

Name _____

Score _____

Lab # _____

THE SEASONS

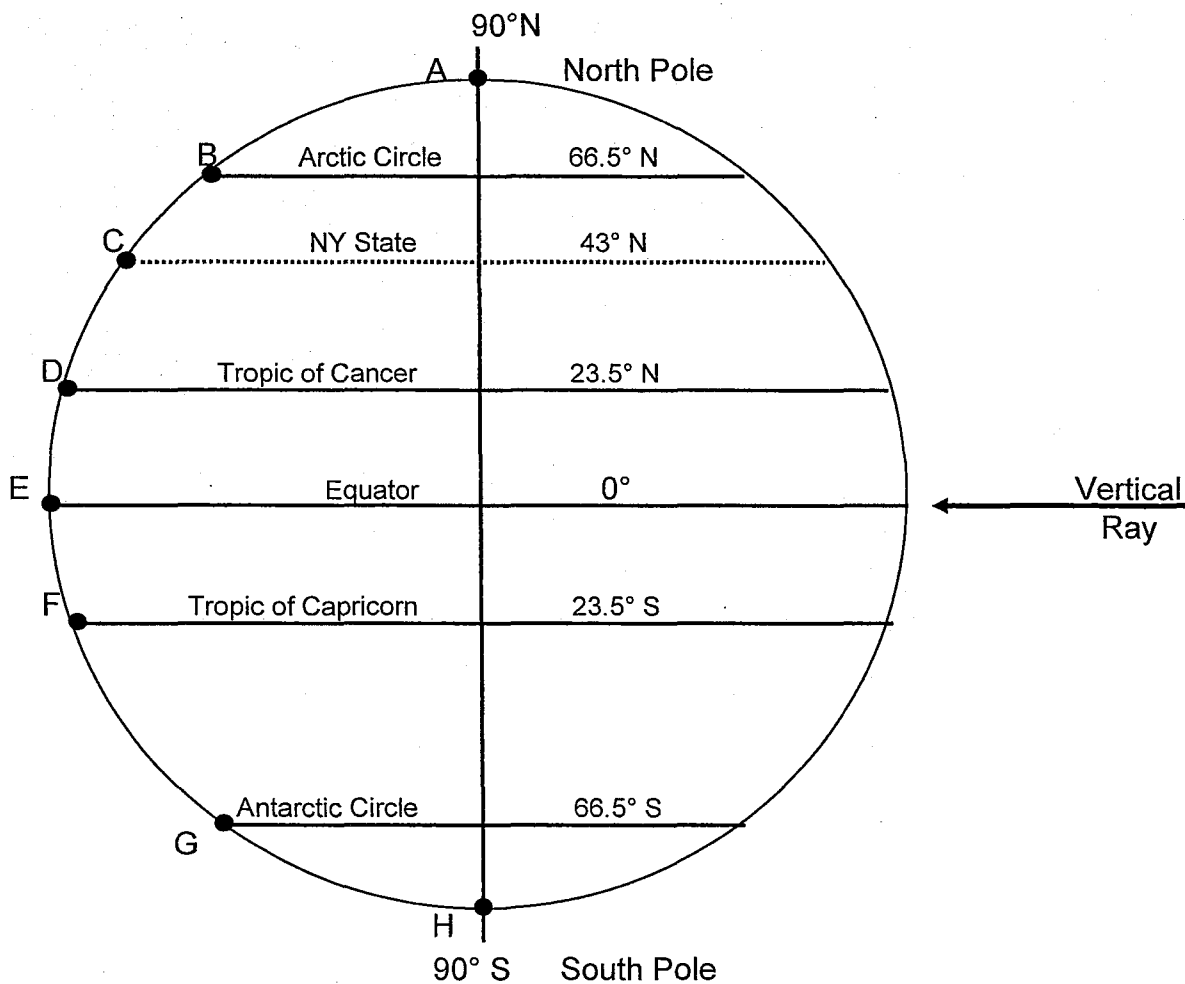
Date _____

Period _____

QUESTION: WHAT CAUSES SEASONS?

INTRODUCTION: There are several factors that combine to produce the seasons as we know them. The revolution, rotation, inclination and parallelism of the earth's axis contribute to the changing seasons. Because all four factors interact it's important to remember that no one factor is more important than the others.

DIAGRAM 1: The Equinoxes ... March 21st and September 23rd



THE EQUINOXES: On these two dates, the vertical ray of the sun is on the Equator. The position of the sun's vertical ray determines the start and end of each season. Each of important latitudes have been lettered A through H.

1. Lightly shade in the area that would be in darkness (night)
2. On these two dates there are _____ hours of day and _____ hours of night for all places on earth.
3. In NY, on these dates, the sun rises at _____ AM and sets at _____ PM.
4. In NY, on these dates, the sun rises due _____ and sets due _____.
5. For the observer in NY, letter C, what is the altitude of the noon sun? _____
6. Likewise, what is the altitude of the noon sun for all the observers?

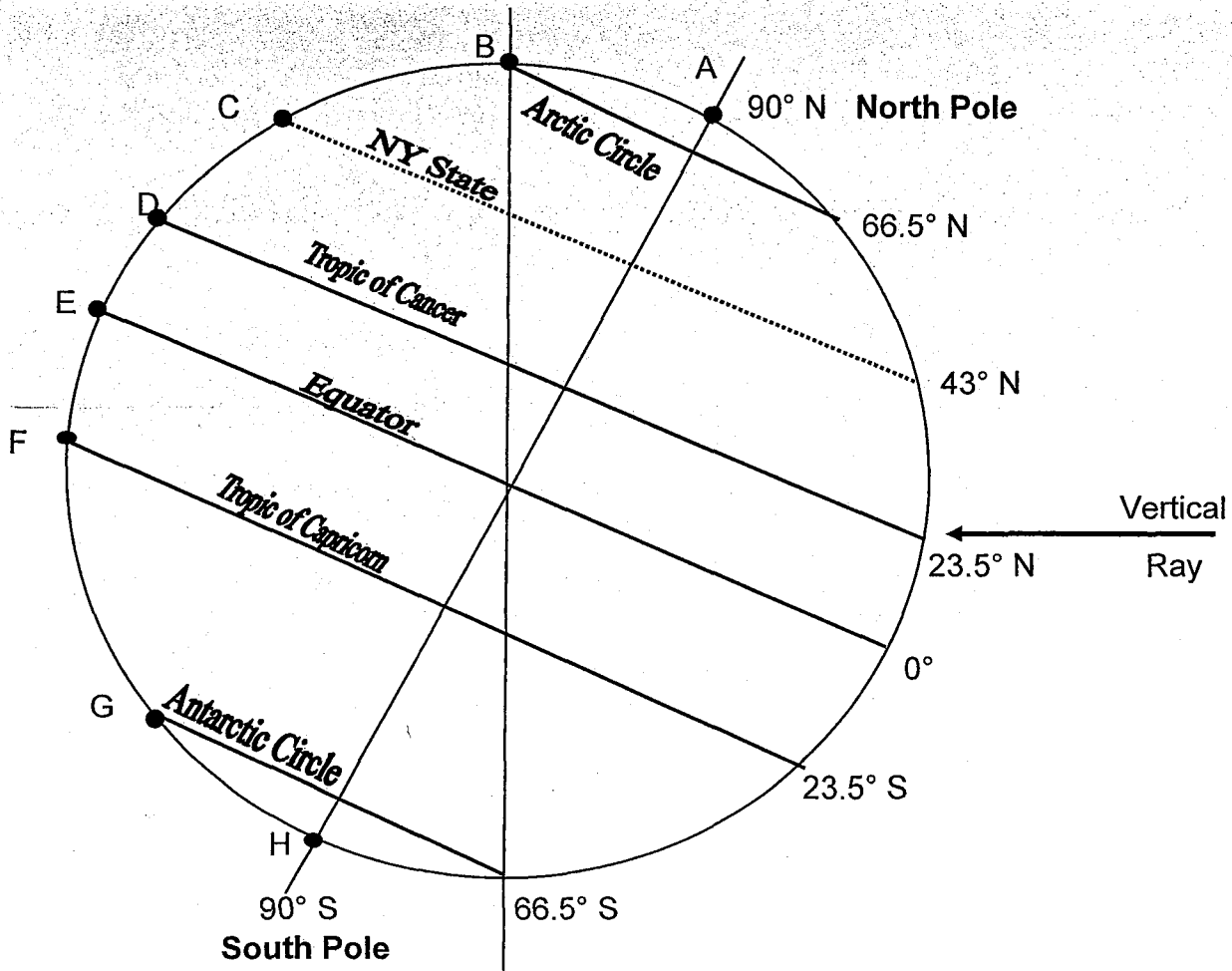
A	_____	E	_____
B	_____	F	_____
C	_____	G	_____
D	_____	H	_____

DIAGRAM 2: The Summer Solstice ... June 21st (next page)

THE SUMMER SOLSTICE: On June 21, the vertical ray is as far north as it ever gets. It is directly overhead on the TROPIC OF CANCER (23.5° N). It is the longest day of the year for the Northern Hemisphere and it marks the start of summer.

1. Lightly shade in the area that would be in darkness (night)
2. How many hours of daylight are there at the North Pole? _____
3. How many hours of daylight are there at the South Pole? _____
4. How many hours of daylight are there at the Equator? _____
5. How many hours of daylight are there in NY? _____
6. How many hours of daylight are there at the Arctic Circle? _____
7. How many hours of daylight are there at the Antarctic Circle? _____

DIAGRAM 2: The Summer Solstice ... June 21st



8. What is the altitude of the noon sun at the following letters?

- | | | | |
|---|-------|---|-------|
| A | _____ | E | _____ |
| B | _____ | F | _____ |
| C | _____ | G | _____ |
| D | _____ | H | _____ |

DIAGRAM 3: The Winter Solstice ... December 21st (next page)

THE WINTER SOLSTICE: On December 21, the vertical ray is as far south as it ever gets. It is directly overhead on the TROPIC OF CAPRICORN (23.5° S). It is the shortest day of the year for the Northern Hemisphere and it marks the start of winter.

1. Lightly shade in the area that would be in darkness (night)
2. How many hours of daylight are there at the North Pole? _____
3. How many hours of daylight are there at the South Pole? _____
4. How many hours of daylight are there at the Equator? _____
5. How many hours of daylight are there in NY? _____
6. How many hours of daylight are there at the Arctic Circle? _____
7. How many hours of daylight are there at the Antarctic Circle? _____
8. What is the altitude of the noon sun at the following letters?

A _____

E _____

B _____

F _____

C _____

G _____

D _____

H _____

DIAGRAM 3: The Winter Solstice ... December 21st

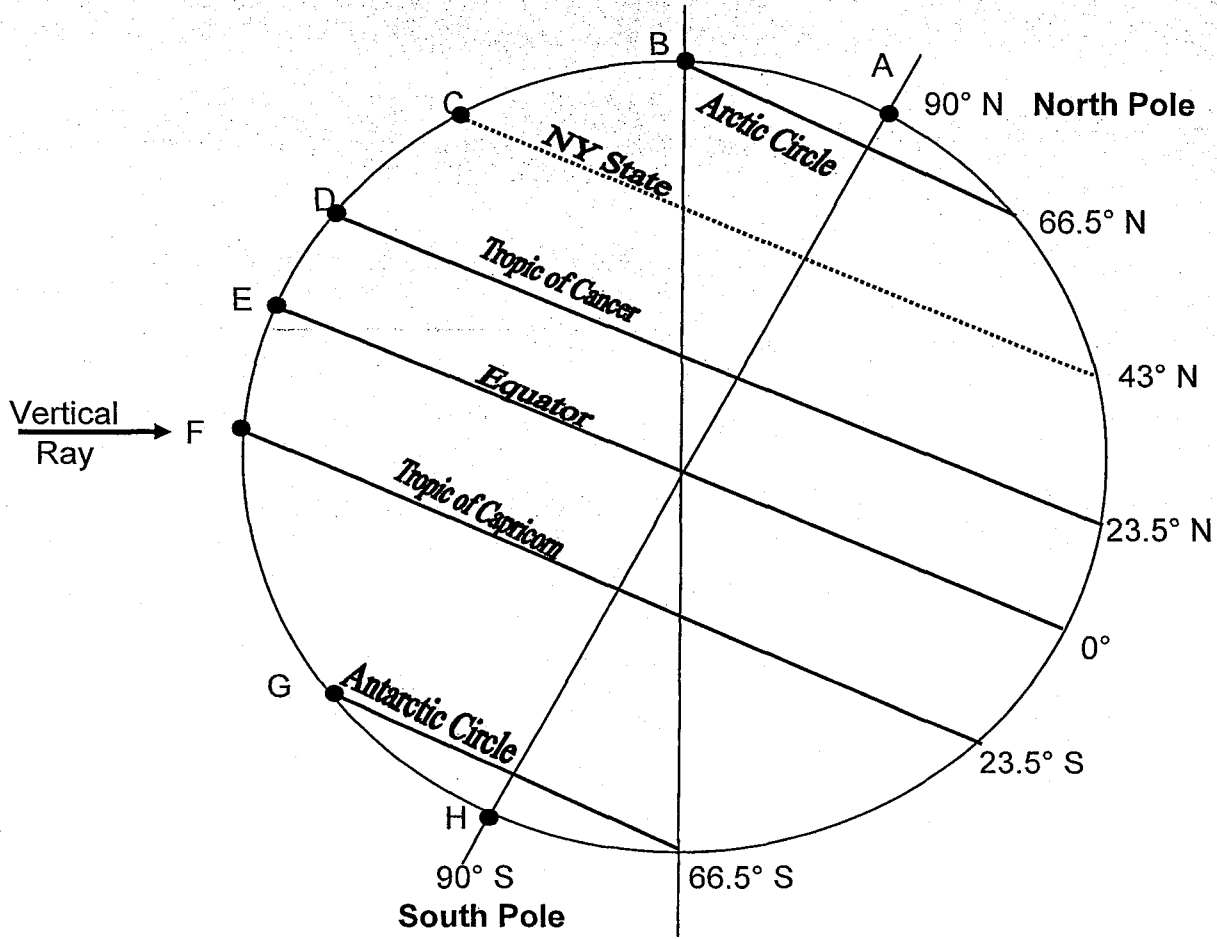
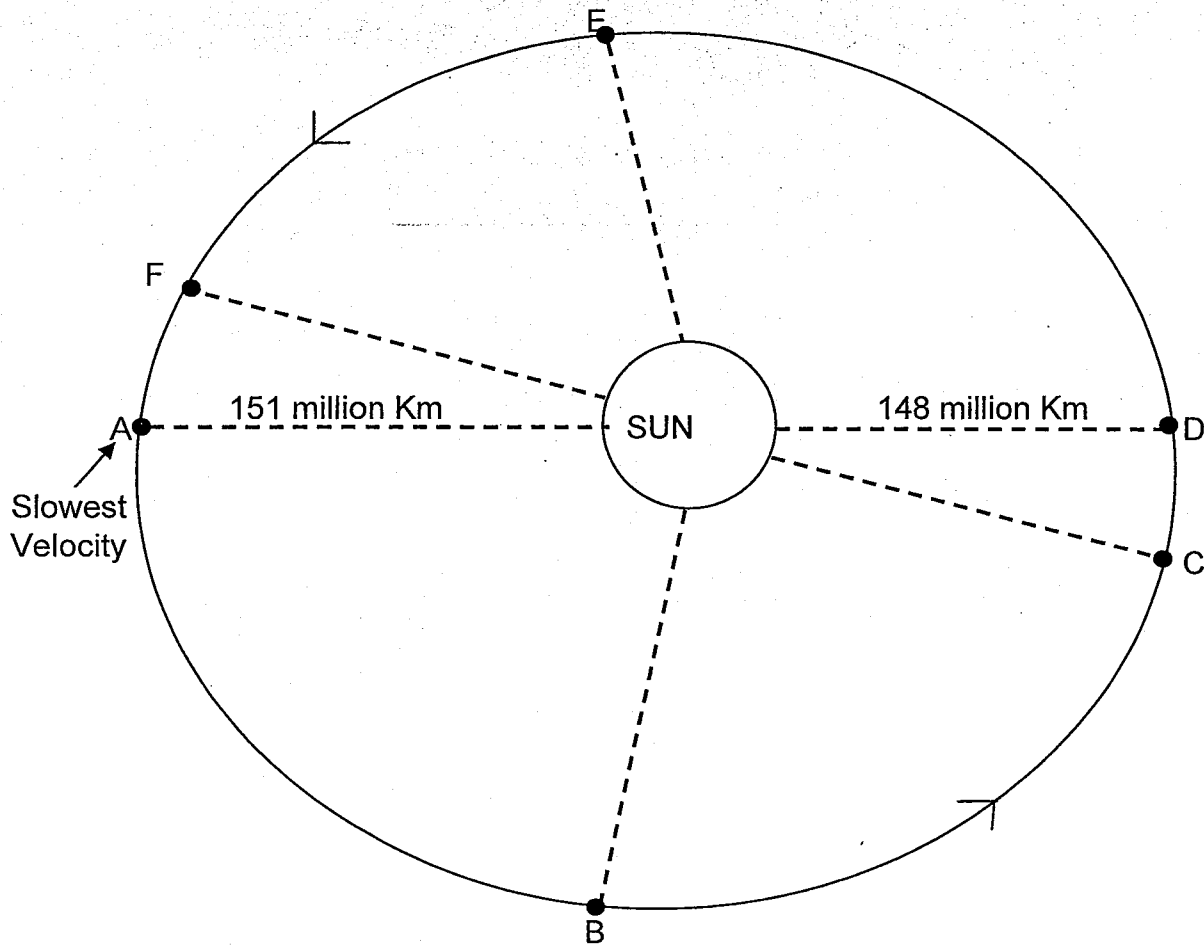


Diagram 4: The Earth in Orbit:

The next diagram shows the earth in orbit as it revolves around the sun. The seasons as well as PERIHELION and APHELION are designated



1. Label the special **date** for each letter.

- | | | | |
|---|-------|---|-------|
| A | _____ | D | _____ |
| B | _____ | E | _____ |
| C | _____ | F | _____ |

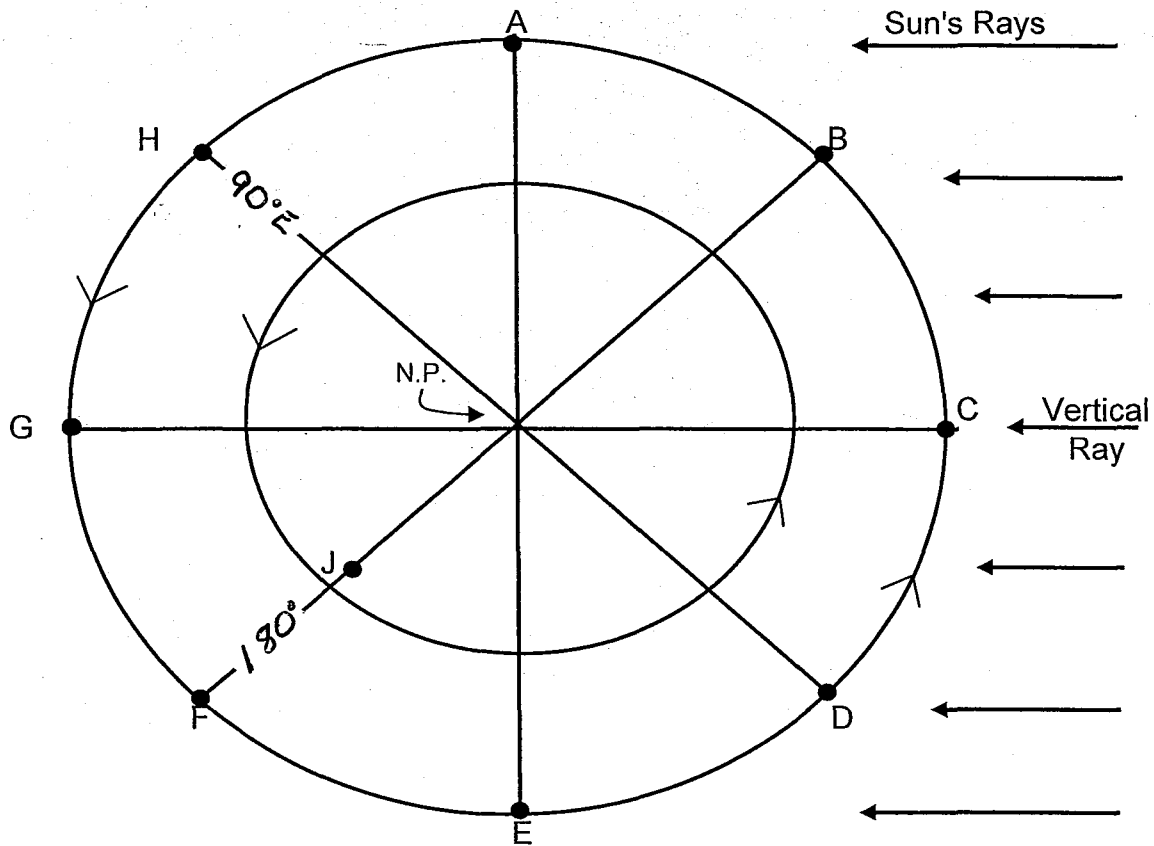
2. At which letter would the sun have its largest apparent diameter? _____

3. At which letter would the gravitational attraction between the earth and the sun be the strongest? _____

4. At which letter would the earth be moving the fastest in its orbit? _____
5. At which letter will the (inertial) velocity of the earth be the least? _____
6. At which two letters will day and night be equal on earth? _____ and _____

Diagram 5: THE EARTH CLOCK -- North Pole View:

This diagram is the earth clock. The two givens are all you need to fill in all times and all longitudes.



1. Lightly shade in the area that would be in darkness (night)
2. What type of season does this diagram represent? _____

3. Complete the data table below

Letter	A	B	C	D	E	J	G	H
Time								
Longitude	45° E	0°	45° W	90° W	135° W	180°	135° E	90° E

