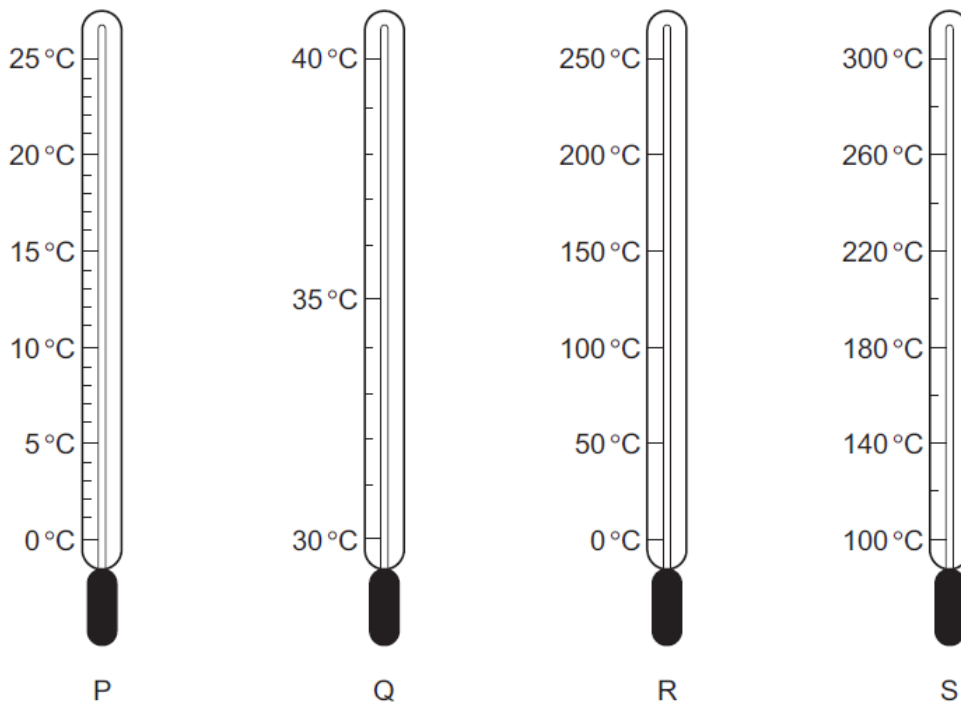


**Thermal Properties of Matter – 2022 Nov O Level 5054**

**1. Nov/2022/Paper\_11,12/No.19,20**

The diagrams represent four thermometers.



Which thermometer has the greatest sensitivity and which thermometer has the greatest range?

	greatest sensitivity	greatest range
<b>A</b>	P	R
<b>B</b>	P	S
<b>C</b>	Q	R
<b>D</b>	Q	S

**2. Nov/2022/Paper\_11/No.20**

A piece of iron of mass  $m$  is placed in a mixture of ice and water.

Its temperature decreases from  $\theta_1$  to  $\theta_2$ .

How much thermal energy is lost by the piece of iron?

- A**  $m \times$  specific heat capacity of iron  $\times (\theta_1 - \theta_2)$
- B**  $m \times$  specific heat capacity of iron  $\times \theta_2$
- C**  $m \times$  heat capacity of piece of iron  $\times (\theta_1 - \theta_2)$
- D**  $m \times$  heat capacity of piece of iron  $\times \theta_2$

3. Nov/2022/Paper\_22/No.7

Copper is sometimes chosen as a material to make pans for heating liquids.

A copper pan contains water at room temperature.

- (a) The top surface of the water in the pan cools as water evaporates. A convection current causes the rest of the water to cool.

Explain how this convection current is produced.

.....

.....

.....

.....

..... [3]

- (b) The copper pan is now placed on a hotplate that is switched on.

- (i) Name the process by which thermal energy passes through the base of the pan.

..... [1]

- (ii) Copper remains a solid when heated up to 1000 °C.

State **one** other reason why it is sensible to make a pan out of copper.

..... [1]

- (c) The water in the pan is heated from 17 °C until it starts to boil at 100 °C.

- (i) The specific heat capacity of water is 4200 J/(kg °C) and the pan contains 750 g of water.

Calculate the energy needed to increase the temperature of the water from 17 °C to 100 °C.

energy = ..... [3]

(ii) State **two** ways in which boiling differs from evaporation.

1 .....

.....

2 .....

.....

[2]

(iii) At 100 °C the temperature of the water stops increasing, even though energy is still being transferred to the water.

Explain, in terms of molecules, why thermal energy is needed to change the state of the water from liquid to gas.

.....

.....

.....

.....

[2]

(iv) The specific latent heat of vaporisation of water is  $2.3 \times 10^6$  J/kg.

Thermal energy is transferred to the boiling water at a rate of 1300 J/s.

Calculate the mass of water that boils away in the 10 minutes immediately after the water reaches 100 °C.

mass = ..... [3]

[Total: 15]