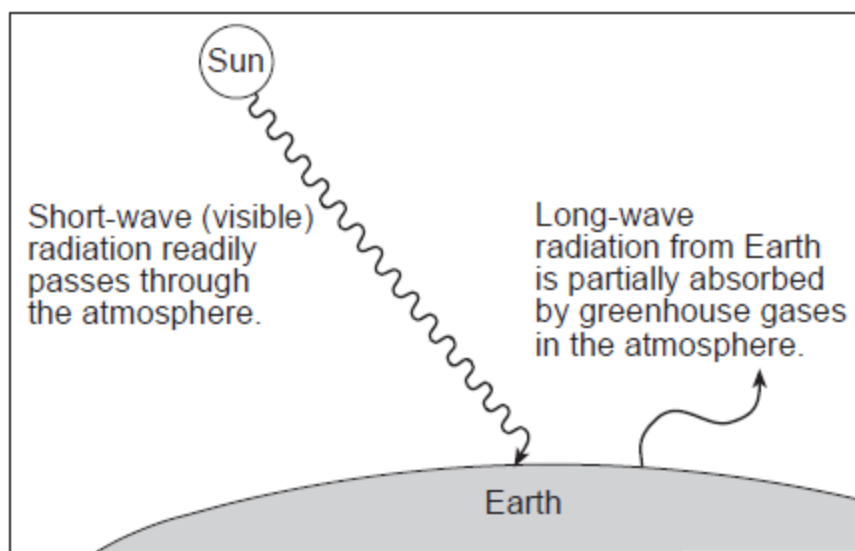


Base your answers to questions 1 and 2 on the diagram below, which represents the greenhouse effect in which heat energy is trapped in Earth's atmosphere

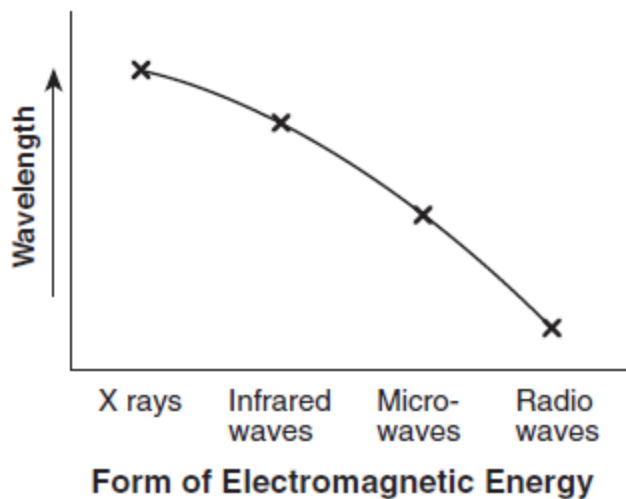


(Not drawn to scale)

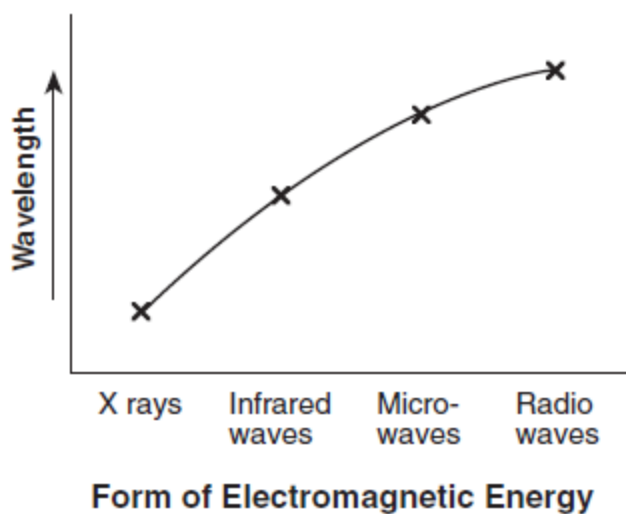
- The Earth surface that best absorbs short-wave solar radiation has which characteristics?
  - 1) black and rough**
  - 2) black and smooth
  - 3) white and rough
  - 4) white and smooth
- Which type of radiation from Earth is the long-wave radiation absorbed by greenhouse gases?
  - 1) ultraviolet
  - 2) visible light
  - 3) infrared**
  - 4) radio waves
- Which type of land surface will most likely absorb the greatest amount of incoming solar radiation?
  - 1) rough, dark-colored surface**
  - 2) rough, light-colored surface
  - 3) smooth, dark-colored surface
  - 4) smooth, light-colored surface
- Which type of electromagnetic radiation has the longest wavelength?
  - 1) ultraviolet
  - 2) gamma rays
  - 3) visible light
  - 4) radio waves**
- Which color of the visible light has the *shortest* wavelength?
  - 1) violet**
  - 2) green
  - 3) yellow
  - 4) red
- Most of the solar radiation absorbed by Earth's surface is later radiated back into space as which type of electromagnetic radiation?
  - 1) x ray
  - 2) ultraviolet
  - 3) infrared**
  - 4) radio wave
- Which type of land surface would probably reflect the most incoming solar radiation?
  - 1) light colored and smooth**
  - 2) light colored and rough
  - 3) dark colored and smooth
  - 4) dark colored and rough
- What is the basic difference between ultraviolet, visible, and infrared radiation?
  - 1) half-life
  - 2) temperature
  - 3) wavelength**
  - 4) wave velocity

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

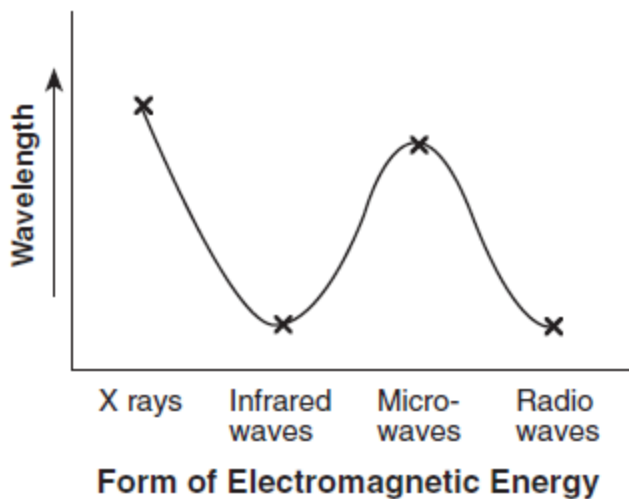
1)



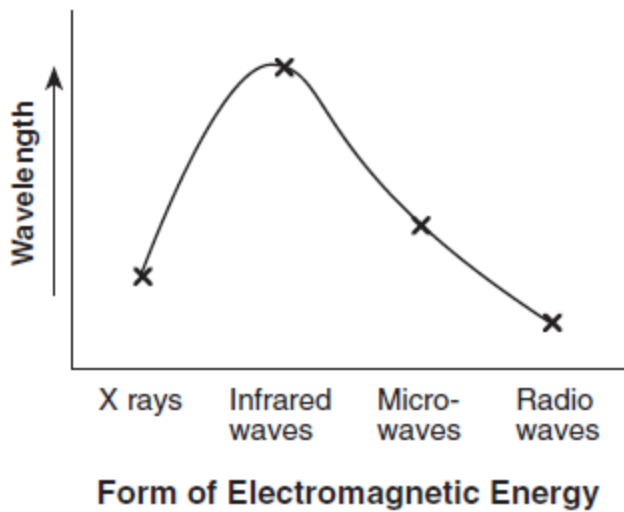
2)



3)



4)



10 Scientists are concerned about the decrease in ozone in the upper atmosphere primarily because ozone protects life on Earth by absorbing certain wavelengths of

- 1) x-ray radiation
- 2) **ultraviolet radiation**
- 3) infrared radiation
- 4) microwave radiation

11. In which list are the forms of electromagnetic energy arranged in order from longest to shortest wavelengths?

- 1) gamma rays, x-rays, ultraviolet rays, visible light
- 2) **radio waves, infrared rays, visible light, ultraviolet rays**
- 3) x-rays, infrared rays, blue light, gamma rays
- 4) infrared rays, radio waves, blue light, red light

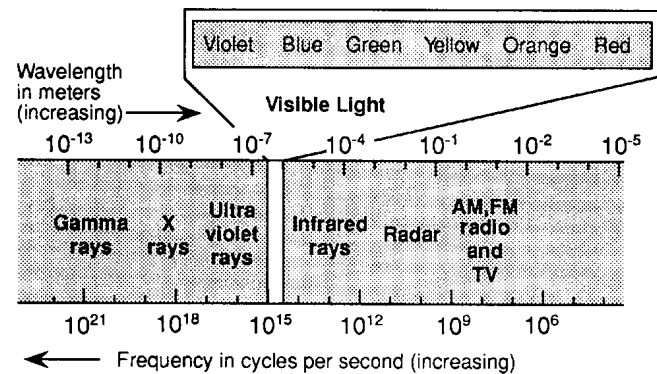
12. When electromagnetic energy travels from air into water, the waves are bent due to the density differences between the air and water. This bending is called

- 1) reflection
- 2) **refraction**
- 3) scattering
- 4) absorption

13. Which is the major source of energy for most Earth processes?

- 1) radioactive decay within the Earth's interior
- 2) convection currents in the Earth's mantle
- 3) **radiation received from the Sun**
- 4) earthquakes along fault zones

14. The diagram below shows part of the electromagnetic spectrum.



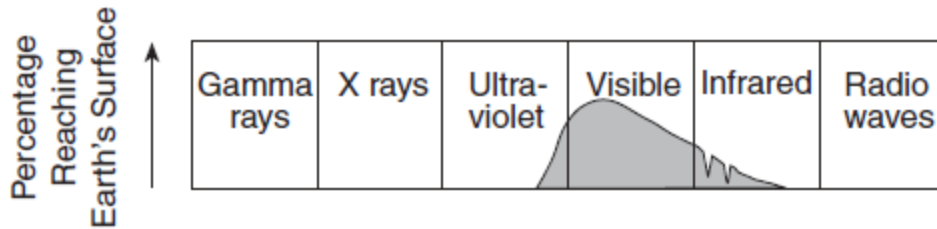
Which form of electromagnetic energy shown on the diagram has the lowest frequency and longest wavelength?

- 1) **AM radio**
- 2) infrared rays
- 3) red light
- 4) gamma rays

15. Which statement about electromagnetic energy is correct?

- 1) Violet light has a longer wavelength than red light.
- 2) X-rays have a longer wavelength than infrared waves.
- 3) Radar waves have a shorter wavelength than ultraviolet rays.
- 4) **Gamma rays have a shorter wavelength than visible light.**

16. The diagram below shows the types of electromagnetic energy given off by the Sun. The shaded part of the diagram shows the approximate amount of each type actually reaching Earth's surface.



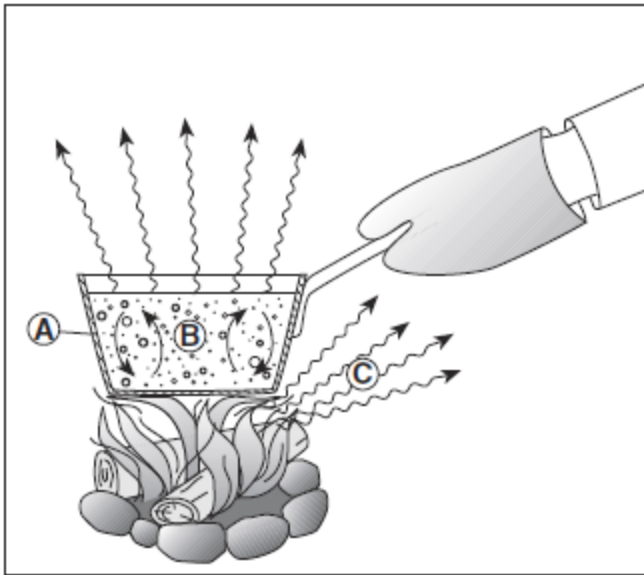
Which conclusion is best supported by the diagram?

- 1) All types of electromagnetic energy reach Earth's surface.
  - 2) Gamma rays and x-rays make up the greatest amount of electromagnetic energy reaching Earth's surface.
  - 3) **Visible light makes up the greatest amount of electromagnetic energy reaching Earth's surface.**
  - 4) Ultraviolet and infrared radiation make up the greatest amount of electromagnetic energy reaching Earth's surface.
- 
17. All forms of electromagnetic energy have
    - 1) **transverse wave properties**
    - 2) the same temperature
    - 3) the same wavelength
    - 4) their own half-life
  18. Which source provides the most energy for atmospheric weather changes?
    - 1) **radiation from the Sun**
    - 2) radioactivity from the Earth's interior
    - 3) heat stored in ocean water
    - 4) heat stored in polar ice caps
  19. What happens to most of the sunlight that strikes a dark-colored area of the Earth's surface?
    - 1) It is reflected and scattered as potential energy.
    - 2) It is reflected and diffused as ultraviolet radiation.
    - 3) It is absorbed and reflected as light.
    - 4) **It is absorbed and reradiated as heat.**
  20. Changing the shingles on the roof of a house to a lighter color will most likely reduce the amount of solar energy that is
 

1) scattered	2) <b>absorbed</b>
3) reflected	4) refracted
  21. The energy radiated from the Sun consists of a
    - 1) narrow range of wavelengths, with ultraviolet radiation having the greatest intensity
    - 2) narrow range of wavelengths, with infrared radiation having the greatest intensity
    - 3) **wide range of wavelengths, with visible radiation having the greatest intensity**
    - 4) wide range of wavelengths, with x-ray radiation having the greatest intensity
  22. An object that is a good radiator of electromagnetic waves is also a good
    - 1) insulator from heat
    - 2) reflector of heat
    - 3) **absorber of electromagnetic energy**
    - 4) refractor of electromagnetic energy
  23. An object that is a good absorber of electromagnetic energy is also a good
    - 1) reflector of electromagnetic energy
    - 2) refractor of electromagnetic energy
    - 3) **radiator of electromagnetic energy**
    - 4) convector of electromagnetic energy
  24. Which of the sources of energy listed below is most nearly pollution free?
 

1) nuclear	2) <b>solar</b>
3) coal	4) natural gas

25. 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?

1)

Letter	Type of Heat Transfer
A	conduction
B	radiation
C	convection

2)

Letter	Type of Heat Transfer
A	conduction
B	convection
C	radiation

3)

Letter	Type of Heat Transfer
A	radiation
B	conduction
C	convection

4)

Letter	Type of Heat Transfer
A	radiation
B	convection
C	conduction

26. During which phase change does water release the most heat energy?

- 1) freezing                      2) melting  
 3) **condensation**            4) vaporization

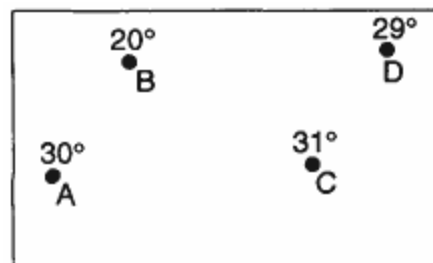
27. When water vapor condenses, how much heat energy will be released into the atmosphere?

- 1) **2260 joules/gram**      2) 334 joules/gram  
 3) 4.18 joules/gram      4) 2.11 joules/gram

28. What is the primary method of heat transfer through solid rock during contact metamorphism?

- 1) advection                  2) convection  
 3) absorption                4) **conduction**

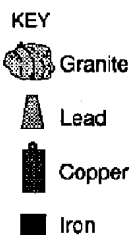
29. The map below shows four locations in a temperature field. The temperature of each location is given in degrees Celsius.



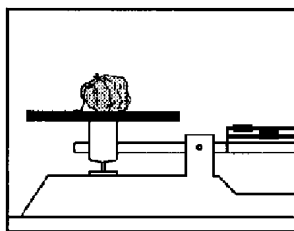
Heat energy will normally flow from

- 1) *A to B*                      2) *A to C*  
 3) *B to D*                      4) *D to C*

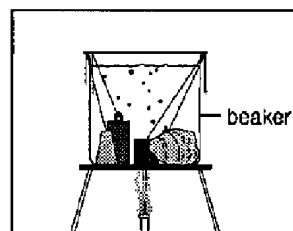
Base your answers to questions 30 and 31 on the diagrams below which show the steps used to determine the amount of heat held by equal masses of iron, copper, lead, and granite.



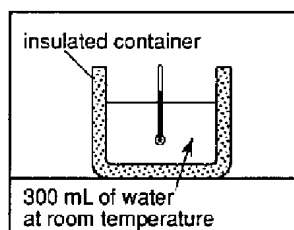
**STEP A**  
Measure the mass of each sample.



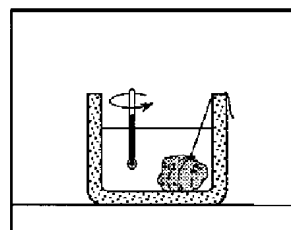
**STEP B**  
Place samples in boiling water.



**STEP C**  
Measure the temperature of water in an insulated container.



**STEP D**  
Transfer one sample from the boiling water and stir gently with the thermometer. Record the temperature changes of the water.



**STEP E**  
Repeat steps C and D with each sample.

30. The granite sample is transferred from the boiling water to the room-temperature water. Why is the total heat lost by the granite greater than the total heat gained by the room-temperature water?
- 1) The granite sample had less volume than the other samples.
  - 2) **The granite sample lost some heat to the air as it was being transferred.**
  - 3) Water gained heat from the insulated container.
  - 4) Water has a lower specific heat than the granite sample.
31. This method of determining the amount of heat absorbed by substances assumes that the energy lost by a heat source is
- 1) refracted by a heat sink
  - 2) reflected by a heat sink
  - 3) **absorbed by a heat sink**
  - 4) scattered by a heat sink

32. The greatest amount of energy would be gained by 1,000 grams of water when it changes from

- 1) water vapor to liquid water
- 2) **liquid water to water vapor**
- 3) liquid water to ice
- 4) ice to liquid water

33. Pieces of lead, copper, iron, and granite, each having a mass of 1 kilogram and a temperature of 100°C, were removed from a container of boiling water and allowed to cool under identical conditions. Which piece most likely cooled to room temperature first?

- 1) copper
- 2) **lead**
- 3) iron
- 4) granite

34. When a heat source loses energy, that energy is

- 1) reflected by a heat sink
- 2) refracted by a heat sink
- 3) scattered by a heat sink
- 4) **absorbed by a heat sink**

35. Which statement best describes the major heat flow associated with an iceberg as it drifts south from the Arctic Ocean into warmer water?

- 1) **Heat flows from the water into the ice.**
- 2) Heat flows from the ice into the water.
- 3) A state of equilibrium exists, with neither ice nor water gaining or losing energy.
- 4) Heat flows equally from the ice and the water into the surrounding air.

36. An insulated cup contains 200 milliliters of water at 20°C. When 100 grams of ice is added to the water, heat energy will most likely flow from the

- 1) **water to the ice, and the temperature of the mixture will drop below 20°C**
- 2) water to the ice, and the temperature of the mixture will rise above 20°C
- 3) ice to the water, and the temperature of the mixture will drop below 20°C
- 4) ice to the water, and the temperature of the mixture will rise above 20°C

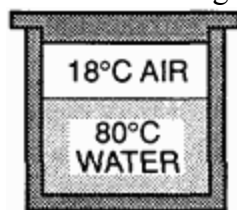
37. The data table below shows the temperatures of two similar objects for 10 minutes after the objects were placed near each other.

Time (minutes)	Temperature (°C)	
	Object A	Object B
0	32	18
2	29	19
4	26	20
6	25	20
8	24	21
10	23	21

Which statement is best supported by the data?

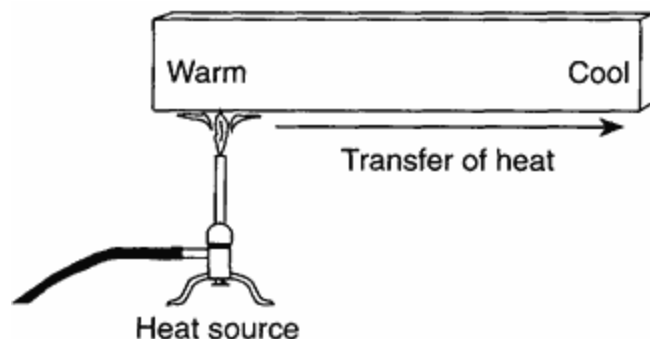
- 1) Some of the heat energy lost by object *B* was gained by object *A*.
  - 2) **Most of the heat energy lost by object *A* was gained by the environment.**
  - 3) Both objects lost heat energy.
  - 4) Both objects gained heat energy.
38. Heat energy transfer will normally occur between two objects that are close to each other if the objects have different
- 1) specific heats
  - 2) **temperatures**
  - 3) masses
  - 4) densities
39. Which process produces the energy that allows the stars of the universe to radiate visible light?
- 1) convection
  - 2) **nuclear fusion**
  - 3) insolation
  - 4) radioactive decay
40. Which process transfers energy primarily by electromagnetic waves?
- 1) **radiation**
  - 2) evaporation
  - 3) conduction
  - 4) convection

41. The diagram below shows a sealed container holding 250 milliliters of water at 80°C. The air above the water had an original temperature of 18°C.



Assuming that the container does not transfer heat, which statement most accurately describes the energy exchanges inside the container?

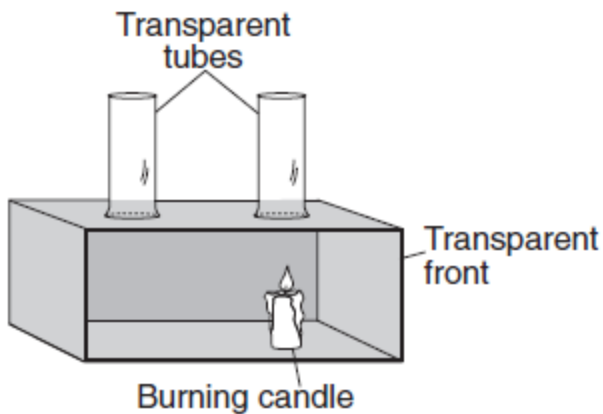
- 1) The air gains more heat energy than the water loses.
  - 2) The air gains less heat energy than the water loses.
  - 3) **The air gains the same amount of heat energy that the water loses.**
  - 4) No energy is exchanged between the water and the air.
42. The diagram below shows a solid iron bar that is being heated in a flame.



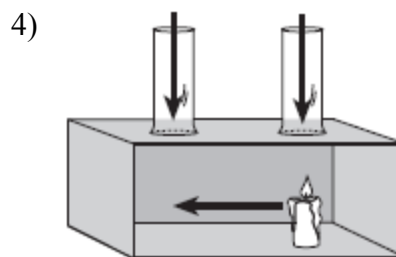
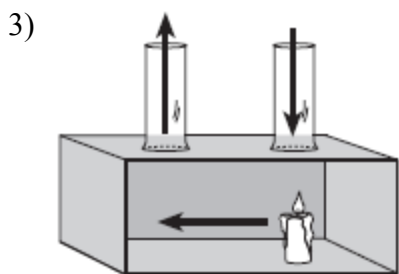
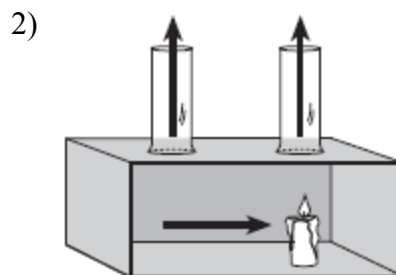
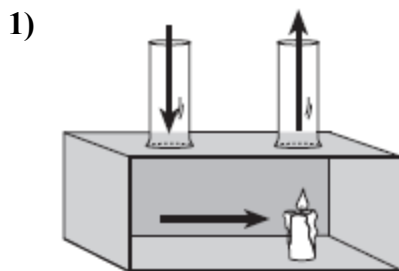
The primary method of heat transfer in the solid iron bar is

- 1) convection
  - 2) **conduction**
  - 3) absorption
  - 4) advection
43. What best explains why, in early spring, ice remains longer on Lake Erie than on the surrounding land areas when the air temperature is above freezing?
- 1) **Water has a higher specific heat than land.**
  - 2) Energy is needed for water to evaporate.
  - 3) Cool winds from the surrounding land cool the ice on the lake.
  - 4) Air temperature does not affect water temperature.

44. The diagram below shows a laboratory box used to demonstrate the process of convection in the atmosphere.



Which diagram has arrows that show the direction of airflow that occurs when the candle is burning?



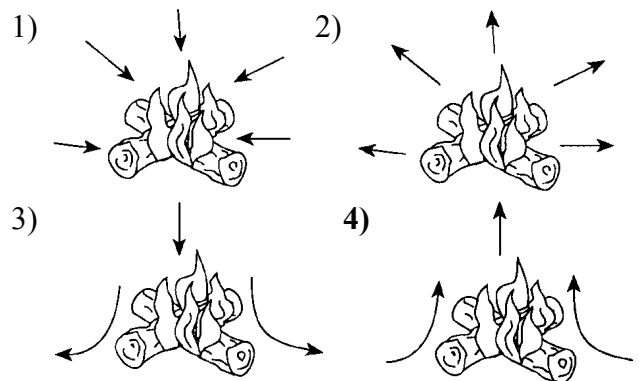
45. Which statement is the best example of heat energy transfer by conduction?

- 1) Heat energy is transferred from the bottom to the top of a lake.
- 2) **Heat energy is transferred from the surface soil to the rocks below.**
- 3) Heat energy is transferred from the Earth's surface to the upper atmosphere.
- 4) Heat energy is transferred from the Sun to the Earth.

46. Which process requires water to gain 2260 Joules of energy per gram?

- |                        |                 |
|------------------------|-----------------|
| 1) <b>vaporization</b> | 2) condensation |
| 3) melting             | 4) freezing     |

47. Which diagram best represents the direction of convection currents around the burning wood of a campfire?





48. The air above a burning candle is heated and rises. Which table correctly identifies the type of heat transfer within the rising air and the change in air density above the burning candle?

1)

Type of Heat Transfer	Change in Air Density
conduction	density increases

2)

Type of Heat Transfer	Change in Air Density
conduction	density decreases

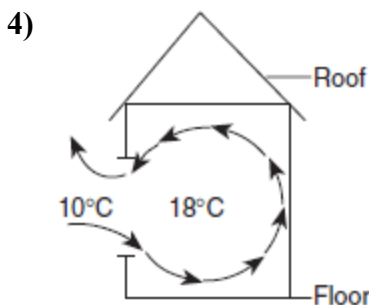
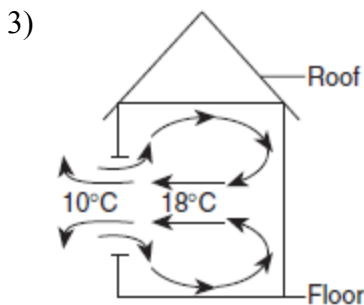
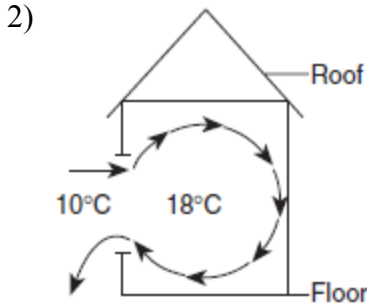
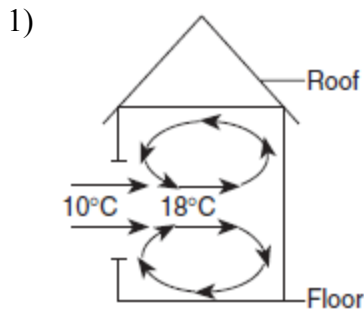
3)

Type of Heat Transfer	Change in Air Density
convection	density increases

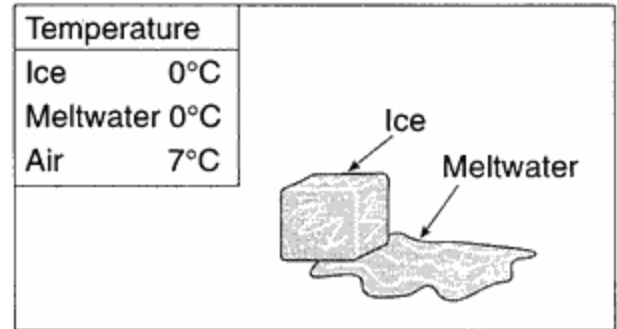
4)

Type of Heat Transfer	Change in Air Density
convection	density decreases

49. On a day with no wind, the air temperature outside a house is  $10^{\circ}\text{C}$ . The air temperature inside the house is  $18^{\circ}\text{C}$ . Which diagram best represents the air circulation pattern that is most likely to occur when a window of the house is first opened?



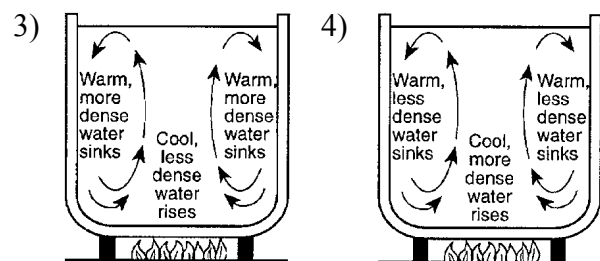
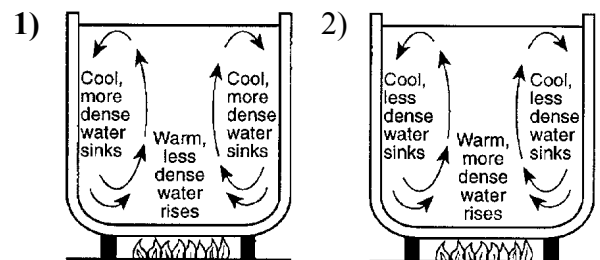
50. The diagram below shows a melting ice cube.



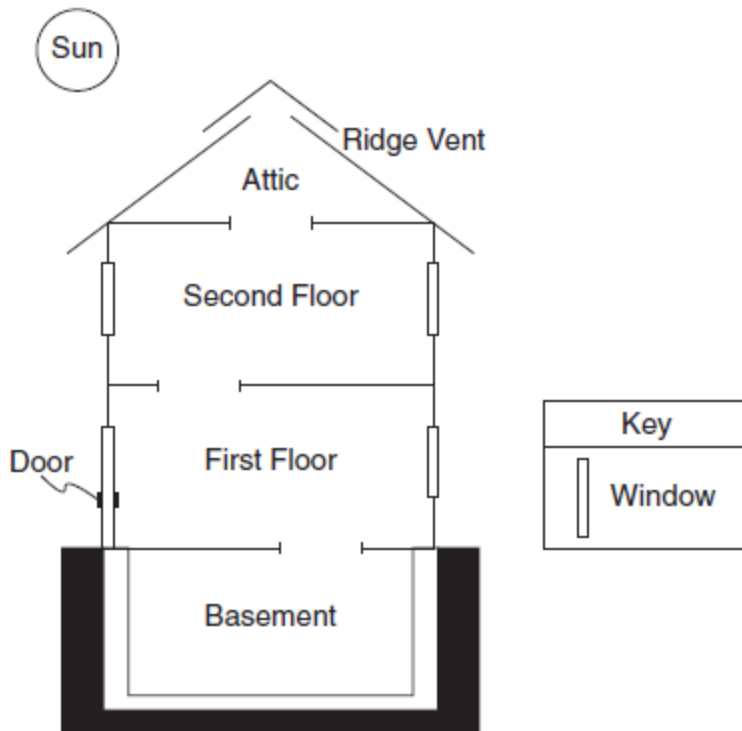
Which statement best describes the energy transfer?

- The meltwater is a heat source and the surrounding air is a heat sink.
- The meltwater and ice cube are both heat sources
- The ice cube and surrounding air are both heat sources.
- The ice cube is a heat sink and the surrounding air is a heat source.**

51. Which diagram correctly indicates why convection currents form in water when water is heated?

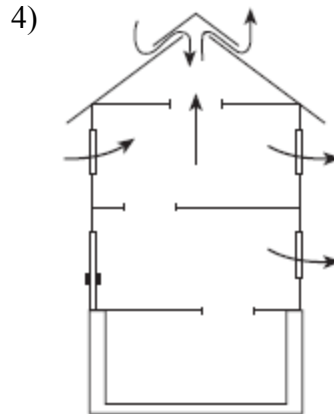
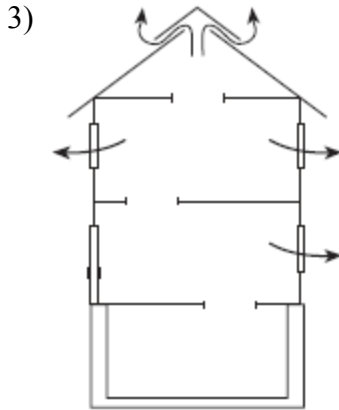
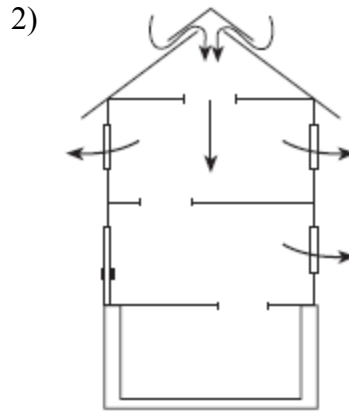
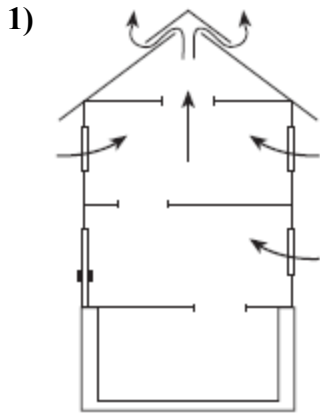


52. The cross section of a house is shown below. Open stairways allow air to move from one floor to another. The ridge vent is an opening in the roof that allows air to move in or out of the attic.

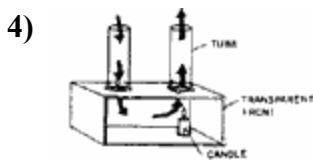
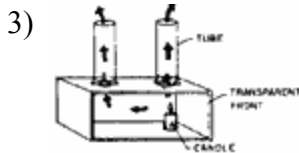
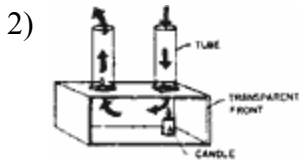
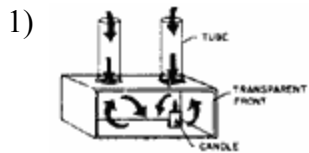


(Not drawn to scale)

During a windless summer day, the air inside this house is warmed by the Sun. In which cross section do the arrows show the most likely air movement when the windows are opened?



53. The diagrams below represent a laboratory model used to demonstrate convection currents. Each model shows a burning candle in a closed box with two open tubes at the top of the box. Which diagram correctly shows the air flow caused by the burning candle?



54. Water vapor crystallizes in the atmosphere to form snowflakes. Which statement best describes the exchange of heat energy during this process?

- 1) Heat energy is transferred from the atmosphere to the water vapor.
- 2) **Heat energy is released from the water vapor into the atmosphere.**
- 3) Heat energy is transferred equally to and from the water vapor.
- 4) No heat energy is exchanged between the atmosphere and the water vapor.

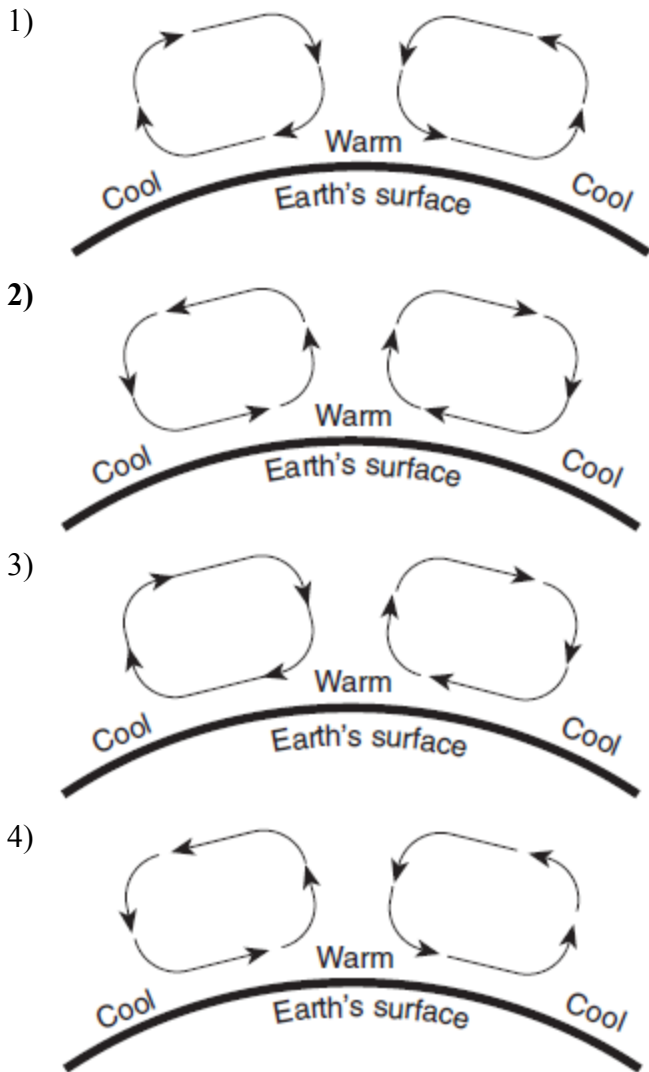
55. When 1 gram of liquid water at 0° Celsius freezes to form ice, how many total Joules of heat are lost by the water?

- 1) 4.18    2) 2.11    **3) 334**    4) 2260

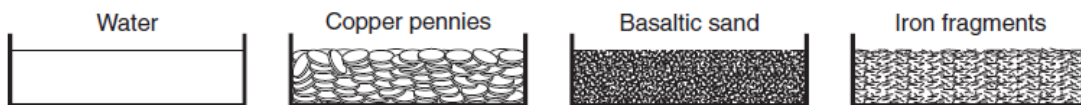
56. The same amount of heat energy is added to equal masses of lead, iron, basalt, and water at room temperature. Assuming no phase change takes place, which substance will have the smallest change in temperature?

- 1) lead    2) iron    3) basalt    **4) water**

57. 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?



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



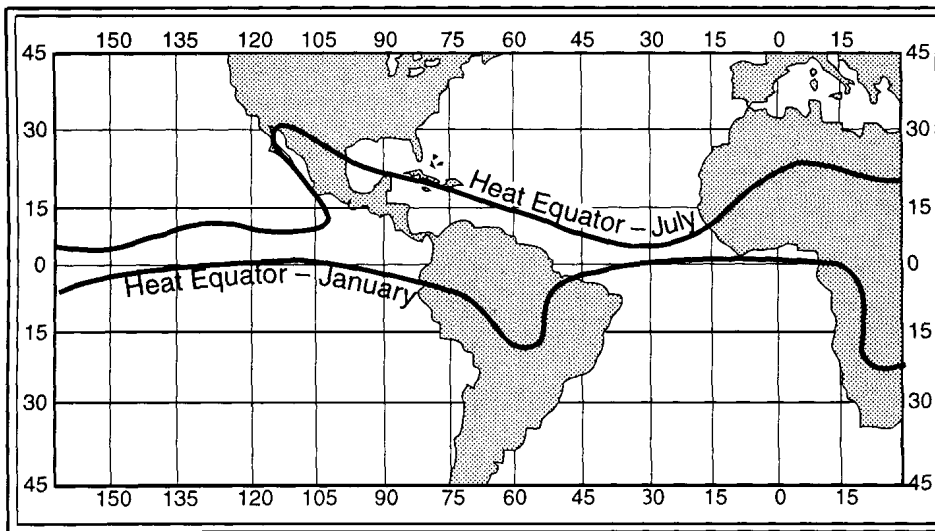
The surface temperature of which sample increased at the *slowest* rate?

- 1) **water**            2) copper pennies    3) basaltic sand    4) iron fragments

59. A large amount of latent heat is absorbed by water during

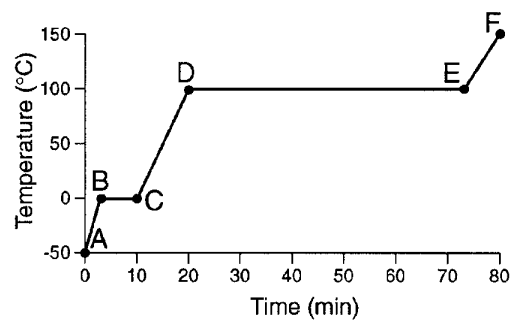
- 1) **evaporation**            2) freezing  
3) condensation            4) precipitation

60. Base your answer to the following question on the map below, which shows the location of the Heat Equator for July and January. A Heat Equator is a line connecting the locations of the highest average monthly temperatures.



Why does the location of the Heat Equator change more over the land than over the oceans?

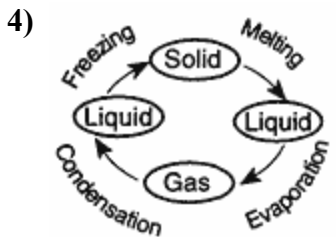
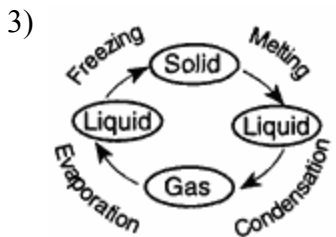
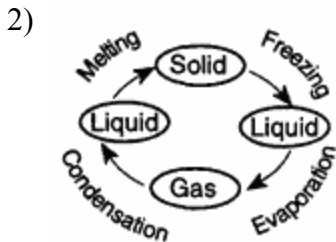
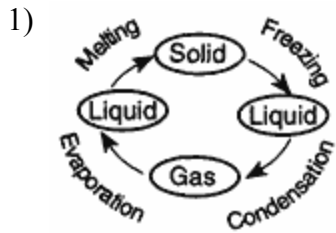
- 1) Land temperatures are cooler than ocean temperatures.
  - 2) The prevailing winds change direction as they pass over land.
  - 3) Hurricanes form over oceans and cool the water surfaces.
  - 4) **Oceans have a higher specific heat than land.**
- 
61. Land surfaces of Earth heat more rapidly than water surfaces because
- 1) more energy from the Sun falls on land than on water
  - 2) **land has a lower specific heat than water**
  - 3) sunlight penetrates to greater depths in land than in water
  - 4) less of Earth's surface is covered by land than by water
62. A student placed two containers of soil in direct sunlight for 10 minutes and observed that moist soil warmed more slowly than dry soil. Which statement best explains this difference?
- 1) The moist soil was darker and absorbed less energy.
  - 2) **The water in the moist soil absorbed energy, evaporated, and cooled the soil.**
  - 3) The dry soil was rougher and reflected more sunlight.
  - 4) The dry soil was lighter in color and received less energy.
63. Base your answer to the following question on the graph below which shows the results of a laboratory activity in which a sample of ice at  $-50^{\circ}\text{C}$  was heated at a uniform rate for 80 minutes. The ice has a mass of 200 grams.



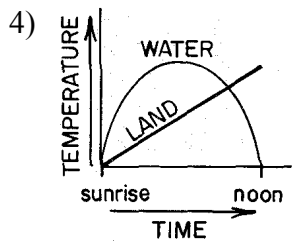
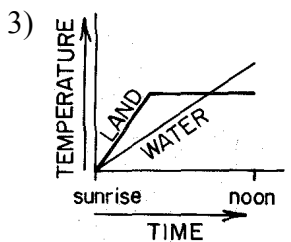
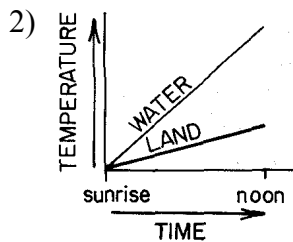
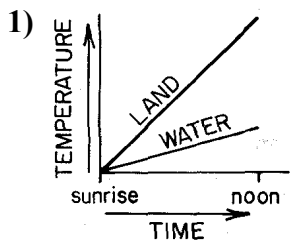
During which interval of the graph is a phase change occurring?

- 1) *A to B*
- 2) *E to F*
- 3) *C to D*
- 4) ***D to E***

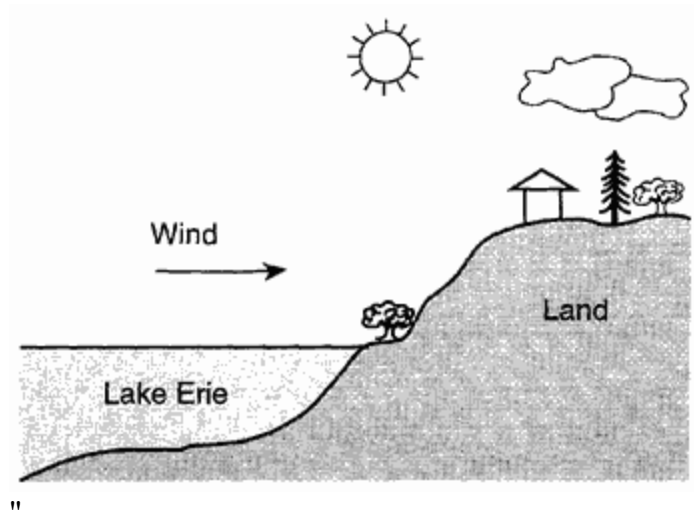
64. Which diagram correctly shows the processes that change the states of matter?



65. Which graph best illustrates the temperature changes on adjacent land and water surfaces as they are heated by the Sun from sunrise to noon on the same day?



66. Base your answer to the following question on "the diagram below, which represents a cross section of the shoreline of Lake Erie.



Compared with the change in temperature of the water surface, the change in temperature of the land surface will be

- 1) **faster, because the land has a lower specific heat**
- 2) faster, because the land has a higher specific heat
- 3) slower, because the land has a lower specific heat
- 4) slower, because the land has a higher specific heat

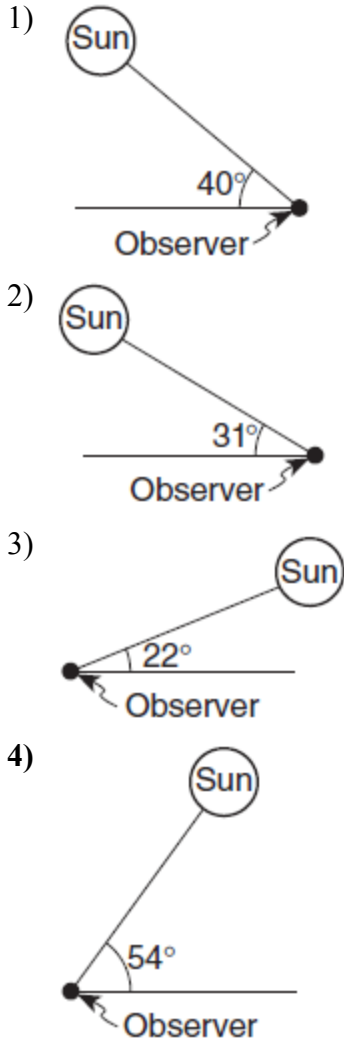
67. Which factor has the greatest influence on the number of daylight hours that a particular Earth surface location receives?

- 1) longitude
- 2) **latitude**
- 3) diameter of Earth
- 4) distance from the Sun

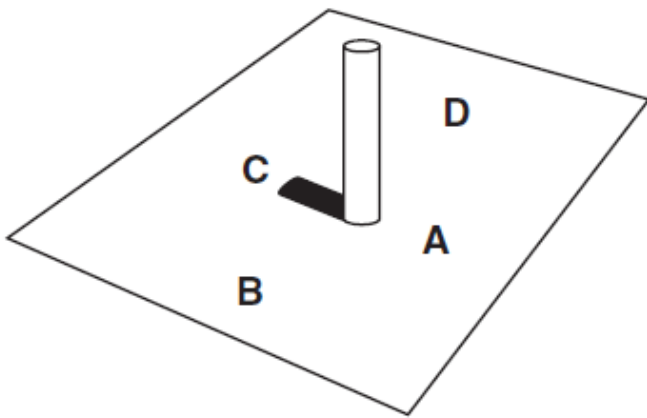
68. In New York State, summer is warmer than winter because in summer New York State has

- 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**

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



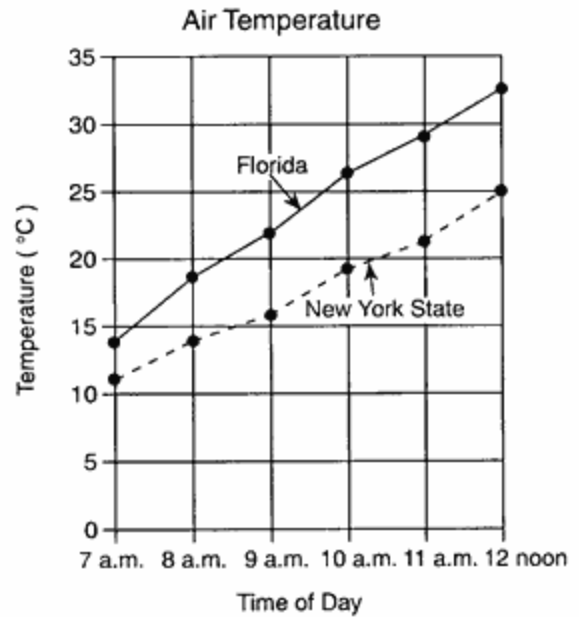
70. The diagram below shows the noontime shadow cast by a vertical post located in New York State.



Which letter indicates a location west of the post?

- 1) A    2) B    3) C    4) D

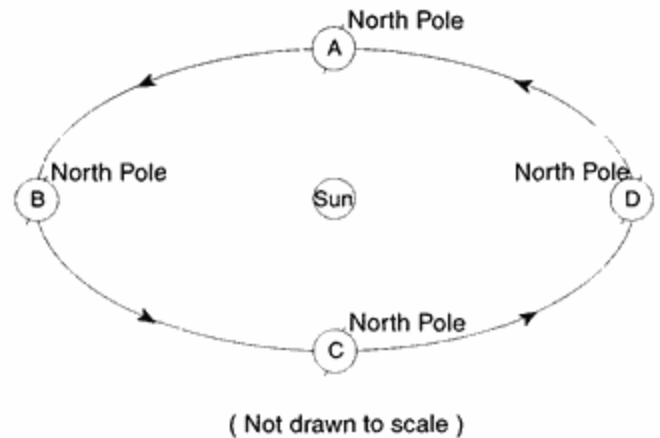
71. The graph below shows air temperatures on a clear summer day from 7 a.m. to 12 noon at two locations, one in Florida and one in New York State.



Air temperature rose slightly faster in Florida than in New York State because Florida

- 1) has a lower angle of insolation
- 2) **has a higher angle of insolation**
- 3) is closer to the Prime Meridian
- 4) is farther from the Prime Meridian

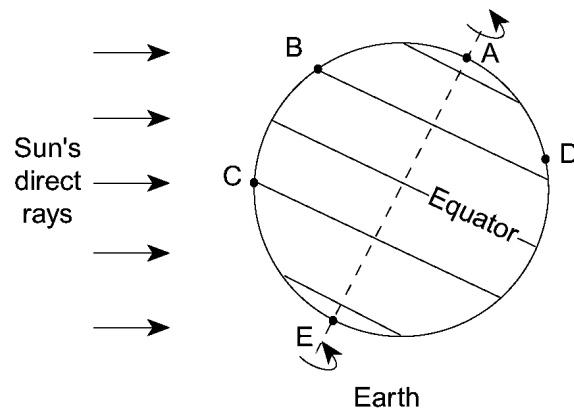
72. The diagram below shows Earth revolving around the Sun.



At which location in Earth's orbit will the maximum surface temperatures occur in Earth's Northern Hemisphere?

- 1) at A
- 2) **between B and C**
- 3) between D and A
- 4) at D

73. Base your answer to the following question on the diagram below, which shows the tilt of Earth on its axis in relation to the Sun on one particular day. Points *A* through *E* are locations on Earth's surface. Point *D* is located in Virginia. The dashed line represents Earth's axis.



Which diagram best represents the angle of the Sun's rays received at location *C* at noon on this day?

- 1) 2) 3) 4)

74. When do maximum surface temperatures usually occur in the Northern Hemisphere?

- 1) early June to mid-June
- 2) **mid-July to early August**
- 3) late August to mid-September
- 4) mid-September to early October

75. The ozone layer helps life on Earth because ozone

- 1) modifies the normal El Niño weather pattern
- 2) reflects insolation from the Sun
- 3) **absorbs damaging ultraviolet radiation from the Sun**
- 4) deflects winds from a straight line to a curved path

76. An increase in the transparency of Earth's atmosphere is often caused by

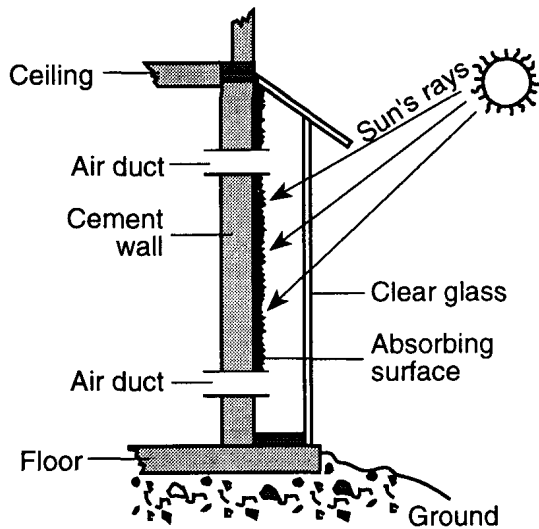
- 1) **a decrease in cloud cover**
- 2) a decrease in solar radiation
- 3) an increase in airborne dust particles
- 4) an increase in the duration of insolation

77. For weeks after a series of major volcanic eruptions, Earth's surface air temperatures are often

- 1) warmer because ash and dust decrease atmospheric transparency
- 2) warmer because ash and dust increase atmospheric transparency
- 3) **cooler because ash and dust decrease atmospheric transparency**
- 4) cooler because ash and dust increase atmospheric transparency

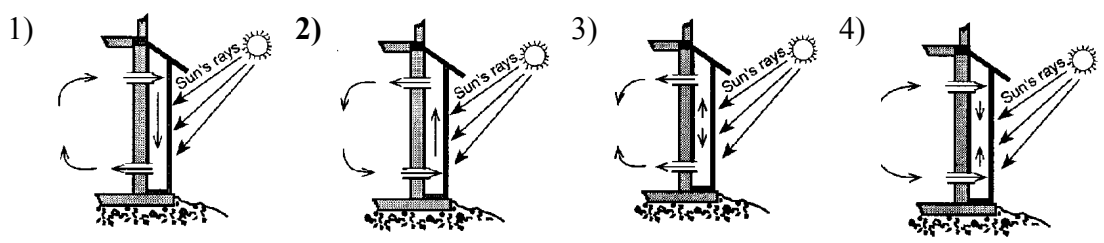


Base your answers to questions 78 and 79 on the diagram and table below. The diagram shows a cross section of a solar-energy collecting system constructed as a portion of a wall of a house. It consists of an energy-absorbing surface, a clear glass covering, and air ducts through the wall into the house. The table gives the house temperatures during a spring day. No other heat source is available for the house.



Time of Day	House Air Temperature (°C)
6 a.m.	12
8 a.m.	14
10 a.m.	16
noon	19
2 p.m.	22
4 p.m.	20

78. Which diagram best represents the direction of air flow through the system under normal solar heating conditions?



79. In Connecticut, on which exterior wall should the solar collector be placed to receive the most insolation?

- 1) a north-facing wall
- 2) a south-facing wall
- 3) an east-facing wall
- 4) a west-facing wall

80. The diagram below shows four surfaces of equal area that absorb insolation.



Which letter represents the surface that most likely absorbs the greatest amount of insolation?

- 1) A
- 2) B
- 3) C
- 4) D

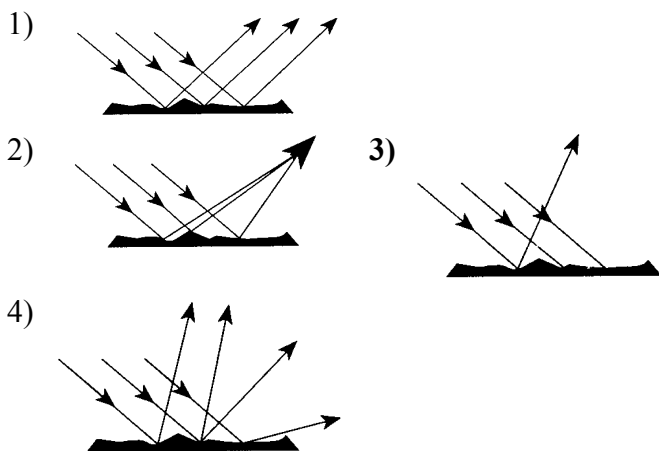
81. The table below shows the duration of insolation at different latitudes for three different days during the year.

Latitude	Day 1 Duration of Insolation (hours)	Day 2 Duration of Insolation (hours)	Day 3 Duration of Insolation (hours)
90° N	24	12	0
80° N	24	12	0
70° N	24	12	0
60° N	18 $\frac{1}{2}$	12	5 $\frac{1}{2}$
50° N	16 $\frac{1}{4}$	12	7 $\frac{3}{4}$
40° N	15	12	9
30° N	14	12	10
20° N	13 $\frac{1}{4}$	12	10 $\frac{3}{4}$
10° N	12 $\frac{1}{2}$	12	11 $\frac{1}{2}$
0°	12	12	12

Which dates are represented most correctly by Day 1, Day 2, and Day 3, respectively?

- 1) March 21, September 22, December 21    2) **June 21, September 22, December 21**  
 3) September 22, December 21, March 21    4) December 21, March 21, June 21

82. Which diagram best represents visible light rays after striking a dark, rough surface?



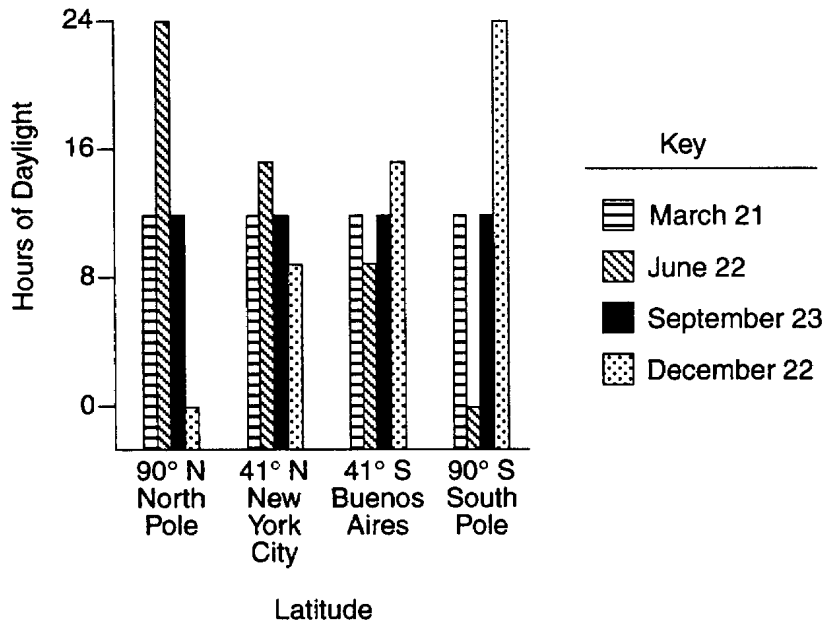
83. Four trays, each containing sand at the same temperature but with different characteristics, were placed on a sunny windowsill. The type of sand in each tray is listed below:

- Tray 1 -light-colored sand which is dry  
 Tray 2 -light-colored sand which is wet  
 Tray 3 -dark-colored sand which is dry  
 Tray 4 -dark-colored sand which is wet

After 30 minutes, which tray would probably contain the sand that had undergone the greatest temperature change?

- 1) 1    2) 2    3) **3**    4) 4

Base your answers to questions 84 through 86 on the graph below which represents the duration of insolation at four different latitudes on Earth on four different dates.



84. The total number of daylight hours during an entire year is

- 1) greatest at 41° N
- 2) greatest at 41° S
- 3) different at each of the four locations
- 4) **the same at each of the four locations**

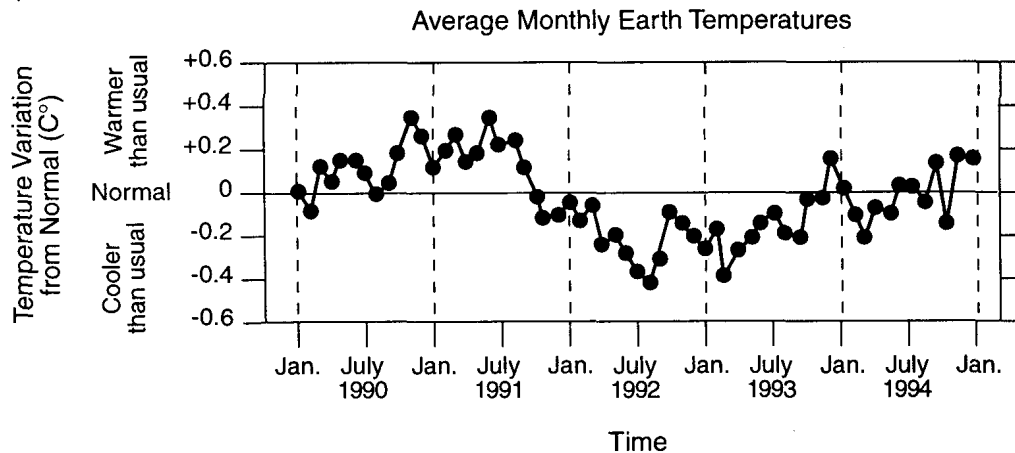
85. At solar noon on June 22, the shadow of a vertical pole in Buenos Aires would point

- 1) northward
- 2) **southward**
- 3) eastward
- 4) westward

86. Buenos Aires, located at 41° S, receives the *shortest* duration of insolation on

- 1) March 21
- 2) **June 22**
- 3) September 23
- 4) December 22

87. Base your answer to the following question on the graph below which shows variations in Earth's monthly temperatures from normal Earth temperatures between January 1990 and January 1995.

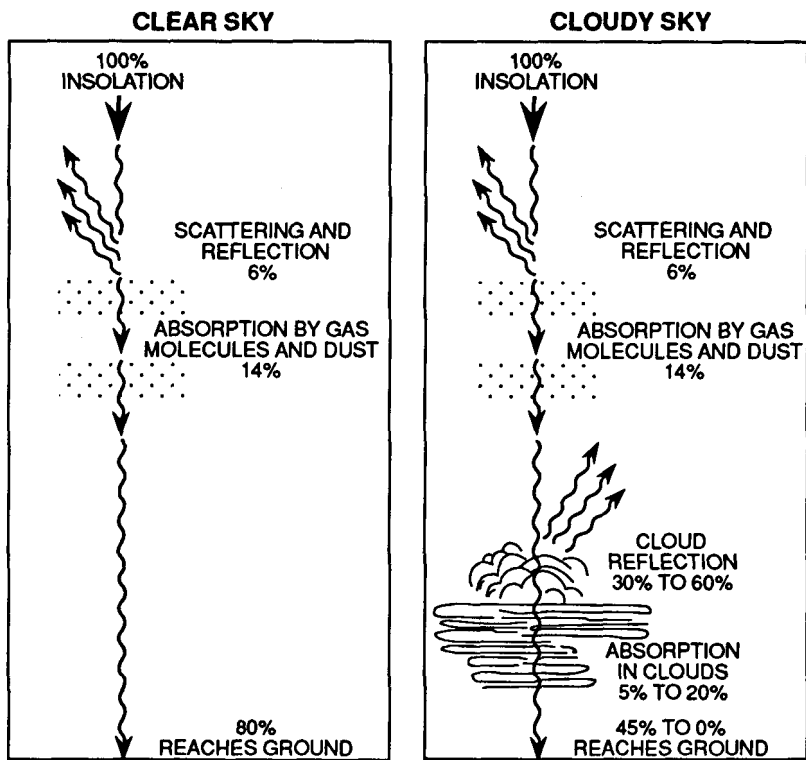


In late summer 1991, Mt. Pinatubo, a volcano in the Philippines, exploded and sent thousands of tons of volcanic dust into the atmosphere. Scientists have suggested that Earth's average monthly temperatures for many months after the explosion generally were

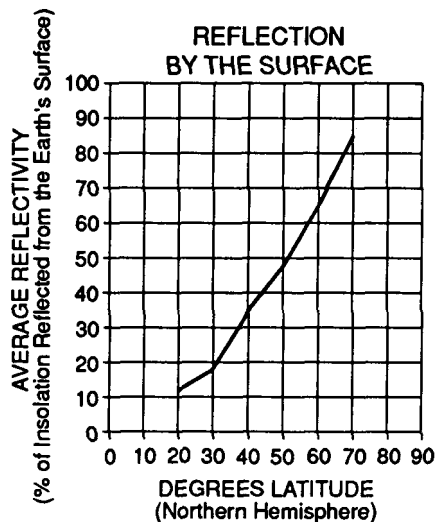
- 1) cooler than normal due to the reflection of sunlight by volcanic dust
- 2) cooler than normal due to the formation of a hole in the ozone layer by the explosion
- 3) warmer than normal due to the heat released into the atmosphere by the volcanic explosion
- 4) warmer than normal due to the heat spread by convection of the volcanic dust

Base your answers to questions 88 through 90 on the diagrams and graphs below. The diagrams 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 shows the percentage of insolation reflected by the Earth's surface at different latitudes in the Northern Hemisphere in winter.

**INSOLATION IN THE ATMOSPHERE**



EARTH'S SURFACE (45° NORTH LATITUDE)



88. Which statement best explains why, at high latitudes, reflectivity of insolation is greater in winter than in summer?

- 1) The North Pole is tilted toward the Sun in winter.
- 2) **Snow and ice reflect almost all insolation.**
- 3) The colder air holds much more moisture.
- 4) Dust settles quickly in cold air.

89. According to the graph, on a winter day at 70° North latitude, what approximate percentage of the insolation is reflected by the Earth's surface?

- 1) 50%
- 2) 65%
- 3) **85%**
- 4) 100%

90. Which factor keeps the greatest percentage of insolation from reaching the Earth's surface on cloudy days?

- 1) absorption by cloud droplets
- 2) **reflection by cloud droplets**
- 3) absorption by clear-air gas molecules
- 4) reflection by clear-air gas molecules

**Answer Key**  
**Regents Review Packet #3: mod 2015**

- |     |          |     |          |     |          |
|-----|----------|-----|----------|-----|----------|
| 1.  | <u>1</u> | 37. | <u>2</u> | 73. | <u>4</u> |
| 2.  | <u>3</u> | 38. | <u>2</u> | 74. | <u>2</u> |
| 3.  | <u>1</u> | 39. | <u>2</u> | 75. | <u>3</u> |
| 4.  | <u>4</u> | 40. | <u>1</u> | 76. | <u>1</u> |
| 5.  | <u>1</u> | 41. | <u>3</u> | 77. | <u>3</u> |
| 6.  | <u>3</u> | 42. | <u>2</u> | 78. | <u>2</u> |
| 7.  | <u>1</u> | 43. | <u>1</u> | 79. | <u>2</u> |
| 8.  | <u>3</u> | 44. | <u>1</u> | 80. | <u>4</u> |
| 9.  | <u>2</u> | 45. | <u>2</u> | 81. | <u>2</u> |
| 10. | <u>2</u> | 46. | <u>1</u> | 82. | <u>3</u> |
| 11. | <u>2</u> | 47. | <u>4</u> | 83. | <u>3</u> |
| 12. | <u>2</u> | 48. | <u>4</u> | 84. | <u>4</u> |
| 13. | <u>3</u> | 49. | <u>4</u> | 85. | <u>2</u> |
| 14. | <u>1</u> | 50. | <u>4</u> | 86. | <u>2</u> |
| 15. | <u>4</u> | 51. | <u>1</u> | 87. | <u>1</u> |
| 16. | <u>3</u> | 52. | <u>1</u> | 88. | <u>2</u> |
| 17. | <u>1</u> | 53. | <u>4</u> | 89. | <u>3</u> |
| 18. | <u>1</u> | 54. | <u>2</u> | 90. | <u>2</u> |
| 19. | <u>4</u> | 55. | <u>3</u> |     |          |
| 20. | <u>2</u> | 56. | <u>4</u> |     |          |
| 21. | <u>3</u> | 57. | <u>2</u> |     |          |
| 22. | <u>3</u> | 58. | <u>1</u> |     |          |
| 23. | <u>3</u> | 59. | <u>1</u> |     |          |
| 24. | <u>2</u> | 60. | <u>4</u> |     |          |
| 25. | <u>2</u> | 61. | <u>2</u> |     |          |
| 26. | <u>3</u> | 62. | <u>2</u> |     |          |
| 27. | <u>1</u> | 63. | <u>4</u> |     |          |
| 28. | <u>4</u> | 64. | <u>4</u> |     |          |
| 29. | <u>1</u> | 65. | <u>1</u> |     |          |
| 30. | <u>2</u> | 66. | <u>1</u> |     |          |
| 31. | <u>3</u> | 67. | <u>2</u> |     |          |
| 32. | <u>2</u> | 68. | <u>4</u> |     |          |
| 33. | <u>2</u> | 69. | <u>4</u> |     |          |
| 34. | <u>4</u> | 70. | <u>2</u> |     |          |
| 35. | <u>1</u> | 71. | <u>2</u> |     |          |
| 36. | <u>1</u> | 72. | <u>2</u> |     |          |
-