

Thermal Properties of Matter – 2023 June O Level 5054

1. June/2023/Paper_ 5054/11/No.16

An incomplete statement about latent heat is given.

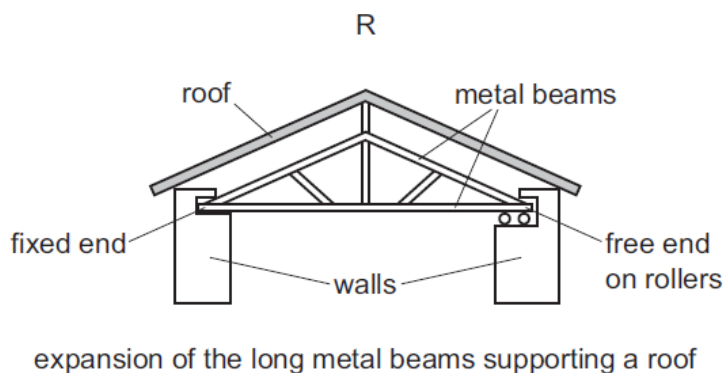
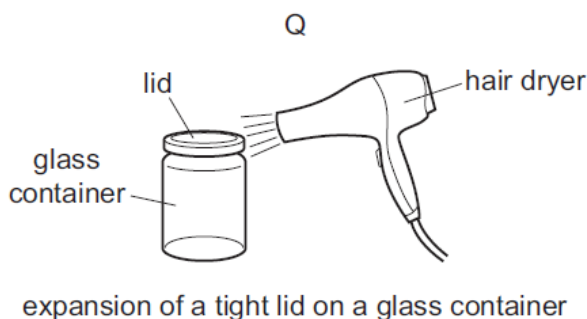
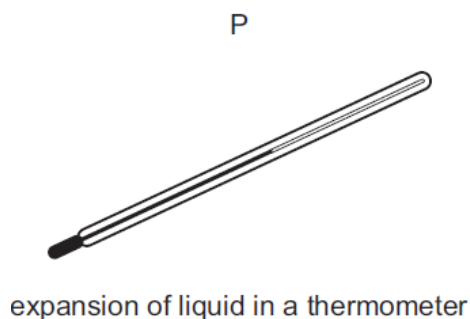
Latent heat is the1..... required to overcome the bonds between molecules and change the2..... of a substance.

Which words are inserted into gap 1 and gap 2 to correctly complete the sentence?

	gap 1	gap 2
A	energy	state
B	force	state
C	energy	temperature
D	force	temperature

2. June/2023/Paper_ 5054/12/No.16

The diagrams show examples of thermal expansion.



In which diagrams is the thermal expansion useful?

- A** P, Q and R **B** P and Q only **C** P only **D** Q and R only

3. June/2023/Paper_5054/21/No.5(c)

Fig. 5.1 shows the particles (molecules) in a sample of liquid water.

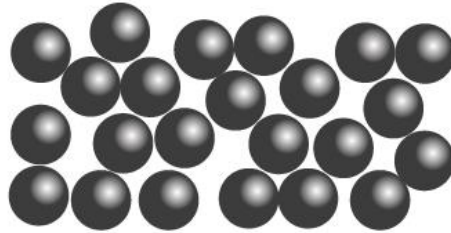


Fig. 5.1

(c) An electric heater is used to heat a sample of metal, as shown in Fig. 5.2. There is no thermal energy transferred from the metal to the surroundings during the heating.

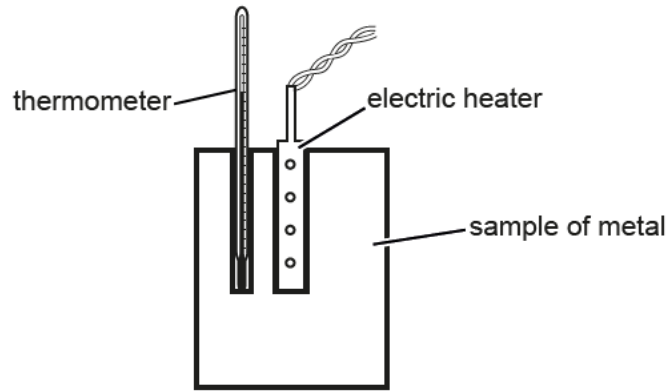


Fig. 5.2

The metal has a mass of 200g and is initially at 15 °C.

The heater is switched on for 2.0 minutes and then switched off. The maximum temperature reached by the metal is 40 °C.

The power of the heater is 20W.

Calculate the specific heat capacity of the metal.

Show your working.

specific heat capacity = J/(g °C) [3]

4. June/2023/Paper_5054/22/No.4

Fig. 4.1 shows the particles (atoms) at one instant in a sample of iron at a temperature below its melting point.

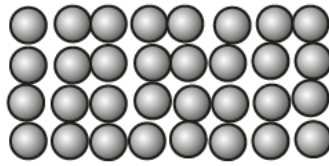


Fig. 4.1

(a) (i) State the lowest possible temperature on the Celsius scale and on the Kelvin scale.

Celsius scale °C Kelvin scale K [1]

(ii) The temperature of the solid increases. The sample remains a solid.

Describe how the motion of the particles changes.

.....
..... [2]

(iii) The solid melts.

State what happens to the internal energy and the temperature of the solid as it melts.

internal energy
temperature [2]

(b) A student:

- places a 300g piece of iron in boiling water until the iron is at a temperature of 100 °C
- removes the iron from the water and places it immediately into 100g of water at 25 °C.

The iron cools and the water warms until both reach the same temperature, 44 °C.

The specific heat capacity of water is 4.2 J/(g °C). No energy is lost to the surroundings.

(i) Calculate the change in energy (internal energy) of the water as it warms up.

change in energy = J [2]

(ii) Calculate the specific heat capacity of iron.

specific heat capacity = J/(g °C) [2]

[Total: 9]