



SINGAPORE SPORTS SCHOOL PRELIMINARY EXAMINATIONS SECONDARY 4 EXPRESS

CANDIDATE
NAME

CLASS

Physics

6091/01

Paper 1 Multiple Choice

1 Sep 2026

1 hour

Additional materials: Multiple Choice Answer Sheet

Reminder on Academic Honesty

All student-athletes are expected to complete this assessment independently.

Do not share, discuss, or seek information about this assessment with others who have yet to complete it.

Any student-athlete who gives, receives, or attempts to obtain unfair assistance will be considered to have breached academic integrity and will face disciplinary action.

As a school, we uphold the value of **Integrity**. Every student-athlete is expected to demonstrate honesty, fairness, and responsibility in all assessments.

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, highlighters, glue or correction fluid.

There are forty 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.

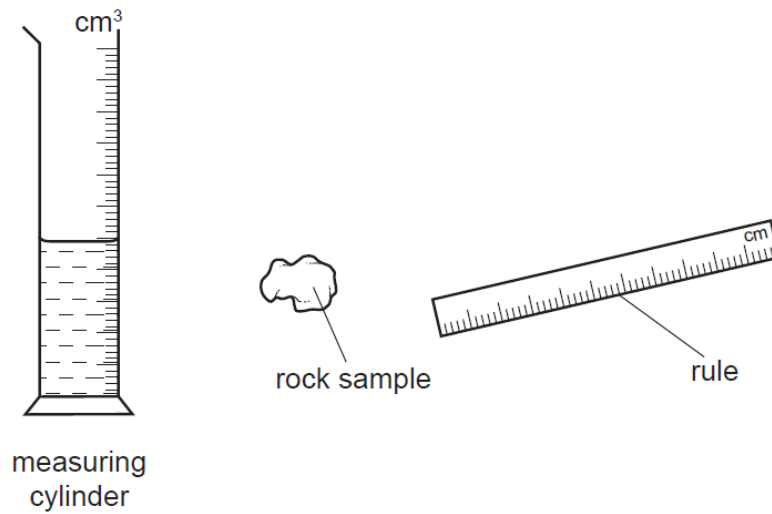
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

The use of an approved scientific calculator is expected, where appropriate.

This document consists of **19** printed pages and **1** blank page.

- 1 A scientist needs to determine the volume of a small, irregularly shaped rock sample. Only a rule and a measuring cylinder, partially filled with water, are available.



To determine the volume, which apparatus should the scientist use?

- A both the measuring cylinder and the rule
 - B neither the measuring cylinder nor the rule
 - C the measuring cylinder only
 - D the rule only
- 2 A steel ball is dropped from the top floor of a building. Air resistance can be ignored.

Which statement describes the motion of the ball?

- A The ball falls with constant acceleration.
- B The ball falls with constant speed.
- C The ball falls with decreasing speed.
- D The ball falls with increasing acceleration.

- 3 A student uses a stopwatch to time a runner running around a circular track. The runner runs two laps (twice around the track). The diagrams show the reading on the stopwatch when the runner starts running, at the end of the first lap, and at the end of the second lap.



reading when
runner starts



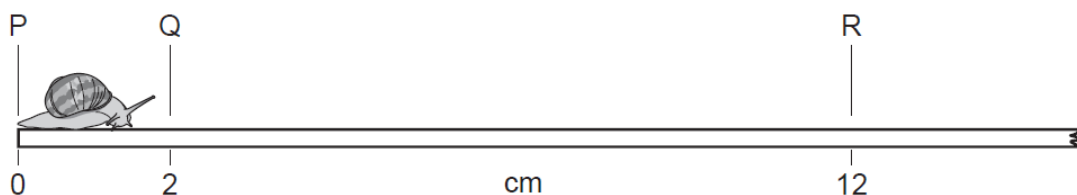
reading at end
of first lap



reading at end
of second lap

What is the time taken for the runner to run the second lap?

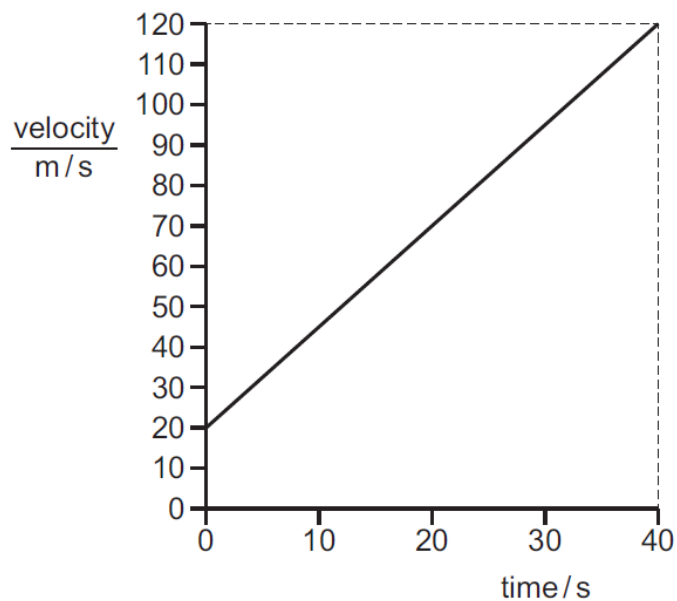
- A** 0 min 50 s **B** 1 min 10 s **C** 1 min 13 s **D** 2 min 03 s
- 4 A snail moves along a ruler. It takes 20 s to move from Q to R.



What is its average speed from Q to R?

- A** $\frac{12}{20}$ cm/s
- B** $\frac{12-2}{20}$ cm/s
- C** $\frac{20}{12}$ cm/s
- D** $\frac{20}{12-2}$ cm/s

- 5 The diagram shows a velocity–time graph for an object which is accelerating.



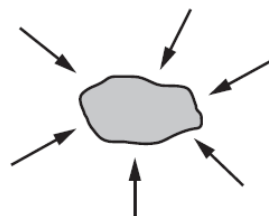
What is the acceleration of the object?

- A** 0.40 m/s^2 **B** 2.5 m/s^2 **C** 3.0 m/s^2 **D** 100 m/s^2
- 6 Diagram 1 shows a piece of flexible material that contains many pockets of air. Diagram 2 shows the same piece of flexible material after it has been compressed so that its volume decreases.

diagram 1
(before compression)



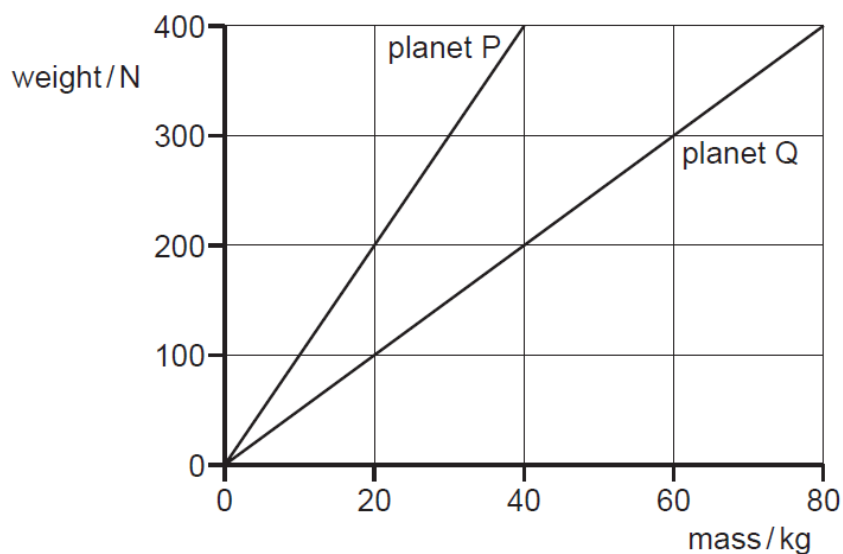
diagram 2
(after compression)



What happens to the mass and to the weight of the flexible material when it is compressed?

	mass	weight
A	increases	increases
B	increases	no change
C	no change	increases
D	no change	no change

- 7 The graph shows how weight varies with mass on planet P and on planet Q.



An object weighs 400 N on planet P. The object is taken to planet Q.

Which row is correct?

	mass of object on planet Q / kg	weight of object on planet Q / N
A	40	200
B	40	400
C	80	200
D	80	400

- 8 A student determines the density of copper.

She has a rectangular block of copper.

Which other apparatus does she need?

	balance	ruler	stop-watch	thermometer
A	✓	✓	✓	✓
B	✓	✓	✓	x
C	✓	✓	x	x
D	✓	x	x	x

key

✓ = needed

x = **not** needed

- 9 Which statement about a moving object is correct?
- A When an object is accelerating, the resultant force acting on it must equal zero.
 - B When an object is moving at a steady speed, the air resistance acting on it must equal zero.
 - C When an object is moving at a steady speed, the resultant force acting on it must equal zero.
 - D When an object is moving, there must be a resultant force acting on it.

- 10 A stone is thrown vertically upwards at a speed of 5.0 m/s.

All of the energy initially in the kinetic store of the stone is transferred to its gravitational potential store when the stone reaches its maximum height.

Which equation gives the maximum height h reached by the stone?

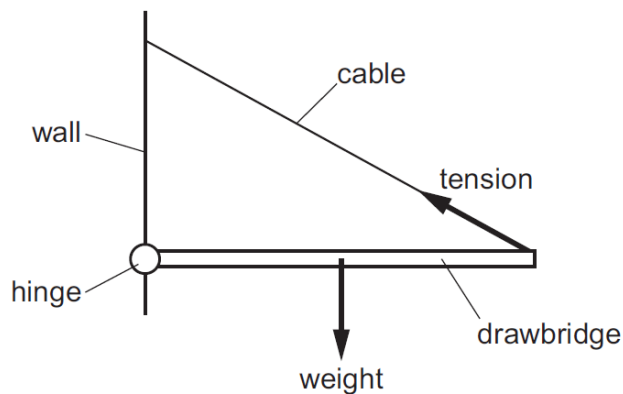
A $h = \frac{10}{2 \times 5.0^2}$

B $h = \frac{5.0^2 \times 2}{10}$

C $h = \frac{5.0^2}{2 \times 10}$

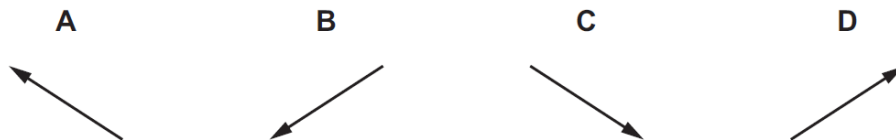
D $h = \frac{2 \times 10}{5.0^2}$

- 11 The diagram shows a drawbridge that is attached to a wall by a hinge at one end and a cable at the other.



The weight of the drawbridge and the tension in the cable are represented by the labelled arrows in the diagram. There is a third force at the hinge, which is not shown. The drawbridge is in equilibrium.

Which arrow shows a possible direction for the force at the hinge?



- 12 Energy is stored in a battery and in a box of matches.

Which type of energy store is energy stored in each of them?

	a battery	a box of matches
A	chemical	chemical
B	chemical	internal (thermal)
C	electrical	chemical
D	electrical	internal (thermal)

- 13 A sample of a substance has a shape that is determined by its container.

What are the possible states of this sample?

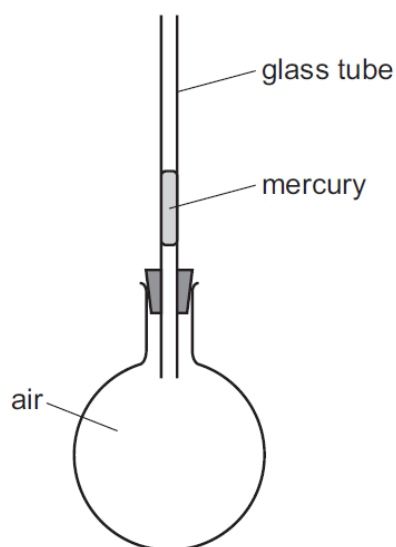
- A** gas, liquid and solid
- B** gas and liquid only
- C** gas and solid only
- D** solid and liquid only

- 14** A stationary smoke particle is hit by a fast-moving nitrogen molecule.

Which row describes the motion of the smoke particle and of the nitrogen molecule after the collision?

	smoke particle	nitrogen molecule
A	moves	rebounds
B	moves	stops
C	remains stationary	rebounds
D	remains stationary	stops

- 15** The diagram shows a glass flask sealed with a small volume of mercury in a glass tube. When the flask is gently warmed, the mercury rises up the tube.

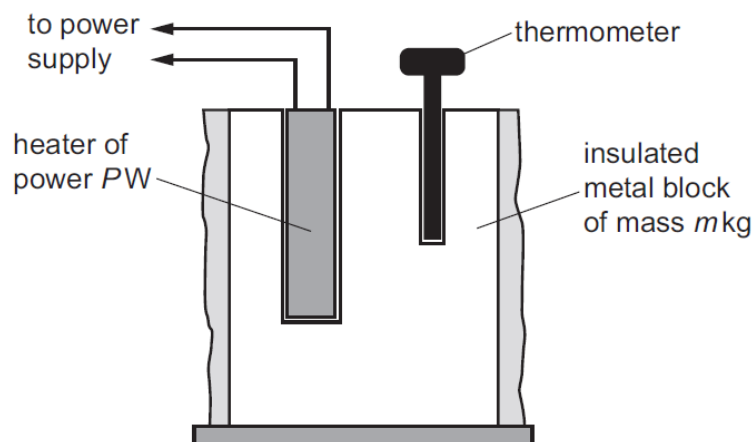


What is the main cause of the movement of the mercury?

- A** expansion of air in the flask
- B** expansion of the glass flask
- C** expansion of the glass tube
- D** expansion of the mercury

- 16** The diagram shows the equipment used in an experiment to determine the specific heat capacity of a metal.

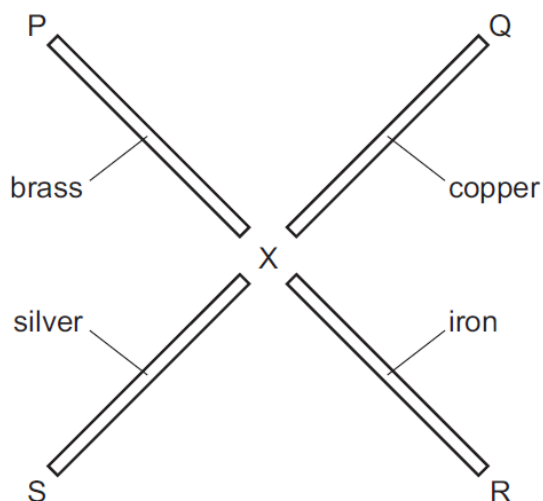
In the experiment, a heater is switched on for t s and the increase in temperature $\Delta\theta$ of a block of the metal is measured in $^{\circ}\text{C}$.



Which equation gives the specific heat capacity of the metal?

- A** $c = \frac{P}{tm\Delta\theta}$ **B** $c = \frac{Pt}{m\Delta\theta}$ **C** $c = \frac{tm\Delta\theta}{P}$ **D** $c = \frac{m\Delta\theta}{Pt}$

- 17 The diagram shows four rods. Each rod is made of a different metal.



Wax is used to attach small metal balls at the rod ends P, Q, R and S.

Each rod is the same size. They are heated uniformly by a Bunsen burner at point X.

As the rods warm up, the wax melts and the balls fall off.

Why does the ball on the silver rod fall first?

- A** Silver is the best conductor of heat.
- B** Silver is the worst conductor of heat.
- C** Silver is the best radiator of heat.
- D** Silver is the worst radiator of heat.

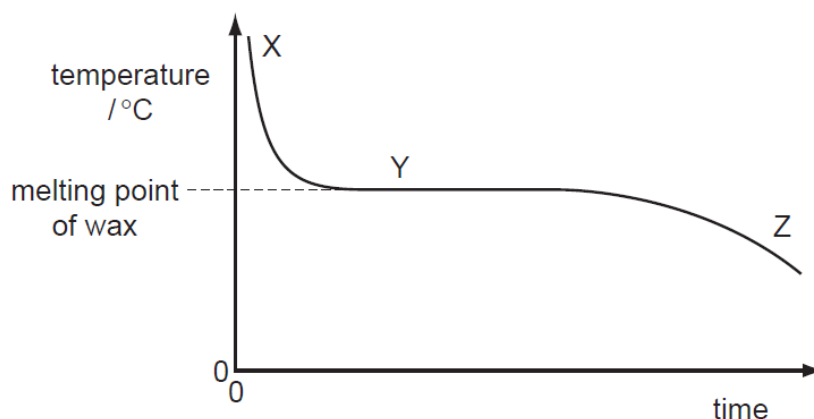
- 18 Three solid copper spheres, X, Y and Z, are heated to the same temperature.

sphere	diameter	colour of surface
X	$2d$	black
Y	d	white
Z	$2d$	white

Which row gives the order for the rate of emission of radiation?

	highest rate of emission	second highest rate of emission	lowest rate of emission
A	X	Y	Z
B	X	Z	Y
C	Z	X	Y
D	Z	Y	X

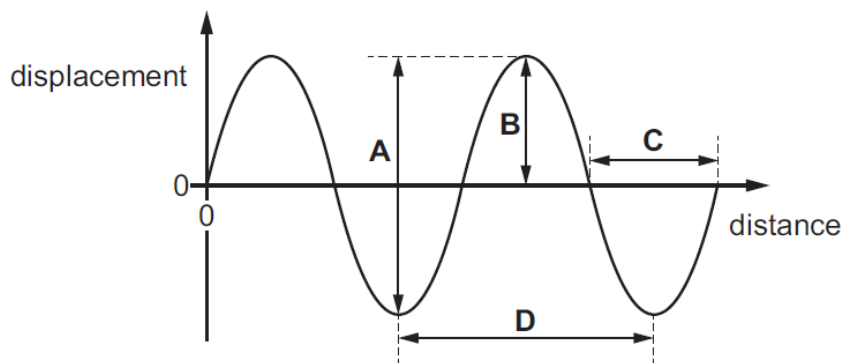
- 19 A student carries out an experiment to find the melting point of wax. The graph shows how the temperature of the wax changes as it cools.



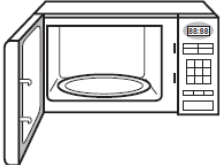
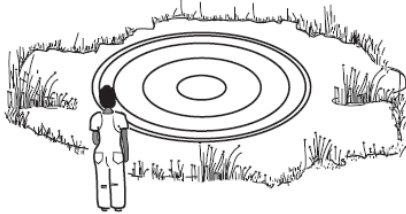
Which statement is correct?

- A** At X the temperature drops more slowly than at Z.
- B** At Y all the wax is solid.
- C** At Y thermal energy is being given out by the wax.
- D** At Z the wax molecules are not moving.

- 20 Which arrow on the graph shows the amplitude of the wave?



- 21 Which waves are longitudinal?

A	B	C	D
			
light waves from a lamp	microwaves in an oven	sound waves from a trumpet	water waves on a pond

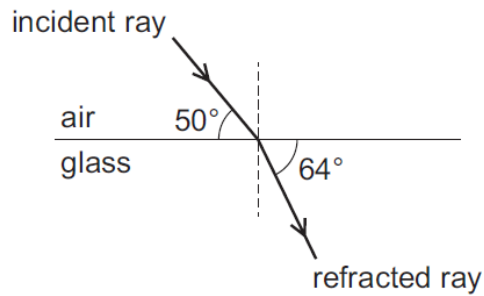
- 22 The image of an object is formed by a plane mirror.

Which row gives the correct properties of the image?

	real or virtual	distance of the image from the mirror
A	real	closer to the mirror than the object
B	real	the same distance from the mirror as the object
C	virtual	closer to the mirror than the object
D	virtual	the same distance from the mirror as the object

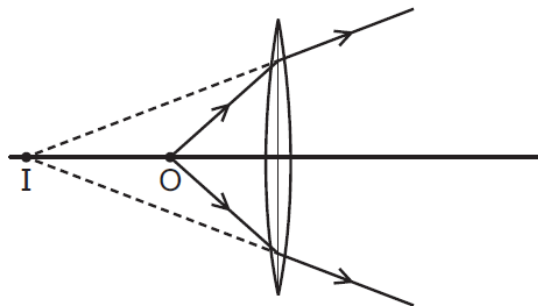
- 23** A ray of light, travelling in air, is incident on an air–glass boundary.

The angles between the incident ray, the refracted ray and the boundary are shown.



Which equation is used to calculate the refractive index n of the glass?

- A** $n = \frac{\sin 40^\circ}{\sin 26^\circ}$ **B** $n = \frac{\sin 40^\circ}{\sin 64^\circ}$ **C** $n = \frac{\sin 50^\circ}{\sin 26^\circ}$ **D** $n = \frac{\sin 50^\circ}{\sin 64^\circ}$
- 24** A small object O is placed near a converging lens, as shown. The lens forms an image I.



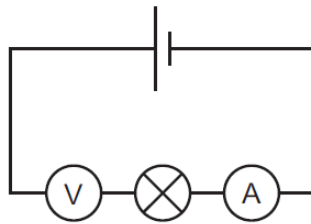
Which statement is correct?

- A** The image I is diminished.
B The image I is inverted.
C The image I is real.
D The object O is closer to the lens than its principal focus.
- 25** A ship sends an ultrasound pulse to the seabed to measure the depth of the sea.
- The speed of ultrasound waves in sea water is 1500 m/s.
- The pulse takes 4.6 seconds to travel to the seabed and back to the ship.
- What is the depth of the sea?
- A** 330 m **B** 650 m **C** 3500 m **D** 6900 m

- 26 A dolphin has a range of audible frequencies of 150 Hz–150 kHz.

Which range of frequencies can be heard both by humans with good hearing and by dolphins?

- A 20 Hz–150 Hz
 - B 20 Hz–150 kHz
 - C 20 kHz–150 kHz
 - D 150 Hz–20 kHz
- 27 A positively charged balloon is placed against a wall. The charge makes the balloon stick to the wall.
- Which statement explains this?
- A Positive charges on the balloon attract electrons in the wall.
 - B Positive charges on the balloon attract protons in the wall.
 - C Positive charges on the balloon repel electrons in the wall.
 - D Positive charges on the balloon repel protons in the wall.
- 28 A student is trying to determine the resistance of a lamp. He sets up the **incorrect** circuit shown.



Which change would allow him to take the measurements needed to calculate the resistance of the lamp?

- A Disconnect the ammeter and move it to the left of the lamp.
- B Swap the positions of the ammeter and the voltmeter in the circuit.
- C Disconnect the ammeter and connect it in parallel with the lamp.
- D Disconnect the voltmeter and connect it in parallel with the lamp.

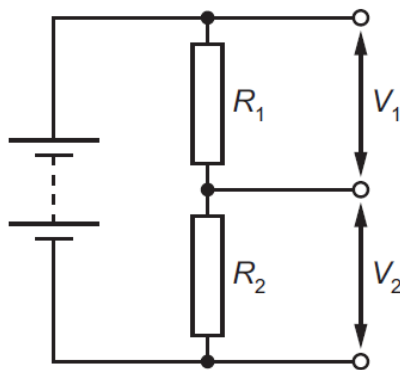
29 A metallic wire X has a resistance.

What is the difference in resistance for a wire of the same material as X that is:

- shorter than X but the same diameter
- the same length as X but with a smaller diameter?

	resistance of shorter wire	resistance of wire with smaller diameter
A	greater	greater
B	greater	smaller
C	smaller	greater
D	smaller	smaller

30 The diagram shows the circuit for a potential divider.



Which equation is used to calculate V_1 ?

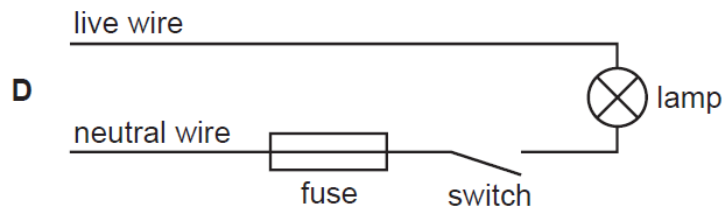
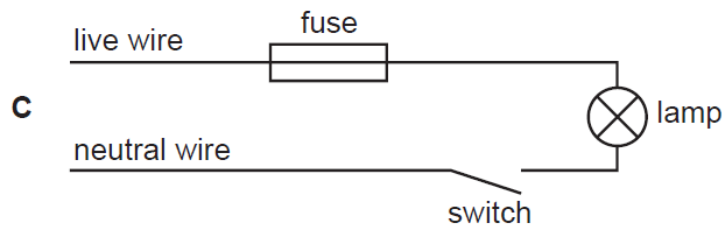
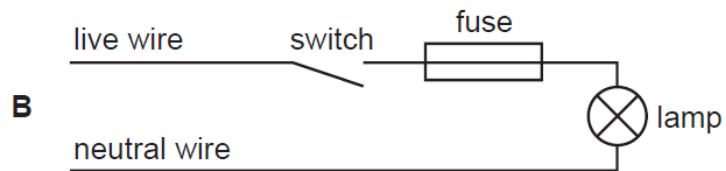
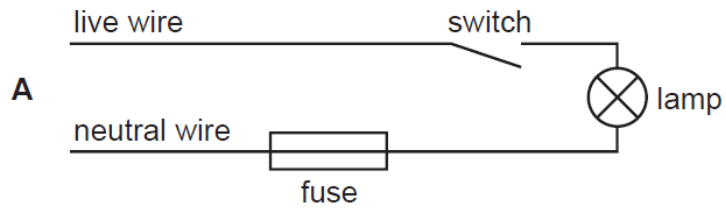
A $V_1 = \frac{R_1}{V_2 \times (R_1 + R_2)}$

B $V_1 = \frac{V_2 \times R_1}{R_2}$

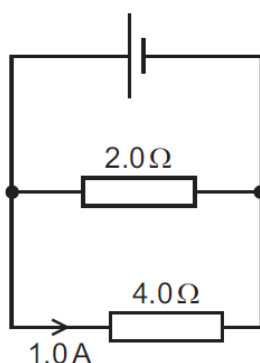
C $V_1 = \frac{V_2 \times R_1}{R_1 + R_2}$

D $V_1 = \frac{R_1}{V_2 \times R_2}$

31 Which diagram shows the correct positions for both the switch and the fuse?



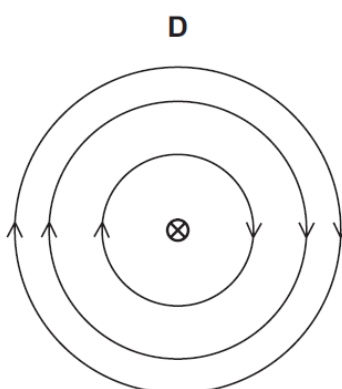
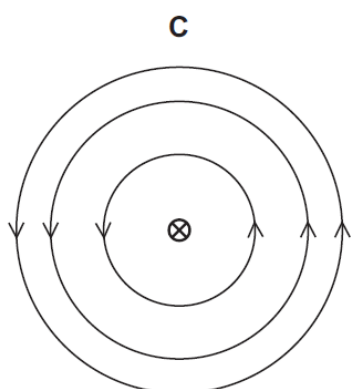
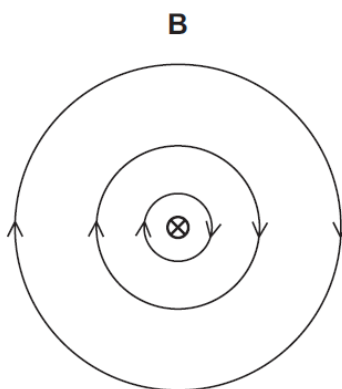
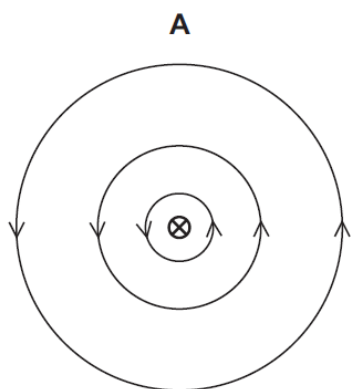
- 32** A cell is connected to a parallel combination of a $2.0\ \Omega$ resistor and a $4.0\ \Omega$ resistor. The current in the $4.0\ \Omega$ resistor is $1.0\ \text{A}$.



What is the current in the cell?

- A** $1.0\ \text{A}$ **B** $1.5\ \text{A}$ **C** $2.0\ \text{A}$ **D** $3.0\ \text{A}$
- 33** When there is an electric current in a long straight wire, a magnetic field is created around the wire.

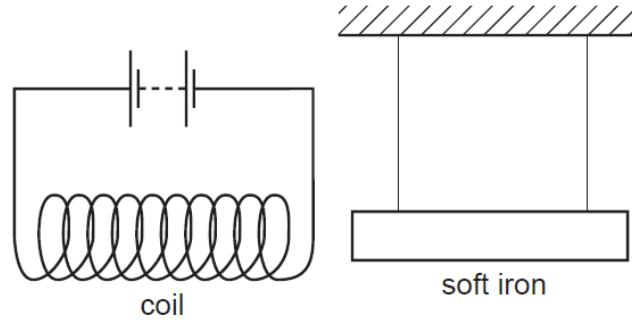
Which diagram shows the correct pattern and direction of magnetic field lines around a long straight wire carrying current into the page?



key

⊗ wire carrying current into page

- 34** A coil is connected to a battery and a soft iron bar is hung near to it.



The current is then reversed by reversing the battery connections.

How does the soft iron bar behave in the two cases?

	with the battery as shown	with the battery reversed
A	attracted to the coil	attracted to the coil
B	attracted to the coil	repelled from the coil
C	repelled from the coil	attracted to the coil
D	repelled from the coil	repelled from the coil

- 35** The primary voltage supplied to a transformer is 3.0 V. The secondary voltage is 5.0 V and the secondary current is 2.0 A. The transformer is 100% efficient.

What is the primary current in the transformer?

- A** 1.2 A **B** 2.0 A **C** 3.3 A **D** 7.5 A

- 36** A transformer has 15 000 turns on its primary coil and 750 turns on its secondary coil.

For what purpose could this transformer be used?

- A** to convert the 8000 V a.c. output of a power station to 160 000 V for long-distance power transmission
B to convert the 160 000 V d.c. supply from a power line to 8000 V for local power transmission
C to use a 12 V d.c. supply to operate a 240 V razor
D to use a 240 V a.c. mains supply to operate a 12 V bulb

- 37 A detector near a radioactive source shows a reading of 2000 counts / minute.

How is the corrected count rate determined?

- A by moving the detector closer to the source
- B by placing an absorber between the detector and the source
- C by repeating and averaging the measurements
- D by subtracting the background radiation count rate

- 38 Which statement about alpha, beta and gamma radiation is **not** correct?

- A Alpha particles are deflected most in an electric field.
- B Beta particles are deflected most in a magnetic field.
- C Gamma radiation is **not** deflected by a magnetic field.
- D Gamma radiation is least ionising.

- 39 A sample of a radioactive material has a half-life of 20 minutes.

Which statement is correct?

- A After 30 minutes, less than half of the radioactive material has decayed.
- B After 40 minutes, all of the radioactive material has decayed.
- C After 60 minutes, an eighth of the radioactive material remains.
- D After 120 minutes, a sixth of the radioactive material remains.

- 40 Stars are powered by nuclear reactions that release energy.

Which statement describes the nuclear reaction in stars?

- A Nuclear fission converts helium into hydrogen.
- B Nuclear fission converts hydrogen into helium.
- C Nuclear fusion converts helium into hydrogen.
- D Nuclear fusion converts hydrogen into helium.