Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

PHYSICS **0625/21**

Paper 2 Multiple Choice (Extended) **May/June 2019**

45 minutes

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

* 7 2 9 6 3 7 4 4 9 6 *

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.
Take the weight of 1.0 kg to be 10 N (acceleration of free fall = 10 m / s^2).

This syllabus is regulated for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **16** printed pages.

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1 Which quantity can be measured directly using a micrometer screw gauge?

A the area of a sheet of paper

B the mass of a sheet of paper

C the thickness of a sheet of paper

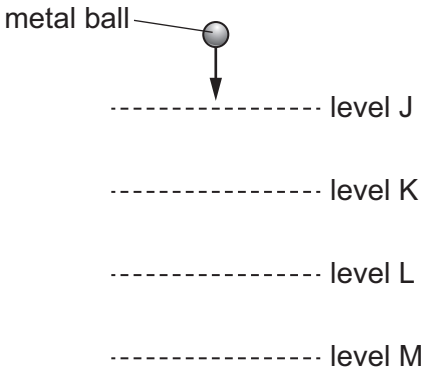
D the volume of a sheet of paper

2 The velocity of an object increases from 30 m / s to 50 m / s in 5.0 seconds.

What is the average acceleration of the object?

A $0.10\,m/s^2$ **B** $0.25\,m/s^2$ **C** $4.0\,m/s^2$ **D** $10\,m/s^2$

3 A heavy metal ball falls vertically downwards through air past four equally spaced levels J, K, L and M.



The times taken to fall from one level to the next are measured.

Where is the speed of the ball greatest and which time is shortest?

	speed is greatest between	time is shortest between
A	J and K	J and K
B	J and K	L and M
C	L and M	J and K
D	L and M	L and M

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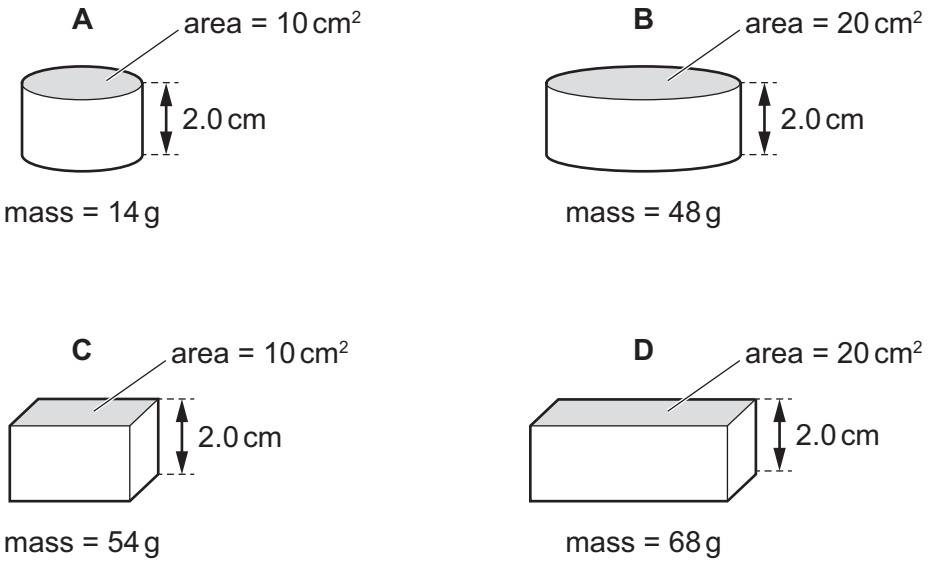
4 A body is moved from place X to place Y where the gravitational field strength is different.

What happens to its mass and to its weight due to the move?

	mass	weight
A	changes	changes
B	changes	stays the same
C	stays the same	changes
D	stays the same	stays the same

5 The diagrams show four solid blocks with their dimensions and masses.

Which block has the greatest density?



6 A student wishes to determine the spring constant of a spring where it obeys Hooke's law.

Different loads are hung from the spring and its length is measured for each different load.

The table shows the results of the experiment.

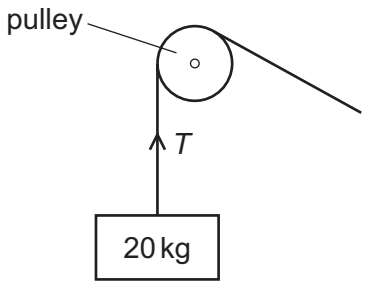
weight of load / N	0	2.0	4.0	5.0
length of spring / cm	12	20	28	38

What is the value of the spring constant of the spring?

A 0.13 N / cm **B** 0.14 N / cm **C** 0.19 N / cm **D** 0.25 N / cm

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7 A mass of 20 kg is held stationary by a rope passing over a frictionless pulley.

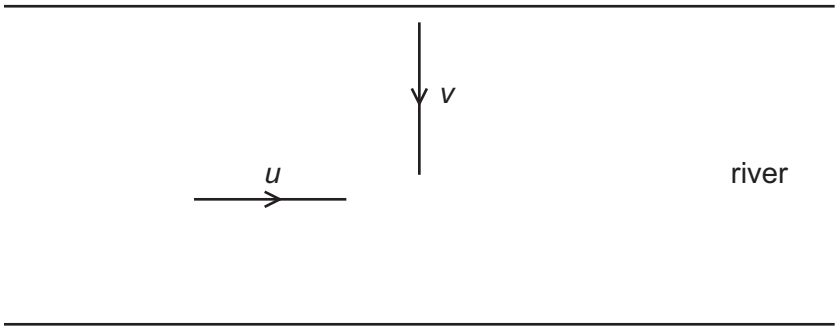


What is the tension *T* in the rope?

A 10 kg **B** 20 kg **C** 100 N **D** 200 N

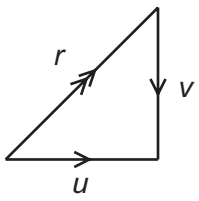
8 A boat starts moving across a river at velocity *v* perpendicular to the river bank.

The boat encounters a current along the river of velocity *u*, as shown.

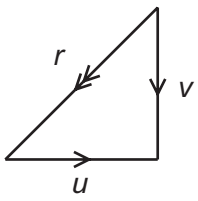


Which vector diagram shows the resultant velocity *r* of the boat?

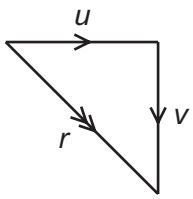
A



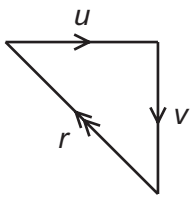
B



C



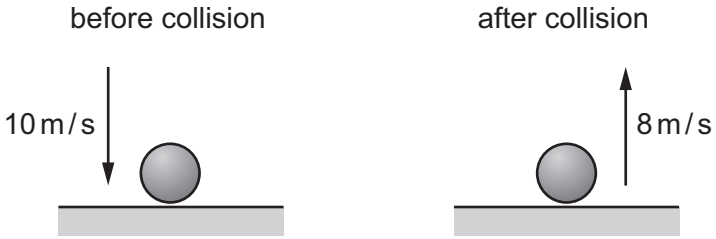
D



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9 A ball of mass 0.50 kg falls and hits the floor at 10 m / s.

It rebounds at speed 8.0 m / s, as shown.



The collision between the ball and the floor lasts for 0.50 s.

What is the average force acting on the ball during the collision?

A 2.0 N upwards

B 2.0 N downwards

C 18 N upwards

D 18 N downwards

10 An object falls from the top of a building that is 25 m high. Air resistance is negligible.

What is the speed of the object when it hits the ground?

A 10 m / s **B** 22 m / s **C** 25 m / s **D** 625 m / s

11 A machine is very efficient.

What does this mean?

A It produces a large amount of power.

B It uses very little energy.

C It wastes very little energy.

D It works very quickly.

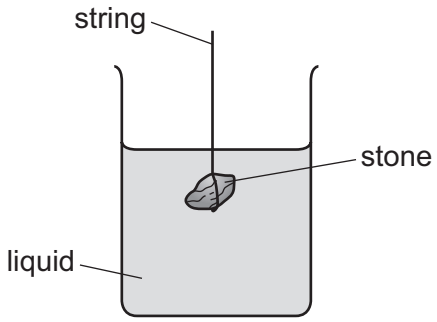
12 A crane takes 2.0 minutes to lift a load to the top of a building. The change in gravitational potential energy of the load is 360 kJ.

What is the useful power output of the crane?

A 3.0 kW **B** 180 kW **C** 720 kW **D** 43 200 kW

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13 The diagram shows a stone suspended on a string under the surface of a liquid. The stone experiences a pressure caused by the liquid.



What would increase the pressure on the stone?

A decreasing the surface area of the stone

B increasing the mass of the stone

C lowering the stone deeper into the liquid

D using a liquid with a lower density

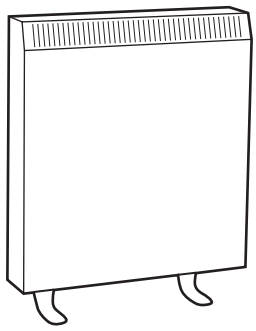
14 A stationary smoke particle is hit by a fast-moving nitrogen molecule.

Which row describes the motion of the smoke particle and of the nitrogen molecule after the collision?

	smoke particle	nitrogen molecule
A	moves	rebounds
B	moves	stops
C	remains stationary	rebounds
D	remains stationary	stops

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15 A night storage heater contains a large block of material that is heated electrically during the night. During the day the block cools down, releasing thermal energy into the room.



Which thermal capacity and which night-time temperature increase will cause the most energy to be stored by the block?

	thermal capacity of block	night-time temperature increase
A	large	large
B	large	small
C	small	large
D	small	small

16 100 g of water at 25 °C is poured into an insulating cup. 50 g of ice at 0 °C is added to the water. The water is stirred until the temperature of the water has fallen to 0 °C.

18 g of ice remains unmelted.

The specific heat capacity of water is 4.2 J / g °C.

Which value does this experiment give for the specific latent heat of fusion of ice?

A 210 J / g **B** 330 J / g **C** 580 J / g **D** 770 J / g

17 In which does thermal conduction **not** occur?

A a gas

B a liquid

C a solid

D a vacuum

18 The metal surface of a kettle is hot.

What happens to the cool air outside the kettle when it comes into contact with the hot kettle?

A The density of the air decreases and the air falls.

B The density of the air decreases and the air rises.

C The density of the air increases and the air falls.

D The density of the air increases and the air rises.

19 Some hot water is sealed inside a metal can. The can is in a vacuum in outer space. The hot water slowly cools down.

How does the thermal energy escape into space?

A by conduction then convection

B by conduction then radiation

C by evaporation then convection

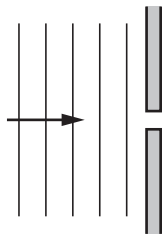
D by evaporation then radiation

20 When water waves pass through a gap they diffract.

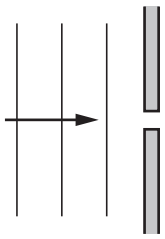
The diagrams show wavefronts approaching a narrow gap.

In which diagram will the diffraction be least?

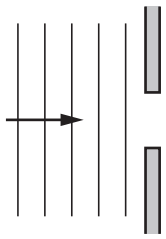
A



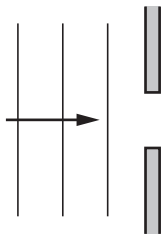
B



C



D



21 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.

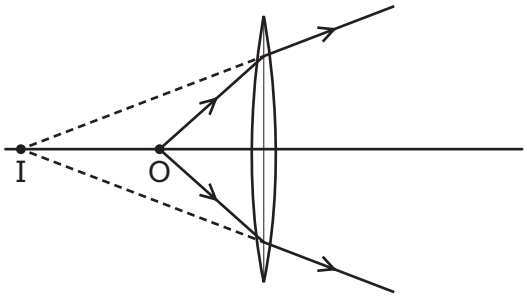
B The image is the same size and 60 cm from the object.

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

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

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22 A small object O is placed near a converging lens, as shown. The lens forms an image I.



Which statement is correct?

A The image I is diminished.

B The image I is inverted.

C The image I is real.

D The object O is closer to the lens than its principal focus.

23 An eclipse of the Sun happens when the Moon comes between the Earth and the Sun.

Which statement is correct?

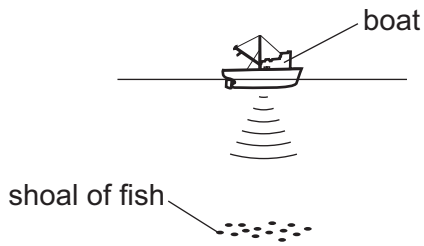
A Infra-red radiation from the Sun disappears before visible light and ultra-violet radiation.

B Ultra-violet radiation from the Sun disappears before visible light and infra-red radiation.

C Visible light from the Sun disappears before ultra-violet radiation and infra-red radiation.

D Infra-red radiation, ultra-violet radiation and visible light from the Sun all disappear at the same moment.

24 A pulse of sound is produced at the bottom of a boat. The sound travels through the water and is reflected from a shoal of fish. The sound reaches the boat again after 1.2 s. The speed of sound in the water is 1500 m / s.



How far below the bottom of the boat is the shoal of fish?

A 450 m **B** 900 m **C** 1800 m **D** 3600 m

25 What is the approximate value of the speed of sound in air at normal temperature?

A 340 m / s **B** 34 000 m / s **C** 340 km / s **D** 3.0×10^8 m / s

26 Why is soft iron used for the core of an electromagnet?

A Soft iron easily becomes a permanent magnet.

B Soft iron is a good electrical conductor.

C Soft iron is a poor thermal conductor.

D Soft iron loses its magnetism when the current in the coil is switched off.

27 Diagram 1 shows two thin, uncharged strips of plastic.

Diagram 2 shows the same strips after they have been rubbed with a dry cloth.

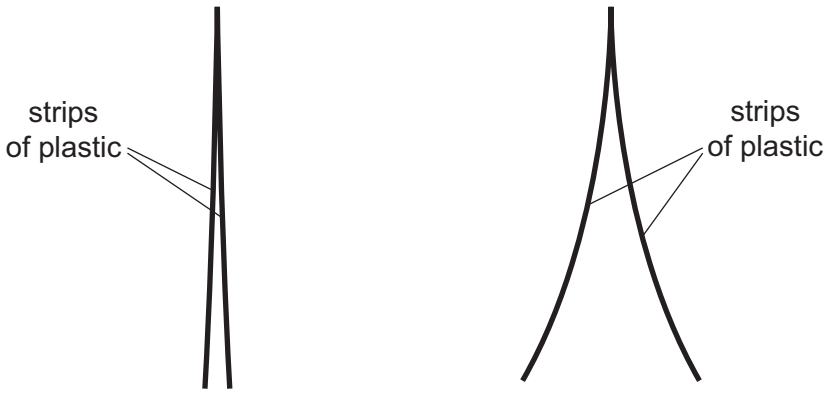


diagram 1 diagram 2

Which row describes the charge on the strips after rubbing, and the force between the strips after rubbing?

	charge on strips	force between strips
A	opposite	attraction
B	opposite	repulsion
C	the same	attraction
D	the same	repulsion

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28 A cell has an electromotive force (e.m.f.) of 1.5 V.

What does this statement mean?

A The cell converts 1.0 J of energy when driving 1.5 C of charge round a complete circuit.

B The cell converts 1.5 J of energy when driving 1.0 C of charge round a complete circuit.

C The cell converts 1.5 J of energy per second when driving 1.0 C of charge round a complete circuit.

D The cell converts 1.5 W of power when driving 1.0 C of charge round a complete circuit.

29 Which two changes to a metal wire both increase resistance?

A decreasing its length and increasing its temperature

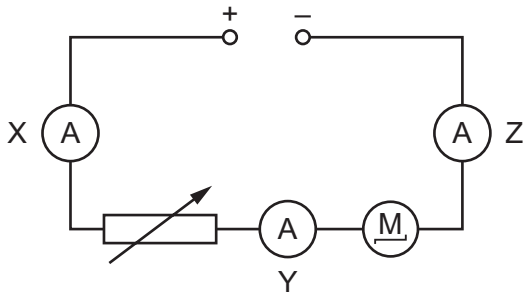
B increasing its length and decreasing its temperature

C decreasing its thickness and increasing its temperature

D increasing its thickness and decreasing its temperature

30 The diagram shows a circuit containing a d.c. power supply, a motor and a variable resistor.

Three ammeters X, Y and Z show the current in different parts of the circuit.



The reading on X is 4.0 A.

Which statement is correct?

A The readings on Y and Z are both less than 4.0 A.

B The readings on Y and Z are both equal to 4.0 A.

C The readings on Y and Z are both greater than 4.0 A.

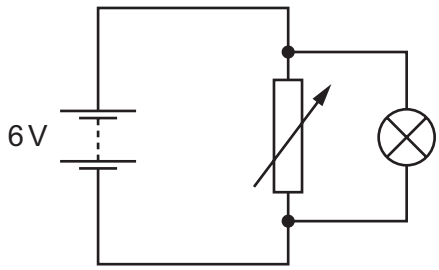
D The reading on Z is zero.

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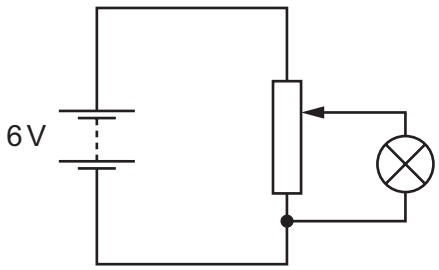
31 A lamp is to be connected in a circuit so that the potential difference (p.d.) across it can be varied from 0 to 6 V.

Which circuit would be most suitable?

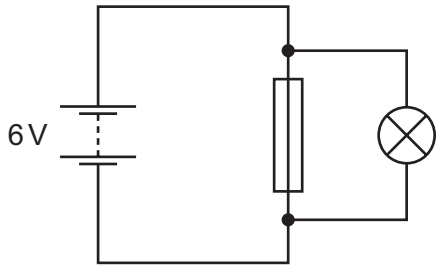
A



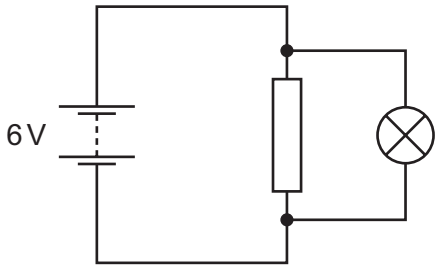
B



C



D



32 Which logic gate is represented by the symbol shown?



A AND **B** NAND **C** NOR **D** OR

33 The diagram shows a combination of logic gates.

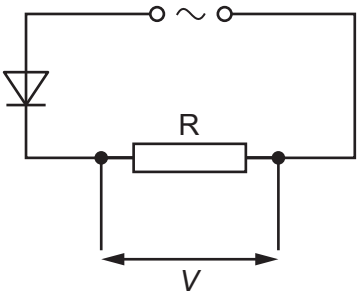


Which single logic gate is equivalent to this combination?

A AND **B** NOR **C** NOT **D** OR

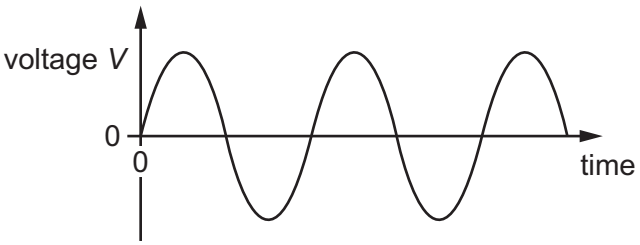
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34 An alternating current (a.c.) power supply is connected in series with a resistor R and a diode.

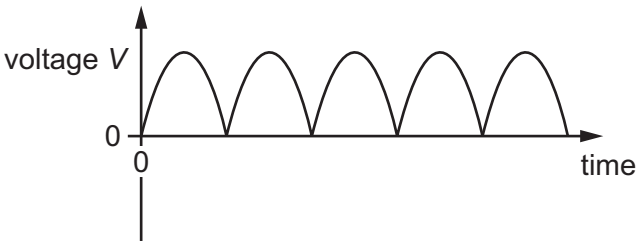


Which graph shows how the voltage *V* across the resistor R varies with time?

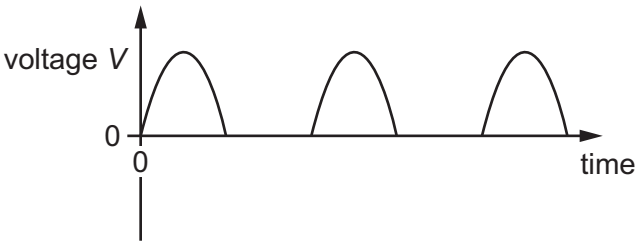
A



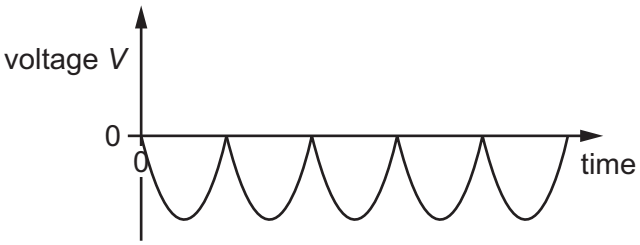
B



C



D



35 An electric heater is plugged into the mains supply using a fused plug.

The current in the heater is 10 A.

The cable attached to the heater is rated at 15 A.

The fuses available are rated at 1 A, 3 A, 5 A and 13 A.

Which fuse should be used?

A 1 A **B** 3 A **C** 5 A **D** 13 A

36 What is the purpose of the commutator in a d.c. electric motor?

A to control the speed at which the motor rotates

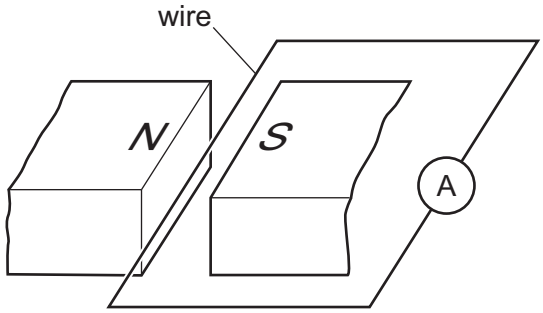
B to reverse the direction of the voltage across the power supply every half-turn

C to reverse the direction of the current in the motor coil every half-turn

D to reverse the direction of spin of the motor coil every half-turn

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37 The diagram shows a wire between two magnetic poles. The wire is connected in a circuit with an ammeter.



The wire is moved downwards, towards the bottom of the page. A current is induced in the wire.

In which direction is the force on the wire caused by this current?

A towards the bottom of the page

B towards the left of the page

C towards the right of the page

D towards the top of the page

38 The chemical symbol for sodium is Na. The equation represents the radioactive decay of sodium-24.

$$^{24}_{11}\text{Na} \rightarrow {}^{24}_{x}\text{Mg} + {}^{y}_{-1}\text{e}$$

What are the numbers x and y?

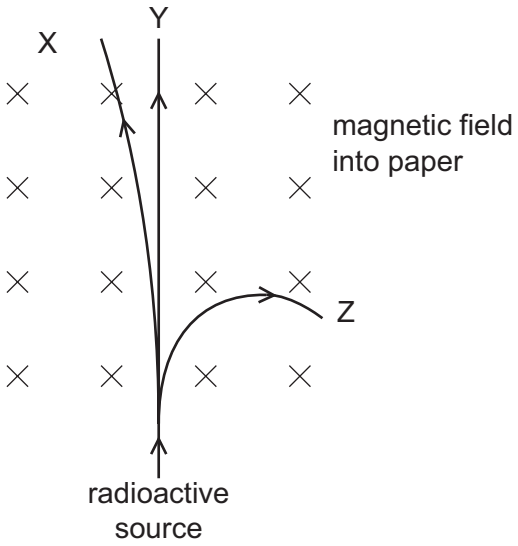
	x	y
A	10	0
B	10	1
C	12	0
D	12	1

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39 A radioactive source emits α-particles, β-particles and γ-rays into a vacuum where there is a magnetic field.

The magnetic field acts perpendicularly into the plane of the paper.

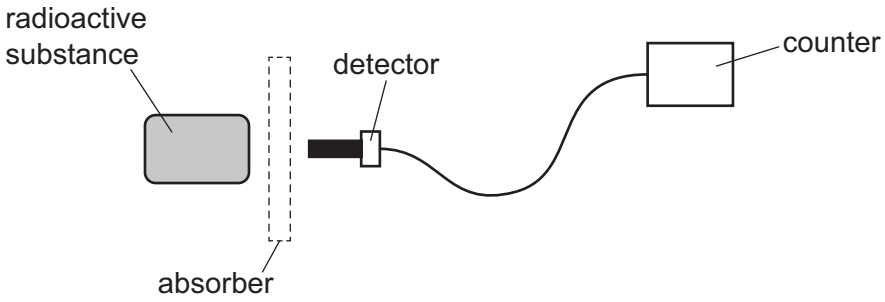
The paths X, Y and Z of the three types of radiation through the magnetic field are shown.



Which radiation follows path X, path Y and path Z?

	X	Y	Z
A	α-particles	β-particles	γ-rays
B	α-particles	γ-rays	β-particles
C	β-particles	α-particles	γ-rays
D	β-particles	γ-rays	α-particles

40 A student measures the level of radiation emitted from a radioactive substance. He places a detector very close to the substance. He puts different absorbers between the radioactive substance and the detector.



The student's results are shown. These results are corrected for background radiation.

absorber	$\frac{\text{counter reading}}{\text{counts per minute}}$
none	95
thin paper	52
few mm of aluminium	52
several cm of lead	12

Which types of radiation are being emitted by the substance?

A α-particles and β-particles only

B α-particles and γ-rays only

C β-particles and γ-rays only

D α-particles, β-particles and γ-rays

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