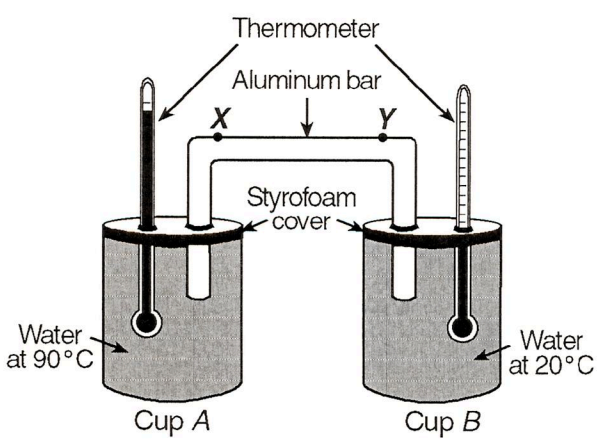


Name: Review

- 1) Energy is transferred from the Sun to Earth mainly by
 - 1) red shifts
 - 2) electromagnetic waves
 - 3) molecular collisions
 - 4) density currents
- 2) What is the basic difference between ultraviolet, visible, and infrared radiation?
 - 1) wavelength
 - 2) wave velocity
 - 3) half-life
 - 4) temperature

- 3) Which part of the Sun's electromagnetic spectrum has the *longest* wavelength?
 - 1) visible light radiation
 - 2) radio wave radiation
 - 3) x-ray radiation
 - 4) infrared radiation
- 4) Which method of energy transfer is primarily responsible for energy being lost from Earth into space?
 - 1) radiation
 - 2) convection
 - 3) solidification
 - 4) conduction

5) Hot water at 90°C is poured into cup A. Cool water at 20°C is poured into cup B. Styrofoam covers are placed on the cups. An aluminum bar and a thermometer are placed through holes in each cover. Points X and Y are locations on the aluminum bar. The data table shows temperature readings taken every minute for 20 minutes.



Minute	Temperature of Water ($^{\circ}\text{C}$)		Minute	Temperature of Water ($^{\circ}\text{C}$)	
	Cup A	Cup B		Cup A	Cup B
0	90	20	11	76	23
1	88	20	12	75	23
2	86	20	13	74	23
3	85	21	14	73	23
4	83	21	15	72	24
5	82	22	16	71	24
6	81	22	17	70	24
7	80	22	18	69	24
8	79	22	19	68	25
9	78	23	20	67	25
10	77	23			

Which change in the experiment would increase the heating rate of the water in cup B?

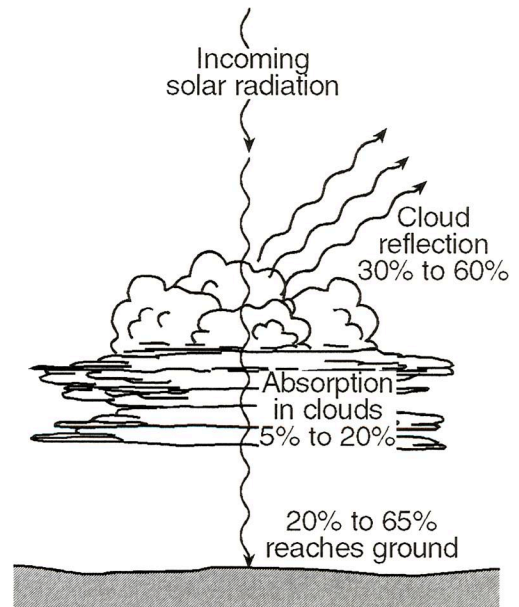
- 1) keeping cup A covered, but uncovering cup B
- 2) making the aluminum bar longer between points X and Y
- 3) keeping cup B covered, but uncovering cup A
- 4) making the aluminum bar shorter between points X and Y

- 6) During which process does heat transfer occur because of density differences?
 - 1) conduction
 - 2) reflection
 - 3) radiation
 - 4) convection
- 7) Which phase change requires water to gain 2260 J per gram?
 - 1) solid ice melting
 - 2) liquid water freezing
 - 3) liquid water vaporizing
 - 4) water vapor condensing

- 8) During which phase change of water is the *most* energy released into the environment?
 - 1) water freezing
 - 2) ice melting
 - 3) water vapor condensing
 - 4) water evaporating
- 9) 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) 334 J
 - 2) 2260 J
 - 3) 4.11 J
 - 4) 1.01 J

- 10) Land surfaces of Earth heat more rapidly than water surfaces because
- 1) more energy from the Sun falls on land than on water
 - 2) less of Earth's surface is covered by land than by water
 - 3) sunlight penetrates to greater depths in land than in water
 - 4) land has a lower specific heat than water
- 11) On a clear summer day, the surface of land is usually warmer than the surface of a nearby body of water because the water
- 1) reflects less insolation
 - 2) has a higher specific heat
 - 3) has a higher density
 - 4) receives less insolation
- 12) Compared to dull and rough rock surfaces, shiny and smooth rock surfaces are most likely to cause sunlight to be
- 1) reflected
 - 2) scattered
 - 3) absorbed
 - 4) refracted
- 13) Which of these characteristics identify an Earth surface that is likely to be the *best* absorber of insolation?
- 1) dark colored and smooth
 - 2) dark colored and rough
 - 3) light colored and rough
 - 4) light colored and smooth
- 14) Which type of land surface would probably reflect the *most* incoming solar radiation?
- 1) dark colored and smooth
 - 2) light colored and rough
 - 3) light colored and smooth
 - 4) dark colored and rough
- 15) 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
- 16) A person in New York State worked outdoors in sunlight for several hours on a day in July. Which type of clothing should the person have worn to absorb the *least* electromagnetic radiation?
- 1) light colored with a smooth surface
 - 2) light colored with a rough surface
 - 3) dark colored with a rough surface
 - 4) dark colored with a smooth surface

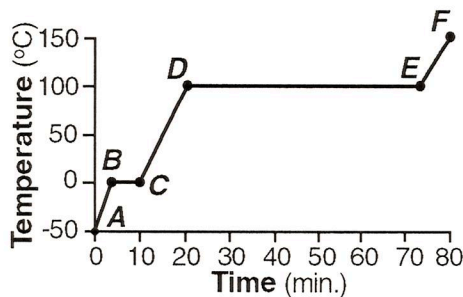
- 17) On a sunny day at the beach, the dark-colored sand gets hot while the water stays cool because the sand
- 1) reflects more energy and has a higher specific heat than the water
 - 2) reflects less energy and has a higher specific heat than the water
 - 3) reflects less energy and has a lower specific heat than the water
 - 4) reflects more energy and has a lower specific heat than the water
- 18) The diagram below represents the percentage of total incoming solar radiation that is affected by clouds.



What percentage of incoming solar radiation is reflected or absorbed on cloudy days?

- 1) 100%
 - 2) 0%
 - 3) 5% to 30%
 - 4) 35% to 80%
- 19) Raindrops often evaporate while falling through the dry air over a desert. What is the total amount of latent heat energy absorbed from the air by 1 gram of water as it evaporates?
- 1) 334 Joules
 - 2) 1 Joules
 - 3) 54 Joules
 - 4) 2260 Joules
- 20) Which process releases the most energy into the atmosphere?
- 1) freezing 1 gram of water
 - 2) condensing 1 gram of water vapor
 - 3) vaporizing 1 gram of water
 - 4) melting 1 gram of ice

21) The graph below shows the results of a laboratory activity in which a sample of ice at -50°C was heated at a uniform rate for 80 minutes. The ice has a mass of 200 grams.



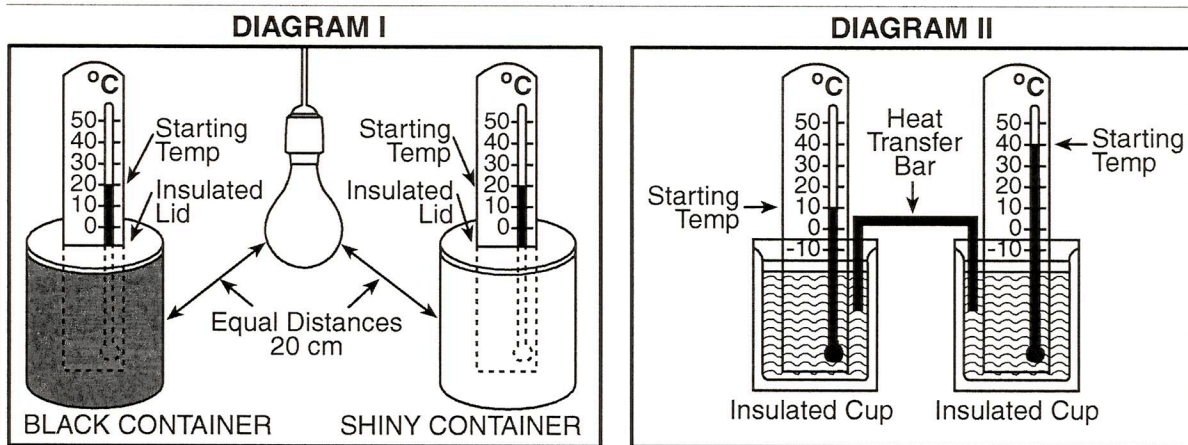
During which interval of the graph is a phase change occurring?

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

- 22) As the ability of a substance to absorb electromagnetic energy increases, the ability of that substance to radiate electromagnetic energy will
 - 1) decrease
 - 2) remain the same
 - 3) increase
- 23) An object that is a good radiator of electromagnetic waves is also a good
 - 1) retractor of electromagnetic energy
 - 2) reflector of heat
 - 3) insulator from heat
 - 4) absorber of electromagnetic energy
- 24) At which temperature will iron radiate the *least* electromagnetic energy?
 - 1) 230 K
 - 2) 32°F
 - 3) 0°C
 - 4) 0°F

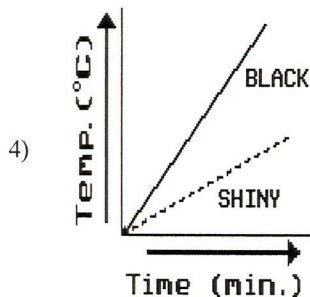
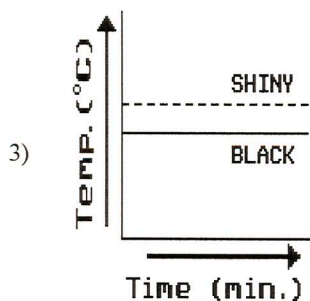
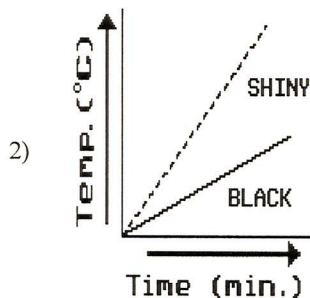
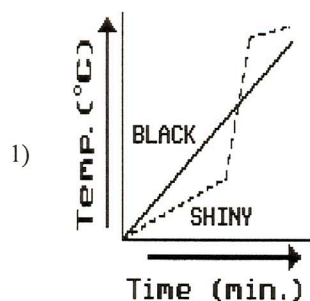
Questions 25 through 27 refer to the following:

Diagram I represents a light source located at an equal distance from two air-filled metal cans. One can is shiny and the other is black. Diagram II represents two insulated cups, each filled with equal masses of water. One insulated cup contains cold water and the other contains warm water. A metal bar is inserted into the water of each insulated cup.

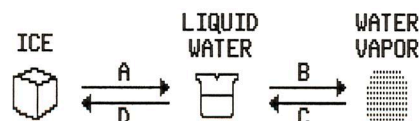


- 25) When the light source is on (diagram I), the amount of radiant energy striking the black container, as compared to the amount striking the shiny container, is
 - 1) less
 - 2) the same
 - 3) more

- 26) With reference to diagram I, which graph best represents the change in temperature during the first 10 minutes after the light source is turned on?



- 27) In the equipment shown in diagram II, heat energy will be transferred through the bar from the hot water to the cold water primarily by
- 1) density differences
 - 2) flowing currents
 - 3) molecular collisions
 - 4) electromagnetic rays
- 28) Two insulated cups are connected by an aluminum bar. Cold water is placed in one cup and an equal mass of hot water is placed in the other cup. The temperature of the hot water decreases more rapidly than the temperature of the cold water increases. Which statement best explains this observation?
- 1) The cold water is undergoing a change of phase.
 - 2) The cold water gains heat from the air.
 - 3) Some heat passes from the aluminum bar to the air.
 - 4) Hot water has a lower specific heat than cold water.
- 29) A sample of water undergoes the phase changes from ice to vapor and back to ice as shown in the model below. During which phase change does the sample gain the *greatest* amount of energy?



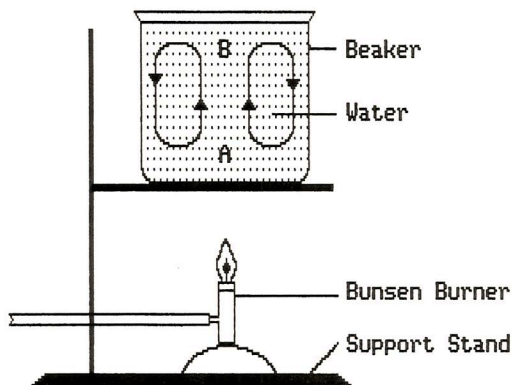
- 1) A
 - 2) C
 - 3) D
 - 4) B
- 30) Which example of heat transfer is due mainly to convection?
- 1) heat energy transferred from the Sun to the Earth
 - 2) heat energy transferred by air moving from the Earth's surface to the upper atmosphere
 - 3) heat energy transferred through a solid metal door
 - 4) heat energy transferred by being reflected from a lake surface to the air above

31) The diagram below shows equal masses of four different earth materials at different temperatures.

Material	Temp. ($^{\circ}\text{C}$)	Mass (g)	Volume (mL)
GRANITE	10°C	10. g	3.7 mL
IRON	20°C	10. g	1.3 mL
WATER	30°C	10. g	10. mL
DRY AIR	40°C	10. g	8,300 mL

Convection currents may be produced most easily in the samples of

- 1) granite and iron 2) water and granite 3) iron and dry air 4) water and dry air
- 32) The diagram below represents a large beaker of water being heated to demonstrate convection.

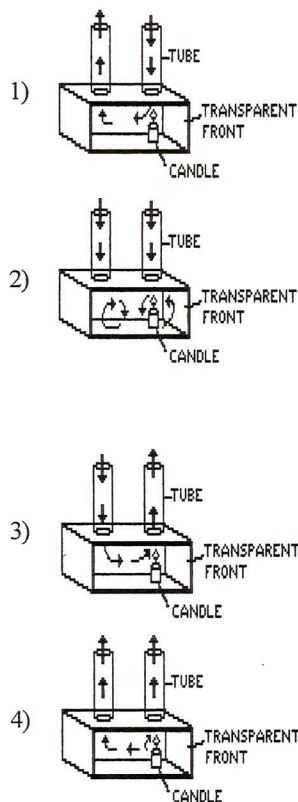


The movement of water upward from *A* toward *B* results primarily from

- 1) air movement across the surface of the water
- 2) the shape of the beaker
- 3) differences in density in the water
- 4) capillary action within the water

- 35) Which process results in a release of latent heat energy?
- 1) evaporation of water
 - 2) melting of ice
 - 3) heating of liquid water
 - 4) condensation of water vapor

33) 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?



- 34) If equal masses of water in various phases (states) are compared, which phase will contain the *greatest* amount of stored energy (latent heat)?
- 1) water vapor 3) solid ice
 - 2) liquid water

- | | | | | |
|-------|-------|-------|-------|-------|
| 1) 2 | 2) 1 | 3) 2 | 4) 1 | 5) 4 |
| 6) 4 | 7) 3 | 8) 3 | 9) 1 | 10) 4 |
| 11) 2 | 12) 1 | 13) 2 | 14) 3 | 15) 2 |
| 16) 1 | 17) 3 | 18) 4 | 19) 4 | 20) 2 |
| 21) 1 | 22) 3 | 23) 4 | 24) 1 | 25) 2 |
| 26) 4 | 27) 3 | 28) 3 | 29) 4 | 30) 2 |
| 31) 4 | 32) 3 | 33) 3 | 34) 1 | 35) 4 |