Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

PHYSICS **5054/12**

Paper 1 Multiple Choice **October/November 2014**

1 hour

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

2818806635

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.

This document consists of **15** printed pages and **1** blank page.

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1 When a heavy coin falls a short distance towards the ground it does **not** reach terminal velocity.

Why is this?

A The coin has not hit the ground.

B The weight of the coin equals the air resistance.

C The weight of the coin increases as air resistance increases.

D The weight of the coin is always more than air resistance.

2 A car travels along a road at 50 km / h.

The driver applies the same braking force at the same place on a day when the surface is dry and then on a day when the road is wet.

On the **wet** surface, how many of these distances are greater than on the dry surface?

braking distance

stopping distance

thinking distance

A 0 **B** 1 **C** 2 **D** 3

3 In a model of an atom, electrons move in circular orbits around a nucleus.

Which statement about the electrons is correct?

A The electrostatic force on the electrons is away from the nucleus.

B The acceleration of the electrons is towards the central nucleus.

C The speed of the electrons varies continuously.

D The velocity of the electrons remains constant.

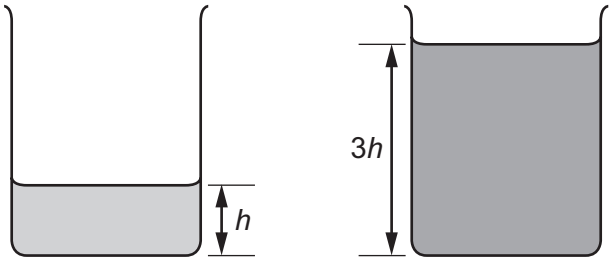
4 A boy stands on some bathroom scales. The reading on the scales is 50 kg.

What is the mass and what is the weight of the boy?

	mass	weight
A	50 kg	50 N
B	50 kg	500 N
C	5.0 N	50 kg
D	50 N	5.0 kg

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5 Two identical beakers contain the same mass of liquid. There is a different liquid in each beaker.



Liquid Q has a density ρ.

What is the density of liquid P?

A $\frac{\rho}{3}$ **B** ρ **C** 3ρ **D** 9ρ

6 What affects the stability of an object?

A only its base area and the location of its centre of mass

B only its weight and its base area

C only the location of its centre of mass

D only its weight

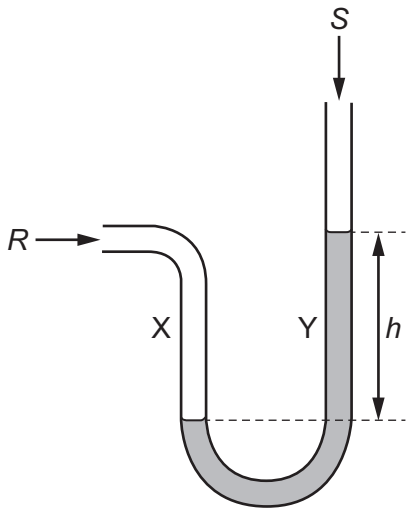
7 Objects of different weights are placed on a rigid, horizontal surface.

Which row shows the correct pressure acting on the surface?

	weight / N	area in contact / m^2	pressure / Pa
A	10	0.1	1
B	20	0.2	0.01
C	30	0.1	300
D	40	0.2	8

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8 The diagram shows a simple manometer that contains a liquid.



Side X is connected to a gas supply of pressure *R*.
Side Y is open to the atmosphere at pressure *S*.

Which pressure is the length *h* used to measure?

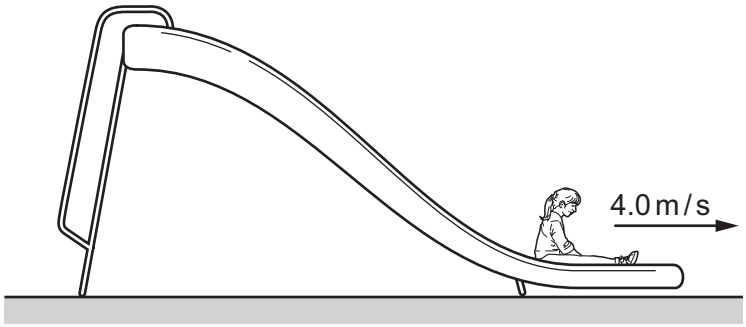
A *R*

B *S*

C *R* – *S*

D *R* + *S*

9 A child of mass 30 kg is moving at a speed of 4.0 m / s when she reaches the bottom of a slide.

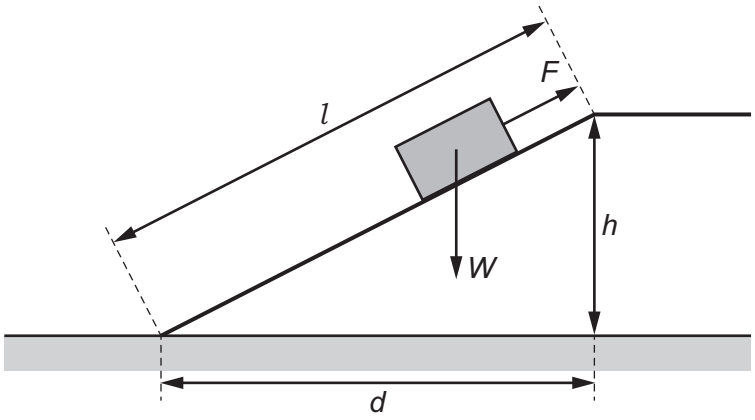


What is her kinetic energy?

A 60 J **B** 120 J **C** 240 J **D** 480 J

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10 A constant force F pulls a block of weight W up the slope shown.



How much work is done in pulling the block up the slope?

A $F \times h$ **B** $F \times l$ **C** $W \times d$ **D** $W \times l$

11 Which statement about copper explains why it is a better conductor of heat than glass?

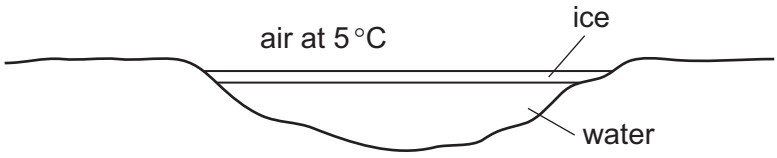
A Atomic vibration is passed on to neighbouring copper atoms quickly.

B Atoms move through the copper and pass on kinetic energy.

C There are density changes within the copper.

D There are free electrons in the copper.

12 The diagram shows a frozen pond with the surface of the ice slowly melting as heat is transferred from the warmer air above it.



By which processes is heat transferred from the air to the ice?

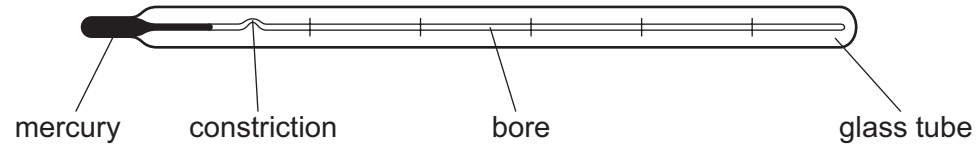
A conduction, convection and radiation

B conduction and convection only

C convection and radiation only

D radiation and conduction only

13 The diagram shows a clinical thermometer.



Which factor affects the sensitivity of the thermometer?

A the constriction

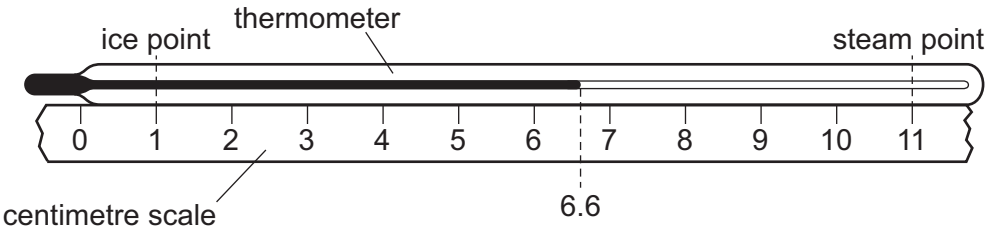
B the diameter of the bore

C the length of the glass tube

D the thickness of the glass tube

14 A centimetre scale is fixed next to an unmarked mercury-in-glass thermometer.

The ice point and the steam point are marked.



What is the temperature shown on the thermometer?

A 44 °C **B** 56 °C **C** 60 °C **D** 66 °C

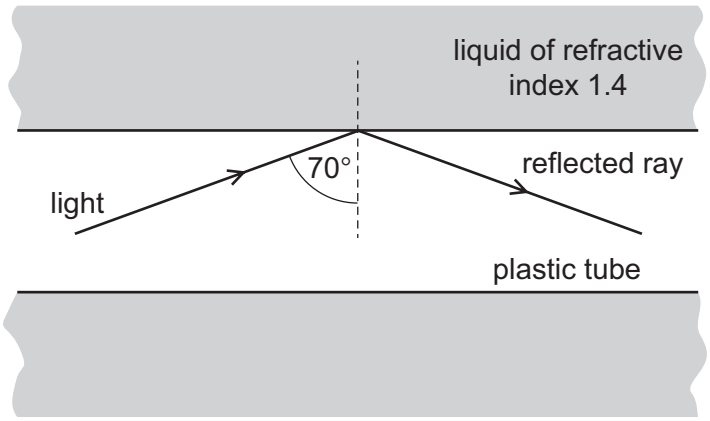
15 At a constant temperature, a solid has a fixed shape and a fixed volume.

Which row describes the shape and the volume of a liquid at constant temperature?

	shape	volume
A	fixed	fixed
B	fixed	not fixed
C	not fixed	fixed
D	not fixed	not fixed

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16 A plastic tube is immersed in a liquid of refractive index 1.4. Light travelling in the plastic tube strikes the inside surface at an angle of incidence of 70°. The light undergoes total internal reflection.



What describes the values of the critical angle in the plastic and the refractive index of the plastic?

	critical angle in plastic	refractive index of plastic
A	greater than 70°	greater than 1.4
B	greater than 70°	less than 1.4
C	less than 70°	greater than 1.4
D	less than 70°	less than 1.4

17 Which application uses microwaves?

A detecting small cracks in metals

B gaining a sun-tan

C lighting a fluorescent tube

D satellite television

18 A student stands at a distance *d* from the base of a tall cliff.

He claps together two pieces of wood and measures the time that elapses before he hears the echo. He conducts the experiment five times and obtains these results.

0.72 s 0.80 s 0.71 s 0.81 s 0.71 s

The speed of sound is 320 m / s.

What is the distance *d*?

A 120 m **B** 240 m **C** 480 m **D** 600 m

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19 Ultrasound has many uses.

For what are ultrasound waves used?

A killing cancerous cells

B pre-natal scanning

C sunbeds

D telephones

20 A metal bar PQ hangs from a thin thread and always comes to rest with end P pointing north. Another bar XY of the same metal settles in no definite direction.

What happens if the two bars are brought near one another?

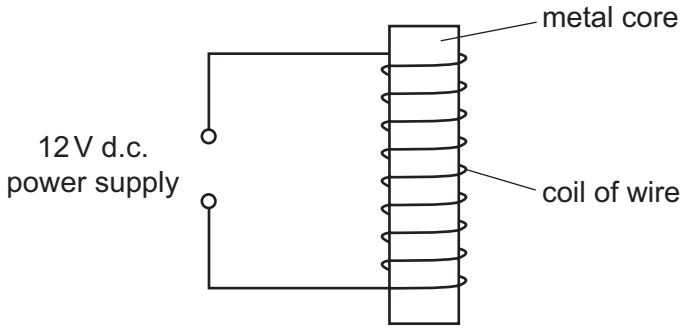
A End P and end Q both attract end X.

B End P attracts end X but repels end Y.

C End P neither attracts nor repels end X.

D End P repels end X but attracts end Y.

21 The diagram shows a 12 V d.c. power supply connected across a coil with a metal core.



The core becomes a magnet when the current is switched on. It remains a magnet after the current is switched off.

From which metal is the core made?

A aluminium

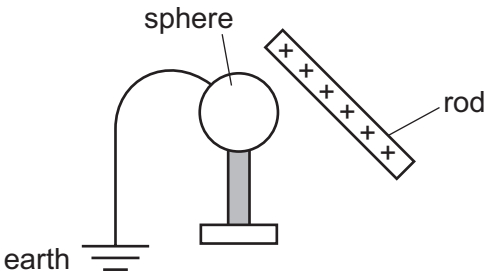
B copper

C soft iron

D steel

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22 A positively charged rod is held close to an earthed metal sphere.



What describes the charge on the metal sphere?

A It is negative because electrons are attracted towards the rod.

B It is neutral because electrons are attracted towards the rod and protons are repelled.

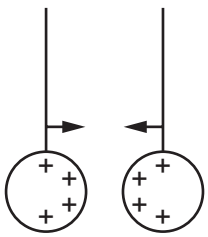
C It is neutral because it is earthed.

D It is positive because protons are repelled by the rod.

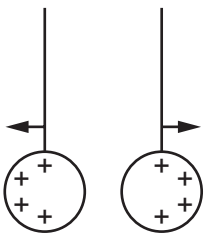
23 Two charged metal spheres are suspended close to each other.

Which diagram shows the charge distribution on the spheres and the directions of the forces on the spheres?

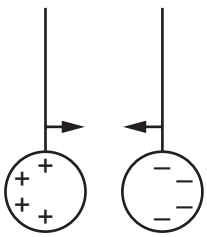
A



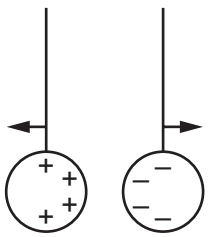
B



C



D



24 Which list contains only electrical insulators?

A glass, plastic, rubber

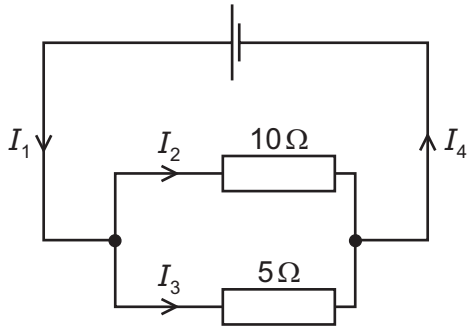
B glass, plastic, steel

C glass, rubber, steel

D plastic, rubber, steel

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25 The currents in different parts of the circuit are I_1, I_2, I_3 and I_4.



Which statement is correct?

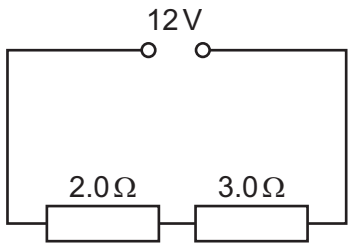
A $I_1 = I_4$ and I_2 is greater than I_3.

B $I_1 = I_4$ and I_3 is greater than I_2.

C I_2 is greater than I_1 and less than I_3.

D I_2 is greater than I_1 and greater than I_3.

26 The diagram shows a circuit that has two resistors in series with a 12 V supply.



What is the current in the circuit?

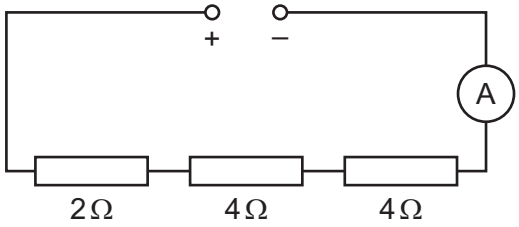
A 2.4 A **B** 10 A **C** 14 A **D** 60 A

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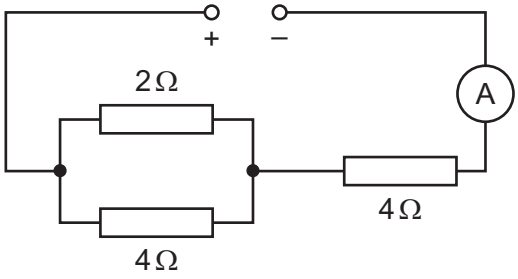
27 An ammeter is connected to three resistors and a power supply.

Which arrangement of resistors gives the greatest ammeter reading?

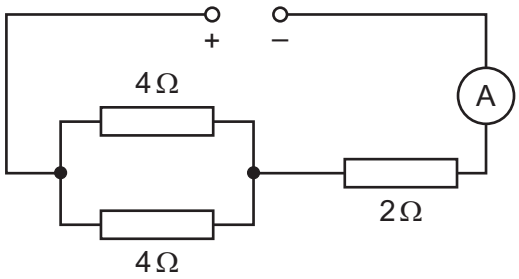
A



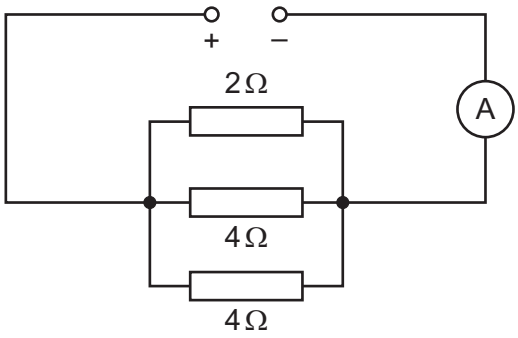
B



C



D



28 There is a current of 0.25 A in a lamp connected to a 240 V supply.

What is the input power to the lamp?

A 15 W **B** 60 W **C** 240 W **D** 960 W

29 Which unit measures the energy input to an electrical appliance?

A ampere

B kilowatt-hour

C volt

D watt

30 An electric lamp is marked 0.5 A. It is connected to a socket marked '30 A maximum'.

Which fuse is best to use in the lamp?

A 0.5 A **B** 3 A **C** 30 A **D** 40 A

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31 Two long, parallel conductors carrying current lie in a horizontal plane.

The two conductors attract one another.

The two currents **must**

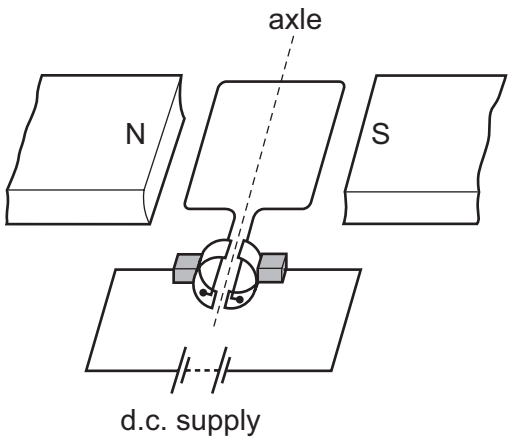
A be in the same direction.

B be in opposite directions.

C be parallel to the Earth's magnetic field.

D be at 90° to the Earth's magnetic field.

32 The diagram shows a d.c. motor with its coil horizontal.



Why is a split-ring commutator used?

A to change the current direction in the coil as the coil passes the horizontal position

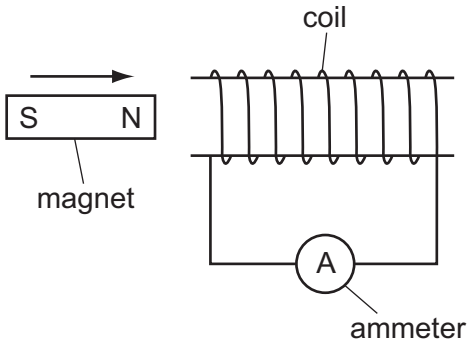
B to change the current direction in the coil as the coil passes the vertical position

C to change the current direction in the d.c. supply as the coil passes the horizontal position

D to change the current direction in the d.c. supply as the coil passes the vertical position

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33 A student moves a magnet into a coil of wire as shown in the diagram. The coil of wire is connected to a sensitive ammeter.



Which change does **not** produce an increase in the reading?

A increasing the number of turns on the coil

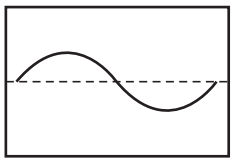
B increasing the resistance of the ammeter

C increasing the speed of the magnet

D increasing the strength of the magnet

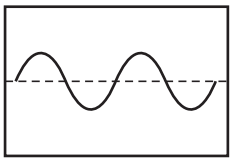
34 The coil of an a.c. generator is rotated and the output is displayed on the screen of a cathode-ray oscilloscope (c.r.o.).

The diagram shows the trace on the screen.

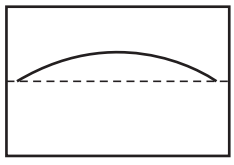


Which trace appears on the screen when the speed of rotation of the coil is doubled but the settings on the c.r.o. are unaltered?

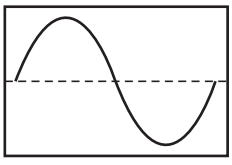
A



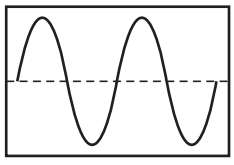
B



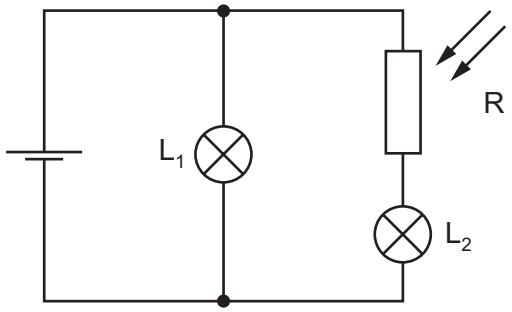
C



D



35 In the circuit shown, R is a light-dependent resistor. Its resistance decreases when the intensity of the light shining on it increases.

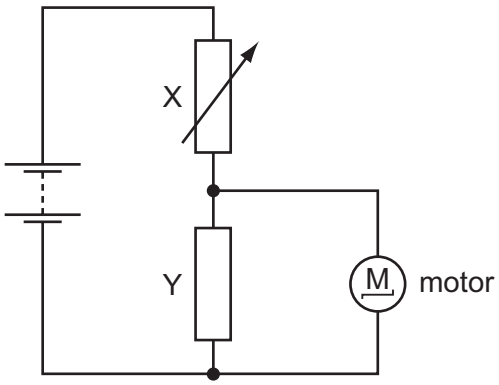


The light intensity on R increases.

What happens to the brightness of the two lamps L_1 and L_2?

	L_1	L_2
A	decreases	decreases
B	decreases	increases
C	stays the same	decreases
D	stays the same	increases

36 In the circuit shown, resistors X and Y act as a potential divider to control the speed of a motor.



What is the reason for the potential divider?

A to vary the direction of the current in X

B to vary the e.m.f. of the battery

C to vary the potential difference across the motor

D to vary the resistance of the motor

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37 Why is a reed relay used in a switching circuit?

A to switch on a small current using a large current

B to switch on a small voltage using a large voltage

C to switch on a large current using a small current

D to switch on a large voltage using a large current

38 People working with radioactive materials use a photographic film badge covered in paper. The badge is used to monitor the level of their exposure to radiation.

Which radiation is detected?

A alpha-particles only

B beta-particles only

C gamma-rays and beta-particles

D gamma-rays only

39 When a radioactive atom decays by alpha-particle emission, its nucleus loses

A 1 proton only.

B 1 proton and 1 electron.

C 2 protons and 2 electrons.

D 2 protons and 2 neutrons.

40 A neutral atom of chlorine-37 is compared with a neutral atom of argon-37.

How do the number of electrons and the number of neutrons in each of the atoms compare?

	number of electrons	number of neutrons
A	different	different
B	different	same
C	same	same
D	same	different

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