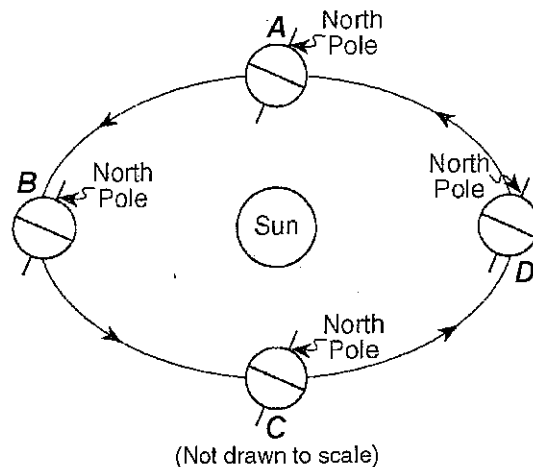


Name: _____

- 1) The coldest climates on Earth are located at or near the poles primarily because Earth's polar regions
- 1) absorb the greatest amount of insolation
 - 2) receive less total yearly hours of daylight
 - 3) receive mostly low-angle insolation
 - 4) are usually farthest from the Sun
- 2) The diagram below represents an exaggerated view of Earth revolving around the Sun. Letters A, B, C, and D represent Earth's location in its orbit on the first day of each of the four seasons.



Which location in Earth's orbit represents the first day of fall (autumn) for an observer in New York State?

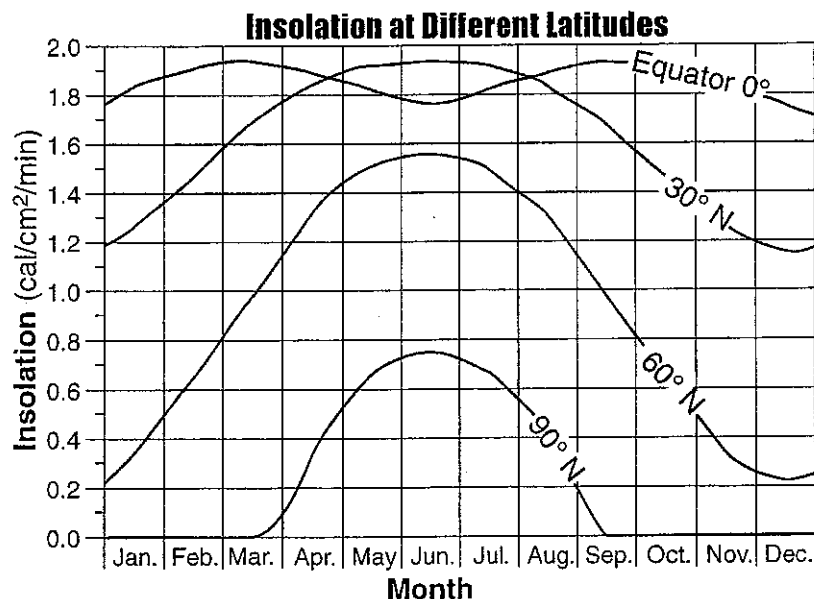
- 1) A 2) B 3) C 4) D
- 3) The primary method of energy transfer by which the Earth loses energy to outer space is
- 1) radiation 2) conduction 3) transpiration 4) convection
- 4) Water vapor and carbon dioxide affect the warming of the Earth's atmosphere because they *both*
- 1) have high specific heats 3) scatter insolation
 - 2) absorb infrared radiation 4) reflect ultraviolet radiation
- 5) What is the most likely reason for a decrease in air temperature observed between 12 midnight and 6 a.m. in New York State?
- 1) Cloud cover was increasing. 3) Air pressure was decreasing.
 - 2) Plants were giving off water vapor. 4) The Earth was radiating heat.
- 6) Which gases in the Earth's atmosphere are the *best* absorbers of infrared radiation?
- 1) carbon dioxide and water vapor 3) nitrogen and oxygen
 - 2) nitrogen and water vapor 4) carbon dioxide and oxygen
- 7) In New York State, the risk of sunburn is *greatest* between 11 a.m. and 3 p.m. on summer days because
- 1) Earth's surface reflects most of the sunlight
 - 2) the air temperature is hot
 - 3) the Sun is closest to Earth
 - 4) the angle of insolation is high

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- 8) The average temperature at Earth's equator is *higher* than the average temperature at Earth's South Pole because the South Pole
- 1) receives more infrared radiation
 - 2) receives less intense insolation
 - 3) has less land area
 - 4) has more cloud cover
- 9) Which two factors cause the perpendicular rays of the Sun to move between 23.5° N and 23.5° S?
- 1) tilt of Earth's axis and Earth's rotation
 - 2) eccentricity of Earth's orbit and Earth's revolution
 - 3) tilt of Earth's axis and Earth's revolution
 - 4) eccentricity of Earth's orbit and Earth's rotation
- 10) At which of the following latitudes is the Sun directly overhead on certain days of the year?
- 1) 42° N
 - 2) 66.5° N
 - 3) 23.5° N
 - 4) 90° N

Questions 11 through 13 refer to the following:

The graph below shows the amount of insolation during one year at four different latitudes on Earth's surface.



- 11) The graph shows that insolation varies with
- 1) latitude and time of day
 - 2) longitude and time of day
 - 3) longitude and time of year
 - 4) latitude and time of year
- 12) Based on the data shown, why is insolation 0 cal/cm²/min from October through February at 90° N?
- 1) The Sun is continually below the horizon during that time.
 - 2) Snowfields reflect sunlight during that time.
 - 3) Dust in the atmosphere blocks sunlight during that time.
 - 4) Intense cold prevents insolation from being absorbed during that time.

- 13) Based on the data shown, why is less insolation received at the equator in June than in March or September?

Winds blow insolation away from the equator in June.

The Sun's vertical rays are north of the equator in June.

3) Thick clouds block the Sun's vertical rays at the equator in June.

4) The daylight period is longest at the equator in June.

Questions 14 through 17 refer to the following:

The data table below shows the time of sunrise and sunset and the total amount of insolation received on the Earth's surface for four locations, *A*, *B*, *C*, *D*, at the beginning of each season. The locations have the same longitude, but are at different latitudes. Data was collected on clear, sunny days.

LOCATION A—66° North Latitude

DATE	SUNRISE	SUNSET	TOTAL INSOLATION (cal/cm ²)
Mar 21	6:00 a.m.	6:00 p.m.	373
June 21	12:51 a.m.	11:09 p.m.	1,014
Sept 21	5:48 a.m.	6:12 p.m.	393
Dec 21	11:06 p.m.	12:54 a.m.	1

LOCATION B—43° North Latitude

DATE	SUNRISE	SUNSET	TOTAL INSOLATION (cal/cm ²)
Mar 21	6:00 a.m.	6:00 p.m.	674
June 21	4:24 a.m.	7:36 p.m.	1,023
Sept 21	5:54 a.m.	6:06 p.m.	682
Dec 21	7:33 a.m.	4:27 p.m.	284

LOCATION C—0° Latitude

DATE	SUNRISE	SUNSET	TOTAL INSOLATION (cal/cm ²)
Mar 21	6:00 a.m.	6:00 p.m.	923
June 21	6:00 a.m.	6:00 p.m.	814
Sept 21	6:00 a.m.	6:00 p.m.	909
Dec 21	6:00 a.m.	6:00 p.m.	869

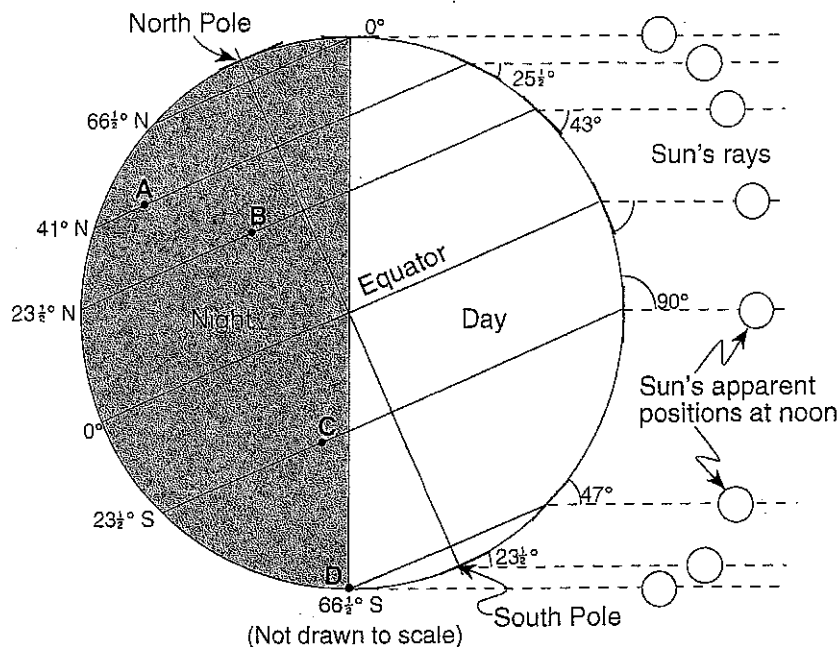
LOCATION D—23° South Latitude

DATE	SUNRISE	SUNSET	TOTAL INSOLATION (cal/cm ²)
Mar 21	5:27 a.m.	6:03 p.m.	851
June 21	6:42 a.m.	5:18 p.m.	545
Sept 21	6:00 a.m.	6:00 p.m.	827
Dec 21	5:15 a.m.	6:45 p.m.	1,044

- 14) A comparison of the times of sunrise and sunset in New York State on December 21 and June 21 shows that, in December, the Sun
- 1) rises earlier and sets later
 - 2) rises and sets earlier
 - 3) rises later and sets earlier
 - 4) rises and sets later
- 15) Which location received the *greatest* total insolation on June 21?
- 1) *A*
 - 2) *B*
 - 3) *C*
 - 4) *D*
- 16) Which statement *best* explains why surface temperatures are higher at 43DN than at 66DN on June 21?
- 1) At 43DN, summer is ending.
 - 2) At 43DN, the angle of insolation is greater.
 - 3) At 66DN, winter is beginning.
 - 4) At 66DN, there is complete darkness.
- 17) Why are the times of sunrise and sunset for March 21 and September 23 nearly the same at each location?
- 1) The Sun is directly above the Equator on these days.
 - 2) the Sun's insolation reaches its maximum intensity on these days.
 - 3) The Earth is at its closest and farthest points from the Sun on these days.
 - 4) the Sun's altitude at noon is the same everywhere on Earth on these days.

Questions 18 through 20 refer to the following:

The diagram below shows the altitude and apparent position of the noontime Sun, as seen from various latitudes on Earth on a particular day of the year. Letters A through D represent locations on Earth's surface.



- 18) Which lettered location in the diagram will experience the *shortest* period of daylight during one Earth rotation on that particular day?
- 1) A 2) B 3) C 4) D
- 19) What is the altitude of the noontime Sun at the Equator on the particular date shown in the diagram?
- 1) $66\frac{1}{2}^\circ$ 2) 43° 3) $23\frac{1}{2}^\circ$ 4) 90°
- 20) Which season will begin at 41° N latitude, three months after the date represented in the diagram?
- 1) fall 2) summer 3) winter 4) spring