Cambridge Assessment International Education

Cambridge IGCSE™

PHYSICS **0625/21**

Paper 2 Multiple Choice (Extended) **October/November 2022**

45 minutes

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

INSTRUCTIONS

- 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 multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- Take the weight of 1.0 kg to be 10 N (acceleration of free fall = 10 m / s^2).

INFORMATION

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.

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[Turn over

1 Which measuring instrument is used to measure the diameter of a thin metal wire?

A 30 cm rule

B measuring tape

C metre rule

D micrometre screw gauge

2 A car starts from rest.

The table shows the readings from its speedometer every 10 s.

time / s	0	10	20	30	40	50	60
$\frac{\text{speed}}{\text{m/s}}$	0	4	8	12	12	12	12

Which row describes the car's motion in the first 30 seconds and in the last 30 seconds?

	motion during first 30 s	motion during last 30 s
A	non-zero acceleration	at rest
B	zero acceleration	constant speed
C	zero acceleration	at rest
D	non-zero acceleration	constant speed

3 Which property of an object is a consequence of the effect of a gravitational field acting on it?

A density

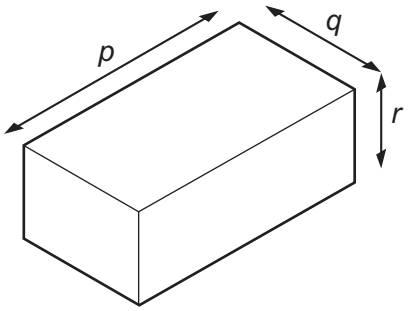
B mass

C volume

D weight

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4 The diagram shows the dimensions of a solid rectangular block of metal of mass m.



Which expression is used to calculate the density of the metal?

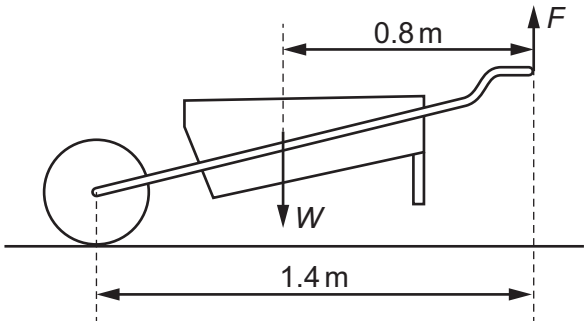
A $\frac{m}{(p \times q)}$

B $\frac{m}{(p \times q \times r)}$

C $m \times p \times q$

D $m \times p \times q \times r$

5 A wheelbarrow has a weight W of 140 N.

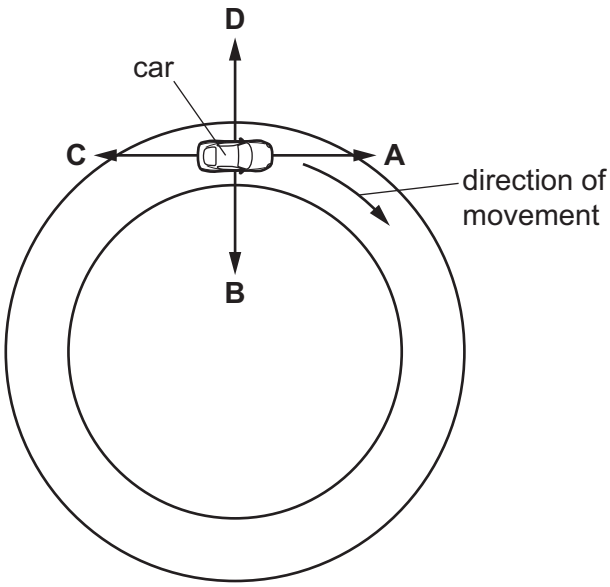


Which vertical force F is needed to support the wheelbarrow in the position shown?

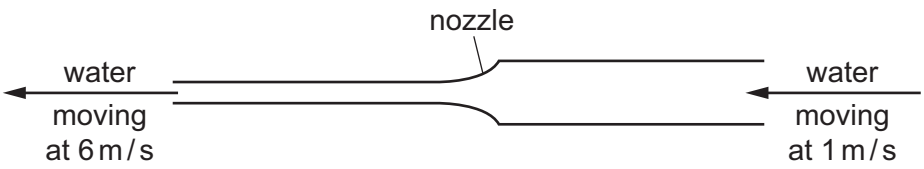
A 60 N **B** 80 N **C** 140 N **D** 245 N

6 A car is travelling around a circular track at a constant speed, as shown.

In which direction is the resultant force on the car?



7 The diagram shows part of a hose used by a firefighter.



NOT TO SCALE

15 kg of water flows through the hose each second.

Which force is applied to the hose by the water?

A 15 N **B** 75 N **C** 90 N **D** 105 N

8 Brakes are used to slow down a moving car.

Into which form of energy is most of the kinetic energy converted as the car slows down?

A chemical

B elastic

C thermal

D sound

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9 An object has kinetic energy of 200 J.

A constant resultant force of 190 N is applied in the direction of its motion through a distance of 10 m.

What is the final kinetic energy of the object?

A 390 J **B** 1700 J **C** 2000 J **D** 2100 J

10 The statements describe what happens when the power of a machine is increased.

1 The work done in a given time decreases.

2 The work done in a given time increases.

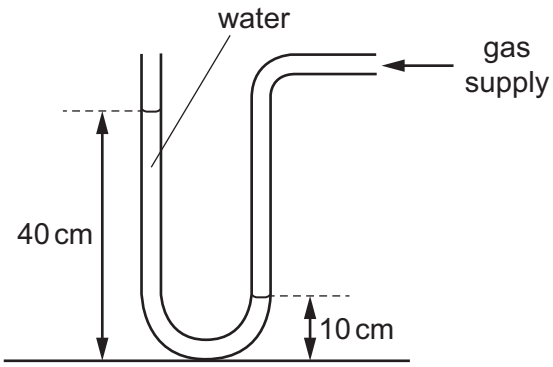
3 The time taken to do a given quantity of work decreases.

4 The time taken to do a given quantity of work increases.

Which statements are correct?

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

11 A manometer containing water is used to measure the pressure of a gas supply, as shown.



The density of water is 1000 kg / m^3.

What is the pressure of the gas supply?

A 300 Pa above atmospheric pressure

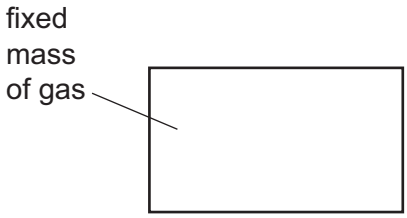
B 400 Pa above atmospheric pressure

C 3000 Pa above atmospheric pressure

D 4000 Pa above atmospheric pressure

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12 A fixed mass of gas is trapped in a container. The temperature of the gas is increased but the volume of the gas is kept constant.



How does this change affect the average kinetic energy of the molecules and the pressure on the walls of the container?

	average kinetic energy	pressure
A	increases	increases
B	stays the same	increases
C	increases	decreases
D	decreases	increases

13 Which row correctly describes boiling and evaporation of water?

	boiling	evaporation
A	bubbles seen	occurs at surface only
B	bubbles seen	occurs throughout the water
C	no bubbles	occurs at surface only
D	no bubbles	occurs throughout the water

14 The diagram shows a liquid-in-glass thermometer.



Which change increases the sensitivity of the thermometer?

A a narrower capillary tube

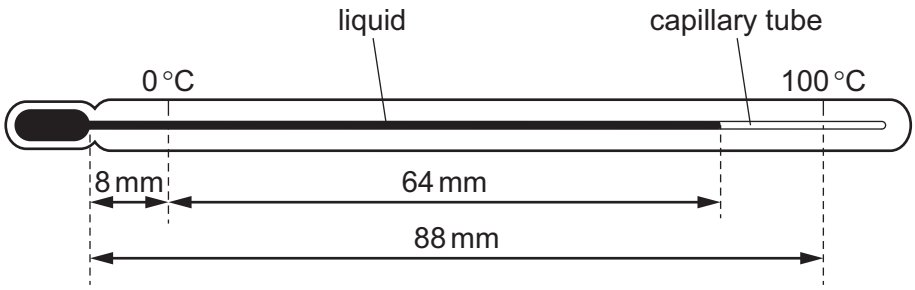
B a wider capillary tube

C thicker glass around the bulb

D thinner glass around the bulb

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15 The diagram shows a liquid-in-glass thermometer with a uniform capillary tube.



NOT TO SCALE

Which temperature is indicated by the thermometer?

A 73 °C **B** 80 °C **C** 82 °C **D** 90 °C

16 Four thermometers, with their bulbs painted different colours, are placed at equal distances from a radiant heater.

Which thermometer shows the slowest temperature rise when the heater is first switched on?

A dull black

B dull white

C shiny black

D shiny white

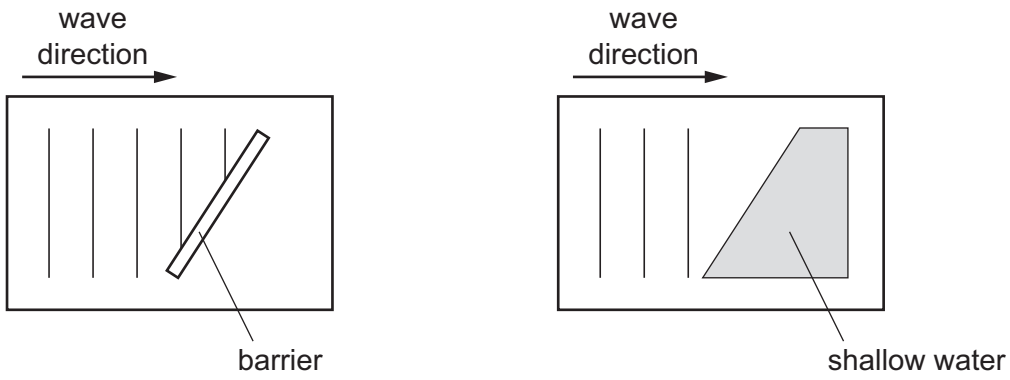
17 A wave source produces 3000 crests every minute. The wave has a speed of 300 m / s.

What is the wavelength of the wave?

A 0.10 m **B** 0.17 m **C** 6.0 m **D** 10.0 m

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18 The diagrams show two sets of wavefronts in a ripple tank.



A student makes two statements about the waves.

1 When the waves reflect from the barrier the direction changes but the wavelength remains the same.

2 When the waves refract as they enter the shallow water the direction remains the same, but the wavelength changes.

Which statements are correct?

A statement 1 and statement 2

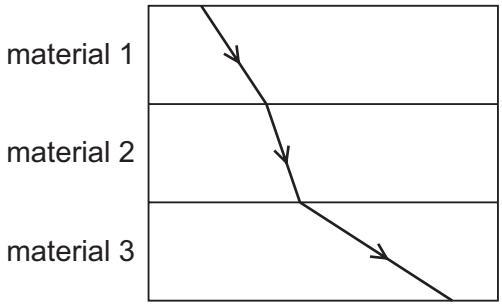
B statement 1 only

C statement 2 only

D neither statement 1 nor statement 2

19 A composite block is made by joining together three transparent materials.

The diagram shows a ray of light passing through the composite block.



Which list gives the three materials in order of the speeds of light in the materials, from slowest to fastest?

A $1 \rightarrow 2 \rightarrow 3$ **B** $1 \rightarrow 3 \rightarrow 2$ **C** $2 \rightarrow 1 \rightarrow 3$ **D** $2 \rightarrow 3 \rightarrow 1$

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20 An object is placed 30 cm in front of a plane mirror.

Which statement describes the image of the object?

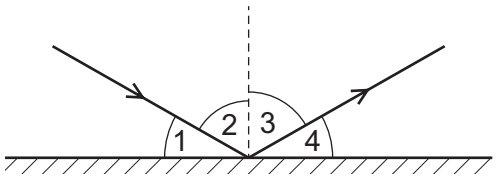
A The image is the same size and 30 cm from the object.

B The image is the same size and 60 cm from the object.

C The image is smaller and 30 cm from the object.

D The image is smaller and 60 cm from the object.

21 A ray of light is shone onto the surface of a mirror.



Which two angles represent the angle of incidence and the angle of reflection?

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

22 The speed of sound in air is 330 m / s.

How do the speeds of sound in concrete and water compare with this speed?

	speed in concrete	speed in water
A	greater	greater
B	greater	less
C	less	greater
D	less	less

23 What is the speed of microwaves in air?

A 3×10^8 μm / s

B 3×10^8 cm / s

C 3×10^8 m / s

D 3×10^8 km / s

24 An observer stands at the finish line of a 100 m race. He wants to time the winner's run. He starts his stop-watch as soon as he sees the smoke from the starting gun instead of when he hears the bang.

What is the reason for doing this?

A Light travels much faster than sound.

B There is a risk he might respond to an echo from a wall.

C Humans react slower to sound than to light.

D Humans react more quickly to sound than to light.

25 Which statement is **not** a method for magnetising an iron bar?

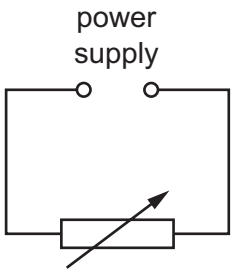
A Place the bar next to a magnet and hammer the bar.

B Place the bar inside a solenoid. Switch on an alternating current (a.c.) in the coil and gradually reduce the current.

C Place the bar inside a solenoid. Switch on a direct current (d.c.) in the coil and gradually reduce the current.

D Stroke the bar repeatedly with a magnet.

26 The diagram shows a circuit containing a variable resistor connected to a variable power supply.



The table shows the currents for different values of the potential difference (p.d.) and the resistance.

p.d. / V	resistance / Ω	current
3.6	12	I_1
1.2	12	I_2
3.6	6	I_3

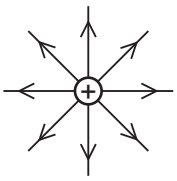
What is the order of the currents from smallest to largest?

A $I_1 \rightarrow I_2 \rightarrow I_3$ **B** $I_1 \rightarrow I_3 \rightarrow I_2$ **C** $I_2 \rightarrow I_1 \rightarrow I_3$ **D** $I_3 \rightarrow I_1 \rightarrow I_2$

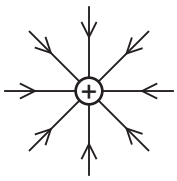
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27 Which diagram shows the electric field pattern around a positive charge?

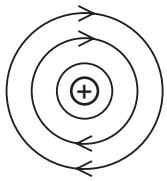
A



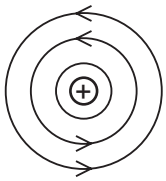
B



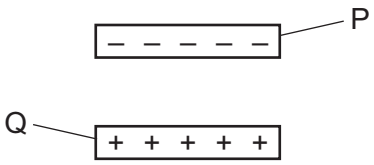
C



D



28 A negatively charged plastic rod P is placed above a positively charged plastic rod Q.



What are the directions of the electrostatic forces on rod P and on rod Q?

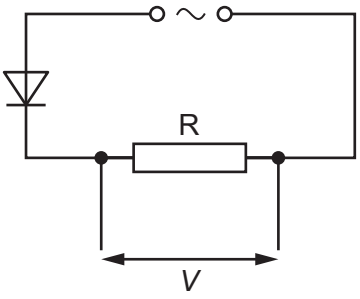
	electrostatic force on rod P	electrostatic force on rod Q
A	downwards	downwards
B	downwards	upwards
C	upwards	downwards
D	upwards	upwards

29 A lamp rated 12 V, 2.0 A is switched on for one minute.

How much energy is transferred by the lamp?

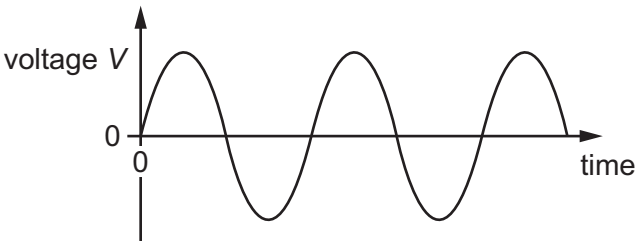
A 6.0 J **B** 24 J **C** 360 J **D** 1440 J

30 An alternating current (a.c.) power supply is connected in series with a resistor R and a diode.

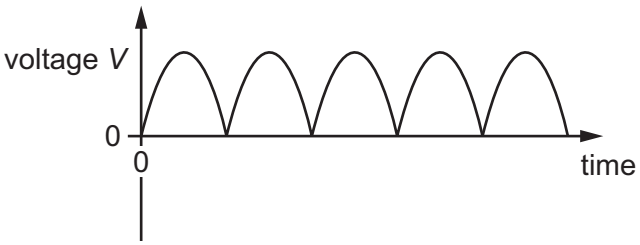


Which graph shows how the voltage *V* across the resistor R varies with time?

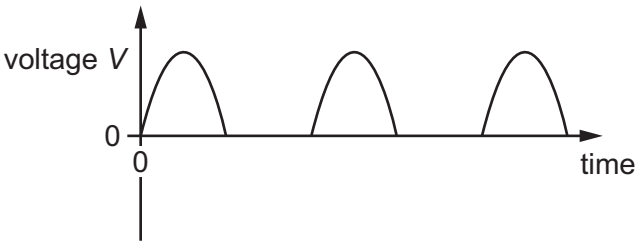
A



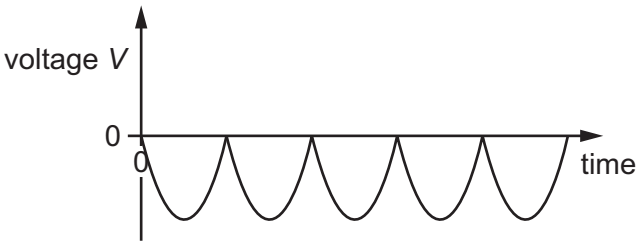
B



C



D



31 A student makes four resistors using different pieces of wire. The wires have different diameters and lengths. All the pieces of wire are made of the same material.

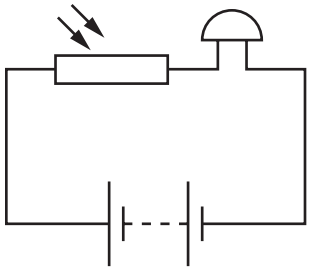
Which piece of wire will make the resistor with the largest resistance?

	diameter / mm	length / cm
A	0.8	10
B	0.8	17
C	2.0	10
D	2.0	17

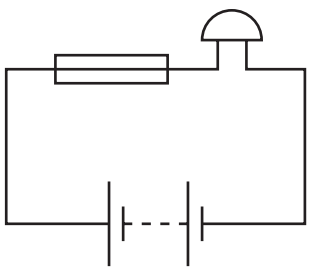
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32 Which diagram shows a circuit containing a battery, a fuse and a buzzer?

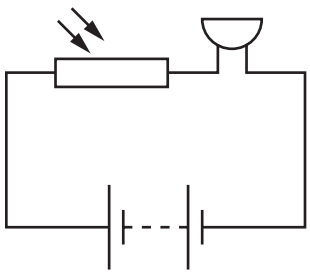
A



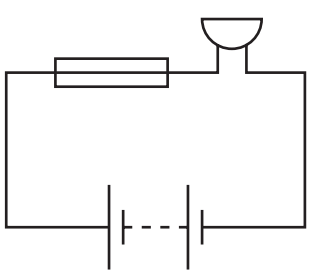
B



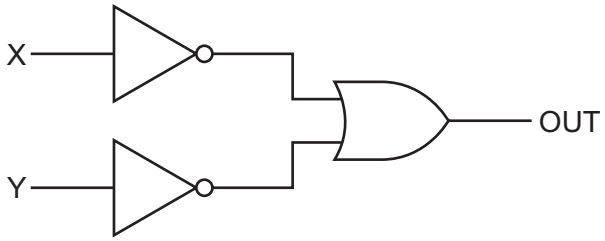
C



D

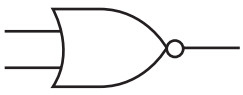


33 The diagram shows a network of logic gates.

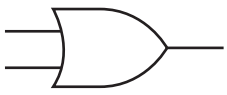


Which single logic gate, placed between X, Y and OUT, would have the same effect as the network?

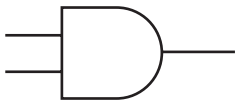
A



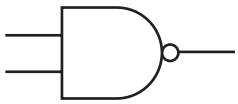
B



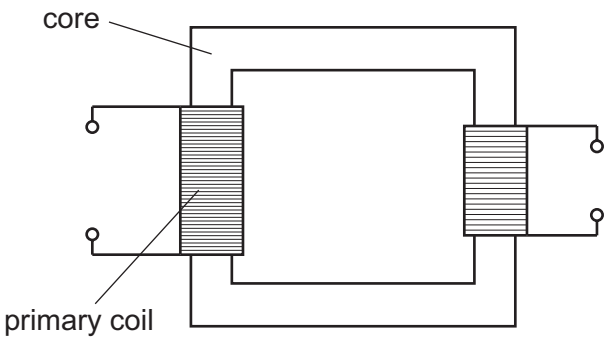
C



D



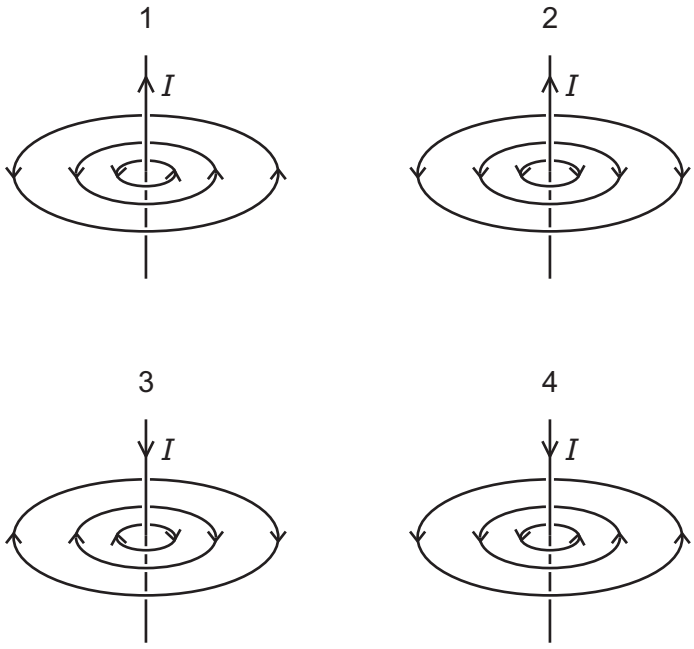
34 The diagram represents a transformer.



Which row shows materials suitable for making the core and the primary coil?

	core	primary coil
A	iron	copper
B	iron	plastic
C	steel	copper
D	steel	plastic

35 The diagrams show the magnetic field lines around a wire carrying a current, I.



Which diagrams are correct?

A 1 only **B** 2 and 3 **C** 4 only **D** 1 and 3

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36 Which statement about electromagnetic induction is correct?

A A conductor moving parallel to magnetic field lines induces an electromotive force (e.m.f.) in the conductor.

B The direction of the induced electromotive force (e.m.f.) opposes the change which produces it.

C The induced current is in a direction parallel to the direction of motion producing it.

D The induced electromotive force (e.m.f.) decreases when the speed of the conductor moving across the field lines increases.

37 A very important experiment increased scientists' understanding of the structure of matter.

In the experiment, particles scattered as they passed through a thin metal foil.

Which particles were used, and to which conclusion did the experiment lead?

	particles	conclusion
A	alpha-particles	matter is made up of atoms
B	alpha-particles	atoms have a very small nucleus
C	beta-particles	matter is made up of atoms
D	beta-particles	atoms have a very small nucleus

38 Polonium, Po, has a proton number equal to 84 and a nucleon number equal to 218.

Polonium changes into astatine, At, by emitting a β-particle.

Which equation represents this decay?

A $^{84}_{218}\text{Po} \rightarrow {}^{85}_{218}\text{At} + {}^{-1}_{0}\beta$

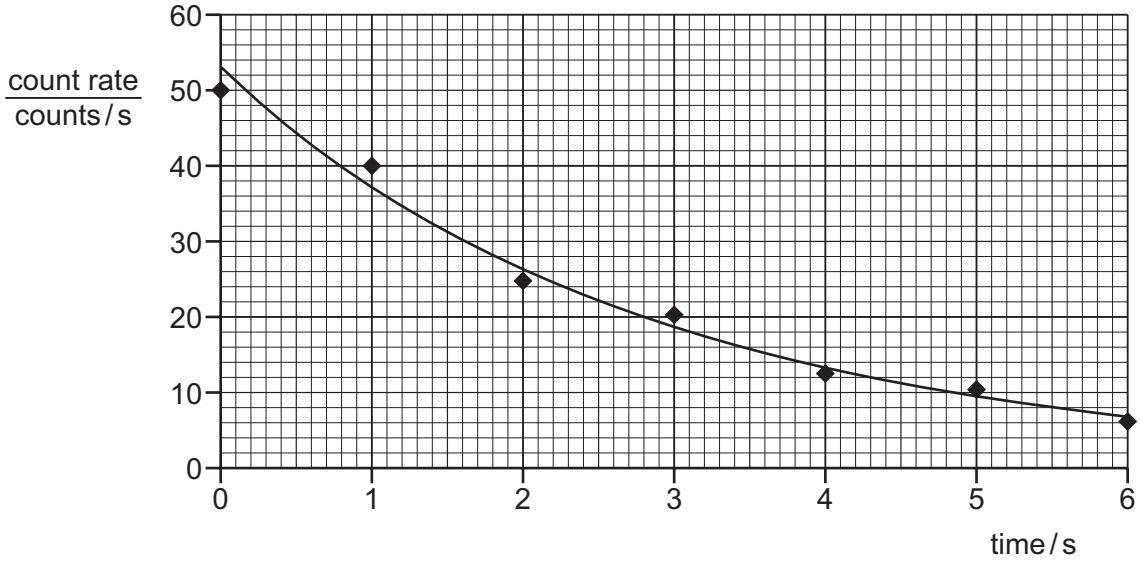
B $^{84}_{218}\text{Po} + {}^{-1}_{0}\beta \rightarrow {}^{85}_{218}\text{At}$

C $^{218}_{84}\text{Po} \rightarrow {}^{218}_{85}\text{At} + {}^{0}_{-1}\beta$

D $^{218}_{84}\text{Po} + {}^{0}_{-1}\beta \rightarrow {}^{218}_{85}\text{At}$

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39 The graph shows how the count rate from a radioactive isotope changes with time.



What is the half-life of this isotope?

A 2.0 s **B** 6.0 s **C** 12 s **D** 53 s

40 What is the nature of α-emission?

A electromagnetic waves

B negatively charged particles

C positively charged particles

D uncharged particles

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