Cambridge Assessment International Education

Cambridge IGCSE™

PHYSICS **0625/21**

Paper 2 Multiple Choice (Extended) **October/November 2024**

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 9.8 N (acceleration of free fall = 9.8 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 uses a metre ruler to measure the length of a sheet of paper.

Which measurement is shown to the nearest millimetre?

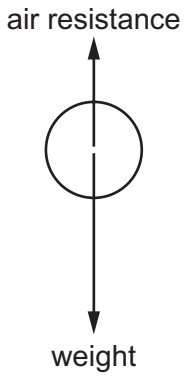
A 0.2932 m **B** 0.293 m **C** 0.29 m **D** 0.3 m

2 A rocket travels with an average speed of 6 km / s for 2 minutes.

What is the distance travelled by the rocket?

A 12 km **B** 50 km **C** 720 km **D** 12 000 km

3 The diagram shows the vertical forces acting on a ball as it falls vertically through the air. The ball does not reach terminal velocity.

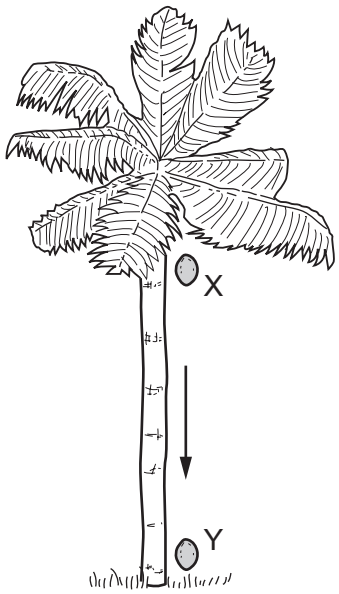


Which row describes what happens to the resultant force on the ball and what happens to the acceleration of the ball as it falls through the air?

	resultant force	acceleration
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

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4 A coconut falls from a palm tree. At X, it has just started falling. Y is the point just before it hits the ground.



What is the acceleration of the coconut at X?

(Air resistance can be ignored.)

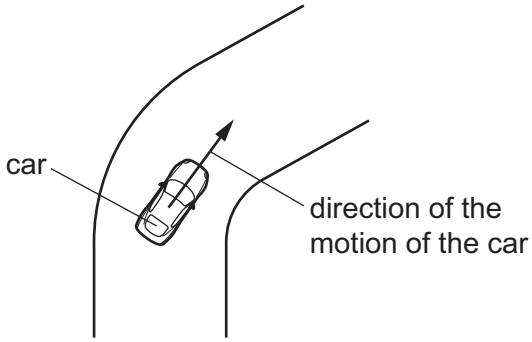
A zero

B less than that at Y

C the same as that at Y

D more than that at Y

5 A car is driven round a bend in the road at a constant speed.



What is the direction of the resultant force on the car when it is going round the bend?

A parallel to the motion and in the same direction as the motion

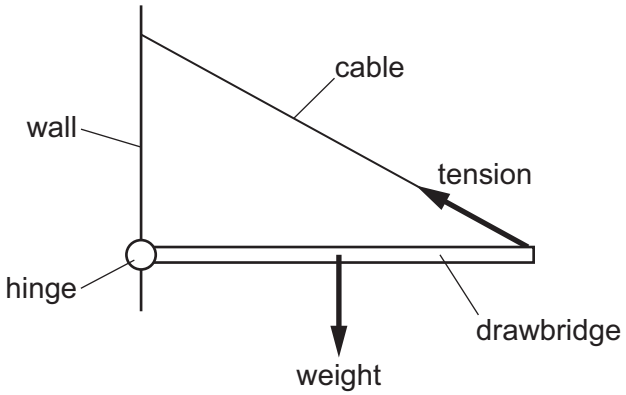
B parallel to the motion and in the opposite direction to the motion

C perpendicular to the motion and towards the inside of the bend

D perpendicular to the motion and towards the outside of the bend

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6 The diagram shows a drawbridge that is attached to a wall by a hinge at one end and a cable at the other.



The weight of the drawbridge and the tension in the cable are represented by the labelled arrows in the diagram. There is a third force at the hinge, which is not shown. The drawbridge is in equilibrium.

Which arrow shows a possible direction for the force at the hinge?



7 Which equation gives the momentum change of an object?

A momentum change = $\frac{\text{force}}{\text{area}}$

B momentum change = force × distance

C momentum change = force × $\frac{\text{distance}}{\text{time}}$

D momentum change = force × time

8 Which statement about the use of nuclear fuel as an energy resource is correct?

A It obtains its energy from the Sun.

B It has **no** environmental impact.

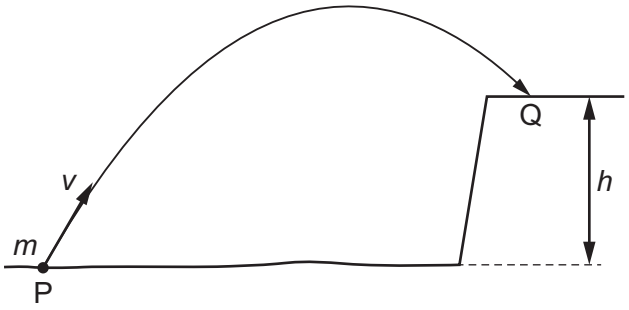
C Nuclear power stations do **not** need turbines.

D The energy is released by nuclear fission.

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9 The diagram shows an object of mass m being projected with speed v from a point P to a point Q on top of a cliff height h.

The object does work W against air resistance as it travels from P to Q.



What is the kinetic energy of the object when it reaches point Q?

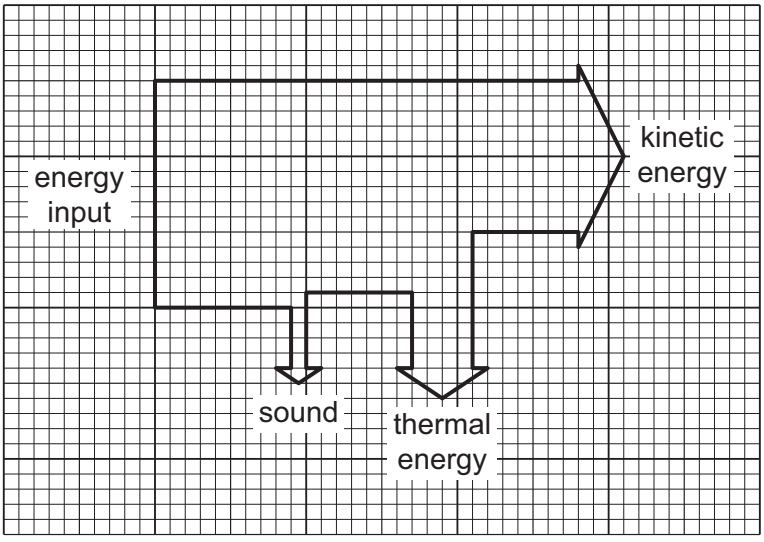
A $\frac{1}{2}mv^2 + mgh + W$

B $\frac{1}{2}mv^2 + mgh - W$

C $\frac{1}{2}mv^2 - mgh + W$

D $\frac{1}{2}mv^2 - mgh - W$

10 The diagram shows a Sankey diagram for an electric drill.



scale: distance between two lines = 40 J

What is the total wasted energy shown by the diagram?

A 120 J **B** 200 J **C** 360 J **D** 560 J

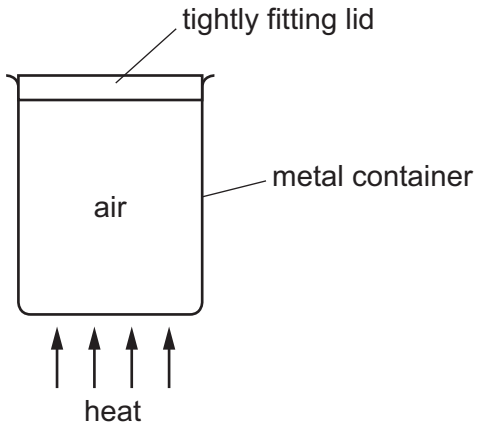
11 An elephant of weight 45 000 N stands with all four feet on the floor.

The average pressure on the floor due to the elephant foot in contact with it is 34 000 Pa.

What is the area of each foot of the elephant?

A $0.19\,m^2$ **B** $0.33\,m^2$ **C** $0.76\,m^2$ **D** $1.3\,m^2$

12 Some air is trapped inside a metal container with a tightly fitting lid.



The container is heated strongly behind a safety screen. The lid is blown off by the increased pressure of the air inside the container.

What causes the increase in pressure of the air inside the container?

A Each air particle expands and takes up more room.

B The air particles move more quickly.

C The number of particles inside the container increases.

D The volume occupied by the air decreases.

13 A very hot mug of coffee is near a large unheated swimming pool holding 2.0×10^6 kg of water.

Which statement is correct?

A If the mug of coffee is tipped in the pool, the coffee will lose much more internal energy than the water in the pool gains.

B The internal energy of a substance depends only on its temperature.

C The internal energy of the water in the pool is lower than the internal energy of the mug of coffee.

D When the temperature of the mug of coffee falls, its internal energy will decrease.

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14 A student measures the mass of water in an open container over two hours. The container is kept in a warm room. The results are in the table.

time / hours	mass of water / g
0.0	33.9
0.5	30.6
1.0	27.6
1.5	24.9
2.0	22.5

Why does the mass of the water change?

A The water evaporates.

B The water freezes.

C The water condenses.

D The water boils.

15 A 1 kg block of aluminium requires more thermal energy to raise its temperature by 1 °C than a 1 kg block of copper requires.

Why is this?

A Aluminium is a better conductor of thermal energy than copper.

B Aluminium is a poorer conductor of thermal energy than copper.

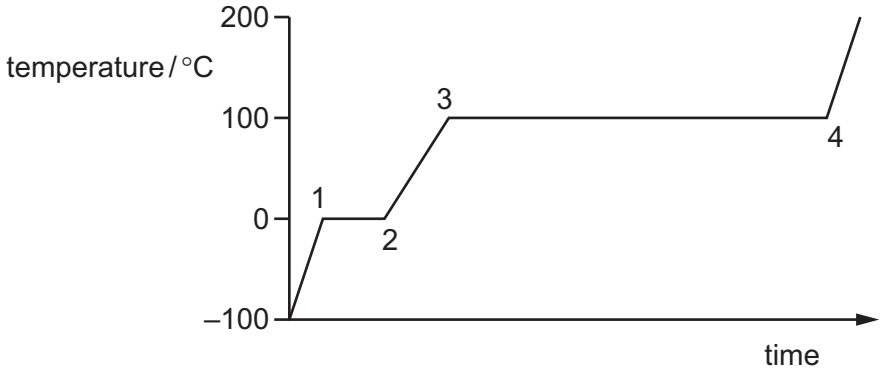
C Aluminium has a higher specific heat capacity than copper.

D Aluminium has a lower specific heat capacity than copper.

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[Turn over

16 A block of ice is at a temperature of –100 °C. Energy is supplied at a constant rate. The graph shows how its temperature changes.



At which points have the ice completely changed state to water and all the water completely changed state to steam?

	completely changed to water	completely changed to steam
A	1	3
B	1	4
C	2	3
D	2	4

17 Water waves are reflected at a plane surface.

Which property of the waves is changed by the reflection?

A direction of propagation

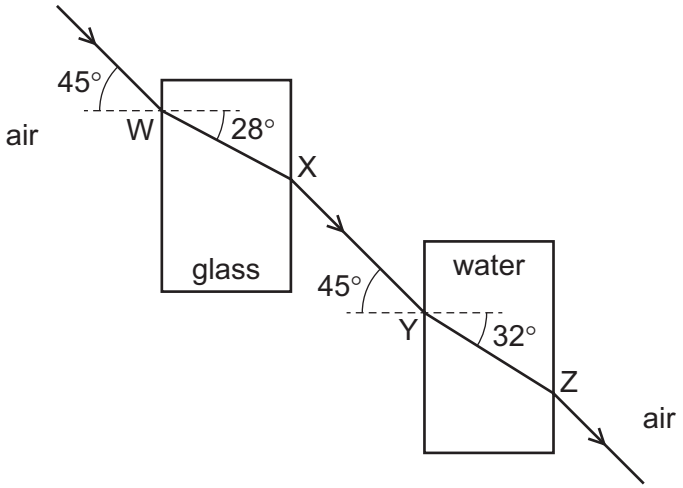
B frequency

C speed

D wavelength

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18 A light ray is passed through air, glass and water.



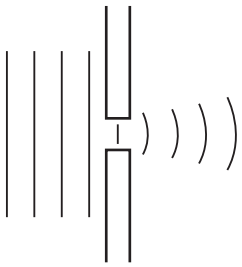
At which points does the light speed decrease?

A W and X **B** W and Y **C** X and Z **D** Y and Z

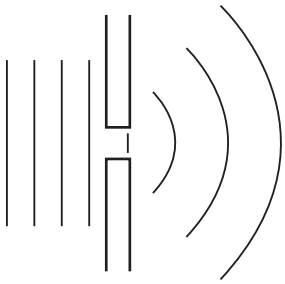
19 Plane water waves approach a narrow gap in a barrier.

Which diagram shows the diffraction pattern that would occur?

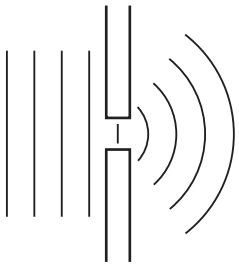
A



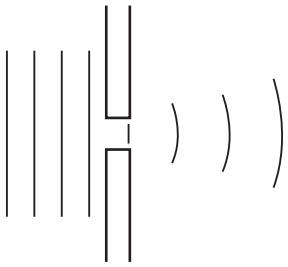
B



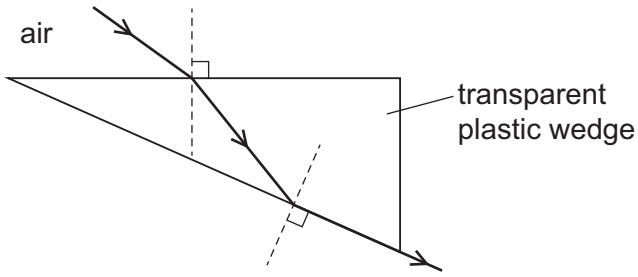
C



D



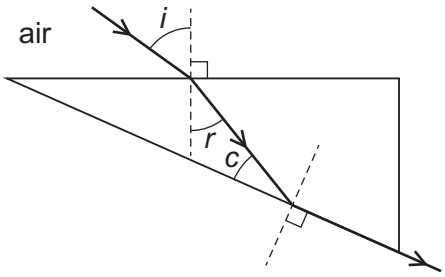
20 A ray of light enters a transparent plastic wedge from air and is incident on the lower surface at the critical angle, as shown.



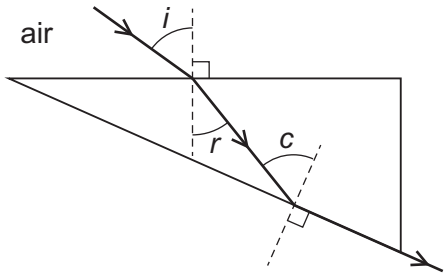
The angle of incidence is *i*, the angle of refraction is *r*, and the critical angle is *c*.

In which ray diagram are the angles labelled correctly?

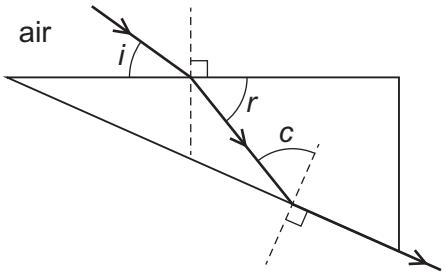
A



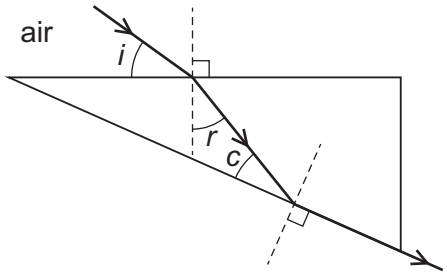
B



C

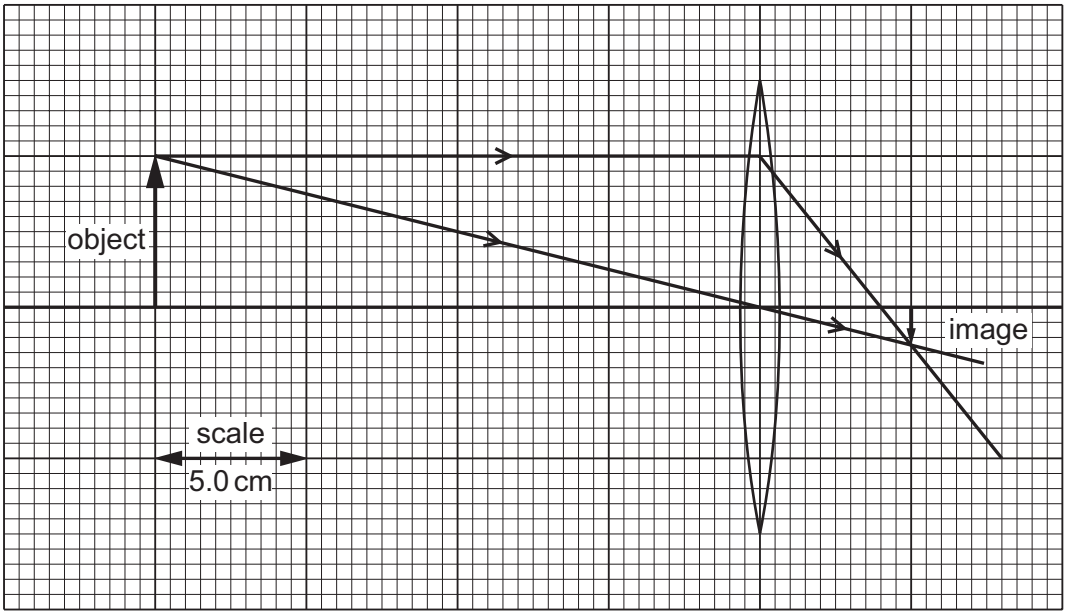


D



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21 An object is placed 20 cm in front of a thin converging lens. The scale diagram shows how the lens forms a real, inverted image.



Which row gives the focal length of the lens and the distance of the image from the lens?

	focal length of lens / cm	distance of image from lens / cm
A	4.0	5.0
B	5.0	4.0
C	8.0	10.0
D	10.0	8.0

22 Radio waves are electromagnetic waves.

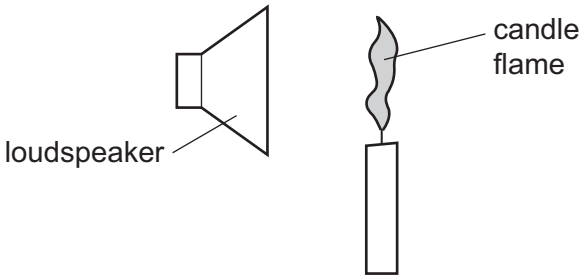
What is the wavelength of a radio wave of frequency 2.0×10^5 Hz?

A 0.00067 m **B** 0.0015 m **C** 670 m **D** 1500 m

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23 A candle flame is placed in front of a loudspeaker.

The loudspeaker produces a sound wave that causes air particles to vibrate. The vibrating air particles make the candle flame vibrate in the same direction as the air particles.

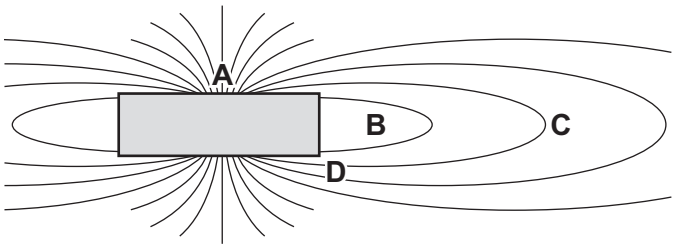


Which row shows the direction of vibration of the candle flame and the nature of sound waves?

	direction of vibration	nature of sound waves
A	↕	longitudinal
B	↕	transverse
C	↔	longitudinal
D	↔	transverse

24 The diagram shows part of the magnetic field around a strong magnet.

In which position does a magnetic pole experience the strongest force?



25 There is a current of 0.60 A in a closed circuit.

How much charge passes a point in the circuit in 2.5 min?

A 0.24 C **B** 1.5 C **C** 90 C **D** 5400 C

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26 Which two physical quantities have the unit J / C?

A charge and energy

B charge and potential difference (p.d.)

C electromotive force (e.m.f.) and p.d.

D e.m.f. and charge

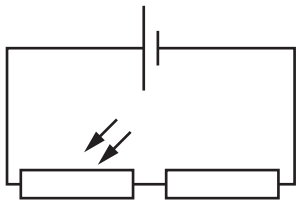
27 A copper wire is placed in an electrical circuit and its resistance is measured. The wire is then replaced with a second copper wire with twice the length and a quarter of the diameter.

What is the ratio of the resistance for the two wires?

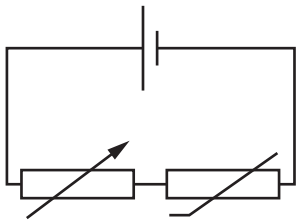
A 1 : 2 **B** 1 : 4 **C** 1 : 8 **D** 1 : 32

28 Which circuit contains a diode connected in series with a fixed resistor?

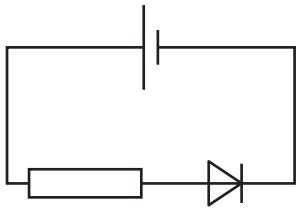
A



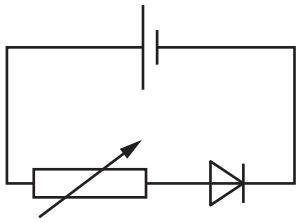
B



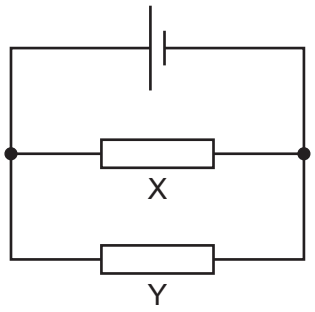
C



D



29 In the circuit shown, resistor X has twice the resistance of resistor Y.



Which statement about the circuit is correct?

A The current in the cell is greater than the current in X.

B The current in X is greater than the current in Y.

C The potential difference (p.d.) across the cell is greater than the p.d. across X.

D The p.d. across X is greater than the p.d. across Y.

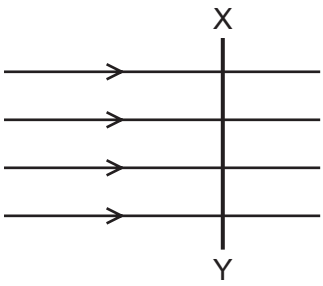
30 A 4 Ω resistor and an 8 Ω resistor are connected in series with a power supply.

A voltmeter connected across the 8 Ω resistor reads 36 V.

What is the voltmeter reading when it is connected across the 4 Ω resistor?

A 12 V **B** 18 V **C** 72 V **D** 108 V

31 A metal rod, XY, is placed in a magnetic field so that it is perpendicular to the field, as shown.



In which direction is the rod moved so that there is an induced current from Y to X?

A left to right

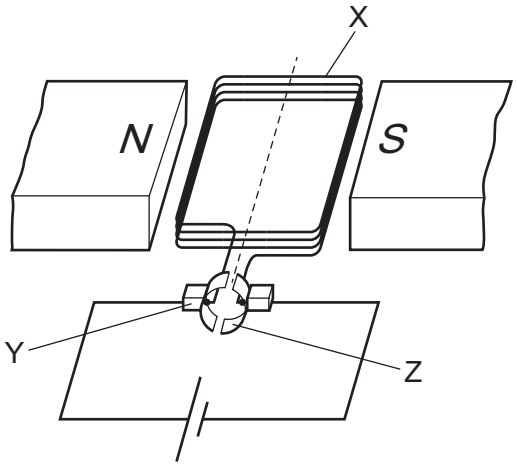
B right to left

C into the paper, away from the observer

D out of the paper, towards the observer

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32 The diagram shows a basic electric motor.



What are the names of the features?

	X	Y	Z
A	axle	battery	brushes
B	coil	brushes	commutator
C	generator	wires	transformer
D	solenoid	connectors	switch

33 Two transformers, P and Q, each have 2000 turns on their primary coils and 1000 turns on their secondary coils. Both transformers are 100% efficient.

The secondary of transformer P is connected to the primary of transformer Q.

Q provides a motor with a current of 0.2 A.

What is the current being supplied to the primary of transformer P?

A 0.8 A **B** 0.4 A **C** 0.1 A **D** 0.05 A

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34 α-particles are directed at a metal foil.

Most of the particles pass through the foil with little change in direction.

A small proportion of the particles are scattered back through large angles.

What does this evidence suggest about the structure of an atom?

A It consists of a charged centre much smaller than the size of the atom and with little of the mass of the atom.

B It consists of a negative charge the size of the atom containing small positive charges scattered through it.

C It consists of a charged centre much smaller than the size of the atom but with most of the mass of the atom.

D It consists of a positive charge the size of the atom containing small negative charges scattered through it.

35 Which statement correctly compares the properties of alpha-particles and beta-particles?

A Alpha-particles are less penetrating than beta-particles because alpha-particles are less ionising.

B Alpha-particles are less penetrating than beta-particles because alpha-particles are more ionising.

C Alpha-particles are more penetrating than beta-particles because alpha-particles are less ionising.

D Alpha-particles are more penetrating than beta-particles because alpha-particles are more ionising.

36 Which statement about alpha decay is correct?

A The nucleus loses electrons.

B The nucleus changes to that of a different element.

C The nucleus does not decay until after one half-life.

D After two half-lives, alpha decay always stops.

37 An explosion in a nuclear reactor spreads the isotope caesium-137, $^{137}_{55}Cs$, across a large area.

After 90.0 years have passed, the quantity of caesium-137 present is 12.5% of its original level.

What is the half-life of caesium-137?

A 11.3 years **B** 22.5 years **C** 30.0 years **D** 45.0 years

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38 Which type of object rotates around the Sun with an elliptical orbit?

A planet

B galaxy

C red giant

D moon

39 Which statement about the Sun is correct?

A The nuclear reactions in the Sun create mainly radio waves and microwaves.

B The Sun is powered by fission reactions in which hydrogen is converted into helium.

C The Sun is powered by fission reactions in which lithium is converted into helium.

D The Sun is powered by fusion reactions and electromagnetic radiation is produced.

40 To determine the value of the Hubble constant, an astronomer measures the distance of a galaxy from the Earth as 2.5×10^{21} km.

She also measures the speed of recession of the galaxy from the Earth as 5.2×10^{3} km/s.

From these data, what is the value of the Hubble constant?

A $7.7 \times 10^{-26}\,s^{-1}$

B $2.1 \times 10^{-18}\,s^{-1}$

C $4.8 \times 10^{17}\,s^{-1}$

D $1.3 \times 10^{25}\,s^{-1}$

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