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Cambridge Assessment International Education

Cambridge IGCSE™

PHYSICS **0625/23**

Paper 2 Multiple Choice (Extended) **May/June 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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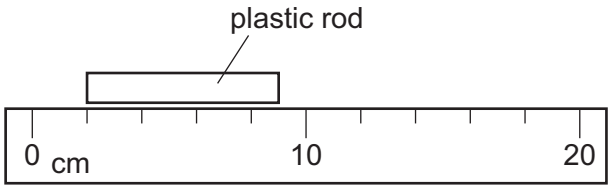
1 The diagram shows a plastic rod alongside a ruler.



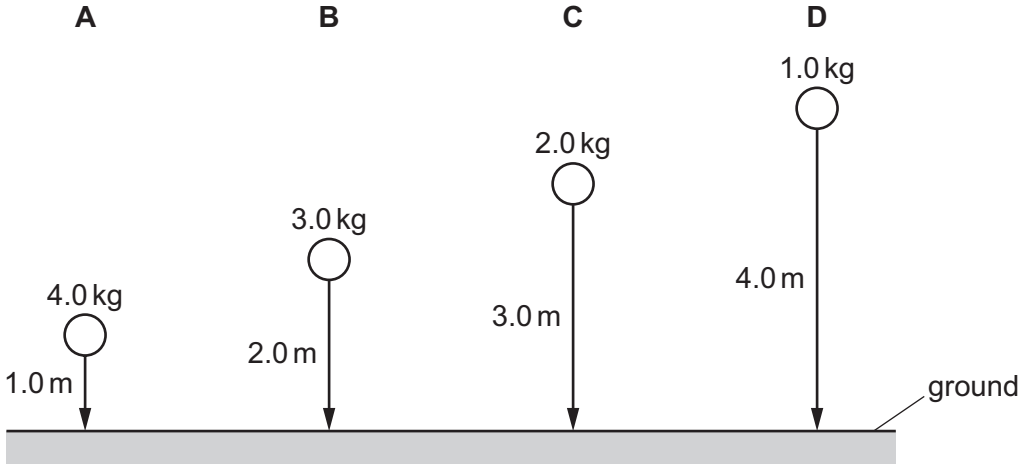
What is the length of the rod?

A 2.5 cm **B** 3.5 cm **C** 7.0 cm **D** 9.0 cm

2 Four balls with different masses are dropped from the heights shown.

Air resistance may be ignored.

Which ball has the smallest average speed?



3 A cyclist rides 300 m up a slope in 50 s.

She then rides down the slope in 25 s.

What is her average speed for the whole journey?

A 4.0 m/s **B** 8.0 m/s **C** 9.0 m/s **D** 16 m/s

4 An object is on the surface of the Earth.

Which statement describes the weight of the object?

A the quantity of material that the object contains

B the quantity of space that the object takes up

C the gravitational force acting on the object

D the object's resistance to a change in its motion

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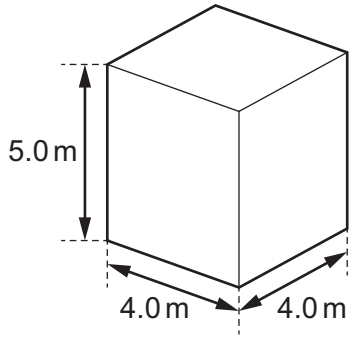
5 The tank shown has the dimensions 5.0 m × 4.0 m × 4.0 m.

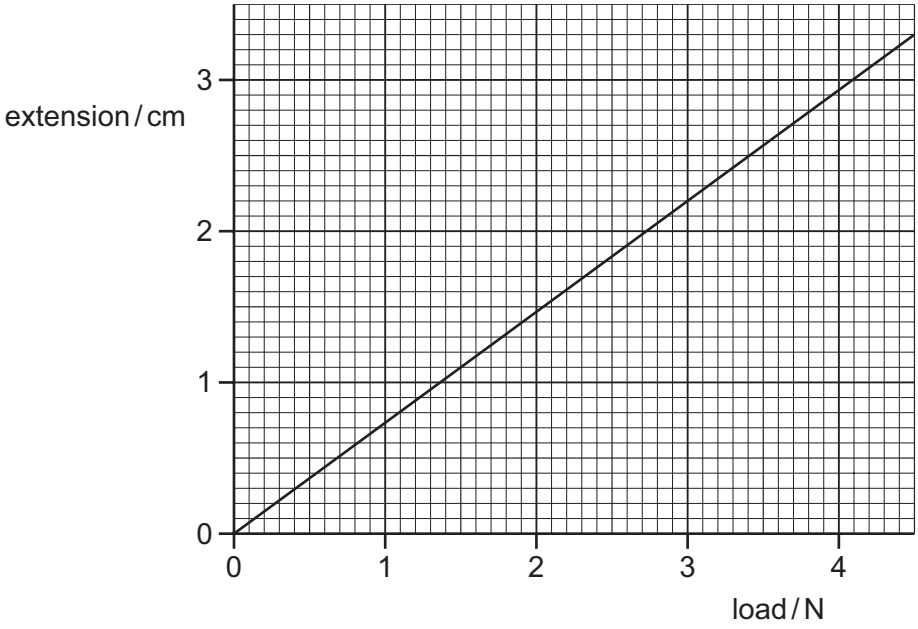
It is completely filled with water of density 1000 kg / m^3.



What is the mass of water in the tank?

A 12.5 kg **B** 62.5 kg **C** 16 000 kg **D** 80 000 kg

6 The extension–load graph for a spring is shown. The unstretched length of the spring is 17.0 cm.



When an object is suspended from the spring, the length of the spring is 19.2 cm.

What is the weight of the object?

A 1.4 N **B** 1.6 N **C** 2.6 N **D** 3.0 N

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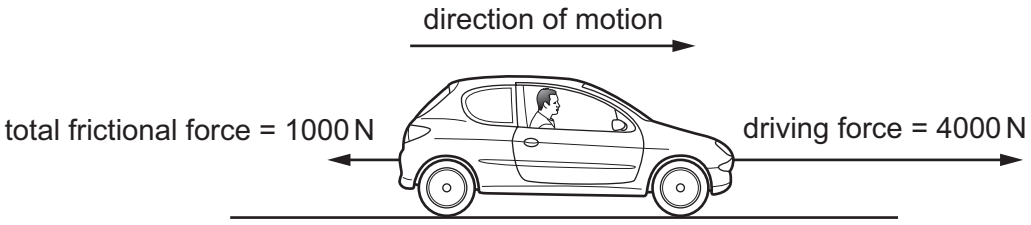
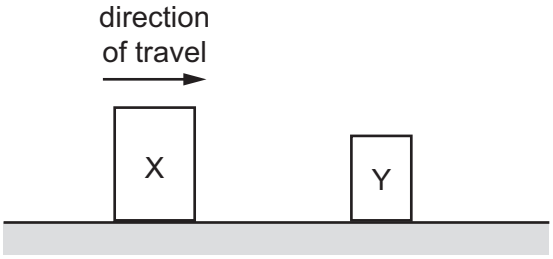
7 A car of mass 1200 kg is travelling along a horizontal road.



What is the acceleration of the car?

A $0.83\,m/s^2$ **B** $1.2\,m/s^2$ **C** $2.5\,m/s^2$ **D** $3.3\,m/s^2$

8 Object X moves to the right along a frictionless surface towards a stationary object Y, as shown.



They make a noise as they collide and then both objects move to the right.

Which equation is correct?

A change in momentum of X = change in momentum of Y

B impulse of force acting on X = impulse of force acting on Y

C kinetic energy of X before collision = (kinetic energy of X + kinetic energy of Y) after collision

D momentum of X before collision = (momentum of X + momentum of Y) after collision

9 A stream flows out of a lake and down the side of a hill.

What best describes the change in energy stores?

A kinetic energy → chemical energy + internal energy

B gravitational potential energy → kinetic energy + internal energy

C gravitational potential energy + kinetic energy → internal energy

D kinetic energy → internal energy + gravitational potential energy

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10 The energy input to a device is E.

The amount of energy wasted by the device is W.

Which expression gives the efficiency of the device?

A $\frac{W - E}{W} \times 100\%$

B $\frac{W}{E} \times 100\%$

C $\frac{E - W}{E} \times 100\%$

D $\frac{E - W}{W} \times 100\%$

11 A builder lifts 30 bricks from the ground onto a platform 2.0 m high.

Each brick has a mass of 4.0 kg.

What is the work done against gravity by the builder in lifting the bricks onto the platform?

A 80 J **B** 120 J **C** 240 J **D** 2400 J

12 A book has a mass of 400 g.

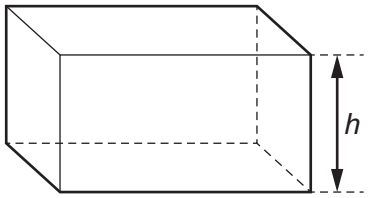
The surface of the book in contact with a table has dimensions 0.10 m × 0.20 m.

The gravitational field strength g is 10 N / kg.

What is the pressure exerted on the table due to the book?

A 0.08 N / m^2 **B** 8.0 N / m^2 **C** 20 N / m^2 **D** 200 N / m^2

13 The diagram shows a tank full of water.



The mass of water in the tank is m.

The density of the water is ρ.

The height of water in the tank is h.

Which equation gives the pressure p due to the water at the bottom of the tank?

A $p = h\rho g$ **B** $p = mgh$ **C** $p = m\rho g$ **D** $p = m\rho h$

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14 A liquid at room temperature is put on a metal surface which is also at room temperature.

A student blows gently across the liquid and its temperature decreases.

What causes the liquid to become cooler?

A Bubbles of water vapour form in the liquid and go into the air.

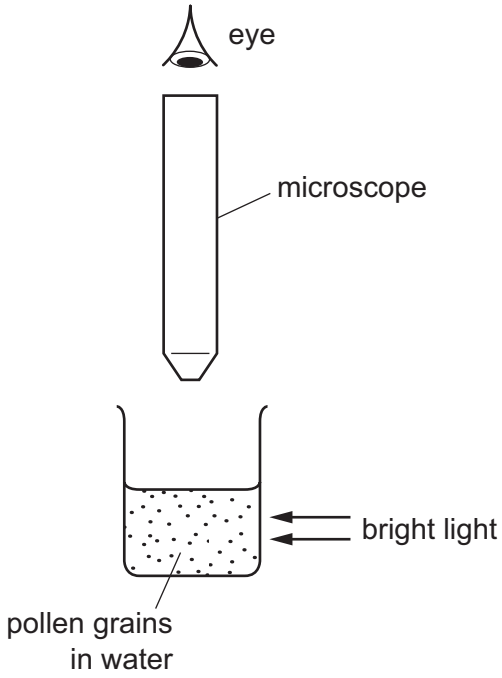
B The moving air reduces the kinetic energy of all the particles in the liquid.

C Thermal energy flows from the liquid into the metal.

D The more energetic particles in the liquid escape into the air.

15 Very small pollen grains are suspended in water. A bright light shines from the side.

When looked at through a microscope, small specks of light are seen to be moving in a random, jerky manner.



What are the moving specks of light?

A pollen grains being hit by other pollen grains

B pollen grains being hit by water molecules

C water molecules being hit by other water molecules

D water molecules being hit by pollen grains

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16 The liquid level in a thermometer rises when the thermometer is placed in hot water.

What causes this?

A The liquid contracts.

B The liquid evaporates.

C The liquid expands.

D The liquid freezes.

17 A student calculates the energy needed to raise the temperature of an aluminium block from 50 °C to 60 °C.

He then does an experiment to measure the energy used to do this.

Which statement about the measured energy is correct?

A The measured energy will be greater than the calculated energy because some energy is transferred to the surroundings.

B The measured energy will be greater than the calculated energy because the block absorbs energy from the surroundings.

C The measured energy will be less than the calculated energy because the mass of the block decreases as it gets warmer.

D The measured energy will be less than the calculated energy because the thermal capacity of the block is low.

18 Which row correctly describes a liquid that is boiling?

	bubbles seen	where it takes place in the liquid
A	no	surface only
B	no	throughout liquid
C	yes	surface only
D	yes	throughout liquid

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19 Three students are planning an experiment to test thermal conduction in different materials.

The students each propose a hypothesis.

1 I think the copper rod will be a good thermal conductor because it is a metal.

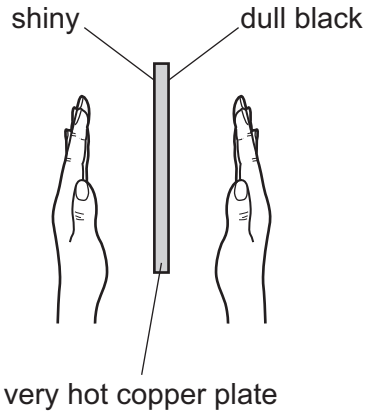
2 I think the glass rod will be a good thermal conductor because it has free electrons which vibrate and transfer energy quickly.

3 I think the wooden rod will be a poor thermal conductor because it can only transfer energy along the rod by vibrating the lattice particles.

Which of their hypotheses are correct?

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

20 A copper plate is shiny on one side and is painted dull black on the other side. The plate is heated to a high temperature. A person places his hands at equal distances from either side of the plate, close to the plate, but not touching it.



Why does the hand near the dull black surface of the plate feel much hotter than the hand near the shiny surface?

A The dull black surface is a better emitter of radiation than the shiny surface.

B The dull black surface is a better conductor of radiation than the shiny surface.

C The dull black surface is a better reflector of radiation than the shiny surface.

D The dull black surface is at a higher temperature than the shiny surface.

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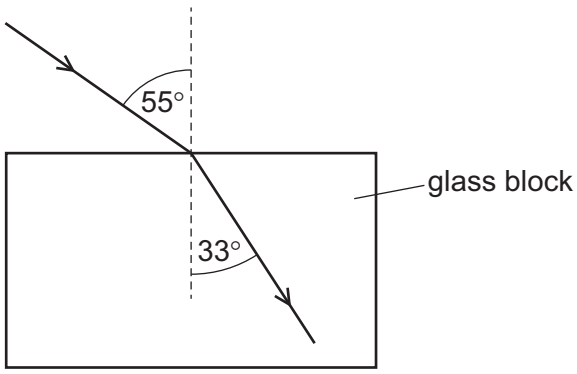
21 A water wave passes into a region where the wave travels more slowly.

As it passes into the slow region, what happens to the frequency and what happens to the wavelength of the wave?

	frequency	wavelength
A	decreases	remains the same
B	increases	remains the same
C	remains the same	decreases
D	remains the same	increases

22 Light travelling at a speed of $3.0 \times 10^8\,\text{m/s}$ strikes the surface of a glass block and undergoes refraction as it enters the block.

The diagram shows a ray of this light before and after it enters the block.



What is the speed of light in the glass?

A $1.8 \times 10^8\,\text{m/s}$

B $2.0 \times 10^8\,\text{m/s}$

C $4.5 \times 10^8\,\text{m/s}$

D $5.0 \times 10^8\,\text{m/s}$

23 A beam of light is monochromatic.

What does monochromatic mean?

A All the waves in the beam must have the same frequency only.

B All the waves in the beam must have the same amplitude only.

C All the waves in the beam must have the same speed only.

D All the waves in the beam must have the same amplitude, frequency and speed.

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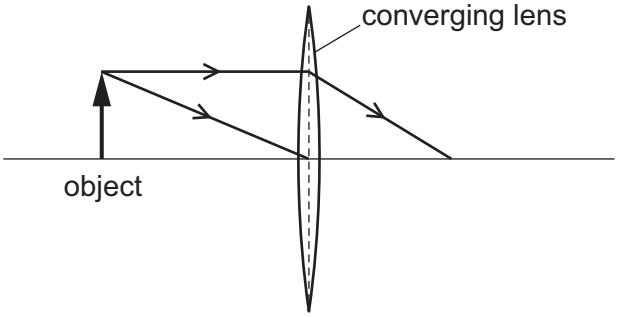
24 An object is placed in front of a thin converging lens.

The diagram shows the paths of two rays from the top of the object.



An image of the object is formed on a screen to the right of the lens.

How does this image compare with the object?

A It is larger and inverted.

B It is larger and the same way up.

C It is smaller and inverted.

D It is smaller and the same way up.

25 Which row correctly describes what happens to the frequency and to the speed of electromagnetic waves as we move through the spectrum from γ-rays to radio waves?

	frequency	speed in a vacuum
A	decreases	increases
B	decreases	remains the same
C	increases	decreases
D	increases	remains the same

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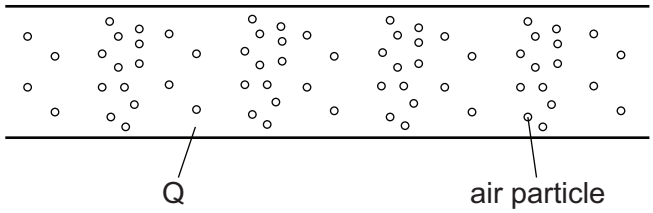
26 The diagram shows a model of a sound wave passing through air in an open tube.



What is the region Q?

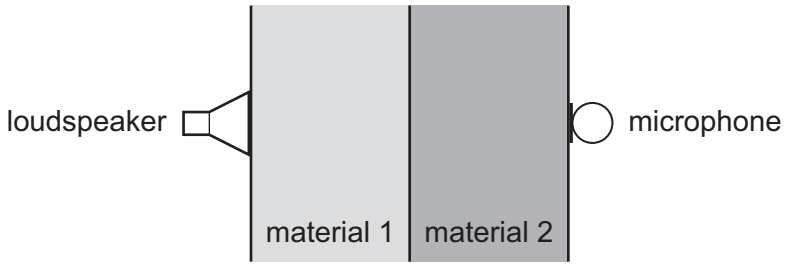
A a compression which is a region of high pressure

B a compression which is a region of low pressure

C a rarefaction which is a region of high pressure

D a rarefaction which is a region of low pressure

27 The sound from a loudspeaker must pass through two materials to reach a microphone.



Which combination of materials gives the shortest time for the sound to reach the microphone?

	material 1	material 2
A	air	hydrogen
B	air	water
C	copper	aluminium
D	water	oil

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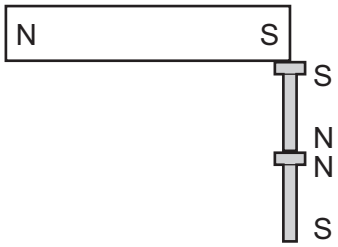
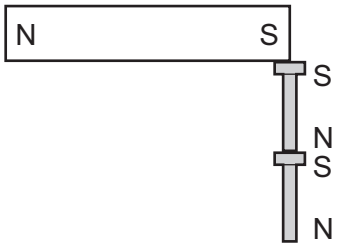
28 A bar magnet picks up two steel bolts.

Which diagram shows the magnetic poles induced in the bolts?

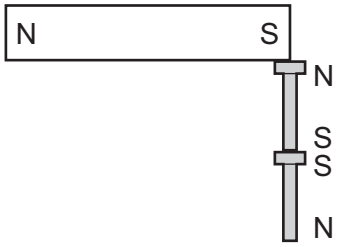
A



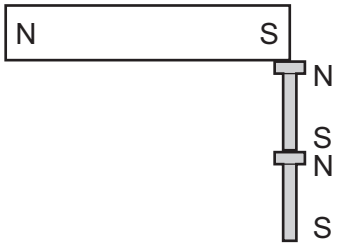
B



C



D



29 A student rubs a plastic rod with a cloth.

The rod becomes positively charged.

What has happened to the rod?

A It has gained electrons.

B It has gained protons.

C It has lost electrons.

D It has lost protons.

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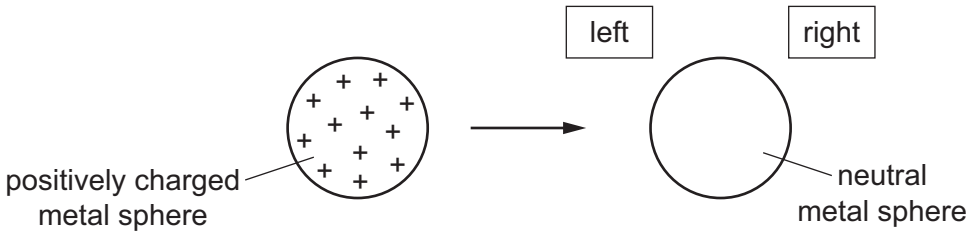
30 An isolated metal sphere is positively charged.

It is then brought near to another isolated metal sphere that is neutral.



What happens to the charges on the neutral sphere as the positively charged sphere is brought close to it?

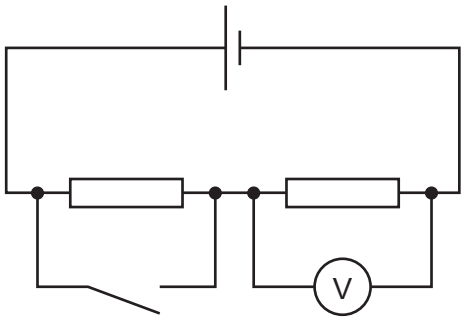
A Some positive charges move to the left and some negative charges move to the right.

B Some positive charges move to the right and some negative charges move to the left.

C Some positive charges move to the right, but the negative charges do not move.

D The positive charges do not move, but some negative charges move to the left.

31 The diagram shows a circuit containing a cell, two resistors, a switch and a voltmeter.



When the switch is open the voltmeter reads 1.5 V.

When the switch is closed the voltmeter reads 2.0 V.

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

A 0.5 V **B** 1.5 V **C** 2.0 V **D** 3.5 V

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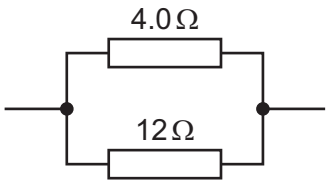
32 A 4.0 Ω resistor and a 12 Ω resistor are connected in parallel.



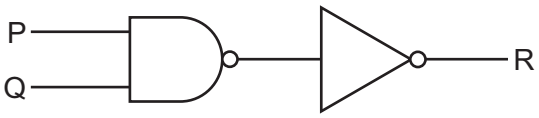
What is the effective resistance of this combination of resistors?

A 0.33 Ω **B** 3.0 Ω **C** 8.0 Ω **D** 16 Ω

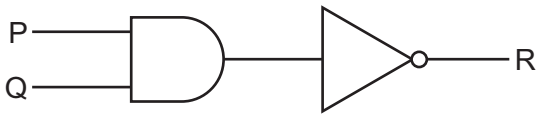
33 Which combination of two gates will result in the truth table shown?

P	Q	R
0	0	0
0	1	1
1	0	1
1	1	1

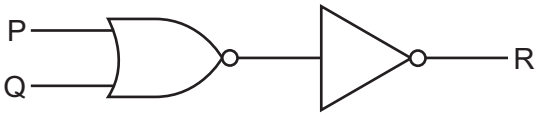
A



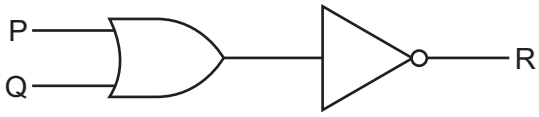
B



C



D



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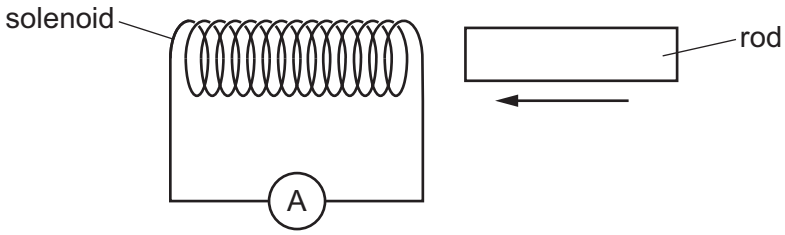
34 A solenoid is connected to a very sensitive ammeter. A rod is inserted into one end of the solenoid. The ammeter shows that there is a small electric current in the solenoid while the rod is moving.



Which rod is being inserted?

A a heated copper rod

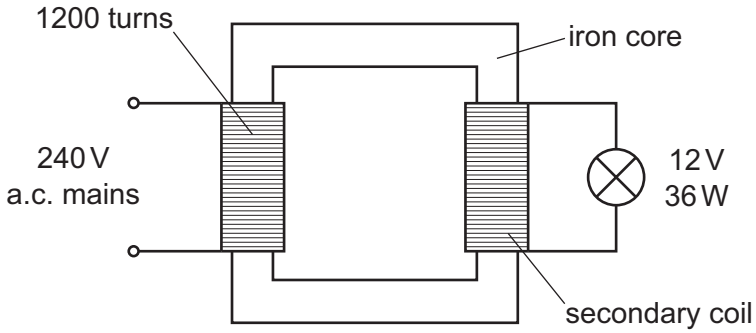
B a magnetised steel rod

C an uncharged nylon rod

D a radioactive uranium rod

35 A 12 V, 36 W lamp shines at normal brightness when connected to a mains transformer.

Assume the transformer is 100% efficient.



Which row shows the number of turns in the secondary coil and the current in the mains wires?

	number of turns in secondary coil	current in the mains wire / A
A	60	0.15
B	60	3.0
C	180	0.15
D	180	3.0

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36 Diagram 1 shows a wire carrying an electric current into the page.

The wire is between the poles of a magnet.

A force is produced on the wire acting down towards the bottom of the page.

Diagram 2 shows the situation after the current is reversed and the magnet is turned through 90°.

diagram 1

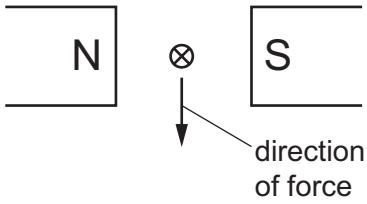

diagram 2



In which direction does the force act after these changes?

A towards the top of the page

B towards the bottom of the page

C towards the left-hand side of the page

D towards the right-hand side of the page

37 The charge on a proton is *e*.

What is the charge on an electron and what is the charge on a neutron?

	electron	neutron
A	*e*	*e*
B	*e*	0
C	$-e$	$-e$
D	$-e$	0

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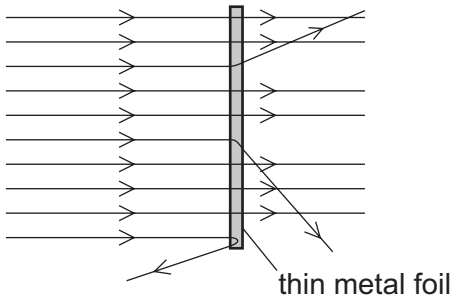
38 The diagram shows α-particles incident on a thin metal foil.



How does the motion of these particles give evidence for the nuclear atom?

A Most particles passing through with minimal deflection shows that the atom is mostly empty space.

B Most particles passing through with minimal deflection shows that the mass of the atom is uniformly distributed.

C Large deflections of some particles shows that the atom is mostly empty space.

D Large deflections of some particles shows that the charge in the atom is uniformly distributed.

39 Radium-226, $^{226}_{88}Ra$, is an α-emitter.

It is implanted inside cancerous tumours.

It is safe to use as it kills the cancerous cells, but not the healthy ones surrounding the tumour.

Which properties of α-particles, compared to other emissions, enable this use of radium-226?

	ionising effect of α-particles	penetration of α-particles
A	high	high
B	high	low
C	low	high
D	low	low

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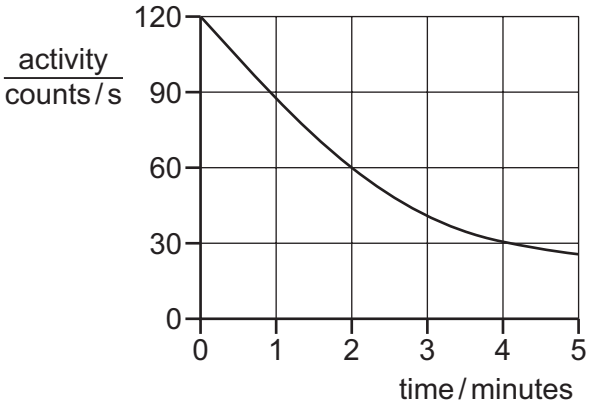
40 The graph shows the activity of a radioactive source over a period of time.



What is the half-life of the source?

A 1.0 minute **B** 2.0 minutes **C** 2.5 minutes **D** 4.0 minutes

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