Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel International GCSE (9–1)

Time 1 hour 10 minutes

Paper reference **4SS0/1P**

Science (Single Award)

Physics

PAPER: 1P

You must have:
Calculator, ruler, Equation Booklet (enclosed)

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.

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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Q:1/1/1/

P 7 1 9 6 0 A 0 1 2 4

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.

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 ☒.

1 (a) Which of these astronomical objects is the largest?

(1)

☒ **A** a comet

☒ **B** the Earth

☒ **C** the Moon

☒ **D** the Sun

(b) Which of these types of radiation is the most ionising?

(1)

☒ **A** alpha

☒ **B** beta

☒ **C** gamma

☒ **D** ultraviolet

(c) Which of these is the unit for resistance?

(1)

☒ **A** ampere

☒ **B** ohm

☒ **C** volt

☒ **D** watt

(d) Which of these parts of the electromagnetic spectrum has the shortest wavelength?

(1)

☒ **A** infrared

☒ **B** microwave

☒ **C** ultraviolet

☒ **D** x-ray

(e) Which of these temperatures is the same as 0 °C?

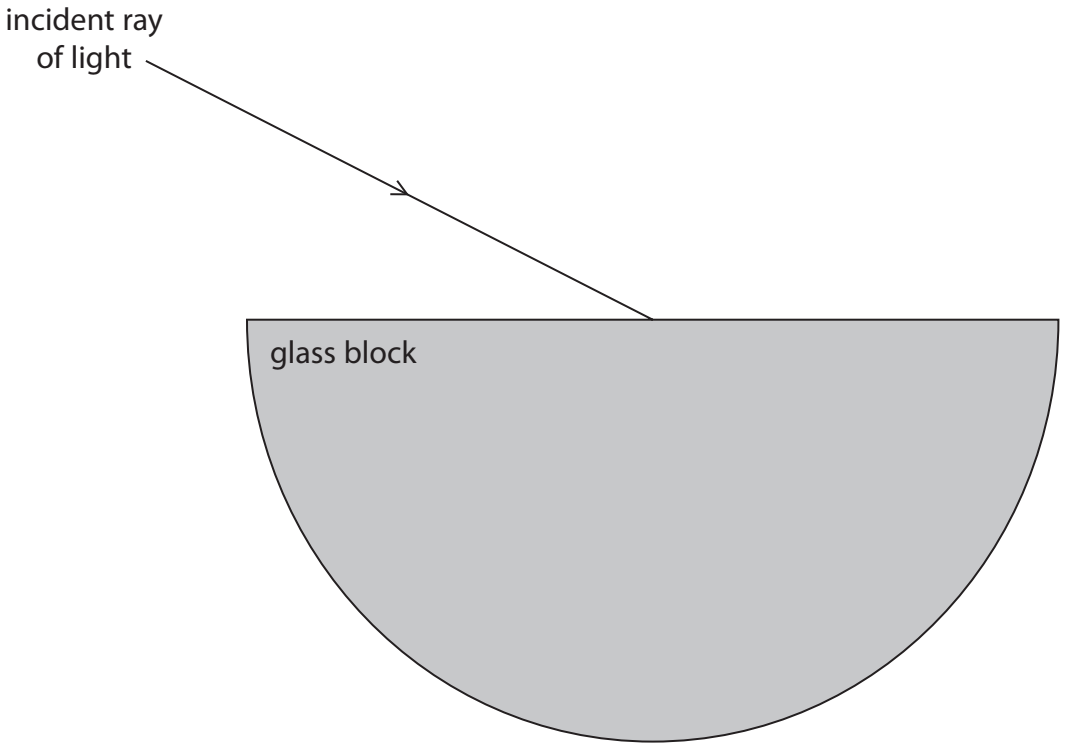
(1)

- ☒ **A** –273 K
- ☒ **B** 3 K
- ☒ **C** 273 K
- ☒ **D** 373 K

(Total for Question 1 = 5 marks)

2 This question is about refraction in a semi-circular glass block.

(a) The diagram shows a ray of light incident on the flat side of the glass block.



(i) Draw the normal where the incident ray of light strikes the glass block.

Label this line **normal**.

(1)

(ii) Some light from the incident ray passes into the glass block and is refracted.

Draw the refracted ray of light.

Label this line **refracted ray**.

(2)

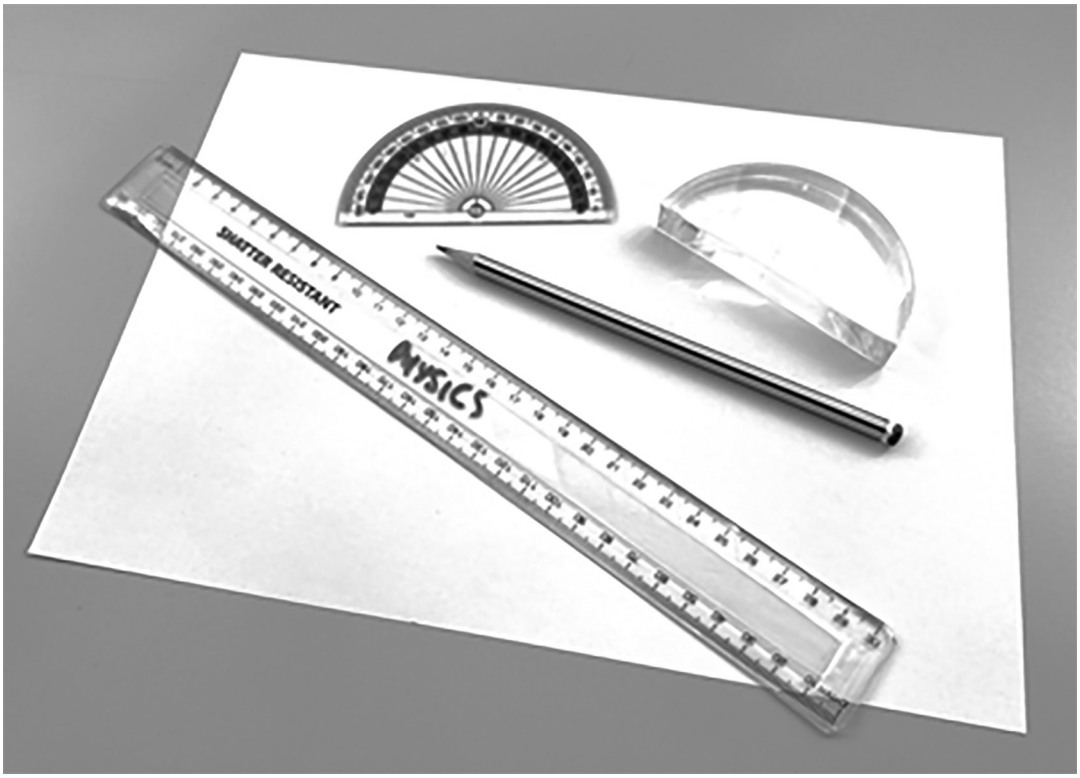
(iii) Some light from the incident ray is reflected at the boundary.

Draw the reflected ray of light.

Label this line **reflected ray**.

(2)

(b) A student investigates the refraction of light by the semi-circular glass block using the equipment in the photograph.



Design an experiment to investigate how the angle of incidence of a ray of light affects the angle of refraction in the glass block.

You may draw a diagram to help your answer.

(6)

(Total for Question 2 = 11 marks)

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3 (a) Give a similarity and a difference between the orbit of a planet and the orbit of a moon.

You may draw a diagram to support your answer.

(2)

similarity

.....

.....

difference

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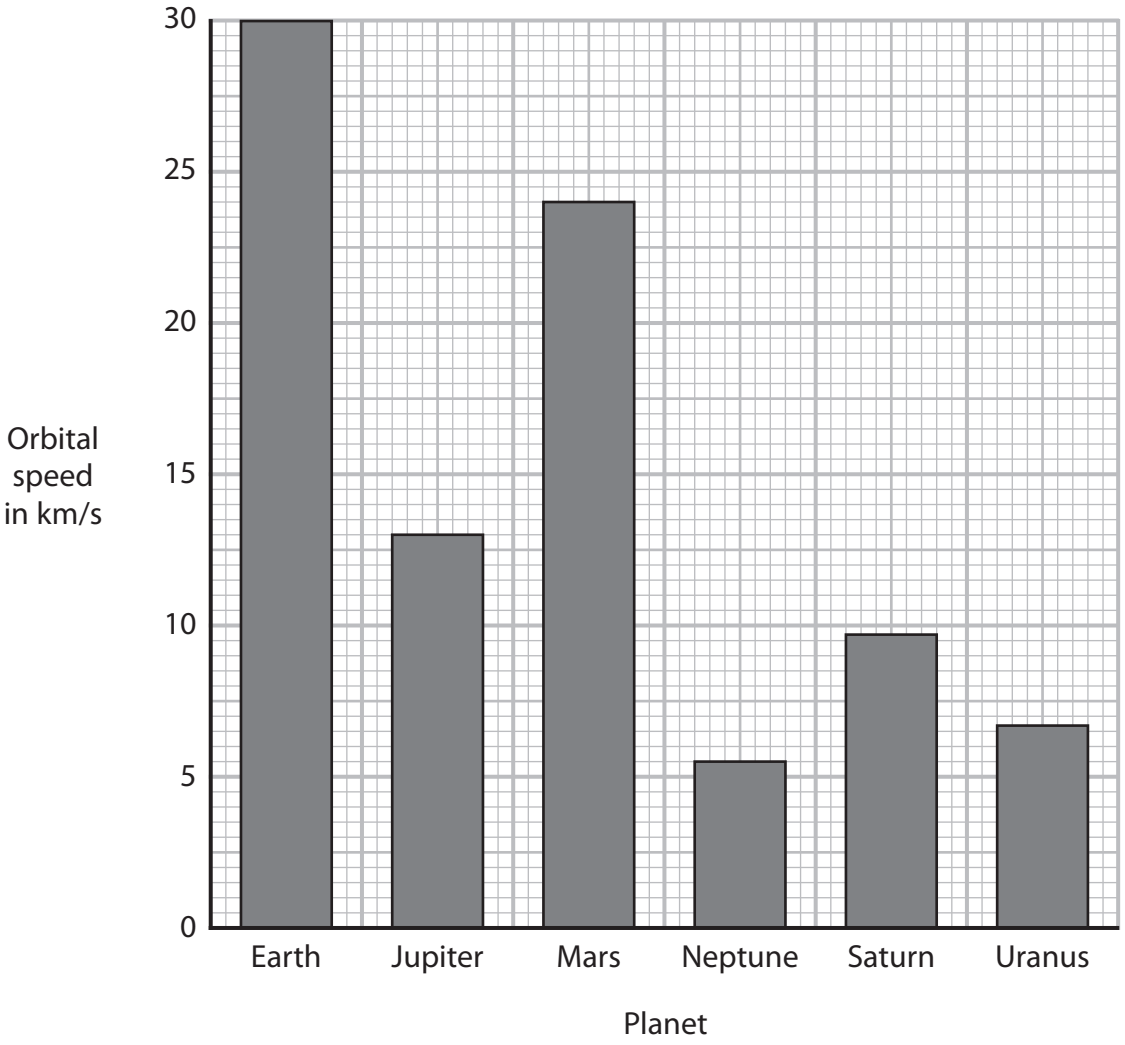
(b) The bar chart shows the mean orbital speed for six planets in the solar system.



(i) Give a reason why a bar chart is used to show this data.

(1)

.....

.....

.....

(ii) Using information from the bar chart, determine the ratio of the orbital speed of Jupiter to the orbital speed of Uranus.

(3)

ratio = ...

(iii) Suggest a reason why Earth has the largest orbital speed, for the planets shown.

(1)

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(Total for Question 3 = 7 marks)

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4 (a) Diagram 1 shows a metal ball held at rest above the floor.

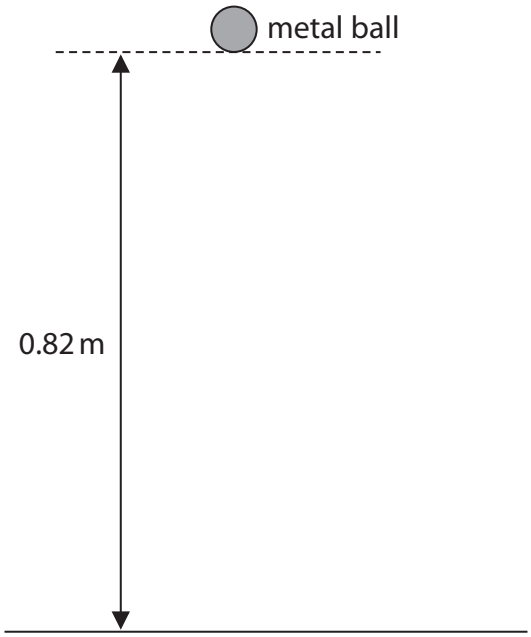

Diagram 1

The metal ball has a mass of 0.52 kg and is held at a height of 0.82 m above the floor.

(i) State the formula linking gravitational potential energy (GPE), mass, *g* and height.

(1)

(ii) Calculate the decrease in the metal ball's GPE store when the ball falls to the floor from this height.

(2)

decrease in GPE store = ... J

(iii) State the amount of energy in the metal ball's kinetic store just before it hits the floor.

Ignore the effects of air resistance.

(1)

energy in kinetic store = ... J

(iv) Calculate the speed of the metal ball just before it hits the floor.

(4)

speed = ... m/s

(b) The metal ball is dropped from rest again from the same height above the floor, as shown in diagram 2.

The metal ball now falls through a cylinder containing oil rather than the air.

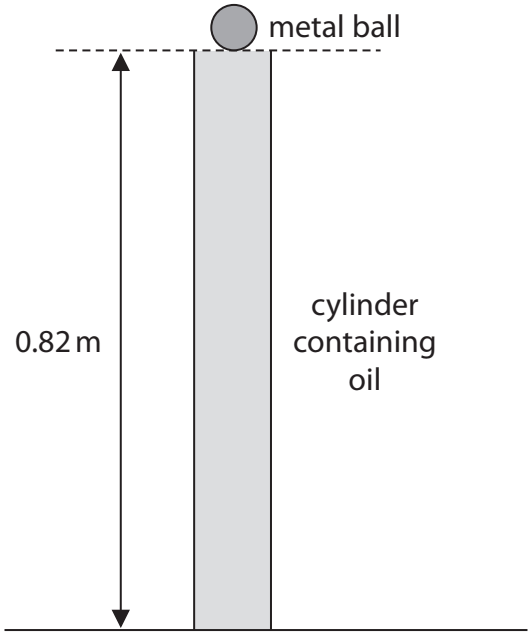

Diagram 2

The speed of the ball just before it hits the floor when moving in oil is less than the speed of the ball just before it hits the floor when moving in air.

Explain, using ideas about energy, the difference in speeds.

(3)

(Total for Question 4 = 11 marks)

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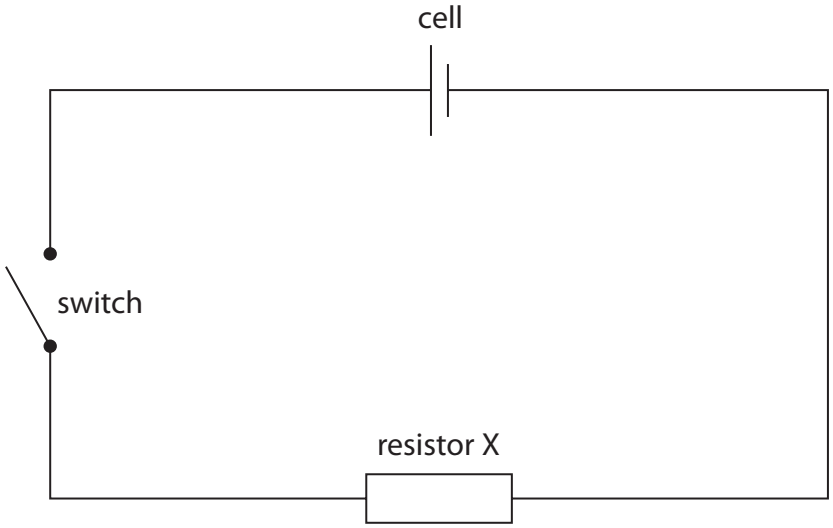
5 The circuit diagram shows a resistor connected in series with a cell and a switch.



There is an electric current in the circuit when the switch is closed.

(a) Describe how another component could be added to the circuit to show that there is a current in resistor X when the switch is closed.

(2)

.....

.....

.....

.....

(b) The electric current in the circuit is a flow of charged particles.

Each charged particle has a charge of -1.6×10^{-19} C.

(i) Give the name of the charged particle.

(1)

.....

(ii) When the switch is closed, the current in the cell is 160 mA.

Calculate the number of charged particles that pass through the cell in 25 s.

[charge transferred = current × time taken]

(4)

number of charged particles = ...

(iii) Resistor X in the circuit is replaced by resistor Y.

Resistor Y has a higher resistance than resistor X.

Explain how the number of charged particles passing through the cell each second changes when resistor X is replaced by resistor Y.

(3)

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(Total for Question 5 = 10 marks)

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6 This question is about nuclear fission.

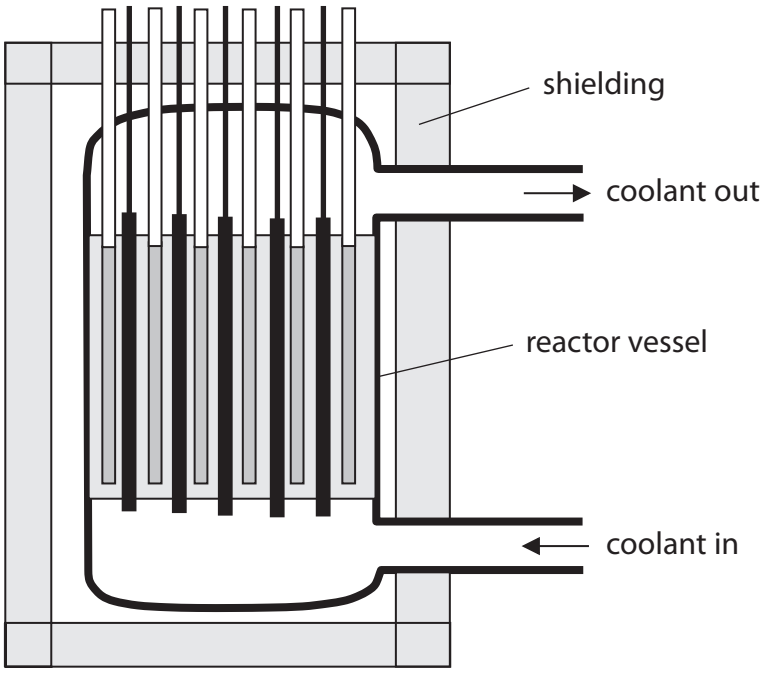
(a) The isotope uranium-235 can be made to undergo nuclear fission.

Describe the process of nuclear fission for uranium-235.

(4)

(b) Some power stations use the nuclear fission of uranium-235 to generate electricity.

Fission takes place inside a nuclear reactor.



(i) Explain why a nuclear reactor is usually surrounded by thick concrete.

(2)

(ii) The coolant from the nuclear reactor is used to heat steam to a very high temperature.

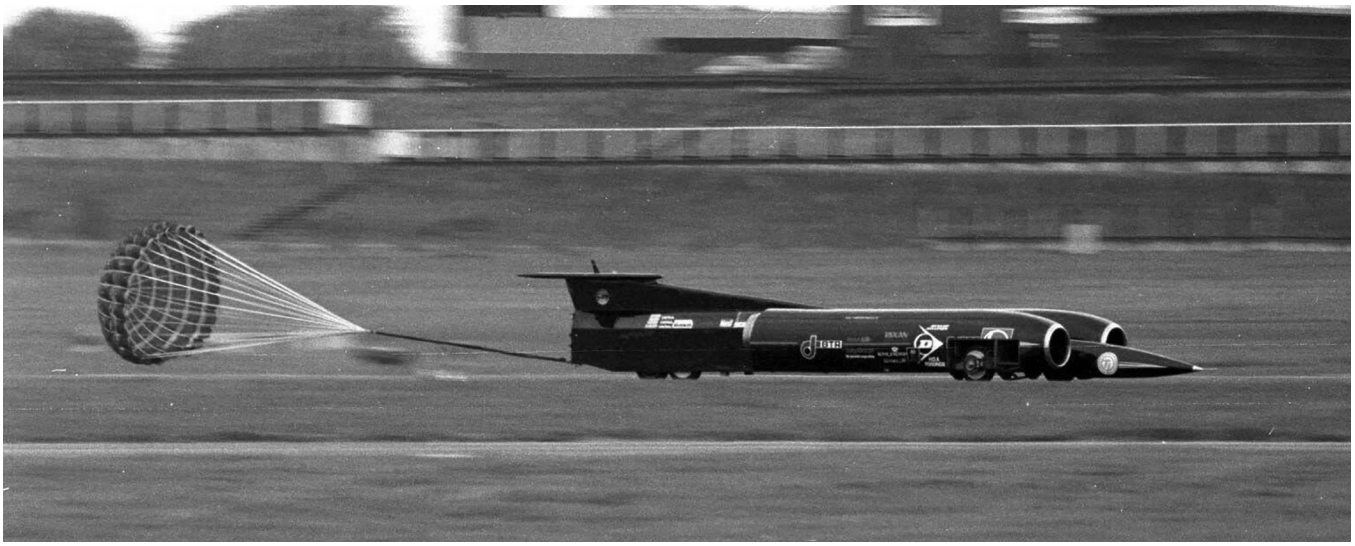
Steam is water in the gas state.

Using ideas about particles, explain why a pressure is exerted on the tubes containing the steam.

(3)

(Total for Question 6 = 9 marks)

7 Thrust SSC was the first land-based vehicle to travel faster than the speed of sound.



(Source: © PA Images/Alamy Stock Photo)

(a) Thrust SSC has a mass of 10 600 kg and uses two jet engines to produce a maximum accelerating force of 223 kN.

(i) State the formula linking unbalanced force, mass and acceleration.

(1)

(ii) Show that the maximum acceleration of Thrust SSC is approximately 20 m/s^2.

(3)

(b) The speed of sound in air is 330 m/s.

Calculate the minimum time taken for Thrust SSC to reach the speed of sound if it starts from rest.

(3)

minimum time = ... s

(Total for Question 7 = 7 marks)

TOTAL FOR PAPER = 60 MARKS

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