Cambridge Assessment International Education

Cambridge IGCSE™

PHYSICS **0625/22**

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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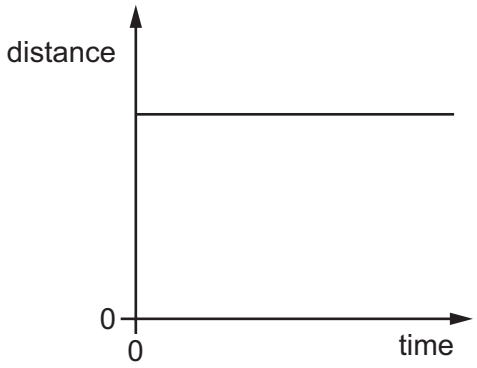
1 A student is taking some measurements.

Which measurement is taken directly using a micrometer screw gauge?

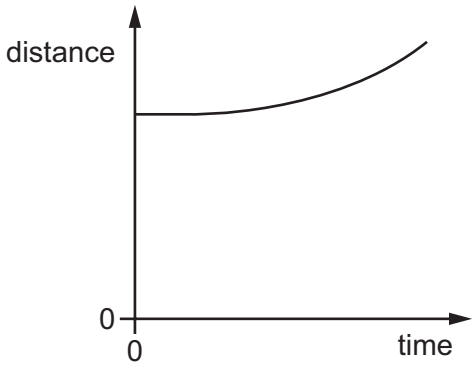
A $0.52\,g/mm^2$ **B** $0.52\,g/mm^3$ **C** $0.52\,mm$ **D** $0.52\,mm^2$

2 Which graph represents an object that is moving at constant speed?

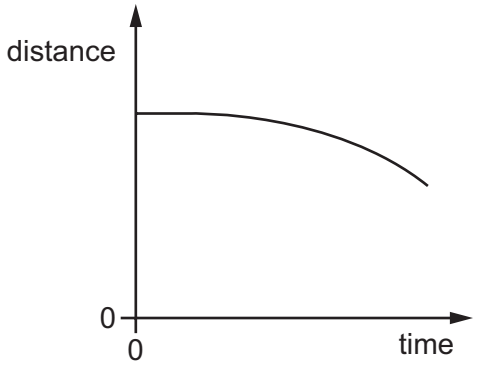
A



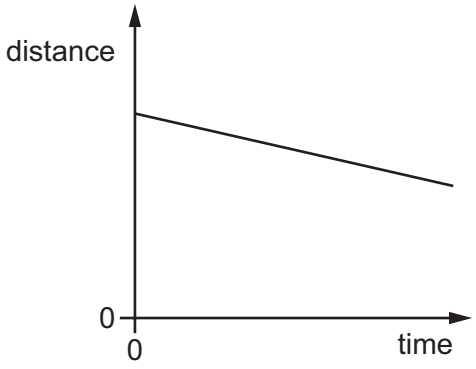
B



C



D



3 In which situation does object X have a greater mass than object Y?

A Object X is in a larger gravitational field than object Y and both have the same weight.

B Object X shows a greater resistance to change in motion than object Y and both experience the same resultant force.

C Object X has a lower density than object Y and both occupy the same volume.

D Object X moves at a greater speed than object Y and both possess the same kinetic energy.

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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

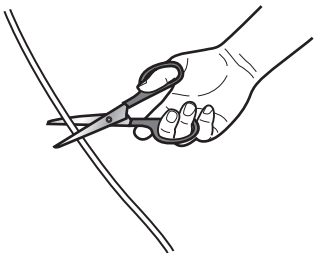
5 Three simple machines are shown.

1



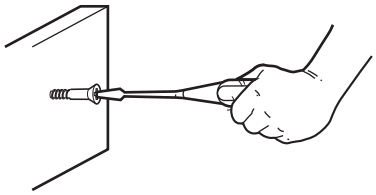
moving soil with a wheelbarrow

2



cutting string with scissors

3



screwing a screw with a screwdriver

Which machines are an application of the moment of a force?

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

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 rocket is launched upwards from the surface of the Moon.

Hot gases are ejected downwards over a very short period of time.

Which statement is **not** correct?

A The rocket experiences a downward force.

B The rocket experiences an upward force.

C The total momentum of the hot gases is equal to the momentum of the rocket.

D The total momentum of the hot gases and rocket when the hot gases have been ejected is zero.

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

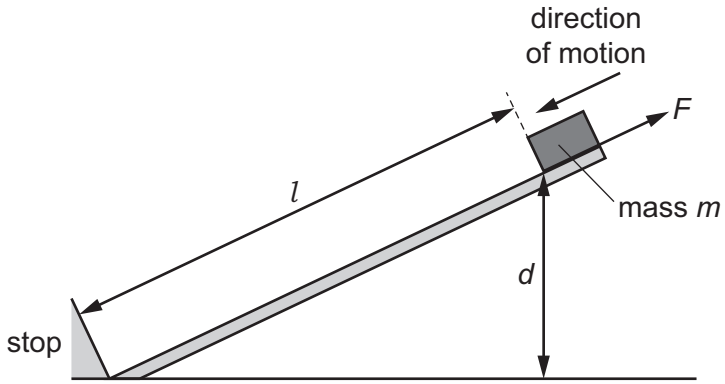
B nuclear fuel → generator → turbines → reactor and boiler

C nuclear fuel → reactor and boiler → generator → turbines

D nuclear fuel → reactor and boiler → turbines → generator

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9 A box of mass *m* slides down a slope of length l against a frictional force *F*. It descends a vertical height *d*.



As the box slides down the slope, it loses gravitational potential energy and it does work against the friction.

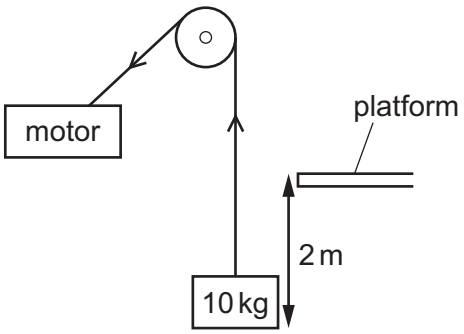
Which row gives the loss in gravitational potential energy and the work done against friction?

	loss in gravitational potential energy	work done against friction
A	*mgd*	Fl
B	*mgd*	*Fd*
C	mgl	Fl
D	mgl	*Fd*

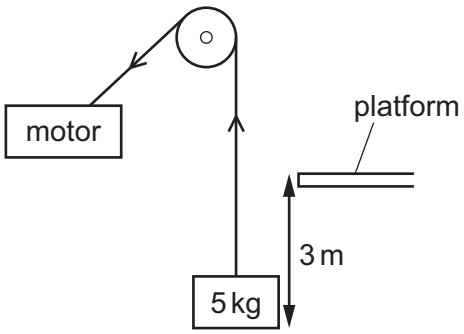
10 A rope, connected to a pulley system and motor, is used to lift different objects through different distances. The time taken to lift each object is the same. The diagrams are not to scale.

Which motor requires the greatest power?

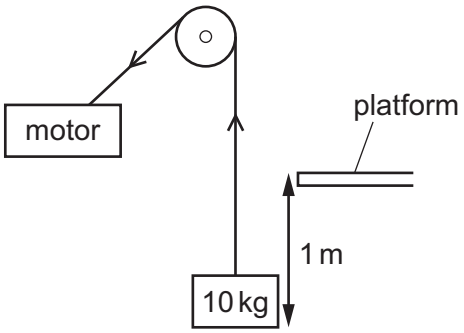
A



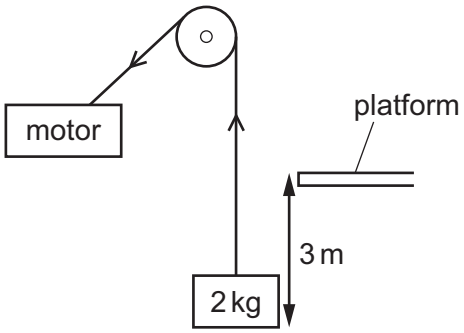
B



C



D



11 Which equation can be used to calculate the pressure at a depth h beneath the surface of a liquid?

A $p = \frac{h}{\rho g}$ **B** $p = \frac{h\rho}{g}$ **C** $p = h\rho g$ **D** $p = \frac{1}{h\rho g}$

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 A gas is contained in a sealed container in a laboratory. The temperature of the gas increases.

What happens to the average speed and what happens to the total kinetic energy of the gas molecules?

	average speed	total kinetic energy
A	does not change	does not change
B	does not change	increases
C	increases	does not change
D	increases	increases

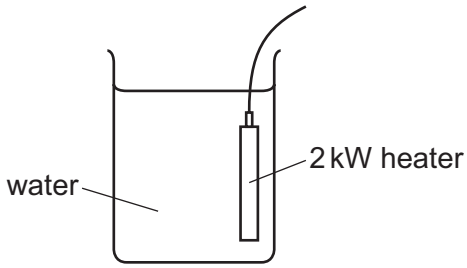
14 An aluminium block has a mass of 200 g.

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 The diagram shows the apparatus used to measure the specific latent heat of vaporisation of water.

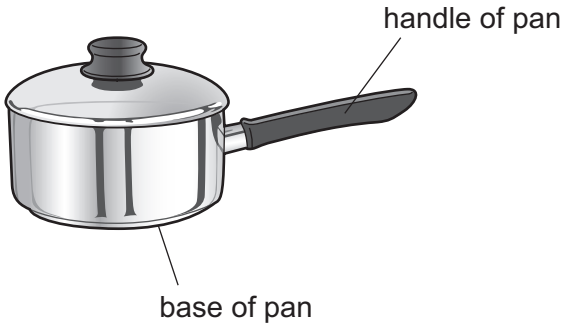


After the water begins to boil, 110 g of water is converted to steam in 120 s.

Using these results, what is the value of the specific latent heat of vaporisation of water?

A 1.8 J / kg **B** 1800 J / kg **C** 2200 J / kg **D** 2 200 000 J / kg

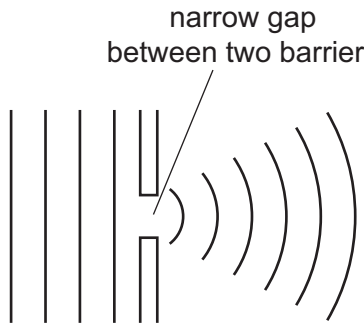
16 The diagram shows a pan used for cooking food.



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 The diagram shows the pattern of water waves as they pass through a narrow gap.



Which row names the process shown and describes the effect of using a wider gap?

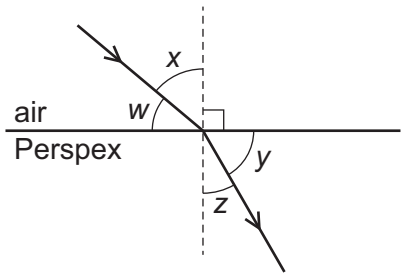
	name of process	wider gap
A	refraction	waves spread out less
B	refraction	waves spread out more
C	diffraction	waves spread out less
D	diffraction	waves spread out more

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18 Which row is **not** correct for a wave on the surface of water?

	quantity	usual unit
A	amplitude	m
B	frequency	Hz
C	wavelength	λ
D	speed	m / s

19 The diagram shows how a ray of light refracts when going from air to Perspex.



The critical angle of Perspex is *c*.

Which expression is correct?

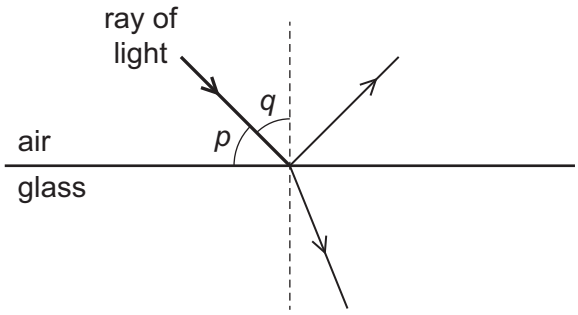
A $\frac{\sin x}{\sin z} = \sin c$

B $\frac{\sin z}{\sin x} = \sin c$

C $\frac{\sin w}{\sin y} = \sin c$

D $\frac{\sin y}{\sin w} = \sin c$

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 The letter F is reflected in a mirror.



What does the optical image look like?

A **B** **C** **D**



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 statement about electromagnetic waves is **not** correct?

A They travel at 3×10^8 m/s in a vacuum.

B They transfer energy.

C They travel at 340 m/s in air.

D They are transverse waves.

24 What is ultrasound?

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

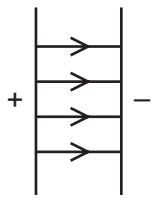
B sound waves that are too high-pitched for humans to hear

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

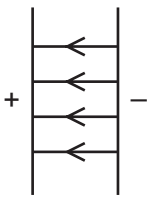
D sound waves that are too quiet for humans to hear

25 Which diagram shows the electric field pattern between two oppositely charged parallel metal plates?

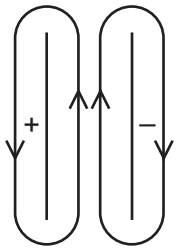
A



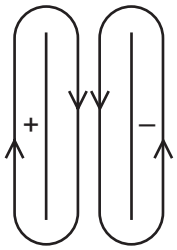
B



C



D

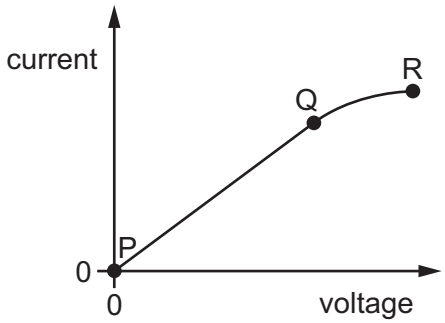


26 Which circuit symbol represents a component used to measure electric current?

A **B** **C** **D**



27 The graph shows the current–voltage characteristic for a conductor.



Where on the graph can Ohm's law be applied to the conductor?

A at Q only

B between P and Q

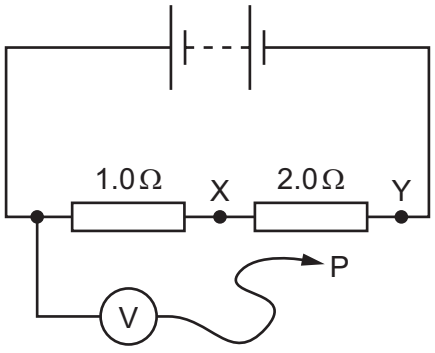
C between P and R

D between Q and R

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

29 There is a current I in a resistor. The potential difference (p.d.) across the resistor is V.

Which other physical quantity is needed to be able to determine the energy transferred W by the resistor?

A the electromotive force (e.m.f.) E of the source

B the power P dissipated

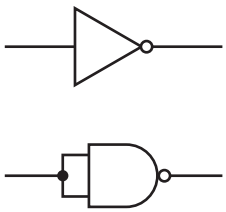
C the resistance R of the resistor

D the time t for which there is a current in the resistor

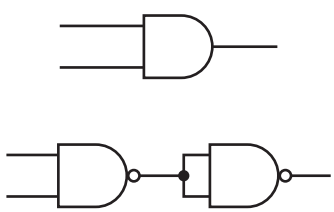
30 The diagrams show pairs of circuits containing logic gates.

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

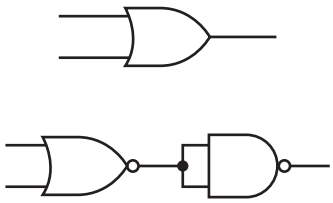
A



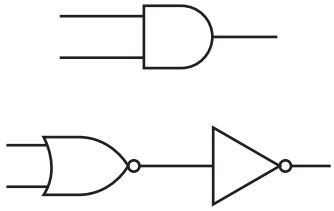
B



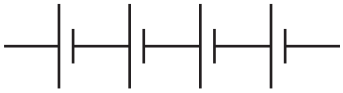
C



D



31 Several cells are connected in series, as shown.



What is the combined electromotive force (e.m.f.) of the cells?

A the average of the e.m.f.s of the separate cells

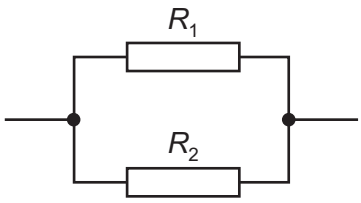
B the e.m.f. of one of the cells

C the product of the e.m.f.s of the cells

D the sum of the e.m.f.s of the cells

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?

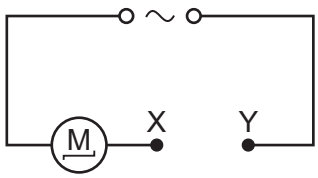
A less than either R_1 or R_2

B equal to R_1

C equal to R_2

D the average of R_1 and R_2

33 The diagram shows a motor connected to an a.c. supply. The circuit is incomplete.



Which device needs to be connected between point X and point Y to prevent the wires from overheating if a fault in the motor causes the current to get too high?

A an ammeter

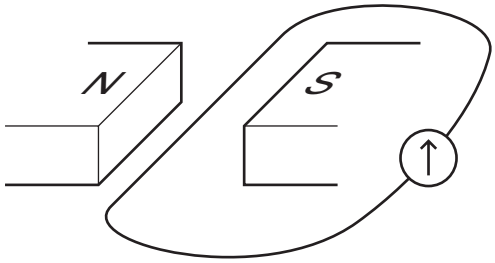
B a fuse

C a transformer

D a length of thick copper wire

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34 The diagram shows a wire between two magnets. An electromotive force (e.m.f.) is induced in the wire when it is moved up between the two magnets.



Four tests are done.

1 The direction of movement of the wire is reversed.

2 The direction of the magnetic field is reversed.

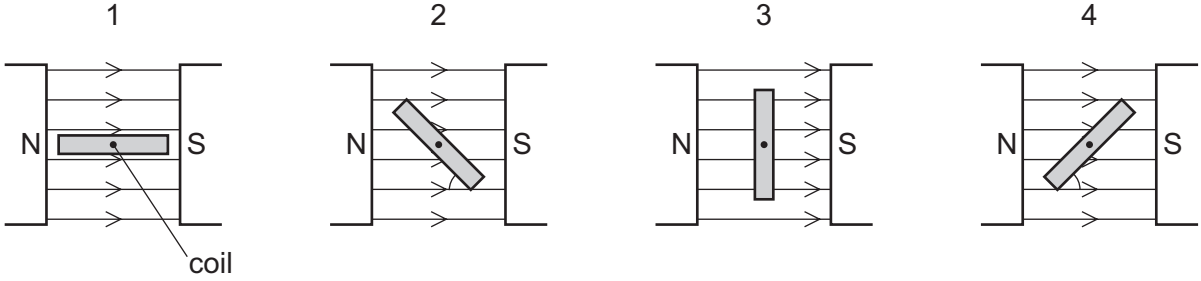
3 The wire is moved more quickly.

4 The magnetic field strength is decreased.

Which tests will induce a smaller e.m.f. in the wire?

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

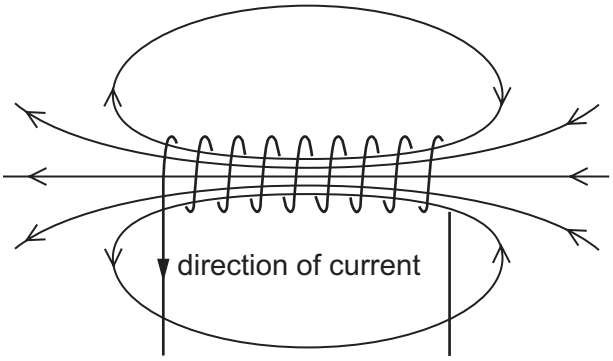
35 Four positions of a current-carrying coil in a magnetic field, as in a d.c. motor, are shown. In diagrams 2 and 4, the coil is at an angle of 45° to the field lines.



Which row is correct?

	turning effect of the forces in positions 1 and 3	turning effect of the forces in positions 2 and 4
A	different	different
B	different	same
C	same	different
D	same	same

36 The diagram shows the magnetic field due to a current in a solenoid.



The direction of the current is reversed.

Which row describes the effect that this has on the magnitude and on the direction of the magnetic field?

	magnitude of magnetic field	direction of magnetic field
A	increases	changes
B	increases	unchanged
C	unchanged	changes
D	unchanged	unchanged

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

38 A sample of americium decays and changes into neptunium. The half-life of americium is 432 years.

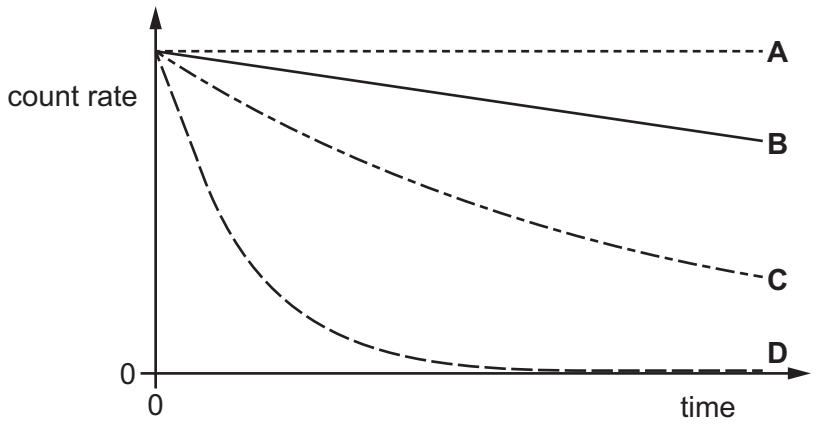
Which fraction of the americium will remain after 1728 years?

A 0 **B** $\frac{1}{16}$ **C** $\frac{1}{8}$ **D** $\frac{1}{4}$

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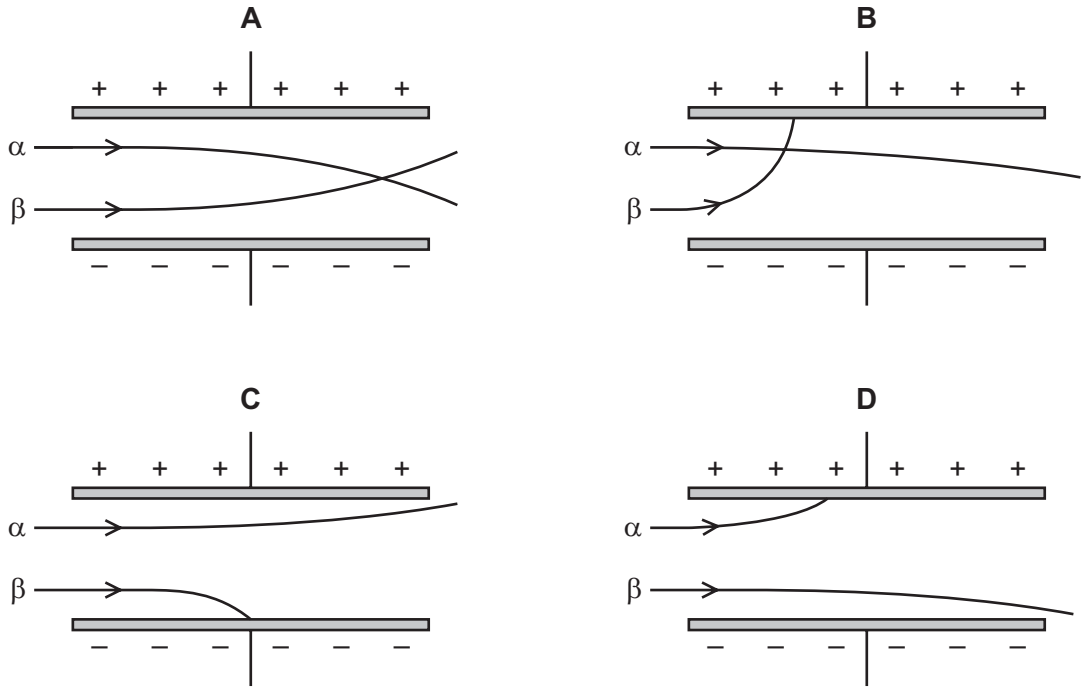
39 The graph shows the decay curves of four different radioactive isotopes.

Which isotope has the largest half-life?



40 The diagrams show α-particles and β-particles passing through an electric field.

Which diagram shows the correct paths of the α-particles and β-particles?



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