Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

PHYSICS **5054/12**

Paper 1 Multiple Choice **October/November 2016**

1 hour

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

0862570060

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.

This document consists of **15** printed pages and **1** blank page.

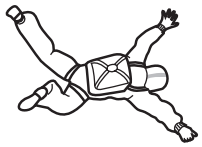
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1 A length of copper wire is labelled ‘length 30 m’ and ‘diameter 0.50 mm’.

Which instruments are most suitable to measure accurately the length and the diameter of the wire?

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

2 A skydiver falls from rest through the air and reaches terminal velocity.



What is the acceleration of the skydiver during his fall?

A constant at $0\,m/s^2$

B constant at $10\,m/s^2$

C starting at $0\,m/s^2$ and increasing to $10\,m/s^2$

D starting at $10\,m/s^2$ and decreasing to $0\,m/s^2$

3 Two aluminium spheres P and Q, of masses 0.50 kg and 1.0 kg respectively, are released at the same time from the same height.

Why do they have the same acceleration?

A The density of P is equal to the density of Q.

B The force on P is equal to the force on Q.

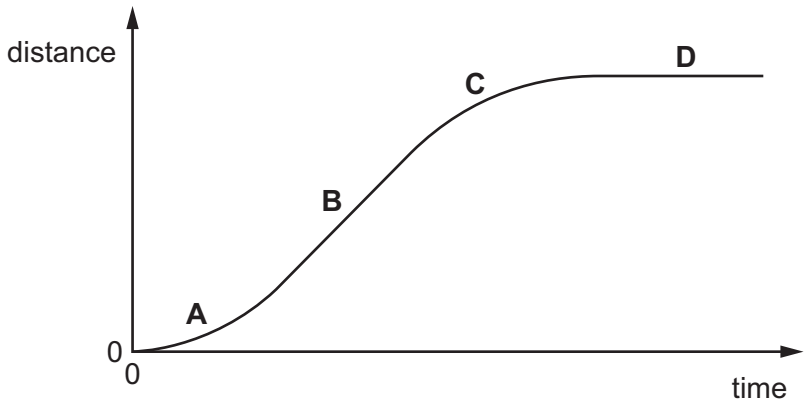
C The force on Q is double the force on P.

D The gravitational field strength for Q is double that for P.

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4 The graph shows a distance-time graph for a car travelling in a straight line.

In which region is the car decelerating?



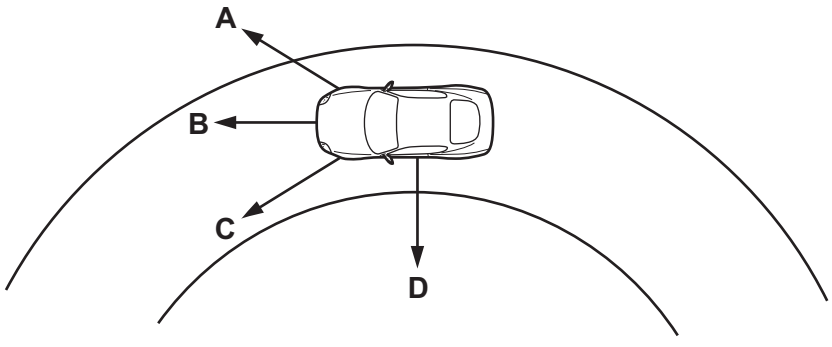
5 A force of 20 N acts on an object of mass 5.0 kg in the forward direction. A second force also acts on the object. The forward acceleration of the object is 3.0 m / s^2.

What is the size and direction of the second force?

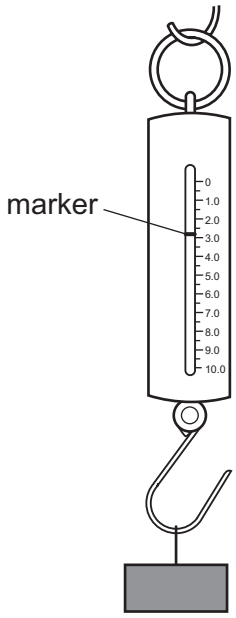
	size of force / N	direction of force
A	5.0	backwards
B	15	backwards
C	15	forwards
D	35	forwards

6 The diagram shows a car going around a circular track at constant speed.

Which arrow shows the direction of the resultant force on the car?



7 A block is hung on a spring balance. The marker inside the balance is pulled down by the block.



What can the position of the marker be used to determine?

A the mass of the block in kg

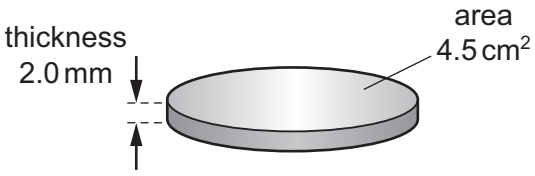
B the mass of the block in N

C the moment caused by the block in N m

D the weight of the block in kg

8 The density of gold is 19 g / cm^3.

A gold coin is 2.0 mm thick. Each face of the coin has an area of 4.5 cm^2.



What is the mass of the coin?

A 2.1 g **B** 17 g **C** 21 g **D** 170 g

9 A man with an open parachute is falling to Earth at constant speed. The following forces are acting.

P the upward force of the parachute on the man.

Q the upward force of the man on the Earth.

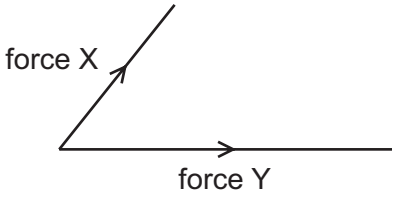
R the downward force of the Earth on the parachute.

S the downward force of the man on the parachute.

Which two forces are a Newton's third law pair?

A P and Q **B** P and R **C** P and S **D** Q and R

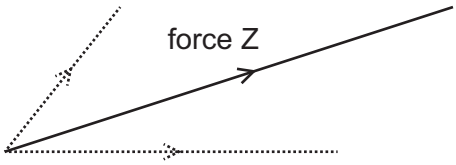
10 Two forces, X and Y, act on an object and produce a resultant force. The scale diagram represents the sizes and directions of forces X and Y.



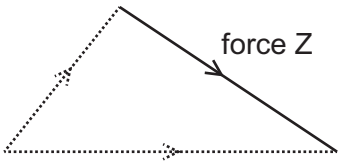
Force Z balances the resultant force due to X and Y and keeps the object stationary.

Which arrow represents force Z?

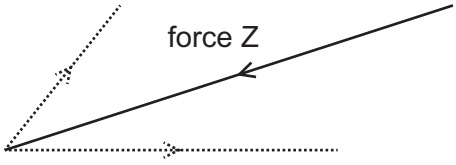
A



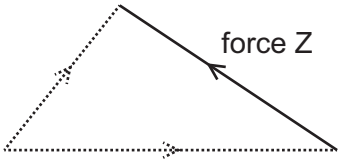
B



C



D



11 Three objects P, Q and R have different masses and different speeds, as shown in the table.

	mass / kg	speed / m/s
P	1.0	3.0
Q	2.0	2.0
R	5.0	1.0

What is the order of increasing kinetic energy (smallest first) of the objects?

A P → Q → R

B P → R → Q

C R → P → Q

D R → Q → P

12 Which power stations all rely on renewable sources of energy?

A hydroelectric, oil-fired, solar power stations

B hydroelectric, solar, wind power stations

C hydroelectric, oil-fired, wind power stations

D oil-fired, wind, solar power stations

13 Which force does no work?

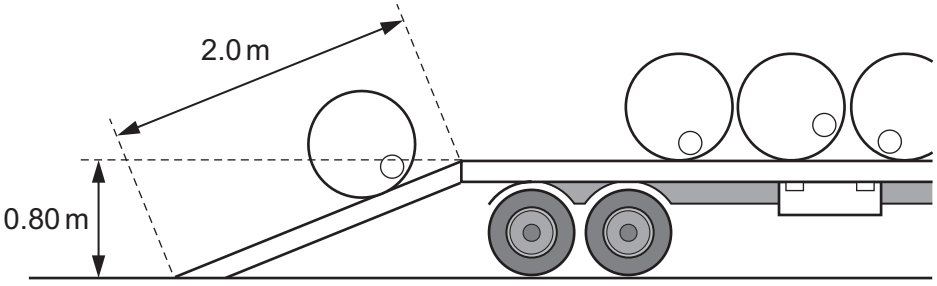
A the force from a car's engine that causes the car to accelerate

B the force that causes a box to slide over a rough horizontal surface

C the force that causes a satellite to move in a circular orbit

D the force that causes a spring to stretch

14 A workman rolls a barrel of weight 2000 N up a plank of length 2.0 m and onto a lorry. The back of the lorry is 0.80 m above the horizontal surface of the road.



What is the work done on the barrel against gravity?

A 1000 J **B** 1600 J **C** 2500 J **D** 4000 J

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15 An electric motor is used to operate a lift (elevator). The motor does 140 000 J of work in 70 s.

What is the output power of the motor?

A 0.50 milliwatts

B 2.0 watts

C 2.0 kilowatts

D 9.8 megawatts

16 Which expression gives the efficiency of an a.c. generator?

A $\frac{\text{electrical energy output}}{\text{total energy input}}$

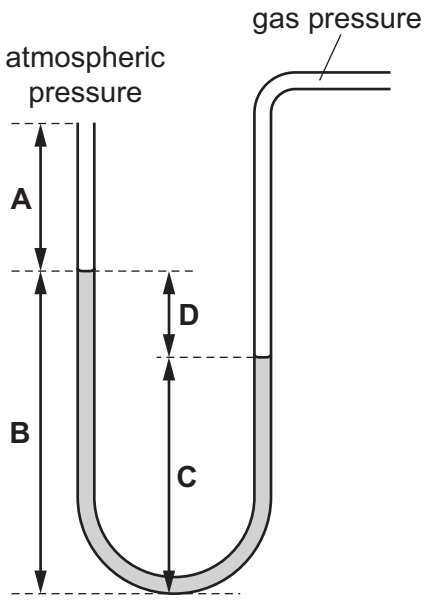
B $\frac{\text{electrical energy output}}{\text{thermal energy output}}$

C $\frac{\text{total energy output}}{\text{electrical energy input}}$

D $\frac{\text{thermal energy output}}{\text{total energy input}}$

17 The pressure of the gas supply in the laboratory is measured using a manometer.

Which distance gives the pressure of the gas above atmospheric pressure?



18 A gas expands slowly and its temperature remains constant.

What happens to the gas molecules?

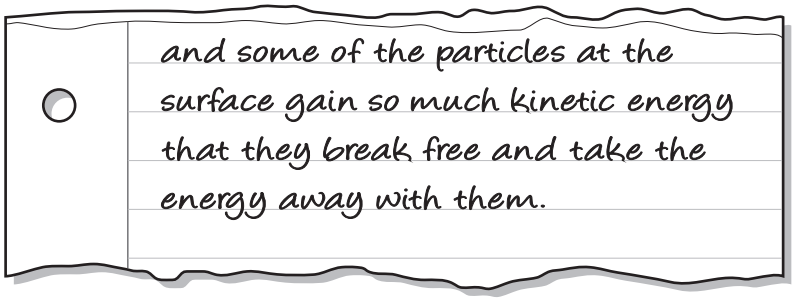
A They move further apart and their average speed decreases.

B They move further apart and their average speed increases.

C They move further apart and their average speed remains unchanged.

D They stay the same distance apart and their average speed decreases.

19 A piece of paper torn out of an exercise book is shown.



Which process is being described?

A conduction

B convection

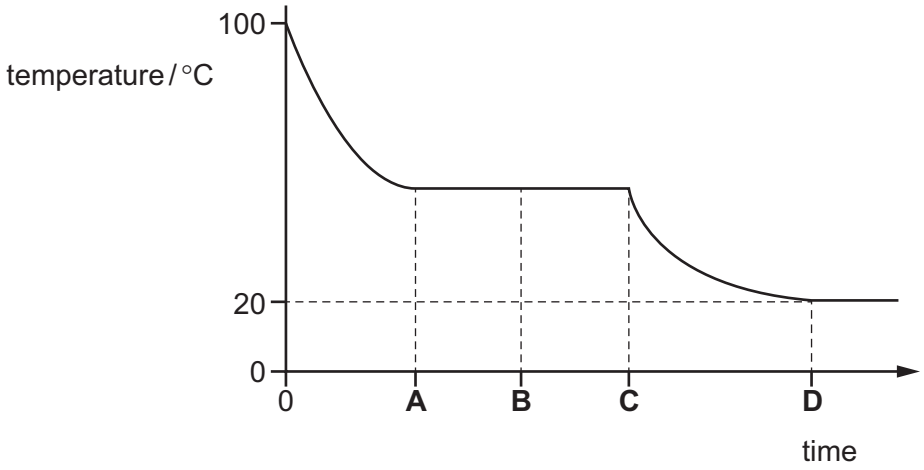
C evaporation

D radiation

20 A sample of liquid at 100 °C is allowed to cool to a room temperature of 20 °C.

The diagram shows how the temperature changes with time during the cooling process.

At which time does the sample become completely solid?



21 One kilogram of water needs more thermal energy to raise its temperature by 1 °C than one kilogram of copper.

Why is this?

A copper has a higher specific heat capacity than water

B copper has a lower specific heat capacity than water

C copper is a better conductor of heat than water

D copper is a poorer conductor of heat than water

22 The thermal energy produced by an electric heater in three minutes is used to melt wax. The wax is initially at its melting point of 60 °C.

The specific latent heat of the wax is 220 J / g. The heater supplies 7700 J of thermal energy to the wax.

How much wax melts?

A 0.58 g **B** 1.7 g **C** 12 g **D** 35 g

23 What makes a clinical thermometer suitable for measuring small changes in body temperature?

A The amount of liquid in the bulb is small.

B The bore of the capillary tube is narrow.

C The capillary tube is long.

D The glass bulb has a thin wall.

24 In which states of matter does convection occur?

A gases, liquids and solids

B gases and liquids only

C gases and solids only

D liquids and solids only

25 Which statement about waves is correct?

A All electromagnetic waves are transverse waves.

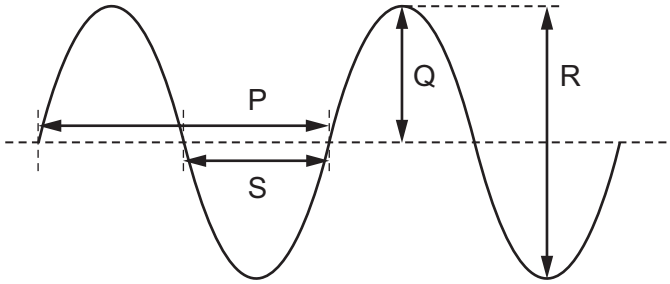
B All transverse waves travel at 300 000 000 m / s.

C Longitudinal waves cannot be refracted.

D Water waves are longitudinal waves.

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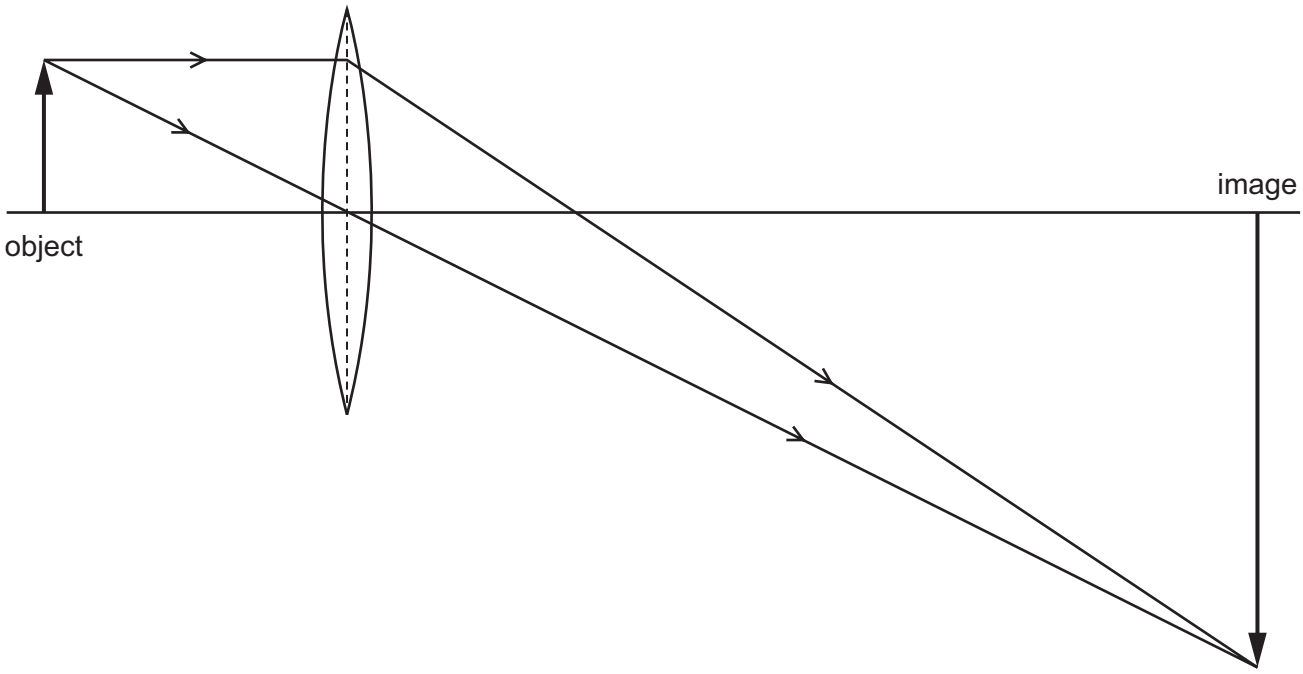
26 The diagram shows the surface of water as a wave passes across a ripple tank.



Which lengths represent the amplitude and the wavelength of the wave?

	amplitude	wavelength
A	Q	P
B	Q	S
C	R	P
D	R	S

27 A lens is used to produce a magnified image, as shown in the scale diagram.



What is the linear magnification produced by the lens?

A 0.33 **B** 3.0 **C** 4.0 **D** 6.0

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28 A girl is long-sighted.

Which statement is correct?

A She sees close objects less clearly than a person with normal vision.

B She sees distant objects more clearly than a person with normal vision.

C The fault is corrected with a diverging lens.

D The image of a close object is formed in front of her retina.

29 Sound travels at different speeds in solids, liquids and gases.

Which list shows these states of matter in order of increasing speed of sound (slowest to fastest)?

A gas → liquid → solid

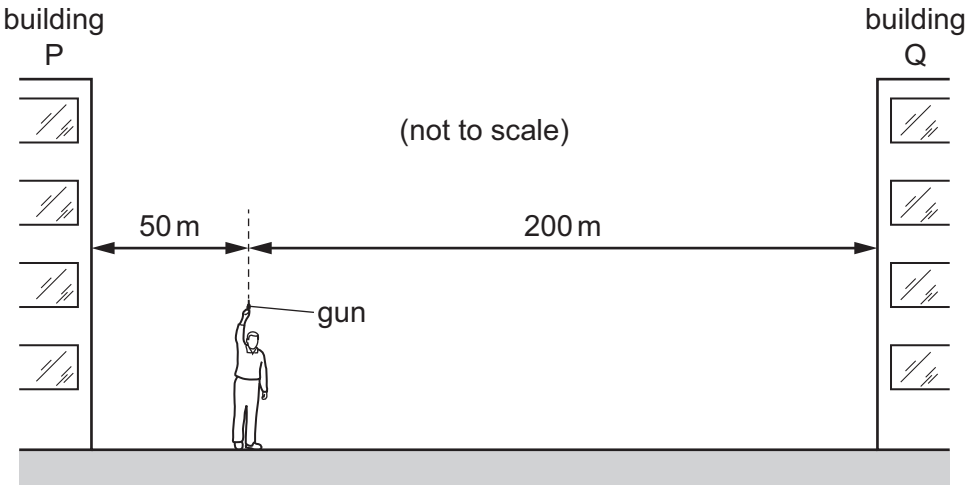
B gas → solid → liquid

C liquid → solid → gas

D solid → liquid → gas

30 A man stands between two tall buildings, P and Q. The diagram is not drawn to scale.

He is 50 m from P and 200 m from Q.



He fires a gun and the first two echoes he hears are 1.0 second apart.

What is the speed of sound calculated from this observation?

A 250 m / s **B** 300 m / s **C** 330 m / s **D** 500 m / s

31 Delicate instruments are often placed in a box to screen them from stray magnetic fields.

What is the material used for the box and why is it chosen?

A Aluminium is used because it is a non-magnetic material.

B Copper is used because it has a low electrical resistance.

C Polythene is used because it is a good electrical insulator.

D Soft iron is used because it is a magnetic material.

32 A positively charged metal sphere is placed midway between two previously uncharged metal rods, one of which is connected to earth.

Which diagram shows the charges on the rods?

A



B



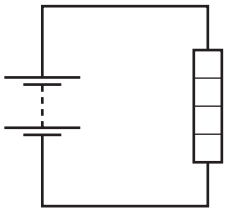
C



D



33 An ammeter and a voltmeter are connected into the circuit shown when determining the power produced by a heater.



How are these meters connected, in relation to the heater?

	ammeter	voltmeter
A	in parallel	in parallel
B	in parallel	in series
C	in series	in parallel
D	in series	in series

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34 Resistors of different resistances are connected to a power supply in either a parallel circuit or a series circuit. Which statement is correct?

A The current is the same in all resistors connected in parallel.

B The current is the same in all resistors connected in series.

C The voltage across each resistor is different for all resistors connected in parallel.

D The voltage across each resistor is the same for all resistors connected in series.

35 The headlamp circuit in a car includes a 7A fuse.

What is the purpose of the fuse?

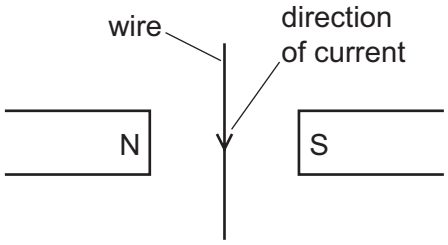
A It increases the resistance of the circuit.

B It makes it easier for the current to flow.

C It protects the wiring from overheating.

D It reduces the voltage across the lamp.

36 A current-carrying wire lies between the poles of two magnets, as shown.



What is the direction of the force on the wire?

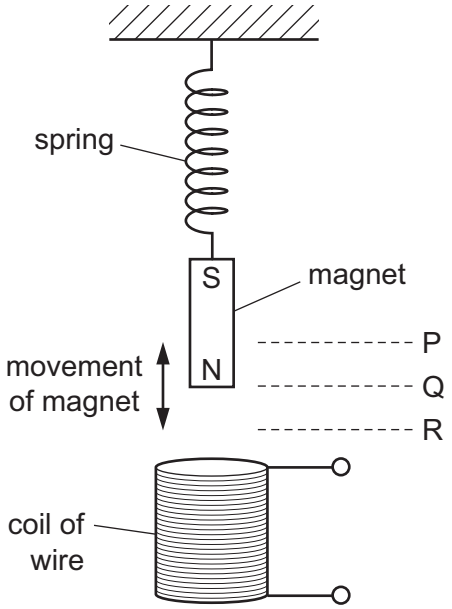
A into the plane of the paper

B out of the plane of the paper

C towards the left

D towards the right

37 A magnet moves up and down above a coil of wire.



The bottom of the magnet moves up and down between P and R.

Where is the bottom of the magnet when there is no induced electromotive force (e.m.f.) in the coil?

A at P and at Q

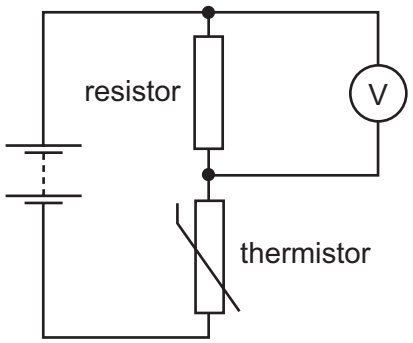
B at P and at R

C at Q only

D at R only

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38 A resistor of constant resistance and a thermistor are connected in series with a battery. A voltmeter is connected in parallel with the resistor.



The temperature falls.

What are the correct changes?

	resistance of thermistor	voltmeter reading
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

39 A freshly made sample of radioactive material gives a count rate of 8000 counts per minute. After 20 days, it gives a count rate of 500 counts per minute.

What is the half-life of the material?

A 4.0 days

B 5.0 days

C 20 days

D 80 days

40 A nucleus of uranium $^{238}_{92}\mathrm{U}$ decays to thorium by emitting an alpha-particle.

What is the resulting thorium nucleus?

A $^{234}_{90}\mathrm{Th}$ **B** $^{236}_{90}\mathrm{Th}$ **C** $^{238}_{93}\mathrm{Th}$ **D** $^{239}_{92}\mathrm{Th}$

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