

**A NEW SYSTEM OF GEOGRAPHY  
AND ASTRONOMY, OR  
A VIEW OF THE EARTH  
AND HEAVENS, PP. 6-268**

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**W. FROST & G. FROST**

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A *S. F. 1831.*  
NEW SYSTEM  
OF  
GEOGRAPHY AND ASTRONOMY,  
OR  
A VIEW  
OF  
THE EARTH AND HEAVENS;

CONTAINING  
AN ACCOUNT OF THE FEATURES, MAGNITUDE, AND MOTIONS,  
OF THE EARTH; AND ALSO THE DIAMETER, MEAN  
DISTANCES FROM THE SUN, AND THE ANNUAL  
PERIODS, OF THE PLANETARY BODIES:

PRECEDED BY

*A copious set of Geographical and Astronomical Definitions, and  
illustrated by numerous Problems, by the application of which the  
Student can determine the rising and setting of the Stars; the  
Moon's southing, and the appearance which the Heavens present to  
the Earth at any instant of time, by a*

MENTAL CALCULATION.

BY

W., AND G. FROST, F. R. A.

TEACHERS OF WRITING, ARITHMETIC, GEOGRAPHY, AND ASTRONOMY, IN  
SCHOOLS AND PRIVATE FAMILIES.

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1831.

82.



## 6 ECLIPTIC, COLURES, EQUINOXES, SOLSTICES.

one is named the Northern and the other the Southern hemisphere. Countries are said to be North or South according to the name of the hemisphere in which they are situated.

1. Has the earth a motion ?
2. Upon what does the earth turn, and from what is the word axis derived ?
3. What are the extremities of the axis called, and why ?
4. Whence are the words arctic and antarctic derived ?
5. What is the cause of day and night ?
6. Near what star is the North Pole in the heavens ?
7. What circle divides the globe into equal parts, and why called equator ?
8. What are the parts separated by the equator called ?
9. Why are countries called Northern, and why Southern ?
10. What do you understand by hemisphere ?
11. By what motion do you measure the day ?
12. What is the measure of a day in the planets ?

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### LESSON IV.

#### *Ecliptic, Colures, Equinoxes, Solstices.*

THE Ecliptic, from the Greek *eclēpō* (to disappear), so called because eclipses generally take place upon or near this circle. In this circle the sun apparently performs his annual course, though in reality it is the real path of the earth round the sun : this circle cuts the equator at an angle of 23½ degrees, which obliquity is the cause of the change of the seasons. This circle in respect to the equator has

four distinct points, two upon it, and two  $23\frac{1}{2}$  degrees above and below it. Each point is the commencement of a season, and the two circles in the heavens cutting each other at right angles, and passing through the four points, are called *colures*, from the Latin *coluri*: they are two great circles which divide the seasons from each other. The one that passes through the two points of the ecliptic, where it cuts the equator, is called the equinoctial colure, and the points themselves, the vernal\* and autumnal† equinoxes.‡ The other, which passes through those parts of the ecliptic which are  $23\frac{1}{2}$  degrees above and below the equator, is called the solstitial, from *sol* the sun, and *sto* to stand, because when the sun arrives at this part of the ecliptic, it appears to stand still for several days, and then returns towards the equator, and the points themselves are called the summer and winter solstices. As the earth moves in the ecliptic to cause the difference of seasons, it follows that the earth's orbit is the measure of its year; therefore the orbits of all the planets must be the measures of their years, and as their orbits are not all equal, their years will not be all equal.

1. What is the Ecliptic, and why so called?
2. Is the Ecliptic the same as the Equator?
3. In what do they differ from each other?
4. In an angle of how many degrees does the Ecliptic cut the Equator?
5. When the sun appears upon the equator, are the days

\* Vernal from *Ver* (Spring).

† Autumnal from *Autumnus* (Autumn).

‡ From the Latin *aequus* equal, and *nox* night: when the sun is in either of these points, the days and nights all over the world are equal.

8 SEASONS—SPRING, SUMMER, AUTUMN, AND WINTER.

and nights equal? And on what two days does the sun appear on it?

6. How many particular points do you observe in the Ecliptic, and what are those points called?

7. How many degrees is the Summer Solstice above the Equator, and why is it called the Summer Solstice?

8. From what words is Solstice derived?

9. What is meant by the Colures, and why are they so called?

10. Into how many parts do the Colures divide the globe?

11. What is that point of the Ecliptic called where spring begins?—where summer begins?—where autumn begins?—and where winter begins?

12. What are the circles called which separate the quadrants or seasons?

13. What is the measure of a planet's year?

14. What is the measure of the earth's year?

15. Are the years of the planets all equal?

16. What is the cause of the difference?

LESSON V.

*Seasons — Spring, Summer, Autumn, and Winter.*

*Zones—Torrid, Temperate, and Frigid.*

THE sun appears in the heavens much higher in summer than in winter, and as this is caused by the obliquity of the ecliptic, or the path of the earth round the sun, it follows that the seasons cannot be the same to all the inhabitants of the earth at the same time of the year—because



the colures are the beginning or separation of the seasons, and the sun cannot appear the same to all the inhabitants of the earth, except on two days of the year, viz. on March 21st and September 23d—our spring and autumn. At all other times the sun will appear above the equator to the inhabitants of our hemisphere and below it to the inhabitants of the other hemisphere. The day on which the sun appears to rise above the equator to the inhabitants of either hemisphere is the day that their spring commences.

The two days on which the sun rises above the equator to the northern and southern hemispheres, are March 21st and September 23d, consequently our spring must be the opposite part of the year to the inhabitants of the southern hemisphere; likewise winter and summer are also, in opposite parts of the year, in opposite hemispheres.

Spring commences with the inhabitants north of the equator on March 21st, and it commences to the inhabitants south of the equator on September 23d. Our summer begins on June 21st, and theirs December 22d.

As the sun is  $23\frac{1}{2}$  degrees above the equator in summer, and  $23\frac{1}{2}$  degrees below it in winter, he must be vertical (vertex, top, over head) to a space of the earth's surface equal to 47 degrees. Now, as this part encompasses the earth as a girdle, it is called a zone, from *zone* (a girdle); and since the sun is vertical over this part of the earth, it is called the *torrid zone*, from *torridus* (hot).

Since the sun attains  $23\frac{1}{2}$  degrees above the equator, so many degrees he will shine beyond the poles; consequently the inhabitants of the poles will have the sun above their horizon as many days as the sun continues above the equator. This part of the earth, where the sun shines without setting, is called the *frigid zone*, from *frigeo* (to freeze).

The spaces of 43 degrees between the torrid and frigid

are called the temperate zones, from *tempero* (to temper), since these parts of the earth have a temperature between extreme heat and extreme cold.

There are two frigid zones, two temperate, and one torrid.

The circles which separate the torrid from the temperate zones are called tropics, from *trepō* (to turn), because, when the sun arrives at these points, he appears for some days to stand still, and then to go backward; these two circles are called the *tropica of Cancer* and *Capricorn*. The circles which separate the temperate zone from the frigid are called arctic and antarctic circles.

1. Why have not the inhabitants of the earth the same seasons at the same time?
2. Where does the sun appear when our spring commences?
3. When does summer begin to the inhabitants of South America?
4. On what day does spring begin to the inhabitants of North America?
5. On what day will winter begin with the inhabitants of North America?
6. What is the cause of spring?
7. What do you mean by a zone?—from what word is it derived?—and how many zones are there?
8. Why are there two frigid zones, and why two temperate?
9. Where are the temperate zones situated, and what is their breadth, also that of the frigid zones?
10. To what are the zones compared?
11. What do you mean by tropics, and by what names are they called?
12. How are the tropics situated with respect to the equator?

## LESSON VI.

*Quadrants, Longitude and Latitude.*

As the earth contains eight quadrants, every country upon its surface must lie upon some one or more of these quadrants. Now, to find or know the exact situation of any country or city, geographers have divided the earth into portions, by a certain number of circles, to shew its length and breadth.

The circles used to measure its length are called lines of longitude (*longitudo*, length) or meridians, so called from the sun being upon them at mid-day (*medius-dies*): these circles cut the equator at right angles and pass through the poles. The circles used to point out latitude are called parallels of latitude, because they are parallel to the equator and to each other. Every circle contains 360 degrees, consequently each quadrant contains 90 degrees. To know the longitude of any place we must have some fixed point to start from.

Geographers of different nations are not agreed as to this point. The French reckon their longitude from a *meridian* passing through Faro, one of the Canaries; but the English, on their maps and globes, make that their first meridian which passes through London or the Royal Observatory of Greenwich. To shew the application of these circles we will suppose the slate before us to represent a quadrant of the earth's surface: if we divide the slate into six divisions by six perpendicular lines, these lines will represent the circles of longitude upon a globe. Then, since each quadrant contains 90 degrees, it follows that each of these divisions or meridians will be 15 degrees from the other; as every place has a meridian, we can de-