

# Insolation and Seasons MC Review

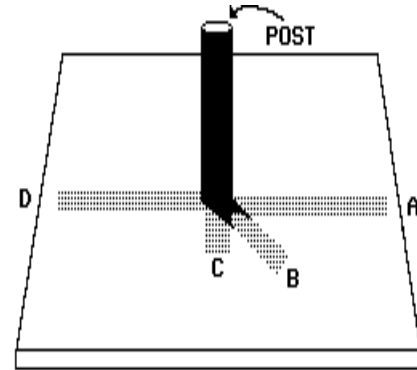
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Name: \_\_\_\_\_

- 1) What is the primary reason New York State is warmer in July than in February?
  - A) The altitude of the noon Sun is greater in February.
  - B) The insolation in New York is greater in July.
  - C) The Earth is closer to the Sun in July.
  - D) The Earth is traveling faster in its orbit in February.
- 2) The factor that contributes most to the seasonal temperature changes during 1 year in New York State is the changing
  - A) distance between the Earth and the Sun
  - B) angle at which the Sun's rays strike the Earth's surface
  - C) speed at which the Earth travels in its orbit around the Sun
  - D) energy given off by the Sun
- 3) Most of the energy in the Earth's atmosphere comes from
  - A) the rotation of the Earth and wind from the Earth
  - B) the rotation and revolution of the Earth
  - C) radioactive decay of elements and radiation from the Earth
  - D) radiation from the Earth and insolation from the Sun
- 4) What happens to the angle of insolation on June 21 between solar noon and 6 p.m. in New York State?
  - A) It increases steadily.
  - B) It remains the same.
  - C) It first increases and then decreases.
  - D) It decreases steadily.
- 5) If dust particles are added to the atmosphere, the amount of insolation reaching the ground will probably
  - A) increase
  - B) remain the same
  - C) decrease
- 6) On which date does the maximum duration of insolation occur in the Northern Hemisphere?
 

A) June 21	C) March 21
B) December 21	D) September 23
- 7) As the amount of reflection caused by dust particles in the atmosphere increases, the amount of insolation reaching the Earth's surface
  - A) increases
  - B) decreases
  - C) remains the same

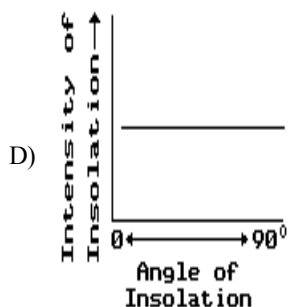
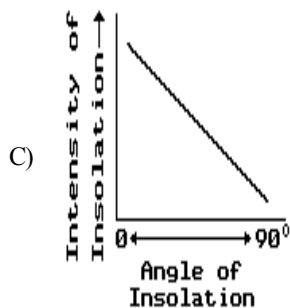
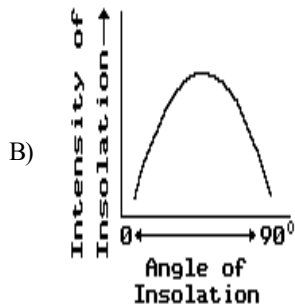
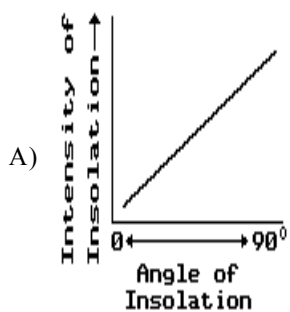
- 8) In the diagram below, a vertical post casts shadows *A*, *B*, *C*, and *D* at four different times during the day. Which shadow was cast when this location was receiving the *greatest* intensity of insolation?



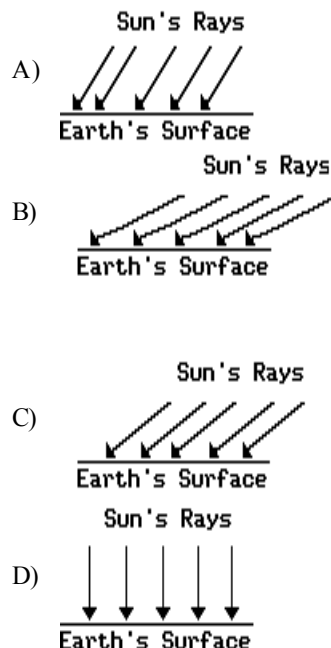
- |                    |                    |
|--------------------|--------------------|
| A) shadow <i>C</i> | C) shadow <i>A</i> |
| B) shadow <i>B</i> | D) shadow <i>D</i> |
- 9) At which latitude would the duration of insolation be *greatest* on December 21?
 

A) $23\frac{1}{2}^{\circ}$ N.	C) $0^{\circ}$
B) $23\frac{1}{2}^{\circ}$ S.	D) $10^{\circ}$ N.
  - 10) Which two factors determine the number of hours of daylight at a particular location?
    - A) longitude and the Earth's average diameter
    - B) longitude and season
    - C) latitude and the Earth's average diameter
    - D) latitude and season
  - 11) The seasonal temperature changes in the climate of New York State are influenced mostly by the
    - A) changing speed at which the Earth travels in its orbit around the Sun
    - B) changing angle at which the Sun's rays strike the Earth's surface
    - C) rotation of the Earth on its axis
    - D) changing distance of the Earth from the Sun

- 12) Which graph below best represents the relationship between the angle of insolation and the intensity of insolation?



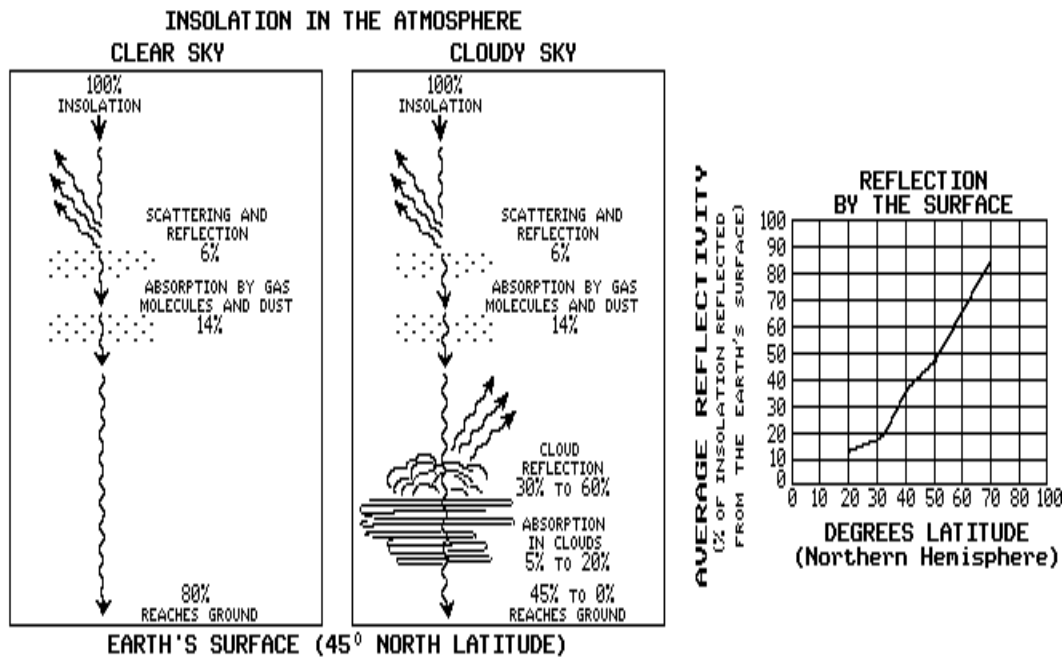
- 13) In which diagram does the incoming solar radiation reaching the Earth's surface have the *greatest* intensity?



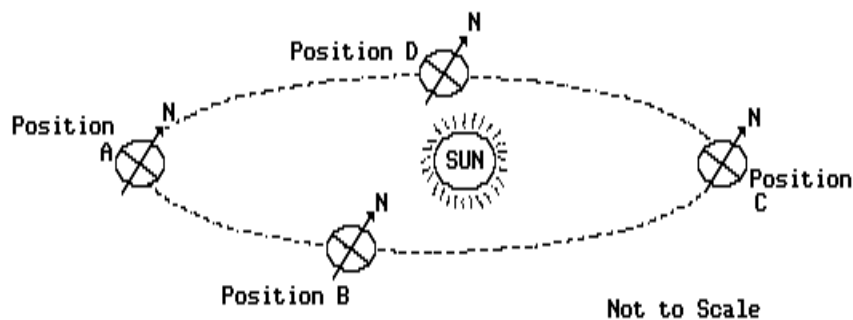
- 14) During which month does the minimum duration of insolation occur in New York State?
  - A) February
  - B) December
  - C) September
  - D) July
- 15) Over a period of one year, which location would probably have the *greatest* average intensity of insolation per unit area? [Assume equal atmospheric transparency at each location.]
  - A) New York City ( $41^{\circ}$  N)
  - B) Tropic of Cancer ( $23\frac{1}{2}^{\circ}$  N)
  - C) the North Pole ( $90^{\circ}$  N)
  - D) the Arctic Circle ( $66\frac{1}{2}^{\circ}$  N)
- 16) In New York State, the longest period of insolation occurs on or about
  - A) June 21
  - B) March 21
  - C) August 21
  - D) January 21
- 17) Which statement best describes how the insolation changes in New York State from May 21 through June 21?
  - A) The intensity and the duration of insolation both decrease.
  - B) The intensity of insolation decreases and the duration of insolation increases.
  - C) The intensity and the duration of insolation both increase.
  - D) The intensity of insolation increases and the duration of insolation decreases.
- 18) Electromagnetic energy that reaches the Earth from the Sun is called
  - A) insolation
  - B) conduction
  - C) terrestrial radiation
  - D) specific heat

Questions 19 and 20 refer to the following:

The diagrams below show the general effect of the Earth's atmosphere on insolation from the Sun at middle latitudes during *both* clear-sky and cloudy-sky conditions. The graph below shows the percentage of insolation reflected by the Earth's surface at different latitudes in the Northern Hemisphere in winter.



- 19) Which factor keeps the *greatest* percentage of insolation from reaching the Earth's surface on cloudy days?
- absorption by clear-air gas molecules
  - absorption by cloud droplets
  - reflection by cloud droplets
  - reflection by clear-air gas molecules
- 20) Which statement best explains why, at high latitudes, reflectivity of insolation is greater in winter than in summer?
- The North Pole is tilted toward the Sun in winter.
  - The colder air holds much more moisture.
  - Dust settles quickly in cold air.
  - Snow and ice reflect almost all insolation.
- 21) 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.

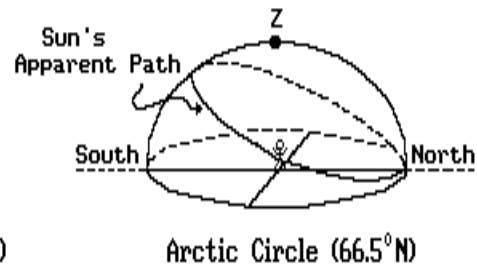
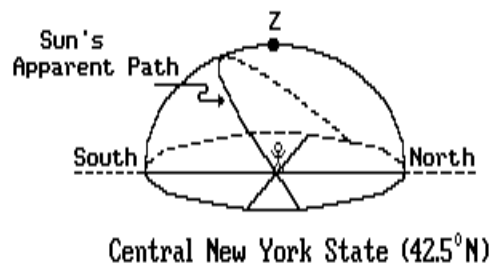
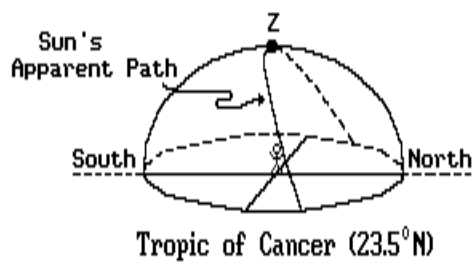
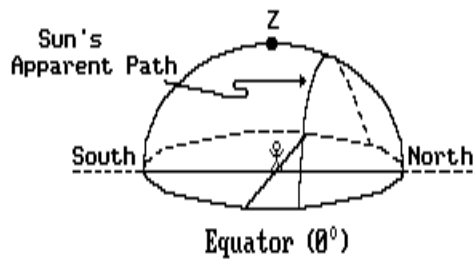


In which position would New York State receive the maximum insolation?

- D
- C
- A
- B

Questions 22 and 23 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.

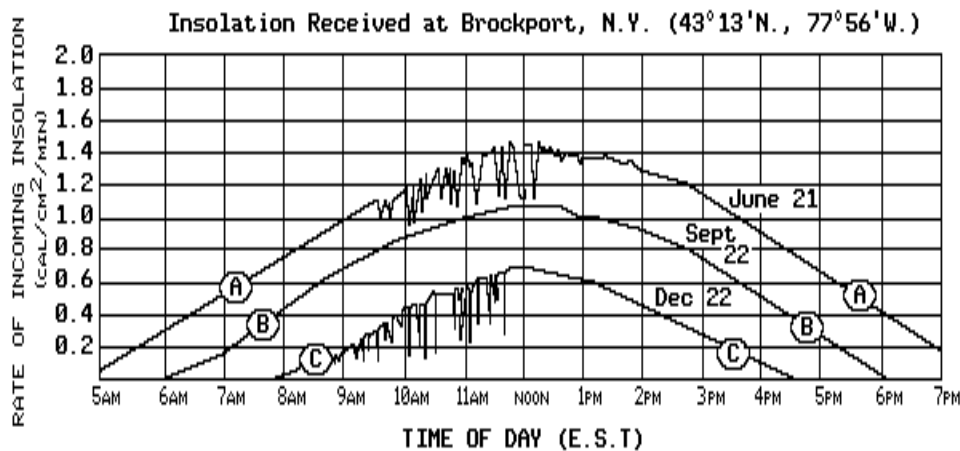


- 22) The Arctic Circle has the coolest climate of these four locations because the Arctic Circle
- A) receives the fewest hours of daylight
  - B) is usually farthest from the Sun
  - C) receives mostly low-angle, slanting insolation rays
  - D) reflects the least amount of insolation

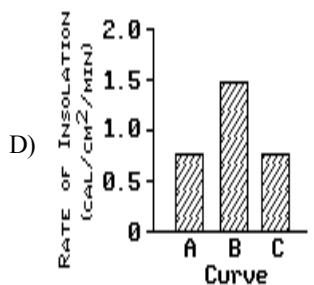
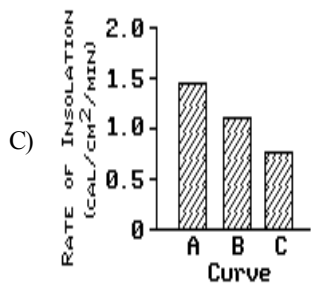
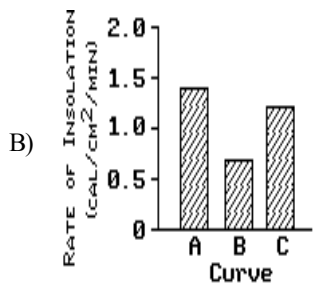
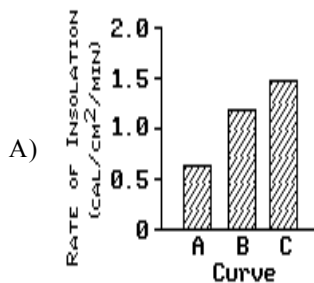
- 23) Which location will experience the shortest duration of insolation?
- A) Arctic Circle
  - B) Equator
  - C) Tropic of Cancer
  - D) central New York State

Questions 24 through 27 refer to the following:

The graph below shows the varying amounts of insolation received at Brockport, New York, on three different dates under clear or partly cloudy skies.

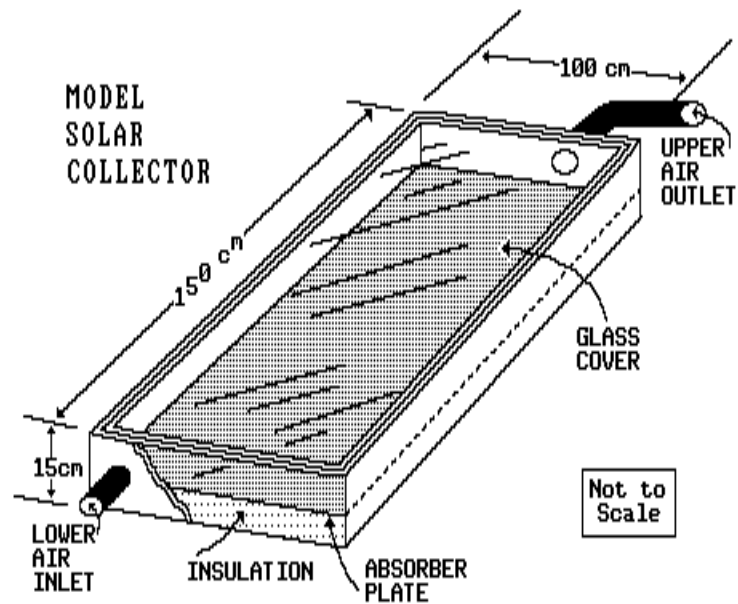


- 24) Why is there a difference in the time of sunrise and sunset for each of the three curves?
- A) The amount of cloud cover varied for each of the three days.
  - B) The daily temperature varied for each of the three days.
  - C) The duration of insolation varied for each of the three days.
  - D) The total energy output of the Sun varied for each of the three days.
- 25) Which chart most nearly represents the maximum rate of insolation on three dates plotted above?

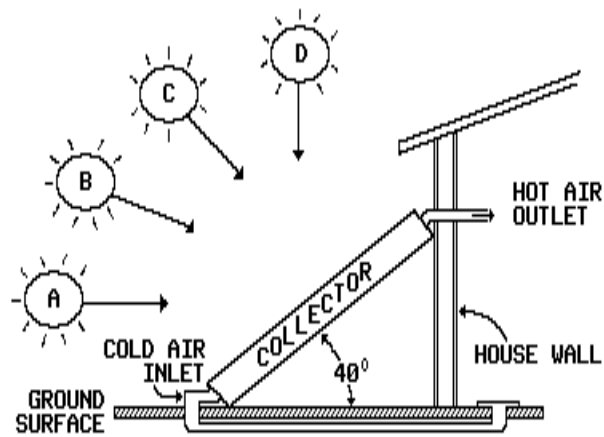


- 26) What most likely caused the irregular changes in insolation shown on curves *A* and *C* between 9 a.m. and noon?
- A) instrument error
  - B) changes in the amount of cloud cover
  - C) variations in the Sun's energy output
  - D) temperature changes within the atmosphere
- 27) The duration of insolation at Brockport on September 22 was approximately
- A) 6 hours
  - B) 12 hours
  - C) 9 hours
  - D) 15 hours

- 28) The diagram below represents a hot-air solar collector consisting of a wooden box frame, an absorber plate, a glass cover, and insulation.



The solar collector is placed outside in sunlight, facing south and tilted  $40^\circ$  from the horizontal. At which position of the Sun would the collector receive the most intense solar radiation?



A) C

B) B

C) A

D) D

- 1) B
- 2) B
- 3) D
- 4) D
- 5) C
- 6) A
- 7) B
- 8) A
- 9) B
- 10) D
- 11) B
- 12) A
- 13) D
- 14) B
- 15) B
- 16) A
- 17) C
- 18) A
- 19) C
- 20) D
- 21) C
- 22) C
- 23) B
- 24) C
- 25) C
- 26) B
- 27) B
- 28) A