

(1) Over the course of a day, the sun angle at any particular place varies. Why?

*(Note: Although all responses below are true statements, only one of them actually explains the observation!)*

- (A) The sun is higher in the sky at some times than it is at others.
- (B) The sun's rays strike the earth at different angles at different times of day.
- (C) As the earth rotates, the earth's surface faces in different directions relative to the sun's rays.

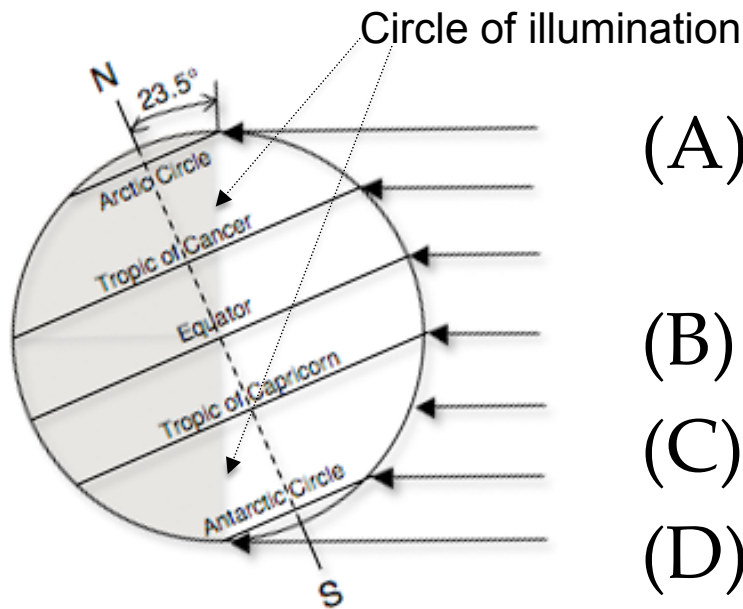
(2) Which of the items below is ***NOT*** a possible explanation for why insolation at a particular place on the earth's surface might vary with time?

- (A) The output of the sun varies.
- (B) The distance between the earth and sun varies.
- (C) The sun angle varies (so the distance that solar radiation travels through the atmosphere varies).
- (D) The sun angle varies (so the degree of “spreading out” on the earth's surface varies).
- (E) The albedo (reflectivity) of the earth's surface varies.

(3) At any particular place, solar noon is the time of day when the sun is highest in the sky. When does solar noon occur?

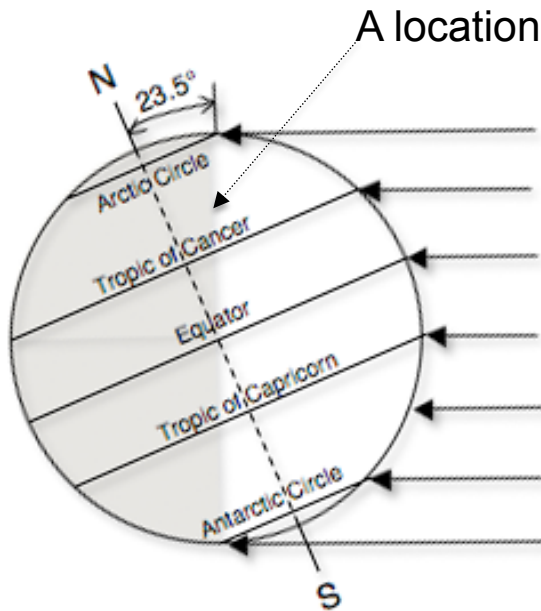
- (A) Exactly half way between sunrise and sunset.
- (B) At the summer solstice (June 21 or so in the Northern Hemisphere, December 21 or so in the Southern Hemisphere).
- (C) At the time of the equinoxes (March 21 or so and September 21 or so).
- (D) Can't say in general--it depends on the latitude of the place.

(4) If you were anywhere on the Circle of Illumination, where would the sun appear to be in the sky?



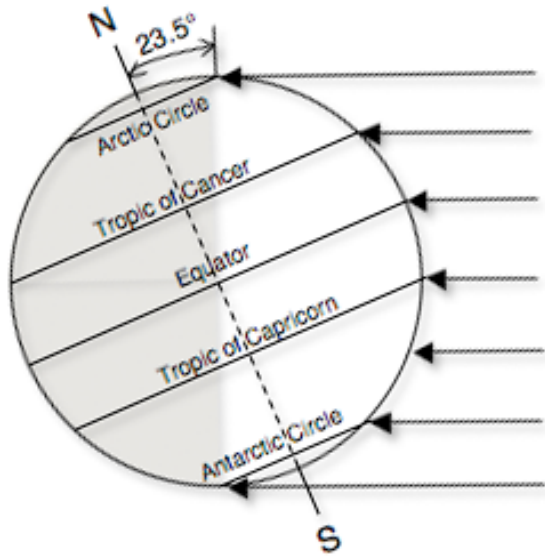
- (A) at its highest point over the course of the day
- (B) on the horizon
- (C) below the horizon
- (D) can't say in general—it varies with latitude and time of year

(5) At the location on the earth indicated in the diagram, what is the sun doing in the sky?



- (A) It is rising (sunrise).
- (B) It is setting (sunset).
- (C) It is reaching its highest point and will start going down.
- (D) Can't say in general—not enough information.

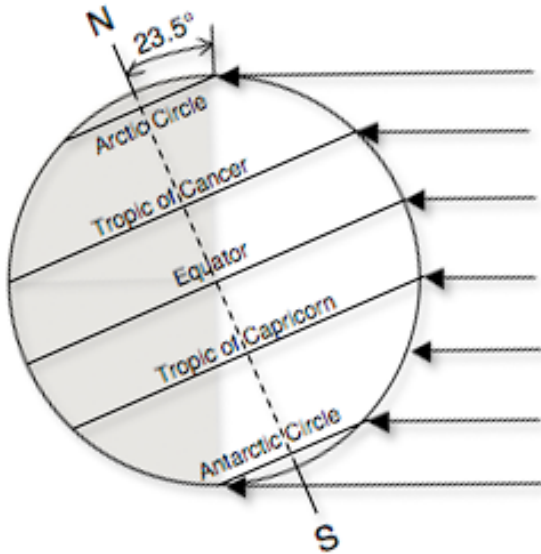
(6) At what locations on the diagram below is it solar noon?



- (A) Everywhere along the axis of rotation.
- (B) Everywhere along the circle of illumination.
- (C) At the right-hand edge of the diagram, on the equator.
- (D) At the right-hand edge of the diagram, on the Tropic of Capricorn.

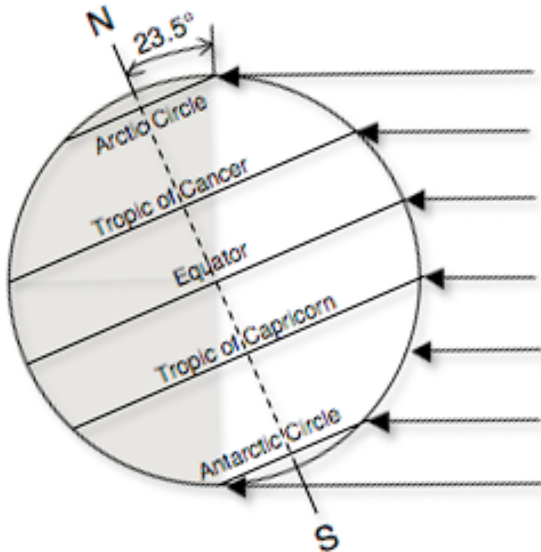
(E) Everywhere from the North Pole to the South Pole along the right-hand edge.

(7) At what locations on the diagram below is it solar midnight?



- (A) Everywhere on the dark (left) half of the diagram.
- (B) At the left-hand edge of the diagram, on the equator,
- (C) At the left-hand edge of the diagram, on the Tropic of Cancer.
- (D) Everywhere from the North Pole to the South Pole, along the left-hand edge of the diagram

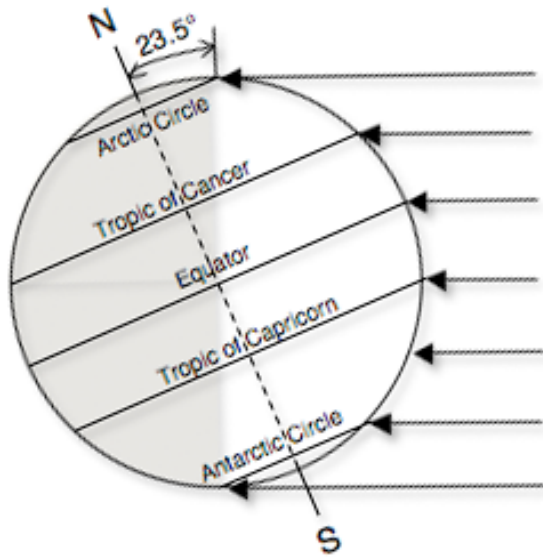
(8) At what locations on the diagram below is it (solar) 6 am?



- (A) Everywhere along the circle of illumination.
- (B) At each latitude along the line represented by the axis of rotation.
- (C) At each latitude, closer to solar noon than solar midnight.
- (D) Can't tell--not enough information shown.

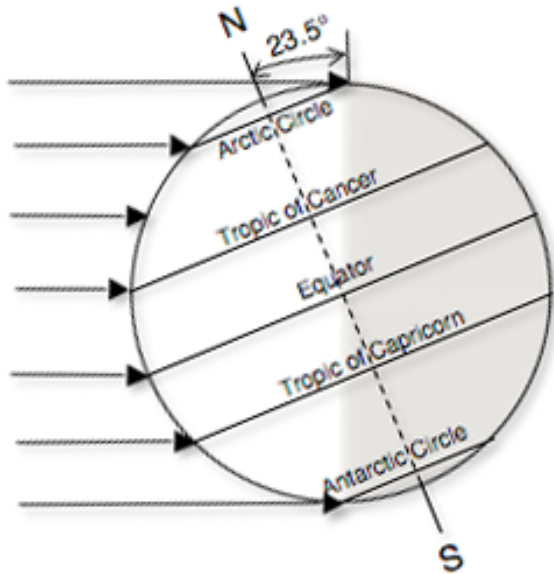


(9) At what location(s) on the diagram below would the sun appear directly overhead?



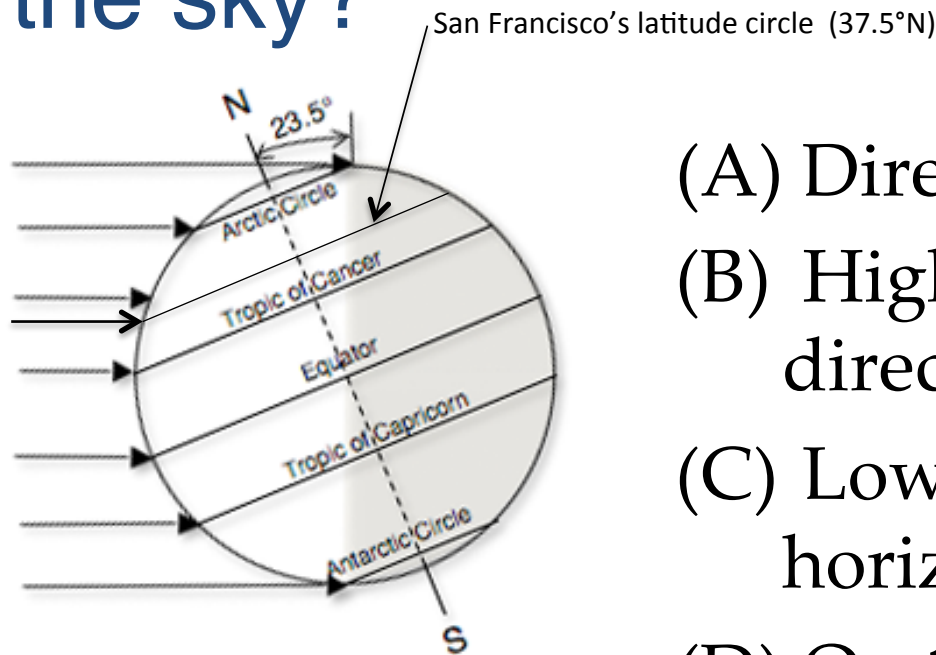
- (A) Everywhere along the circle of illumination.
- (B) At each latitude along the line represented by the axis of rotation.
- (C) From the North Pole to the South Pole, along the right-hand edge.
- (D) On the right-hand edge of the diagram, at the Tropic of Capricorn.

(10) At what location(s) on the diagram below would the sun appear directly overhead?



- (A) On the left-hand edge of the diagram, on the Tropic of Capricorn.
- (B) On the left-hand edge of the diagram, on the equator.
- (C) On the left-hand edge of the diagram, on the Tropic of Cancer.
- (D) On the North Pole.

(11) The diagram below shows the earth at the time of the June solstice. At the latitude of San Francisco at solar noon, where does the sun appear to be in the sky?



- (A) Directly overhead.
- (B) High in the sky (but not directly overhead).
- (C) Low in the sky (close the horizon).
- (D) On the horizon.