56
57	80.1	79.8	79.5	79.2	78.9	78.6	78.3	78.0	77.7	77.4	77.1	76.8	76.5	76.2	75.9	75.6	75.3	57
58	80.4	80.1	79.8	79.5	79.2	78.9	78.6	78.3	78.0	77.7	77.5	77.2	76.9	76.6	76.3	76.0	75.7	58
59	80.6	80.4	80.1	79.8	79.5	79.2	78.9	78.6	78.4	78.1	77.8	77.5	77.2	77.0	76.7	76.4	76.1	59
60	80.9	80.6	80.4	80.1	79.8	79.5	79.2	79.0	78.7	78.4	78.1	77.9	77.6	77.3	77.0	76.8	76.5	60
61	81.2	80.9	80.6	80.4	80.1	79.8	79.6	79.3	79.0	78.8	78.5	78.2	78.0	77.7	77.4	77.2	76.9	61
62	81.5	81.2	80.9	80.7	80.4	80.1	79.9	79.6	79.4	79.1	78.8	78.6	78.3	78.1	77.8	77.6	77.3	62
63	81.7	81.5	81.2	81.0	80.7	80.5	80.2	80.0	79.7	79.5	79.2	79.0	78.7	78.5	78.2	78.0	77.7	63
64	82.0	81.8	81.5	81.3	81.0	80.8	80.5	80.3	80.1	79.8	79.6	79.3	79.1	78.8	78.6	78.4	78.1	64
65	82.3	82.1	81.8	81.6	81.3	81.1	80.9	80.6	80.4	80.2	79.9	79.7	79.5	79.2	79.0	78.8	78.5	65
66	82.6	82.4	82.1	81.9	81.7	81.4	81.2	81.0	80.8	80.5	80.3	80.1	79.9	79.6	79.4	79.2	79.0	66
67	82.9	82.7	82.4	82.2	82.0	81.8	81.6	81.3	81.1	80.9	80.7	80.5	80.2	80.0	79.8	79.6	79.4	67
68	83.2	83.0	82.7	82.5	82.3	82.1	81.9	81.7	81.5	81.3	81.1	80.8	80.6	80.4	80.2	80.0	79.8	68
69	83.5	83.3	83.1	82.9	82.6	82.4	82.2	82.0	81.8	81.6	81.4	81.2	81.0	80.8	80.6	80.4	80.2	69
70	83.8	83.6	83.4	83.2	83.0	82.8	82.6	82.4	82.2	82.0	81.8	81.6	81.4	81.3	81.1	80.9	80.7	70
71	84.1	83.9	83.7	83.5	83.3	83.1	82.9	82.8	82.6	82.4	82.2	82.0	81.8	81.7	81.5	81.3	81.1	71
72	84.4	84.2	84.0	83.8	83.7	83.5	83.3	83.1	83.0	82.8	82.6	82.4	82.3	82.1	81.9	81.7	81.6	72
73	84.7	84.5	84.3	84.2	84.0	83.8	83.7	83.5	83.3	83.2	83.0	82.8	82.7	82.5	82.3	82.2	82.0	73
74	85.0	84.8	84.6	84.5	84.3	84.2	84.0	83.9	83.7	83.6	83.4	83.2	83.1	82.9	82.8	82.6	82.5	74
75	85.3	85.1	85.0	84.8	84.7	84.5	84.4	84.2	84.1	83.9	83.8	83.6	83.5	83.4	83.2	83.1	82.9	75
76	85.6	85.4	85.3	85.2	85.0	84.9	84.7	84.6	84.5	84.3	84.2	84.1	83.9	83.8	83.7	83.5	83.4	76
77	85.9	85.8	85.6	85.5	85.4	85.2	85.1	85.0	84.9	84.7	84.6	84.5	84.3	84.2	84.1	84.0	83.8	77
78	86.2	86.1	86.0	85.8	85.7	85.6	85.5	85.4	85.2	85.1	85.0	84.9	84.8	84.7	84.5	84.4	84.3	78
79	86.5	86.4	86.3	86.2	86.1	86.0	85.9	85.7	85.6	85.5	85.4	85.3	85.2	85.1	85.0	84.9	84.8	79
80	86.8	86.7	86.6	86.5	86.4	86.3	86.2	86.1	86.0	85.9	85.8	85.7	85.6	85.5	85.4	85.3	85.2	80

If A & B have the SAME name :- C = (A + B) and C takes the name of A & B.

If A & B have DIFFERENT names :- C = (A ~ B) and C takes the name of A or B, whichever is the larger.

The Azimuth is N or S depending on the name of C and E or W depending on the value of the L.H.A.

(E. if the L.H.A. is between 180° and 360°, W. if the L.H.A. is between 0° and 180°)

Norie's nautical Table, True Azimuth Rising and setting Problem-6 Calculation

Norie's Nautical Table for Amplitude calculation

Amplitude= True azimuth at rising and setting Against the Latitude.

Name amplitude north or south depending on name of declination (same Name) east or west Depending whether it is rising or setting. (E if rising and west if setting)

True Azimuths at Rising and Setting

True Zenith Distance = 90°

Lat.	Declination																Lat.
°	21·5°	22°	22·5°	23°	23·5°	24°	24·5°	25°	25·5°	26°	26·5°	27°	27·5°	28°	28·5°	29°	°
	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	
0	68.5	68.0	67.5	67.0	66.5	66.0	65.5	65.0	64.5	64.0	63.5	63.0	62.5	62.0	61.5	61.0	0
2	68.5	68.0	67.5	67.0	66.5	66.0	65.5	65.0	64.5	64.0	63.5	63.0	62.5	62.0	61.5	61.0	2
4	68.4	67.9	67.4	66.9	66.4	65.9	65.4	64.9	64.4	63.9	63.4	62.9	62.4	61.9	61.4	60.9	4
6	68.4	67.9	67.4	66.9	66.4	65.9	65.4	64.9	64.3	63.8	63.3	62.8	62.3	61.8	61.3	60.8	6
8	68.3	67.8	67.3	66.8	66.3	65.7	65.2	64.7	64.2	63.7	63.2	62.7	62.2	61.7	61.2	60.7	8
10	68.2	67.6	67.1	66.6	66.1	65.6	65.1	64.6	64.1	63.6	63.1	62.5	62.0	61.5	61.0	60.5	10
12	68.0	67.5	67.0	66.5	65.9	65.4	64.9	64.4	63.9	63.4	62.9	62.3	61.8	61.3	60.8	60.3	12
14	67.8	67.3	66.8	66.3	65.7	65.2	64.7	64.2	63.7	63.1	62.6	62.1	61.6	61.1	60.5	60.0	14
16	67.6	67.1	66.5	66.0	65.5	65.0	64.4	63.9	63.4	62.9	62.3	61.8	61.3	60.8	60.2	59.7	16
18	67.3	66.8	66.3	65.7	65.2	64.7	64.1	63.6	63.1	62.6	62.0	61.5	61.0	60.4	59.9	59.4	18
20	67.0	66.5	66.0	65.4	64.9	64.4	63.8	63.3	62.7	62.2	61.7	61.1	60.6	60.0	59.5	58.9	20
21	66.9	66.3	65.8	65.3	64.7	64.2	63.6	63.1	62.5	62.0	61.4	60.9	60.4	59.8	59.3	58.7	21
22	66.7	66.2	65.6	65.1	64.5	64.0	63.4	62.9	62.3	61.8	61.2	60.7	60.1	59.6	59.0	58.5	22
23	66.5	66.0	65.4	64.9	64.3	63.8	63.2	62.7	62.1	61.6	61.0	60.4	59.9	59.3	58.8	58.2	23
24	66.3	65.8	65.2	64.7	64.1	63.6	63.0	62.4	61.9	61.3	60.8	60.2	59.6	59.1	58.5	57.9	24
25	66.1	65.6	65.0	64.5	63.9	63.3	62.8	62.2	61.6	61.1	60.5	59.9	59.4	58.8	58.2	57.7	25
26	65.9	65.4	64.8	64.2	63.7	63.1	62.5	62.0	61.4	60.8	60.2	59.7	59.1	58.5	57.9	57.4	26
27	65.7	65.1	64.6	64.0	63.4	62.8	62.3	61.7	61.1	60.5	59.9	59.4	58.8	58.2	57.6	57.0	27
28	65.5	64.9	64.3	63.7	63.2	62.6	62.0	61.4	60.8	60.2	59.6	59.1	58.5	57.9	57.3	56.7	28
29	65.2	64.6	64.1	63.5	62.9	62.3	61.7	61.1	60.5	59.9	59.3	58.7	58.1	57.5	56.9	56.3	29
30	65.0	64.4	63.8	63.2	62.6	62.0	61.4	60.8	60.2	59.6	59.0	58.4	57.8	57.2	56.6	56.0	30
31	64.7	64.1	63.5	62.9	62.3	61.7	61.1	60.5	59.9	59.2	58.6	58.0	57.4	56.8	56.2	55.6	31
32	64.4	63.8	63.2	62.6	62.0	61.3	60.7	60.1	59.5	58.9	58.3	57.6	57.0	56.4	55.8	55.1	32
33	64.1	63.5	62.9	62.2	61.6	61.0	60.4	59.7	59.1	58.5	57.9	57.2	56.6	56.0	55.3	54.7	33
34	63.8	63.1	62.5	61.9	61.3	60.6	60.0	59.4	58.7	58.1	57.4	56.8	56.2	55.5	54.9	54.2	34
35	63.4	62.8	62.1	61.5	60.9	60.2	59.6	58.9	58.3	57.6	57.0	56.3	55.7	55.0	54.4	53.7	35
36	63.1	62.4	61.8	61.1	60.5	59.8	59.2	58.5	57.8	57.2	56.5	55.9	55.2	54.5	53.9	53.2	36
37	62.7	62.0	61.4	60.7	60.0	59.4	58.7	58.1	57.4	56.7	56.0	55.4	54.7	54.0	53.3	52.6	37
38	62.3	61.6	60.9	60.3	59.6	58.9	58.2	57.6	56.9	56.2	55.5	54.8	54.1	53.4	52.7	52.0	38
39	61.9	61.2	60.5	59.8	59.1	58.4	57.8	57.1	56.4	55.7	55.0	54.3	53.5	52.8	52.1	51.4	39
40	61.4	60.7	60.0	59.3	58.6	57.9	57.2	56.5	55.8	55.1	54.4	53.7	52.9	52.2	51.5	50.7	40
41	60.9	60.2	59.5	58.8	58.1	57.4	56.7	55.9	55.2	54.5	53.8	53.0	52.3	51.5	50.8	50.0	41
42	60.5	59.7	59.0	58.3	57.5	56.8	56.1	55.3	54.6	53.9	53.1	52.3	51.6	50.8	50.1	49.3	42
43	59.9	59.2	58.4	57.7	57.0	56.2	55.5	54.7	53.9	53.2	52.4	51.6	50.8	50.1	49.3	48.5	43
44	59.4	58.6	57.9	57.1	56.3	55.6	54.8	54.0	53.2	52.5	51.7	50.9	50.1	49.3	48.4	47.6	44
45	58.8	58.0	57.2	56.5	55.7	54.9	54.1	53.3	52.5	51.7	50.9	50.1	49.2	48.4	47.6	46.7	45
46	58.2	57.4	56.6	55.8	55.0	54.2	53.3	52.5	51.7	50.9	50.0	49.2	48.3	47.5	46.6	45.7	46
47	57.5	56.7	55.9	55.0	54.2	53.4	52.6	51.7	50.9	50.0	49.1	48.3	47.4	46.5	45.6	44.7	47
48	56.8	56.0	55.1	54.3	53.4	52.6	51.7	50.8	50.0	49.1	48.2	47.3	46.4	45.4	44.5	43.6	48
49	56.0	55.2	54.3	53.4	52.6	51.7	50.8	49.9	49.0	48.1	47.1	46.2	45.3	44.3	43.3	42.4	49
50.0	55.2	54.4	53.5	52.6	51.7	50.7	49.8	48.9	48.0	47.0	46.0	45.1	44.1	43.1	42.1	41.0	50.0
50.5	54.8	53.9	53.0	52.1	51.2	50.2	49.3	48.4	47.4	46.4	45.5	44.5	43.5	42.4	41.4	40.3	50.5
51.0	54.4	53.5	52.5	51.6	50.7	49.7	48.8	47.8	46.8	45.8	44.8	43.8	42.8	41.8	40.7	39.6	51.0
51.5	53.9	53.0	52.1	51.1	50.2	49.2	48.2	47.2	46.2	45.2	44.2	43.2	42.1	41.0	40.0	38.8	51.5
52.0	53.5	52.5	51.6	50.6	49.6	48.7	47.7	46.7	45.6	44.6	43.6	42.5	41.4	40.3	39.2	38.1	52.0
52.5	53.0	52.0	51.1	50.1	49.1	48.1	47.1	46.0	45.0	43.9	42.9	41.8	40.7	39.5	38.4	37.2	52.5
53.0	52.5	51.5	50.5	49.5	48.5	47.5	46.4	45.4	44.3	43.2	42.1	41.0	39.9	38.7	37.5	36.3	53.0
53.5	52.0	51.0	50.0	48.9	47.9	46.9	45.8	44.7	43.6	42.5	41.4	40.2	39.1	37.9	36.7	35.4	53.5
54.0	51.4	50.4	49.4	48.3	47.3	46.2	45.1	44.0	42.9	41.8	40.6	39.4	38.2	37.0	35.7	34.4	54.0
54.5	50.9	49.8	48.8	47.7	46.6	45.5	44.4	43.3	42.2	41.0	39.8	38.6	37.3	36.1	34.7	33.4	54.5
55.0	50.3	49.2	48.1	47.1	46.0	44.8	43.7	42.5	41.4	40.2	38.9	37.7	36.4	35.1	33.7	32.3	55.0
55.5	49.7	48.6	47.5	46.4	45.3	44.1	42.9	41.7	40.5	39.3	38.0	36.7	35.4	34.0	32.6	31.1	55.5
56.0	49.0	47.9	46.8	45.7	44.5	43.3	42.1	40.9	39.7	38.4	37.1	35.7	34.3	32.9	31.4	29.9	56.0
56.5	48.4	47.3	46.1	44.9	43.7	42.5	41.3	40.0	38.7	37.4	36.1	34.7	33.2	31.7	30.2	28.6	56.5
57.0	47.7	46.5	45.4	44.2	42.9	41.7	40.4	39.1	37.8	36.4	35.0	33.5	32.0	30.5	28.8	27.1	57.0
57.5	47.0	45.8	44.6	43.3	42.1	40.8	39.5	38.1	36.8	35.3	33.9	32.3	30.8	29.1	27.4	25.5	57.5
58.0	46.2	45.0	43.8	42.5	41.2	39.9	38.5	37.1	35.7	34.2	32.6	31.1	29.4	27.6	25.8	23.8	58.0
58.5	45.5	44.2	42.9	41.6	40.3	38.9	37.5	36.0	34.5	33.0	31.4	29.7	27.9	26.0	24.0	21.9	58.5
59.0	44.6	43.3	42.0	40.7	39.3	37.8	36.4	34.9	33.3	31.7	30.0	28.2	26.3	24.3	22.1	19.7	59.0
59.5	43.8	42.4	41.1	39.7	38.2	36.7	35.2	33.6	32.0	30.3	28.5	26.6	24.5	22.3	19.9	17.2	59.5
60.0	42.9	41.5	40.1	38.6	37.1	35.6	34.0	32.3	30.6	28.7	26.8	24.8	22.6	20.1	17.4	14.2	60.0
	21·5°	22°	22·5°	23°	23·5°	24°	24·5°	25°	25·5°	26°	26·5°	27°	27·5°	28°	28·5°	29°	

24. Actual compass error log book

QN	DATE	GMT	SHIPS POSITION		SHIPS HEADING			BEARING			BODY/ OBJECT	ERROR		VAR	DEV	MASTER GYRO NUMBER	REPEATER	REMARKS	OOW
			LAT	LONG	GYRO	STAND	TRUE	TRUE	GYRO	STAND		GYRO	STAN						
1	05/07/2019	114103	16 19.3 N	054 13.0W	81.0	96.0	81.9	72.9	72.0		SUN (AZ)	0.9 L	15 W	15.9 W	0.9 E	2	PORT	Slight rolling	
2	05/07/2019	224103	56 12.61 N	022 52.7 W	331.0	339.00	332.1	280.1	279.0		MOON	1.1 L	8 W	10.2 W	2.2 E	1	STBD	VSL Rolling	
3	05/07/2019	172244	39 10.16N	014 00' E	211.0	209.0	208.9	172.9	175.0		SPICA	2.1 H	2 E	4.3 E	2.3 W	1	PORT	VSL Rolling Heavily	
4	05/07/2019	029056	07 35.6 N	104 40.4 W	187.0	176.0	186.7	336.7	337.0		DUBHE	0.3 H	11 E	6.7 E	4.3 E	2	STBD	AT SEA	
5	05/07/2019	093800	02 14.4 S	034 54.0 W	94.0	110.0	94.3	65.3	65.0		SUN (AZ)	0.3 L	16 W	19.8 W	3.8 E	2	PORT	AT SEA	
6	08/07/2019	2124000	26 08.30 N	037 36.70W	60.00	72.00	60.2	295.2	295.0		Sun (Am)	0.2 L	12.0 W	12.5 W	0.5 E	1	PORT	AT SEA	

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Contents

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