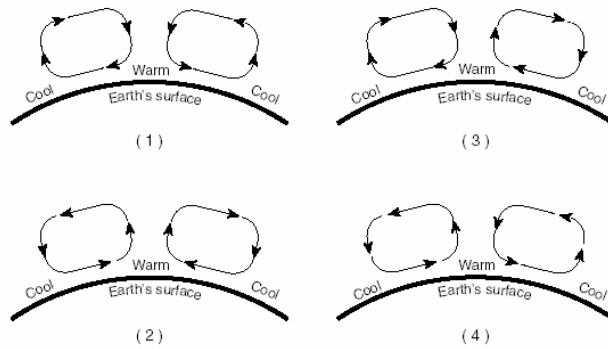


ENERGY AND INSOLATION REVIEW

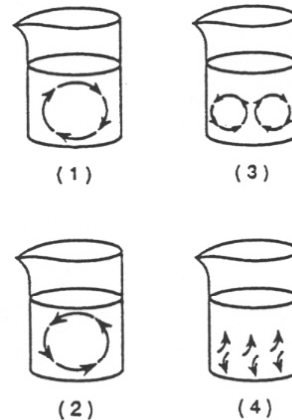
- By which method is energy transferred by density differences?
 - absorption
 - conduction
 - convection
 - radiation
- By which process does most of the Sun's energy travel through space?
 - absorption
 - conduction
 - convection
 - radiation

- The cross sections below show different patterns of air movement in Earth's atmosphere. Air temperatures at Earth's surface are indicated in each cross section.

Which cross section shows the most likely pattern of air movement in Earth's atmosphere that would result from the surface air temperatures shown?



- Water is being heated in a beaker as shown below.



Which drawing shows the most probable movement of water in the beaker due to the heating?

- An ice cube is placed in a glass of water at room temperature. Which heat exchange occurs between the ice and the water within the first minute?
 - The ice cube gains heat and the water loses heat.
 - The ice cube loses heat and the water gains heat.
 - Both the ice cube and the water gain heat.
 - Both the ice cube and the water lose heat.

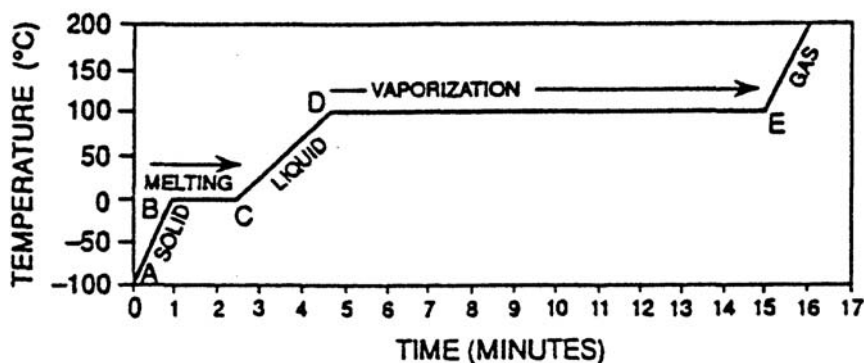
6. The process by which air flows from one location in the atmosphere to another is called
 - (1) absorption
 - (2) conduction
 - (3) convection
 - (4) radiation

7. Infrared, ultraviolet, and visible light are all part of the solar spectrum. The basic difference between them is their
 - (1) wavelength
 - (2) speed
 - (3) source
 - (4) temperature

8. Which substance will heat up the quickest?
 - (1) 1 gram of liquid water
 - (2) 1 gram of iron
 - (3) 1 gram of basalt
 - (4) 1 gram of granite

9. Which process requires the addition of energy to water?
 - (1) freezing of water
 - (2) cooling of water
 - (3) vaporization of water
 - (4) condensation of water

Base your answers to the **questions 10-12** on the graph below. The graph shows the results of heating 10 grams of water from -100°C to $+200^{\circ}\text{C}$. The same amount of heat was added during each minute.



10. Approximately how long did it take to completely change the 10 grams of water from a solid at -100°C to a gas at $+100^{\circ}\text{C}$?
 - (1) 1 minute
 - (2) 5 minutes
 - (3) 11 minutes
 - (4) 15 minutes

11. During which time interval was the rate of temperature change the greatest?
 - (1) A to B
 - (2) B to C
 - (3) C to D
 - (4) D to E

12. During which change would the 10 grams of water gain the most energy?
 - (1) Ice at -100°C changes to ice at 0°C .
 - (2) Ice at 0°C changes to ice at 0°C .
 - (3) Liquid water at 0°C changes to liquid water at 100°C .
 - (4) Liquid water at 100°C changes to water vapor at 100°C .

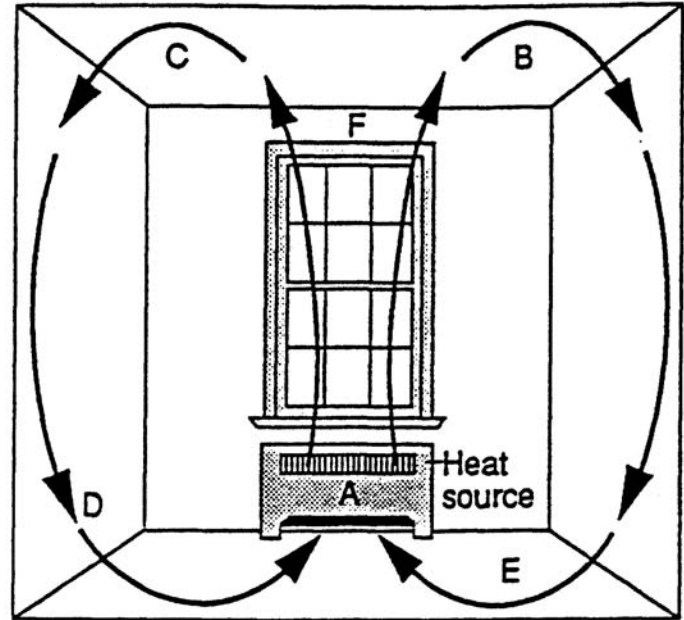
Base your answers to **questions 13-15** on the diagram below and your knowledge of Earth Science. The diagram shows the pattern of air movement within a closed room.

13. Which type of energy transfer is indicated by the arrows in the diagram?

- 1 insulation
- 2 conduction
- 3 convection
- 4 radiation

14. At which location in the room will the density of the air be the greatest?

- 1 F
- 2 B
- 3 C
- 4 E



15. The temperature of the radiator is 65°C . What is the equivalent Fahrenheit temperature?

- | | |
|-------------------------|-------------------------|
| 1 126°f | 3 144°f |
| 2 132°f | 4 149°f |

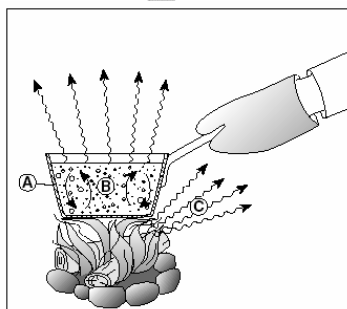
16. Which process releases the most energy into the atmosphere?

- | | |
|----------------------------|------------------------------------|
| 1 melting 1 gram of ice | 3 vaporizing 1 gram of water |
| 2 freezing 1 gram of water | 4 condensing 1 gram of water vapor |

17. Which type of electromagnetic radiation has the longest wavelength?

- | | |
|-----------------|-------------------|
| (1) ultraviolet | (3) visible light |
| (2) gamma rays | (4) radio waves |

18. The diagram below shows a student heating a pot of water over a fire. The arrows represent the transfer of heat. Letter *A* represents heat transfer through the metal pot, *B* represents heat transfer by currents in the water, and *C* represents heat that is felt in the air surrounding the pot.



Which table correctly identifies the types of heat transfer at *A*, *B*, and *C*?

| Letter | Type of Heat Transfer |
|--------|-----------------------|
| A | conduction |
| B | radiation |
| C | convection |

(1)

| Letter | Type of Heat Transfer |
|--------|-----------------------|
| A | radiation |
| B | conduction |
| C | convection |

(3)

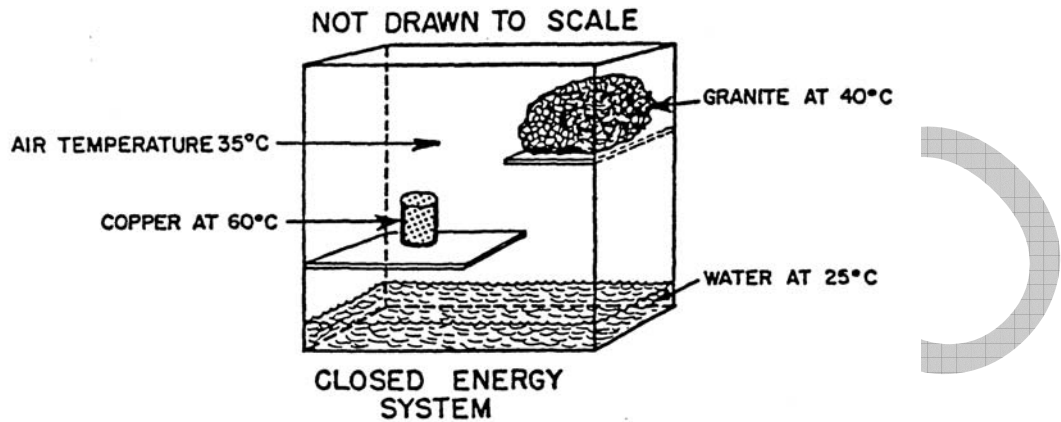
| Letter | Type of Heat Transfer |
|--------|-----------------------|
| A | conduction |
| B | convection |
| C | radiation |

(2)

| Letter | Type of Heat Transfer |
|--------|-----------------------|
| A | radiation |
| B | convection |
| C | conduction |

(4)

Base your answers to the **questions 19-21** on the diagram below. The diagram represents a closed energy system consisting of air and equal masses of copper, granite, and water in a perfectly insulated container. The temperatures were taken at the time the materials were placed inside the closed system.



19. In this system, which material is a heat sink for another material?
 - 1 The water is a heat sink for the air.
 - 2 The copper is a heat sink for the granite.
 - 3 The granite is a heat sink for the water.
 - 4 The copper is a heat sink for the air.

20. Which material in the container will heat up or cool down the slowest?
 - 1 copper
 - 2 granite
 - 3 dry air
 - 4 water

21. Which material in the energy system has the highest specific heat?
 - 1 copper
 - 2 granite
 - 3 dry air
 - 4 water

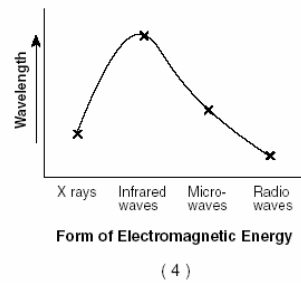
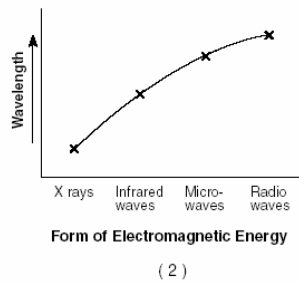
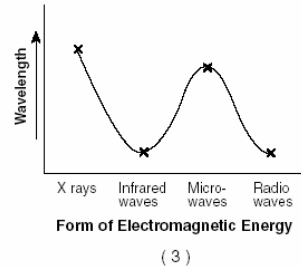
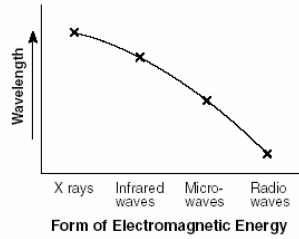
22. When Earth cools, most of the energy transferred from Earth's surface to space is transferred by the process of
 - (1) conduction
 - (2) reflection
 - (3) refraction
 - (4) radiation

23. Equal volumes of the four samples shown below were placed outside and heated by energy from the Sun's rays for 30 minutes.



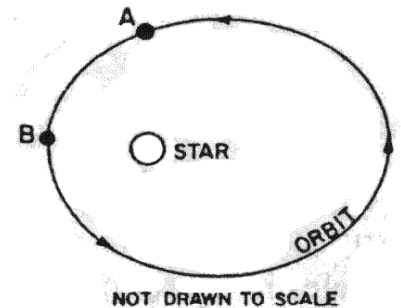
- The surface temperature of which sample increased at the *slowest* rate?
- (1) water
 - (2) copper pennies
 - (3) basaltic sand
 - (4) iron fragments

24. Which graph best represents the relative wavelengths of the different forms of electromagnetic energy?



25. The diagram to the right represents a planet in orbit around a star. Which statement best describes how the planet's energy is changing as it moves from point A to point B?

- 1 Kinetic energy is increasing and potential energy is decreasing.
- 2 Kinetic energy is decreasing and potential energy is increasing.
- 3 Both kinetic and potential energy are decreasing.
- 4 Both kinetic and potential energy are increasing.



26. An example of a heat sink is

- | | |
|---------------------------------|---|
| 1 an iceberg on a summer day | 3 steam from heated ground water |
| 2 magma erupting from a volcano | 4 an ocean current beginning at the Equator |

27. Heat transfer will normally occur between two objects that are close to each other if the objects have different

- | | |
|------------------|-------------|
| 1 specific heats | 3 masses |
| 2 temperatures | 4 densities |

28. Which type of land surface would probably reflect the most incoming solar radiation?

- | | |
|------------------------------|-----------------------------|
| (1) light colored and smooth | (3) dark colored and smooth |
| (2) light colored and rough | (4) dark colored and rough |

29. An increase in the amount of which atmospheric gas is thought to cause global climate warming?

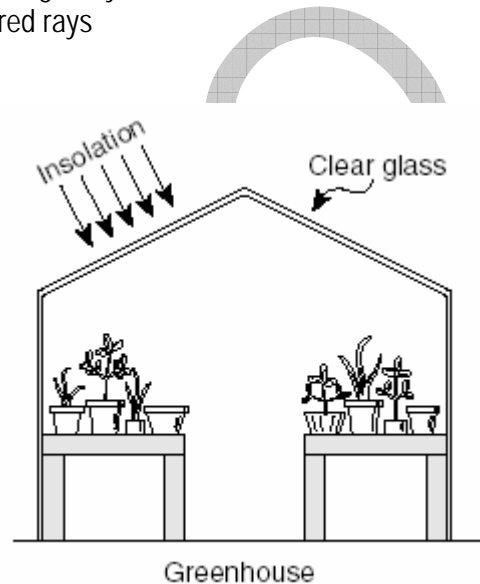
- | | |
|--------------|--------------------|
| (1) oxygen | (3) nitrogen |
| (2) hydrogen | (4) carbon dioxide |

30. The coldest climates on Earth are located at or near the poles primarily because Earth's polar regions
- (1) receive mostly low-angle insolation
 - (2) receive less total yearly hours of daylight
 - (3) are usually farthest from the Sun
 - (4) absorb the greatest amount of insolation

31. During nighttime cooling, most of the energy radiated by Earth's oceans into space is
- (1) ultraviolet rays
 - (2) gamma rays
 - (3) visible light rays
 - (4) infrared rays

32. The diagram below shows a greenhouse. What is the primary function of the clear glass of the greenhouse?

- (1) The glass reduces the amount of insolation entering the greenhouse.
- (2) The glass allows all wavelengths of radiation to enter and all wavelengths of radiation to escape.
- (3) The glass allows short wavelengths of radiation to enter, but reduces the amount of long-wavelength radiation that escapes.
- (4) The glass allows long wavelengths of radiation to enter, but reduces the amount of short-wavelength radiation that escapes.



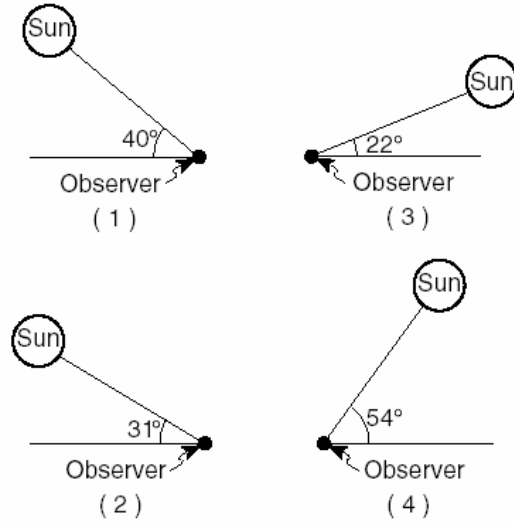
33. On which day of the year would the intensity of insolation at Kingston, New York, most likely be greatest?
- (1) March 21
 - (2) June 21
 - (3) September 23
 - (4) December 21

34. Under identical conditions, which surface will reflect the greatest amount of insolation?
- (1) a basaltic sand beach
 - (2) a pine tree forest
 - (3) a glacial ice sheet
 - (4) a blacktop parking lot

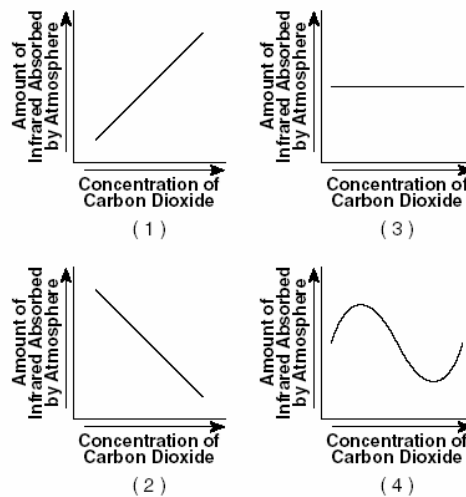
35. The average temperature at Earth's equator is higher than the average temperature at Earth's South Pole because the South Pole
- (1) receives less intense insolation
 - (2) receives more infrared radiation
 - (3) has less land area
 - (4) has more cloud cover

36. Great volcanic eruptions send dust and ash into the stratosphere. Weeks after such great eruptions, air temperatures are often
- (1) cooler than normal because the atmosphere is less transparent
 - (2) cooler than normal because the atmosphere is more transparent
 - (3) warmer than normal because the atmosphere is less transparent
 - (4) warmer than normal because the atmosphere is more transparent

37. In which diagram is the observer experiencing the greatest intensity of insolation?



38. Which graph best shows the relationship between the concentration of carbon dioxide in Earth's atmosphere and the amount of infrared radiation absorbed by the atmosphere?



39. In New York State, summer is warmer than winter because in summer New York State has

- (1) fewer hours of daylight and receives low-angle insolation
- (2) fewer hours of daylight and receives high-angle insolation
- (3) more hours of daylight and receives low-angle insolation
- (4) more hours of daylight and receives high-angle insolation

40. Which graph best represents the general relationship between latitude and average surface temperature?

