

Notes: Reasons for Seasons

Main Reasons for Seasons are...

- 1. _____
- 2. _____

The other most important factors which moderate the effects of the seasons are

- 3. _____
- 4. _____
- 5. _____
- 6. _____
- 7. _____

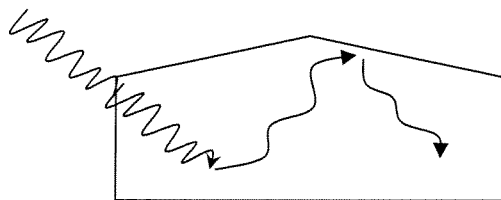
Energy from the Sun

8. Circle the electromagnetic wavelength below with the highest energy:

- Gamma Rays X-rays Visible Light Infrared Waves Radio Waves

9. What are the wavelengths of electromagnetic radiation most strongly emitted by the Sun?

The diagram below depicts the greenhouse effect.



10. Draw a box around the lower energy wavelengths of light in the diagram.

11. Use the space below to explain what happens to visible light after it is absorbed by the Earth:

What is the value for the solar constant (record the units)?

12. Solar Constant: _____

List the percent of the energy from the Sun that is absorbed by the Earth:

13. Percent of incoming energy that is absorbed: _____

Describe how much of the solar energy absorbed by Earth is subsequently re-radiated to space.

14. Amount Re-Radiated: _____

15. Use the space below to explain what would happen if the Earth did not radiate away the same amount of energy that it receives from the sun?

16. Which type of radiation from Earth is the long-wave radiation absorbed by greenhouse gases?

- (1) ultraviolet
- (2) visible light
- (3) infrared
- (4) radio waves

17. Energy is transferred from the Sun to Earth by

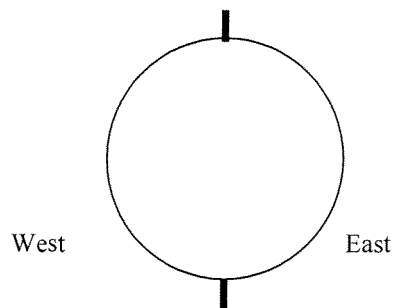
- (1) red shifts
- (2) density currents
- (3) conduction
- (4) electromagnetic waves

18. The Earth surface that best absorbs short-wave solar radiation has which characteristics?

- (1) black and rough
- (2) black and smooth
- (3) white and rough
- (4) white and smooth

Shape, Rotation and Axis of Earth

19. Draw a curved arrow on the globe below showing the direction of movement that the Coriolis Effect causes in air mass in the northern hemisphere that is **moving toward** the equator.



20. What is the name for the latitude line where Sun's perpendicular rays hit Earth during the summer solstice?
21. How many hours of daylight are there at the South Pole on the summer (June) solstice?
22. How many hours of daylight are there at the South Pole on the autumnal equinox?

Earth Facts

23. What is the approximate diameter of Earth at the equator (in miles)?

How many times bigger (or smaller) are the Sun and Moon compared to the **mass** of Earth?

24. Sun
25. Moon

How many times bigger (or smaller) are the Sun and Moon compared to the **diameter** of Earth?

26. Sun
27. Moon

What is the approximate distance from other solar system objects to Earth (in miles)?

28. Sun
29. Moon

30. What is the Rotational speed on surface of Earth (miles per hour) at the equator?

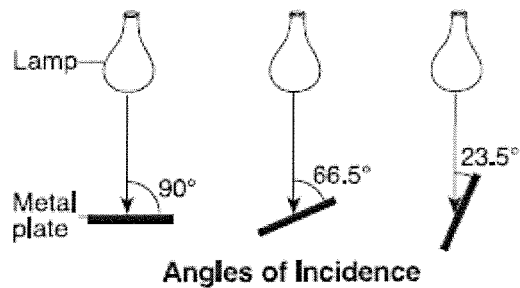
Real Science – Definitions

31. What is a *Hypothesis*

32. What is a *Theory*

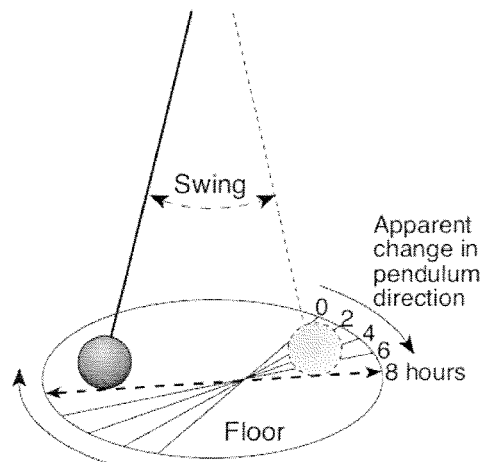
33. What is a *Scientific Law*

A student was interested in how the angle of insolation affects absorption of radiation. The student took three black metal plates, each containing a built-in thermometer, and placed them at the same distance from three identical lamps. The plates were tilted so that the light from the lamps created three different angles of incidence with the center of the plates, as shown in the diagram. The starting temperatures of the plates were recorded. The lamps were turned on for 10 minutes. Then the final temperatures were recorded.



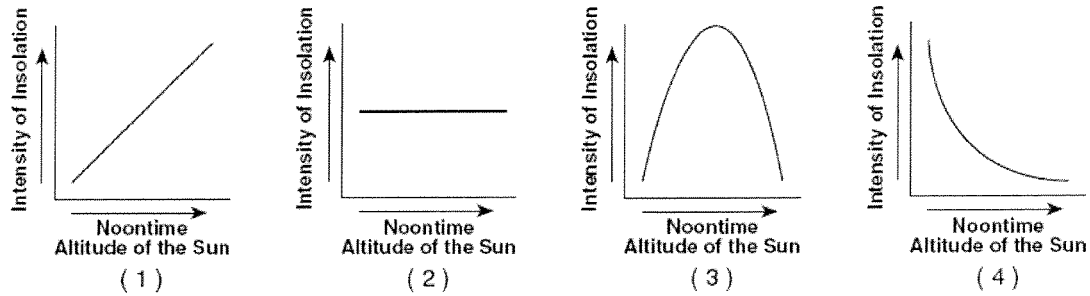
- 34 Explain why the metal plate at a 90° angle of incidence had a final temperature higher than the other two plates. [1]

The diagram below shows a large pendulum in motion over an 8-hour period.

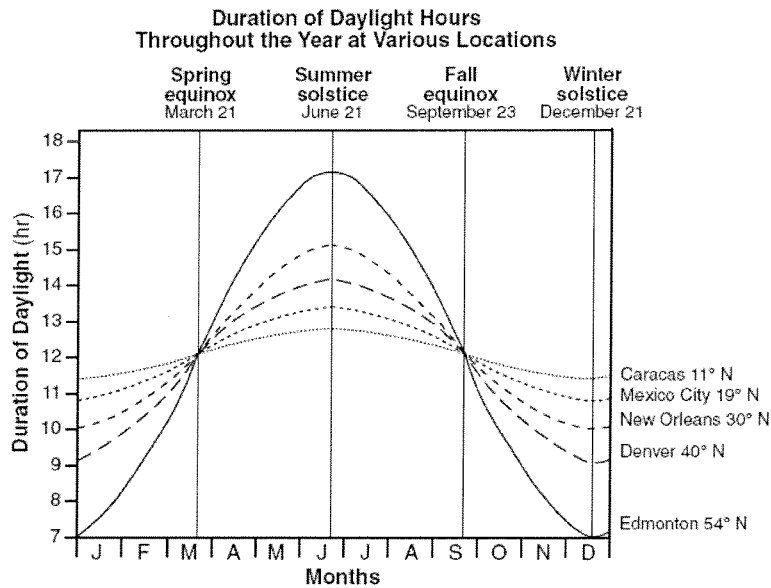


35. What is the main reason the pendulum appears to change its direction of swing over time?
- (1) tilt of Earth on its axis
 - (2) rotation of Earth on its axis
 - (3) revolution of Earth in its orbit
 - (4) speed of Earth in its orbit

36. Which graph best shows the general relationship between the altitude of the noontime Sun and the intensity of insolation received at a location?

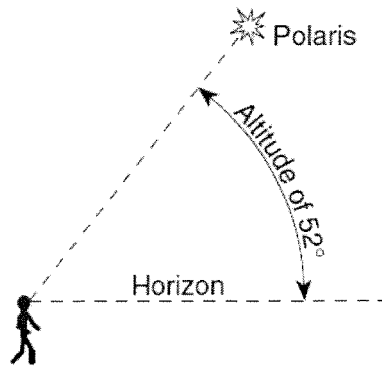


The graph below shows the duration of daylight hours throughout the year for five cities located in the Northern Hemisphere.



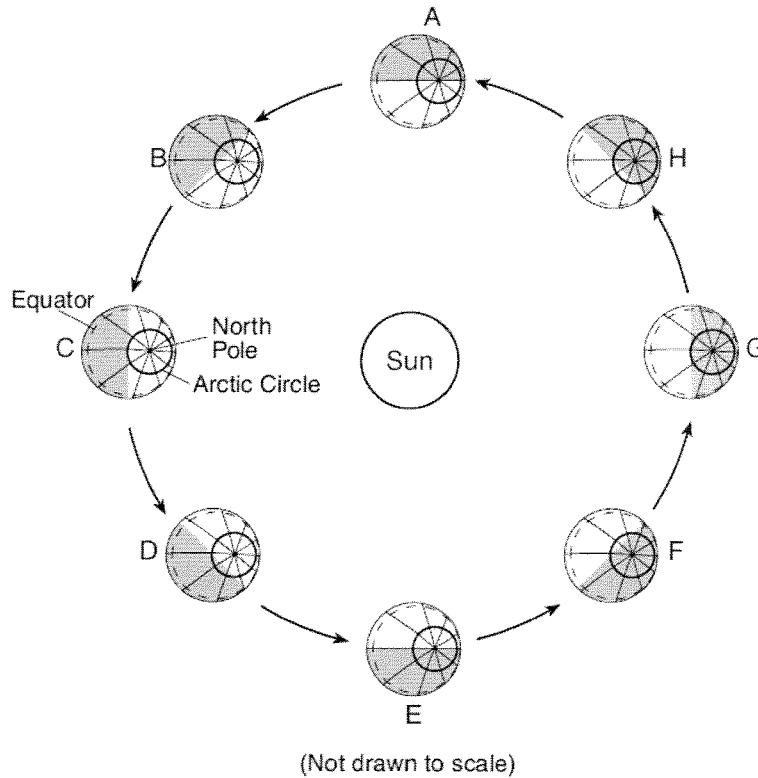
37. Which city experiences the greatest variation in daylight hours during one year?
- Caracas
 - New Orleans
 - Mexico City
 - Edmonton
38. What is the primary reason each city's duration of daylight changes throughout the year?
- Earth's axis is tilted 23.5° to the plane of its orbit.
 - Earth's rotation rate is 15° per day.
 - The cities are located at different longitudes.
 - The cities are located at different elevations.

The diagram below shows an observer on Earth viewing the star Polaris.



39. What is this observer's latitude?
 (1) 38° N (2) 52° N (3) 38° S (4) 52° S

The diagram below shows Earth's orbit around the Sun as viewed from space. Earth is shown at eight different positions labeled A through H. Earth's North Pole, Arctic Circle, and equator have been labeled at position C. The arrows show the direction of orbital motion.



40. Write the words **SUMMER**, **AUTUMN**, **WINTER** and **SPRING** next to the Earth in the diagram above that match the position of the Earth at the start of *each* season in the Northern Hemisphere.
41. Approximately how many days does Earth take to move from position A to position C?