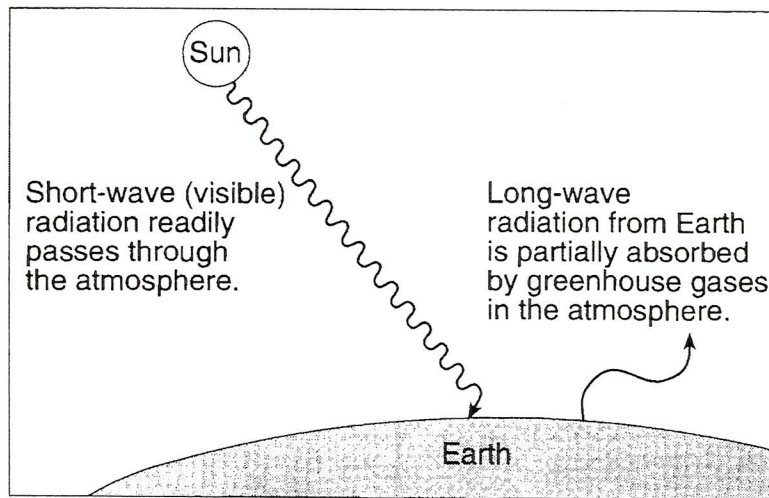


Name _____

Topic 5/6 Review

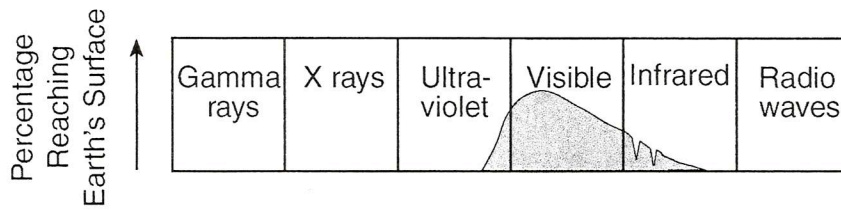
1. Which type of electromagnetic energy has the longest wavelength?
1) infrared radiation 3) ultraviolet radiation
2) radio wave radiation 4) x-ray radiation
2. Which color of the visible spectrum has the *shortest* wavelength?
1) violet 3) yellow
2) blue 4) red
3. In which list are the forms of electromagnetic 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
4. What is the basic difference between ultraviolet, visible, and infrared radiation?
1) half-life 3) wavelength
2) temperature 4) wave velocity

Base your answers to questions 5 and 6 on the diagram below, which represents the greenhouse effect in which heat energy is trapped in Earth's atmosphere



5. 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
 6. 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
-

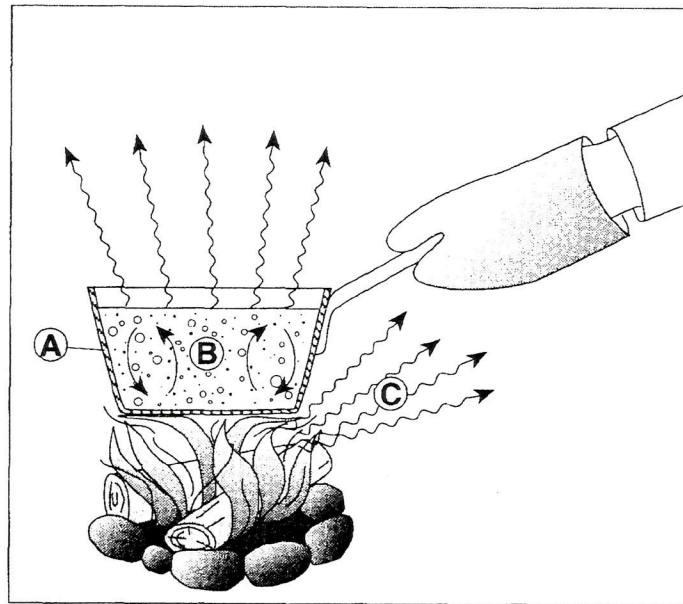
7. The diagram below shows the types of electromagnetic energy given off by the Sun. The shaded part of the diagram shows the approximate amount of each type actually reaching Earth's surface.



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.

8. 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

3)

Letter	Type of Heat Transfer
A	radiation
B	conduction
C	convection

2)

Letter	Type of Heat Transfer
A	conduction
B	convection
C	radiation

4)

Letter	Type of Heat Transfer
A	radiation
B	convection
C	conduction

9. 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

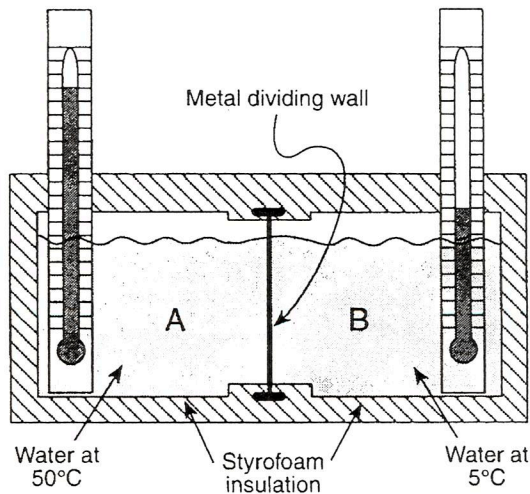
10. Pieces of lead, copper, iron, and granite, each having a mass of 1 kilogram and a temperature of 100°C, were removed from a container of boiling water and allowed to cool under identical conditions. Which piece most likely cooled to room temperature first?

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

11. Which type of surface absorbs the greatest amount of electromagnetic energy from the Sun?

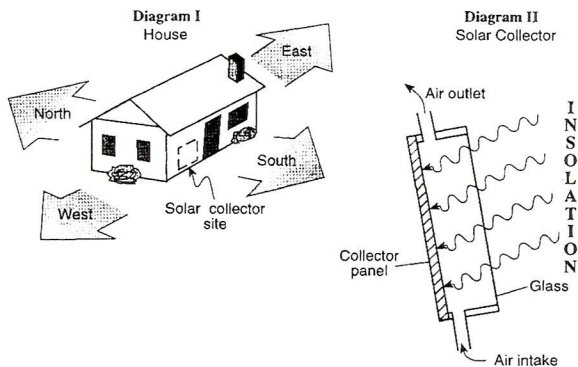
- 1) smooth, shiny, and light colored
- 2) smooth, shiny, and dark colored
- 3) rough, dull, and light colored
- 4) rough, dull, and dark colored

12. The cross section below shows two compartments of water of equal volume insulated by Styrofoam and separated by a metal dividing wall, forming a closed energy system.



When the temperature of the water in compartment A decreases by 10°C , the temperature of the water in compartment B will

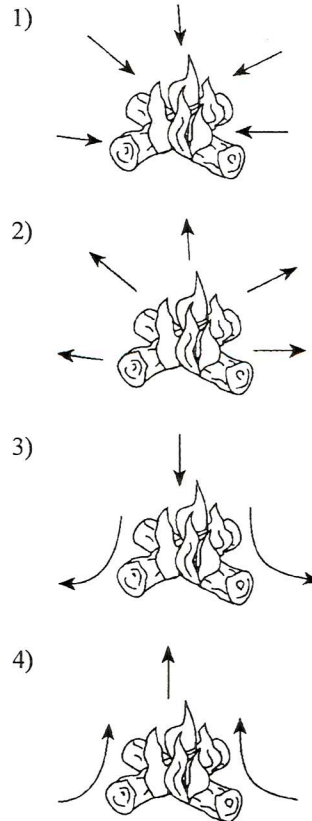
- 1) remain unchanged
 - 2) decrease by only 5°C
 - 3) decrease by approximately 10°C
 - 4) increase by approximately 10°C
13. During which process does heat transfer occur because of density differences?
- 1) conduction
 - 2) convection
 - 3) radiation
 - 4) reflection
14. Base your answer to the following question on the diagrams below. Diagram I shows a house located in Michigan. Diagram II shows a solar collector that the homeowner is using to help heat the house.



Air leaves the outlet of the solar collector because the air within the solar collector becomes

- 1) cooler and less dense
- 2) cooler and more dense
- 3) warmer and less dense
- 4) warmer and more dense

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



16. Which process transfers energy primarily by electromagnetic waves?
- 1) radiation
 - 2) evaporation
 - 3) conduction
 - 4) convection
17. 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.
18. When 1 gram of liquid water at 0°C 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
19. Liquid water can store more heat energy than an equal amount of any other naturally occurring substance because liquid water
- 1) covers 71% of Earth's surface
 - 2) has its greatest density at 4°C
 - 3) has the higher specific heat
 - 4) can be changed into a solid or a gas

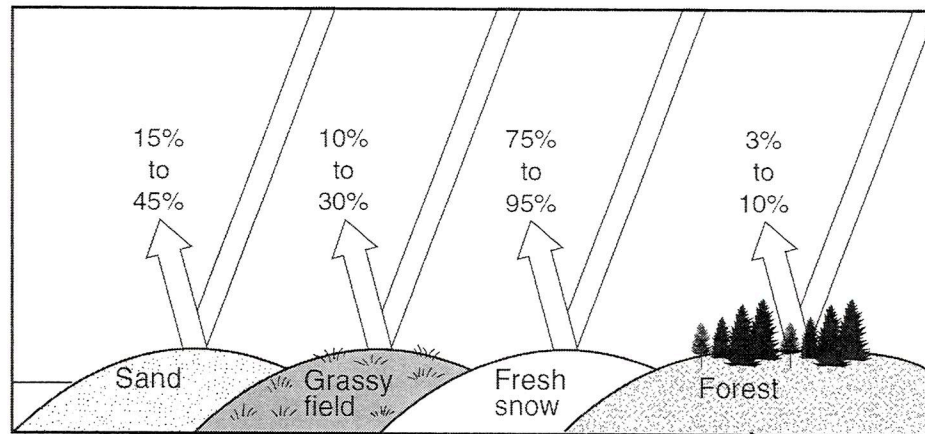
20. For weeks after a series of major volcanic eruptions, Earth's surface air temperatures are often

- 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

21. Which change would cause a *decrease* in the amount of insolation absorbed at Earth's surface?

- 1) a decrease in cloud cover
- 2) a decrease in atmospheric transparency
- 3) an increase in the duration of daylight
- 4) an increase in nitrogen gas

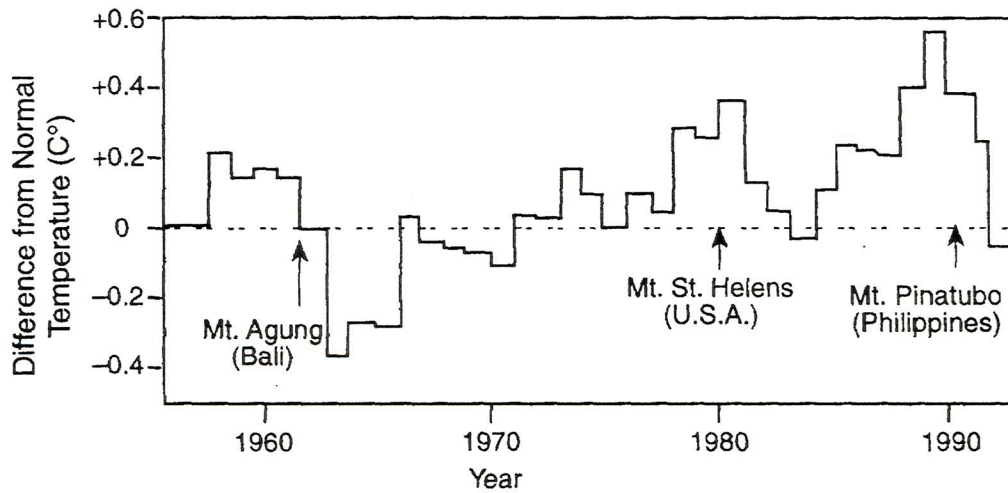
22. The diagram below indicates the amount of solar radiation that is reflected by equal areas of various materials on Earth's surface.



Which material absorbs the most solar radiation?

- 1) grassy field
- 2) fresh snow
- 3) sand
- 4) forest

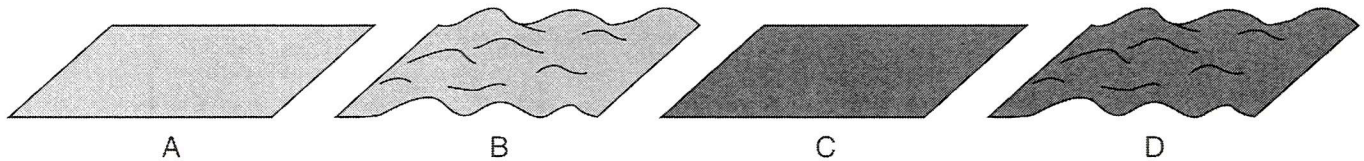
23. The graph below shows atmospheric temperature variations on Earth between 1956 and 1993. The dates of three major volcanic eruptions are indicated.



What is the most probable reason that Earth's atmospheric temperature decreased shortly after each major volcanic eruption?

- 1) Water droplets produced by the eruptions absorbed terrestrial reradiation.
- 2) Ozone produced by the eruptions absorbed ultraviolet radiation from the Sun.
- 3) Volcanic dust from the eruptions blocked insolation.
- 4) Carbon dioxide gas from the eruptions blocked terrestrial reradiation.

24. 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

25. A square meter of surface of which of these natural areas would most likely absorb the most insolation during a clear day?

- 1) a fast-moving river
- 2) a dark-green forest
- 3) a beach with white sand
- 4) a snow-covered field

26. An increase in which gas in Earth's atmosphere will most significantly increase global temperatures?

- 1) methane
- 2) oxygen
- 3) nitrogen
- 4) hydrogen

27. Deforestation increases the greenhouse effect on Earth because deforestation causes the atmosphere to contain

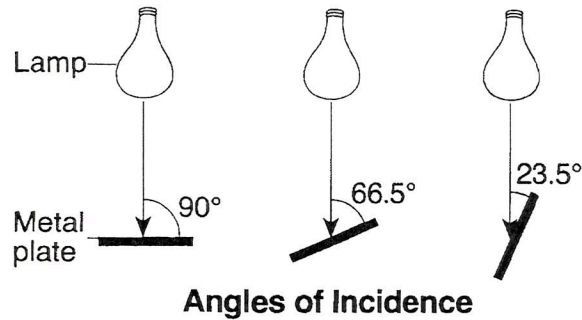
- 1) more carbon dioxide, which absorbs infrared radiation
- 2) less carbon dioxide, which absorbs short-wave radiation
- 3) more oxygen, which absorbs infrared radiation
- 4) less oxygen, which absorbs short-wave radiation

28. Which two gases have been added to Earth's atmosphere in large amounts and are believed to have increased global warming by absorbing infrared radiation?

- 1) neon and argon
- 2) chlorine and nitrogen
- 3) hydrogen and helium
- 4) methane and carbon dioxide

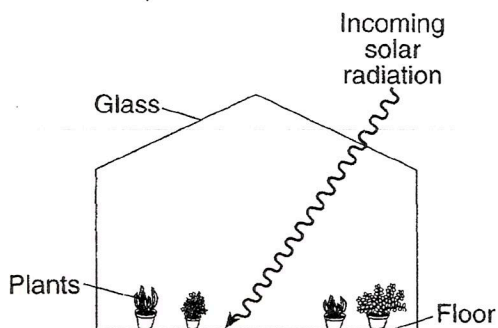
Base your answers to questions 29 through 31 on the experiment description and diagram below.

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.



29. How would the final temperatures of the three metal plates be different if the experiment was repeated using white metal plates? Explain why the white plates would have these final temperatures.
30. Explain why the metal plate at a 90° angle of incidence had a final temperature higher than the other two plates.
31. The metal plate at a 90° angle of incidence represents a location on Earth at solar noon on March 21. What is the latitude of this location?

Base your answers to questions 32 and 33 on the diagram below, which shows incoming solar radiation passing through the glass of a greenhouse and then striking the floor.



32. Describe *one* way the glass in the greenhouse acts like the greenhouse gases in Earth's atmosphere.

33. Some of the incoming solar radiation is absorbed by the floor. Identify the type of electromagnetic energy reradiated by the floor.

Reference Tables

Table 1
Table 2
Table 3
Table 4
Table 5