Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

PHYSICS **5054/12**

Paper 1 Multiple Choice **May/June 2015**

1 hour

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

* 3 5 1 8 0 4 8 6 8 0 *

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.

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1 Which quantity is a scalar?

A acceleration

B force

C temperature

D velocity

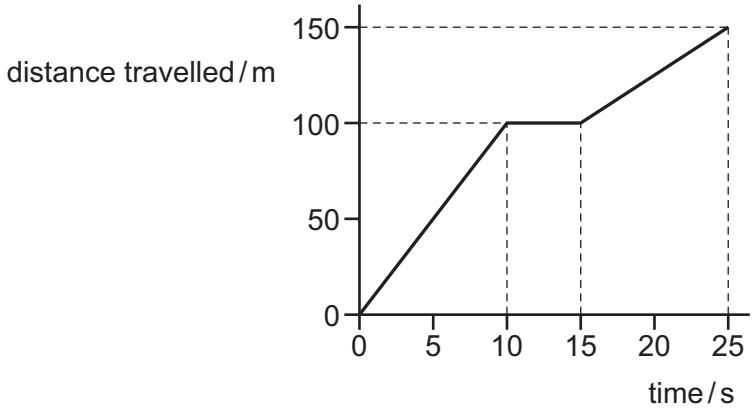
2 The diameter and the length of a thin wire, approximately 50 cm in length, are measured as precisely as possible.

What are the best instruments to use?

	diameter	length
A	micrometer	rule
B	micrometer	vernier calipers
C	rule	tape
D	vernier calipers	rule

3 A cyclist takes a ride lasting 25 s.

The diagram shows how her distance travelled from the starting position varies with time.



What is her average speed for the whole ride?

A 6.0 m / s **B** 7.5 m / s **C** 10.0 m / s **D** 11.0 m / s

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4 A car begins to move. It speeds up until it reaches a constant speed. It continues to travel at this constant speed for the rest of the journey.

What happens to the acceleration and what happens to the velocity of the car during the journey?

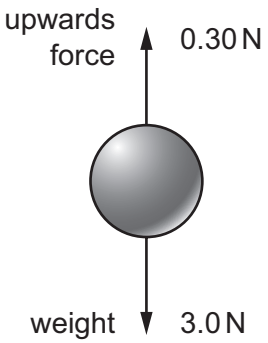
A Both the acceleration and the velocity change.

B Only the acceleration changes.

C Only the velocity changes.

D Neither the acceleration nor the velocity changes.

5 A metal ball of mass 0.30 kg and weight 3.0 N is held so that it is below the surface of oil.
It experiences an upwards force of 0.30 N.



When the ball is released, what is its initial acceleration?

A $1.0\,m/s^2$ **B** $9.0\,m/s^2$ **C** $10\,m/s^2$ **D** $11\,m/s^2$

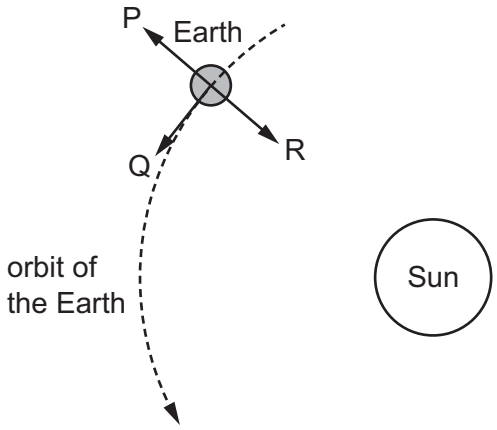
6 A student drops, from rest, a table-tennis ball in air.

What happens to the velocity and to the acceleration of the ball during the first few seconds after release?

	velocity	acceleration
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

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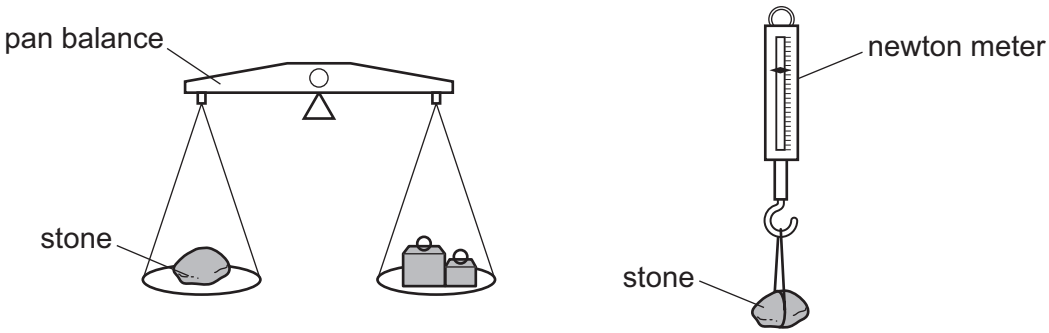
7 The Earth travels in a circular orbit around the Sun at constant speed.



Which arrows show the direction of the acceleration of the Earth and the direction of the velocity of the Earth?

	direction of acceleration	direction of velocity
A	P	Q
B	Q	P
C	Q	R
D	R	Q

8 The mass of a stone is found on Earth using a pan balance. The weight of the stone is found using a newton meter.

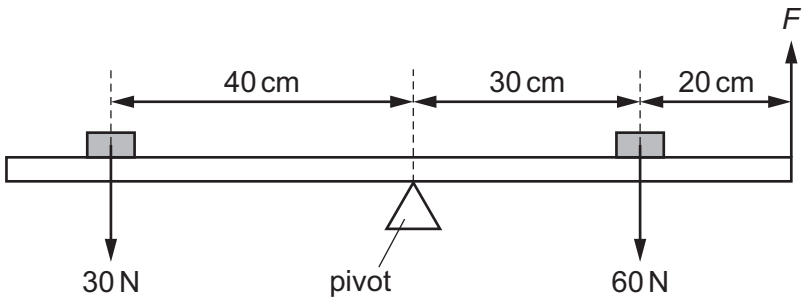


Are the readings the same or different on the Moon?

	reading on pan balance	reading on newton meter
A	different	different
B	same	different
C	different	same
D	same	same

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9 A uniform beam is pivoted at its centre. Two weights are placed on the beam in the positions shown and the beam is balanced by an upward force *F*.

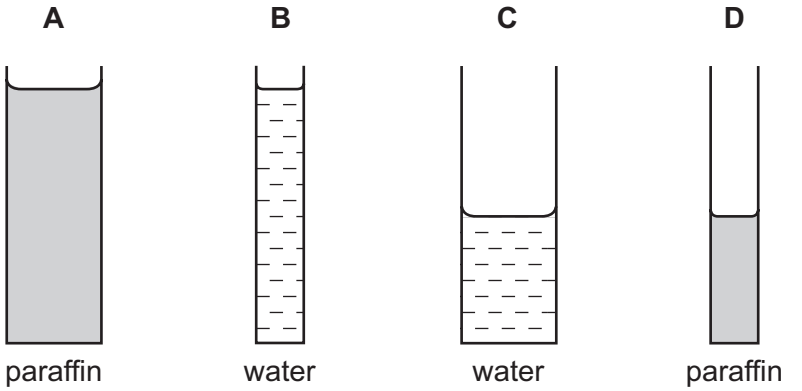


What is the size of *F*?

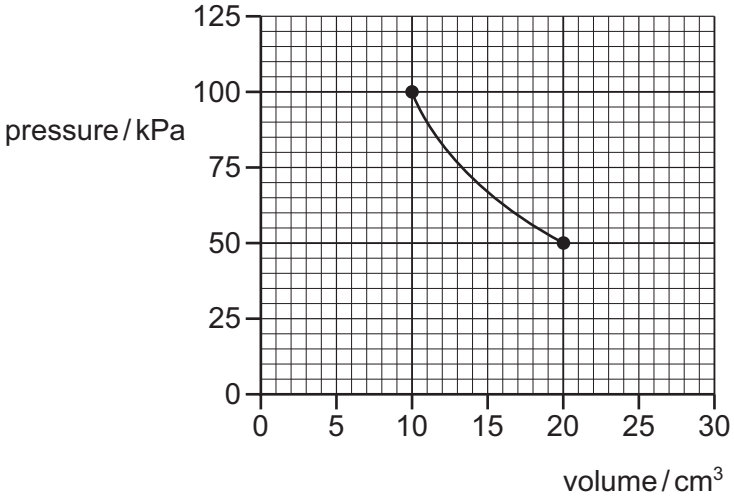
A 6 N **B** 12 N **C** 30 N **D** 60 N

10 The diagrams show liquids in containers.

Which column of liquid exerts the greatest pressure on the base of its container?



11 The graph shows how the pressure of a fixed mass of gas varies with volume at constant temperature.



What is the volume of the gas when the pressure is 25 kPa?

A 2.5 cm^3 **B** 10 cm^3 **C** 30 cm^3 **D** 40 cm^3

12 A rocket of total mass M is travelling at a speed v. The engine of the rocket is fired and fuel is used up. The mass of the rocket decreases to $M/2$ and its speed increases to $2v$.

What happens to the kinetic energy of the rocket?

A it doubles

B it halves

C it increases by a factor of four

D it stays the same

13 A builder lifts eight slabs from the ground on to the back of a lorry 1.5 m high.

The total time taken is 48 s and each slab weighs 200 N.

How much useful power does the builder produce?

A 50 W **B** 400 W **C** 2400 W **D** 3200 W

14 A solid bar is heated at one end.

How is thermal energy transferred to the other end of the bar?

A Heated molecules move along the bar, carrying energy to the other end.

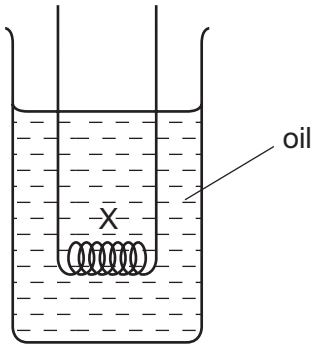
B Heated molecules move along the bar, giving energy to others along the bar.

C Heated molecules stay completely still, but give energy to other molecules.

D Heated molecules vibrate more rapidly and pass energy to other molecules.

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15 An electrical heater is placed in a beaker of cold oil, as shown.



The heater is switched on.

What happens to the liquid at X?

A It becomes less dense and falls.

B It becomes less dense and rises.

C It becomes more dense and falls.

D It becomes more dense and rises.

16 The tubes inside solar heating panels use the Sun's radiation to warm water.

Why are the tubes painted black?

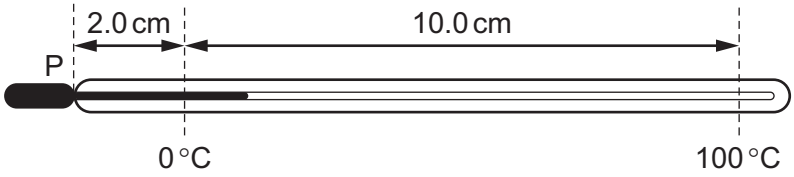
A Black surfaces absorb radiation well.

B Black surfaces conduct heat well.

C Black surfaces emit radiation well.

D Black surfaces reflect radiation well.

17 In a liquid-in-glass thermometer, the liquid column is 2.0 cm long at 0 °C and it expands 10.0 cm when heated to 100 °C.



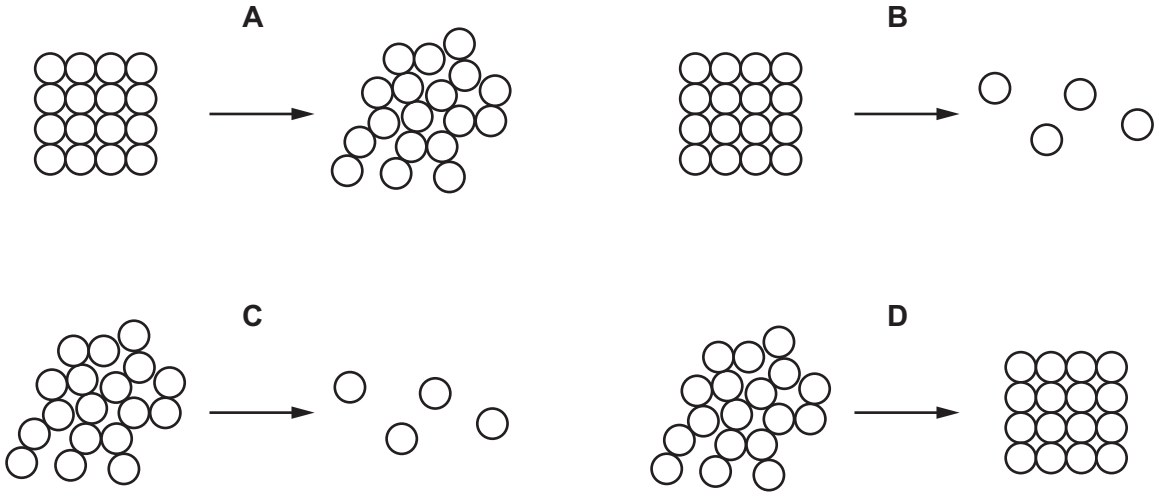
Measuring from P, how long is the liquid column at 30 °C?

A 2.3 cm **B** 3.0 cm **C** 5.0 cm **D** 7.0 cm

18 Which substance in the table is liquid at 20 °C?

	melting point / °C	boiling point / °C
A	–218	–183
B	–39	357
C	44	280
D	119	444

19 Which diagram represents the change in the arrangement of the molecules in a solid as the substance melts?



20 Some gas is trapped in a closed container. The gas is cooled and the volume of the container is kept constant.

What happens to the gas molecules?

A They collide with the walls more often.

B They contract.

C They get closer together.

D They move more slowly.

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21 In a liquid, some energetic molecules break free from the surface even when the liquid is too cold for bubbles to form.

What is the name of this process?

A boiling

B condensation

C convection

D evaporation

22 A pupil adds 37 g of ice at 0 °C to 100 g of water at 30 °C. The final temperature of the water and melted ice is 0 °C. No heat is lost to, or gained from, the surroundings.

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

What is the specific latent heat of ice?

A 47 J / g **B** 341 J / g **C** 4700 J / g **D** 12 600 J / g

23 The heat capacity of an object, of mass 2.0 kg, is C. The energy needed to

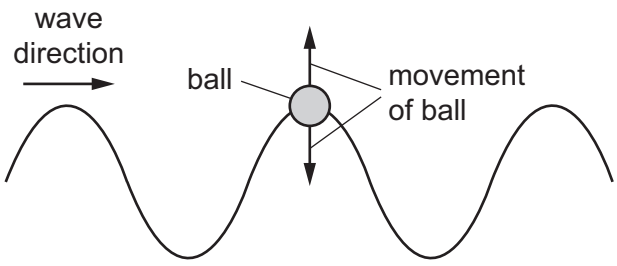
A increase the temperature of the whole object by Δt is $C\Delta t$.

B increase the temperature of unit mass of the object by Δt is $C\Delta t$.

C melt the whole object is C.

D melt unit mass of the object is C.

24 A ball floating in a ripple tank begins to move vertically up and down as a wave passes beneath it. The ball does not move horizontally.



Which statement is correct?

A Both energy and water are transferred in the wave direction.

B Energy is not transferred in the wave direction but water is.

C Energy is transferred in the wave direction but water is not.

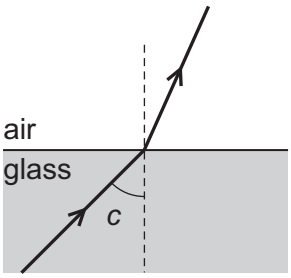
D Neither energy nor water is transferred in the wave direction.

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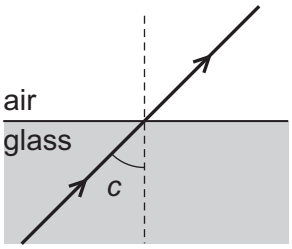
25 A ray of light in glass is incident on the surface at an angle *c*. The angle *c* is the critical angle.

Which diagram shows what happens to the light?

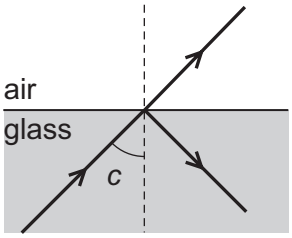
A



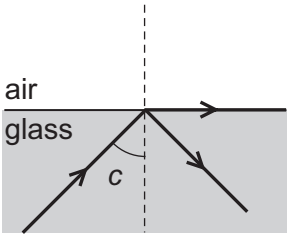
B



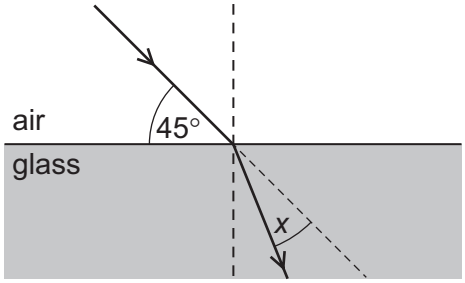
C



D



26 A ray of light is incident on the surface of a glass block, as shown in the diagram below.



The refractive index of the glass is 1.5.

The light ray changes direction when entering the glass.

What is the angle *x* through which the ray moves?

A 30° **B** 28° **C** 17° **D** 15°

27 An image is formed by a thin converging lens when it is used as a magnifying glass.

What is the correct description of the image?

A real and erect

B real and inverted

C virtual and erect

D virtual and inverted

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28 Which component of the electromagnetic spectrum is used for television transmission from satellites?

A microwaves

B radio waves

C ultra-violet

D X-rays

29 In which situation do sound waves **not** travel?

A from a satellite in space to Earth

B from a ship to a submarine

C from an explosion underground to the surface

D through a balloon filled with helium gas

30 Two sound waves X and Y are compared.

X has the greater frequency.

Y has the greater amplitude.

How do the loudness and pitch of sound wave Y compare to those of X?

A Y is louder and higher pitch.

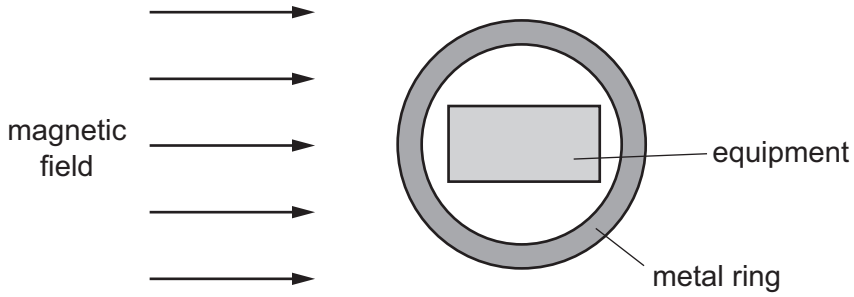
B Y is louder and lower pitch.

C Y is quieter and higher pitch.

D Y is quieter and lower pitch.

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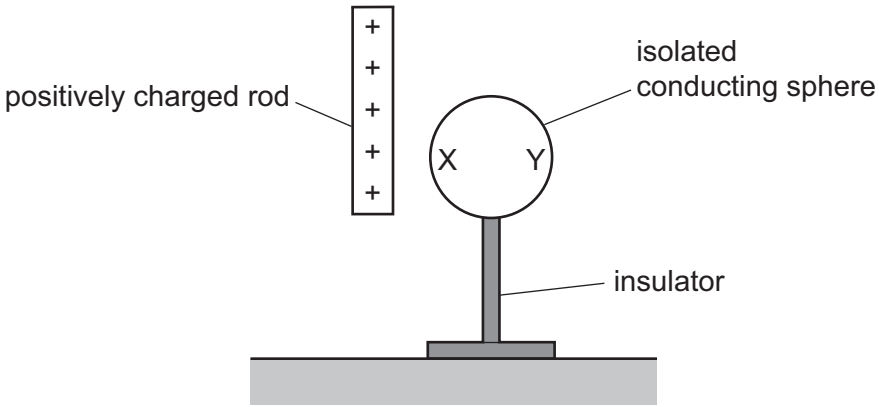
31 A metal ring screens a piece of equipment from a magnetic field.



Which metal should be used for the ring, and why?

	metal	reason
A	copper	the metal carries the field lines around the equipment
B	copper	the metal is non-magnetic
C	iron	the metal carries the field lines around the equipment
D	iron	the metal is non-magnetic

32 A positively charged rod is brought near to an isolated uncharged conducting sphere.



What are the charges on sides X and Y of the sphere?

A Both X and Y are positively charged.

B Both X and Y are negatively charged.

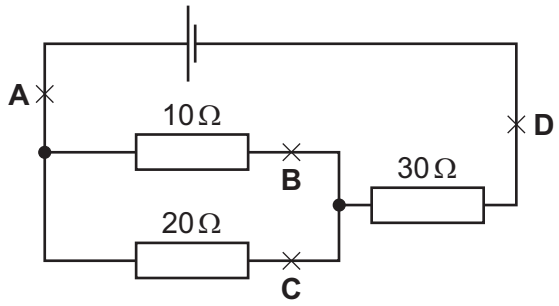
C X is positively charged and Y is negatively charged.

D X is negatively charged and Y is positively charged.

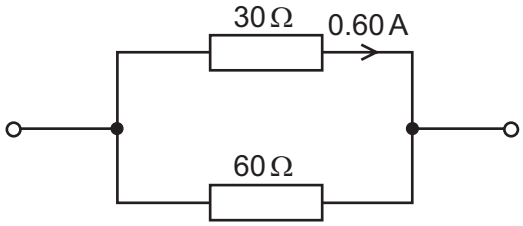
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33 The diagram shows a circuit.

Where must an ammeter be connected to measure the smallest current?



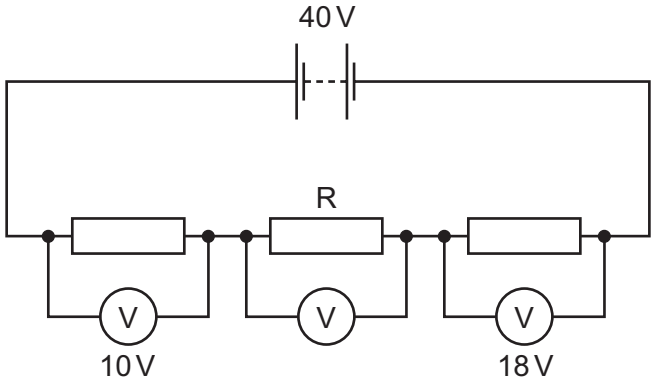
34 Two resistors of resistances 30 Ω and 60 Ω are arranged in parallel. The current in the 30 Ω resistor is 0.60 A.



What is the potential difference across the 60 Ω resistor?

A 9.0 V **B** 18 V **C** 36 V **D** 54 V

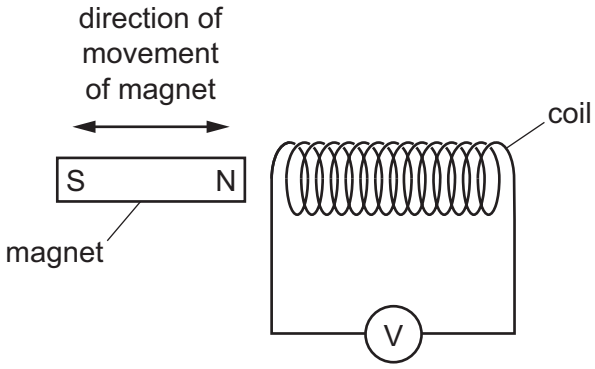
35 The circuit shows three resistors in series connected to a battery. Each resistor has a voltmeter across it and two of the voltages are shown.



What is the potential difference (p.d.) across the resistor R?

A 12 V **B** 22 V **C** 30 V **D** 68 V

36 A teacher moves a magnet into and out of a coil of wire, as shown, in order to demonstrate electromagnetic induction.



Which statement is correct?

A As the magnet is moved into the coil the left-hand end of the coil becomes a S-pole.

B As the magnet is taken out of the coil the left-hand end of the coil becomes a N-pole.

C Increasing the speed at which the magnet enters the coil, increases the induced voltage.

D Increasing the speed at which the magnet leaves the coil decreases the induced voltage.

37 A transformer consists of two coils which are wound on to a metallic core.

Which type of voltage is supplied to the transformer and which metal is used to make the core?

	supply voltage	metal
A	alternating	iron
B	alternating	steel
C	direct	iron
D	direct	steel

38 A nucleus of $^{215}_{84}Po$ decays by emitting an alpha-particle and the resulting nucleus then decays by emitting a beta-particle.

What is the nucleon number and proton number of the final nucleus?

	nucleon number	proton number
A	211	81
B	211	83
C	212	81
D	212	83

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39 A radioactive material decays by this process:

$$^{Y}_{Z}L \rightarrow {}^{Y}_{Z+1}M + x$$

What is particle x?

A an electron

B a helium nucleus

C a neutron

D a proton

40 The half-life of a radioactive isotope is 24 hours. A sample of this isotope produces an initial count rate of 720 counts per second.

How long does it take for the count rate to fall to 90 counts per second?

A 3 hours

B 72 hours

C 96 hours

D 192 hours

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