PEARSON EDEXCEL GCSE PHYSICS (HIGHER) · 1PH0

PHYSICS



EXAM QUESTION PACK

TOPIC 14: PARTICLE MODEL (PACK 2)

SCORE	PERCENTAGE
/60	%

STEMUP

These questions belong to Pearson Edexcel, not to us.

The examination questions, mark schemes and examiner comments in this pack were written and published by Pearson Edexcel. They are past assessment materials, reproduced here so that students can revise from them.

What we do not own

STEMUP is not affiliated with Pearson Edexcel and does not own, and makes no claim to own, any of the question, mark scheme or examiner report material in this pack. Pearson Edexcel has not endorsed, approved or been involved in the production of it. Pearson Edexcel and the qualification titles used here belong to their respective owners and appear for identification only.

Where to find the originals

Pearson Edexcel publishes its past papers, mark schemes and examiner reports. Always check the current specification at qualifications.pearson.com before you revise, because content and wording can change between series.

If you hold the rights to any material in this pack and would like it amended or removed, contact admin@stemup.co.uk and we will act on it.

Q1.

A student measures the density of glass.

The student has

− a bag of marbles, all made from the same type of glass

− a weighing balance

− a plastic measuring cylinder containing water

Describe how the student could find, as accurately as possible, the density of the glass used for the marbles.

(4)

.....

.....

.....

.....

.....

.....

.....

.....

(Total for question = 4 marks)

Q2.

A student measures the density of glass.

The student has

− a bag of marbles, all made from the same type of glass

− a weighing balance

− a plastic measuring cylinder containing water

Describe how the student could find, as accurately as possible, the density of the glass used for the marbles.

(4)

.....

.....

.....

.....

.....

.....

.....

.....

(Total for question = 4 marks)

Q3.

Describe what happens when a substance experiences sublimation.

(2)

.....

.....

.....

.....

(Total for question = 2 marks)

Q4.

Describe, in terms of particles, **two** differences between a solid and a liquid of the same substance.

(2)

1 .....

.....

2 .....

.....

(Total for question = 2 marks)

Q5.

Describe what happens when a substance experiences sublimation.

(2)

.....

.....

.....

(Total for question = 2 marks)

Q6.

Figure 1 shows some gas in a container.

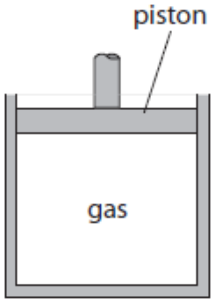


Figure 1

Explain, in terms of particles, how the gas exerts a pressure on the piston.

(2)

.....

.....

.....

.....

(Total for question = 2 marks)

Q7.

Figure 10 shows some apparatus that may be used to determine the specific heat capacity of water.

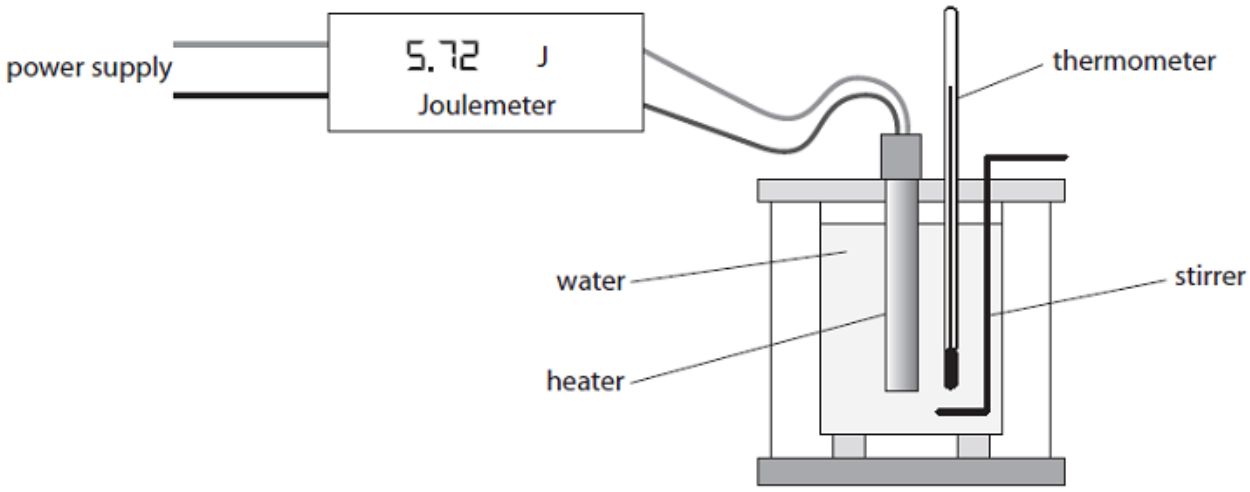


Figure 10

A student measures the initial temperature of the water.

The power supply is switched on for 10 minutes and then switched off.

Explain how the student should then obtain an accurate reading for the final temperature of the water, to be used in the calculation of the specific heat capacity.

(3)

.....

.....

.....

.....

.....

.....

(Total for question = 3 marks)

Q8.

Figure 19 shows some apparatus that may be used to determine the specific heat capacity of water.

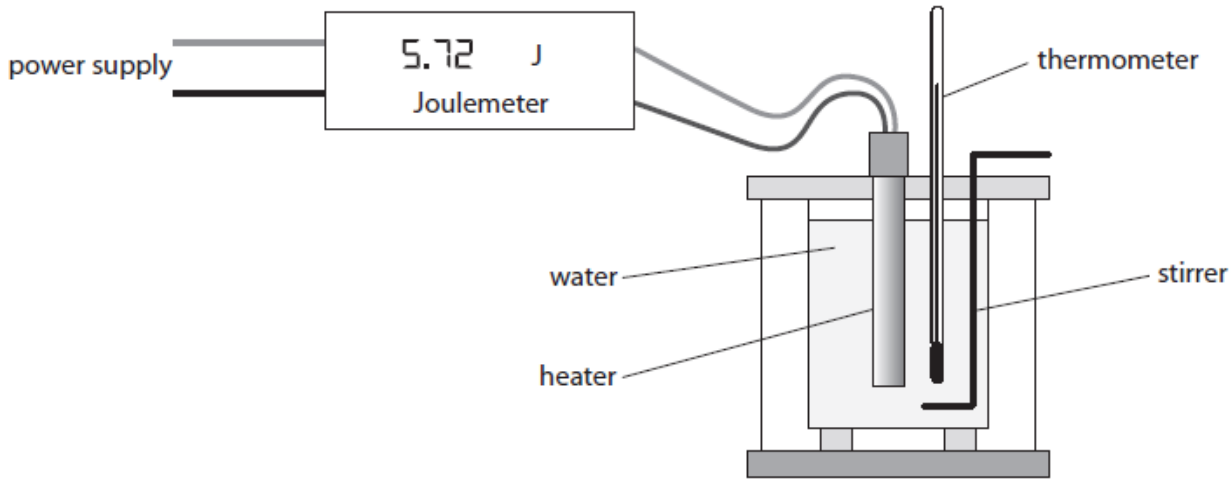


Figure 19

A student measures the initial temperature of the water.

The power supply is switched on for 10 minutes and then switched off.

Explain how the student should then obtain an accurate reading for the final temperature of the water, to be used in the calculation of the specific heat capacity.

(3)

.....

.....

.....

.....

.....

(Total for question = 3 marks)

Q9.

* A container of gas is at room temperature.

The gas is then heated.

The volume of the container remains the same.

By considering changes in velocities of the gas particles, explain how the temperature increase affects

- the average kinetic energy of the particles
- the pressure the particles exert on the walls of the container.

(6)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Total for question = 6 marks)

Q10.

Explain the difference between the term 'specific heat capacity' and the term 'specific latent heat' when applied to heating substances.

(2)

.....

.....

.....

.....

(Total for question = 2 marks)

Q11.

Explain the difference between the term 'specific heat capacity' and the term 'specific latent heat' when applied to heating substances.

(2)

.....

.....

.....

.....

(Total for question = 2 marks)

Q12.

A container of gas is at room temperature.

The gas is then heated.

The volume of the container remains the same.

By considering changes in velocities of the gas particles, explain how the temperature increase affects

- the average kinetic energy of the particles
- the pressure the particles exert on the walls of the container.

(6)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Total for question = 6 marks)

Q13.

Figure 3 shows some water in a measuring cylinder and a lump of iron.

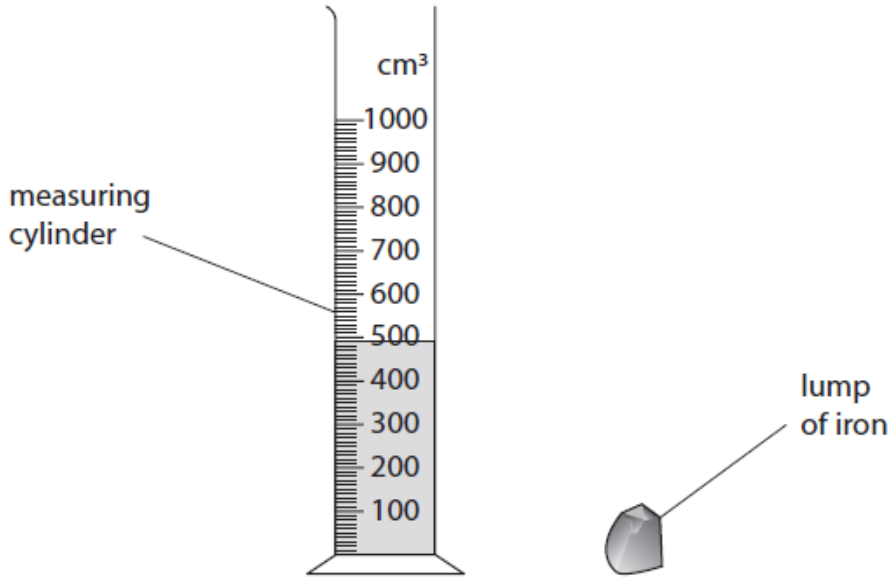


Figure 3

The lump of iron is lowered fully into the water.

The water level in the measuring cylinder rises to 530 cm^3.

The density of iron is 7.9 g / cm^3.

To find the mass of the lump of iron you would use the equation

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

A piece of wood has a similar shape and volume to the lump of iron.

The density of the wood is 0.82 g / cm^3.

The density of water is 1.00 g / cm^3

Explain why the method used for the lump of iron cannot be used to determine the mass of the piece of wood.

(2)

.....

.....

.....

.....

(Total for question = 2 marks)

Q14.

Figure 5 shows some water in a measuring cylinder and a lump of iron.

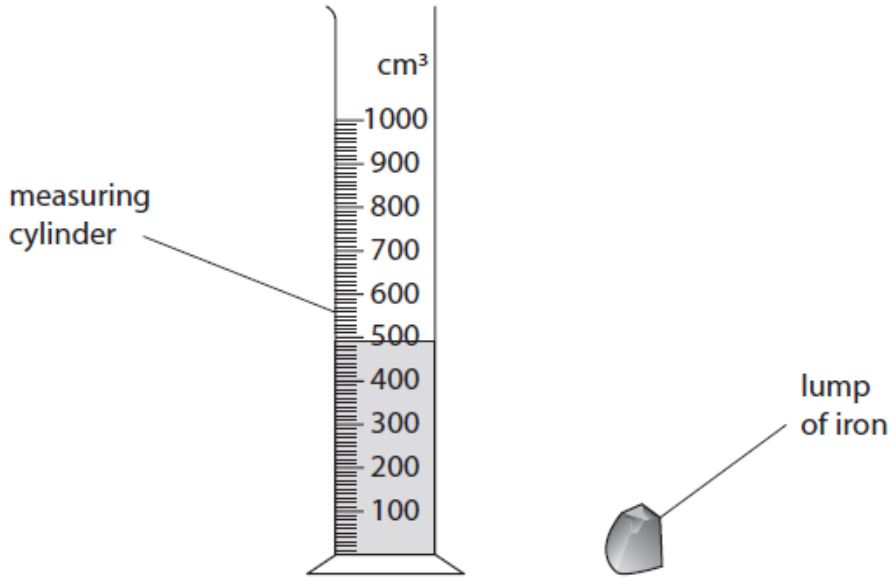


Figure 5

The lump of iron is lowered fully into the water.

The water level in the measuring cylinder rises to 530 cm^3.

The density of iron is 7.9 g / cm^3.

A piece of wood has a similar shape and volume to the lump of iron.

The density of the wood is 0.82 g / cm^3.

The density of water is 1.00 g / cm^3

Explain why the previous method used cannot be used to determine the mass of the piece of wood.

(2)

.....

.....

.....

.....

(Total for question = 2 marks)

Q15.

Figure 1 shows some gas in a container.

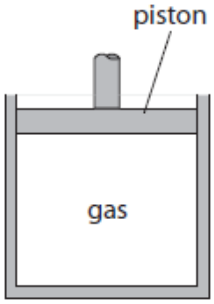


Figure 1

The piston is forced down to a new position, compressing the gas, as in Figure 2.

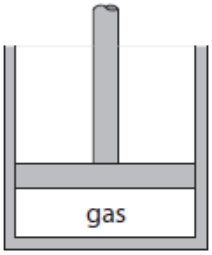


Figure 2

The temperature of the gas remains constant.
Explain, in terms of particles, why the pressure of the gas increases.

(2)

.....

.....

.....

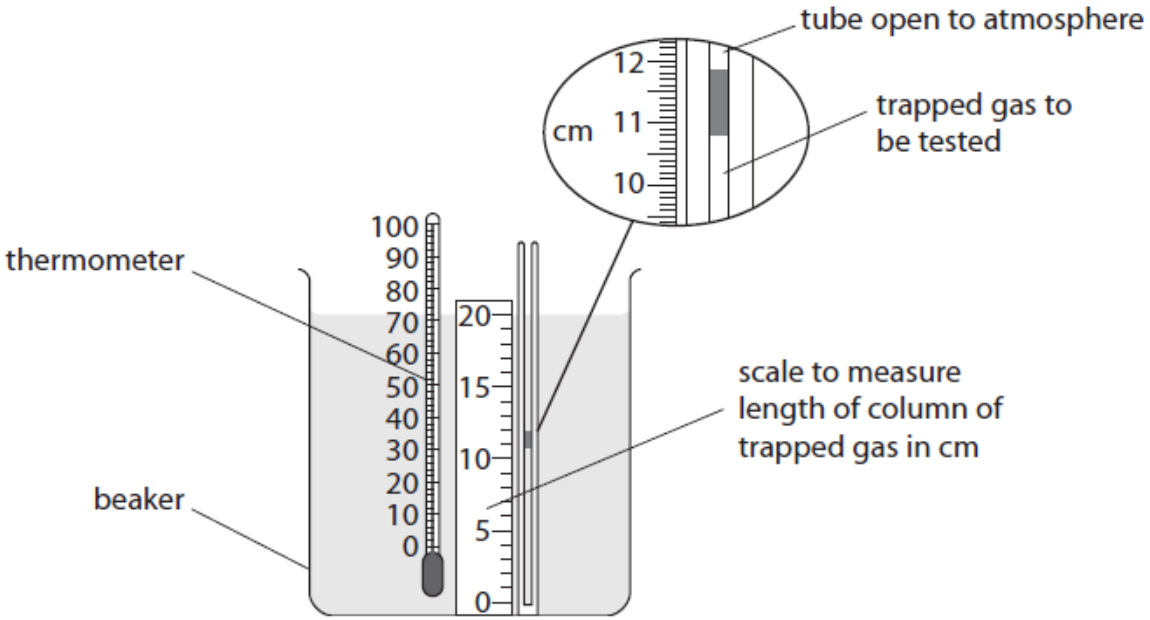
.....

(Total for question = 2 marks)

Q16.

A student investigates how the volume of a gas changes when its temperature increases.

The diagram shows the equipment used and the length of the trapped gas at 25°C.



(a) (i) Use the scale to estimate the length of the column of trapped gas.

(1)

length of column of trapped gas = ... cm

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

The cross-sectional area of the capillary tube is 1.94×10^{-3} cm^2.

The volume of the column of trapped gas at 25°C is about

(1)

☒ **A** $5.6 \times 10^{+3}$ cm^3

☒ **B** 2.1×10^{-2} cm^3

☒ **C** 2.1×10^{-3} cm^3

☒ **D** 5.6×10^{-4} cm^3

(iii) The gas is heated to 50°C.

The volume of the trapped gas at 50°C is 2.31×10^{-2} cm^3.

Calculate the volume of the trapped gas at 100°C.

(3)

volume of the trapped gas = ... cm^3

(b) Describe how the average kinetic energy of the particles of the gas changes as the temperature of the gas changes.

(3)

.....

.....

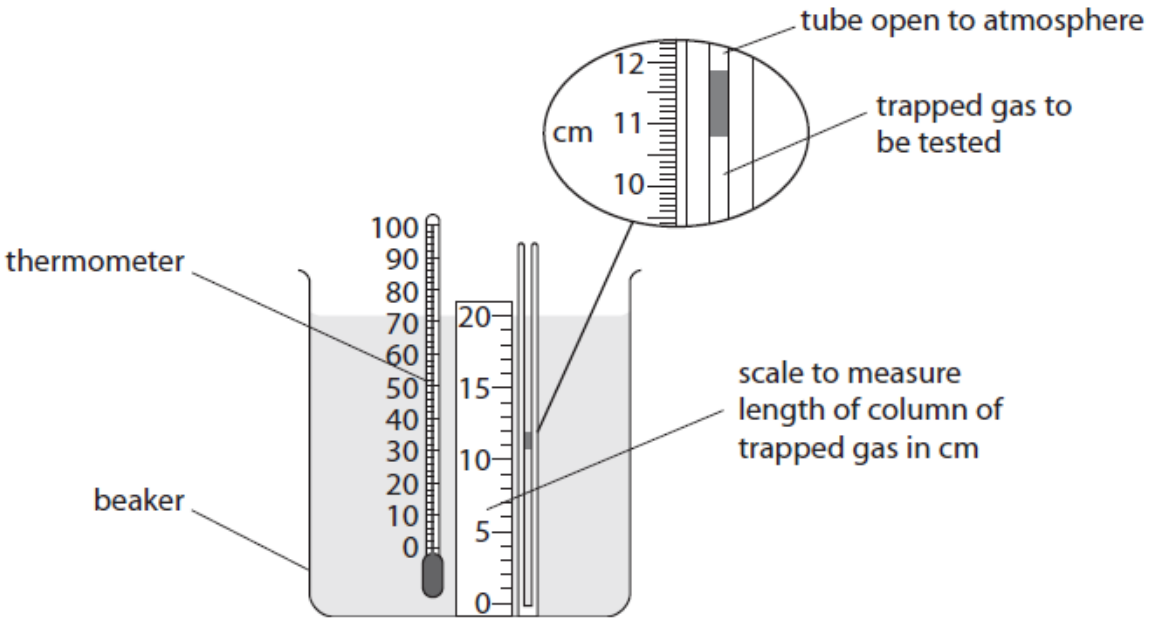
.....

.....

Q17.

A student investigates how the volume of a gas changes when its temperature increases.

The diagram shows the equipment used and the length of the trapped gas at 25°C.



(a) (i) Use the scale to estimate the length of the column of trapped gas.

(1)

length of column of trapped gas = ... cm

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

The cross-sectional area of the capillary tube is 1.94×10^{-3} cm^2.

The volume of the column of trapped gas at 25°C is about

(1)

☒ **A** $5.6 \times 10^{+3}$ cm^3

☒ **B** 2.1×10^{-2} cm^3

☒ **C** 2.1×10^{-3} cm^3

☒ **D** 5.6×10^{-4} cm^3

(iii) The gas is heated to 50°C.

The volume of the trapped gas at 50°C is 2.31×10^{-2} cm^3.

Calculate the volume of the trapped gas at 100°C.

(3)

volume of the trapped gas = ... cm^3

(b) Describe how the average kinetic energy of the particles of the gas changes as the temperature of the gas changes.

(3)

.....

.....

.....

.....

Q18.

Kinetic theory describes the behaviour of gas particles.

(a) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

At −273 °C the particles in a gas are

(1)

☒ **A** moving rapidly

☒ **B** moving slowly

☒ **C** stationary

☒ **D** vibrating

(ii) The temperature of a gas changes from 300 K to 150 K.

State how the average kinetic energy of the gas particles changes.

(1)

.....

.....

(b) The photograph shows a weather balloon filled with helium.
When released the balloon rises rapidly to a height of 30 000 m above the Earth.



Explain how the helium gas exerts a pressure on the balloon.

(3)

.....

.....

.....

.....

.....

.....

(c) On the surface of the Earth the weather balloon has a volume of 9.1 m^3, when the temperature is 0 °C and the pressure inside the balloon is 101 kPa.

At 30 000 m above the Earth, the temperature is −46 °C and the pressure inside the balloon is 1.12 kPa.

(i) Show that −46 °C is 227 K.

(1)

(ii) Calculate the volume of the weather balloon when it is at a height of 30 000 m.

(3)

volume = ... m^3

(iii) Suggest what will happen to the balloon as it carries on rising above 30 000 m.

(1)

.....

.....

(Total for Question = 10 marks)

Q19.

As part of the testing of different types of steel, a steelworker needs to obtain a temperature-time graph for **solidifying** molten steel.

Figure 9 shows an arrangement the steelworker could use.

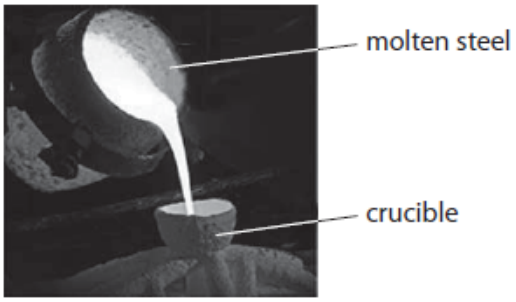


Figure 9

The following devices are available to the steel worker.
The melting point of these steels is between 1425 and 1540 °C

device	range of temperatures	other notes
Thermocouple thermometer	−50 to 1800 °C	Fast response time Probe inserted into melt
Infrared thermometer (pyrometer)	1200 to 2000 °C	Remotely read, using infrared radiation, measures the temperature of the surface it is aimed at
Platinum resistance thermometer	−200 to 850 °C	The most accurate of thermometers based on how resistance changes with temperature

Describe how the steelworker could obtain a temperature-time graph for steel as it goes from the liquid to the solid state.

(4)

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Total for question = 4 marks)

Q20.

As part of the testing of different types of steel, a steelworker needs to obtain a temperature-time graph for **solidifying** molten steel.

Figure 6 shows an arrangement the steelworker could use.

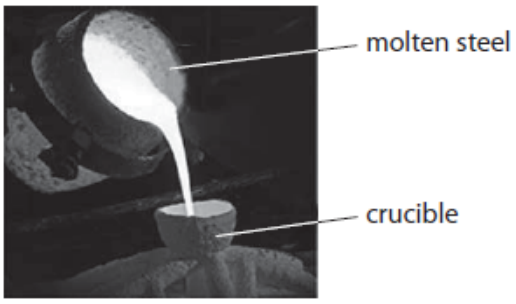


Figure 6

The following devices are available to the steel worker.
The melting point of these steels is between 1425 and 1540 °C

device	range of temperatures	other notes
Thermocouple thermometer	−50 to 1800 °C	Fast response time Probe inserted into melt
Infrared thermometer (pyrometer)	1200 to 2000 °C	Remotely read, using infrared radiation, measures the temperature of the surface it is aimed at
Platinum resistance thermometer	−200 to 850 °C	The most accurate of thermometers based on how resistance changes with temperature

Describe how the steelworker could obtain a temperature-time graph for steel as it goes from the liquid to the solid state.

(4)

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Total for question = 4 marks)

Q21.

A student uses the apparatus in Figure 3 to determine the specific heat capacity of water.

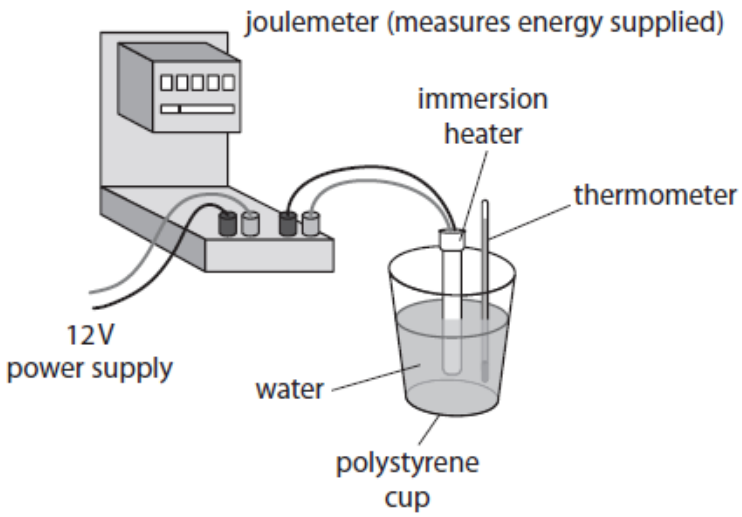


Figure 3

The student decides to measure the temperature of the water every minute while it is being heated.

Figure 4 shows a graph of the student's results.

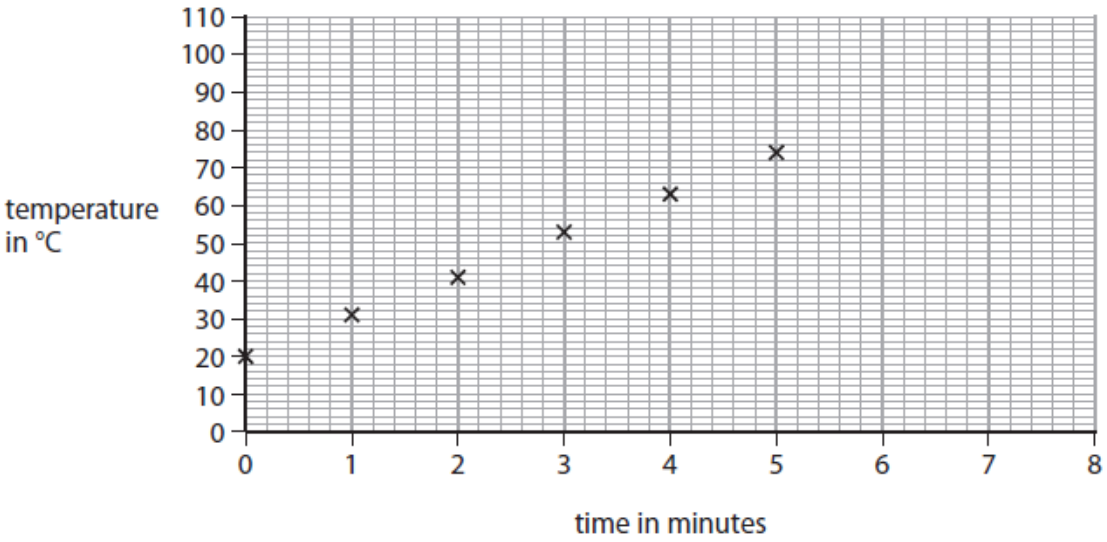


Figure 4

Predict the temperature of the water if the heating continues up to 8 minutes.

(1)

temperature of the water = ... °C

(Total for question = 1 mark)

Q22.

A student uses the apparatus in Figure 3 to determine the specific heat capacity of water.

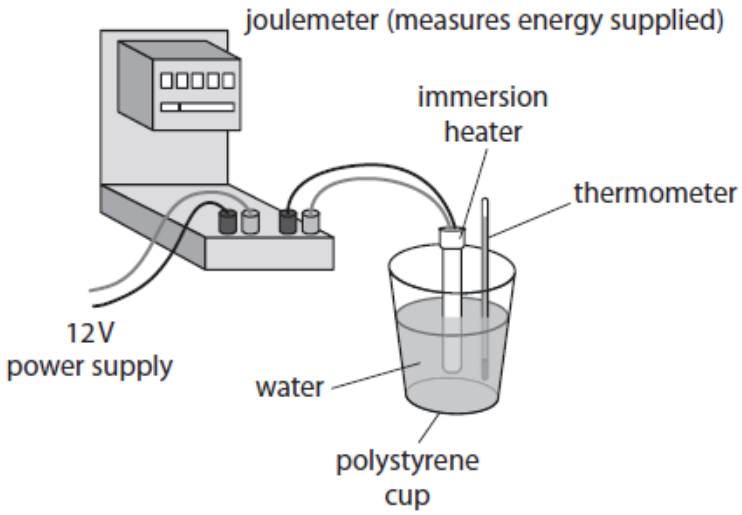


Figure 3

The student decides to measure the temperature of the water every minute while it is being heated.

Figure 4 shows a graph of the student's results.

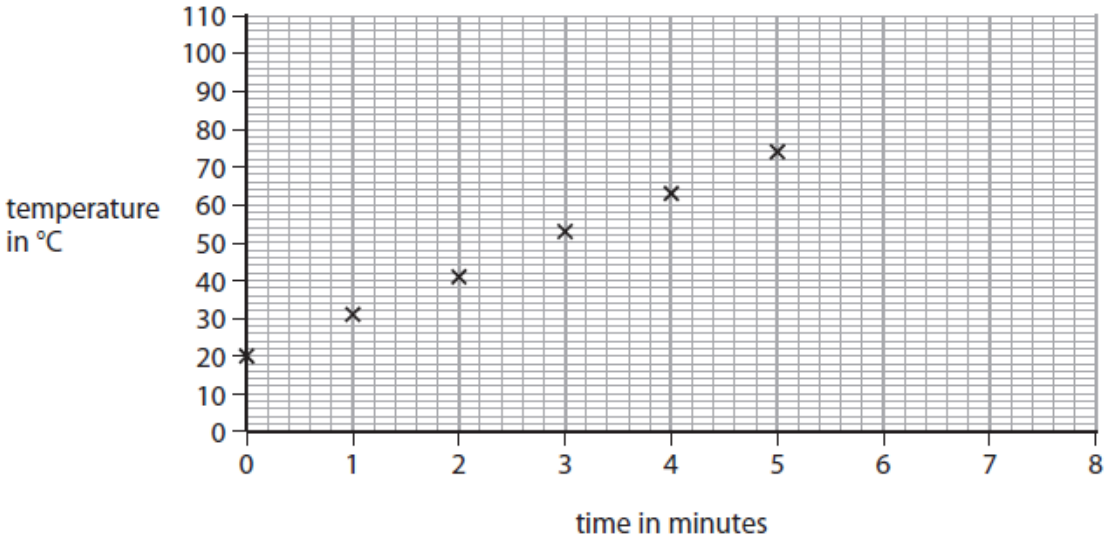


Figure 4

Predict the temperature of the water if the heating continues up to 8 minutes.

(1)

temperature of the water = ... °C

(Total for question = 1 mark)

Q23.

Figure 4 shows a shed made mostly of concrete blocks.

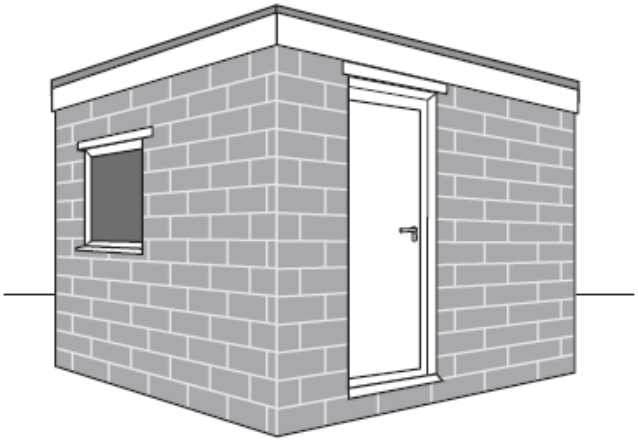


Figure 4

State **two** practical ways to reduce heat loss from this shed.

(2)

1 .....

.....

2 .....

.....

(Total for question = 2 marks)

Q24.

Figure 7 shows a shed made mostly of concrete blocks.

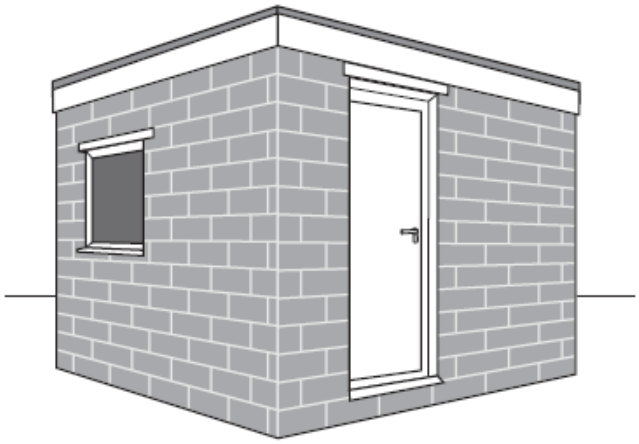


Figure 7

State **two** practical ways to reduce heat loss from this shed.

(2)

1 .....

.....

2 .....

.....

(Total for question = 2 marks)

Q25.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

When water boils and turns into steam, there are changes in the arrangement of particles and the density.

Which of these shows the changes?

(1)

		space between particles in steam	density of steam
☒	**A**	bigger than in water	greater than water
☒	**B**	bigger than in water	less than water
☒	**C**	smaller than in water	greater than water
☒	**D**	smaller than in water	less than water

(Total for question = 1 mark)

Q26.

Some questions must be answered with a cross in a box (☒). If you change your mind about an answer, put a line through the box (☒) and then mark your new answer with a cross (☒).

When water boils and turns into steam, there are changes in the arrangement of particles and the density.

Which of these shows the changes?

(1)

	space between particles in steam	density of steam
☒ A	bigger than in water	greater than water
☒ B	bigger than in water	less than water
☒ C	smaller than in water	greater than water
☒ D	smaller than in water	less than water

(Total for question = 1 mark)