Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel International GCSE (9–1)

Centre Number | | | | | |

Candidate Number | | | | |

Friday 12 June 2020

Morning (Time: 1 hour 10 minutes) | Paper Reference **4SS0/1P**

Science (Single Award)

Physics

Paper: 1P

You must have:
Calculator, ruler, protractor

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- Calculators may be used.
- 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 ☒.

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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P 6 2 0 6 5 A 0 1 2 0

Pearson

FORMULAE

You may find the following formulae useful.

$$\text{power} = \frac{\text{work done}}{\text{time taken}} \qquad P = \frac{W}{t}$$

$$\text{power} = \frac{\text{energy transferred}}{\text{time taken}} \qquad P = \frac{W}{t}$$

Where necessary, assume the acceleration of free fall, $g = 10\,\text{m/s}^2$.

Answer ALL questions.

1 The Sun is a low-mass star.

(a) The box lists some of the stages in the evolution of a low-mass star.

white dwarf	main sequence	nebula	red giant

Give these stages in the evolution of a low-mass star in the correct order.

Start with the earliest stage.

(3)

earliest stage

latest stage

(b) State the name given to a large collection of billions of stars.

(1)

.....

(c) State the property of a star that determines its colour.

(1)

.....

(Total for Question 1 = 5 marks)

2 This is a question about light.

(a) State what is meant by the term **critical angle**.

You may include a diagram to help your answer.

(2)

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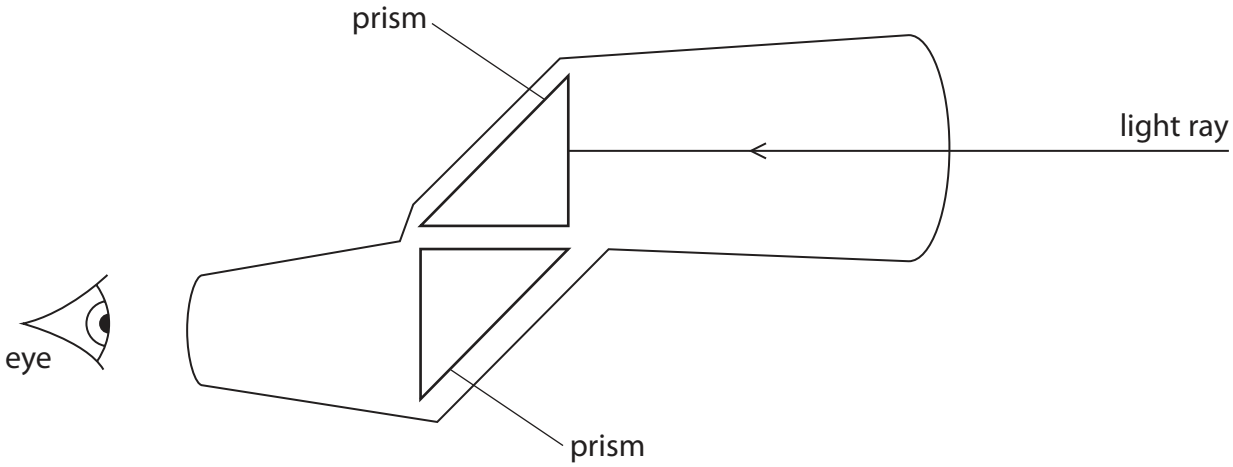
(b) The photograph shows a pair of binoculars.

The diagram shows a cross-section through one half of a pair of binoculars.



There are two glass prisms inside this half of the pair of binoculars.

Complete the path of the light ray as it travels through this half of a pair of binoculars to the eye.

[critical angle of glass = 42°]

(3)

(Total for Question 2 = 5 marks)

3 A student uses this apparatus, and a stopwatch, to investigate the motion of a ball rolling down a ramp.

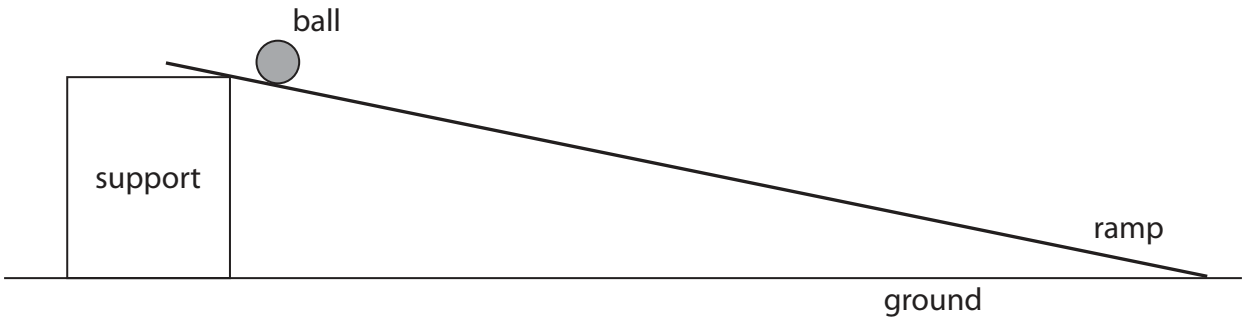


Diagram 1

Diagram 2 shows a section of the ramp when viewed from above.

The ramp has markings every 20 cm along its length.

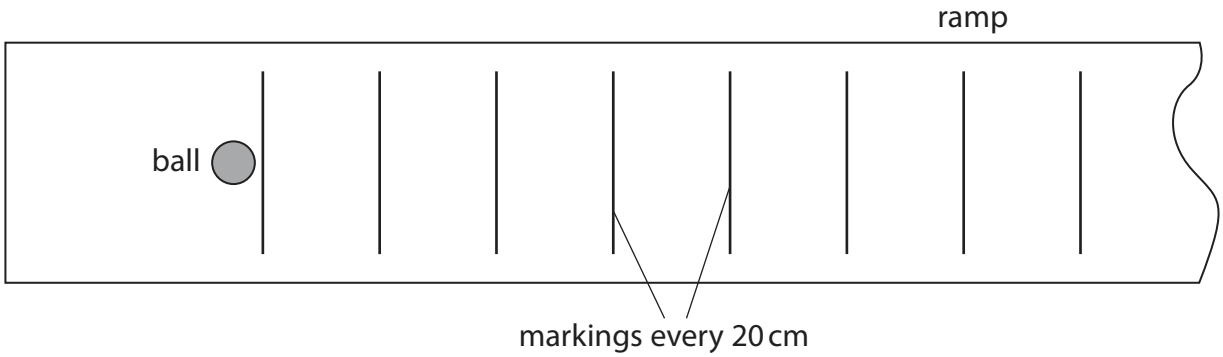


Diagram 2

(a) Describe how the student could use this apparatus, and a stopwatch, to determine the acceleration of the ball down the ramp.

In your answer describe

- the measurements required
- the graph that should be plotted
- how to use the graph to determine the acceleration

(5)

(b) Suggest why this investigation may not give an accurate value for the acceleration of the ball.

(1)

(Total for Question 3 = 6 marks)

4 This is a question about electric circuits.

(a) Diagram 1 shows a 19 Ω resistor connected to a 1.6 V cell.

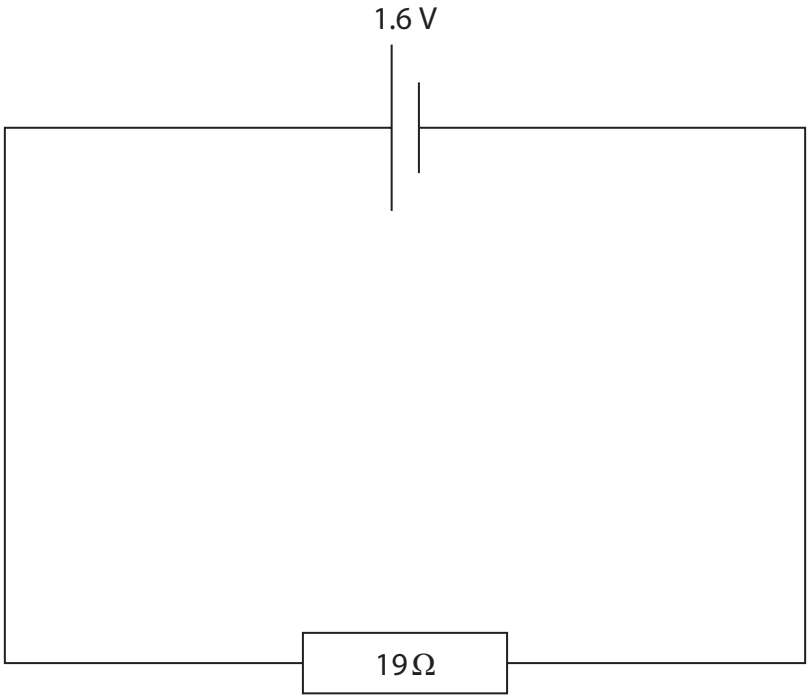


Diagram 1

(i) State the formula linking voltage, current and resistance.

(1)

(ii) Calculate the current in the 19 Ω resistor.

(3)

current = ... A

(b) Diagram 2 shows two different resistors connected in series to the same cell.

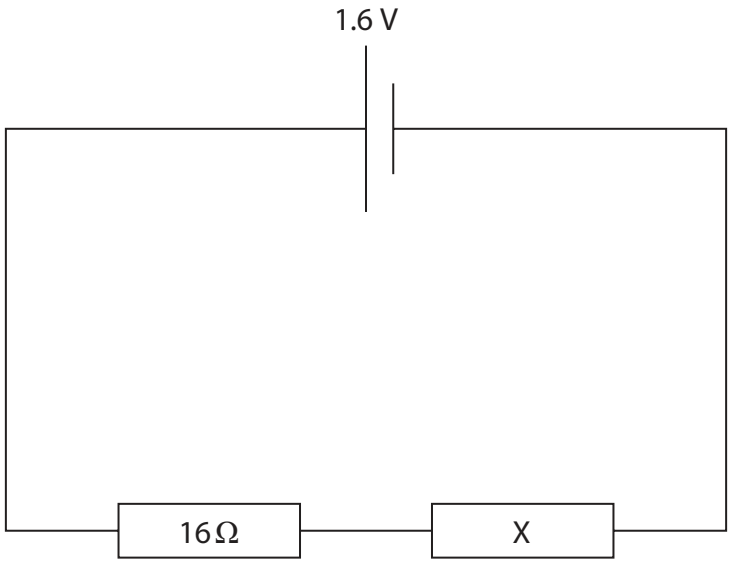


Diagram 2

(i) Draw a component on diagram 2 to measure the voltage of resistor X.

(2)

(ii) The voltage of the 16 Ω resistor is 0.91 V.

Calculate the voltage of resistor X.

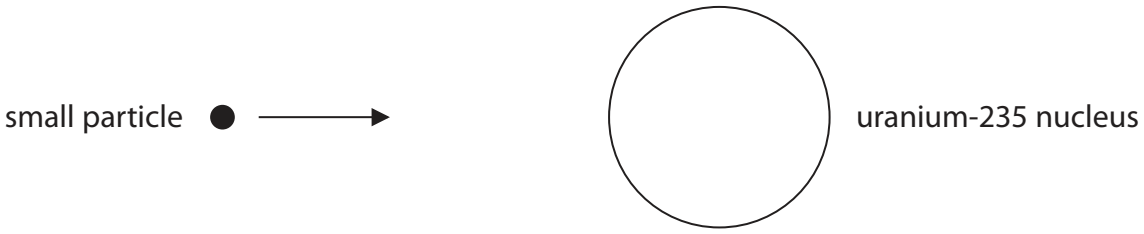
(2)

voltage = ... V

(Total for Question 4 = 8 marks)

5 This is a question about a nuclear reactor.

(a) The diagram shows a small particle about to collide with a uranium-235 nucleus inside the reactor.



The nucleus absorbs this small particle and undergoes nuclear fission.

(i) State the name of the small particle.

(1)

.....

(ii) State what happens to the nucleus in nuclear fission.

(1)

.....

.....

(iii) State the name of the energy store that increases during nuclear fission.

(1)

.....

(b) The fission products emit gamma radiation.

Explain why the nuclear reactor is surrounded by thick concrete shielding.

(3)

(Total for Question 5 = 6 marks)

6 Diagram 1 shows a hydro-electric power station.

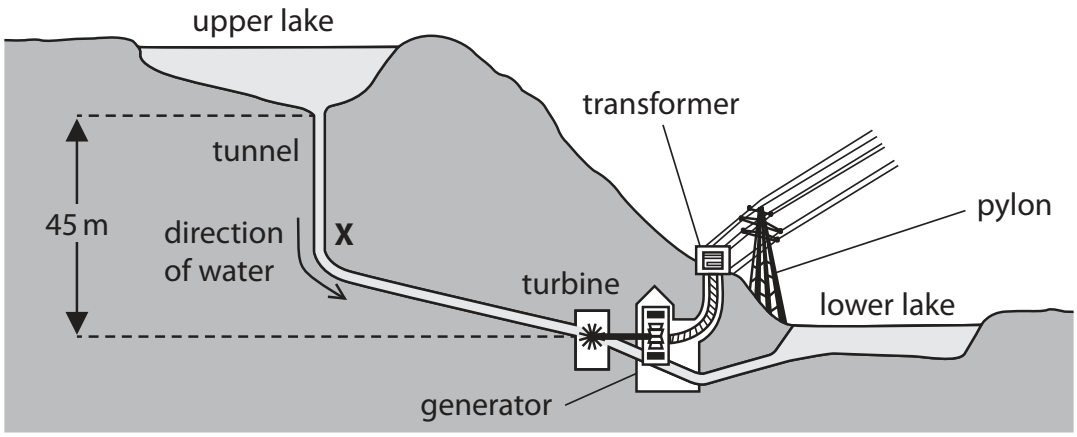


Diagram 1

(a) Water falls from the upper lake and passes position X in the tunnel.

After falling to position X, 1.25×10^3 kg of water has 3.2×10^5 J of energy in its kinetic store.

Calculate the speed of the water at position X.

[kinetic energy = $\frac{1}{2} \times$ mass $\times$ speed^2]

(3)

speed = ... m/s

(b) Water with a mass of 1.25×10^3 kg falls through a height of 45 m from the upper lake to the turbine.

(i) Calculate the decrease in the gravitational potential energy (GPE) store of the water between the upper lake and the turbine.

(3)

decrease in GPE = ... J

(ii) State how much work has been done on the water by the Earth.

(1)

work done = ... J

(iii) State the method of energy transfer required for this work to be done.

(1)

.....

(c) (i) State the formula linking total energy output, useful energy output and efficiency.

(1)

(ii) Diagram 2 shows a Sankey diagram for the generator in the hydro-electric power station.
The generator is designed to transfer energy electrically to the transformer.

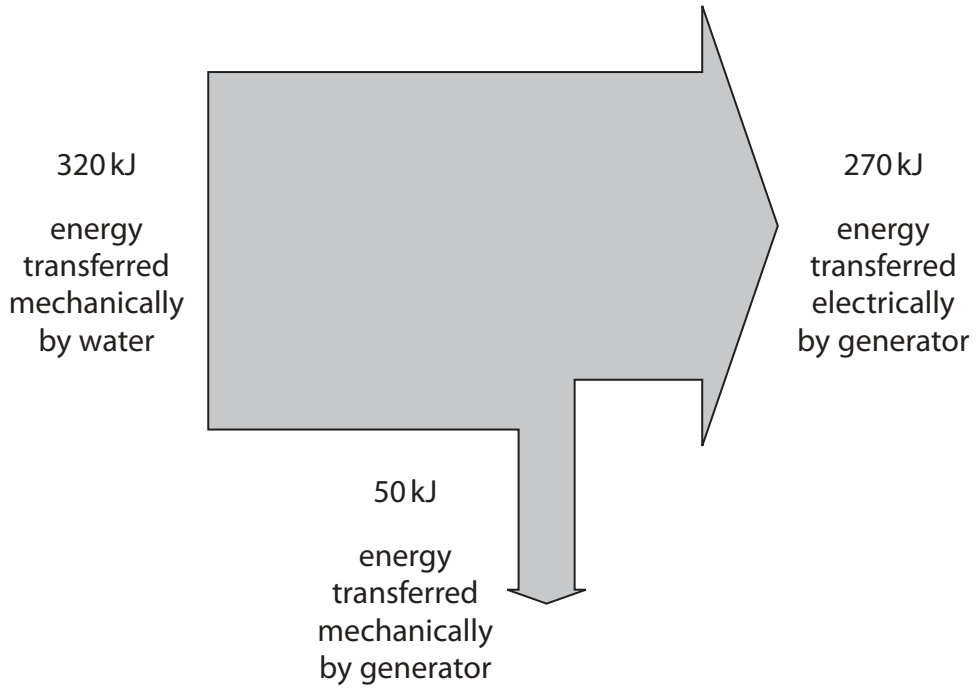


Diagram 2

Which of these is the correct expression for calculating the efficiency of the process shown in diagram 2?

(1)

☒ **A** $\frac{50}{270} \times 100\ \%$

☒ **B** $\frac{270}{320} \times 100\ \%$

☒ **C** $\frac{50}{320} \times 100\ \%$

☒ **D** $\frac{320}{270} \times 100\ \%$

(Total for Question 6 = 10 marks)

7 This is a question about how a loudspeaker works.

(a) Diagram 1 shows a student's left hand.

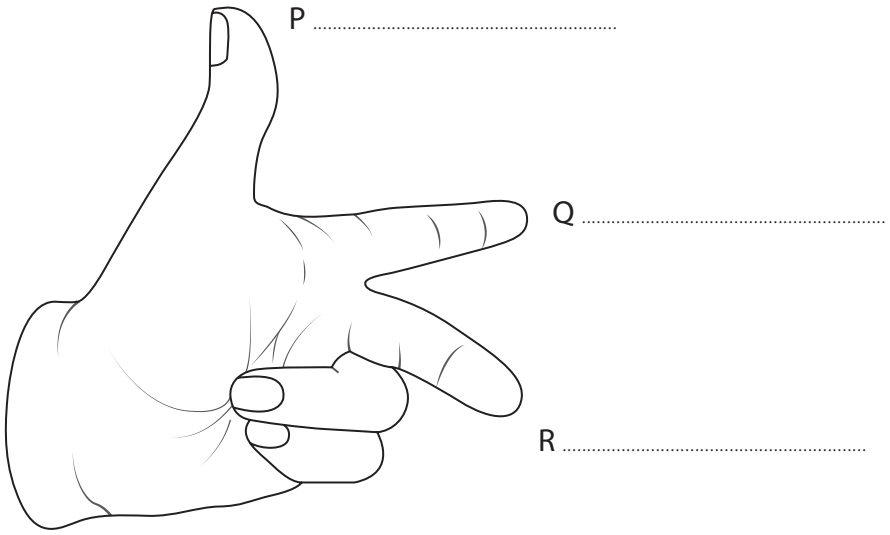


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Diagram 1

Label diagram 1 to show what P, Q and R represent in the left-hand rule.

(3)

(b) Diagram 2 shows part of the permanent magnet taken from a loudspeaker.

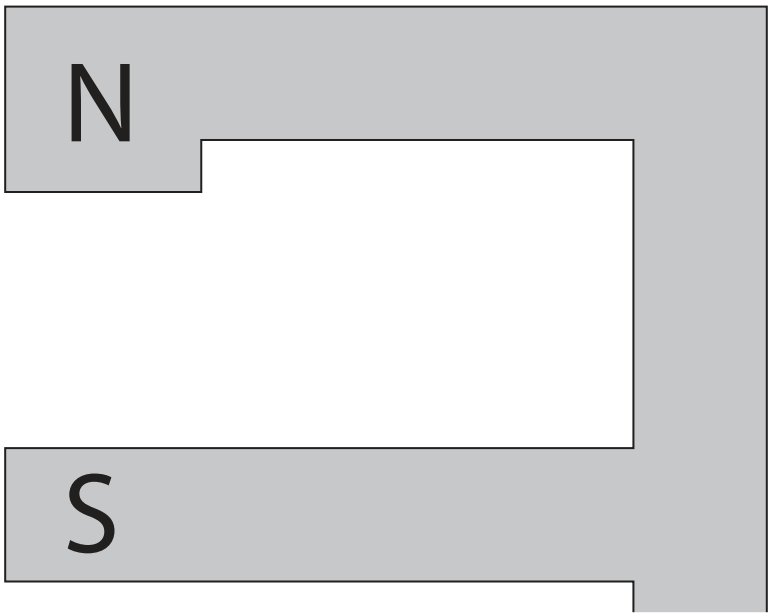


Diagram 2

There is a uniform magnetic field between the north pole and the south pole of the permanent magnet.

On diagram 2, draw three field lines to show this uniform magnetic field.

(2)

(c) The loudspeaker is connected to an alternating current supply.

(i) Describe the difference between alternating current (a.c.) and direct current (d.c.).

(2)

.....

.....

.....

.....

(ii) Diagram 3 shows a cross-section of the loudspeaker with a current in the coil.

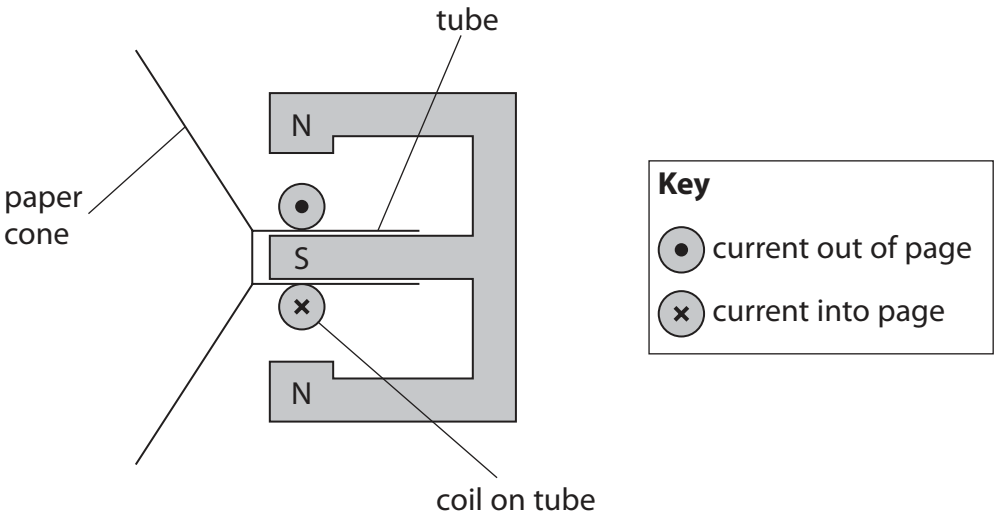


Diagram 3

The coil is attached to the tube.

The tube is attached to the paper cone.

State the direction of motion of the paper cone when the current is in the direction shown in diagram 3.

(1)

.....

(iii) Explain why the loudspeaker does not work when the coil is connected to a battery.

(2)

.....

.....

.....

.....

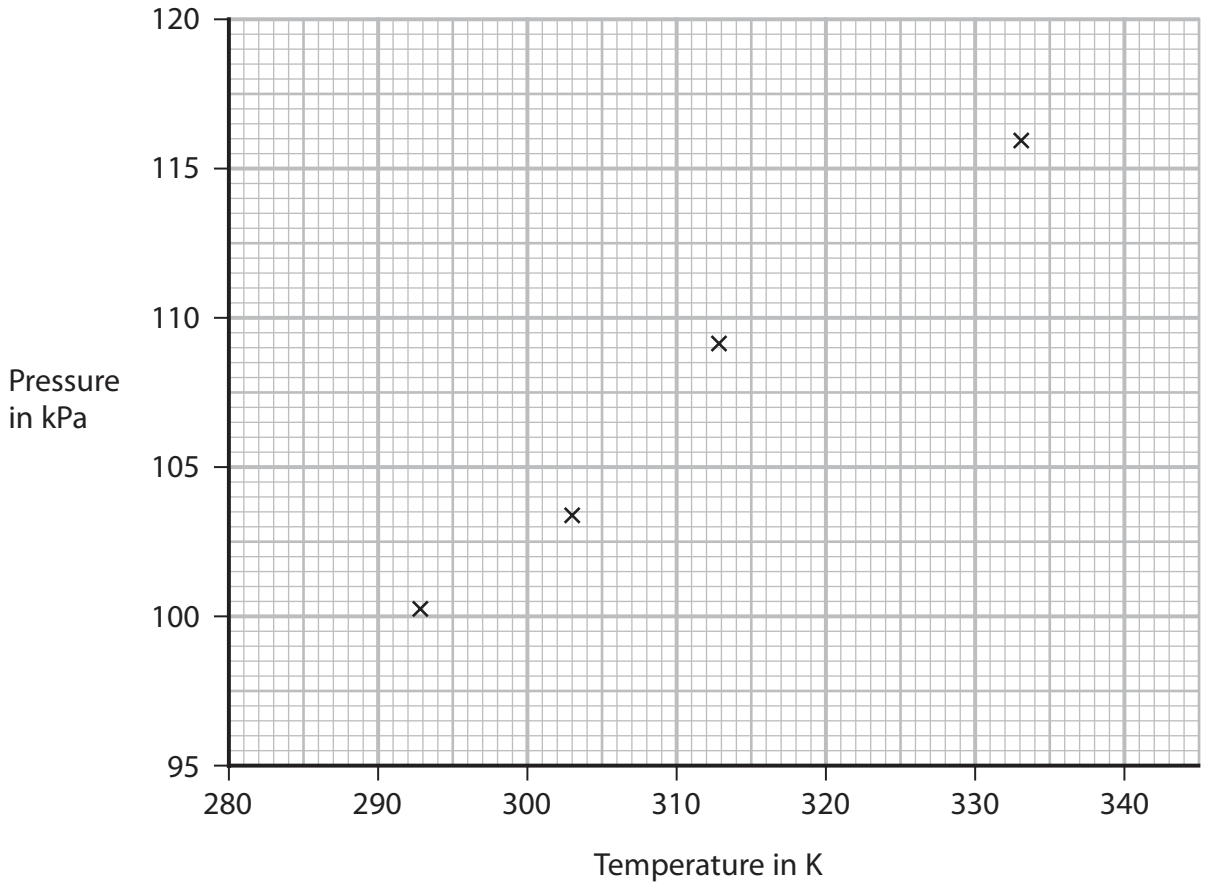
.....

.....

(Total for Question 7 = 10 marks)

8 A student investigates the relationship between the pressure of a gas and its temperature.

The graph shows the student's data.



(a) The table shows some additional data.

temperature in °C	temperature in K	pressure in kPa
50		112

(i) Calculate the temperature in kelvin for the additional data.

(1)

temperature = ... K

(ii) Plot this additional data on the graph.

(1)

(iii) Draw the line of best fit on the graph.

(1)

(b) The average kinetic energy (KE) of a gas molecule is calculated for the gas at two temperatures.

Determine the value of the expression

$$\frac{\text{average KE of a gas molecule at 500K}}{\text{average KE of a gas molecule at 250K}}$$

(1)

(c) Explain how gas molecules exert a pressure on the walls of a container.

(3)

(d) The student reduces the volume of the gas container slowly so that the gas does not increase in temperature and no gas escapes.

The student then repeats the investigation.

Explain what effect this change would have on the line of best fit on the graph.

(3)

(Total for Question 8 = 10 marks)

TOTAL FOR PAPER = 60 MARKS

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