

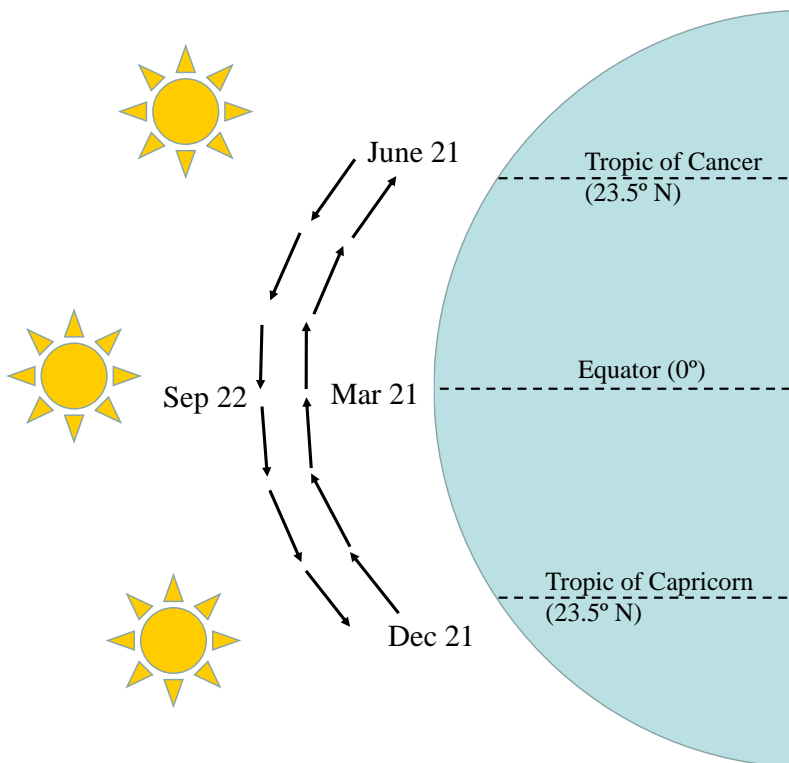
Name: _____ Date: _____

ASTRONOMY: Unit 1

Where is the Sun?

The **solar noon** sun will appear directly overhead on unique days of the calendar year within the tropical latitudes, between 23.5° N (Tropic of Cancer) and 23.5° S (Tropic of Capricorn).

- On the Summer Solstice (June 21), the solar noon sun is directly over the Tropic of Cancer.
- As time progresses from June 21 to September 22, the solar noon sun migrates from the Tropic of Cancer southward to the Equator.
- On September 22, the Autumnal Equinox, the solar noon sun is directly over the Equator.
- As time progresses from September to December 21, the solar noon sun migrates from the Equator to the Tropic of Capricorn.
- On the Winter Solstice (December 21), the solar noon sun is directly over the Tropic of Capricorn.
- As time progresses from December to March 21, the solar noon sun migrates from the Tropic of Capricorn to the Equator.
- On March 21, the Vernal Equinox, the solar noon sun is directly over the Equator.
- As time progresses from March to June 21, the solar noon sun migrates from the Equator to the Tropic of Cancer, again.



All latitudes between the Tropic of Cancer and Tropic of Capricorn have **two unique days** of the calendar year with an overhead solar noon sun.

The Tropic of Cancer and Tropic of Capricorn mark the northernmost and southernmost latitudes that will experience a direct overhead Sun.

ANALEMMA

An *analemma* is a graph that shows the solar noon sun's position as a function of latitude over the course of the calendar year. The Figure 8 diagram is the sun's solar noon track across as a function of latitude (how far north or how far south of the equator). The Y-axis of the analemma is the latitude that is experiencing the overhead solar noon sun on the unique day of the calendar year.

Activity

Part 1: **Match the latitude with the calendar day.** Use the analemma. Determine at which latitude the solar noon sun is directly over on the unique day of the calendar year. Starting from that day on the red figure 8 line, move left to the Y-axis and read the latitude corresponding to the overhead sun on that day.

Drag and drop the correct answer on the line next to the date. Each option is only used once.

- | | | | |
|-------|-------|-------|-------|
| 3° N | 18° N | 2° S | 19° S |
| 9° N | 21° N | 7° S | 22° S |
| 14° N | 23° N | 13° S | 23° S |

- | | |
|--------------------|-------------------|
| July 15 _____ | January 15 _____ |
| August 15 _____ | February 15 _____ |
| September 15 _____ | March 15 _____ |
| October 15 _____ | April 15 _____ |
| November 15 _____ | May 15 _____ |
| December 15 _____ | June 15 _____ |

Part 2: **Match the calendar day(s) with the latitude.** Use the analemma to determine on which day (or days) of the calendar year the solar noon sun is directly the given latitude. Starting from the latitude on the Y-axis, move right across the diagram to where it intersects the red figure 8 line, then read the day of the calendar year.

Drag and drop the correct date or dates on the line next to the latitude. Each option is only used once.

Jan 30 & Nov 13 Mar 10 & Oct 5 Apr 18 & Aug 27 June 21

Feb 12 & Nov 1 Mar 21 & Sep 22 Apr 28 & Aug 14 Dec 21

Feb 23 & Oct 22 Apr 1 & Sep 14 May 15 & July 31

0° _____

4° s _____

4° N _____

10° S _____

10° N _____

14° S _____

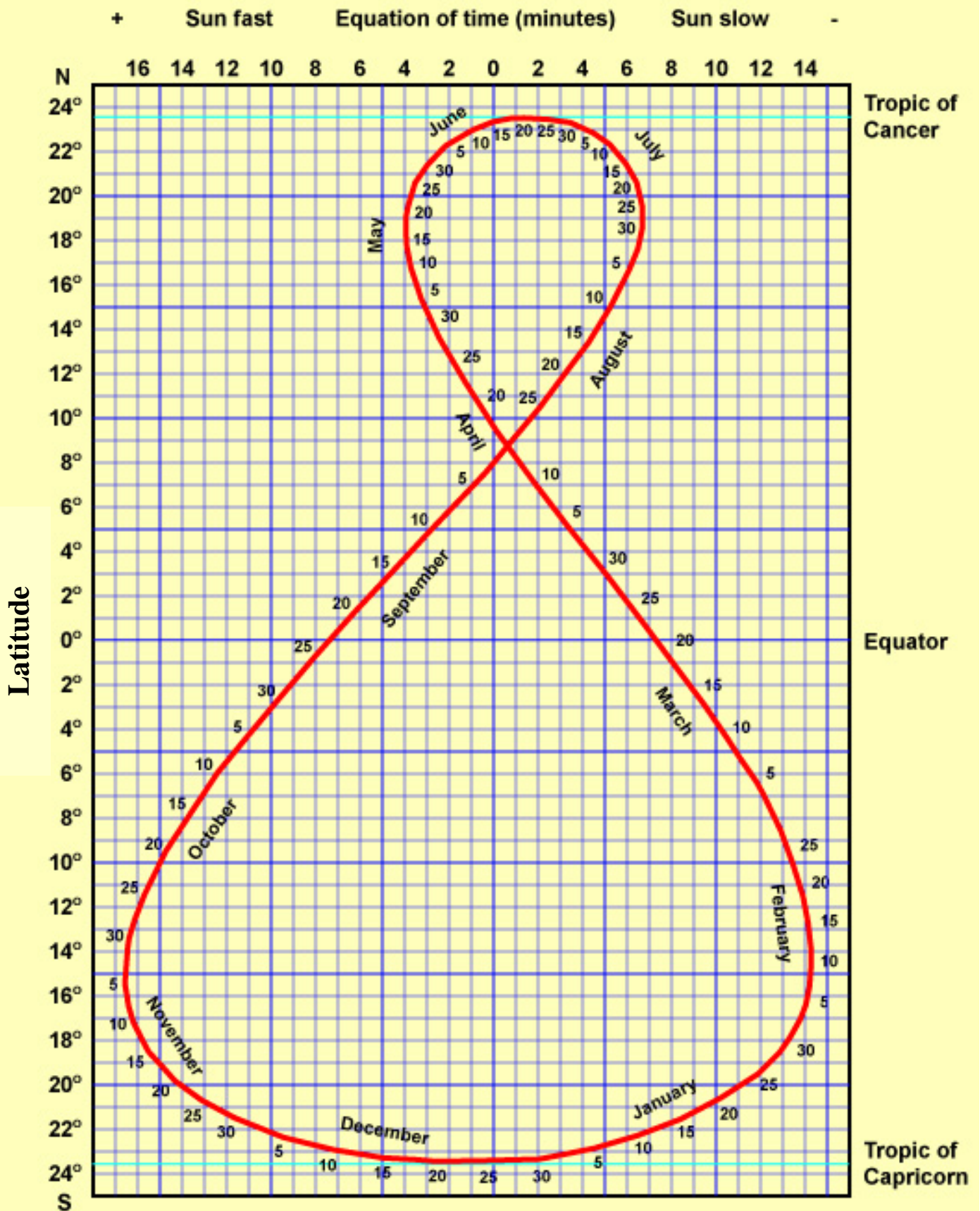
14° N _____

18° S _____

18° N _____

23.5°S _____

23.5°N _____



The *analemma* (redrawn using data from the U.S. Coast and Geodetic Survey)