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)

Friday 16 June 2023

Morning (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.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **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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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, $g = 10\,\text{m/s}^2$.

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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 This is a question about the motion of a rolling ball.

(a) Which of these gives the two pieces of equipment that could be used to determine the velocity of the ball?

(1)

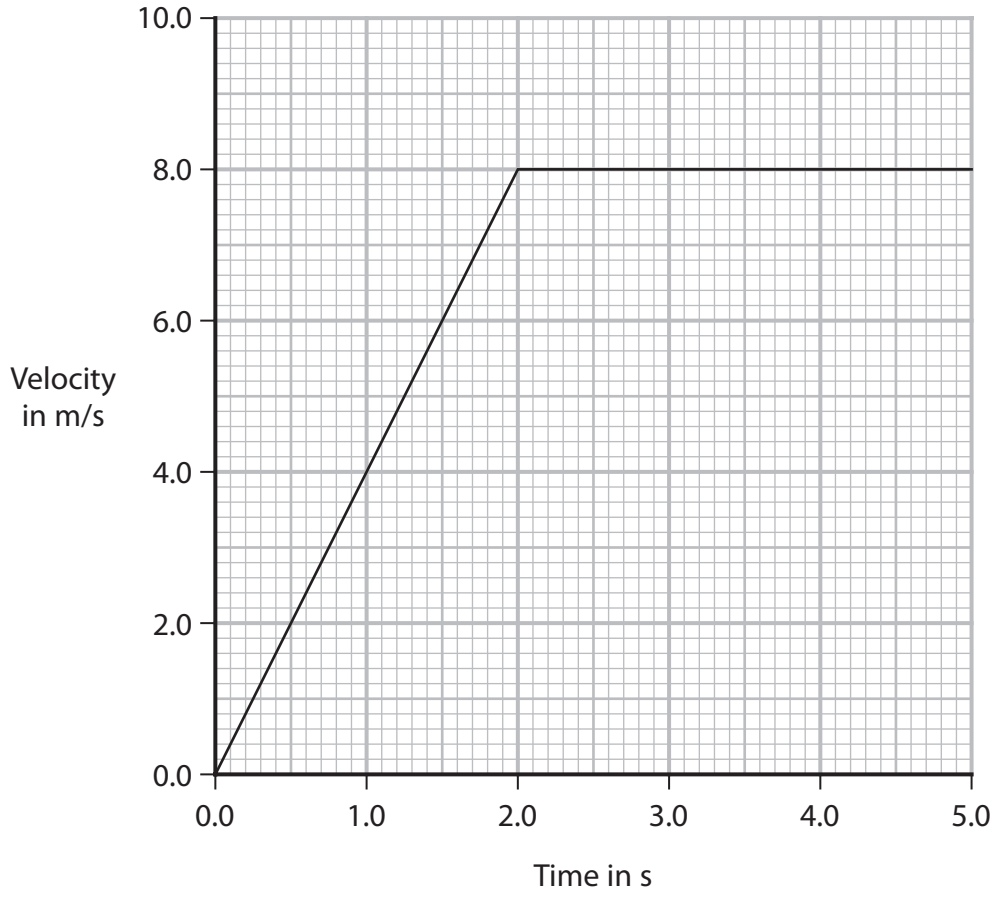
☒ **A** ammeter and stopwatch

☒ **B** balance and ruler

☒ **C** ruler and ammeter

☒ **D** stopwatch and ruler

(b) The graph shows how the velocity of the ball changes with time.



(i) Which of these gives the correct formula linking acceleration, change in velocity and time taken?

(1)

- ☒ **A** acceleration = change in velocity + time taken
- ☒ **B** acceleration = change in velocity – time taken
- ☒ **C** acceleration = change in velocity × time taken
- ☒ **D** acceleration = change in velocity ÷ time taken

(ii) Give the acceleration of the ball between 2.0 s and 5.0 s.

(1)

acceleration = ... m/s^2

(iii) Calculate the distance travelled during the first 2.0 seconds of the motion of the ball.

(3)

distance travelled = ... m

(Total for Question 1 = 6 marks)

2 A car is moving at a speed of 21 m/s. The driver of the car sees a hazard in the road and applies the brakes.

(a) (i) Calculate the thinking distance if the driver of the car has a reaction time of 0.34 s.

(3)

thinking distance = ... m

(ii) The braking distance of the car is 8.2 m.

Calculate the stopping distance of the car.

(2)

stopping distance = ... m

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

(1)

(ii) The car has a mass of 780 kg and a braking force of 21 000 N.

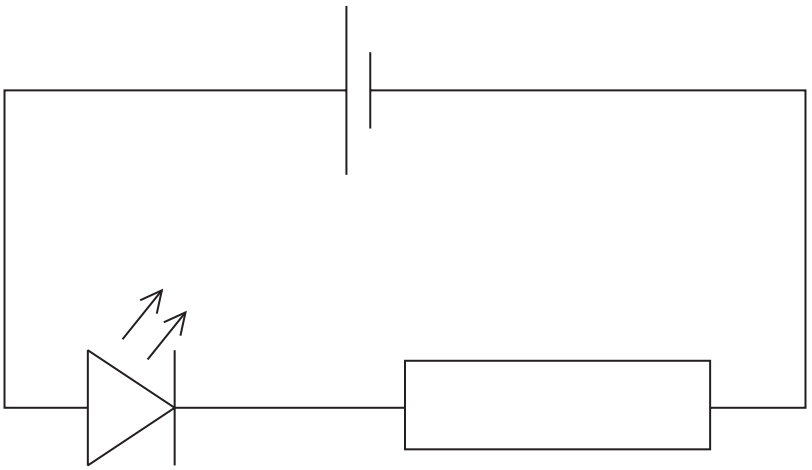
Calculate the acceleration of the car due to the braking force.

(3)

acceleration = ... m/s^2

(Total for Question 2 = 9 marks)

3 The diagram shows a circuit containing a light emitting diode (LED) and a resistor.



(a) Add meters to the diagram to measure the voltage of the resistor and the current in the resistor.

(3)

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

(1)

(ii) The current in the resistor is 7.3 mA.

The voltage of the resistor is 0.92 V.

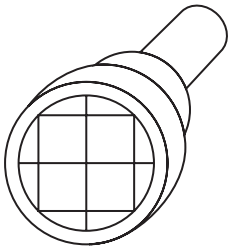
Calculate the resistance of the resistor.

(3)

resistance = ... Ω

(Total for Question 3 = 7 marks)

4 The diagram shows a sample of radon-226 in a container.



Radon-226 is an isotope that emits alpha radiation and gamma radiation.

(a) State one use of alpha radiation.

(1)

(b) Describe a harmful effect of ionising radiation on the human body.

(2)

(c) A technician has three radioactive sources. The sources look identical.

One source only emits alpha radiation, one source only emits beta radiation and one source only emits gamma radiation.

The technician has samples of paper, aluminium and lead.

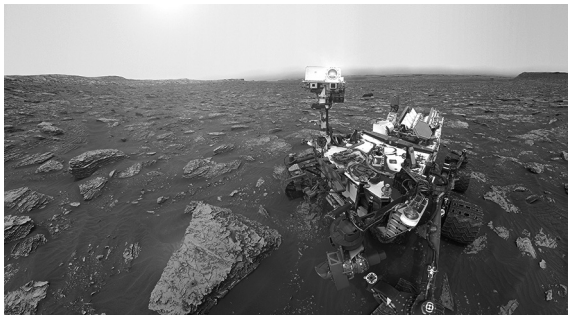
Describe how the technician can determine which source emits each type of radiation.

You may draw a diagram to help your answer.

(5)

(Total for Question 4 = 8 marks)

5 The photograph shows a robotic vehicle called Opportunity. Opportunity landed on Mars in 2004.



(Source: © Dima Zel/Shutterstock)

Several large balloons protected Opportunity during landing.

(a) Explain how the gas molecules inside a balloon exert a pressure on the inside surface of the balloon.

(3)

(b) The balloons were tested in a cold room on Earth so that the temperature of the gas was the same as on Mars.

(i) Explain why the pressure of the gas decreases if the temperature of the gas decreases.

(3)

(ii) State the formula linking pressure, force and area.

(1)

(iii) The pressure due to the gas inside the balloon is 1200 Pa and the balloon has an inside surface area of 11 m^2.

Calculate the force on the inside surface of the balloon due to the gas inside the balloon.

(2)

force = ... N

(Total for Question 5 = 9 marks)

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6 This is a question about stars.

(a) State the name of the process that releases energy from hydrogen in stars.

(1)

(b) Describe the evolution of the Sun from the start of its life to the end of its life.

(4)

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DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(c) A star's colour is related to the peak wavelength of the light it emits.

A student claims that the peak wavelength is related to a star's surface temperature using the formula

$$\text{peak wavelength} \times \text{surface temperature} = \text{constant}$$

Describe how a student could use data to test the validity of this formula.

(2)

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(Total for Question 6 = 7 marks)

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7 A helicopter is stationary above the ground.

A bag of sand is dropped from the helicopter.

(a) (i) The bag falls 6.3 m.

The mass of the bag is 19 kg.

Calculate the gravitational potential energy (GPE) change for the bag.

[GPE change = mass × gravitational field strength × height change]

(2)

GPE change = ... J

(ii) State the kinetic energy (KE) gained by the bag after falling 6.3 m.

You can ignore the effects of air resistance.

(1)

KE gained = ... J

(b) Closer to the ground, the effects of air resistance cannot be ignored.

The bag travels at a constant speed when the air resistance equals the weight of the bag.

The bag has a mass of 19 kg.

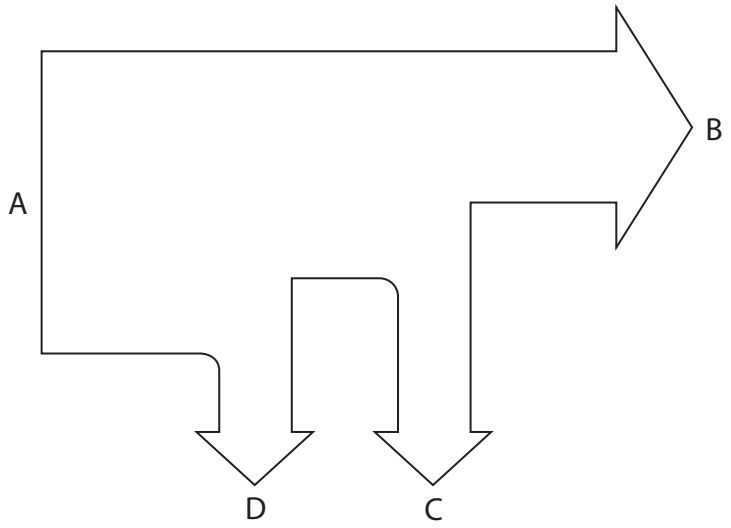
Calculate the value of the air resistance when the bag travels at constant speed.

(2)

air resistance = ... N

(c) The bag hits the ground and stops without bouncing.

The Sankey diagram shows energy transfers for the bag from just before the bag hits the ground to when the bag stops.



Use words from the box to complete the labels A, B and D. Label C has been done for you. Each word may be used once, more than once or not at all.

thermal	magnetic	mechanically	electrically
kinetic	nuclear	by heating	by radiation

(3)

A: energy transferred mechanically from the bag's ..... store

B: energy transferred mechanically to the bag's ..... store

C: energy transferred mechanically to the ground's thermal store

D: energy transferred ..... to the surroundings

(Total for Question 7 = 8 marks)

8 A student uses this equipment to investigate the force on a current-carrying wire in a uniform magnetic field.

- two permanent bar magnets
- straight length of wire
- connecting leads
- power supply

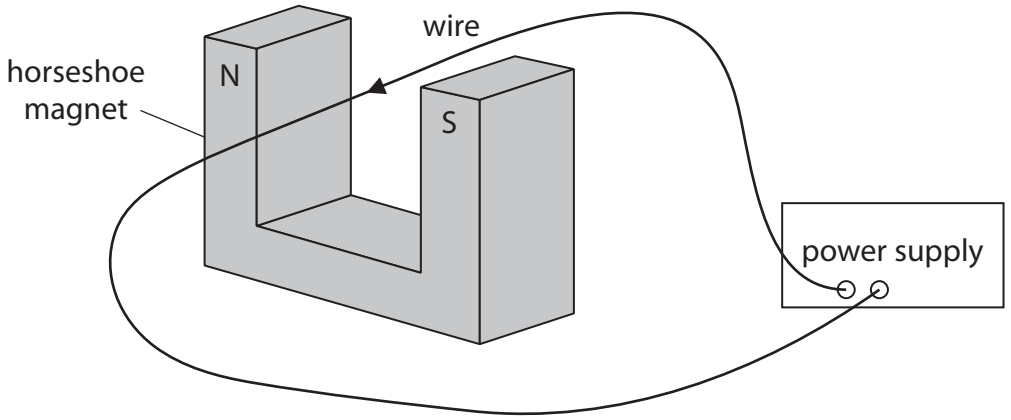
(a) Describe how to use two permanent bar magnets to form a uniform magnetic field.

You may draw a diagram to help your answer.

(2)

(b) The student decides that the magnetic field is not strong enough and replaces the two bar magnets with a horseshoe magnet.

The diagram shows the current-carrying wire in the magnetic field provided by the horseshoe magnet. The direction of the current is shown by the arrow on the wire.



(i) Draw an arrow on the diagram to show the direction of the force on the current-carrying wire.

(2)

(ii) Explain why a force is exerted on the current-carrying wire.

(2)

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(Total for Question 8 = 6 marks)

TOTAL FOR PAPER = 60 MARKS

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Science (Single Award)

Physics
PAPER: 1P

Equation Booklet
Do not return this Booklet with the question paper.

Turn over ▶

P72592RA

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1. Forces and Motion	
average speed = $\frac{\text{distance moved}}{\text{time taken}}$	
acceleration = $\frac{\text{change in velocity}}{\text{time taken}}$	$a = \frac{(v-u)}{t}$
force = mass × acceleration	$F = m \times a$
weight = mass × gravitational field strength	$W = m \times g$
2. Electricity	
power = current × voltage	$P = I \times V$
voltage = current × resistance	$V = I \times R$
3. Waves	
wave speed = frequency × wavelength	$v = f \times \lambda$
4. Energy resources and energy transfers	
efficiency = $\frac{\text{useful energy output}}{\text{total energy output}} \times 100\%$	
work done = force × distance moved	$W = F \times d$
gravitational potential energy = mass × gravitational field strength × height	$GPE = m \times g \times h$
kinetic energy = $\frac{1}{2} \times$ mass × speed^2	$KE = \frac{1}{2} \times m \times v^2$
power = $\frac{\text{work done}}{\text{time taken}}$	$P = \frac{W}{t}$
5. Solids, liquids and gases	
pressure = $\frac{\text{force}}{\text{area}}$	$p = \frac{F}{A}$

END OF EQUATION LIST