



**BEATTY SECONDARY SCHOOL
PRELIMINARY EXAMINATION 2025
SECONDARY FOUR NORMAL (ACADEMIC) / G2**

CANDIDATE
NAME

CLASS

REGISTER
NUMBER

SCIENCE (PHYSICS)

5105/01

Paper 1 Multiple Choice (Physics)

4 August 2025

Setter: Mr Jerrod Lo

Papers 1 and 2: 1 hour 15 minutes

Additional Materials:
Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, class and register number on the Multiple Choice Answer Sheet provided.

There are **twenty** questions on this paper. Answer **all** questions. For each question there are four possible answers, **A, B, C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

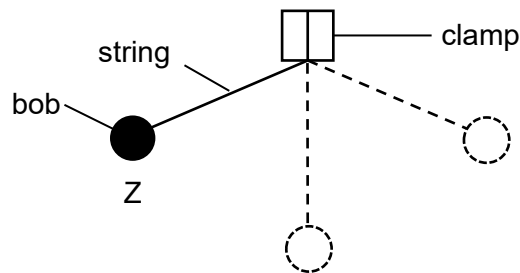
Read the instructions on the Answer Sheet very carefully.

Answers to Paper 1 and Paper 2 must be handed in separately.
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
You are advised to spend no more than **30 minutes** on **Paper 1**.
You may proceed to answer Paper 2 as soon as you have completed Paper 1.
Any rough working should be done in this booklet.
The use of an approved scientific calculator is expected, where appropriate.

1 Which statement is correct about acceleration?

- A It has direction and magnitude only.
- B It has direction and a unit only.
- C It has magnitude and a unit only.
- D** It has magnitude, direction and a unit.

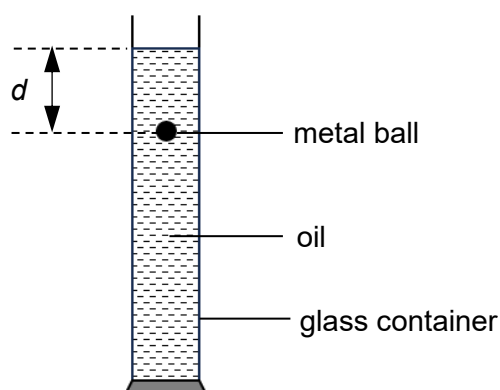
2 A simple pendulum is set up. The bob is released from point Z and allowed to swing.



A digital stopwatch is used to measure the time for one swing. The experiment is repeated using different string lengths and different bob masses.

Which other instruments are needed to carry out this experiment?

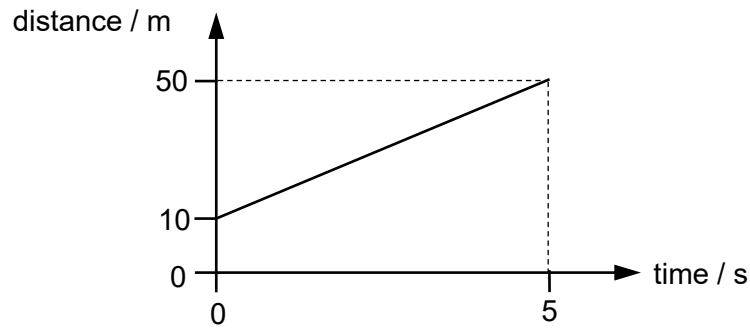
- A digital caliper and electronic balance
 - B digital caliper and spring balance
 - C** metre rule and electronic balance
 - D metre rule and spring balance
- 3 An experiment is conducted to investigate the motion of a metal ball as it is released into a column of oil. The distance, d , between the oil surface and the metal ball is measured every 5 seconds.



Which step increases the accuracy of the experiment?

- A** Perform multiple trials and calculate the average results.
- B Release the metal ball from a large height above the oil surface.
- C Stop measuring d after 10 seconds.
- D Use a short glass container for the column of oil.

- 4 The distance-time graph shows a car's motion in a straight line.

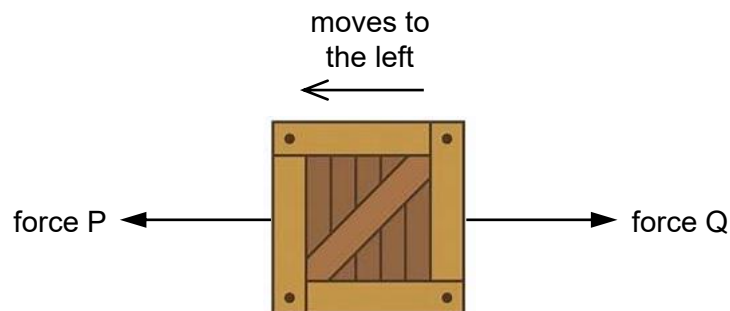


Which statement about the car's motion is correct?

- A** The car has an acceleration of 0 m/s^2 .
B The car has a constant acceleration of 8 m/s^2 .
C The car has a constant speed of 4 m/s .
D The car travels a total distance of 60 m .
- 5 Two balls, X and Y, are made of the same material. X has a larger volume than Y.

Which statement about the balls is correct?

- A** X has the same density as Y, but X weighs less.
B X has the same density as Y, but Y weighs less.
C X has the same mass as Y, but X is less dense.
D X has the same mass as Y, but Y is less dense.
- 6 A crate is moving to the left at constant speed. Two forces, P and Q, then act on the crate as shown.



Which row correctly describes the change in the crate's motion due to forces P and Q?

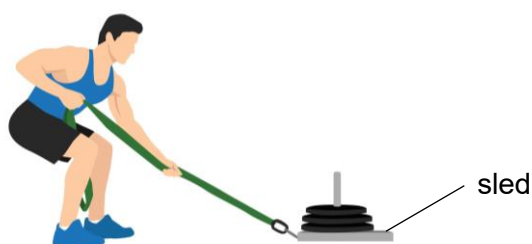
	force P / N	force Q / N	change in motion
A	2.0	2.0	comes to a stop
B	2.0	2.0	moves faster to the left
C	2.0	5.0	moves faster to the right
D	2.0	5.0	moves slower to the left

- 7 A student is walking on the ground.

Which statement about the frictional force with the ground is correct?

- A** It is a contact force.
- B** It is a force exerted by the student.
- C** It changes with the speed of the student's motion.
- D** It opposes the direction of the student's motion.

- 8 During a race, four athletes each pull the same sled, but over different distances and durations.



Which athlete develops the most power?

- A** applies a force F and pulls the sled a distance $\frac{d}{2}$ in time $3t$
- B** applies a force F and pulls the sled a distance d in time $3t$
- C** applies a force $2F$ and pulls the sled a distance $\frac{d}{2}$ in time t
- D** applies a force $2F$ and pulls the sled a distance d in time t

- 9 A cylinder filled with air is heated.

What happens to the air particles in the cylinder?

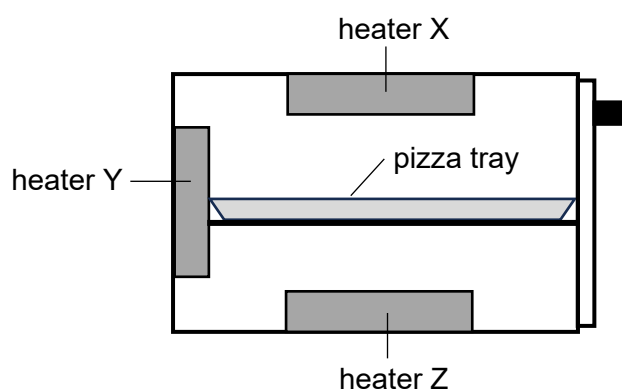
- A** They move at a constant speed.
- B** They move at higher speeds.
- C** They move closer together.
- D** They move in the same direction.

- 10 Water in a freezer solidifies into ice.

How does the energy and temperature of the water change during solidification?

	energy	temperature
A	decreases	decreases
B	decreases	unchanged
C	unchanged	decreases
D	unchanged	unchanged

- 11 An oven contains a pizza tray heated by three heaters X, Y and Z.



What is the main method of heat transfer from each heater to the pizza tray?

	heater X to pizza tray	heater Y to pizza tray	heater Z to pizza tray
A	conduction	convection	radiation
B	convection	conduction	radiation
C	radiation	conduction	convection
D	radiation	convection	conduction

- 12 Which statement is correct?

- A** Heat conduction can occur in a vacuum.
- B** Heat conduction occurs only in solids.
- C** Heat radiation can occur in a vacuum.
- D** Heat radiation occurs only in solids.

- 13 How many of these statements about electromagnetic waves are correct?

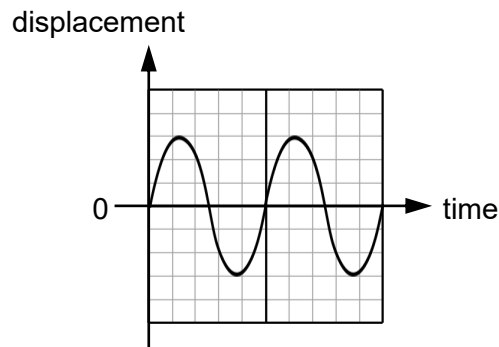
- Radio waves are used in remote controllers.
- Red light has a longer wavelength than blue light.
- Ultra-violet radiation is used to sterilise water.
- X-rays travel at 3.0×10^8 m/s in a vacuum.

- A** 1 **B** 2 **C** 3 **D** 4

14 Which physical property of a wave always changes with its frequency?

- A the amplitude of the wave
- B the period of the wave**
- C the speed of the wave
- D the wavelength of the wave

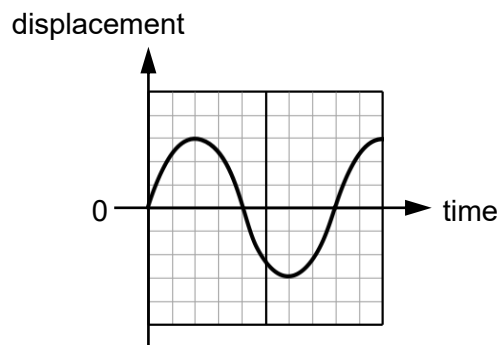
15 The diagram shows the waveform of a sound wave.



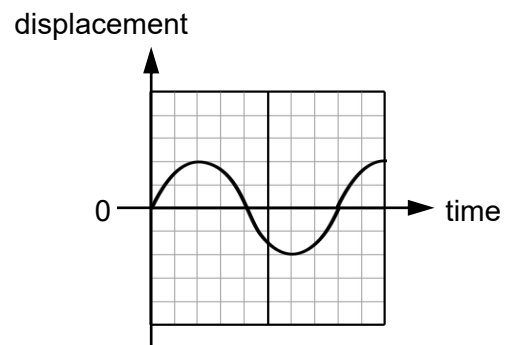
The echo of the sound wave has the same frequency but has a smaller amplitude.

Which waveform represents the echo of the sound wave on the same scale?

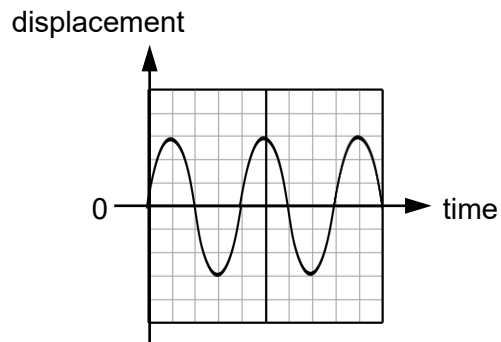
A



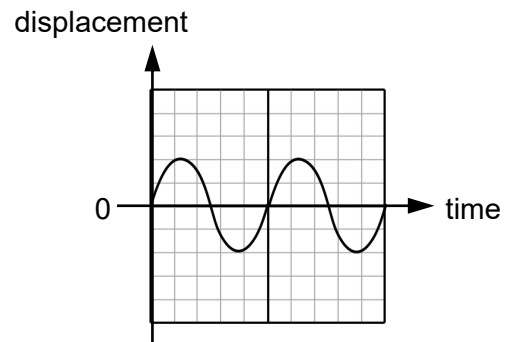
B



C



D



- 16 4 J of energy is required to move 0.5 C of charges across a lamp.

Which statement is correct?

- A The electromotive force (e.m.f.) of the lamp is 2 V.
- B The electromotive force (e.m.f.) of the lamp is 8 V.
- C The potential difference (p.d.) of the lamp is 2 V.
- D** The potential difference (p.d.) of the lamp is 8 V.

- 17 A current of 2.0 A flows through a wire with a resistance of 1.6 Ω .

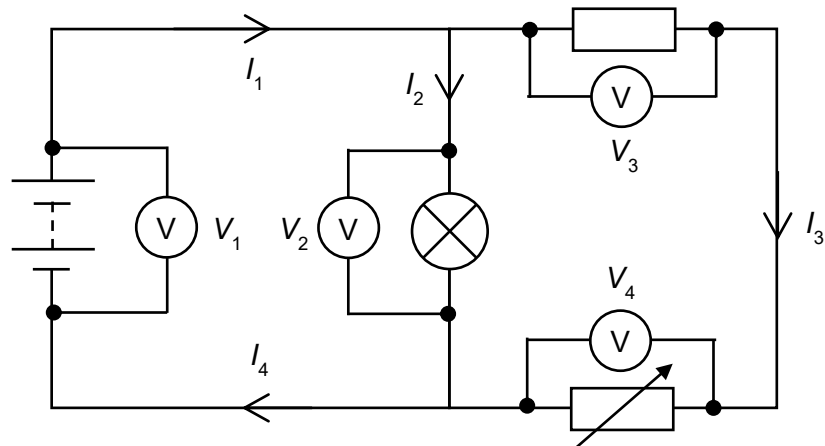
The wire is then removed from the circuit and cut into two equal pieces.

Only one piece is put back into the circuit.

What is the resistance of the shorter wire and what is the current flowing through it?

	resistance of shorter wire / Ω	current flowing through shorter wire / A
A	0.8	1.0
B	0.8	4.0
C	3.2	1.0
D	3.2	4.0

- 18 The diagram shows a circuit.



Which pair of equations is correct?

- A** $I_1 = I_4$ and $V_2 = V_3 + V_4$
- B $I_3 = I_4$ and $V_1 = V_2$
- C $I_4 = I_2 + I_3$ and $V_1 = V_2 + V_3 + V_4$
- D $I_2 = I_1 + I_3$ and $V_2 = V_4$

- 19 A 6.0 V battery supplies 3.2 A of current to power several identical decorative lamps.

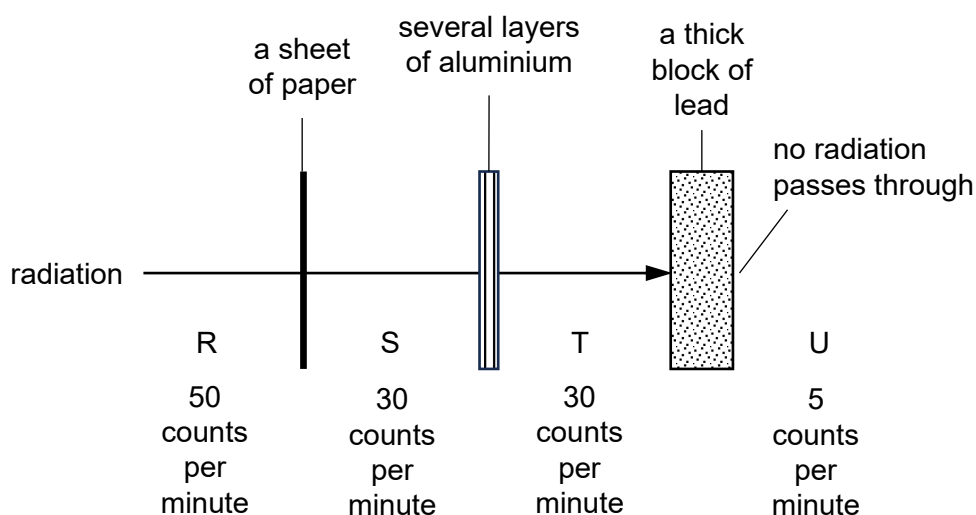
Each decorative lamp has an output power of 1.5 W.

How many decorative lamps can be powered?

- A 2 B 3 **C** 12 D 13

- 20 A radioactive source emits radiation that passes through a sheet of paper, several layers of aluminium and a thick block of lead.

The diagram shows the count rates measured at locations R, S, T and U.



What are the count rates of alpha, beta and gamma radiation emitted by the radioactive source?

	count rate of alpha radiation / counts per minute	count rate of beta radiation / counts per minute	count rate of gamma radiation / counts per minute
A	15	5	25
B	15	5	30
C	20	0	25
D	20	0	30