



Cambridge IGCSE™

PHYSICS

0625/12

Paper 1 Multiple Choice (Core)

October/November 2023

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).

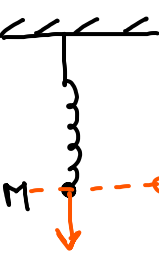
INFORMATION

- 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 **16** pages.



- 1 A student investigates the oscillation of a mass suspended from a spring.



The student pulls the mass down from its rest position P and then releases it so that it oscillates vertically.

The student then follows the instructions listed to find the period of the oscillating mass.

- 1 Count 10 complete oscillations. → Average 3 → 1 → 4 → 2
- 2 Divide the time on the stop-watch by 10.
- 3 Start the stop-watch as the mass passes upwards through point P.
- 4 Stop the stop-watch.

What is the correct order of these instructions?

- A 1 → 3 → 4 → 2
- ~~B 3 → 1 → 4 → 2~~
- C 3 → 4 → 1 → 2
- D 4 → 3 → 2 → 1

- 2 A student measures the average speed of a cyclist in a race.

$$V_{avg} = \frac{\text{Total distance}}{\text{Total time}}$$

Which quantities must she measure?

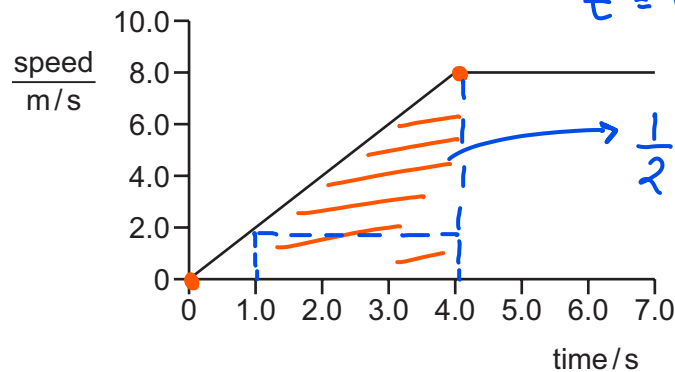
- A the total time taken to complete the race and the time taken for the cyclist to reach her highest speed
- B the total time taken to complete the race and the total distance travelled by the cyclist at her highest speed
- ~~C the total time taken to complete the race and the total distance travelled by the cyclist~~
- D the time taken to reach her highest speed and the total distance travelled by the cyclist



3

- 3 The graph shows the motion of a sprinter.

Area under the speed time curve represents the dist. travelled.



$t = 0$ to $t = 4s$
 $t = 1$ to $t = 4s$

$$\frac{1}{2} \times 3 \times (2 + 8) = 15m$$

She accelerates steadily from rest to 8.0 m/s in 4.0 s.

How far does she travel in the last three seconds of her acceleration?

- A 9.0 m ☒ B 15 m C 16 m D 24 m

- 4 A person steps onto a bathroom scale.

The bathroom scale records both mass and weight.

Which row shows the readings on the bathroom scale?

	mass	weight
A	60 N	590 kg
<input checked="" type="checkbox"/> B	60 kg	590 N
C	590 kg	60 N
D	590 N	60 kg

$$W = mg$$

$$g = 9.8 \text{ ms}^{-2}$$

- 5 Which equation is correct?

- A density = mass \times volume
 B density = weight \times volume
☒ C mass = density \times volume
 D weight = density \times volume

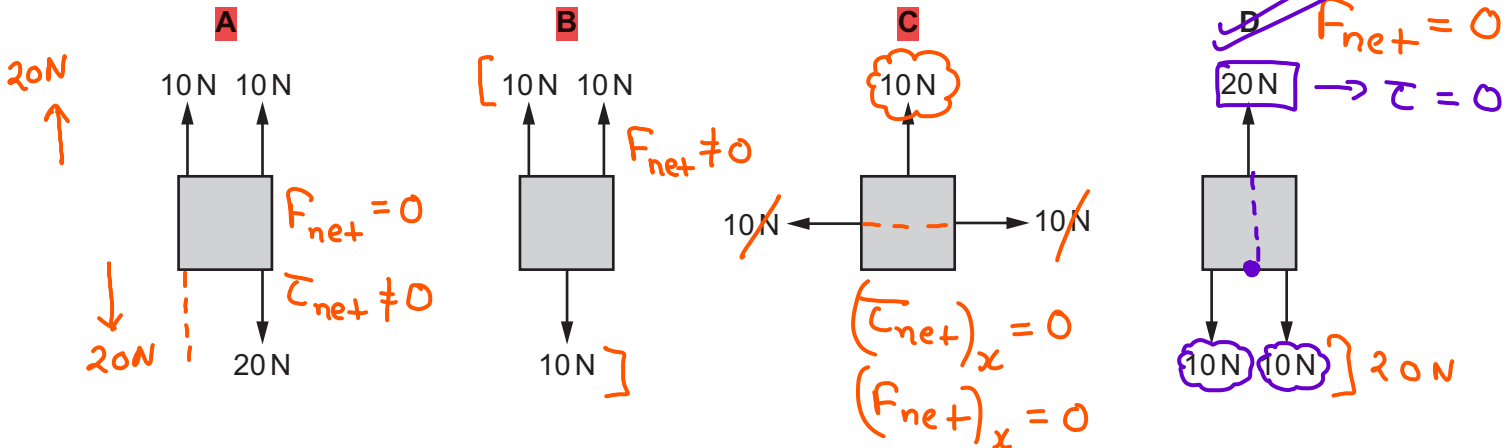
$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

$$\text{mass} = d \times V$$

- 6 The diagrams show four identical objects. Each object is acted on by only the forces shown.

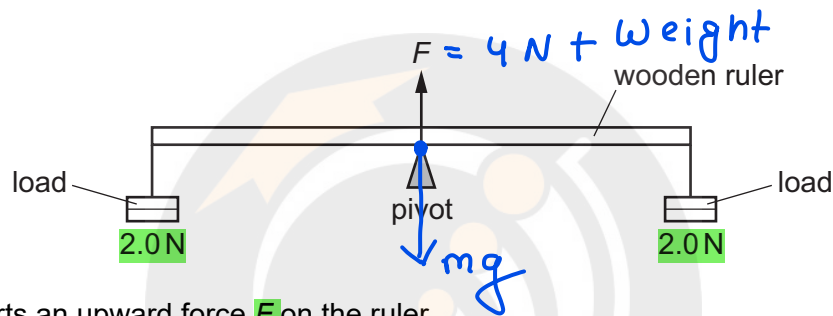
Which diagram shows an object in equilibrium?

$$F_{\text{net}} = 0 \ \& \ \tau_{\text{net}} = 0$$



- 7 A uniform wooden ruler is pivoted at its centre. A load of 2.0 N is suspended from each end of the ruler.

$$F_{\text{net}} = 0$$



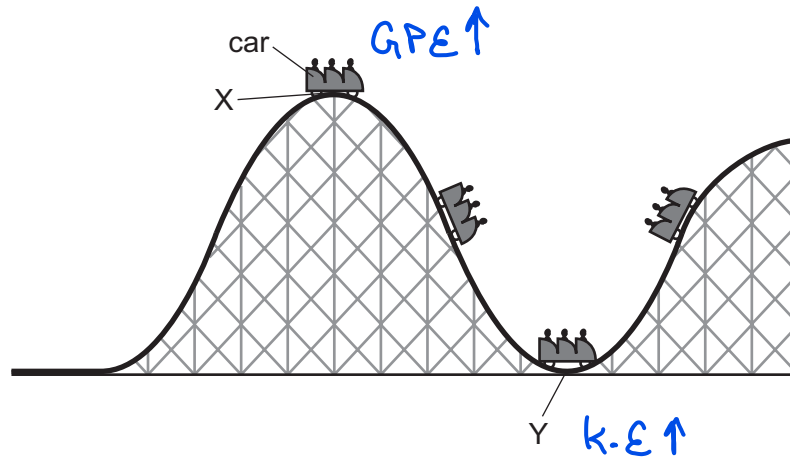
The pivot exerts an upward force F on the ruler.

What is F equal to?

- A 2.0 N
- B the weight of the ruler
- C 4.0 N
- D 4.0 N plus the weight of the ruler

- 8 The diagram shows part of a rollercoaster ride with the car at different positions.

The car runs freely down from position X to position Y and up the hill on the other side.



$$P.E = mgh$$

$$K.E = \frac{1}{2}mv^2$$

What happens to the energy in the kinetic store and the gravitational potential store of the car as it moves from position X to position Y?

	energy in kinetic store	energy in gravitational potential store
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

- 9 In a small power station, **biofuel** is used to **generate electricity**.

Which energy store is reduced by this process?

Ethanol

- ☒ A chemical
- ☐ B kinetic
- ☐ C nuclear
- ☐ D thermal

- 10 An electric car is charged overnight. In 8.0 hours, 180 MJ of energy is transferred.

What is the power of the charger?

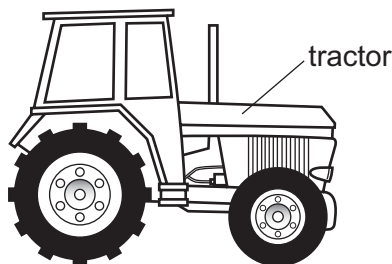
- ☒ A 6.3 kW B 380 kW C 23 MW D 1400 MW

$$P = \frac{\text{Work}}{\text{time}} = \frac{180 \times 10^6 \text{ J}}{8 \times 3600 \text{ s}} = \frac{18 \times 10^7}{8 \times 3600} = \frac{1}{16} \times 10^5$$

$$\frac{100}{16} \times 10^3 \text{ W}$$

11 Tractors have large tyres. These help to prevent the wheels from sinking into soft ground.

↓ Pressure = $\frac{\text{force} \rightarrow \text{const.}}{\text{Area} \uparrow}$



Which statement explains this?

- A Larger tyres exert a greater force on the ground.
- B Larger tyres exert a greater pressure on the ground.
- C Larger tyres exert a smaller force on the ground.
- ☒ D Larger tyres exert a smaller pressure on the ground.

12 Brownian motion is the random motion of particles.

In which states of matter is Brownian motion observed?

- A gases, liquids and solids
- ☒ B gases and liquids only → fluids
- C gases and solids only
- D liquids and solids only

13 A student investigates the relationship between the pressure of a gas and its volume at constant temperature. He records his results in the table.

At $T = \text{const.}$ (Boyle's law)
 $PV = \text{const.}$
 $P \propto \frac{1}{V}$

reading	pressure N/cm ²	volume /cm ³
1	10.0	24
2	7.4	32
3	4.0	63
4	13.0	19

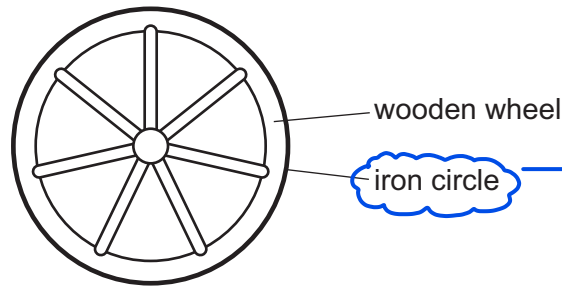
$$PV = nRT$$

$n \rightarrow$ no. of moles
 $R \rightarrow$ gas const.

What is the correct conclusion from the experiment?

- ☒ A The volume decreases when the pressure increases.
- B The volume increases when the pressure increases.
- C The volume initially increases when the pressure increases, but then decreases.
- D The volume is independent of the pressure.

- 14 A wooden wheel can be strengthened by putting a tight circle of iron around it.

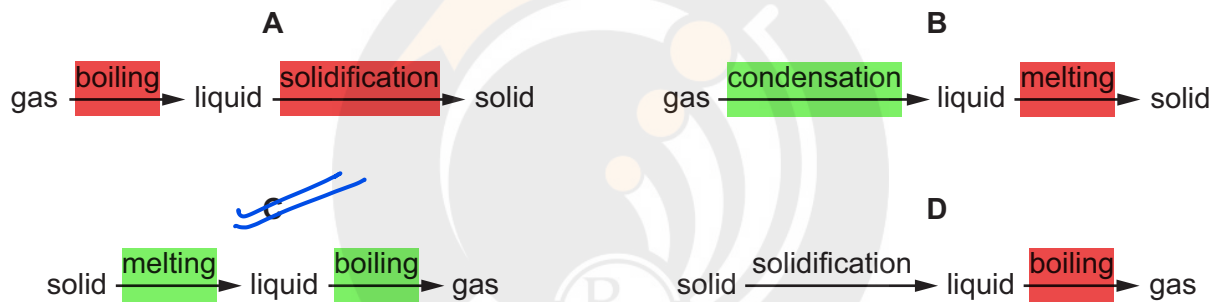


With heat, iron expands & contracts on cooling

Which action would make it easier to fit the circle over the wood?

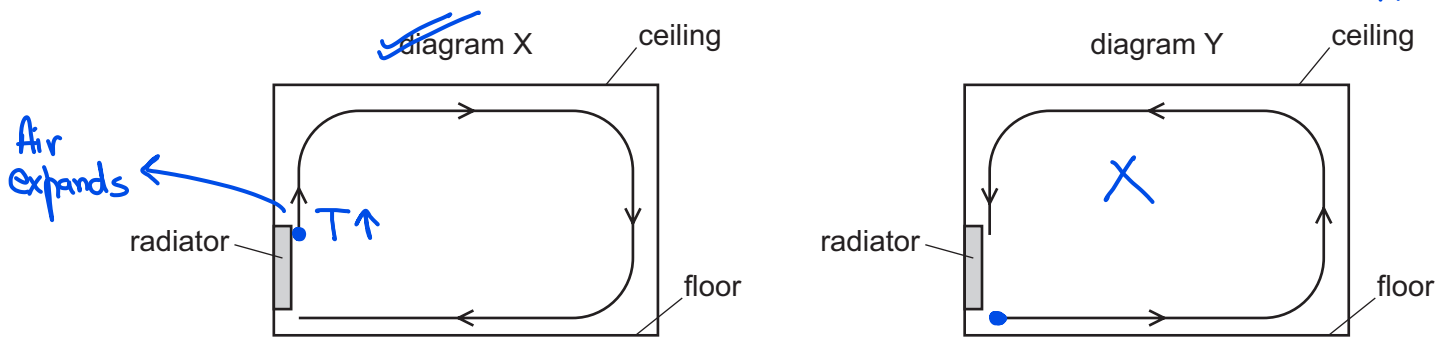
- A cooling the iron circle only
- ☒ B heating the iron circle
- C heating the wooden wheel and cooling the iron circle
- D heating the wooden wheel but not heating or cooling the iron circle

- 15 Which diagram shows the processes happening during changes of state?



- 16 A room is heated by a radiator. The diagrams X and Y show two possible circulations of hot air, which heat the room.

→ Convection



Which diagram and reason explain the heating of the room by convection?

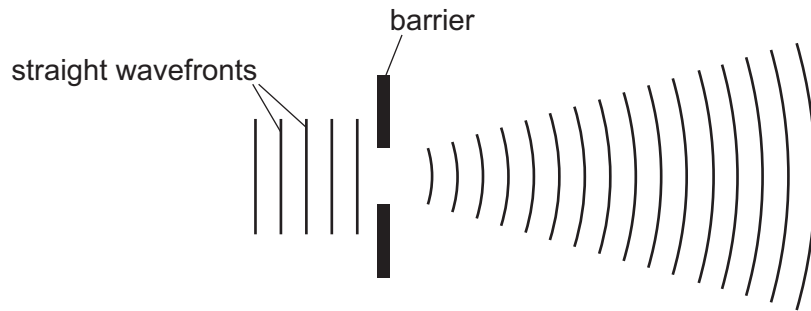
	diagram	reason
A	X	air density decreases when air is heated
B	X	air density increases when air is heated
C	Y	air density decreases when air is heated
D	Y	air density increases when air is heated

- 17 Which description and example are correct for a transverse wave?

Part. → Wave

	description	example
A	The direction of vibration is parallel to the direction of propagation.	sound
B	The direction of vibration is parallel to the direction of propagation.	waves on a rope
C	The direction of vibration is at right angles to the direction of propagation.	sound
D	The direction of vibration is at right angles to the direction of propagation.	waves on a rope

- 18 Straight wavefronts on the surface of a ripple tank approach a gap in a barrier. The diagram shows how the wavefronts change shape as they pass through the gap.



What is the name of this effect?

- A **diffraction**
- B propagation
- C reflection
- D refraction

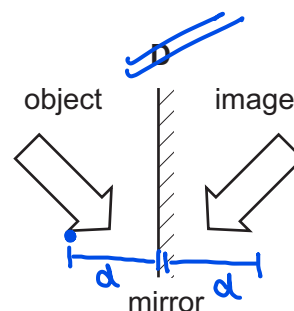
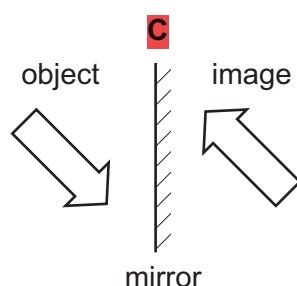
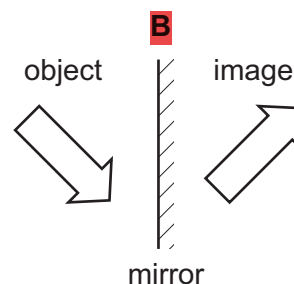
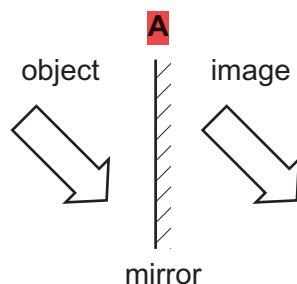
- 19 Red, green and violet lights are part of the **visible spectrum** of light.

What is the order of colours from shortest to longest wavelength?

- A red → green → violet
- B red → violet → green
- C violet → red → green
- D **violet** → **green** → **red**

- 20 Which diagram shows the image correctly formed by **reflection**?

Plane mirror

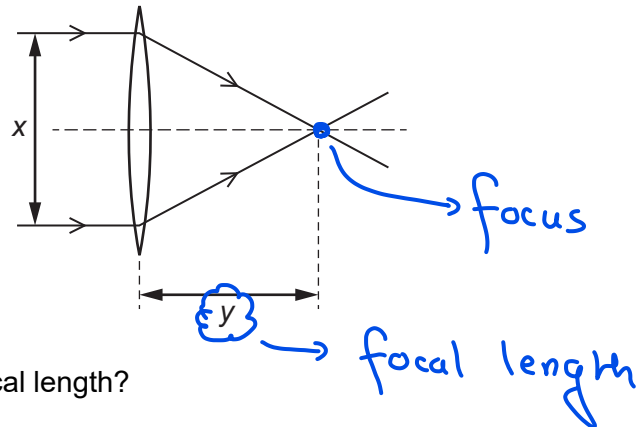


- Erect/Virtual
- Lateral inversion
- Same size
- At a same dist. from mirror as the object is from mirror.



Convex lens

- 21 A student passes parallel rays of light through four different converging lenses. He measures the distance x and the distance y for each experiment.



Which lens has the longest focal length?

	x / cm	y / cm
A	4.6	2.0
B	5.1	3.1
C	5.9	2.3
D	6.1	2.4

- 22 The table shows different types of wave in the electromagnetic spectrum.

radio waves	microwaves	infrared waves	visible light	ultraviolet waves	X-rays	gamma rays
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Where do all the waves travel at the same speed?

- A** in a vacuum
B in diamond
C in glass
D in water

$$c = 3 \times 10^8 \text{ ms}^{-1}$$

- 23 Which statement about a sound that can be heard by a person with normal hearing is correct?

- A** The sound is a longitudinal wave with a frequency between 2.0 Hz and 20 Hz.
B The sound is a longitudinal wave with a frequency between 20 Hz and 20 000 Hz.
C The sound is a transverse wave with a frequency between 2.0 Hz and 2000 Hz.
D The sound is a transverse wave with a frequency between 2.0 Hz and 20 MHz.

24 A **hard magnetic material** can be used to make a permanent magnet.

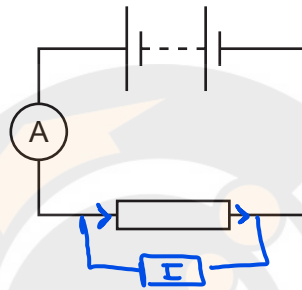
A **soft magnetic material** can be used to make a temporary magnet.

Which row shows whether iron and steel are hard or soft magnetic materials?

	iron	steel
A	hard	hard
B	hard	soft
C	soft	hard
D	soft	soft

25 A battery is connected to an ammeter and a resistor.

$$R_{\text{insu.}} = \infty$$



The ammeter reading is **0.20 A**.

An **electrical insulator** is connected in **parallel** with the **resistor**.

What is the **ammeter reading**?

- A** 0 A
- B** between 0 A and 0.20 A
- C** 0.20 A
- D** greater than 0.20 A

26 Which unit is used to measure **electromotive force (e.m.f.)**?

- A** ampere
- B** joule
- C** volt
- D** watt

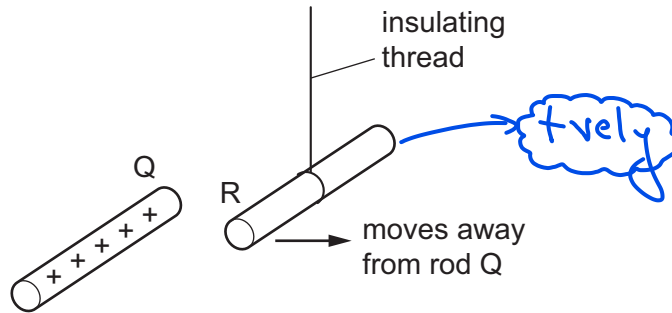
P.d b/w the electrodes of a cell.

27 Which equation is correct for resistance R , potential difference (p.d.) V and current I ?

- A** $R = \frac{V}{I}$
- B** $R = V + I$
- C** $R = \frac{I}{V}$
- D** $R = V \times I$

OHM'S law

28 In the diagram, rod R is suspended from an insulating thread.



When the positively charged rod Q is brought close to rod R, rod R moves away from rod Q.

Which conclusion can be made from this observation?

- A Rod R is charged, but it is not possible to identify the sign of the charge.
- ☒ B Rod R must be positively charged.
- C Rod R must be negatively charged.
- D Rod R is uncharged.

29 In which heating system circuit would thermistors not be useful?

- A to keep different rooms at different temperatures
- B to turn an alarm on if the system overheats
- C to turn a heating system off at a particular temperature
- ☒ D to turn a heating system on when a sound is detected

30 Which statement is correct?

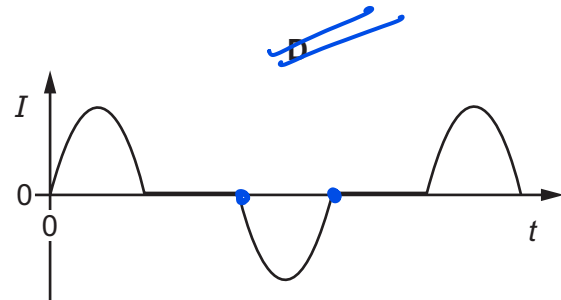
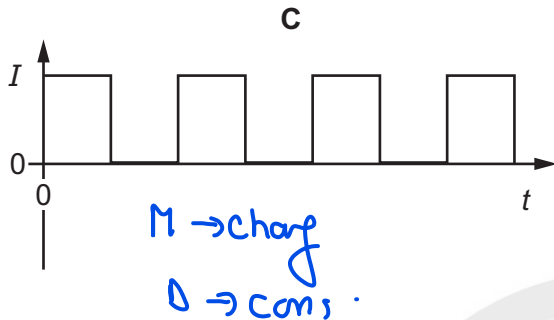
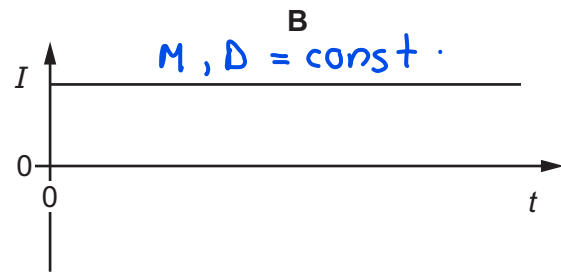
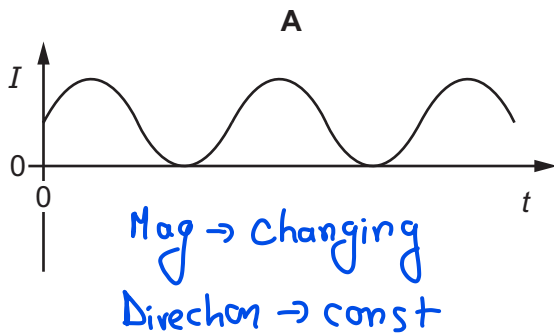
- ☒ A A fuse is included in a circuit to prevent the current becoming too high.
- B A fuse should be connected to the neutral wire in a plug.
- C An electric circuit will only work if it includes a fuse.
- D An earth wire is needed to prevent the fuse blowing.

Resistances which are temp. dependent

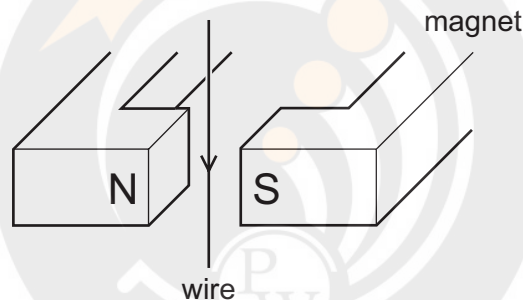


Mag & directions
Charge.

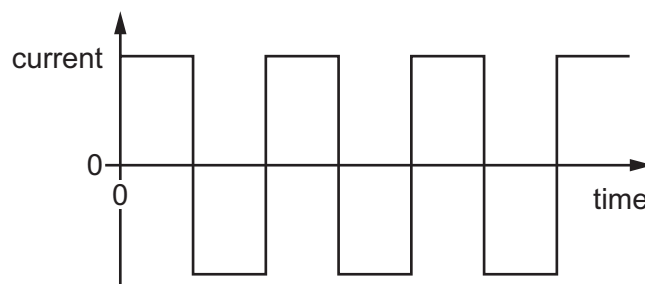
31 Which graph of current I against time t represents an alternating current (a.c.)?



32 The diagram shows a wire in the magnetic field between two poles of a magnet.



The current in the wire repeatedly changes between a constant value in one direction and a constant value in the opposite direction, as shown in the graph.



What is the effect on the wire?

- ☒ **A** The force on the wire alternates between one direction and the opposite direction.
- B** The force on the wire is constant in size and direction.
- C** There is no force acting on the wire at any time.
- D** There is only a force on the wire when the current reverses.



- 33 A transformer has N_p turns on its primary coil and N_s turns on its secondary coil. The voltage across the primary coil is V_p and the voltage across the secondary coil is V_s .

What is the relationship between these four quantities?

A $V_p \times V_s = N_p \times N_s$

~~B~~ $\frac{V_p}{V_s} = \frac{N_p}{N_s}$

C $\frac{V_p}{V_s} = \frac{N_s}{N_p}$

D $\frac{V_p}{V_s} = N_p \times N_s$

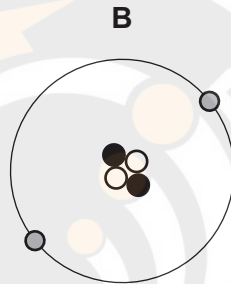
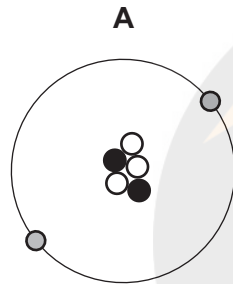
$$\frac{V_p}{V_s} = \frac{N_p}{N_s}$$

- 34 The diagrams represent the protons, neutrons and electrons in different atoms and ions.

Which diagram shows a negatively charged ion?

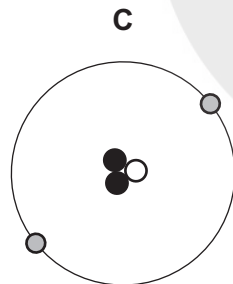
$$n_p > n_e$$

$$2p = 2e^-$$

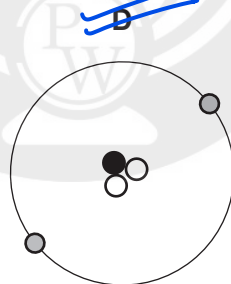


$$2p = 2e^-$$

key
 ● = proton
 ○ = neutron
 ● = electron

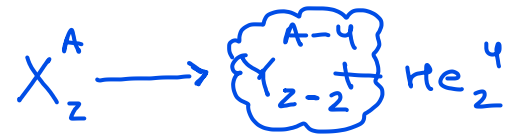


$$2p = 2e$$



$$1p < 2e^-$$

- 35 Which row correctly describes an example of radioactive decay?



	original nucleus	emission	change or no change of element
A	stable	γ	change of element
B	unstable	α	change of element
C	unstable	α	no change of element
D	unstable	β	no change of element



- 36 A detector is used to monitor the emissions from a radioactive source over several days.

The table shows the **count rate** from the source at different times.

250 → 125

time / days	count rate counts / s
0	250
1	215
2	180
3	148
4	120
5	100

Half life
 $N_0 \rightarrow \frac{N_0}{2}$

] → 125

What is the **half-life** of the source?

- A between 1 and 2 days
- B between 2 and 3 days
- ☒ C between 3 and 4 days
- D between 4 and 5 days
- 37 What is the most effective precaution to reduce the **risk when handling**, storing or using a **radioactive source that emits γ -rays**?
- ☒ A Handle the source for the least possible time.
- B Have a fire extinguisher nearby when using the source.
- C Store the source at a low temperature.
- D Wear plastic safety goggles when handling the source.
- 38 Approximately how long does the **Moon take** to **orbit the Earth**?
- A 1 day
- B 7 days
- ☒ C 28 days
- D 365 days

39 The Sun transfers energy to the Earth through electromagnetic radiation.

What are two of the parts of the electromagnetic spectrum to which most of the energy belongs?

A gamma rays and X-rays

☒ B infrared radiation and visible light

C microwaves and visible light

D radio waves and microwaves

Doppler effect

40 What provides evidence that the Universe is expanding?

A Stars in galaxies outside the Milky Way are all red.

B The Andromeda galaxy is moving toward the Milky Way.

☒ C Light from distant galaxies is shifted to longer wavelengths.

D The Universe is 14 billion years old.



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