

## Unit 3 Test: States of Matter, Heat, Phase Changes – 45 pts

### Matching - 18 pts

Notes: Answers may be used more than once.

- |           |           |
|-----------|-----------|
| A. matter | C. liquid |
| B. solid  | D. gas    |

- The state of matter with the weakest intermolecular forces is \_\_\_\_\_.
  - Anything that has mass and takes up space is \_\_\_\_\_.
  - The state of matter in which conduction is most likely to occur is \_\_\_\_\_.
  - The state of matter with an indefinite shape and definite volume is \_\_\_\_\_.
  - The state of matter with a definite shape and volume is \_\_\_\_\_.
- 

- |                   |
|-------------------|
| A. temperature    |
| B. thermal energy |
| C. heat           |

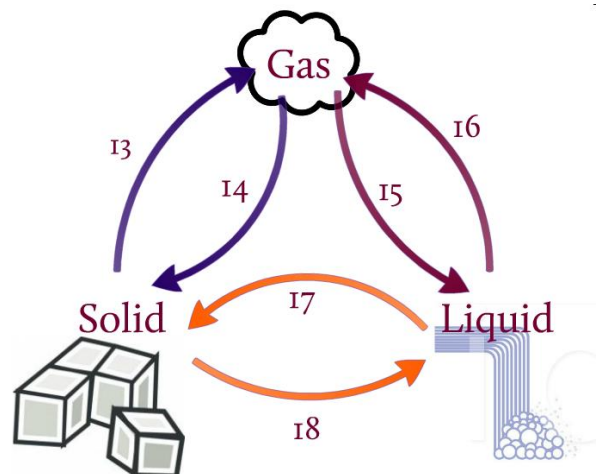
- \_\_\_\_\_ is defined as average kinetic energy.
  - The sum of kinetic energy and potential energy is \_\_\_\_\_.
  - Convection, conduction, and radiation are examples of \_\_\_\_\_.
- 

- |               |               |
|---------------|---------------|
| A. heat       | C. convection |
| B. conduction | D. radiation  |

- The transfer of thermal energy by movement of particles through gases and liquids is \_\_\_\_\_.
  - The transfer of thermal energy is \_\_\_\_\_.
  - The transfer of thermal energy through electromagnetic waves is \_\_\_\_\_.
  - The transfer of thermal energy by direct contact is \_\_\_\_\_.
- 

- #13
- #14
- #15
- #16
- #17
- #18

- |                |                  |
|----------------|------------------|
| A. sublimation | D. vaporization  |
| B. deposition  | E. freezing      |
| C. melting     | AE. condensation |



### Multiple Choice-27 points

Identify the choice that best completes the statement or answers the question..

19. Rank the states of matter from weakest to strongest intermolecular forces.

- A. gas, solid, liquid  
B. gas, liquid, solid  
C. solid, liquid, gas  
D. solid, gas, liquid

20. Rank the states of matter from slowest to fastest particle speed.

- A. gas, solid, liquid  
B. gas, liquid, solid  
C. solid, liquid, gas  
D. solid, gas, liquid

21. Convection occurs most easily in liquids and gases because \_\_\_\_\_.

- A. their particles are spaced far enough that they can move easily.  
B. their particles are close together and vibrating.  
C. their particles are at a low kinetic energy.  
D. they have high heat capacities.

22. Conduction, convection, and radiation ALL \_\_\_\_\_.

- A. occur most easily in solids.  
B. can transfer heat without particles.  
C. require direct contact.  
D. transfer thermal energy from high to low temperatures.

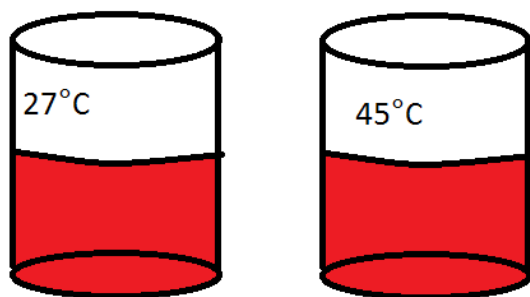
23. The sun's rays increasing the temperature of a house is an example of \_\_\_\_\_.

- A. convection  
B. sublimation  
C. conduction  
D. radiation

24. **Fig. 2**

Beaker A: 125mL

Beaker B: 125mL



The beakers both contain the same substance. The beaker in Figure 2 with the greater AVERAGE kinetic energy is

- A. A  
B. B  
C. they are the same

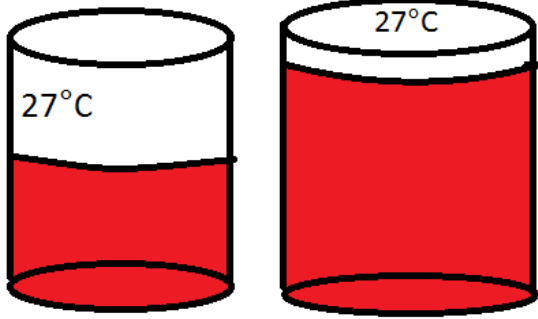
25. An ice cube (50mL and 0°C) is placed inside each beaker (Fig 2). The greatest amount of thermal energy will GAINED by \_\_\_\_\_.

- A. the fluid in beaker A  
B. the fluid in beaker B  
C. the ice cube in beaker A  
D. the ice cube in beaker B

**Fig. 3**

Beaker A: 125mL

Beaker C: 200mL



26. In Fig 3, if both pots are heating to the point of boiling, what process would take place?

- A. conduction
- B. convection
- C. Vaporization

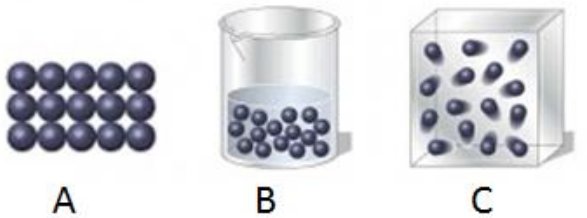
27. You are boiling water in a pot on the stovetop. The water at the BOTTOM of the pot heats primarily through \_\_\_\_\_.

- A. conduction
- B. convection
- C. radiation
- D. induction

28. You are boiling water in a pot on the stove. The water at the TOP of the pot heats primarily through \_\_\_\_\_.

- A. conduction
- B. convection
- C. radiation
- D. induction

29. If enough heat was REMOVED from B, it would change into \_\_\_\_\_.



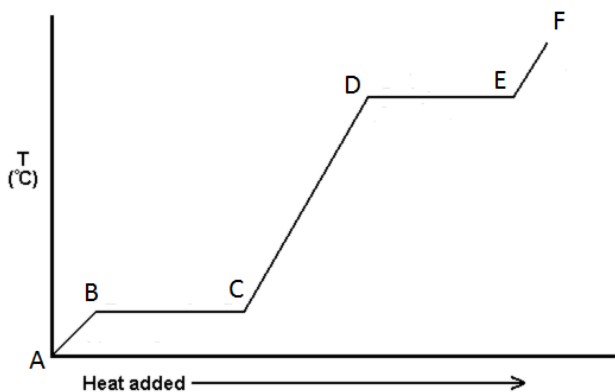
- A. A
- B. a gas
- C. C
- D. a liquid

30. Dry ice is an example of which process?

- A. conduction
- B. sublimation
- C. convection
- D. radiation

For questions 33-40, refer to Figure 5

Fig 5



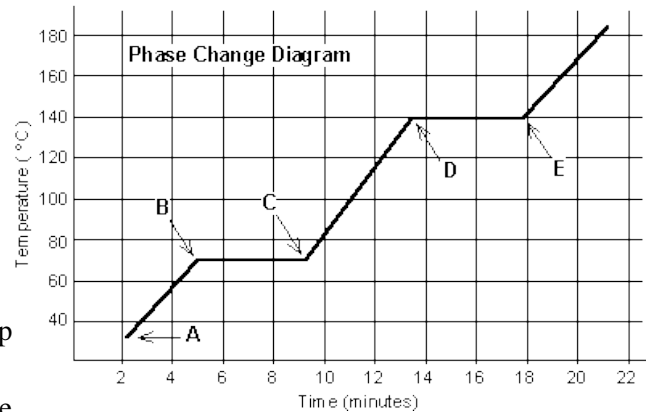
31. The MELTING POINT of the substance is represented by  
A. A to B  
B. B to C  
C. C to D  
D. D to E
32. The BOILING POINT of the substance is represented by \_\_\_\_\_.  
A. A to B  
B. B to C  
C. C to D  
D. D to E
33. Heat is added between points D and E. The substance is \_\_\_\_\_.  
A. sublimating  
B. melting  
C. freezing  
D. boiling
34. Between points B and C, the heat added is being used to \_\_\_\_\_.  
A. increase temperature.  
B. break the bonds of the liquid.  
C. break the bonds of the solid.  
D. boil the substance.
35. Between points C and D, the substance is \_\_\_\_\_.  
A. a liquid increasing in temperature.  
B. a solid/liquid mixture.  
C. a liquid/gas mixture.  
D. a solid.
36. If heat is REMOVED from point E and the temperature is not changed, the substance will \_\_\_\_\_.  
A. condense  
B. boil  
C. melt  
D. evaporate
37. Average kinetic energy increases at all parts of the graph EXCEPT  
A. A to B  
B. B to C  
C. C to D  
D. E to F
38. The part of the graph with the STRONGEST intermolecular forces is \_\_\_\_\_.  
A. A to B  
B. C to D  
C. E to F  
D. F

TURN THE PAGE.

39. The diagram to the right shows the heating of an unknown substance.

(It is NOT water). Its melting point is \_\_\_\_\_.

- between 35°C and 70°C
- 70°C
- between 70°C and 140°C
- 140°C



40. In a cup of liquid water, when would the water molecules stop moving?

- The molecules would stop moving if the liquid water in the cup became a solid.
- The molecules would stop moving if the liquid water in the cup became a gas.
- The molecules would stop moving if the liquid water in the cup became still.
- The molecules would not stop moving in the cup of liquid water.

41. Why does liquid water take the shape of a cup it is poured into, but solid ice cubes do not?

- Because the molecules of liquid water are softer than the molecules of solid ice
- Because the molecules of liquid water are smaller than the molecules of solid ice
- Because the molecules of liquid water are moving but the molecules of solid ice are not
- Because the molecules of liquid water can easily move past one another but the molecules of solid ice cannot

42. When a substance changes from a liquid to a solid, which of the following is TRUE?

- The molecules of the substance get heavier.
- The molecules of the substance change shape.
- The molecules of the substance change from soft to hard.
- The molecules of the substance connect more strongly to one another.

43. In which state(s) of matter could a substance have thermal energy?

- Only liquids
- Only liquids and solids
- Only liquids and gases
- Liquids, solids, and gases

44. A student has two identical glasses of milk except that the temperature of the milk in one glass is 40°F and the temperature of the milk in the other glass is 80°F.

The milk at which temperature has more thermal energy?

- The milk at 40°F has more thermal energy.
- The milk at 80°F has more thermal energy.
- Both the milk at 40°F and the milk at 80°F have the same amount of thermal energy.
- Neither the milk at 40°F nor the milk at 80°F has any thermal energy.



Milk at 40°F



Milk at 80°F

45. Which of the following has thermal energy?

- Both a piece of metal that feels hot and a piece of metal that feels cold
- A piece of metal that feels hot but not a piece of metal that feels cold
- A piece of metal that feels cold but not a piece of metal that feels hot
- Neither a piece of metal that feels hot nor a piece of metal that feels cold