

Please write clearly in block capitals.

School _____

Class _____

Name _____

Teacher _____

GCSE COMBINED SCIENCE: TRILOGY

PHYSICS

Physics Paper 1 (Topics P1-P4) · Higher tier · 2020 series · mapped to the AQA 8464 specification

Time allowed: 1 hour 15 minutes

Materials

For this paper you must have:

- a ruler
- a scientific calculator
- the physics equations sheet (provided).

Instructions

- Answer all questions in the spaces provided.
- Use black ink or black ball-point pen.
- In all calculations, show clearly how you work out your answer and give units.
- Do all rough work in this book.

Information

- The maximum mark for this paper is 70.
- The marks for questions are shown in brackets.
- You are reminded of the need for good English and clear presentation.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
TOTAL	

Answer all questions in the spaces provided.

1 This question is about energy.

1.1 Calculate the kinetic energy of a 1200 kg car moving at 10 m/s. ($KE = \frac{1}{2}mv^2$)

[2 marks]

1.2 Calculate the gravitational potential energy gained when a 4 kg mass is raised 12 m. ($g = 9.8 \text{ N/kg}$)

[2 marks]

1.3 A car of mass 1200 kg slows from 10 m/s to rest. Calculate the energy transferred from its kinetic store.

[2 marks]

1.4 A pump transfers 24 000 J of energy in 40 s. Calculate its power.

[3 marks]

1.5 Explain how the efficiency of a device can be improved by reducing energy wasted as heat.

[3 marks]

2 This question is about energy resources.

2.1 State the equation for the efficiency of an energy transfer.

[1 mark]

2.2

A motor wastes 30 J of energy and is 70% efficient. Calculate the total energy input.

[2 marks]

2.3

Explain one advantage and one disadvantage of using wind power.

[2 marks]

2.4

Explain why the National Grid transmits electricity at a very high voltage.

[2 marks]

2.5

Evaluate the use of fossil fuels for generating electricity.

[4 marks]

3

This question is about electricity.

3.1

Use $Q = I \times t$ to calculate the charge when a current of 0.5 A flows for 4 minutes.

[2 marks]

3.2

Calculate the resistance of a component with a p.d. of 12 V and a current of 0.25 A.

[2 marks]

3.3

Describe how the current through a fixed resistor changes as the p.d. across it increases (at constant temperature).

[2 marks]

3.4

Explain how the resistance of a thermistor changes with temperature, and give one use.

[3 marks]

3.5

Explain why two resistors connected in parallel have a smaller total resistance than either one alone.

[3 marks]

4

This question is about mains electricity and power.

4.1

State the frequency and the voltage of UK mains electricity.

[1 mark]

4.2

Explain why a fault that connects the live wire to a metal case is dangerous, and how the earth wire and fuse make it safe.

[2 marks]

4.3

Use $P = I^2 \times R$ to calculate the power dissipated when 4 A flows through a 5 ohm resistor.

[2 marks]

4.4

An appliance runs at 230 V and draws 5 A for 60 s. Calculate the energy it transfers.

[3 marks]

4.5

Explain how a step-up and a step-down transformer are used in the National Grid.

[3 marks]

5

This question is about particles and energy.

5.1

Calculate the density of a 500 g block with a volume of 200 cm^3 .

[2 marks]

5.2

Define the specific latent heat of fusion.

[2 marks]

5.3

Use $E = m c (\text{change in } \theta)$ to calculate the energy needed to heat 2 kg of water by 10 C. ($c = 4200 \text{ J/kg C}$)

[2 marks]

5.4

Explain why the temperature stays constant while a substance is melting, even though energy is still being supplied.

[6 marks]

6

This question is about radioactivity.

6.1

State what is meant by an isotope.

[1 mark]

6.2

Describe what happens to a nucleus when it emits an alpha particle.

[2 marks]

6.3

Explain why gamma radiation is the most penetrating type of radiation.

[2 marks]

6.4

A source has a half-life of 3 days and an activity of 960 Bq. Calculate its activity after 9 days.

[3 marks]

6.5

Explain the difference between contamination and irradiation, and how the risk from each can be reduced.

[4 marks]

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outside the
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END OF QUESTIONS

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