# Chaucer's Astrolabe Treatise

Geoffrey Chaucer (ca. 1340-1400), appr. 1391

## Edited by James E. Morrison

### Editor's Preface

Chaucer's astrolabe treatise is the oldest known technical manual in English, subject to certain grammatical, style and spelling conventions that have evolved over the last 600 years. Although not the first European technical publication or astrolabe treatise in the vernacular (the French were earlier), it was certainly the first authoritative treatise on astronomy or an astronomical instrument in English. It is not, however, at all original, a point that Chaucer makes abundantly clear. Historians have developed plausible sources used by Chaucer, but it represents a high level of astronomical knowledge in any case. I am impressed by Chaucer's astronomical depth, which is at a high level for a layman of any era.

The preface to the treatise tells us that it was written as a basic introduction to the astrolabe for his little son, Lewis. There has been considerable controversy about whether little Lewis was actually Chaucer's son or his godson, the son of his friend, Lewis Clifford. Evidence exits of an association between a Lewis Chaucer and a Thomas Chaucer, who was very likely Chaucer's son. This evidence lends credibility to the theory that Lewis was, in fact, one of Chaucer's sons. The work was never completed and some have speculated that the boy might have died, but it is also possible one or the other of them simply lost interest, or Chaucer became occupied with other undertakings. Some manuscripts are subtitled, "Bread and Milk for Children", presumably by a scribe with a sense of humor, since the material is heavy going for a well informed adult, much less a child.

This treatise has been studied for centuries by Chaucer students for clues to Chaucer's astronomical and astrological allusions in *The Canterbury Tales*. It certainly has historical and literary value and it is an invaluable source document for students of medieval cosmology. Its value as an astrolabe manual depends on the context in which it is evaluated. It was a model of clarity and completeness for a $14^{th}$ century treatise, which probably accounts for the large number of copies made. However, when it is compared to later treatises, such a Stoeffler's $16^{th}$ century work, or modern astrolabe publications, it is very sparse, rather poorly organized and promises far more than it delivers. Its greatest flaw is a total lack of introductory material that defines the terms used. Presumably, Chaucer felt that Lewis would already have some background in basic astronomy, which was a required educational element at that time.

Modern readers who hope to learn about astrolabes from this treatise are strongly advised to find other sources first and then return to this work. Chaucer's treatise is required reading for serious astrolabe students, but there are several introductory sources about astrolabes and how to use them that are clearer and easier to understand. If you really want to understand this treatise in its full context, it is **strongly** recommended that John D. North's, "Chaucer's Universe" (Oxford University Press, 1988) be used as a explanatory reference. It is very difficult for the non-specialist to understand the astrological and cosmological usage without such a supplement.

Strictly speaking, this is not a transcription of Chaucer's astrolabe treatise, but is more of a 'translation' into modern idiomatic English with the intention of rephrasing Chaucer so that his thoughts are expressed in terms more familiar to the modern reader. It is intended to make Chaucer's treatise more accessible to those who do not want to exert the considerable effort required to completely digest the original. Effort has been taken to ensure that the intention of the original passages is retained. A few explanatory comments have been inserted in an attempt to clarify some of the more obscure passages or to provide additional details. There are a few

errors in the original that are pointed out in the notes. If you are a student of Chaucer and his work, this version of his astrolabe treatise is not for you since its very purpose is to change his method of expression.

In particular, some of the terms used by Chaucer for the parts of the astrolabe have been changed to the terms used by every other astrolabe source. Specifically, Chaucer calls the alidade on the back of the astrolabe the *rule*. This is confusing to many students since the rotating hand on the front of the astrolabe is called the rule by almost all other sources. The word *rule* has been changed to *alidade* throughout. Chaucer calls the rotating hand on the front of the instrument the *label*. The word *label* has been changed to the more universal *rule* when referring to this component. The scale of degrees on the margin of the front of the astrolabe is usually referred to as the *limb*. Chaucer calls this the *border*. This term, even thought it is not conventional, has not been changed since there is little opportunity for confusion. The other terms used by Chaucer are either the conventional ones or differences are noted in the text.

This edition is not intended to be evaluated as a scholarly reference. North, Skeats and other Chaucer scholars have evaluated numerous manuscripts and commentaries to select the version most likely to conform closest to Chaucer's original work. No such evaluation was performed for this edition. The base Middle English version used was the F. N. Robertson edition which is included after the edited text.

Every attempt at technical accuracy has been made, but it is likely that there are errors in detail or points that would benefit from additional clarification.

# A Treatise on the Astrolabe

Little Lewis, my son, I see some evidence that you have the ability to learn science, number and proportions, and I recognize your special desire to learn about the astrolabe. So, as the philosopher said, "he serves his friend who grants his friend's wishes", I propose to teach you some facts about the instrument with this treatise. There are several reasons for this treatise. First, no one in this region has complete knowledge of the noble astrolabe. Another reason is that there are errors in the astrolabe treatises that I have seen and some of them present material too difficult for a ten year old to understand.

This treatise is divided into five parts and is written clearly and in plain English, because your Latin is still not good enough, my little son. But the facts are the same in English as Greek was to the Greeks, Arabic to the Arabs, Hebrew to the Jews and Latin to the Romans, who learned them first from other diverse languages and rewrote them in Latin. And, as God wills, all of these facts have been completely learned and taught in all these languages, but by different methods, much as all roads lead to Rome. Now I ask every person who reads or hears this little treatise to excuse my crude editing and my excessive use of words for two reasons. First, it is hard for a child to learn from complex sentences. Second, it seems better to me to write a good sentence twice for a child so he will not forget the first.

And Lewis, I get my satisfaction if my English treatise presents as many and the same facts as any Latin treatise on the astrolabe.  And praise God and save the king, who is lord of this language, and all who obey him, each in his own way, more or less. But consider well that have not claimed to create this work from own work or energy. I am but a lewd compiler of the labor of old astronomers (astrologers) and have translated it into English only for your use. With this statement I slay envy.

*First part* - The first part of this treatise presents the parts of your astrolabe so you can become familiar with your own instrument.

*Second part* - The second part teaches practical uses of previous facts, as much as possible for such a small portable instrument, for every astronomer (astrologer) knows that the smallest fractions shown in special tables that are calculated for a specific reason are not visible on such a small instrument.

*Third part*  - The third part contains various tables of longitudes and latitudes of fixed stars for the astrolabe, a table of declinations of the Sun,   tables of longitudes of cities and towns,  tables for setting a clock and to find the meridian altitude and other notable conclusions from the calendars of the reverend clerks, Brother J. Somes (John Somer) and Brother N. Lenne (Nicholas of Lynn).

*Fourth part* - The fourth part contains a theory to explain the movements of the celestial bodies and their causes. In particular, the fourth part contains a table of the moon's motion for every hour of every day and in every sign  from your almanac. A rule adequate to teach the manner of the working of the moon based on this table follows which allows you to know the degree of the zodiac that the moon rises in for any latitude and the rising of any planet based on its latitude from the ecliptic.

 *Fifth part* – The fifth part shall be an introduction, following the style of our scholars, in which you can learn most of the general theory of astrology. You will find tables of equations of the houses for the latitude of Oxford and tables of dignities of the planets and other relevant things, if God and his Mother the Virgin wills, more than I am asked.

**PART I**

*The description of your astrolabe begins here.*

1. Your astrolabe has a ring in which you put the thumb of your right hand when measuring the height of things. And take care, for this point forward I will call the height of anything that is taken as "the altitude" without more words.

2. This ring goes through a kind of eyelet connected to the body of your astrolabe with enough room so the instrument center always hangs straight down.

3. The body of your astrolabe, the thickest plate, is hollowed out with a cavity  that receives the thin plates created for various latitudes, and your rete shaped like a net or spider's web.

4. (ed. Chaucer describes the back of the astrolabe first) The back of the body of your astrolabe is divided by a line that descends from the ring to the bottom border. This line is called the south line or meridional line from the ring to the hole in the center. The rest of the line down to the border is called the north line or else the line of midnight. Here is a figure that shows the idea:

5. Another line of the same length crosses the meridional line at a right angle from east to west. The part of this line from a little cross (+) on the edge to the hole in the center is called the east line or the oriental line. The rest of this line, from the center to the edge, is called the west line or the occidental line. You now have the four quarters of your astrolabe divided like the four principal zones of the compass or the quarters of the Earth. The figure shows the idea.

6. The east side of your astrolabe is called the right side and the west side is called the left side. Don't forget this, little Lewis. Put the astrolabe ring on the thumb of your right hand and then its right side will be toward your left side and its left side will be toward your right side. Take this as a general rule that applies to the back as well as the hollow side. As I have said, there is a small cross (+) at the end of this line, which is always regarded as the first degree where the Sun rises (ed. That is, the horizon).

7. The border is divided into 90 degrees from the little cross (+) to the end of the meridional line under the ring. Each quadrant of the astrolabe is also divided the same way. Numbers are engraved over the degrees to divide the scale in 5 degree sections as shown by the long strokes between the numbers. Each long stroke divides the scale into a mile-way (ed. The time required to walk a mile ~ 20 minutes) and every degree represents 4 minutes of time. The figure shows the scale.

8. The names of the twelve signs (of the zodiac) are written below the circle of degrees: Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricornus, Aquarius, Pisces. The number of degrees for each sign is shown in arabic numerals above (ed. Chaucer uses the term 'noumbres of augrym', that is, numbers used in arithmetic, to draw a distinction between Arabic numbers and Roman numerals) and the sign is divided in 5 degree intervals from the beginning to the end of the sign. But understand that these divisions of the signs are considered to be 60 minutes (ed. of longitude), and each minute 60 seconds, and so forth into infinitely small fractions as shown by Alkabucius (ed. al-Qabisi, c. 950, Aleppo, author of "Introduction to Astrology", a highly regarded text at the time). Note carefully that a degree of the border represents 4 minutes and a degree of a sign contains 60 minutes (ed. of longitude).

9. Next is the circle of the days divided in the same way as the degree scale but containing 365 divisions, divided by long strokes into 5's with the number in arabic numerals written under the circle.

10. Next comes the circle of the names of the months, that is: Januarius, Februarius, Marcius, Aprilis, Maius, Junius, Julius, Augustus, September, October, November, December. Some of the month names come from their properties, some by Arabian lords and others by lords

of Rome. The lengths of the months were defined of various numbers of days, such as July and August, at the pleasure of Julius Caesar and Caesar Augustus. Then January had 31 days, February 28, March 31, April 30, May 31, June 30, July 31, August 31, September 30, October 31, November 30 and December 31. Nevertheless, although Julius Caesar took 2 days from February and put them in his month of July and Augustus Caesar named August after himself and made it 31 days, the Sun is still in each sign for the same amount of time (ed. This is not a correct statement of the calendar reforms enacted during the reign of Julius Caesar).

11. Then follow the names of the holy days in the calendar and next to them the letters A, B, C.. on which day they follow (ed. The dominical numbers of the holy days ).

12. Next to the A, B, C circle described above and under the East-West line is marked a scale for many uses in the form of two squares, or in the style of ladders, that has 12 points and their divisions. This scale is called the *Umbra Versa* from the line to the right angle and the bottom part is called the *Umbra Recta* or *Umbra Extensa* as shown in the figure.
(ed. Chaucer has the names of the scales reversed. The horizontal scale is used for shadows cast on the ground by a vertical gnomon and is called the *umbra recta*. The vertical scale is used for shadows cast by a horizontal gnomon on a wall and is called *umbra versa*. It is understandable that Chaucer might confuse the two since *recta* is the Latin word for 'upright', but it is the gnomon that is upright, not the scale.)

13. You also have a broad rule that has a square plate at each end that is drilled with a hole (one large and one smaller) to receive the rays of the Sun during the day and to determine the altitude of stars with your eye at night (ed. This device is usually called the *alidade.*).

14. There is also a large pin, like an axle, that goes through the hole. It holds the tables of the climates and the rete in the mater. A little wedge called the horse holds all the parts together. This pin is imagined to be the North Pole of your astrolabe.

15. The cavity side or your astrolabe is also divided into four quarters from east to and north to south by a large cross, just like the back.

16. Each border of each quadrant of the cavity side is divided into 90 degrees, just like the back. The total is 360 degrees. Note carefully that the border divisions are concentric to the equator and is divided in the same way as every other circle in the sky. The border is also divided by 23 capital letters and a small cross (+) showing the 24 hours of time in a day. And, as noted earlier, five of these degrees make a mile-way (ed. 20 minutes) and three mile-ways make an hour. Every division of the border contains four minute, and every minute 60 seconds. Now I have said this twice.

17. The plate under the rete is engraved with three principal circles, of which the smallest is called the circle of Cancer because Cancer's head (ed. That is, the beginning of the sign of Cancer) always follows this circle. The beginning of Cancer is the greatest north declination of the Sun and, therefore, it is called the summer solstice. Ptolemy gives this declination as 23 degrees and 50 minutes as well in Cancer as in Capricorn. (ed. It is not clear what value Chaucer used for the obliquity of the ecliptic because the numerical examples vary between editions. The actual value was about 23° 31′. In my opinion, he probably used the Toledan value of 23° 33′.) The sign of Cancer is called the summer tropic, from *tropos*, that is "turning", because the Sun then begins to move away from it.

The middle circle in diameter of the three is called the equinoctial, on which the start of Aries and Libra always fall. Note carefully that the equinoctial circle always goes from due east to due west, as I have shown you on the solid sphere (ed. It is not clear whether Chaucer means a globe or the more common armillary sphere. Either context works since they are both three dimensional). This circle is also called the Equator, that is the measurer of the day, because when the Sun is at the start of Aries and Libra, the days are same length everyplace in the world. Therefore, these two signs are called the equinoxes. The movement of everything inside these points (on the astrolabe) is north of the equator and everything outside the equator (on the astrolabe) is south of the equator. Do not forget the north and

south latitudes. The 24 hours of the day are defined by the equinoctial circle because each 15 degrees of the equinoctial is equal to one hour of time. The equinoctial is called the "girdle of the first mover" or primum mobile. And note that first mover means moving the first of the eight moveable spheres from east to west and back to the east. It is called the girdle of the first mover because it divides the first mover, that is the (celestial) sphere into two equal parts the same distance from the poles.

The largest of the three circles is called the circle of Capricorn because the beginning of Capricorn always falls on this circle. The beginning of the sign of Capricorn is greatest southern declination of the Sun, and there is called the winter solstice. The sign of Capricorn is also called the winter tropic, because then the Sun then begins to come to us again. Here is the picture.

18. Circles of altitude called *almucantars* are drawn on the plate mentioned earlier. Some are complete circles and some are partial circles. The center of the smallest circle is called the zenith. The bottom most circle represents the horizon, that is, the circle that divides the two hemispheres; the part of the heaven above the Earth and the part below. The almucantars are drawn for each two degrees, but some astrolabes have them for each degree, some for each two degrees and others for three degrees, depending on the size of the astrolabe. The zenith is imagined to the exact point above the top of your head. The zenith is the exact pole of the horizon for every place.

19. A type of curved lines, like the legs of a spider or a woman's hairnet, come from the zenith and cross the almucantars at right angles. These curves or divisions are called azimuths and the divide the horizon of your astrolabe into 24 parts. The azimuths show directions and other results, such as finding the hour angle of the Sun and every star. (ed. Chaucer uses the term 'cenyth' which is the point on the horizon corresponding to an azimuth angle. This is not exactly hour angle, but it is probably what was meant.). The figure shows the azimuth curves.

20. Next to the azimuths, under the Tropic of Cancer, are 12 oblique divisions, shaped similar to the azimuths, that show the planetary hours.

21. The rete of your astrolabe with the zodiac, shaped like a net or spider's web according to the traditional description, which you can rotate to any desired position, contains several fixed stars according to their latitudes and longitudes (if the instrument is correctly made). The names of the stars are shown in the margin of the rete near their locations and the tip of the pointer shows the position. Note that all the stars inside the zodiac are the northern stars because they rise to the north of east. And all of the stars outside the zodiac are called southern stars. But I see that they do not all rise south of east; Aldebaran and Algol, for example. The general rule is that those stars called northern stars rise earlier than the degree of their longitude and the southern stars rise later than the degree of their longitude, that is, for the stars on your astrolabe. The longitude of the stars is measured from the ecliptic, on which line, when the Sun and moon are aligned or else on the surface of this line, then there is an eclipse of the Sun or the moon, which I will explain later. But truthfully, the ecliptic of your zodiac is the extreme border of the zodiac where the degrees are marked (ed. What Chaucer is trying to say is that the ecliptic on the astrolabe rete has the ecliptic arc itself as the border to the ecliptic circle and the northern six degrees of the zodiac are inside the ecliptic. The southern six degrees of the zodiac are not shown on the astrolabe).

The zodiac of your astrolabe is shaped like a wide circle for the proportions of your astrolabe, to show that the zodiac in the sky is seen as a surface with a width of 12 degrees, whereas all the other circles in the sky are thought of as having no width. Imagine a line in the middle of the zodiac that is called the ecliptic line, on which the Sun always travels. Thus, there are six degrees of the zodiac are on one side of the ecliptic line and six degrees are on the other side. The zodiac is divided into 12 principal sections that represent the 12 signs, and as made on your astrolabe, every small division of a sign represents two degrees (I mean degrees containing 60 minutes). This heavenly zodiac is called the 'circle of the

signs' or the 'circle of the beasts', because the Greek "zodia" means "beast" in Latin. And the twelve signs of the zodiac have the names of animals, or else the Sun takes on the characteristics of such animals when it enters into any of the signs, or else the fixed stars are arranged in animal shapes, or else when the planets are under these signs their actions influence effects like the behavior of animals.

And also understand that, when a hot planet comes into a hot sign, its heat increases. And, if a planets is cold, then its coldness is reduced by a hot sign. And by this conclusion you can take examples in all the signs, be they moist or dry or mobile or fixed, determining the characteristics of the planet as I first said. And each of the 12 signs has characteristics of a certain part of a man's body and governs it; Aries for your head, Taurus your neck and throat, Gemini your arm pits and arms, and so forth, as will be shown in more detail in part 5 of this treatise.

The zodiac, which is that part of the 8$^{th}$ sphere, intersects the equinoctial and intersects it again in equal parts, with one half of southern declination and the other northern, as is clearly stated in the Treatise on the Sphere.

22. You have a 'label' (ed. more commonly called the 'rule') shaped like the alidade except that it is straight and does not have sights on the ends. But, with the small point of the label, you shall calculate your equations on the border of the astrolabe, as by your almuri (ed. from the Arabic 'al muri' – the pointer or index).

23. The almuri is called the tooth of Capricorn or the calculator. It is fixed in the head of Capricorn and is used for many necessary elements of equations of things, as will be shown.

*This ends the description of the Astrolabe and now begins the uses of the astrolabe.*

# Part II

*The uses of the astrolabe begin here.*

1. *To find the Sun's longitude for each day in its orbit.*

    Determine the day of the month and set the rule (ed. alidade) on that day. The tip of the rule points to the Sun's longitude on the scale on the border.

    For example, to find the Sun's longitude at noon, March 12, 1391, I find the scale of days on the back of my astrolabe, which I recognize by the names of the months written under the circle. I set the rule over this day and find that the tip of the rule lies on the first degree of Aries and a little. Thus, I have solved the problem.

    I would also like to know the Sun's longitude at noon on December 13. I find the day of the month as before and set the rule on this date and find the point of the rule is on the first degree of Capricorn and a little. Now I have good practice for this problem.

2. *To find the altitude of the Sun or other celestial bodies.*

    Put the astrolabe's ring on your right thumb and turn your left side towards the Sun. Move the rule up and down until the sunlight goes through both holes of the rule's sights. Note how many degrees the rule has moved from the little cross on the east line and take this as the altitude of the Sun. In the same way you can find the altitude of the moon or bright stars.
    This function is so simple that it needs no further explanation, but remember it well.

3. *To find the time of day from sunlight and the time at from the fixed stars and also to find the ecliptic degree rising on the eastern horizon, commonly called the ascendant or 'horoscopium'.*

Take the altitude of the Sun when you can, as I have said, and set the altitude of the Sun on almucantars on the east side of the astrolabe if it is morning and one the west if it is afternoon. This is always the rule for setting the Sun's altitude on the astrolabe. Once you have set the altitude of the Sun on the almucantar corresponding to the Sun's altitude measured with the alidade, position the label over the Sun's longitude and the tip of the label will point to the time of day on the border.

An example is: Find the time on March 12, 1391. (ed. It is pretty obvious that Chaucer 'cooked' the data in all of his examples by working backward from the answer, probably using tables. It is not realistic to be as accurate with a small astrolabe as his examples demonstrate. The results are, however, pretty close.)  I took the altitude of the Sun and found it to be 25 degrees and 30 minutes by using the scale on the back side. Then I turned the astrolabe over and, because it was before midday, I set the  first point of Aries at the almucantar for 25 degrees, 30 minutes on the east side of my astrolabe. Then I set the label on the Sun's position and found the tip of the label was on the capital 'X' on the border. Then I counted the capital letters from midnight to the X and found it to 9 o'clock in the morning. Then I looked at the eastern horizon and found that Gemini 20° ascending, which is the ascendant. Using this method I can always find the time of day and the ascendant. (ed. This problem is worked correctly for an astrolabe made for 52° 18′ N latitude. The latitude of Oxford is 51° 46′ N. Not bad accuracy.)

I want to find the time at night for the same day and proceed as follows: Among the group of fixed stars, it seemed best to measure the altitude of the star named Alhabor (ed. i.e. Sirius, 1391 Right Ascension 6:45, Declination -16° 43′), using the alidade on the back, found its altitude to be 12 degrees in the west. Then I set the pointer for Alhabor on the 12° almucantar on the west side because the star was in the west. Then I set the label on the longitude of the Sun,  which was below the western horizon, and counted the capital letters from noon to the tip of the label and found that was 10° past nine o'clock (ed. i.e. 9:40 PM). Then I looked at the eastern horizon and found Scorpio 10° rising. Thus I learned once and for all how to find the time at night and the ascendant as accurately as it can be found on such a small instrument. (ed. This example is somewhat less accurate than the previous one. The altitude of  Sirius at 9:40 PM on March 12, 1391 was about 9°. Chaucer's result is about 25 minutes later than the actual time when Sirius was at 12° in altitude at Oxford. On the other hand, the answer is correct if calculated for a latitude of 47°. Note also that it is very hard to take an altitude for a star that is that low in the sky and that the moon was nearly half full on the night of March 12, 1391 which might not be bright enough to affect a star as bright as Sirius, but it might make it harder to find. I think that Chaucer chose his examples for ease in explanation and never actually made the observations. This is not a criticism by any means since his treatise was intended as a general educational tool. The examples are fine for that purpose.)

But, despite the generality of this method, I must warn you – never use a celestial body that is near the meridian to determine an ascendant or set a clock. Because, when the Sun is near the meridian its altitude stays on the same almucantar for so long that you will get the wrong ascendant (ed. i.e. the Sun's altitude does not change enough when it is near culmination to get an accurate altitude reading).  The same rule applies to the fixed stars at night. In my experience, for our latitude you should never take a reading from 11 to 1 (ed. i.e. within 15° of the meridian).

4. *A special note about the ascendant.*

The ascendant is an item of great interest to astrologers for all births and selecting (auspicious) times. Therefore, this seems to be a convenient place to make special note of it.

The ascendant, in the largest sense, is the degree (of the zodiac) that rises on the eastern horizon at a specific time. Therefore, if any planet rises at the same time as does that degree (of the zodiac), then the planet has no latitude from the ecliptic, and its position on the

ecliptic is equal to its longitude. People then say that this planet is in 'horoscopo' (ed. The horoscope is the degree of the ecliptic that is rising).

(ed. We are getting to fairly complicated material here related to the astrological houses. Several methods of defining the astrological houses have been used. The one used by Chaucer divides the angle from the point where the ecliptic crosses the eastern horizon to the meridian into three equal sections measured on the equator. The points where these angles cross the ecliptic are three of the houses. Another set of angles to the west of the meridian to the descendent (the point where the ecliptic crosses the horizon in the west) defines three more houses of a different angular width than the first three. The area below the horizon to the northern meridian is divided by into three different angles and three more are defined from the northern meridian to the descendent. The twelve houses thus defined are numbered from I to XII counterclockwise from the ascendant. Houses I, II and III have the same angular size as houses VII, VIII and IX and are in opposite quadrants. Similarly, houses X, XI and XII and IV, V and VI are the same size. The houses are particularly easy to determine on an astrolabe. Some astrologers sometimes defined the first house as beginning five degrees above the horizon (measured on the ecliptic) so a planet in the first house would be visible. This is the convention adopted by Chaucer in the next, rather tortuous paragraph. North offers a much more detailed and scholarly interpretation.)

The house of the ascendant, that is, the first house or east angle, is larger. For, according to astrological rules, a celestial body that is five degrees or less above the (zodiac) degree that is rising, that is, near the ascendant, they say the planet is in the ascendant (ed. i.e. in the first house). And a planet that is within 25 degrees below the ascending angle is also said to be in the house of the ascendant. But if a planet is outside these bounds it is said to be "falling from the ascendant". Yet, the astrologers say that the ascendant and also the lord of the ascendant may be fortunate or unfortunate. A "fortunate ascendant" is declared when no wicked planet such as Saturn or Mars or the Tail of the Dragon (ed. The brightest star in the constellation Scorpio) is in the house of the ascendant, nor any wicked planets have any aspect or enmity on the ascendant. But they will predict that they have a fortunate planet in the ascendant and all is joyful and well. An unfortunate ascendant is the opposite. They say that the lord of the ascendant is lucky when it is in a good position from the ascendant, as in an angle or in succident (?) where he has his dignity and is comforted by friendly aspects of planets well received and also that he may see the ascendant and not be retrograde nor quenched nor joined with an evil presence in the same sign, nor that he is not in his descent (?) nor joined with another planet in its descent nor have any unfortunate aspect, then they say that he is well. (ed. I'm not confident that this paragraph is rendered correctly).

In any case, these are observances of judicial matters and the rites of pagans in which I have no faith nor knowledge of their observations (horoscopes?). Because they say that every sign is divided into the three equal parts of 10 degrees, and they call each section a face. And yet some people say that although a planet has a latitude from the ecliptic, if the planet rises in the face in which its longitude is found, then the planet is in horoscopo, be it birth or decision, etc.

5.  *To find the position of the Sun if it falls between two almucantars.* (ed. That is, to interpolate between almucantars, which were drawn for each two degrees on Chaucer's instrument).

In as much as the almucantars on your astrolabe are for each two degrees, whereas some astrolabes have almucantars for each degree or each three degrees, it is necessary for your training to learn how to work your own instrument. If the altitude of the Sun falls between two almucantars, or if the almucantar lines are engraved with tool that is too wide (because these factors may also cause an error in finding the time of day or the true ascendant) you work it this way:

Set the altitude of the Sun on the almucantar just greater than the altitude and note where the almuri is on the degree scale on the border. Mark this point with dot of ink. Set the Sun on the lower of the two almucantars and make another dot. Now set the almuri halfway between the to dots and this will set the correct position of the Sun between the almucantars.

Now set the label over the Sun and find the true time of day or night. You can find the ascendant on the eastern horizon in the same way.

6. *To find daybreak t and the end of evening twilight, which are called the two crepuscules.*

(ed. The problem is to find when the Sun is 18° below the horizon. Many astrolabes have a special almucantar for this purpose, but Chaucer's apparently didn't).

Set the Sun's nadir (ed. the point on the ecliptic opposite the sun) on the 18° almucantar in the west and set the label on Sun's position. The point of the label shows the time of daybreak. Similarly, set the Sun's nadir on the 18° almucantar in the east and set the label on the Sun's position. The tip of the label shows the end of evening twilight, that is, the beginning of true night.

The nadir of the Sun is the point opposite the position of the Sun on the ecliptic in the seven signs as follows: each degree in Aries in order is the nadir to each degree in Libra in order, and Taurus to Scorpio, Gemini to Capricorn, Leo to Aquarius, Virgo to Pisces. (ed. Note that Chaucer is counting the signs of the zodiac inclusively, as was the custom in the Middle Ages.) And if any degree in your zodiac is dark, its nadir will demonstrate it.

7. *To find the length of the day, which some people call the artificial day, from sunrise to sunset.*

Set the degree of the Sun on the eastern horizon and set the label on the Sun's position. Mark the position of the tip of the label. Turn the rete until the Sun's position is on the western horizon and mark the point of the tip of the label. Calculate the length of time between to two marks which is the length of the day. That part of the border below the horizon is the length of the night. In this way you can calculate both lengths, or any portion, as you choose. And, using this technique, you can find the length of time that any fixed star is above the horizon, from the time it rises until it sets. But the complete day of 24 hours is the revolution of the equinoctial with as much of the zodiac as the Sun in its proper motion in the same time. (ed. The term *artificial day* is apparently used to signify that this length does not actually correspond to the length of daylight since there is considerable light during morning and evening twilight.)

8. *To convert unequal hours to equal hours*

Find the number of degrees in the unequal hours and divide by 15, giving the equal hour. (ed. This item is a bit terse. The question raised is actually, "How long is a day in equal hours?". The answer is to find the number of degrees in the day and divide by 15. Thus, if the Sun is above the horizon for the 200°, the day is 13 hours, 20 min long in equal hours.)

9. *To find the length of the vulgar day, that is, from the beginning of morning twilight to the end of evening twilight.*

Find the time of the twilights as shown in item 2, above, and add them to the length of the artificial day, taking the length of the complete day until complete night. You can find the length of vulgar night in the same way.

10. *To find the unequal hour during the day.*

(ed. It is not clear why this problem is included because the unequal hour can be found directly using the unequal hour arcs described in Part I.20. Either Chaucer's astrolabe did not actually have the unequal hour arcs or this item was included for theoretical completeness.)

The unequal hours are called planetary hours. Some of the time they are longer during the day than at night, and sometimes the opposite. But, in general, the sum of length of the unequal hours of the day and the length of the unequal hours of the night is 30° of the border, which corresponds to equinoctial degrees. Therefore, divide the arc of the day into

12 equal parts to find the length (ed. in equal hours) of an unequal hour during the day. If you subtract the length of the unequal hour during the day from 30, the difference is the length of the unequal hour of the night.

11. *To find the size of the equal hours.*

The number of the equal hours, that is, the hours of the clock, are divided in 15 degree sections on the border of your astrolabe, for both night and day. Nothing more needs to be said.

When you want to know how many clock hours have passed, or what part of any of these hours have passed, or how many hours or parts of hours are to come by day or night, find the position of the Sun and set the label on it. Turn your rete and label together and, using the its tip, calculate the time interval from sunrise to the time of interest, for the day or night. I will cover this result with such completeness in the last chapter of part IV of this treatises that no more explanation is needed.

12. *Special explanation of the planetary hours.*

Understand well that, from sunrise to sunset, the nadir of the Sun shows the planetary hour, and from sunset to sunrise the Sun itself shows the planetary hour. (ed. This is because the unequal hour arcs are drawn only below the horizon. Thus, the Sun's actual position in the zodiac shows the unequal hour at night when the Sun is below the horizon. The point on the ecliptic that is opposite the Sun (the Sun's nadir) is used during the day when the Sun is above the horizon.)

(ed. The next rather complex paragraph attempts to explain the astrological concept of the planetary control of days and hours. Basically, each day of the week is said to ruled by a particular planet (of the seven classical planetary bodies) as follows: Saturday is ruled by Saturn, Sunday by the Sun, Monday/Moon, Tuesday/Mars, Wednesday/Mercury, Thursday/Jupiter, Friday/Venus. For each day, the first unequal hour of the day is ruled by the day's planet and each subsequent hour by other planets (the moon being a planet in this context) in the order of their distance from the Earth according to Ptolemaic astronomy; Saturn, Jupiter, Mars, Sun, Venus, Mercury, Moon. The cycle of the planet ruling an hour cycles three times in 24 hours plus three planets. The ruling planet of the first hour of the next day falls in this sequence, which continues unbroken through the entire week, month, etc. This cycle repeats 24 times in a week so each hour of each day of each week is ruled by the same planet. )

For example: Say the 13<sup>th</sup> day of March is a Saturday (ed. this would occur in 1389) and I find a little less than Aries 2° on the east horizon at sunrise. I then find Libra 2°, the Sun's nadir, descending on the western horizon. The planetary hours begin at sunrise and the planet for the day gives its name to the first hour which is begins at the western horizon and ends at the first unequal hour arc below the western horizon (ed. Chaucer is pointing out that the first hour of the day is named for the day's planet and that the unequal hours of the day are found using the Sun's nadir.) And, as the Sun rises higher, the nadir descends, reaching each planetary hour division in their order in the sky. The first unequal hour of every Saturday belongs to Saturn and second belongs to Jupiter, the third to Mars, the fourth to the Sun, the fifth to Venus, the sixth to Mercury and the seventh to the moon. And then again the eighth hour is Saturn's, the 9<sup>th</sup> Jupiter's, the 10<sup>th</sup> Mar's, the 11<sup>th</sup> the Sun's and the 12<sup>th</sup> Venus'. Now the Sun rises on Sunday morning and the Sun's nadir on the western horizon shows the beginning of the Sun's hour (ed. That is, the Sun rules the first hour of the day on Sunday). And the successive planets from Saturn to the moon and from the moon again to Saturn, hour after hour, generally. Thus, this conclusion if complete.

13. *To find the Sun's noon altitude which is called the meridian altitude*

Set the degree of the Sun on the meridian line and note how the degree of the almucantar. This is the meridian altitude, that is the Sun's maximum altitude for that day. You can find

the maximum altitude attained by any fixed star using the same line. This is to say that any fixed star begins to descend when it has passed the meridian, just like the Sun.

14. *To find the degree of the Sun using the rete for any date.*

(ed. Chaucer labels this item, "To know the degre of the sonne by thy ryet, for a maner curiosite". In other words, "at your pleasure" or "just because you are curious".)
Carefully measure the maximum altitude of the Sun at noon with rule. Turn your astrolabe over and mark that altitude on the meridian line with a dot of ink. Turn the rete until you find the degree of the zodiac that that matches mark. In this way you can find the position in the zodiac within two degrees. If these two degrees are in different signs you will have to find the correct sign from the date.

15. *To find which days have the same length.*

Find which degrees are the same distance from the heads of Cancer and Capricorn and note when the Sun is in any of these locations. The lengths of these days are the same. That is to say, the length of that day in that month will not be much different. (ed. This can be done using either the rete or the calendar scale on the back).
Also, if you take two natural days in the year of equal distance from either point of the equator, but in opposite directions, then length of the artificial day for one will be the length of the night for the other, and vice versa.

16. *This chapter explains the following conclusions.*

Note that the zodiac is divided into to two half circles; from the beginning of Capricorn to the beginning of Cancer and again, from the beginning of Cancer to the beginning of Capricorn. The beginning of Capricorn is the lowest point of the Sun in winter and the beginning of Cancer is the highest point of the Sun in summer. Note, therefore, that any two position in the zodiac that are the same distance from these two points have the same declination, whether it is north or south. And the lengths of the days and nights, the shadows and midday altitudes will always be he same.

17. *To find the coordinates of any star, known or unknown, from its mediation, even if the star is not included on your astrolabe.*

(ed. This item has been modified considerably from the original. The original statement of the proposition was, "*To knowe the verrey degre of eny maner sterre, straunge or unstraunge, after his longitude; though he be indetermynat in thin Astralabye, sothly to the trouthe thus he shal be knowe.*". The problem is the use of term 'longitude'. The normal definition of celestial longitude is the angle of a celestial body on the ecliptic from the vernal equinox. Lines of equal longitude originate at the ecliptic pole. Celestial latitudes are angles above or below the ecliptic with 90° latitude at the ecliptic pole. In the Middle Ages, celestial positions were often specified using declination and a measure called *mediation* (coeli mediatio in Latin, literally 'measure of the sky'). The definition of declination was the same then as now. The mediation of a celestial object is the point on the ecliptic that passes the meridian at the same instant as the star. Mediation is measured from the celestial pole to the ecliptic and is **not** the same as longitude. It is likely that the adoption of mediation as a celestial coordinate was because it is so obvious on an astrolabe; simply a line from the center of the instrument (the north celestial pole) to the ecliptic. The word 'longitude' has been replaced by 'mediation' in the following discussion.)

Measure the altitude of the star as closely as possible when it is on the east side of the meridian and make a note of it. Also, quickly find the ascendant for some star that is on your rete that is close to the same azimuth and note the value. (ed. This is intended to establish the time of the first observation.) Take another reading of the ascendant of the known star when the unknown star is at the same altitude in the west as it was when you made your first measurement in the east and note the ascendant. (ed. This is intended to give a second time. The two times are supposed to be equal times before and after meridian passage of the unknown star; difficult to do in practice with an astrolabe.)   Find the

ascendant halfway between the two measured values and set the that degree on the eastern horizon. (ed. This step is supposed to define the instant of meridian passage for the unknown star but it is wrong. The points on the ecliptic do not represent equal angles and the error is meaningful. Chaucer should have used the almuri or other index on the border scale to find an angle halfway between the observations instead of using the ascendant. The observational accuracy of this proposition is questionable in any case.) Note the degree of the ecliptic that is on the meridian. This is the mediation of the unknown star. Its north or south declination is measured toward the celestial pole.

Furthermore, measure the declination of the Sun or fixed star from the equator. Measure the latitude of planets from the ecliptic. Note that the latitude of any celestial body except the Sun can be determined from its position north or south of the ecliptic, from which line all planets vary north or south except the Sun.

18. *To find the mediation of stars included on your astrolabe, if they are correctly placed.*

Set the point for the star on the meridian and note the degree of the zodiac that is on the meridian line. This star will be on the same ecliptic degree from the horizon to the meridian. (ed. Basically, this is just the definition of mediation.)

19. *To find the ecliptic degree that rises on the eastern horizon at the same time as a fixed star, even if the star is in a different sign.*

(ed. This is a rather difficult problem to solve analytically, but is quite simple on the astrolabe.)

Set the point for the star on the eastern horizon and note the zodiac degree that is also on the same horizon at the some time. This zodiac degree rises at the same time as the star.
This marvelous rising with a strange degree in another sign is because the latitude of the fixed star is either north or south of the equator. But the latitudes of planets are normally measured from the ecliptic because none of them vary more than a few degrees within the width of the zodiac. Note the contents of this chapter on the rising of celestial bodies, because neither the moon nor stars rise with the same degree as its longitude on our oblique horizon unless they have no latitude from the ecliptic line. But, nonetheless, each of these planets is eventually on this line.

20. *To find the declination of any degree in the zodiac from the equator.*

Set the degree of any sign on the meridian and note the altitude on the almucantars. Then rotate the rete until the beginning of Aries or Libra is on the meridian and note the altitude. (ed. This step is intended to find the southern altitude of the equator and is not needed if the equator is drawn on the astrolabe plate.)    The difference in the altitudes taken is the declination of this degree (of the zodiac) from the equator. If the zodiac degree is north of the equator then the declination is north and it is south of the equator, the declination is south.

21. *To find the latitude for which the almucantars on the astrolabe plate are designed.*

Note the number of degrees on the almucantars on the meridian from the equator to the zenith or from the north celestial pole to the northern horizon. This is the latitude for the plate.

22. *To find the latitude of our region, I mean the latitude of Oxford and the altitude of our pole*
.

Note that the distance of the beginning of Aries or Libra (ed. the equinoxes) from our horizon is the same as the zenith from the north pole and the altitude of the north pole from the horizon is the same as the equator from the zenith. (ed. i.e. the zenith distance of the equator is equal to the latitude. Presumably, Chaucer intends the equinoxes to be positioned

on the meridian, but he does not say it specifically here, but see proposition 25 below. )  I shall prove this for the latitude of Oxford. Note that the altitude of the north pole in Oxford is 51 degrees and 50 minutes and the distance of our zenith from the north pole is 39 degrees, 10 minutes. The distance from the equator to our zenith is 51 degrees 50 minutes and our southern horizon is 38 degrees 10 minutes from the equator. Note these calculations carefully. Also, do not forget that the zenith is 90 degrees in altitude from our horizon and the equator is 90 degrees from the north pole. There is this short rule: the latitude of an place is the distance from the zenith to the equator.

23. *To use the previous article to find the latitude of any place by measuring the altitude of the north pole*

.

On a winter's night when the sky is clear and filled with stars, wait until a fixed star is directly above the north pole and name that star A. Find another star that is directly under A and below the pole and call that star F. Note that F is considered only to establish that A is directly above the pole. Measure the altitude of A quickly and not the value. Let A and F rotate until near daybreak, go out again and wait until A is directly under the pole and under F (F will be directly above the pole and A will be directly beneath it). Measure the altitude of A and note it. When this is done, calculate how many degrees the first altitude is greater than the second, take half of the result and add it to second altitude. This is the altitude of the pole and equal to the latitude of your place because the polar altitude equals the latitude of a place.

For example: Say the altitude of A in the evening is 56° and the second altitude taken near dawn is 48°, which is 8° less than 56°. Take half of the 8 and add it to 48 giving 52°. You now have the altitude of the pole and the latitude of the region. But you should understand to conduct this measurement correctly you must have a plumb line that hangs from a point higher than your head and this line must hang vertically between the pole and your eye. This will allow you to see when A is directly over the pole and F and when F is directly over the pole and A. (ed. This proposition tells you to measure the altitude of a star when it is directly above and below the pole and take the point halfway between as the pole. The method described is theoretically sound, if difficult to do accurately with an astrolabe. A finely divided and well sited quadrant would be better. One infers that the suggestion for making the measurements in the winter is because the measurement requires 12 hours and a long night is needed to complete the process. Chaucer was apparently aware that measuring the altitude of Polaris was not sufficiently accurate in the 14th century. Polaris is much closer to the celestial pole now.)

24. *Another method of finding the altitude of the pole.*

Take any star that never sets in the region of interest and determine its maximum and minimum altitude from the horizon. Then take the altitude that is halfway between as the altitude of the pole in that place. (ed. This article seems to be identical to 23.)

25. *Another method of finding the latitude of a place*

.

The latitude of any place is the distance between the local zenith and the equator, north or south, taking the measurement on the meridian line of your astrolabe. (ed. It is not clear what Chaucer means by 'north or south'. The zenith distance of the southern culmination of the equator equals the latitude. The northern extreme of the equator is below the horizon for all northern latitudes.)  This distance is equal to the altitude of the pole at the same place. And is also the same as the depression of the antarctic pole, that is to say, the antarctic pole below the horizon is the same distance, neither more nor less.
If you want to find the latitude of this place, take the altitude of the Sun at noon when the Sun is at the beginning of Aries or Libra (ed. i.e. at an equinox.) because the Sun is on the equator at this time. (ed. This is not strictly true. The Sun's latitude is zero at the instant of

the equinox, which is generally not at noon. The Sun will almost always have some latitude, either plus or minus, at noon on the day of the equinox. The maximum solar declination at noon on the day of an equinox is about ¼ degree). Subtract the Sun's altitude from 90 degrees. The difference is the latitude of the place. Suppose the Sun's altitude on that day was 38°. 90° - 38° = 52°. So, the latitude is 52°. This is only an example. The actual latitude of Oxford is a few minutes less, as you might demonstrate. (ed. The latitude of the center of Oxford is 51° 46′).

Now, if it seems to long to wait for an equinox, then wait until the Sun is any other degree in the zodiac and measure its angle from the equator. If the Sun is in the north, subtract the Sun's declination from its noon altitude, which gives the altitude of the equator. Say the Sun is in the first degree of Leo, its noon altitude is 58° 10′ and its declination is almost 20° north. Subtract the 20° of declination from the noon altitude leaving 38° and odd minutes. This is the altitude of the equator in this area. Also, if the Sun's declination is to the south, add the declination to the Sun's noon altitude, giving the altitude of the equator. Subtract the equator's altitude from 90° to get the altitude of the pole of that place from the equator. (ed. i.e. the local zenith.)  Or else, as a last resort, take the highest altitude from the equator of any fixed star that you know and take the lowest elongation (in distance) from the equator and work in the manner above.

26. *Declaration on the ascension of signs.*

The excellence of the solid sphere (ed. globe or armillary sphere) shows the rising of the signs in various places clearly, as well as the right circle (ed. the equator) and the oblique circle (ed. latitudes not on the equator. These terms predate Ptolemy and are prominent in Ptolemy's work.)  These authors (Ptolemy et al?) have written that a sign if called 'of right ascension' if more degrees of the equator rise than the degrees of the zodiac when the sign rises. A sign is called 'oblique' if fewer equatorial degrees than zodiac degrees rise when the sign rises. Furthermore, they say that people have this right horizon and right circle in a region where the zenith is the equator and the poles are on the horizon (ed. i.e. at the equator) and length of the day and night is always the same and twice a year the Sun passes directly overhead and they have two summers and two winters in a year. And the almucantars are straight lines, as shown in the figure (ed. This last statement is totally wrong. The almucantars for an astrolabe made for a 0° latitude are arcs of circle, as they are for all latitudes. The horizon is, however, a straight line.).

The value of knowing the ascensions of the signs in the right circle is this: the measurement of these ascensions with their tables and instruments allows the astrologers to determine the altitude of every degree and minute in the entire zodiac in the oblique circle, as shall be shown. And note that the right horizon, called Orison Rectum, divides the equator into right angles and the oblique horizon, where the pole is above the horizon, intersects the equator at oblique angles, as is shown in the figure.

27. *The conclusion to determining the rising time of signs in the right circle, that is circulus directus*
.

Set the start of sign for which you want to find the rising time on the meridian and note where the almuri falls on the border and mark that point. Turn the rete westward until the end of the sign is on the meridian and make another mark at the position of the almuri on the border. Calculate the number of degrees between the marks. This is the ascension of the sign in the right circle. (ed. To find the rising time you would divide the angle by 15.). You can do this with every part of the zodiac.

28. *To find the rising time of signs in the oblique circle in every region, I mean, in circulo oblique*

.

Set the beginning of the sign for which you want to find the ascension on the eastern horizon and note the position of the almuri on the border. Turn the rete upward until the end of the same sign is on the eastern horizon and note the position of the almuri on the border. Calculate the number of degrees on the border between the two positions. This is the rising time of the sign on the oblique horizon (ed. After dividing by 15). Note that the signs from beginning of Aries to the end of Virgo are known as the northern signs. These signs are always rise north of east. And all the signs from the beginning of Libra to the end of Pisces are known as southern signs because they always rise south of the equator. Also, the signs between the beginning of Capricorn to the end of Gemini rise in less than two equal hours on our horizon. These signs, from the beginning of Capricorn to the end of Gemini, are known as 'tortured signs' or 'crooked signs' because they rise at an oblique angle on our horizon. The signs of right ascension are those from the beginning of Cancer to the end of Sagittarius and these signs rise more upright, so they are called 'sovereign signs' and they all take more than two hours to rise. Thus, two signs that are of equal distance from the beginning of Capricorn have the same characteristics.

29. *The find the four cardinal directions; East, West, North and South.*

Measure the altitude of the Sun a the selected time and note its azimuth (ed. i.e. east or west). Turn the astrolabe over and set the degree of the Sun on the almucantar for the Sun's altitude on the side where the Sun is, as when finding the time, set the rule on the Sun's position and note the number of degrees from the meridian to the point of the rule. Turn the astrolabe over and set the alidade to the number of degrees that the rule was from the meridian on the front of the instrument. Now, set the astrolabe carefully and gently on a smooth, flat place and let the Sun shine through the sights on the alidade. The meridian line now points south and the east will point east and the west line will point west. You now have the cardinal compass points if you work carefully and easily when setting the astrolabe down. (ed. This article is not quite correct. Instead of noting the angle of the rule on the border, you should note the Sun's azimuth using the azimuth arcs on the plate and set the alidade on the back to the Sun's azimuth angle. It is difficult to read the azimuth very accurately since there are usually few azimuth arcs. This method works best if the Sun's altitude when it is on a marked azimuth is predetermined and then wait until the Sun reaches that altitude.)

30. *To find the latitude of the planets*
.

(ed. The terms used in this article have been significantly changed from the original. Chaucer refers to the ecliptic in this context as *the wey of the sonne*. Strictly speaking, *the wey of the sonne* is the path of the Sun in the sky for a given day.)
Measure the altitude of a planet when it on the meridian. If the altitude is the same as the degree of the Sun for that day then the planet is on the ecliptic and has no altitude. If the planet's altitude is greater than the Sun's, the planet is north of the ecliptic by the amount shown by the almucantars. If the planet's altitude is less than the Sun's then the planet is south of the ecliptic by the amount shown by the almucantars. This to be seen from the position of the Sun for this day only, and not for every place in the zodiac. (ed. This article works only in part. It is true that you can use the astrolabe with a normal plate to determine if the latitude of a planet is north (positive) or south (negative). You cannot, however, determine the amount of the planet's latitude directly from the almucantars on an ordinary astrolabe plate. The problem is that latitudes are measured from the ecliptic plane to the ecliptic pole and the almucantars are based on the angle from the horizon to the zenith or nadir of a place. The alumcantars are in a different coordinate system than latitudes and calculating the latitude as Chaucer suggests gives the wrong answer. In any case, it would be asking too much from and astrolabe to suggest that a very accurate latitude could be measured at all. Some astrolabes were equipped with a special plate for the latitude of the

arctic circle that was used for working with latitudes. It is possible to calculate the latitude from an observed altitude and azimuth using spherical trigonometry)

31. *To find the azimuth of the rising Sun,  that is the point on the horizon where the Sun rises.*

The Sun does not always rise in due east, but sometimes rises north of east and sometimes south of east. The only time the Sun rises due east is when the Sun is at the beginning of Aries or Libra. The horizon of your astrolabe is divided into 24 parts by the azimuth arcs, showing the 24 compass directions, although sailors use 32 directions. All you have to do is note the azimuth arc where the Sun rises and take that as the azimuth of sunrise.

Your astrolabe is divided as follows: First, it is divided into the four cardinal quarters by the line from east to west and the line from north to south (ed. the meridian). Then it is divided into smaller parts by azimuths as east, east by south (the first azimuth above the east line) an so forth from section to section until you come back to the east line. In this way you can fine the azimuth of rising of any star and section where it rises. (ed. Chaucer mixes his terminology a bit here. The mariner's compass rose divides the winds into 32 parts named, for example, N, N by E, NNE, NE by N, NE, etc. Chaucer begins to incorrectly apply the mariner's terms to the azimuths but does not continue, so it is possible he was not certain of this point.)

32. *To find the direction of conjunction [of the Sun and Moon]*
.

Find the time of the conjunction from a calendar thus: note the number of hours of the conjunction from noon of the preceding day as shown by the canon of your calendar. Calculate the number of hours on the border of your astrolabe, as in finding the time of day or night, and set the rule over the Sun's position. The point of the rule will be on the time of the conjunction. Note the Sun's azimuth. This is the direction of the conjunction.

33. *To find the azimuth from the Sun's altitude*
.

There is nothing more to do than measure the altitude of the Sun at any time and note the azimuth of the Sun's position. This can also be done at night for any star, whether is in the east, west, north or south, or any place in between, from the azimuth of the star's position.

34. *To find the longitude of the moon or any planets that has no latitude at the time*
.

Measure the altitude of the moon and mark its location on the almucantars on the appropriate side of the meridian. Then quickly measure the altitude of a known fixed star on the same side of the meridian and set its pointer on the appropriate almucantar. Note the degree of the zodiac that touches the moon's position. This is the moon's longitude. This procedure works well if the stars on your astrolabe are accurately made. Other astrolabe treatises do not make an exception for whether the moon has a latitude or not and on which side of the meridian the altitude of the fixed star should be taken.
Note also that you can perform this same procedure when the moon is visible during the day using the Sun.

35. *The procedure to find if a planet's motion is direct or retrograde.*

Measure the altitude of any planet and note the value. Then quickly take the altitude of any fixed star on your astrolabe and note this value also. Wait three or four nights in order for the forward or backward movement of the planet to be visible. Then wait until the fixed star is at the same altitude that was measured before and measure the altitude of the same planet and note the value. If the planet is on the right of the astrolabe (ed. i.e. in the east) and the second altitude is less than the first altitude, then the planet's movement is direct. And if the planet is on the east side and the second altitude is greater than the first altitude, then its

motion is retrograde. If it is on the west, then the motion is direct. But the opposite applies to the path of the moon because the motion of the moon is different in its epicycle from the other planets, but not in other ways. (ed. Planetary motions can be quite complex and this proposition does not work for any but the most elementary. Specifically, the time when the planet is stationary in its position is not covered and there are times when the planet's latitude can change that do not match the conditions noted. One can use an astrolabe to determine if a planet is in direct or retrograde motion with only two observations under many, but not all circumstances. Many observations conducted over an extended period can be used to define the approximate movement of the moon and planets.)

36. *Determining the houses using the astrolabe*
.

Set the beginning of the ascending degree on the end of the 8th unequal hour. The beginning of the second house will be on the midnight line. Move the ascending degree and set it on the end of the 10th unequal hour and the beginning of the 3rd house will be on the midnight line. Set the ascending degree on the eastern horizon and the beginning of the 4th house will be on the midnight line. The beginning of the 7th house is the nadir of the ascendant and the beginning of the 8th house is the nadir of the 2nd house and the beginning of the 9th is the nadir of the 3rd and the beginning of the 10th house is the nadir of the 4th and the beginning of the 11th house is the nadir of the 5th and the beginning of the 12th house is the nadir of the 6th. (ed. North covers this proposition and the next in detail on pp. 76-85)
.

37. *Another method of determining the houses using the astrolabe*
.

Take the ascendant, which gives you four angles because the opposite of the ascendant, the beginning of the 7th house, is on the western horizon and the beginning of the 10th house sits on the meridian and its opposite (ed. The beginning of the 4th house) is on the midnight line. Then set the rule on the degree that is ascending and calculate the number of degrees from the point of the rule to the meridian. Divide this angle into three equal parts, which defines three houses. Set the rule on each of the house divisions and you can see the beginning of each house in the zodiac. The beginning of the houses from the ascendant, that is, the start of the 12th house just above the ascendant, the beginning of the 11th house and then the 10th on the meridian line, as I have said. Continue in the same way below the ascendant and you have the other three houses, that is to say, the beginning of the 2nd, 3rd and 4th. The nadir of these three houses are the beginning of the three houses that follow.

38. *To find the meridian line for any location.*

Take a round metal plate, the thicker the better to avoid warping, and draw a full circle a little inside the edge. Set the round plate on even ground, a flat stone or post in the ground and make it true using a level. Insert a compass stake, even pin or wire, the thinner the better, with a length no longer than one-quarter of the diameter of the circle, in the center of the plate and make it vertical using plumb rule. Wait until about 10 or 11 by the clock on a sunny day. Mark the point where the shadow of the pin just touches the circle. Then wait until after 1 o'clock when the shadow of the pin just touches the circle and mark that point. Take a compass and find the point exactly halfway between the marks. Take a rule and draw a line from the pin through the middle mark. This line is the meridian for that place. (ed. This item clearly has nothing to do with astrolabes. Apparently, Chaucer felt it had sufficient educational value to justify including it anyhow.)

39. *Description of the meridian line and the longitudes and latitudes of cities and towns relative to one another*
.

It is called the meridian because, regardless of the time of year, whenever the Sun comes to this place it is midday, or what we call noon. Therefore, it is called the midday line. Also

note that any two towns, one of which is more easterly than the other, have different meridians.

Note also that arc of the equinoctial that is contained in or bounded between the two meridians is called the longitude of the town. And if it be that two towns have the same meridian, then they are the same distance to the east, and vice versa. But they have different almucantars for the elevation of the pole and the distance of the Sun.

The longitude of a climate is an imaginary line from east to west, always the same distance from the equator. And the latitude of a climate may be defined as the distance on the Earth from the beginning of the first climate to the end of that climate, up to the north pole. (ed. Chaucer seems to be referring to the 'climates' defined by Ptolemy where the northern hemisphere was divided by latitudes where the length of the longest day varied by a half hour. Chaucer seems a bit vague in this proposition. Perhaps his knowledge was weak, this was just a draft to be edited later or he was running out of steam by this point in his treatise.) Some authors say that if the latitude of a country is measured, the meridian arc that is contained in or intercepted between the zenith and equator, then the distance from the equator to the end of a climate in the direction of the north pole is the true latitude of a climate.

40. *To find the degree of the zodiac where any planet rises on the horizon, regardless of whether its latitude is north or south*

.

Look up the degree of the ecliptic for any sign where a planet is calculated to be in your almanac and this is planet's longitude. Also look up the planet's north or south latitude. You will be able to work in any sign of the zodiac by the following examples.

For example, the longitude of Venus or another planet was Capricorn 6° and the latitude was 2° north. Then I took a pair of dividers and called one point A and the other point F. I set point A on the longitude of Venus, Capricorn 6°, and I set point F upward 2° in the same sign because the latitude was north, so I have two degrees between the points. (ed. Chaucer appears to be estimating two degrees in latitude by measuring two degrees in longitude along the ecliptic. The approximation is actually not too bad because of the characteristics of he stereographic projection.) I then laid by compass down gently and set the degree of the longitude on the horizon. I applied a coat of wax to the rule, such as one waxes a pair of tables, so the marks of my dividers will be distinct. Then a set the rule over the degree of longitude and used the dividers to mark point A on the rule and, as closely as possible, marked the point F inside the ecliptic so it is to the north. Then a laid down the compass and examined marks A and F. I turned the rete and rule together until mark F is on the horizon and saw Venus with northern latitude of 2° at Capricorn 6°. (ed. Chaucer seems to miss a minor point that the planet will not be above its longitude point on the ecliptic, but will be displaced toward the ecliptic pole. The error is not great for small latitudes, but is meaningful for larger values.)

You can use this technique with any northern latitude in all of the signs. But you will not be able to work with southern planetary latitudes in Capricorn because of the small space between the ecliptic and the border of the astrolabe, but you will be able to in of the other signs.

Also, assume the longitude of Jupiter, or some other planet was the first degree of Pisces and its latitude was 2° south. I set the point A on the first degree of Pisces on the ecliptic and set the point F downward in the same sign because the latitude was 2° south of the beginning of Pisces. Thus, I have two degrees between the two points. Then I set the degree of longitude on the horizon, set the rule over the ecliptic on the longitude degree and set point F on the rule 2° of latitude outward from the zodiac (that is, south of the ecliptic toward the border) and turned the rete [and rule together] point F is on the horizon. I then see that Jupiter, with a latitude of 2° south rises with Pisces 8° *in horoscopo*. You can use

this method to work with any southern latitude, except in Capricorn, as I said earlier. If you use this technique with the rising of the moon, you must calculate its path hour by hour because it stays in a degree of longitude for only a short time, as well you know. But nonetheless, if you calculate its movement hourly from the tables [the original manuscript ends in mid-sentence at this point. The sentence was completed in some manuscripts by later scribes with, "thou shalt do wel ynow "- you will do well enough.]

Some later editions include six supplementary propositions. They were probably not written by Chaucer and are not included here but are in the original text which follows.

# Chaucer's Original Text

**F.N. Robinson edition**

Lyte Lowys my sone, I aperceyve wel by certeyne evydences thyn abilite to lerne sciences touching nombres and proporciouns; and as wel considre I thy besy praier in special to lerne the tretys of the Astrelabie. Than for as mochel as a philosofre saith, "he wrappith him in his frend, that condescendith to the rightfulle praiers of his frend," therfore have I latitude of Oxenforde; upon which, by mediacioun of this litel tretys, I purpose to teche the a certein nombre of conclusions aperteynyng to the same instrument. I seie a certein of conclusions, for thre causes. The first cause is this: truste wel that alle the conclusions that han be founde, or ellys possibly might be founde in so noble an instrument as is an Astrelabie ben unknowe parfitly to eny mortal man in this regioun, as I suppose. An-other cause is this, that sothly in any tretis of the Astrelabie that I have seyn there be somme conclusions that wol not in alle thinges parformen her bihestes; and somme of hem ben to harde to thy tendir age of ten yeer to conceyve.

This tretis, divided in 5 parties, wol I shewe the under full light reules and naked wordes in Englissh, for Latyn ne canst thou yit but small, my litel sone. But natheles suffise to the these trewe conclusions in Englissh as wel as sufficith to these noble clerkes Grekes these same conclusions in Grek; and to Arabiens in Arabik, and to Jewes in Ebrew, and to the Latyn folk in Latyn; whiche Latyn folk had hem first out of othere dyverse langages, and writen hem in her owne tunge, that is to seyn, in Latyn. And God woot that in alle these langages and in many moo han these conclusions ben suffisantly lerned and taught, and yit by diverse reules; right as diverse pathes leden diverse folk the righte way to Rome. Now wol I preie mekely every discret persone that redith or herith this litel tretys to have my rude endityng for excusid, and my superfluite of wordes, for two causes. The first cause is for that curious endityng and hard sentence is ful hevy at onys for such a child to lerne. And the secunde cause is this, that sothly me semith better to writen unto a child twyes a god sentence, than he forgete it onys.

And Lowys, yf so be that I shewe the in my light Englissh as trewe conclusions touching this mater, and not oonly as trewe but as many and as subtile conclusiouns, as ben shewid in Latyn in eny commune tretys of the Astrelabie, konne me the more thank. And preie God save the king, that is lord of this langage, and alle that him feith berith and obeieth, everich in his degre, the more and the lasse. But considre wel that I ne usurpe not to have founden this werk of my labour or of myn engyn. I n'am but a lewd compilator of the labour of olde astrologiens, and have it translatid in myn Englissh oonly for thy doctrine. And with this swerd shal I sleen envie.

*Prima pars.* -The firste partie of this tretys shal reherse the figures and the membres of thyn Astrelabie by cause that thou shalt have the gretter knowing of thyn owne instrument.

*Secunda pars.* -The secunde partie shal techen the worken the verrey practik of the forseide conclusiouns, as ferforth and as narwe as may be shewed in so small an instrument portatif aboute. For wel woot every astrologien that smallist fraccions ne wol not be shewid in so small an instrument as in subtile tables calculed for a cause.

*Tertia pars.* -The thirde partie shal contene diverse tables of longitudes and latitudes of sterres fixe for the Astrelabie, and tables of the declinacions of the sonne, and tables of longitudes of citees and townes; and tables as well for the governaunce of a clokke, as for to fynde the altitude meridian; and many anothir notable conclusioun after the kalenders of the reverent clerkes, Frere J. Somes and Frere N. Lenne.

*Quarta pars.* -The fourthe partie shal ben a theorike to declare the moevyng of the celestiall bodies with the causes The whiche fourthe partie in speciall shal shewen a table of the verrey moeving of the mone from houre to houre every day and in every signe after thyn almenak. Upon which table there folewith a canoun suffisant to teche as wel the manere of the worchynge of the same conclusioun as to knowe in oure orizonte with which degre of the zodiak that the mone arisith in any latitude, and the arisyng of any planete after his latitude fro the ecliptik lyne.

*Quinta pars.* -The fifthe partie shal be an introductorie, after the statutes of oure doctours, in which thou maist lerne a gret part of the generall rewles of theorik in astrologie. In which fifthe partie shalt thou fynden tables of equaciouns of houses after the latitude of Oxenforde; and tables of dignitees of planetes, and othere notefull thinges, yf God wol vouche saaf and his Moder the Maide, moo then I behete.

## PART I

Here begynneth the descripcioun of thin Astralabie.

1.  Thyn Astrolabie hath a ring to putten on the thombe of thi right hond in taking the height of thinges. And tak kep, for from henes forthward I wol clepen the heighte of any thing that is taken by the rewle "the altitude," withoute moo wordes.

2.  This ryng renneth in a maner toret fast to the moder of thyn Astrelabie in so rowm a space that it distourbith not the instrument to hangen after his right centre.

3.  The moder of thin Astrelabye is thikkest plate, perced with a large hool, that resceiveth in hir wombe the thynne plates compowned for diverse clymates, and thy reet shapen in manere of a nett or of a webbe of a loppe.

4.  This moder is dividid on the bakhalf with a lyne that cometh descending fro the ring doun to the netherist bordure. The whiche lyne, fro the forseide ring unto the centre of the large hool amidde, is clepid the south lyne, or ellis the lyne meridional. And the remenaunt of this lyne doun to the bordure is clepid the north lyne, or ellis the lyne of midnyght.

5.  Overthwart this forseide longe lyne ther crossith him another lyne of the same lengthe from eest to west. Of the whiche lyne, from a litel cros (+) in the bordure unto the centre of the large hool, is clepid the est lyne, or ellis the lyne orientale. And the remenaunt of this lyne, fro the forseide centre unto the bordure, is clepid the west lyne, or ellis the lyne occidentale. Now hast thou here the foure quarters of thin Astrolabie divided after the foure principales plages or quarters of the firmament.

6.  Tlle est syde of thyn Astrolabie is clepid the right syde, and the west syde is clepid the left syde. Forget not thys, litel Lowys. Put the ryng of thyn Astrolabie upon the thombe of thi right hond, and than wol his right side be toward thi lift side, and his left side wol be toward thy right syde. Tak this rewle generall, as wel on the bak as on the wombe syde. Upon the ende of this est lyne, as I first seide, is marked a litel cros (+), where as evere moo generaly is considerid the entring of the first degre in which the sonne arisith.

7.  Fro this litel cros (+) up to the ende of the lyne meridionall, under the ryng, shalt thou fynden the bordure divided with 90 degrees; and by that same proporcioun is every quarter of thin Astrolabie divided. Over the whiche degrees there ben noumbres of augrym that dividen thilke same degres fro 5 to 5, as shewith by longe strikes bitwene. Of whiche longe

strikes the space bitwene contenith a myle wey, and every degre of the bordure conteneth 4 minutes, this is seien, mynutes of an houre.

8. Under the compas of thilke degrees ben writen the names of the Twelve Signes: as Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricornus, Aquarius, Pisces. And the nombre of the degrees of thoo signes be writen in augrym above, and with longe divisiouns fro 5 to 5, dyvidid fro the tyme that the signe entrith unto the last ende. But understond wel that these degres of signes ben everich of hem considred of 60 mynutes, and every mynute of 60 secundes, and so furth into smale fraccions infinite, as saith Alkabucius. And therfore knowe wel that a degre of the bordure contenith 4 minutes, and a degre of a signe conteneth 60 minutes, and have this in mynde.

9. Next this folewith the cercle of the daies, that ben figured in manere of degres, that contenen in nombre 365, dividid also with longe strikes fro 5 to 5, and the nombre in augrym writen under that cercle.

10. Next the cercle of the daies folewith the cercle of the names of the monthes, that is to say, Januarius, Februarius, Marcius, Aprilis, Maius, Junius, Julius, Augustus, September, October, November, December. The names of these monthes were clepid thus, somme for her propirtees and somme by statutes of lordes Arabiens, somme by othre lordes of Rome. Eke of these monthes, as liked to Julius Cesar and to Cesar Augustus, somme were compouned of diverse nombres of daies, as Julie and August. Than hath Januarie 31 daies, Februarie 28, March 31, Aprill 30, May 31, Junius 30, Julius 31, Augustus 31, September 30, October 31, November 30, December 31. Natheles, all though that Julius Cesar toke 2 daies out of Feverer and putte hem in his month of Juyll, and Augustus Cesar clepid the month of August after his name and ordeined it of 31 daies, yit truste wel that the sonne dwellith therfore nevere the more ne lasse in oon signe than in another.

11. Than folewen the names of the holy daies in the Kalender, and next hem the lettres of the A B C on whiche thei fallen.

12. Next the forseide cercle of the A B C, under the cross lyne, is marked the skale in manere of 2 squyres, or ellis in manere of laddres, that serveth by his 12 pointes and his dyvisiouns of ful many a subtil conclusioun. Of this forseide skale fro the cross lyne unto the verrey angle is clepid Umbra Versa, and the nethir partie is clepid Umbra Recta, or ellis Umbra Extensa.

13. Than hast thou a brod reule, that hath on either ende a square plate perced with certein holes, somme more and somme lasse, to resceyve the stremes of the sonne by day, and eke by mediacioun of thin eye to knowe the altitude of sterres by night.

14. Than is there a large pyn in manere of an extre, that goth thorugh the hole that halt the tables of the clymates and the riet in the wombe of the moder; thorugh which pyn ther goth a litel wegge, which that is clepid the hors, that streynith all these parties to-hepe. Thys forseide grete pyn in manere of an extre is ymagyned to be the Pool Artik in thyn Astralabie.

15. The wombe syde of thyn Astrelabie is also divided with a longe croys in 4 quarters from est to west, fro southe to northe, fro right syde to left side, as is the bakside.

16. The bordure of which wombe side is divided fro the point of the est lyne unto the point of the south lyne under the ring, in 90 degrees; and by that same proporcioun is every quarter divided, as is the bakside. That amountith 360 degrees. And understondwel that degres of this bordure ben aunswering and consentrike to the degrees of the equinoxiall, that is dividid

in the same nombre as every lo othir cercle is in the highe hevene. This same bordure is divided also with 23 lettres capitals and a small crosse (+) above the south lyne, that shewith the 24 houres equals of the clokke. And, as I have seid, 5 of these degres maken a myle wey, and 3 milewei maken an houre. And every degre ot thys bordure contenith 4 minutes, and every minute 60 secundes. Now have I told the twyes.

17. The plate under the riet is discrived with 3 principal cercles, of whiche the leest is clepid the cercle of Cancre by cause that the heved of Cancre turnith evermo consentrik upon the same cercle. In this heved of Cancer is the grettist declinacioun northward of the sonne, and therfore is he clepid solsticium of somer; which declinacioun, after Ptholome, is 23 degrees and 50 minutes as wel in Cancer as in lo Capricorn. This signe of Cancer is clepid the tropik of somer, of tropos, that is to seien " ageynward. " For than beginneth the sonne to passen from us-ward.

The myddel cercle in wydnesse, of these 3, is clepid the cercle equinoxiall, upon which turnith evermo the hevedes of Aries and Libra. And understond wel that evermo thys cercle equinoxiall turnith justly from verrey est to verrey west as I have shewed the in the speer solide. This same cercle is clepid also Equator, that is the weyer of the day- for whan the sonne is in the hevedes of Aries and Libra, than ben the dayes and the nightes ylike of lengthe in all the world. And therfore ben these 2 signes called the equinoxiis. And all that moeveth withinne the hevedes of these Aries and Libra, his moevyng is clepid north- ward; and all that moevith withoute these hevedes, his moevyng is clepid southward, as fro the equinoxiall. Tak kep of these latitudes north and south, and forget it nat. By this cercle equinoxiall ben considred the 24 houres of the clokke; for evermo the arisyng of 15 degrees of the equinoxiall makith an houre equal of the clokke. This equinoxiall is clepid the gurdel of the first moeving, or ellis of the first moevable. And note that the first moevyng is clepid moevyng of the first moevable of the 8 speer, which moeving is from est into west, and eft ageyn into est. Also it is clepid girdel of the first.moeving for it departith the first moevable, that is to seyn the spere. in two llke partyes evene distantz fro the poles of this world.

The widest of these 3 principale cercles is clepid the cercle of Capricorne, by cause that the heved of Capricorne turneth evermo consentrik upon the same cercle. In the heved of this forseid Capricorne is the grettist declinacioun southward of the sonne, and therfore it is clepid the solsticium of wynter. This signe of Capricorne is also clepid the tropic of wynter, for than begynneth the sonne to come ageyn to us- ward.

18. Upon this forseide plate ben compassed certeyn cercles that highten almycanteras, of whiche somme of hem semen parfit cercles and somme semen inparfit. The centre that stondith amyddes the narwest cercle is clepid the cenyth. And the netherist cercle, or the first cercle, is clepid the orizonte, that is to seyn, the cercle that divideth the two emysperies, that is, the partie of the lo hevene above the erthe and the partie bynethe. These almykanteras ben compowned by 2 and 2, all be it so that on diverse Astrelabies somme almykanteras ben divided by oon, and somme by two, and somme by thre, after the quantite of the Astrelabie. This forseide cenyth is ymagined to ben the verrey point over the crowne of thin heved. And also this cenyth is the verray pool of the ori- zonte in every regioun.

19. From this cenyth, as it semeth, there comen a maner croked strikes like to the clawes of a loppe, or elles like the werk of a wommans calle, in kervyng overthwart the almykanteras And these same strikes or divisiouns ben clepid azimutz, and thei dividen the orisounte of thin Astrelabie in 24 divisiouns. And these azymutz serven to knowe the costes of the firmament, and to othre conclusions, as for to knowe the cenyth of the sonne and of every sterre.

20. Next these azymutz, under the cercle of Cancer, ben there 12 divisouns embelif, muche like to the shap of the azemutz, that shewen the spaces of the hollres of planetes.

21. The riet of thin Astrelabie with thy zodiak, shapen in manere of a net or of a lopwebbe after the olde descripcioun, which thou maist turnen up and doun as thiself liketh, contenith certein nombre of sterres fixes, with her longitudes and latitudes determinat, yf so be that the maker have not errid. The names of the sterres ben writen in the margyn of the riet there as thei sitte, of whiche sterres lo the smale point is clepid the centre. And understond also that alle the sterres sitting within the zodiak of thin Astrelabie ben clepid sterres of the north, for thei arise by northe the est lyne. And all the remenaunt fixed oute of the zodiak ben clepid sterres of the south. But I seie not that thei arisen alle by southe the est lyne; witnesse on Aldeberan and Algomeyse. Generaly understond this rewle, that thilke sterres that ben clepid sterres of the north arisen rather than the degre of her longitude, and alle the sterres of the south arisen after the degre of her longitude - this is to seyn, sterres fixed in thyn Astrelabie. The mesure of the longitude of sterres is taken in the lyne ecliptik of hevene, under which lyne, whan that the sonne and the mone be lyne-right, or ellis in the superficie of this lyne, than is the eclipse of the sonne or of the mone, as I shal declare, and eke the cause why. But sothly the ecliptik lyne of thy zodiak is the utterist bordure of thy zodiak there the degrees be marked.

Thy zodiak of thin Astrelabie is shapen as a compas which that contenith a large brede as after the quantite of thyn Astrelabie, in ensample that the zodiak in hevene is ymagyned to ben a superfice contenyng a latitude of 12 degrees, whereas alle the remenaunt of cercles in the hevene ben ymagyned verrey Iynes withoute eny latitude. Amiddes this celestial zodiak is ymagined a lyne which that is clepid the ecliptik lyne, under which lyne is evermo the wey of the sonne. Thus ben there 6 degres of the zodiak on that oo syde of the lyne and 6 degrees on that othir. This zodiak is dividid in 12 principale divisiouns that departen the 12 signes, and, for the streitnesse of thin Astrolabie, than is every smal divisoun in a signe departed by two degrees and two! I mene degrees contenyng 60 mynutes. And this forseide hevenysshe zodiak is clepid the cercle of the signes, or the cercle of the bestes, for " zodia " in langage of Grek sowneth " bestes " in Latyn tunge. And in the zodiak ben the 12 signes that han names of bestes, or ellis for whan the sonne entrith into eny of tho signes he takith the propirte of suche bestes, or ellis that for the sterres that ben ther fixed ben disposid in signes of bestes or shape like bestes, or elles whan the planetes ben under thilke signes thei causen us by her influence operaciouns and effectes like to the operaciouns of bestes.

And understond also that whan an hot planete cometh into an hot signe, than encrescith his hete; and yf a planete be cold, than amenusith his coldnesse by cause of the hoote sygne. And by thys conclusioun maist thou take ensample in alle the signes, be thei moist or drie, or moeble or fixe, reknyng the qualite of the planete as I first seide. And everich of these 12 signes hath respect to a certeyn parcel of the body of a man, and hath it in governaunce; as Aries hath thin heved, and Taurus thy nekke and thy throte, Gemini thin armholes and thin armes, and so furth, as shall be shewid more pleyn in the 5 partie of this tretis.

This zodiak, which that is part of the speer, over-kervith the equinoxial, and-he over-kervith him ageyn in evene parties; and that oo half declineth so southward; and that othir northward, as pleinly declarith the Tretys of the Speer.

Than hast thou a label that is shapen like a reule, save that it is streit and hath no plates on either ende with holes. But with the smale point of the forseide label shalt thou calcule thin equaciouns in the bordure of thin Astralabie, as by thin almury.

Thin almury is clepid the denticle of Capricorne, or ellis the calculer. This same almury sitt fix in the heved of Capricorne, and it serveth of many a necessarie conclusioun in equacions of thinges as shal be shewid.

*Here endith the descripcioun of the Astrelabie and here begynne the conclusions of the Astrelabie.*

**PART II**

1. To fynde the degre in which the sonne is day by day, after his cours aboute.

Rekne and knowe which is the day of thy month, and ley thy rewle up that same day, and than wol the verrey poynt of thy rewle sitten in the bordure upon the degre of thy sonne.

Ensample as thus: -The yeer of oure Lord 1391, the 12 day of March at midday, I wolde knowe the degre of the sonne. I soughte in the bakhalf of myn Astrelabie and fond the cercle of the daies, lo the whiche I knowe by the names of the monthes writen under the same cercle. Tho leyde I my reule over this forseide day, and fond the point of my reule in the bordure upon the firste degre of Aries, a litel within the degre. And thus knowe I this conclusioun.

Anothir day I wolde knowen the degre of my sonne, and this was at midday in the 13 day of December. I fond the day of the month in manere as I seide; tho leide I my rewle upon this forseide 13 day, and fond the point of my rewle in the bordure upon the firste degre of Capricorne a lite within the degre. And than had I of this conclusioun the ful experience.

2. *To knowe the altitude of the sonne or of othre celestial bodies.*

Put the ryng of thyn Astrelabie upon thy right thombe, and turne thi lift syde ageyn the light of the sonne; and remewe thy rewle up and doun til that the stremes of the sonne shine thorugh bothe holes of thi rewle. Loke than how many degrees thy rule is areised fro the litel crois upon thin est lyne, and tak there the altitude of thi sonne. And in this same wise maist thow knowe by night the alti- tude of the mone or of brighte sterres.

This chapitre is so generall evere in oon that there nedith no more declaracioun; but forget it not.

3. *To knowe every tyme of the day by light of the sonne; and every tyme of the nyght by the sterres fixe; and eke to knowe by nyght or by day the degre of eny signe that ascendith on the est orisonte, which that is clepid comounly the ascendent, or ellis horoscopum.*

Tak the altitude of the sonne whan the list, as I have seid, and set the degre of the sonne, in caas that it be beforn the myddel of the day, among thyn almykanteras on the est syde of thin Astrelabie; and if it be after the myddel of the day, set the degre of thy sonne upon the west syde. Take this manere of settyng for a general rule, ones for evere. And whan thou hast set the degre of thy sonne upon as lo many almykanteras of height as was the altitude of the sonne taken by thy rule, ley over thi label upon the degre of the sonne; and than wol the point of thi labell sitte in the bordure upon the verrey tyde of the day.

Ensample as thus: -The yeer of oure lord 1391, the 12 day of March, I wolde knowe the tyde of the day. I tok the altitude of my sonne, and fond that it was 25 degrees and 30 of minutes of height in the bordure on the bak side. Tho turned I myn Astrelabye, and by

cause that it was beforn mydday, I turned my riet and sette the degre of the sonne, that is to seyn the first degre of Aries, on the right side of myn Astrelabye upon 25 degrees and 30 mynutes of height among myn almykanteras. Tho leide I my label upon the degre of my sonne, and fond the point of my label in the bordure upon a capital lettre that is clepid an X. Tho rekned I alle the capitale lettres fro the lyne of mydnight unto this forseide lettre X, and fond that it was 9 of the clokke of the day. Tho loked I doun upon the est orizonte, and fond there the 20 degre of Geminis ascendyng, which that I tok for myn ascendent. And in this wise had I the experience for evermo in which manere I shulde knowe the tyde of the day and eke myn ascendent.

Tho wolde I wite the same nyght folewyng the houre of the nyght, and wroughte in this wise: - Among an heep of sterres fixe it liked me for to take the altitude of the faire white sterre that is clepid Alhabor, and fond hir sittyng on the west side of the lyne of midday, 12 degrees of heighte taken by my rewle on the bak side. Tho sette I the centre of this Alhabor upon 12 degrees among myn almykanteras upon the west side, by cause that she w as founde on the west side. Tho leyde I my label over the degre of the sonne, that was discendid under the west orisounte, and rekned all the lettres capitals fro the lyne of midday unto the point of my Iabel in the bordure, and fond that it was passed 9 of the c lokke the space of 10 degrees. Tho lokid I doun upon myn est orisounte, and fond there 10 degrees of Scorpius ascendyng, whom I tok for myn ascendent. And thus lerned I to knowe onys for evere in which manere I shuld come to the houre of the nyght, and to myn ascendent, as verrely as may be taken by so smal an instrument.

But natheles this rule in generall wol I warne the for evere: - Ne make the nevere bold to have take a just ascendent by thin Astrelabie, or elles to have set justly a clokke, whan eny celestial body by which that thou wenyst governe thilke thinges be nigh the south Iyne. For trust wel, whan the sonne is nygh the meridional lyne, the degre of thc sonne renneth so longe consentrik upon the almykanteras that sothly thou shalt erre fro the just ascendent. The same conclusion sey I by the centre of eny sterre fix by nyght. And more over, by experience I wot wel that in our orisounte, from xi of the clokke unto oon of the clokke, in taking of a just ascendent in a portatif Astrelabie it is to hard to knowe - I mene from xi of the clokke before the houre of noon til oon of the clokke next folewyng.

4.   *A special declaracioun of the ascendent.*

The ascendent sothly, as wel in alle nativites as in questions and eleccions of tymes, is a thing which that these astrologiens gretly observen. Wherfore me semeth convenyent, syth that I speke of the ascendent, to make of it speciall declaracioun.

The ascendent sothly, to take it at the largest, is thilke degre that ascendith at eny of these forseide tymes upon the est orisounte. And therfore, yf that eny planete ascende at thatt same tyme in thilke forseide degre, than hath he no latitude fro the ecliptik lyne, but he is than in the degre of the ecliptik which that is the degre of his longitude. Men sayn that thilke planete is in horoscopo.

But sothly the hous of the ascendent, that is to seyn, the first hous or the est angle, is a thing more brod and large. For, after the statutes of astrologiens, what celestial body that is 5 degrees above thilke degre that ascendith, or withinne that nombre, that is to seyn neer the degree that ascendith, yit rekne they thilke planete in the ascendent. And what planete that is under thilke degre that ascendith the space of 25 degres, yit seyn thei that thilke planete is "like to him that is the hous of the ascendent." But sothly, if he passe the boundes of these forseide spaces, above or bynethe, thei seyn that the planete is "fallyng fro the ascendent." Yit saien these astrologiens that the ascendent and eke the lord of the ascendent may be shapen for to be fortunat or infortunat, as thus: - A "fortunat ascendent " clepen they whan that no wicked planete, as Saturne or Mars or elles the Tayl of the

Dragoun, is in the hous of the ascendent, ne that no wicked planete have noon aspect of enemyte upon the ascendent. But thei wol caste that thei have a fortunat planete in hir ascendent, and yit in his felicite; and than sey thei that it is wel. Further over thei seyn that the infortunyng of an ascendent is the contrarie of these forseide thinges. The lord of the ascendent, sey thei that he is fortunat whan he is in god place fro the ascendent, as in an angle, or in a succident where as he is in hys dignite and comfortid with frendly aspectes of planetes and wel resceyved; and eke that he may seen the ascendent; an that he be not retrograd, ne combust, ne joyned with no shrewe in the same signe; ne that he be not in his discencioun, ne joyned with no planete in his descencioun, ne have upon him noon aspect infortunat; and than sey thei that he is well.

Natheles these ben observaunces of judicial matere and rytes of payens, in whiche my spirit hath no feith, ne knowing of her horoscopum. For they seyn that every signe is departid in thre evene parties by 10 degrees, and thilke porcioun they clepe a face. And although that a planete have a latitude fro the ecliptik, yit sey somme folk, so that the planete arise in that same signe with eny degre of the forseide face in which his longitude is rekned, that yit is the planete in horoscopo, be it in nativyte or in eleccion, etc.

5.  *To knowe the verrey equacioun of the degre of the sonne yf so be that it falle bitwene two almykanteras.*

For as muche as the almykanteras in thin Astrelabie ben compowned by two and two, where as somme almykanteras in sondry astrelabies be compowned by 1 and 1, or elles by 3 and 3, it is necessarie to thy lernyng to teche the first to knowe and worke with thin owne instrument. Wherfore whan that the degre of thi sonne fallith bytwixe 2 almykanteras, or ellis yf thin almykanteras ben graven with over-gret a poynt of a compas (for bothe these thinges may causen errour as wel in knowing of the tide of the day, as of the verrey ascendent), thou must worken in this wise: -

Set the degre of thy sonne upon the hyer almykanteras of bothe, and wayte wel where as thin almury touchith the bordure and set there a prikke of ynke. Sett doun agayn the degre of the sunne upon the nether almykanteras of bothe, and sett there another pricke. Remeve than thin almury in the bordure evene amiddes bothe prickes, and this wol lede justly the degre of thi sonne to sitte atwixe bothe almykanteras in his right place. Ley than thy label over the degre of thi sonne, and fynd in the bordure the verrey tyde of the day, or of the night. Andasverrailyshaltthoufynde upon thin est orisonte thin ascendent.

6.  *To knowe the spryng of the dawenyng and the ende of the evenyng, the whiche ben called the two crepuscules.*

Set the nadir of thy sonne upon 18 degrees of height among thyn almykanteras on the west syde; and ley thy label on the degre of thy sonne, and than shal the point of thy label shewen the spryng of the day. Also set the nader of thy sonne upon 18 degrees of height among thin almykanteras on the est side, and ley over thy lahel upon the degre of the sonne, and with the point of thy label fynd in the bordure lo the ende of the evenyng, that is verrey nyght.

The nader of the sonne is thilke degre that is opposyt to the degre of the sonne, in the 7 signe, as thus: - every degre of Aries by ordir is nadir to every degre of Libra by ordre, and Taurus to Scorpioun, Gemini to Sagittarie, Cancer to Capricorne, Leo to Aquarie, Virgo to Pisces. And if eny degre in thy zodiak be derk, his adir shal declare hym.

7.  *To knowe the arch of the day, that sorne folk callen the day artificiall, fro sonne arisyng tyl it go to reste.*

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Set the degre of thi sonne upon thin est DriSonte and ley thy label on the degre of the sonne, and at the point of thy label in the bordure set a pricke. Turne than thy riet aboute tyl the degre of thy sonne sitte upon the west orisonte, and ley thy label upon the same degre of the sonne, and at the poynt of thy label set there another pricke. Rekne than the quantite of tyme in the bordure bitwixe bothe prickes, and tak there thyn arch of the day. The remenaunt of the bordure under the orisonte is the arch of the nyght. Thus maist thou rekne bothe arches, or every porcioun, of whether that the liketh. And by this manere of worching maist thou se how longe that eny sterre fix dwelleth above the erthe, fro tyme that he riseth til he go to reste. But the day naturall that is to seyn 24 houres, is the revolucioun of the equinoxial with as muche partie of the zodiak as the sonne of his propre moeving passith in the mene while.

8.   *To turne the houres inequales in houres equales.*

Know the nombre of the degrees in the houres inequales, and depart hem by 15, and tak there thin houres equales.

9.   *To knowe the quantite of the day vulgar, that is to seyn fro spryng of the day unto verrey nyght.*

Know the quantite of thy crepuscles, as I have taught in the 2 chapitre bifore, and adde hem to the arch of thy day artificial, and tak there the space of all the hool day vulgar unto verrey night. The same manere maist thou worche to knowe the quantite of the vulgar nyght.

10.   *To knowe the quantite of houres in, equales by day.*

Understond wel that these houres inequales ben clepid houres of planetes. And understond wel that som tyme ben thei lenger by day than by night, and som tyme the contrarie. But understond wel that evermo generaly the houre inequal of the day with the houre inequal of the night contenen 30 degrees of the bordure, which bordure is evermo answeryng to the degrees of the equinoxial. Wherfore departe the arch of the day artificial in 12, and tak there the quantite of the houre inequale by day. And if thou abate the quantite of the houre inequale by day out of 30, than shal the remenaunt that levith parforme the houre inequale by night.

11.   *To knowe the quantite of houres equales.*

The quantite of houres equales, that is to seyn the houres of the clokke, ben departid by 15 degrees alredy in the bordure of thin Astrelaby, as wel by night as by day, generaly for evere. What nedith more declaracioun?

Wherfore when the list to knowe how many houres of the clokke ben passed, or eny part of eny of these houres that ben passed, or ellis how many houres lo or parties of houres ben to come fro such a tyme to such a tyme by day or by nyght, know the degre of thy sonne, and ley thy label on it. Turne thy ryet aboute joyntly with thy label, and with the poynt of it rekne in the bordure fro the sonne ariste unto that same place there thou desirist, by day as by nyght. This conclusioun wol I declare in the last chapitre of the 4 partie of this tretys so openly that ther shal lakke no word that nedith to the declaracioun.

12.   *Special declaracioun of the houres of planetes.*

Understond wel that evermo, fro the arisyng of the sonne til it go to reste, the nadir of the sonne shal shewe the houre of the planete; and fro that tyme forward al the night til the sonne arise, than shal the verrey degre of the sonne shewe the houre of the planete.

Ensample as thus: -The xiij day of March fyl upon a Saturday, peraventure, and atte risyng of the sonne I lo fond the secunde degre of Aries sittyng upon myn est orisonte, all be it that it was but litel. Than fond I the 2 degre of Libra, nadir of my sonne, discending on my west orisonte, upon which west orisonte every day generaly, atte sonne arist, entrith the houre of every planete, after which planete the day berith his name, and endith in the next strike of the plate under the forseide west orisonte. And evere as the sonne clymbith upper and upper, so goth his nadir downer and downer, teching by suche strikes the houres of planetes by ordir as they sitten in the hevene. The firste houre inequal of every Saturday is to Saturne, and the seconde to Jupiter, the thirde to Mars, the fourthe to the sonne, the fifte to Venus, the sixte to Mercurius, the seventhe to the mone. And then ageyn the 8 houre is to Saturne, the 9 is to Jupiter, the 10 to Mars, the 11 to the sonne, the 12 to Venus. And now is my sonne gon to reste as for that Saturday. Than shewith the verrey degre of the sonne the houre of Mercurie entring under my west orisonte at eve; and next hilr succedith the mone, and so furth by ordir planete after planete in houre after houre, all the nyght longe til the sonne arise. Now risith the sonne that Sonday by the morwe, and the nadir of the sonne upon the west orisonte shewith me the entring of the houre of the forseide sonne. And in this manere succedith planete under planete fro Saturne unto the mone, and fro the mone up ageyn to Saturne, houre after houre generaly. And thus have I this conclusyoun.

13.  *To knowe the altitude of the sonne in myddes of the day that is clepid the altitude meridian.*

Set the degre of the sonne upon the lyne meridional, and rekne how many degrees of almykanteras ben bitwyxe thin est orisonte and the degre of thy sonne; and tak there thin altitude meridian, this to seyn, the highest of the sonne as for that day. So maist thou knowe in the same lyne the heighest cours that eny sterre fix clymbeth by night. This is to seyn that whan eny sterre fix is passid the lyne merid- ional, than begynneth it to descende; and so doth the sonne.

14.  *To knowe the degre of the sonne by thy ryet, for a maner curiosite.*

Sek besily with thy rule the highest of the sonne in mydde of the day. Turne than thin Astrelabie, and with a pricke of ynke marke the nombre of that same altitude in the lyne meridional; turne than thy ryet aboute tyl thou fynde a degre of thy zodiak according with the pricke, this is to seyn, sitting on the pricke. And in soth thou shalt finde but 2 degrees in all the zodiak of that condicioun; and yit lo thilke 2 degrees ben in diverse signes. Than maist thou lightly, by the sesoun of the yere, knowe the signe in which that is the sonne.

15.  *To knowe which day is lik to which day as of lengthe.*

Loke whiche degrees ben ylike fer fro the hevedes of Cancer and Capricorne, and loke when the sonne is in eny of thilke degrees; than ben the dayes ylike of lengthe. This is to seyn that as longe is that day in that month, as was such a day in such a month- there varieth but litel.

Also, yf thou take 2 dayes naturales in the yere ylike fer fro either point of the equinoxiall in the opposyt parties, than as longe is the day artificiall of that oon day as is the night of that othir, and the contrarie.

16.  *This chapitre is a maner declaracioun to conclusiouns that folewen.*

Understond wel that thy zodiak is departed in two halve circles, as fro the heved of Capricorne unto the heved of Cancer, and ageynward fro the heved of Cancer unto the heved of Capricorne. The heved of Capricorne is the lowest point where as the sonne goth in wynter, and the heved of Cancer is the heighist point in which the sonne goth in somer. And therfor understond wel that eny two degrees lo that ben ylike fer fro eny of these two hevedes, truste wel that thilke two degrees hen of ilike declinacioun, be it southward or northward, and the daies of hem ben ilike of lengthe and the nyghtes also, and the shadewes ilyke, and the altitudes ylike atte midday for evere.

17. *To knowe the verrey degre of eny maner sterre, straunge or unstraunge, after his longitude; though he be indetermynat in thin Astralabye, sothly to the trouthe thus he shal be knowe.*

Tak the altitude of this sterre whan he is on the est syde of the lyne meridionall, as neigh as thou mayst gesse; and tak an ascendent anon right by som manere sterre fix which that thou knowist; and forget not the altitude of the firste sterre ne thyn ascendent. And whan that this is don, aspye diligently whan this same firste sterre passith eny thyng the south westward; and cacche him anon right in the same nombre of altitude on the west syde of this lyne meridional, as he was kaught on the est syde; and tak a newe ascendent anon-ryght by som manere sterre fix which that thou knowist, and forget not this secunde ascendent. And whan that this is don, rekne than how many degrees ben bitwixe the first ascendent and the secunde ascendent; and rekne wel the myddel degre bitwene bothe ascendentes, and set thilke myddel degre upon thyn est orizonte; and wayte than what degre that sitte upon the Iyne meridional, and tak there the verrey degre of the ecliptik in which the sterre stondith for the tyme. For in the ecliptik is the longitude of a celestiall body rekned, evene fro the heved of Aries unto the ende of Pisces; and his latitude is rekned after the quantite of his declynacioun north or south toward the polys of this world.

As thus: -Yif it be of the sonne or of eny fix sterre, rekne hys latitude or his declinacioun fro the equinoxiall cercle; and if it be of a planete, rekne than the quantite of his latitude fro the ecliptik lyne, all be it so that fro the equinoxiall may the declinacioun or the latitude of eny body celestiall be rekned after the site north or south and after the quantite of his declinacioun. And right so may the latitude or the declinacioun of eny body celestiall, save oonly of the sonne, after hys site north or south and after the quantite of his declinacioun. be rekned fro the ecliptik lyne; fro which lyne alle planetes som tyme declinen north or south save oonly the forseide sonne.

18. *To knowe the degrees of longitudes of fixe sterres after that they be determynat in thin Astrelabye, yf so be that thei be trewly sette.*

Set the centre of the sterre upon the lyne meridionall, and tak kep of thy zodiak, and loke what degre of eny signe that sitte upon the same lyne meridionall at that same tyme, and tak there the degre in which the sterre stondith; and with that same degre cometh that same sterre unto that same lyne fro the orisonte.

19. *To knowe with which degre of the zodiak eny sterre fix in thin Astrelabie arisith upon the est orisonte, all though his dwellyng be in another signe.*

Set the centre of the sterre upon the est orisonte, and loke what degre of eny signe that sitt upon the same orisonte at that same tyme. And understond wel that with that same degre arisith that same sterre.

And thys merveylous arisyng with a straunge degre in another signe is by cause that the latitude of the sterre fix is either north or south fro the equi- noxiall. But sothly the

latitudes of planetes be comounly rekened fro the ecliptyk, by cause that noon of hem declyneth but fewe degrees out fro the brede of the zodiak. And tak god kep of this chapitre of arisyng of celestialle bodies; for truste wel that neyther mone ne sterre, as in our embelif orisonte, arisith with that same degre of his longitude save in oo cas, and that is whan they have no latitude fro the ecliptyk lyne. But natheles som tyme is everich of these planetes under the same lyne.

20. *To knowe the declinacioun of eny degre in the zodiak fro the equinoxiall cercle.*

Set the degre of eny signe upon the lyne meridionall, and rekne hys altitude in the almykanteras fro the est orisonte up to the same degre set in the forseide lyne, and set there a prikke; turne up than thy riet, and set the heved of Aries or Libra in the same meridionall lyne, and set there a nother prikke. And whan that this is don, considre the altitudes of hem bothe; for sothly the difference of thilke alti- tudes is the declinacioun of thilke degre fro the equinoxiall. And yf it so be that thilke degre be northward fro the equinoxiall, than is his declinacyoun north; yif it be southward, than is it south.

21. *To knowe for what latitude in eny regioun the almykanteras of eny table ben com powned .*

Rekene how many degrees of almykanteras in the meridionall lyne ben fro the cercle equinoxiall unto the cenyth, or elles from the pool artyk unto the north orisonte; and for so gret a latitude, or for so smal a latitude, is the table compowned.

22. *To know in speciall the latitude of oure countre, I mene after the latitude of Oxenford, and the height of oure pool.*

Understond wel that as fer is the heved of Aries or Libra in the equinoxiall fro oure orisonte as is the cenyth fro the pool artik; and as high is the pool artik fro the orisonte as the equinoxiall is fer fro the cenyth. I prove it thus by the latitude of Oxenford: understond wel that the height of oure pool artik fro oure north orisonte is 51 degrees and 50 mynutes; than is the cenyth fro oure pool artik 38 degrees and 10 mynutes; than is the equinoxial from oure cenyth 51 degrees and 50 mynutes; than is oure south orisonte from oure equinoxiall 38 degres and 10 mynutes. Understond wel this rekenyng. Also forget not that the cenyth is 90 degrees of height from oure orisonte, and oure equinoxiall is 90 degres from oure pool artik. Also this shorte rule is soth, that the latitude of eny place in a regioun is the distaunce fro the cenyth unto the equinoxiall.

23. *To prove evidently the latitude of eny place in a regioun by the preve of the height of the pool artik in that same place.*

In som wynters nyght when the firmament is cler and thikke sterred, wayte a tyme til that eny sterre fix sitte lyne-right perpendiculer over the pool artik, and clepe that sterre A; and wayte another sterre that sitte lyne right under A, and under the pool, and clepe that sterre F. And understond wel that F is not considrid but oonly to declare that A sitte evene over the pool. Tak than anoon-right the altitude of A from the orisonte, and forget it not; let A and F goo fare wel tyl ageynst the dawenyng a gret while, and com than ageyn, and abid til that A is evene under the pool, and under F, for sothly than wol F sitte over the pool, and A wol sitte under the pool. Tak than eftsonys the altitude of A from the orisonte, and note as wel his secunde altitude as hys first altitude. And whan that this is doon, rekene how many degrees that the first altitude of A excedith his secunde altitude, and tak half thilke porcioun that is excedid and adde it to his secunde altitude, and tak there the elevacioun of thy pool, and eke the latitude of thyregioun; for these two ben of oo nombre, this is to seyn, as many degres as thy pool is elevat, so muche is the latitude of the regioun.

Ensample as thus: - peraventure the altitude of A in the evenyng is 56 degrees of height; than wol his secunde altitude or the dawenyng be 48 degres that is 8 degrees lasse than 56, that was his first altitude att even. Tak than the half of 8 and adde it to 48 that was his secunde altitude, and than hast thou 52. Now hast thou the height of thy pool and the latitude of the regioun. But understond wel that to prove this con- clusioun and many another faire conclusioun, tholu must have a plomet hangyng on a lyne, heygher than thin heved, on a perche; and thilke lyne must hange evene perpendiculer bytwixe the pool and thin eye; and than shalt thou seen yf A sitte evene over the pool, and over F atte evene; and also yf F sitte evene over the pool and over A or day.

24. *Another conclusioun to prove the height of the pool artik fro the orisonte.*

Tak eny sterre fix that never discendith under the orisonte in thilke regioun, and considre his heighist altitude and his lowist altitude fro the orisonte, and make a nombre of bothe these altitudes; tak than and abate half that nombre, and tak there the elevacioun of the pool artik in that same regioun.

25. *Another conclusioun to prove the latitude of the regioun.*

Understond wel that the latitude of eny place in a regioun is verrely the space bytwexe the cenyth of hem that dwellen there and the equinoxiall cercle north or south, takyng the mesure in the meridional Iyne, as shewith in the almykanteras of thin Astrelabye. And thilke space is as much as the pool artike is high in that same place fro the orisonte. And than is the depressioun of the pool antartik, that is to seyn, than is the pool antartik, bynethe the orisonte the same quantite of space neither more ne lasse.

Than if thou desire to knowe this latitude of the regioun, tak the altitude of the sonne in the myddel of the day, whan the sonne is in the hevedes of Aries or of Libra; for than moeveth the sonne in the lyne equinoxiall; and abate the nombre of that same sonnes altitude out of 90 degrees, and than is the remenaunt of the nombre that leveth the latitude of that regioun. As thus: - I suppose that the sonne is thilke day at noon 38 degrees of height; abate than 38 oute of 90; so leveth there 52; than is 52 degrees the latitude. I say not this but for ensample; for wel I wot the latitude of Oxenford is certeyn minutes lasse, as thow might preve.

Now yf so be that the semeth to longe a tarieng to abide til that the sonne be in the hevedes of Aries or of Libra, than wayte whan the sonne is in eny othir degre of the zodiak, and considre the degre of his declinacioun fro the equinoxiall lyne; and if it so be that the sonnes declinacioun be northward fro the equinoxiall, abate than fro the sonnes altitude at non the nombre of his declinacioun, and than hast thou the height of the hevedes of Aries and Libra. As thus: -My sonne is peraventure in the first degre of Leoun, 58 degrees and 10 minutes of height at non, and his declinacioun is almost 20 degrees northward fro the equinoxiall; abate than thilke 20 degrees of declinacioun out of the altitude at non; than leveth there 38 degrees and odde minutes. Lo there the heved of Aries or Libra and thin equinoxiall in that regioun. Also if so be that the sonnes declinacioun be southward fro the equinoxiall, adde than thilke declinacioun to the altitude of the sonne at noon, and tak there the hevedes of Aries and Libra and thin equinoxial; abate than the height of the equinoxial out of 90 degrees; than leveth there the distance of the pool of that regioun fro the equinoxiall. Or elles, if the list, tak the highest altitude fro the equinoxial of eny sterre fix that thou knowist, and tak the netherest elongacioun (lengthing) fro the same equinoxial lyne, and work in the manere forseid.

26. *Declaracioun of the ascensioun of signes.*

The excellence of the spere solide, amonges othir noble conclusiouns, shewith manyfest the diverse ascenciouns of signes in diverse places, as wel in the right cercle as in the embelif cercle. These auctours writen that thilke signe is cleped of right ascensioun with which more part of the cercle equinoxiall and lasse part of the zodiak ascendith- and thilke signe ascendith embelif with which lasse part of the equinoxiall and more part of the zodiak ascendith. Ferther-over they seyn that in thilke cuntrey where as the senith of hem that dwellen there is in the equinoxial lyne, and her orisonte passyng by the two poles of this world, thilke folk han this right cercle and the right orisonte; and evermore the arch of the day and the arch of the night is there ilike longe- and the sonne twies every yer passing thorugh the cenith of hir heed, and two someres and two wynters in a yer han these forseide peple. And the almycanteras in her Astrelabyes ben streight as a lyne, so as it shewith in the figure.

The utilite to knowe the ascensions of signes in the right cercle is this: - Truste wel that by mediacioun of thilke ascensions these astrologiens, by her tables and her instrumentes, knowen verreily the ascensioun of every degre and minute in all the zodiak in the embelif cercle, as shal be shewed. And nota that this forseide right orisonte, that is clepid Orison Rectum, dividith the equinoxial into right angles; and the embelif orisonte where as the pool is enhaunced upon the orisonte, overkervith the equinoxiall in embilif angles, as shewith in the figure.

27.   *This is the conclusioun to knowe the ascensions of signes in the right cercle, that is circulus directus.*

Set the heved of what signe the lyst to knowe his ascendyng in the right cercle upon the lyne meridionall, and wayte where thyn almury touchith the bordure, and set there a prikke; turne than thy riet westward til that the ende of the forseide signe sitte upon the meridional lyne and eftsonys wayte where thin almury touchith the bordure, and set there another pricke. Rekene than the nombre of degres in the bordure bitwixe bothe prikkes, and tak the ascensioun of the signe in the right cercle. And thus maist thou werke with every porcioun of thy zodiak.

28.   *To knowe the ascensions of signes in the embelif cercle in every regioun, I mene, in circulo obliquo.*

Set the heved of the signe which as the list to knowe his ascensioun upon the est orisonte, and wayte where thin almury touchith the bordure, and there set a prikke. Turne than thy riet upward til that the ende of the same signe sitte upon the est orisonte, and wayte eftsonys where as thin almury touchith the bordure, and set there a nother prikke. Rekene than the nombre of degrees in the bordure bitwyxe bothe prikkes and tak there the ascensioun of the signe in the embelif cercle. And understond wel that alle the signes in thy zodiak, fro the heved of Aries unto the ende of Virgo, ben clepid signes of the north fro the equinoxiall. And these signes arisen bitwyxe the verrey est and the verrey north in oure orisonte generaly for evere. And alle the ignes fro the heved of Libra unto the ende of Pisces ben clepid signes of the south fro the equinoxial; and these signes arisen evermore bitwexe the verrey est and the verrey south in oure orisonte. Also every signe bitwixe the heved of Capricorne unto the ende of Geminis arisith on oure orisonte in lasse than 2 houres equales. And these same signes fro the heved of Capricorne unto the ende of Geminis ben cleped tortuose signes, or croked signes, for thei arise embelyf on oure orisonte. And these croked signes ben obedient to the signes that ben of right ascensioun. The signes of right ascencioun ben fro the heved of Cancer unto the ende of Sagittarie; and these signes arisen more upright, and thei ben called eke sovereyn signes and everich of hem arisith in more space than in 2 houres. Of whiche signes Gemini obeieth to Cancer, and 'raurus to Leo, Aries to Virgo, Pisces to Libra, Aquarius to Scorpioun, and Capricorne

to Sagittarie. And thus evermore 2 signes that ben ilike fer fro the heved of Capricorne obeyen everich of hem til othir.

29. *To knowe justly the 4 quarters of the world, as Est, West, North, and South.*

Tak the altitude of thy sonne whan the list, and note wel the quarter of the world in which the sonne is for the tyme by the azymutz. Turne than thin Astrelabie, &nd set the degre of the sonne in the almykanteras of his altitude on thilke syde that the sonne stant, as is the manere in takyng of houres, and ley thy label on the degre of the sonne; and rekene how many degrees of the bordure ben bitwixe the Iyne meridional and the point of thy label, and note wel that nombre. Turne than ageyn thin Astrelabie, and set the point of thy gret rule there thou takist thin altitudes upon as many degrees in his bordure fro his meridional as was the point of thy label fro the lyne meridional on the wombe side. Take than thin Astrelabie with bothe hondes sadly and slighly, and lat the sonne shyne thorugh bothe holes of thy rule, and slighly in thilke shynyng lat thin Astrelabie kouche adoun evene upon a smothe ground, and than wol the verrey lyne meridional of thin Astrelabie lye evene south, and the est Iyne wol Iye est, and the west Iyne west, and the north lyne north, so that thou worke softly and avysely in the kouching. And thus hast thou the 4 quarters of the firmament.

30. *To knowe the altitude of planetes fro the wey of the sonne, whethir so they be north or south fro the forseide wey.*

Loke whan that a planete is in the lyne meridional, yf that hir altitude be of the same height that is the degre of the sonne for that day, and than is the planete in the verrey wey of the sonne and hath no latitude. And if the altitude of the planete be heigher than the degre of the sonne, than is the planete north fro the wey of the sonne such a quantite of latitude as shewith by thin almykanteras. And if the altitude of the planete be lasse than the degre of the sonne, than is the planete south fro the wey of the sonne such a quantite of latitude as shewith by thin almykanteras. This is to seyn, fro th(wey where as the sonne went thilke day but not fro the wey of the sonne in every place of the zodiak.

31. *To knowe the cenyth of the arising of the sonne, this is to seyn, the partie of the orisonte in which that the sonne arisith.*

Thou must first considere that the sonne arisith not alwey verrey est, but somtyme by northe the est and somtyme by south the est. Sothly the sonne arisith nevere moo verrey est in oure orisonte, but he be in the heved of Aries or Libra. Now is thin orisonte departed in 24 parties by thin azimutes in significacioun of 24 parties of the world; al be it so that shipmen rekene thilke parties in 32. Than is there no more but wayte iIl which azimut that thy sonne entrith at his arisyng, and take there the cenith of the arisyng of the sonne.

The manere of the divisioun of thin Astrelabie is this, I mene as in this cas: - First it is divided in 4 plages principalis with the lyne that goth from est to west; and than with another lyne that goth fro south to north; than is it divided in smale parties of azymutz, as est, and est by south, where as is the first azymut above the est lyne; and so furth fro partie to partie til that thou come ageyn unto the est lyne. Thus maist thou understonde also the cenyth of eny sterre, in which partie he riseth.

32. *To knowe in which partie of the firmament is the conjunccyoun.*

Considere the tyme of the conjunccyoun by the kalender, as thus: - Loke hou many houres thilke conjunccioun is fro the midday of the day precedent, as shewith by the canon of thy kalender. Rekene than thilke nombre of houres in the bordure of thin Astrelabie, as thou art

wont to do in knowyng of the houres of the day or of the nyght, and ley thy label over the degre of the sonne, and than wol the point of thy label sitte upon the houre of the conjunccioun. Loke than in which azymut the degre of thy sonne sittith, and in that partie of the firmament is the conjunccioun.

33. *To knowe the cenyth of the altitude of the sonne.*

This is no more to seyn but eny tyme of the day tak the altitude of the sonne, and by the azymut in which he stondith maist thou seen in which partie of the firmament he is. And in the same wise maist thou seen by night, of eny sterre, whether the sterre sitte est or west, or north or south, or eny partie bitwene, after the name of the azimut in which the sterre stondith.

34. *To knowe sothly the degre of the longitude of the mone, or of eny planete that hath no latitude for the tyme fro the ecliptik lyne.*

Tak the altitude of the mone, and rekne thy altitude up among thyn almykanteras on which syde that the mone stondith, and set there a prikke. Tak than anon-right upon the mones syde the altitude of eny sterre fix which that thou knowist, and set his centre upon his altitude among thyn almykanteras there the sterre is founde. Wayte than which degre of the zodiak touchith the prykke of the altitude of the mone, and tak there the degre in which the mone stondith. This conclusioun is verrey soth, yf the sterres in thin Astrelabie stonden after the trouthe. Comoun tretes of the Astrelabie ne maken non excepcioun whether the mone have latitude or noon, ne on wheyther syde of the mone the altitude of the sterre fixe be taken.

And nota that yf the mone shewe a himself by light of day, than maist thou worche this same conclusioun by the sonne, as wel as by the fixe sterre.

35. *This is the worchynge of the conclusioun to knowe yf that eny planete be direct or retrograd.*

Tak the altitude of any sterre that is clepid a planete, and note it wel; and tak eke anon the altitude of any sterre fix that thou knowist, and note it wel also. Com than ageyn the thridde or the fourthe nyght next folewing, for than shalt thou perceyve wel the moeving of a planete, whether so he moeve forward or bakward. Awayte wel than whan that thy sterre fixe is in the same altitude that she was whan thou toke hir firste altitude. And tak than eft-sones the altitude of the forseide planete and note it wel; for truste wel yf so be that the planete be on the right syde of the meridional lyne, so that his secunde altitude be lasse than hys first altitude was, than is the planete direct; and yf he be on the west syde in that condicioun, than is he retrograd. And yf so be that this planete be upon the est side whan his altitude is ytaken, so that his secunde altitude be more than his first altitude, than is he retrograd. And if he be on the west syde, than is he direct. But the contrarie of these parties is of the cours of the mone; for certis the mone moeveth the contrarie from othre planetes as in hir epicicle, but in noon othir manere.

36. *The conclusioun of equaciouns of houses after the Astrelabie.*

Set the begynnyng of the degre that ascendith upon the ende of the 8 houre inequal; than wol the begynnyng of the 2 hous sitte upon the lyne of mydnight. Remeve than the degre that ascendith, and set him on the ende of the 10 houre inequal, and than wol the begynnyng of the 3 hous sitte up on the mydnight lyne. Bring up ageyn the same degre that ascended first, and set him upon the est orisonte, and than wol the begynnyng of the 4 hous sitte upon the lyne of mydnight. Tak than the nader of the degre that first ascendid, and set

him in the ende of the 2 houre inequal; and than wol the begynnyng of the 5 hous sitte upon the lyne of mydnight. Set than the nader of the ascendent in the ende of the 4 houre inequal, and than wol the begynnyng of the 6 hous sitte on the mydnight lyne. The begynnyng of the 7 hous is nader of the ascendent, and the begynnyng of the 8 hous is nader of the 2 hous, and the begynnyng of the 9 hous is nader of the 3, and the begynnyng of the 10 hous is nader of the 4, and the begynnyng of the 11 hous is nader of the 5, and the begynnyng of the 12 hous is nader of the 6.

37. *Another maner of equaciouns of houses by the Astrelabie.*

Tak thin ascendent, and than hast thou thy 4 angles; for wel thou wost that the opposit of thin ascendent, that is to seyn, the begynnyng of the 7 hous, sitt upon the west orisonte, and the begynnyng of the hous sitt upon the lyne meridional, and his opposyt upon the lyne of mydnight. Than ley thy label over the degre that ascendith, and rekne fro the point of thy label alle the degrees in the bordure tyl thou come to the meridional lyne; and departe alle thilke degrees in 3 evene parties, and take there the evene equacions of 3 houses; for ley thy label over everich of these 3 parties, and than maist thou se by thy label, lith in the zodiak, the begynnyng of everich of these same houses fro the ascendent; that is to seyn the begynnyng of the 12 hous next above thin ascendent, the begynnyng of the 11 hous, and than the 10 upon the meridional lyne, as I first seide. The same wise worch thou fro the ascendent doun to the lyne of mydnyght, and thus hast thou othre 3 houses; that is to seyn, the begynnyng of the 2, and the 3, and the 4 hous. Than is the nader of these 3 houses the begynnyng of the 3 houses that folewen.

38. *To fynde the lyne meridional to dwelle fix in eny certeyn place.*

Tak a round plate of metal; for werpyng, the brodder the better; and make there upon a just compas a lite within the bordure. And ley this rounde plate upon an evene ground, or on an evene ston, or on an evene stok fix in the ground; and ley it evene by a level. And in the centre of the compas styke an evene pyn, or a wyr, upright, the smaller the better; set thy pyn by a plom-rule evene upright, and let this pyn be no lenger than a quarter of the dyametre of thy compas, fro the centre amiddes. And wayte bisely aboute 10 or 11 of the clokke, whan the sonne shineth, whan the shadewe of the pyn entrith enythyng within the cercle of thy compas an heer-mele- and marke there a pricke with inke. Abid than stille waityng on the sonne til after 1 of the clokke, til that the shadwe of the wyr, or of the pyn, passe enything out of the cercle of the compas, be it nevere so lyte, and set there another pricke of ynke. Tak than a compas, and mesure evene the myddel bitwixe bothe prickes, and set there a prikke. Tak me than a rule and draw a strike evene a-lyne, fro the pyn unto the middel prikke- and tak there thi lyne mer heved. And it is cleped the lyne meridional, for in what place that eny man ys at any tyme of the yer, whan that the sonne, by mevynge of the firmament, cometh to his verrey meridian place, than is it verrey mydday, that we clepen oure non, as to thilke man. And therefore is it clepid the lyne of mydday. And nota that evermore of eny 2 cytes or 2 townes, of which that oo town approchith more toward the est than doth that othir town, truste wel that thilke townes han diverse meridians. Nota also that the arch of the equinoxial that is contened or bownded bitwixe the 2 meridians is clepid the longitude of the toun. And yf so be that two townes have ilike meridian or oon meridian, than is the distaunce of hem both ilike fer fro the est, and the contrarie; and in this manere thei change not her meridian. But sothly thei chaungen her almykanteras, for the enhaunsyng of the pool and the distance of the sonne.

The longitude of a climat is a lyne ymagined fro est to west ilike distant fro the equinoxiall. And the latitude of a climat may be cleped the space of the erthe fro the begynnyng of the first clymat unto the verrey ende of the same clymat evene direct ageyns the pool artyke. Thus sayn somme auctours; and somme of hem sayn that yf men clepe the latitude of a cuntrey the arch meridian that is contened or intercept bitwix the cenyth and the

equinoxial, than say they that the distance fro the equinoxial unto the ende of a climat evene ageynst the pool artik is the latitude of a clymat forsoothe.

40. *To knowe with which degre of the zodiak that eny planete ascendith on the orisonte, whether so that his latitude be north or south.*

Know by thin almenak the degre of the ecliptik of eny signe in which that the planete is rekned for to be, and that is clepid the degre of his longitude. And know also the degre of his latitude fro the ecliptik north or south. And by these ensamples folewynge in speciall maist thou worche forsothe in every signe of the zodiak: -

The degree of the longitude per-aventure of Venus or of another planete was 6 of Capricorne, and the latitude of hir was northward 2 degrees fro the ecliptik lyne. Than tok I a subtil compas and clepid that oo point of my compas . and that other point F. Than tok I the point of A and sette it in the ecliptik ]yne in my zodiak in the degre of the longitu(lc of Venus, that is to seyn, in the 6 degre of Capricorne; and than sette I the point of F upward in the same signe by cause that latitude was north upon the latitude of Venus, that is to seyn, in the 6 degre fro the heved of Capricorne; and thus have I 2 degrees bitwixe my two prickes. Than leide I down softly my compas, and sette the degre of the longitude upon the orisonte; tho tok I and waxed my label in manere of a peire tables to receyve distinctly the prickes of my compas. Tho tok I thys forseide label, and leyde it fix over the degre of my longitude; tho tok I up my compas and sette the point of A in the wax on my label, as evene as I koude gesse, over the ecliptik lyne in the ende of the longitude, and sette the point of F endelong in my label upon the space of the latitude, inward and over the zodiak, that is to seyn northward fro the ecliptik. Than leide I doun my compas, and loked wel in the wey upon the prickes of A and of F; tho turned I my ryet til that the pricke of F satt upon the orisonte; than saw I wel that the body of Venus in hir latitude of 2 degrees septemtrionals ascendid, in the ende of the 6 degre, in the heved of Capricorne.

And nota that in this manere maist thou worche with any latitude septem- trional in alle signes. But sothly the latitude meridional of a planete in Capricorne ne may not be take by cause of the litel space bitwixe the ecliptyk and the bordure of the Astrelabie; but sothely in all othre signes it may.

Also the degre peraventure of Jupiter, or of another planete, was in the first degre of Piscis in longitude, and his latitude was 2 degrees meridional; tho tok I the point of A and sette it in the first degre of Piscis on the ecliptik; and than sette I the point of F dounward in the same signe by cause that the latitude was south 2 degres, that is to seyn, fro the heved of Piscis; and thus have 2 degres bitwexe bothe 66 prikkes. Than sette I the degre of the longitude upon the orisonte; tho tok I my label, and leide it fix upon the degre of the longitude; tho sette I the point of A on my label evene over the ecliptik lyne in the ende of the degre of the longitude, and sette the point of F endlong in my label the space of 2 degres of the latitude outward fro the zodiak (this is to seyn southward fro the ecliptik toward the bor- dure), and turned my riet til that the pricke of F saat upon the orisonte. Than say I wel that the body of Jupiter in his latitude of 2 degres meridional ascendid with 8 degres of Piscis in horoscopo. And in this manere maist thou worche with any latitude meridional, as I first seide, save in Capricorne. And yf thou wilt pleye this craft with the arisyng of the mone, loke thou rekne wel hir cours houre off by houre, for she ne dwellith not in a degre of hir longitude but litel while, as thow wel knowist. But natheles yf thou rekne hir verrey moevyng by thy tables houre after houre, [thou shalt do wel ynow].

2 *pars hujus conclusio.*

**Supplementary Propositions**

41. *Umbra Recta.*

   Yif it so be that thou wilt werke by umbra recta, and thou may come to the bas of the tour, in this maner thou shalt werke. Tak the altitude of the tour by bothe holes, so that thy rewle ligge even in a poynt. Ensample as thus: I see him thorw at the poynt of 4; than mete I the space between me and the tour, and I finde it 20 feet; than beholde I how 4 is to 12, right so is the space betwixe thee and the tour to the altitude of the tour. For 4 is the thridde part of 12, so is the space between thee and the tour the thridde part of the altitude of the tour; than thryes 20 feet is the heyghte of the tour, with adding of thyn owne persone to thyn eye. And this rewle is so general in umbra recta, fro the poynt of oon to 12. And yif thy rewle falle upon 5, than is 5 12-partyes of the heyght the space between thee and the tour; with adding of thyn owne heyghte.

42. *Umbra Versa.*

   Another maner of werkinge, by umbra versa. Yif so be that thou may nat come to the bas of the tour, I see him thorw the nombre of 1; I sette ther a prikke at my fot; than go I neer to the tour, and I see him thorw at the poynt of 2, and there I sette another prikke; and I beholde how 1 hath him to 12, and ther finde I that it hath him twelfe sythes; than beholde I how 2 hath him to 12, and thou shalt finde it sexe sythes;than thoushaltfinde that as 12 above 6 is the numbre of 6, right so is the space between thy two prikkes the space of 6 tymes thyn altitude. And note, that at the ferste altitude of 1, thou settest a prikke; and afterward, whan thou seest him at 2, ther thou settest another prikke; than thou findest between two prikkys 60 feet; than thou shalt finde that 10 is the 6-party of 60. And then is 10 feet the altitude of the tour. For other poyntis, yif it fille in umbra versa, as thus: I sette caas it fill upon 2, and at the secunde upon 3; than schalt thou finde that 2 is 6 partyes of 12; and 3 is 4 partyes of 12; than passeth 6 4, by nombre of 2; so is the space between two prikkes twyes the heyghte of the tour. And yif the differens were thryes, than shulde it be three tymes; and thus mayst thou werke fro 2 to 12; and yif it be 4, 4 tymes; or 5, 5 tymes; et sic de ceteris.

43. *Umbra Recta.*

   Another maner of wyrking, by umbra recta. Yif it so be that thou mayst nat come to the baas of the tour, in this maner thou schalt werke. Set thy rewle upon 1 till thou see the altitude, and set at thy foot a prikke. Than set thy rewle upon 2, and behold what is the difference between 1 and 2, and thou shalt finde that it is 1. Than mete the space between two prikkes, and that is the 12 partie of the altitude of the tour. And yif ther were 2, it were the 6 partye; and yif ther were 3, the 4 partye; et sic deinceps. And note, yif it were 5, it were the 5 party of 12; and 7, 7 party of 12; and note, at the altitude of thy onclusioun, adde the stature of thyn heyghte to thyn eye.

44. *Another maner conclusion, to knowe the mene mote and the argumentis of any planete. To know the mene mote and the argumentis of every planete fro yere to yere, from day to day, from houre to houre, and from smale fraccionis infinite.*

   In this maner shalt thou worche; consider thy rote first, the whiche is made the beginning of the tables fro the yer of oure Lord 1397, and enter hit into thy slate for the laste meridie of December- and than consider the yer of oure Lord, what is the date, and behold whether thy date be more or lasse than the yer 1397. And yf hit so be that hit be more, loke how many yeres hit passeth, and with so many enter into thy tables in the first Iyne theras is writen anni collecti et expansi. And loke where the same planet is writen in the hed of thy

table, and than loke what thou findest in direct of the same yer of oure Lord which is passid, be hit 8, or 9, or 10, or what nombre that evere it be, til the tyme that thou come to 20, or 40, or 60. And that thou findest in direct wryt in thy slate under thy rote, and adde hit togeder, and that is thy mene mote, for the laste meridian of the December, for the same yer which that thou hast purposed. And if hit so be that hit passe 20, consider wel that fro 1 to 20 ben anni expansi, and fro 20 to 3000 ben anni collecti; and if thy nomber passe 20, than tak that thou findest in direct of 20, and if hit be more, as 6 or 18, than tak that thou findest in direct thereof, that is to sayen, signes, degrees, minutes, and secoundes, and adde togedere unto thy rote; and thus to make rotes. And note that if hit so be that the yer of oure Lord be lasse than the rote, which is the yer of oure Lord 1397, than shalt thou wryte in the same wyse furst thy rote in thy slate, and after enter into thy table in the same yer that be lasse, as I taught before; and than consider how many signes, degrees, minutes, and secoundes thyn entringe conteyneth. And so be that thebe 2 entrees, than adde hem togeder, anafter withdraw hem from the rote, the yer of oure Lord 1397; and the residue that leveth is thy mene mote for the laste meridie of December, the whiche thou hast purposed; and if hit so be that thou wolt weten thy mene mote for any day, or for any fraccioun of day, in this maner thou shalt worche. Make thy rote fro the laste day of December in the maner as I have taught, and afterward behold how many monethes, dayes, and houres ben passid from the meridie of December, and with that enter with the laste moneth that is ful passed, and take that thou findest in direct of him, and wryt hit in thy slate; and enter with as many dayes as be more, and wryt that thou findest in direct of the same planete that thou worchest for; and in the same wyse in the table of houres, for houres that ben passed, and adde alle these to thy rote; and the residue is the mene mote for the same day and the same houre.

45. *Another manere to knowe the mene mote.*

When thou wolt make the mene mote of eny planete to be by Arsechieles tables tak thy rote, the whiche is for the yer of oure Lord 1397; and if so be that thy yer be passid the date, wryt that date, and than wryt the number of the yeres. Than withdraw the yeres out of the yeres that ben passed that rote. Ensampul as thus: the yer of oure Lord 1400, I wolde witen, precise, my rote; than wroot I furst 1400. And under that number I wrot a 1397; than withdrow I the laste nomber out of that, and than fond I the residue was 3 yer; I wiste that 3 yer was passed fro the rote, the whiche was writen in my tables. Than afterward soghte I in my tables the annis collectis et expansis, and among myn expanse yeres fond I 3 yeer. Than tok I alle the signes, degrees, and minutes, that I fond direct under the same planete that I wroghte for, and wroot so many signes, degrees, and minutes in my slate, and afterward added I to signes, degrees, minutes, and secoundes, the whiche I fond in my rote the yer of oure Lord 1397; and kepte the residue; and than had I the mene mote for the laste day of December. And if thou woldest wete the mene mote of any planete in March April, or May, other in any other tyme or moneth of the yer, loke how many monethes and dayes ben passed from the laste day of December, the yer of oure Lord 1400; and so with monethes and dayes enter into thy table ther thou findest thy mene mote ywriten in monethes and dayes, and tak alle the signes, degrees, minutes, and secoundes that thou findest ywrite in direct of thy monethes, and adde to signes, degrees, minutes, and secoundes that thou findest with thy rote the yer of oure Lord 1400, and the residue that leveth is the mene mote for that same day. And note, if hit so be that thou woldest wete the mene mote in any yer that is lasse than thy rote, withdraw the number of so many yeres as hit is lasse than the yer of oure Lord a 1397, and kep the residue; and so many yeres, monethes, and dayes enter into thy tabels of thy mene mote. And tak alle the signes, degrees, and minutes, and secoundes, that thou findest in direct of alle the yeres, monethes, and dayes, and wryt hem in thy slate; and above thilke nomber wryt the signes, degrees, minutes and secoundes, the whiche thou findest with thy rote the yer of oure Lord a 1397; and withdraw alle the nethere signes and degrees fro the signes and de- grees, minutes, and

secoundes of other signes with thy rote; and thy residue that leveth is thy mene mote for that day.

46. *For to knowe at what houre of the day or of the night, shal be flod or ebbe.*

First wite thou certeinly, how that haven stondeth, that thou list to werke for; that is to say in which place of the firmament the mone being, maketh full see. Than awayte thou redily in what degree of the zodiak that the mone at that tyme is inne. Bring furth than the label, and set the point therof in that same cost that the mone maketh flod, and set thou there the degree of the mone according with the egge of the label. Than afterward awayte where is than the degree of the sonne, at that tyme. Remeve thou than tlle label fro the mone, and bring and set it justly upon the degree of the sonne. And the point of the label shal than declare to thee, at what houre of the day or of the night shal be flod. And there also maist thou wite by the same point of the label, whether it be, at that same tyme, flod or ebbe, or half flod, or quarter flod, or ebbe, or half or quarter ebbe; or ellis at what houre it was last, or shal be next by night or by day, thou than shalt esely knowe, &c. Furthermore, if it so be that thou happe to worke for this matere aboute the tyme of the conjunccioun, bring furth the degree of the mone with the label to that coste as it is before seyd. But than thou shalt under- stonde that thou may not bringe furth the label fro the degree of the mone as thou dide before; for-why the sonne is than in the same degree with the mone. And so thou may at that tyme by the point of the label unremeved knowe the houre of the flod or of the ebbe, as it is before seyd, &c. And evermore as thou findest the mone passe fro the sonne, so remeve thou the label than fro the degree of the mone, and bring it to the degree of the sonne. And work thou than as thou dide before, &c. Or elles know thou what houre it is that thou art inne, by thyn instrument. Than bring thou furth fro thennes the label and ley it upon the degree of the mone, and therby may thou wite also whan it was flod, or whan it wol be next, be it night or day; &c.