Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

PHYSICS **5054/11**

Paper 1 Multiple Choice **May/June 2015**

1 hour

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

* 2 8 9 1 5 1 3 4 1 2 *

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.
DO **NOT** WRITE IN ANY BARCODES.

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.
Electronic calculators may be used.

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1 Is mass a scalar or a vector, and is acceleration a scalar or a vector?

	mass	acceleration
A	scalar	scalar
B	scalar	vector
C	vector	scalar
D	vector	vector

2 The diameter and the length of a thin wire, approximately 50 cm in length, are measured as precisely as possible.

What are the best instruments to use?

	diameter	length
A	micrometer	rule
B	micrometer	vernier calipers
C	rule	tape
D	vernier calipers	rule

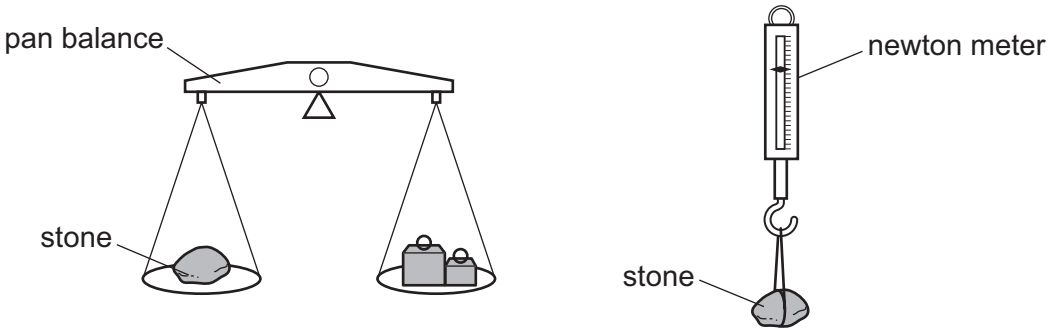
3 A student walks at a constant speed. He takes 100 s to walk 160 paces. The length of each pace is 0.80 m.

How far does the student walk in 50 s?

A 64 m **B** 80 m **C** 128 m **D** 256 m

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4 The mass of a stone is found on Earth using a pan balance. The weight of the stone is found using a newton meter.



Are the readings the same or different on the Moon?

	reading on pan balance	reading on newton meter
A	different	different
B	same	different
C	different	same
D	same	same

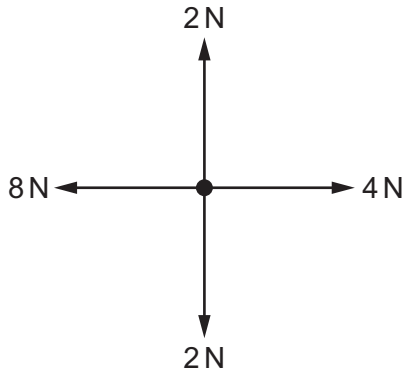
5 The table shows the weights and masses of four objects on different planets.

On which planet is the gravitational field strength the largest?

	weight / N	mass / kg
A	2.0	20
B	4.0	30
C	6.0	40
D	8.0	50

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6 Four forces act at a point as shown.



What is the size of the resultant force?

A 0 N **B** 4 N **C** 6 N **D** 8 N

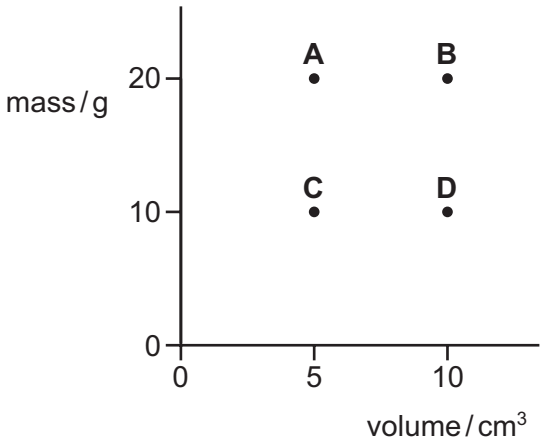
7 A student drops, from rest, a table-tennis ball in air.

What happens to the velocity and to the acceleration of the ball during the first few seconds after release?

	velocity	acceleration
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

8 The mass and volume of four different objects are plotted as shown.

Which object has the smallest density?



9 Newton's third law involves two quantities which are equal in size and opposite in direction.

What is the unit for these two quantities?

A J

B m/s^2

C N

D W

10 When a car turns a corner at speed, it risks toppling over. Two factors affecting the stability of a car are the height of its centre of mass and the distance between its front wheels.

Which factors make the car most stable?

	centre of mass	distance between front wheels
A	high	small
B	high	large
C	low	small
D	low	large

11 A cyclist travels along a horizontal track at constant speed.

The work done by the cyclist is equal to

A the change in kinetic energy.

B the force of air resistance.

C the force of friction in the bicycle.

D the thermal energy (heat) produced.

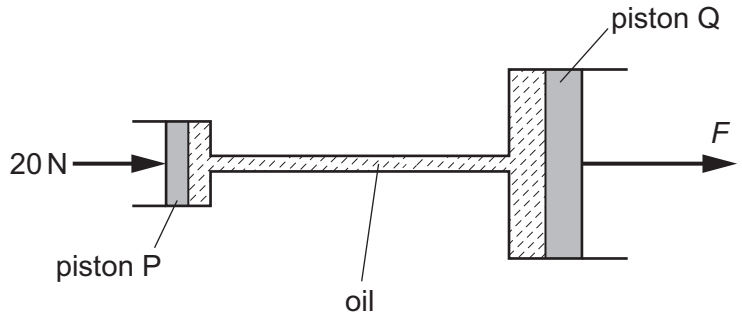
12 A 2.0 kg mass has 300 J of kinetic energy.

What is the speed of the mass?

A 8.7 m/s **B** 12 m/s **C** 17 m/s **D** 24 m/s

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13 The diagram shows a simple model of the braking system of a car. A force of 20 N is applied to piston P. As a result, there is a force *F* on piston Q.



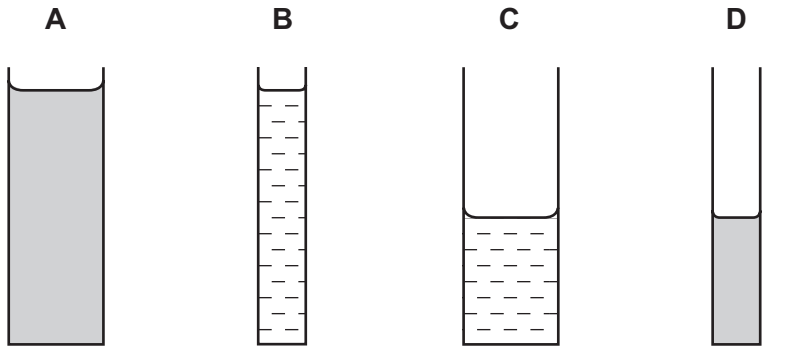
Piston P has an area of 5.0 cm^2 and piston Q has an area of 25 cm^2.

What is the force *F*?

A 4.0 N **B** 20 N **C** 100 N **D** 500 N

14 The diagrams show liquids in containers.

Which column of liquid exerts the greatest pressure on the base of its container?



15 A solid bar is heated at one end.

How is thermal energy transferred to the other end of the bar?

A Heated molecules move along the bar, carrying energy to the other end.

B Heated molecules move along the bar, giving energy to others along the bar.

C Heated molecules stay completely still, but give energy to other molecules.

D Heated molecules vibrate more rapidly and pass energy to other molecules.

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16 The tubes inside solar heating panels use the Sun's radiation to warm water.

Why are the tubes painted black?

A Black surfaces absorb radiation well.

B Black surfaces conduct heat well.

C Black surfaces emit radiation well.

D Black surfaces reflect radiation well.

17 Why is there a constriction in a clinical thermometer?

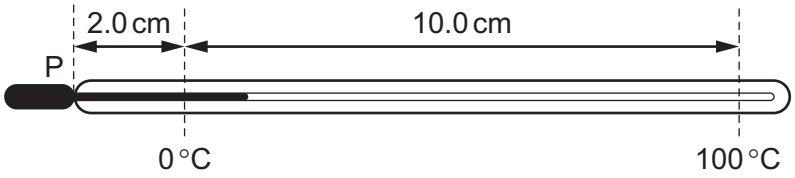
A to give the thermometer a smaller temperature range

B to make the thermometer more sensitive

C to prevent the mercury breaking the bulb when it expands

D to stop the mercury from going back to the bulb

18 In a liquid-in-glass thermometer, the liquid column is 2.0 cm long at 0 °C and it expands 10.0 cm when heated to 100 °C.



Measuring from P, how long is the liquid column at 30 °C?

A 2.3 cm **B** 3.0 cm **C** 5.0 cm **D** 7.0 cm

19 Which substance in the table is liquid at 20 °C?

	melting point / °C	boiling point / °C
A	–218	–183
B	–39	357
C	44	280
D	119	444

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20 In which situation do sound waves **not** travel?

A from a satellite in space to Earth

B from a ship to a submarine

C from an explosion underground to the surface

D through a balloon filled with helium gas

21 A wave in a ripple tank passes from a deeper to a shallower region and refracts.

Which wave properties decrease as the wave enters the shallow region?

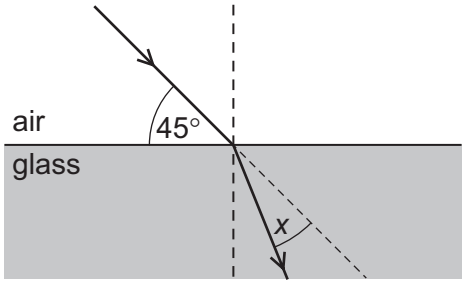
A frequency only

B speed only

C frequency and wavelength

D speed and wavelength

22 A ray of light is incident on the surface of a glass block, as shown in the diagram below.



The refractive index of the glass is 1.5.

The light ray changes direction when entering the glass.

What is the angle *x* through which the ray moves?

A 30° **B** 28° **C** 17° **D** 15°

23 An image is formed by a thin converging lens when it is used as a magnifying glass.

What is the correct description of the image?

A real and erect

B real and inverted

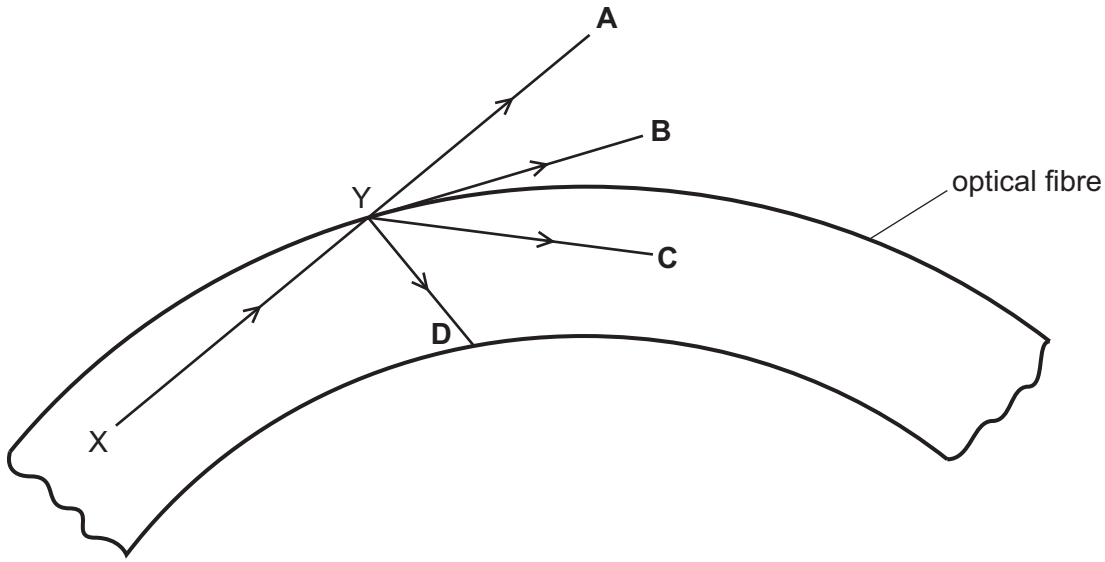
C virtual and erect

D virtual and inverted

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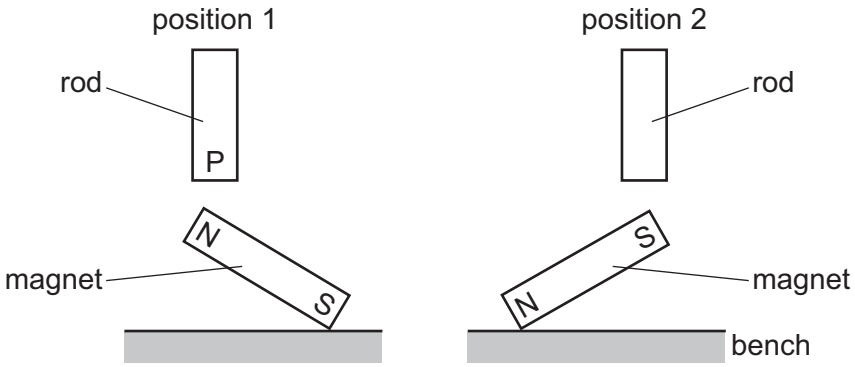
24 A ray of light travels from X to Y along an optical fibre. The angle of incidence at Y is greater than the critical angle.

In which direction does the ray of light travel after reaching point Y?



25 One end of a rod picks up the N-pole of a bar magnet when in position 1.

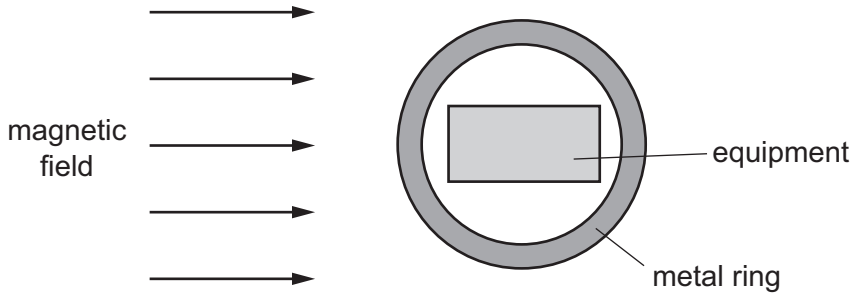
The same end of the rod picks up the S-pole of the bar magnet when in position 2.



Which material is the rod made from and what is the pole at end P of the rod when in position 1?

	material	pole at P
A	iron	N-pole
B	iron	S-pole
C	steel	N-pole
D	steel	S-pole

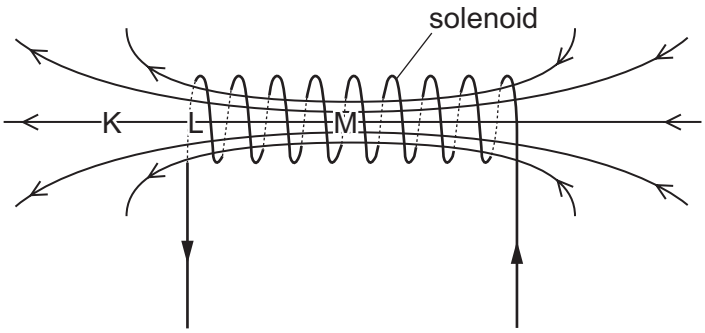
26 A metal ring screens a piece of equipment from a magnetic field.



Which metal should be used for the ring, and why?

	metal	reason
A	copper	the metal carries the field lines around the equipment
B	copper	the metal is non-magnetic
C	iron	the metal carries the field lines around the equipment
D	iron	the metal is non-magnetic

27 The diagram shows the magnetic field pattern of a current in a solenoid.



When the current in the solenoid is increased, where is there an increase in the magnetic field strength?

A K, L and M

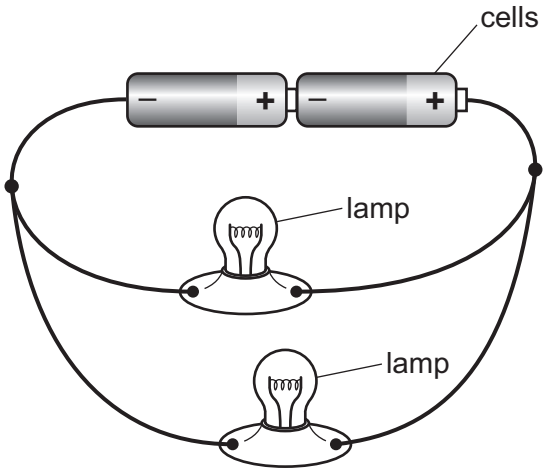
B K and L only

C M and L only

D M only

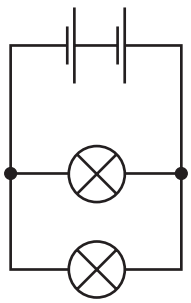
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28 The diagram shows a circuit.

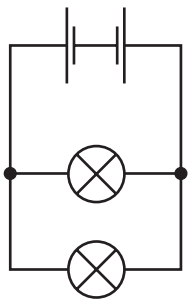


Which circuit diagram shows this circuit?

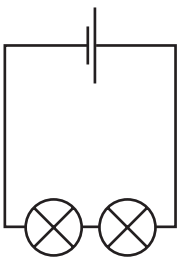
A



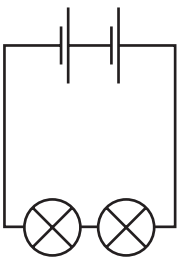
B



C



D



29 A charge of 7.5 C flows through a resistor in 5.0 s. A student has ammeters with different ranges that he can use to measure the current in the resistor.

Which ammeter range is the most appropriate?

A 0-1 A **B** 0-2 A **C** 0-5 A **D** 0-40 A

30 Three identical cells are connected in parallel to a resistor.

What is the advantage of using three cells in parallel, rather than using a single cell?

A Each cell produces more energy.

B Each cell supplies more charge.

C Each cell takes longer to run down.

D The total electromotive force (e.m.f.) is larger.

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31 When the flash on a camera is used, a charge of 1.5 C flows through the flash-tube in 0.0030 s.

The average voltage across the flash-tube is 3600 V.

What is the electrical energy supplied to the flash-tube and what is the average power supplied?

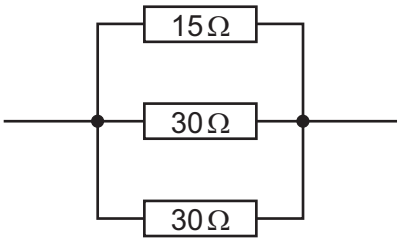
	energy / J	power / W
A	2400	7.2
B	2400	800 000
C	5400	16.2
D	5400	1.8×10^6

32 A 1.0 m length of wire of cross-sectional area 0.40 mm^2 has a resistance of 2.0 Ω.

What is the resistance of a 0.50 m length of wire, of the same material, with a cross-sectional area of 0.80 mm^2?

A 0.5 Ω **B** 1.0 Ω **C** 4.0 Ω **D** 8.0 Ω

33 The diagram shows three resistors in parallel.



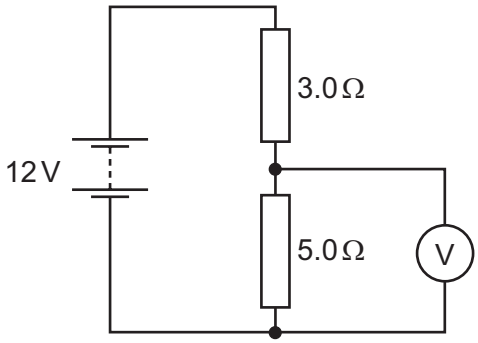
What is the combined resistance?

A 7.5 Ω **B** 15 Ω **C** 30 Ω **D** 75 Ω

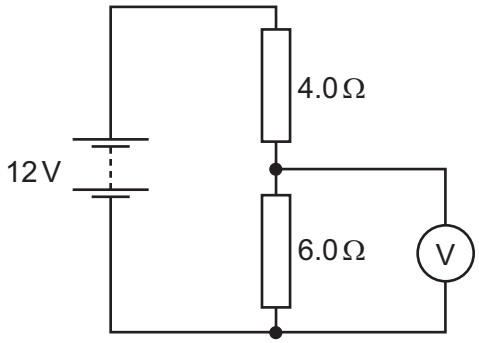
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34 In which circuit is the voltmeter reading 7.2 V?

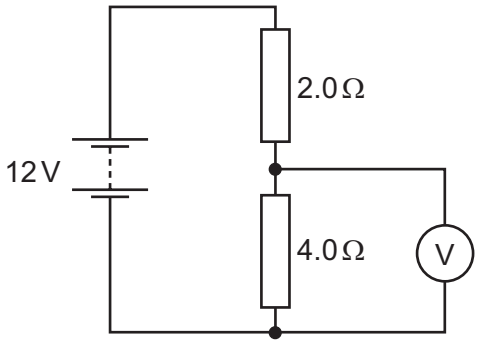
A



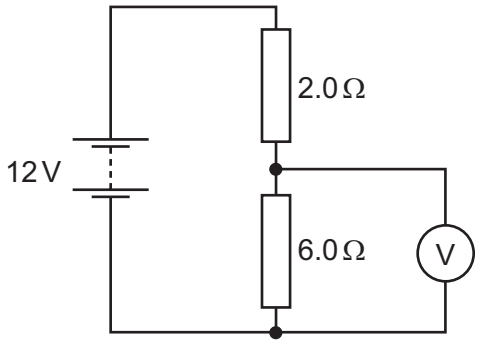
B



C



D



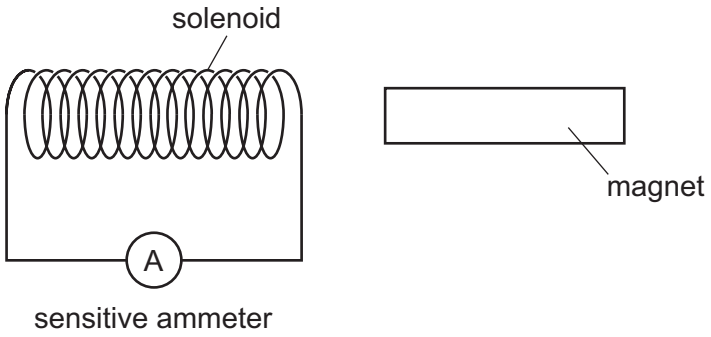
35 The diagram shows the information found on an electric kettle.

240 V	50 Hz
600 W	700 cm^3

What is the frequency of the electrical supply used to power the kettle?

A 50 Hz **B** 240 V **C** 600 W **D** 700 cm^3

36 A magnet is placed near to a solenoid that is connected to a sensitive centre-zero ammeter.



The magnet is pushed towards the solenoid. It accelerates, then moves at constant speed, then decelerates and stops inside the solenoid.

When is the reading on the ammeter zero?

A when the magnet is accelerating

B when the magnet is moving at constant speed

C when the magnet is decelerating

D when the magnet is stationary

37 A radioactive material decays by this process:

$$^{Y}_{Z}L \rightarrow {}^{Y}_{Z+1}M + x$$

What is particle x?

A an electron

B a helium nucleus

C a neutron

D a proton

38 A factory continuously produces plastic sheets. A radioactive isotope and a detector are used to check the thickness of the sheets.

What is the most suitable source to use?

A an alpha source with a half-life of a few minutes

B an alpha source with a half-life of several years

C a beta source with a half-life of a few minutes

D a beta source with a half-life of several years

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39 A source contains a radioactive material.

Without the radioactive source present, a detector records a background count rate of 20 counts per minute.

This source is placed in a fixed position near the detector. Initially a count rate of 520 per minute is recorded.

What count rate is recorded after a time of **two** half-lifes of the radioactive source?

A 125 counts per minute

B 130 counts per minute

C 135 counts per minute

D 145 counts per minute

40 A nucleus contains 94 protons and 240 nucleons. It emits an alpha-particle.

How many protons and how many neutrons are in the nucleus produced?

	number of protons	number of neutrons
A	90	144
B	90	236
C	92	144
D	92	236

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