

Please write clearly in block capitals.

School _____

Class _____

Name _____

Teacher _____

GCSE COMBINED SCIENCE: TRILOGY

PHYSICS

Physics Paper 2 (Topics P5-P7) · Higher tier · 2024 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	

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Answer all questions in the spaces provided.

1 This question is about forces and elasticity.

- 1.1** Calculate the work done when a force of 30 N moves an object 4 m in the direction of the force. ($W = F s$)

[2 marks]

- 1.2** A spring has a spring constant of 80 N/m and is extended by 0.25 m. Calculate the force applied.

[2 marks]

- 1.3** Calculate the elastic potential energy stored in the spring in part (b). ($E_e = \frac{1}{2} k e^2$)

[2 marks]

- 1.4** Explain the difference between elastic and inelastic deformation.

[3 marks]

- 1.5** A 3.0 N weight extends a spring by 0.06 m. Calculate the spring constant and the energy stored.

[3 marks]

2 This question is about motion and momentum.

- 2.1** Use $v^2 = u^2 + 2 a s$ to find the final velocity when $u = 0$, $a = 3 \text{ m/s}^2$ and $s = 24 \text{ m}$.

[2 marks]

2.2

Define terminal velocity.

[2 marks]

2.3

Explain, in terms of forces, what happens to a parachutist when the parachute opens.

[3 marks]

2.4

A 1500 kg car travels at 20 m/s. Calculate its momentum and state the principle of conservation of momentum.

[4 marks]

3

This question is about forces and motion.

3.1

Use $F = ma$ to calculate the acceleration of a 2000 kg vehicle when the resultant force is 6000 N.

[2 marks]

3.2

Explain Newton's Third Law using an example.

[2 marks]

3.3

Explain the factors that increase the thinking distance and the braking distance of a vehicle.

[3 marks]

3.4

Use the idea of work done and kinetic energy to explain why braking distance increases sharply with speed.

[2 marks]

3.5

Explain how crumple zones and seat belts reduce the force on people in a car crash.

[3 marks]

4

This question is about waves.

4.1

Use $v = f \times \text{wavelength}$ to find the frequency of a wave with speed 340 m/s and wavelength 0.5 m.

[2 marks]

4.2

Describe what happens to a wave when it is reflected and when it is refracted.

[2 marks]

4.3

Describe how a ripple tank can be used to measure the speed of water waves.

[2 marks]

4.4

Explain why sound travels faster through a solid than through a gas.

[2 marks]

4.5

Explain how ultrasound can be used to produce a medical image.

[3 marks]

5

This question is about the electromagnetic spectrum.

5.1

Explain how radio waves are produced and how they are detected.

[2 marks]

5.2

Explain why microwaves are suitable for communicating with satellites.

[2 marks]

5.3

Explain why X-rays are useful in medicine but their use must be controlled.

[2 marks]

5.4

Describe the order of the electromagnetic spectrum and explain how the energy and penetrating power change across it, giving a use and a hazard.

[6 marks]

6

This question is about electromagnetism.

6.1

Describe what the magnetic field looks like in a uniform field.

[1 mark]

6.2

Describe the magnetic field around a straight wire that is carrying a current.

[2 marks]

6.3

Explain the motor effect and how to find the direction of the force using Fleming's left-hand rule.

[3 marks]

6.4

Use $F = B I L$ to calculate the force on a wire when $B = 0.4 \text{ T}$, $I = 3 \text{ A}$ and $L = 0.2 \text{ m}$.

[3 marks]

6.5

Describe how a simple direct-current electric motor works.

[3 marks]

END OF QUESTIONS

Do not
write
outside the
box