Cambridge Assessment International Education

Cambridge IGCSE™

PHYSICS **0625/23**

Paper 2 Multiple Choice (Extended) **October/November 2021**

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.

This document has **20** pages. Any blank pages are indicated.

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1 For which purpose is a micrometer screw gauge suitable?

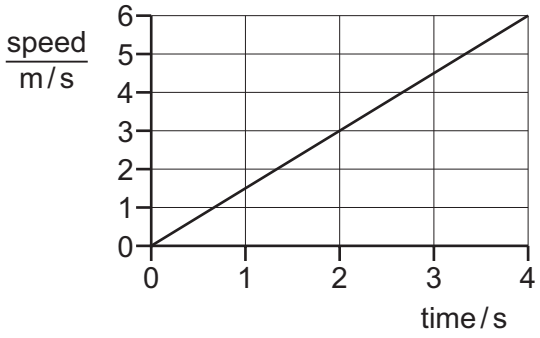
A measuring the current in a coil that is known to be about 3×10^{-6} A

B measuring the diameter of a ball bearing that is known to be about 3×10^{-3} m

C measuring the mass of a grain of sand that is known to be about 3×10^{-3} g

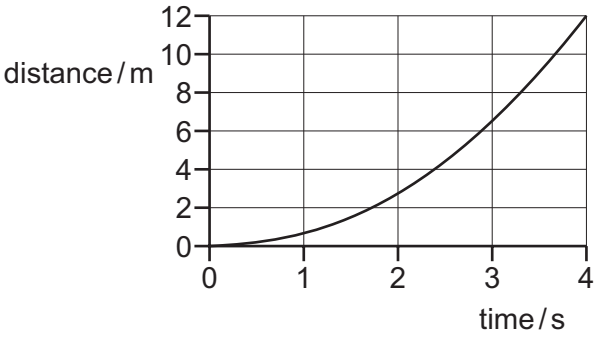
D measuring the moment used to turn a screw that is known to be about 3×10^{-6} N m

2 The graph shows how the speed of a car varies with time at the start of a journey.

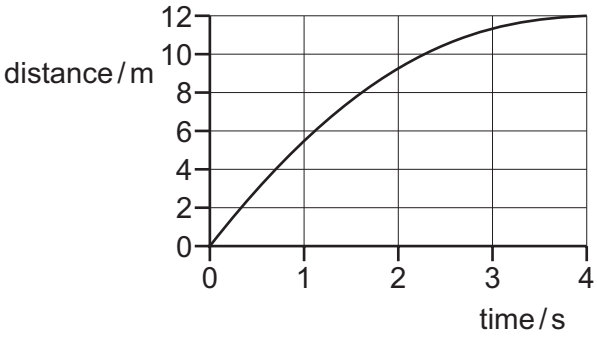


Which distance–time graph represents the motion of the car over the same time period?

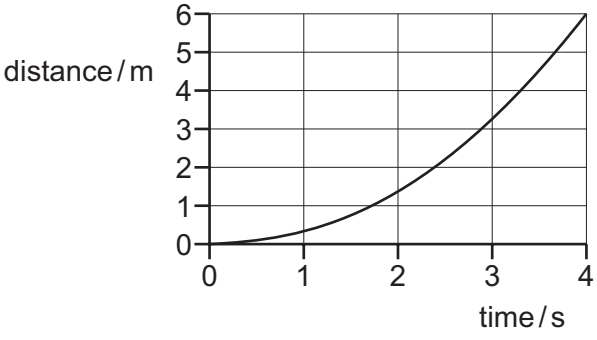
A



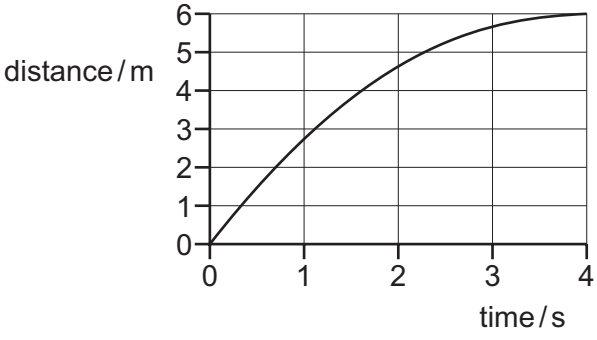
B



C



D



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3 Which statement about mass and weight is correct?

A Mass is a property that causes change in motion.

B Mass is caused by a gravitational field acting on a weight.

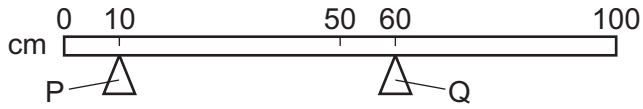
C Weight is a property that resists change in motion.

D Weight is caused by a gravitational field acting on a mass.

4 Which substance in the table has the lowest density?

	substance	mass / g	volume / cm^3
A	nylon	1.2	1.0
B	cotton	1.5	1.0
C	olive oil	1.8	2.0
D	water	2.0	2.0

5 The diagram shows a uniform bar resting on two supports, P and Q.



The weight of the bar is 4.0 N.

What is the force exerted on the bar by support P?

A 0.80 N **B** 2.0 N **C** 3.2 N **D** 4.0 N

6 A spring, which obeys Hooke's law, has an unstretched length of 10 cm.

A load of 20 N is suspended from the spring.

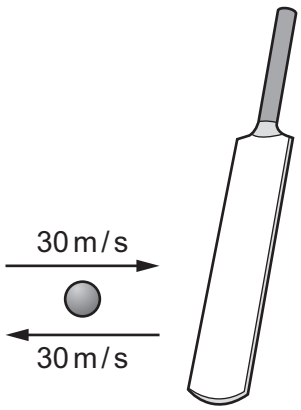
The new length of the spring is 36 cm.

What is the spring constant *k* of the spring?

A 0.56 N / cm **B** 0.77 N / cm **C** 1.3 N / cm **D** 1.8 N / cm

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7 A cricket ball has a mass of 0.16 kg. The ball travels at 30 m / s. The ball is hit by a bat with a force of 10 800 N. After being hit, the ball moves off at 30 m / s in the opposite direction.



For how long was the ball in contact with the bat?

A 0.0004 s **B** 0.00089 s **C** 0.0044 s **D** 0.015 s

8 Electrical energy may be obtained from nuclear fission.

In which order is the energy transferred in this process?

A nuclear fuel → generator → reactor and boiler → turbines

B nuclear fuel → generator → turbines → reactor and boiler

C nuclear fuel → reactor and boiler → generator → turbines

D nuclear fuel → reactor and boiler → turbines → generator

9 Which energy resource has the Sun as its only source of energy?

A geothermal

B nuclear

C oil

D tidal

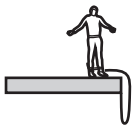
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10 A man, attached to an elastic cord, jumps from a platform. He falls 60 m before starting to rise. The length of the unextended cord is 30 m.

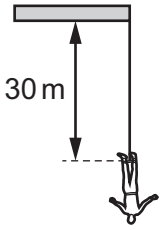
The diagrams show four successive stages in his fall.

In which position is elastic (strain) energy and kinetic energy present?

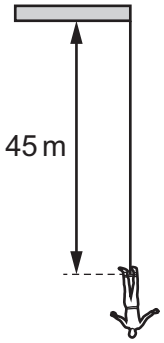
A



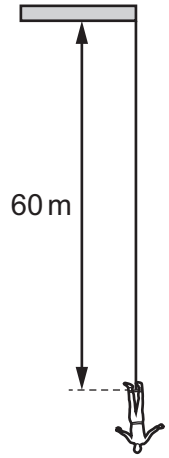
B



C

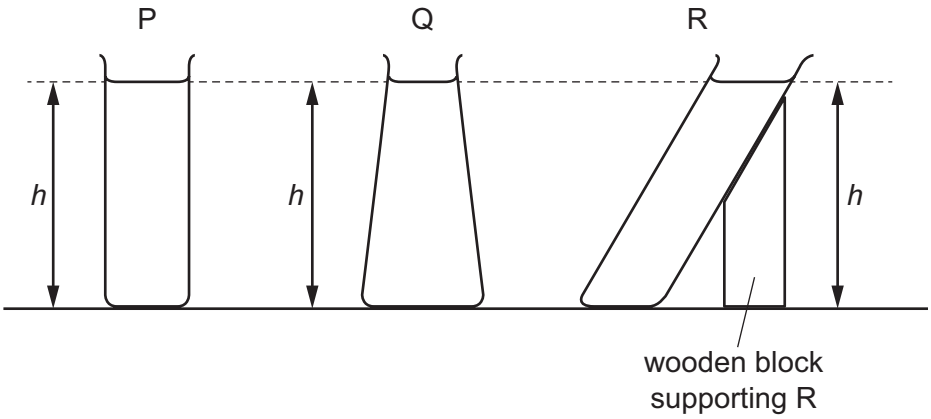


D



11 The diagram shows three glass containers.

All three contain water filled to the same vertical height *h*.



The base area of P is equal to the base area of R.

The base area of Q is larger than the other two.

Students are asked to compare the water pressure at the bottom of each container.

Student 1 says that the pressure at base R is more than the pressure at base P.

Student 2 says that the pressure at base Q is less than the pressure at base P.

Student 3 says that the pressures at all three bases are the same.

Which students are correct?

A none are correct

B 1 only

C 2 only

D 3 only

12 A liquid is evaporating. The liquid is not boiling.

Which statement about the liquid is correct at an instant in time?

A Any molecule can escape, and from any part of the liquid.

B Any molecule can escape, but only from the liquid's surface.

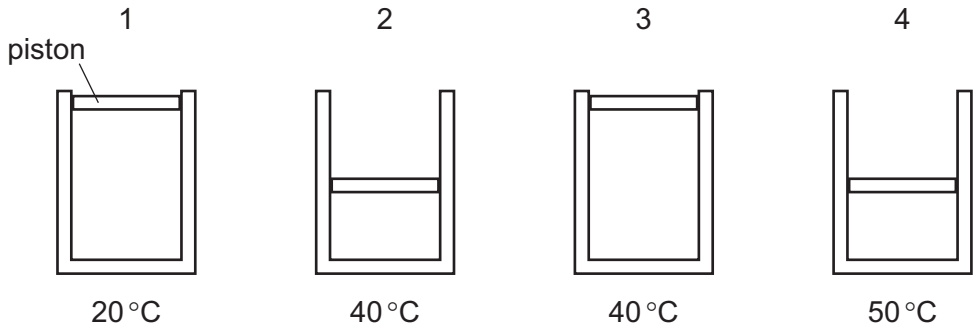
C Only molecules with enough energy can escape, and only from the liquid's surface.

D Only molecules with enough energy can escape, but from any part of the liquid.

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13 The same mass of a gas is trapped in four identical cylinders by a piston that can move.

The diagrams show the samples of gas in different conditions of volume and temperature.



Which list gives the pressure of the gas in order from lowest to highest?

A $1 \rightarrow 2 \rightarrow 3 \rightarrow 4$

B $1 \rightarrow 3 \rightarrow 2 \rightarrow 4$

C $4 \rightarrow 2 \rightarrow 3 \rightarrow 1$

D $4 \rightarrow 3 \rightarrow 2 \rightarrow 1$

14 An aluminium block has a mass of 200 g.

The specific heat capacity of aluminium is 900 J / (kg °C).

How much energy is needed to increase the temperature of the block from 20 °C to 110 °C?

A 2.0 J **B** 2000 J **C** 16 200 J **D** 16 200 000 J

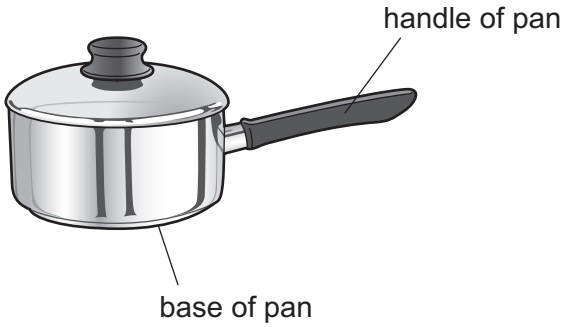
15 A solid and a gas are each given the same increase in temperature. The gas is kept at a constant pressure.

Which row is correct?

	the one which expands most	the reason
A	the gas	molecules in the gas each expand more than the solid molecules
B	the gas	the molecules in the solid are held strongly together
C	the solid	molecules in the solid each expand more than the gas molecules
D	the solid	all the molecules in the gas are separate from one another

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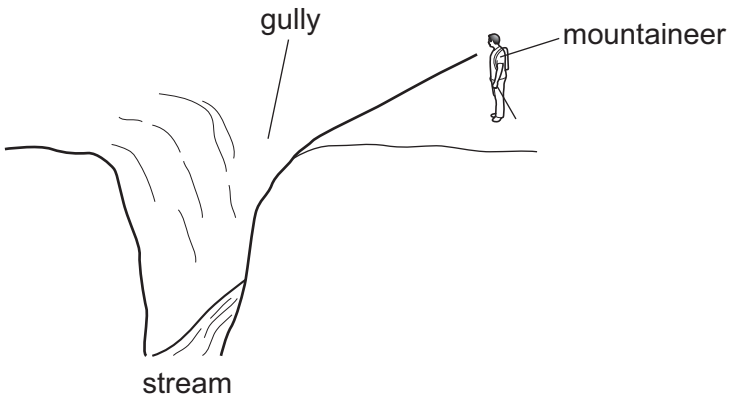
16 The diagram shows a pan used for cooking food.



Which row is correct for the materials used to make the base and the handle of the pan?

	base of pan	handle of pan
A	good thermal conductor	good thermal conductor
B	good thermal conductor	poor thermal conductor
C	poor thermal conductor	good thermal conductor
D	poor thermal conductor	poor thermal conductor

17 In the diagram, the mountaineer can hear the stream although he cannot see it. When he is closer to the gully, he can both hear and see the stream. When he is further from the gully, he can neither hear nor see the stream.



Which statement is **not** correct?

A As he approaches the gully edge, he hears first the short wavelength, higher frequencies and then the long wavelength, lower frequencies.

B As he approaches the gully edge, the sound becomes louder.

C He hears the stream because some of the sound is diffracted.

D He hears the stream because some of the sound is reflected from the opposite wall of the gully.

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18 Which row correctly defines the frequency and the speed of a wave?

	frequency	speed
A	number of waves	distance travelled per unit time
B	number of waves	time taken for one complete wave to pass a point
C	number of waves passing per unit time	distance travelled per unit time
D	number of waves passing per unit time	time taken for one complete wave to pass a point

19 A ray of light travels from air into a glass block.

	in air	in glass
speed of ray	v_a	v_g
wavelength of ray	λ_a	λ_g
frequency of ray	f_a	f_g

Three suggestions as to how the refractive index of glass n may be calculated are listed.

1 $n = \frac{v_a}{v_g}$

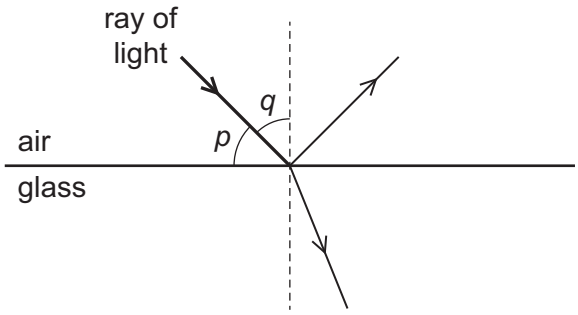
2 $n = \frac{\lambda_a}{\lambda_g}$

3 $n = \frac{f_a}{f_g}$

Which suggestions are correct?

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

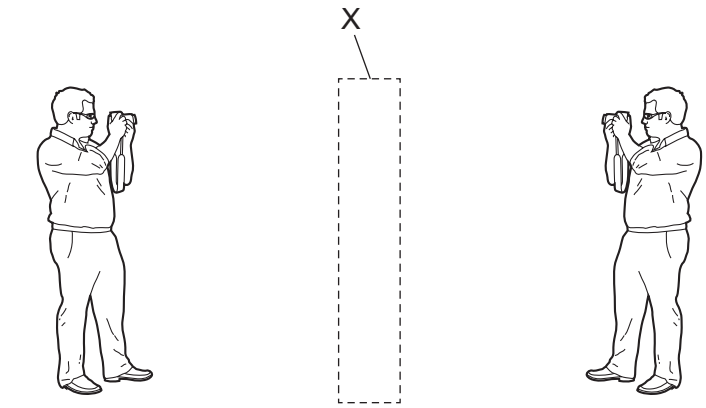
20 The diagram shows a ray of light in air incident on a glass block. Some of the light is refracted and some of the light is reflected. Two angles, *p* and *q*, are marked on the diagram.



Which row gives the angle of incidence and states whether total internal reflection occurs?

	angle of incidence	total internal reflection
A	*p*	no
B	*p*	yes
C	*q*	no
D	*q*	yes

21 A photographer sees his image as shown.



What could X be?

A



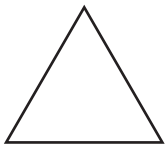
mirror

B



translucent glass block

C



transparent glass prism

D



transparent semicircular glass block

22 The Sun emits infrared radiation and light.

Light from the Sun reaches the Earth in 8 minutes.

Which row gives correct information about the infrared radiation?

	wavelength of infrared radiation	time taken for infrared radiation to reach the Earth
A	longer than wavelength of light	8 minutes
B	longer than wavelength of light	much less than 8 minutes
C	shorter than wavelength of light	8 minutes
D	shorter than wavelength of light	much more than 8 minutes

23 Which row gives the typical values of the speed of sound at room temperature in the materials stated?

	speed of sound / m/s		
	air	water	iron
A	340	1500	5100
B	340	5100	1500
C	5100	1500	340
D	3.0×10^8	3.0×10^8	3.0×10^8

24 What is ultrasound?

A sound waves that are so loud that they damage human hearing

B sound waves that are too high-pitched for humans to hear

C sound waves that are too low-pitched for humans to hear

D sound waves that are too quiet for humans to hear

25 A stationary, charged particle is in a field.

Which fields can cause there to be a force on this particle due to its charge?

1 gravitational field

2 magnetic field

3 electric field

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

26 An electric current in a copper wire is due to the flow of charge.

Which particles are moving along the wire?

A α-particles

B copper nuclei

C electrons

D protons

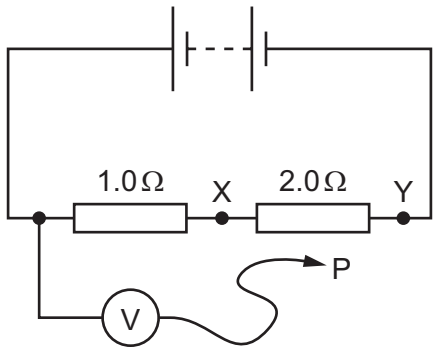
27 Which row is correct?

	definition of current I	direction of conventional current
A	$I = \frac{Q}{t}$	from positive terminal to negative terminal
B	$I = \frac{Q}{t}$	from negative terminal to positive terminal
C	$I = Q \times t$	from positive terminal to negative terminal
D	$I = Q \times t$	from negative terminal to positive terminal

28 The diagram shows a circuit containing two resistors of resistance 1.0 Ω and 2.0 Ω.

A voltmeter is connected across the 1.0 Ω resistor by connecting P to X.

The reading on the voltmeter is 6.0 V.



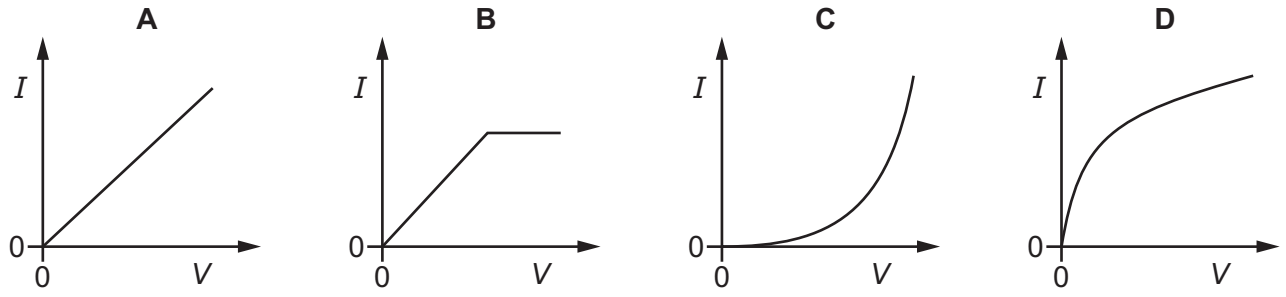
P is moved to point Y in the circuit.

What is the new reading on the voltmeter?

A 3.0 V **B** 6.0 V **C** 12 V **D** 18 V

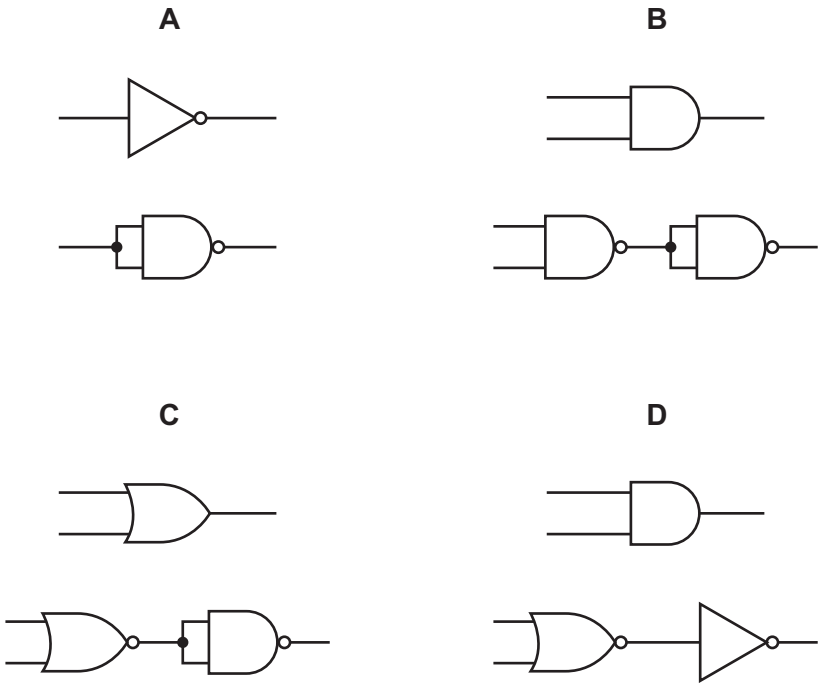
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29 Which graph shows the current–voltage characteristic for a filament lamp?



30 The diagrams show pairs of circuits containing logic gates.

In which diagram does the lower circuit of the pair behave differently from the upper circuit?



31 Two 3.0 Ω resistors and one 6.0 Ω resistor are connected in series with a cell.

Which statement is correct?

A The current in the cell is equal to the current in the resistors.

B The current in the cell is greater than the current in the resistors.

C The potential difference (p.d.) across each resistor is equal to the p.d. across the cell.

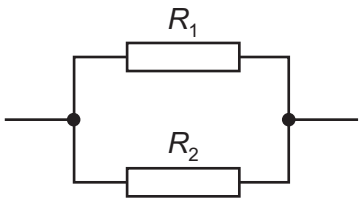
D The potential differences across each resistor are equal.

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[Turn over

32 Two resistors, with resistances R_1 and R_2, are connected in parallel.

The resistance R_1 is greater than the resistance R_2.



What is the resistance of the parallel combination?

A less than either R_1 or R_2

B equal to R_1

C equal to R_2

D the average of R_1 and R_2

33 Circuit breakers and fuses are devices used to protect a circuit from overloading.

Which statement correctly describes the difference between a circuit breaker and a fuse?

A Circuit breakers can be reset if they operate but fuses need to be replaced.

B Circuit breakers need to be replaced if they operate but fuses can be reset.

C Circuit breakers can be used in an a.c. circuit but fuses cannot.

D Circuit breakers cannot be used in an a.c. circuit but fuses can.

34 Electrical energy is transferred by transmission lines at high voltage.

Which statement explains why a high voltage is used?

A The voltage is alternating.

B The transmission lines have a larger resistance.

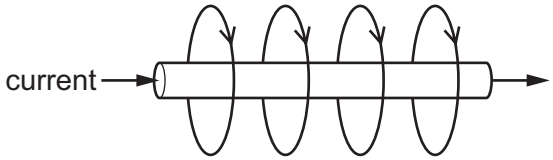
C The transmission lines carry greater power.

D There is a smaller current in the transmission lines for the same power.

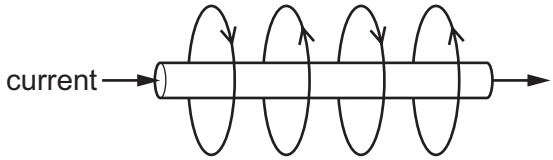
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35 Which diagram shows the magnetic field around a straight, current-carrying wire?

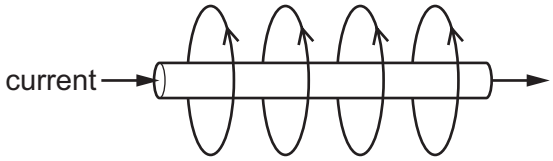
A



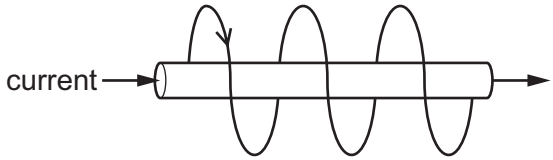
B



C



D



36 The coil in a d.c. motor is connected to a split-ring commutator.

What is the purpose of the split-ring commutator?

A to ensure that the coil continues to rotate in the same direction

B to ensure that the size of the current in the coil remains constant

C to ensure that the size of the turning effect on the coil remains constant

D to ensure that the turning effect on the coil changes direction

37 The nucleus of an americium atom contains 146 neutrons and 95 protons. It decays by emitting an α-particle.

How many neutrons and how many protons remain in the nucleus when this form of americium decays?

	number of neutrons remaining	number of protons remaining
A	142	93
B	142	95
C	144	93
D	144	95

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38 The half-life for lead-202 is 52 500 years.

A sample of lead-202 produces 800 counts / s.

How long will it take for the count rate to drop to 100 counts / s?

A 105 000 years

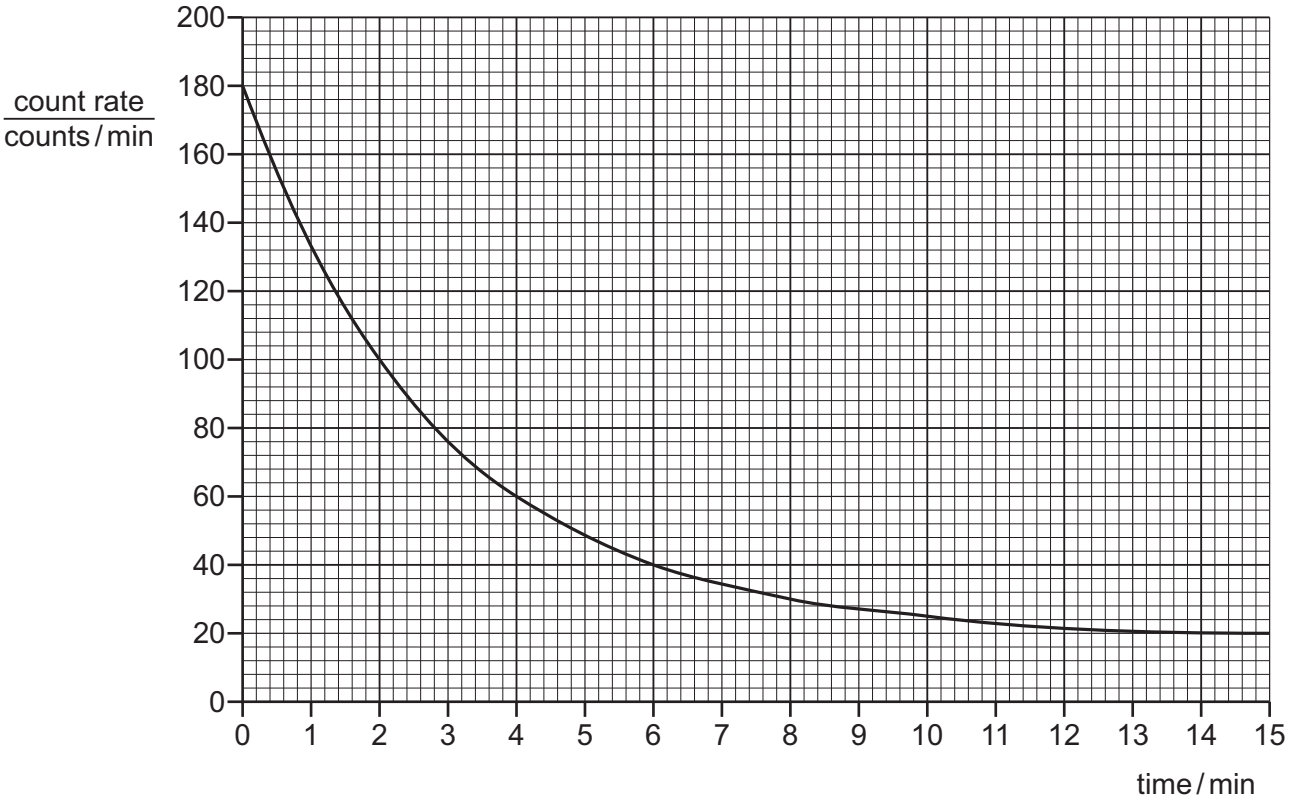
B 157 500 years

C 210 000 years

D 420 000 years

39 Oxygen-15 is used in hospitals.

The count rate from a detector placed close to a sample of oxygen-15 was recorded over a period of 15 min. The background count rate is 20 counts / min.



What is the half-life of this sample of oxygen-15?

A 2.0 min **B** 2.4 min **C** 2.8 min **D** 7.5 min

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40 Of the three types of ionising radiation, α, β and γ, why does α-emission cause the most ionisation?

A α-particles have the smallest mass.

B α-particles have the greatest mass.

C α-particles move with the greatest speed.

D α-particles travel the greatest distance in matter.

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