

## S.4 PHYSICS TEST

### HEAT

1 hr

Specific heat capacity of water =  $4200 \text{ Jkg}^{-1}\text{K}^{-1}$

Specific heat capacity of copper =  $400 \text{ Jkg}^{-1}\text{K}^{-1}$

Specific latent heat of fusion of water =  $340000 \text{ Jkg}^{-1}$

- When liquid naphthalene is cooled, a time comes when its temperature remains constant for some time. This is because as naphthalene freezes
  - It stops losing heat to the surroundings.
  - The heat lost to the surroundings is replaced by latent heat of fusion.
  - An insulating layer forms around it.
  - It loses as much heat as it gains from the surroundings.
- Which of the following statements about boiling and evaporation is correct?
  - Boiling takes place at all temperatures while evaporation does not.
  - Evaporation takes place throughout a liquid while boiling takes place at the bottom of the container.
  - Boiling takes place throughout a liquid while evaporation takes place at the surface.
  - Evaporation only takes place at a much lower temperature than boiling does.
- In a four stroke internal combustion engine, the work required for initial induction and compression comes from
  - The rotational kinetic energy stored in the flywheel.
  - The movement of the steering wheel.
  - The separate starter motor.
  - The sparking plug.
- When a liquid is heated
  - Its molecules move with the same speed.
  - Its density decreases.
  - Evaporation takes place throughout the liquid.
  - Boiling occurs at all temperatures.
- How much energy is required to melt 2kg of ice at  $0^{\circ}\text{C}$ ?
  - 0kJ
  - 167kJ
  - 334kJ
  - 668kJ
- Which of the following is not true about a vacuum flask?
  - It controls loss of heat by radiation using the vacuum.
  - It can be used to keep cold liquids cold.
  - The cork is used to reduce loss of heat by convection.
  - The silvering of the walls on the vacuum side reduces loss or gain of heat by radiation.
- In metals heat is transmitted by
  - Conduction and radiation
  - Conduction only
  - Convection and radiation
  - Convection only

8. The sensitivity of a thermometer can be increased by
- Increasing the volume of the bulb.
  - Increasing the amount of liquid in the thermometer
  - Decreasing the thickness of the stem wall
  - Decreasing the diameter of the bore of the capillary tube.
9. A flywheel connected to an internal combustion engine is made heavy in order to
- Store kinetic energy.
  - Produce a spark.
  - Store rotational kinetic energy.
  - Help valves to open at regular intervals.
10. When a saturated vapour is compressed
- More liquid evaporates.
  - More vapour condenses.
  - The amount of vapour remains the same.
  - The vapour becomes unsaturated.
11. Saturated vapour pressure is the pressure exerted by a
- Vapour which is in dynamic equilibrium with its liquid.
  - Liquid which is in dynamic equilibrium with its vapour.
  - Solid which is in dynamic equilibrium with its vapour.
  - Liquid which is in dynamic equilibrium with its solid.
12. If a fixed mass of a gas is kept at constant temperature, its
- Volume increases with decrease in pressure.
  - Volume remains the same.
  - Density remains the same when pressure is varied.
  - Density is inversely proportional to the pressure.
13. Which of the following represents the firing order of a four stroke petrol engine?
- Exhaust, inlet, compression and power strokes.
  - Inlet, power, compression, and exhaust strokes.
  - Power, compression, inlet and exhaust strokes.
  - Inlet, power, exhaust and compression strokes.
14. On a cool day, a metal feels cold to the touch because
- Metals contain less heat.
  - The temperature of the metal is the same as that of the surrounding.
  - The temperature of the metal is less than that of the surrounding.
  - The metal conducts the heat away from the hand.
15. Which of the following sets contains only good conductors of heat?
- Copper, wood, air.
  - Iron, mercury, copper.
  - Silver, gold, rubber.
  - Magnesium, paper, wool.
16. How much heat is required to raise the temperature of 20g of water from 30°C to 60°C?
- 2520J
  - 6300J
  - 8400J
  - 126000J
17. Air in a 3 litre vessel at 27°C exerts a pressure of  $2\text{Nm}^{-2}$ . Calculate the pressure that the same mass of air would exert if it was contained in a 2 litre vessel at -33°C
- $1.1\text{Nm}^{-2}$
  - $2.0\text{Nm}^{-2}$
  - $2.4\text{Nm}^{-2}$
  - $3.7\text{Nm}^{-2}$
18. It's more difficult to compress a liquid than a gas because
- The speed of liquid molecules is lower than that of gas molecules.
  - Liquid particles attract one another when compressed while gas particles repel each other.

- C. The distances between liquid molecules are less than those between gas molecules.
- D. Liquid molecules repel one another when compressed while gas molecules attract each other.
19. A thermopile is an instrument which converts
- A. Heat energy to electrical energy. C. Electrical energy to light energy.  
B. Light energy to electrical energy D. Chemical energy to heat energy.
20. Metals are good conductors of heat because
- A. They are ductile. C. They contain free electrons.  
B. They contain loose electrons. D. Their atoms can be easily displaced.
21. Which of the following statements about states of matter is/are true?
1. A liquid has a definite volume but not a definite shape.
  2. A vapour has no definite volume and no definite shape.
  3. A solid has a definite volume and shape.
  4. A gas has a definite volume and shape.
- A. 1, 2, 3 only correct C. 2, 4 only correct  
B. 1, 3 only correct D. 4 only correct
22. The unusual expansion of water when it is cooled between  $4^{\circ}\text{C}$  and  $0^{\circ}\text{C}$  is due to
- A. Water molecules coming closer together to form a compact structure.  
B. Formation of a new arrangement of molecules which requires a larger volume.  
C. The increased repulsive forces between the water molecules.  
D. Differences in the size of water molecules.
23. A sea breeze occurs
- A. When cool air blows towards the land.  
B. When warm air blows towards the land.  
C. During the night.  
D. When cool air blows towards the sea.
24. An electric heater immersed in  $0.05\text{kg}$  of oil in a calorimeter of negligible heat capacity. The temperature of the oil rose from  $20^{\circ}\text{C}$  to  $50^{\circ}\text{C}$  in  $100\text{s}$ . If the specific heat capacity of the oil is  $200\text{Jkg}^{-1}\text{K}^{-1}$ . Calculate the power supplied by the heater, assuming that there is no heat loss.
- A.  $30\text{ W}$  B.  $50\text{ W}$  C.  $140\text{ W}$  D.  $600\text{ W}$
25. Which of the following can produce a cooling effect?
- I. Compression of a gas.
  - II. Expansion of a gas.
  - III. Evaporation of a liquid.
- A. I, II, and III C. II and III only  
B. I and III only D. III only
26. Which of the following changes occur when a metal block is heated?
- | Volume              | Mass             | Density   |
|---------------------|------------------|-----------|
| A. Increases        | remains the same | decreases |
| B. Increases        | increases        | increases |
| C. Remains the same | remains the same | decreases |
| D. Increases        | remains the same | increases |

27. The temperature at which all the heat energy is removed from a substance is called
- A. Kelvin temperature                      C. freezing temperature  
 B. Celsius temperature                      D. absolute zero temperature
28. The pressure of a gas at  $17^{\circ}\text{C}$  is  $10^5$  pa. find its pressure at  $27^{\circ}\text{C}$  if the volume remains constant
- A.  $\frac{27}{17} \times 10^5$ pa                                  C.  $\frac{17}{27} \times 10^5$ pa  
 B.  $\frac{300}{290} \times 10^5$ pa                                  D.  $\frac{290}{300} \times 10^5$ pa
29. A tight bottle top becomes easier to unscrew when hot water flows over it because the
- A. Cap expands more than the glass.  
 B. Glass in the neck of the bottle contracts.  
 C. Hot water acts like oil between the glass and bottle.  
 D. Increased pressure of the air in the bottle causes the cap to expand.
30. A bimetallic strip operates on the principle that metals
- A. Are heat controllers.                                  C. Are good heat conductors.  
 B. Have different rates of expansion. D. Have the same rates of expansion.
31. A dull black surface feels hotter even though it is at the same temperature as a shiny surface because it
- A. Has more heat than a shiny surface.  
 B. Emits more heat than a shiny surface.  
 C. Reflects more heat than a shiny surface  
 D. Conducts more heat than a shiny surface.
32. When 1kg of a certain liquid is heated for 10s its temperature rises by  $25^{\circ}\text{C}$ . If the power supplied is 1000W, find the specific heat capacity of the liquid.
- A.  $40 \text{ Jkg}^{-1}\text{K}^{-1}$     B.  $400 \text{ Jkg}^{-1}\text{K}^{-1}$     C.  $1000 \text{ Jkg}^{-1}\text{K}^{-1}$     D.  $2500 \text{ Jkg}^{-1}\text{K}^{-1}$
33. When the pressure of a fixed mass of a gas is reduced by half, its volume
- A. Doubles at constant pressure  
 B. Is halved at constant temperature.  
 C. Is halved if the temperature is also halved.  
 D. Remains the same at constant temperature.
34. The particles in a solid at room temperature are
- A. Close together and vibrating.  
 B. Close together and stationary.  
 C. Far apart and moving at random.  
 D. Close together and moving at random.
35. 450g of water at  $60^{\circ}\text{C}$  is to be cooled to  $35^{\circ}\text{C}$  by addition of cold water at  $20^{\circ}\text{C}$ . How much cold water is to be added?
- A. 0.169 kg    B. 0.270 kg    C. 0.281 kg    D. 0.750 kg
36. The rate of evaporation from a body is increased by
- I. Temperature  
 II. Pressure  
 III. Liquid with greater cohesive forces.  
 IV. Dryness of air around the body.

- A. I and II only  
B. II and III only  
C. I and IV only  
D. III only
37. A block of lead of mass 1000g hits a hard surface without rebounding with a velocity of  $23 \text{ ms}^{-1}$ . If its temperature rises from  $25^{\circ}\text{C}$  to  $27^{\circ}\text{C}$ , calculate the specific heat capacity of lead.  
A.  $5.75 \text{ Jkg}^{-1}\text{K}^{-1}$  B.  $9.79 \text{ Jkg}^{-1}\text{K}^{-1}$  C.  $132.25 \text{ Jkg}^{-1}\text{K}^{-1}$  D.  $264.50 \text{ Jkg}^{-1}\text{K}^{-1}$
38. A domestic refrigerator uses a volatile liquid. Which of the following represents the order of the processes the liquid undergoes?  
A. Evaporation, cooling, compression, condensation, evaporation  
B. Cooling, condensation, evaporation, compression, evaporation  
C. Compression, evaporation, condensation, cooling, evaporation  
D. Condensation, cooling, evaporation, compression, evaporation
39. The amount of heat required to raise the temperature of 0.5 kg of iron from  $25^{\circ}\text{C}$  to  $50^{\circ}\text{C}$  is  
(Specific heat capacity of iron is  $460 \text{ Jkg}^{-1}\text{K}^{-1}$ )  
A.  $\frac{0.5 \times 460}{25}$   
B.  $\frac{460 \times 25}{0.5}$   
C.  $0.5 \times 460 \times 25$   
D.  $\frac{0.5 \times 25}{460}$
40. The volume of a fixed mass of a gas at  $27^{\circ}\text{C}$  and pressure of 750 mmHg is  $300 \text{ cm}^3$ . What is its volume when the pressure is raised to 900 mmHg and the temperature is  $327^{\circ}\text{C}$ ?  
A.  $125 \text{ cm}^3$  B.  $180 \text{ cm}^3$  C.  $500 \text{ cm}^3$  D.  $720 \text{ cm}^3$
41. The process of using a material of low thermal conductivity to prevent heat loss is called  
A. Cooling B. Lagging C. Absorption D. contraction
42. When air is pumped in a tube at constant temperature, the pressure increases because  
A. The molecules are larger.  
B. The molecules are moving faster.  
C. The molecules are closer together.  
D. More are hitting the tube.
43. A 100g quantity of water at  $24^{\circ}\text{C}$  is added to 50g of water at  $36^{\circ}\text{C}$ . The final temperature of the mixture is  
A.  $28^{\circ}\text{C}$  B.  $32^{\circ}\text{C}$  C.  $30^{\circ}\text{C}$  D.  $34^{\circ}\text{C}$
44. Which one of the following fluids is the best conductor of heat?  
A. Air B. Alcohol C. Water D. Mercury
45. Calculate the amount of heat required to change 100g of water at  $100^{\circ}\text{C}$  to steam at  $100^{\circ}\text{C}$ .  
(Specific latent heat of steam =  $2.26 \times 10^6 \text{ J kg}^{-1}$ )  
A.  $2.26 \times 10^8 \text{ J}$  B.  $2.26 \times 10^7 \text{ J}$  C.  $2.26 \times 10^5 \text{ J}$  D.  $2.26 \times 10 \text{ J}$
46. The specific heat capacity of a substance is the amount of  
A. Heat required to raise it through  $1^{\circ}\text{C}$   
B. Heat required to raise the temperature of 1kg mass of the substance through  $1^{\circ}\text{C}$

- C. Heat required to change 1kg mass of the substance into liquid at the same temperature.
- D. Heat required to raise its temperature a specific number of degrees.
47. The transfer of heat by the actual movement of molecules of matter takes place
- A. Only in liquids                      C. only in gases  
B. In solids and liquids              D. in liquids and gases
48. The mode of transfer of heat between the boiler and storage tank of a hot water supply system is
- A. Radiation    B. Conduction    C. Convection    D. evaporation
49. Radiation is the transfer of heat
- A. In a liquid which involves the movement of the molecules.  
B. From one place to another by means of electromagnetic waves.  
C. Through a material medium without the bulk movement of the medium.  
D. Through a fluid which involves the bulk movement of the fluid itself.
50. During the power stroke of a four stroke petrol engine
- I. The plug sparks  
II. The piston moves up  
III. Both valves remain closed  
IV. The piston moves down wards
- A. I and II only                      C. I, II and III only  
B. I and IV only                     D. I, III and IV only

***THE END***