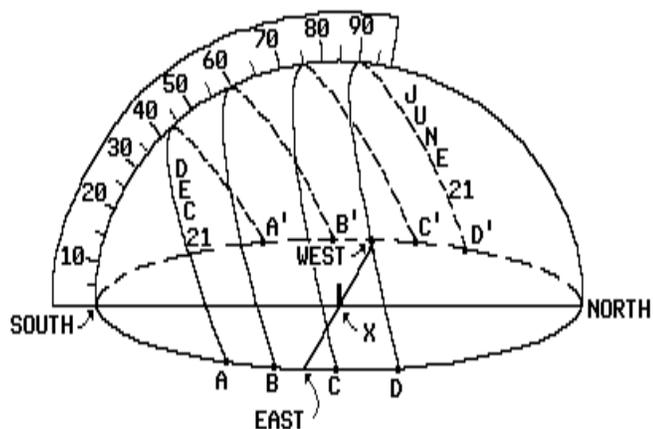


Name: _____

Questions 1 through 4 refer to the following:

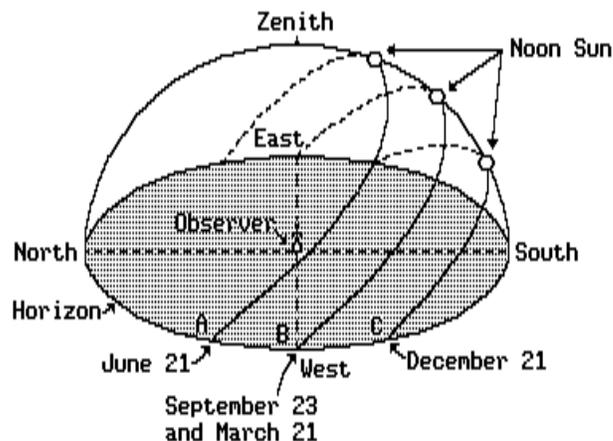
The diagram below represents a plastic hemisphere upon which lines have been drawn to show the apparent paths of the Sun on four days at one location in the Northern Hemisphere. Two of the paths are dated. The protractor is placed over the north-south line. X represents the position of a vertical post.



- For which path is the altitude of the noon Sun 74° ?
 - $C-C'$
 - $B-B'$
 - $A-A'$
 - $D-D'$
- What is the latitude of this location?
 - 0°
 - $66\frac{1}{2}^\circ$ N
 - $23\frac{1}{2}^\circ$ N
 - 90° N
- How many degrees does the altitude of the Sun change from December 21 to June 21?
 - 43°
 - $66\frac{1}{2}^\circ$
 - 74°
 - 47°
- Which path of the Sun would result in the longest shadow of the vertical post at solar noon?
 - $D-D'$
 - $B-B'$
 - $C-C'$
 - $A-A'$

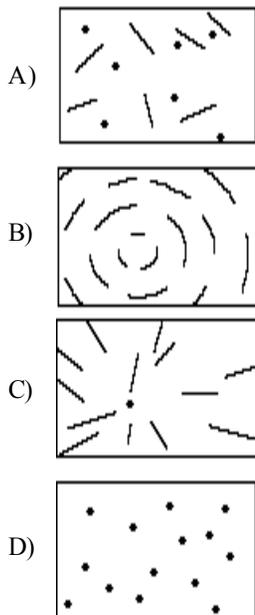
Questions 5 and 6 refer to the following:

The diagram below represents the apparent daily path of the Sun across the sky in the Northern Hemisphere on the dates indicated.



- Which observation about the Sun's apparent path at this location on June 21 is best supported by the diagram?
 - The Sun appears to move across the sky at a rate of 1° per hour.
 - Sunrise occurs north of east.
 - Sunset occurs south of west.
 - The Sun's total daytime path is shortest on this date.
- At noon on which date would the observer cast the longest shadow?
 - September 23
 - June 21
 - December 21
 - March 21
- The length of time that daylight is received at a location during one day is called the location's
 - intensity of insolation
 - angle of insolation
 - eccentricity of insolation
 - duration of insolation
- Based on observations made in the Northern Hemisphere, which statement is the best supporting evidence that the Earth rotates on its axis?
 - The seasons (spring, summer, fall, and winter) repeat in a cyclic pattern.
 - The apparent solar diameter varies throughout the year.
 - The stars appear to follow daily circular paths around Polaris.
 - The length of the daylight period varies throughout the year.
- In the Northern Hemisphere, during which season does the Earth reach its *greatest* distance from the Sun?
 - summer
 - fall
 - spring
 - winter

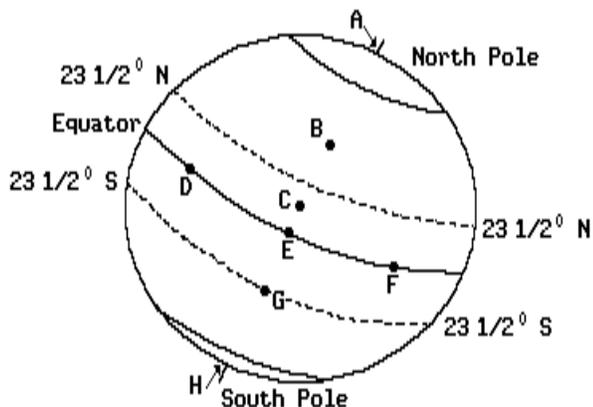
- 10) On December 21, at which latitude would an observer find the Sun directly overhead?
 A) $23\frac{1}{2}^\circ$ North C) $23\frac{1}{2}^\circ$ South
 B) 90° South D) 0°
- 11) How would a three-hour time exposure photograph of stars in the northern sky appear if the Earth did *not* rotate?



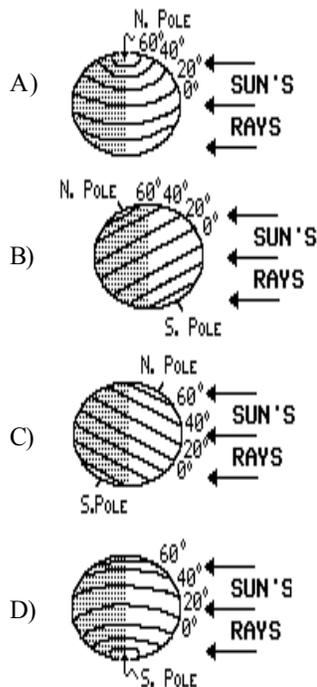
- 12) Which is the best indication that the Moon's distance from the Earth varies?
 A) the apparent change in the shape of the Moon
 B) the apparent change in the altitude of the Moon
 C) the apparent change in the diameter of the Moon
 D) the apparent change in the color of the Moon

Questions 13 through 15 refer to the following:

The diagram below represents a view of the Earth as seen from space. Locations *A* through *H* are on the Earth's surface.

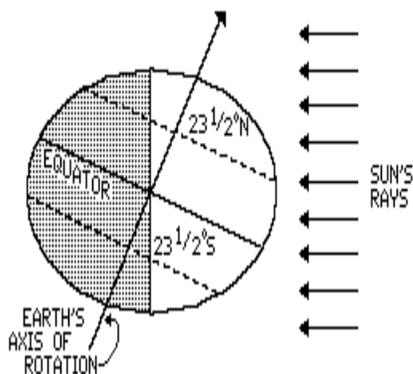


- 13) The latitude of position *G* is $23\frac{1}{2}^\circ$ South. During which months would the Sun's vertical ray be moving northward between locations *G* and *E*?
 A) July and August
 B) January and February
 C) April and May
 D) October and November
- 14) At which two locations could the Sun be directly overhead at local noon sometime during the same 24-hour period?
 A) *B* and *C* C) *D* and *F*
 B) *C* and *E* D) *E* and *G*
- 15) When it is noon at location *E*, what time of day will it be at location *D*?
 A) afternoon C) noon
 B) morning D) night
- 16) Which diagram below best represents the illumination of the Earth on the first day of summer in the Northern Hemisphere?

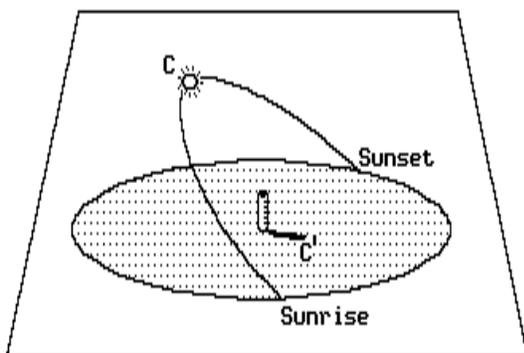


- 17) Which statement best explains the apparent daily motion of the Sun?
 A) The Earth's orbit is an ellipse.
 B) The Earth rotates on its axis.
 C) The Earth's shape is an oblate spheroid.
 D) The Earth is closest to the Sun in winter.

- 18) In the diagram below, the direct rays of the Sun are striking the Earth's surface at $23\frac{1}{2}^{\circ}$ N. What is the date shown in the diagram?



- A) September 23
B) December 21
C) March 21
D) June 21
- 19) The diagram below shows the Sun's maximum altitude (C) relative to a vertical stick in New York State on June 21. In which direction from the base of the stick does shadow C' point?

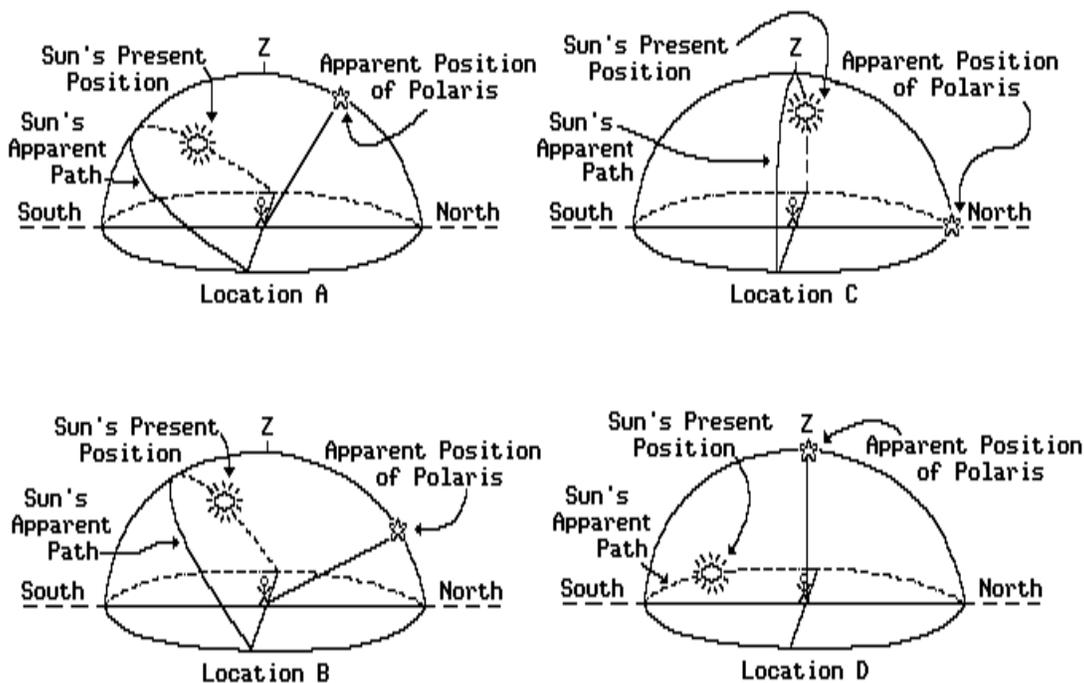


- A) west
B) south
C) east
D) north
- 20) New York State has several more hours of daylight in summer than in winter. Which statement helps explain this observation?
- A) The speed of the Earth in its orbit changes.
B) The distance between the Earth and the Sun varies.
C) The Earth is tilted on its axis.
D) The diameter of the Sun appears to change.

- 21) On March 21, two observers, one at 45° north latitude and the other at 45° south latitude, watch the "rising" Sun. In which direction(s) must they look?
- A) Both observers must look eastward.
B) The observer at 45° N. must look westward while the other must look eastward.
C) Both observers must look westward.
D) The observer at 45° S. must look westward while the other must look eastward.
- 22) Why do stars appear to move through the night sky at the rate of 15 degrees per hour?
- A) The stars actually revolve around the Earth at a rate of 15° per hour.
B) The Earth actually moves around the Sun at a rate of 15° per hour.
C) The stars actually move around the center of the galaxy at a rate of 15° per hour.
D) The Earth actually rotates at a rate of 15° per hour.
- 23) The tilt of the Earth on its axis is a cause of the Earth's
- A) 24-hour day
B) changing length of day and night
C) uniform daylight hours
D) $365\frac{1}{4}$ -day year
- 24) During a period of one year, what would be the *greatest* altitude of the Sun at the North Pole?
- A) 0°
B) $66\frac{1}{2}^{\circ}$
C) 90°
D) $23\frac{1}{2}^{\circ}$
- 25) Some constellations (star patterns) observed in the summer skies in New York State are different from those observed in the winter skies. The best explanation for this observation is that
- A) the Earth revolves around the Sun
B) the Earth rotates on its axis
C) constellations are moving away from the Earth
D) constellations revolve around the Earth

Questions 26 through 28 refer to the following:

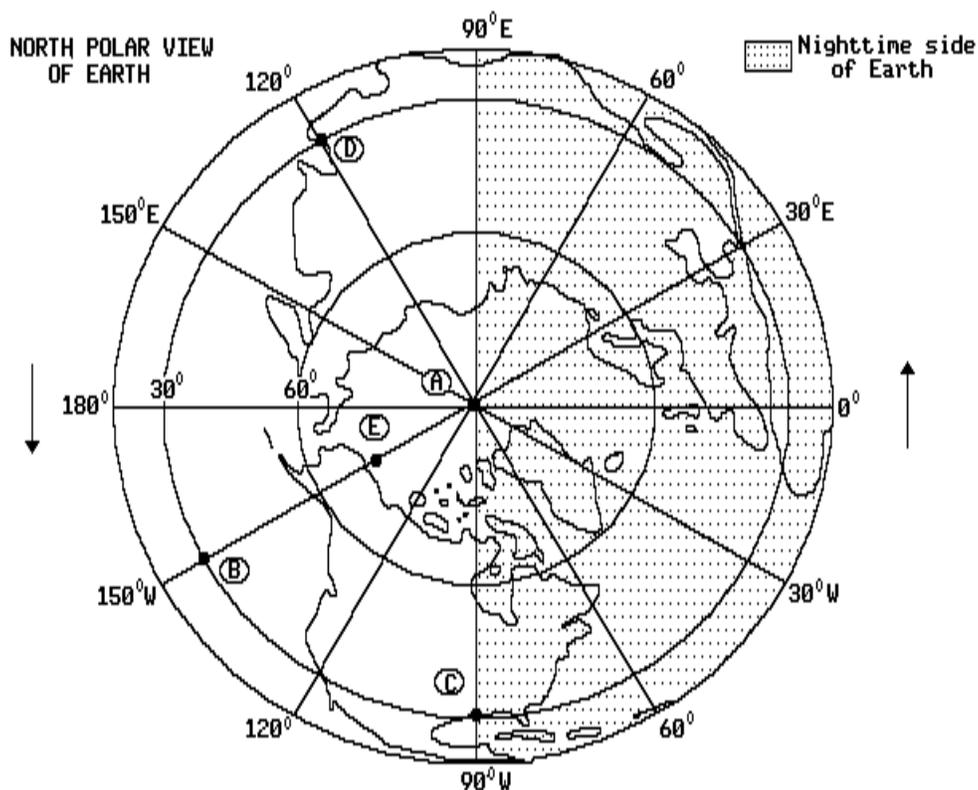
The diagrams below represent four locations on the Earth's surface at the same time on March 21. Lines have been drawn to represent the apparent path of the sun across the sky. The present position of the Sun, the position of Polaris, and the zenith (Z) are shown for an observer at each location.



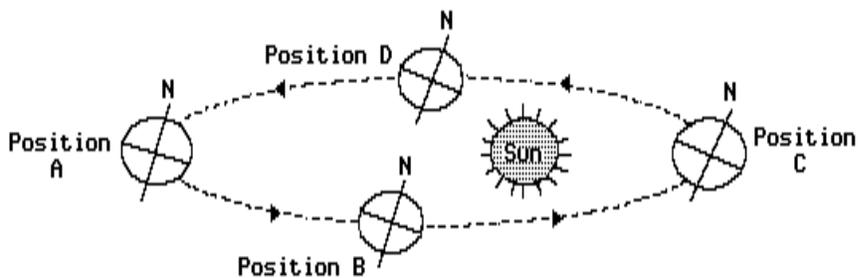
- 26) The Sun's apparent path through the sky on this day is a direct result of the
- Sun's revolution around the Earth
 - Earth's revolution around the Sun
 - Sun's rotation
 - Earth's rotation
- 27) What time of the day is shown by the Sun's present position at location A ?
- midnight
 - afternoon
 - morning
 - noon
- 28) To an observer at location A , the Sun will appear to move from
- east to west at $15^\circ/\text{hr}$
 - east to west at $1^\circ/\text{hr}$
 - west to east at $15^\circ/\text{hr}$
 - west to east at $1^\circ/\text{hr}$

Questions 29 and 30 refer to the following:

On the map below, points *A* through *E* are points on the Earth's surface.



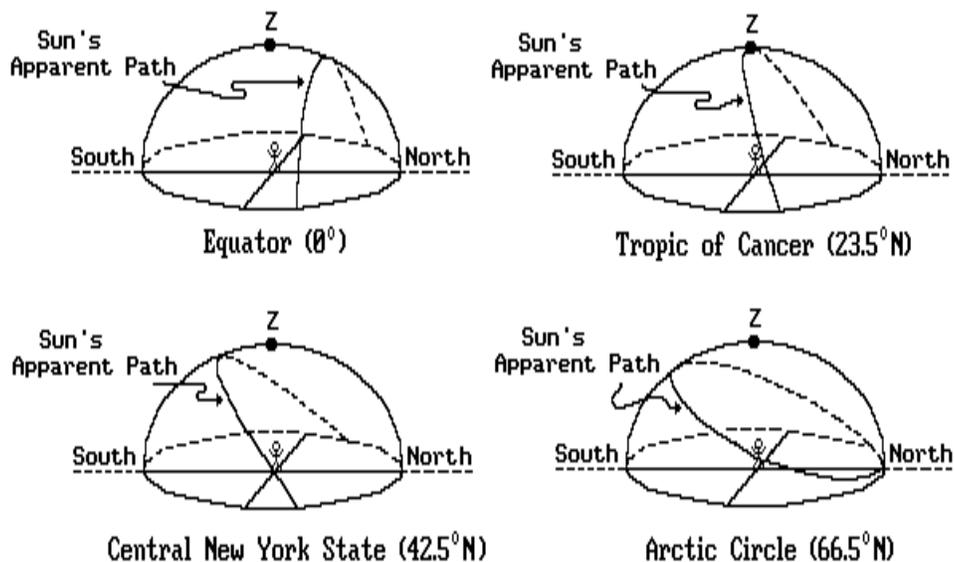
- 29) The time at point *C* is closest to
- | | |
|-----------|----------------|
| A) 6 p.m. | C) 12 noon |
| B) 6 a.m. | D) 12 midnight |
- 30) Which day of the year is represented by this diagram?
- | | |
|-------------|----------------|
| A) March 21 | C) December 21 |
| B) June 21 | D) October 21 |
- 31) The diagram below represents four positions of the Earth as it revolves around the Sun. At which position is the Earth located on December 21?



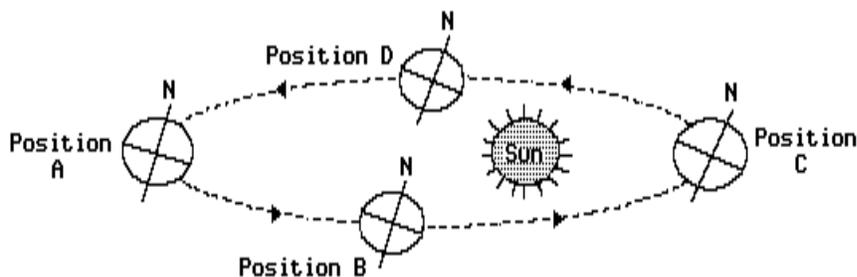
- | | | | |
|-------------|-------------|-------------|-------------|
| A) <i>B</i> | B) <i>A</i> | C) <i>C</i> | D) <i>D</i> |
|-------------|-------------|-------------|-------------|

Questions 32 through 34 refer to the following:

The diagrams below represent plastic hemisphere models. Lines have been drawn to show the apparent path of the Sun across the sky on June 21 for observers at four different Earth locations. The zenith (Z) is the point in the sky directly over the observer.



- 32) Which location will receive the *greatest* intensity of insolation at solar noon?
- A) Equator
B) Tropic of Cancer
C) central New York State
D) Arctic Circle
- 33) In three months, the length of a day in central New York State will be
- A) longer, because the Sun will rise and set farther south
B) longer, because the Sun will rise and set farther north
C) shorter, because the Sun will rise and set farther north
D) shorter, because the Sun will rise and set farther south
- 34) At which location will the longest noontime shadow be observed?
- A) central New York State
B) Tropic of Cancer
C) Arctic Circle
D) Equator
- 35) The diagram below shows several positions of the Earth as it moves around the Sun.

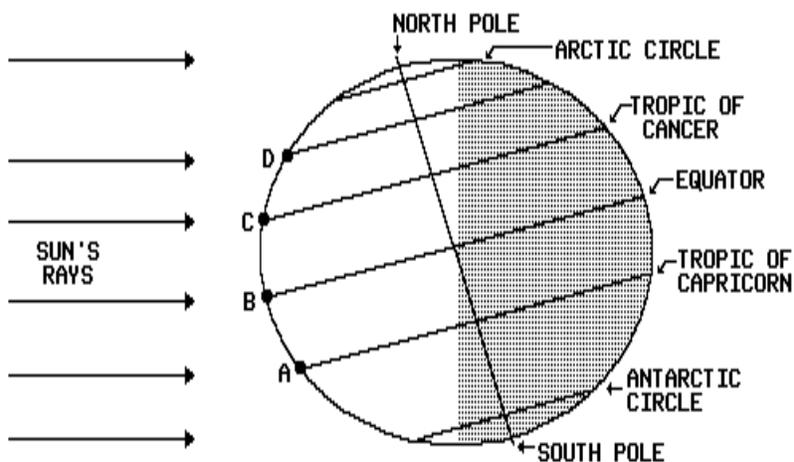


Which position shows the Earth during summer in the Northern Hemisphere?

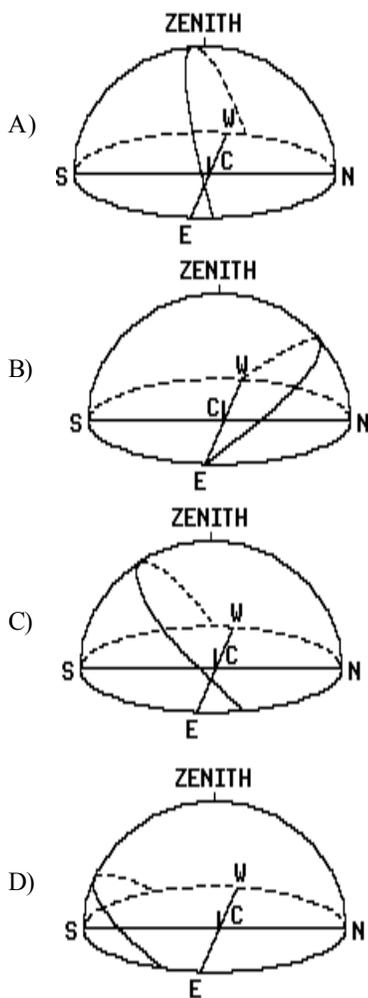
- A) B B) D C) A D) C

Questions 36 and 37 refer to the following:

The diagram below represents the Earth at a specific position in its orbit. Arrows indicate radiation from the Sun. Points *A* through *D* are locations on the Earth's surface.



36) Which diagram below best represents the path of the Sun on this date as seen by an observer at location *C*?

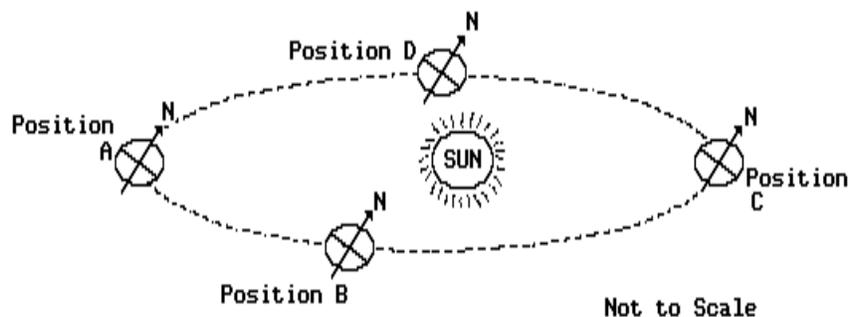


37) Which location would have the *greatest* number of daylight hours when the Earth is in this position?

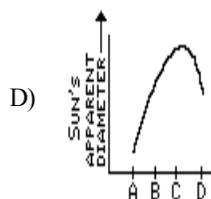
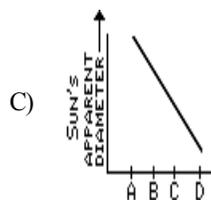
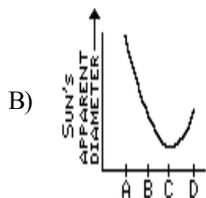
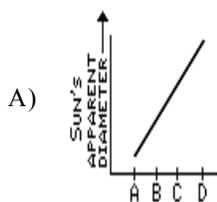
- A) *C* B) *A* C) *B* D) *D*

Questions 38 through 40 refer to the following:

The diagram below shows four positions of the Earth in its orbit around the Sun. The diagram indicates relative positions of the Earth to the Sun, but the diagram has not been drawn to scale.



- 38) Which graph best represents the relationship between the Sun's apparent diameter and the positions of the Earth around the Sun from *A* and *D*?



- 39) When the Earth is at position *A*, where will the Sun appear to rise anywhere in New York State?

- A) north of due east C) due west
B) due east D) south of due east

- 40) For an observer in New York State, which event will occur when the Earth is at position *C*?

- A) minimum apparent diameter of the Sun
B) minimum duration of insolation
C) maximum intensity of insolation
D) maximum altitude of the Sun