Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

PHYSICS **5054/11**

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)

* 1 0 8 2 8 5 7 0 0 7 *

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 **17** printed pages and **3** blank pages.

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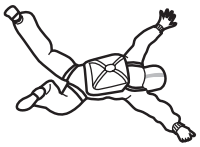
CAMBRIDGE
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1 A length of copper wire is labelled 'length 30 m' and 'diameter 0.50 mm'.

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 $0\,m/s^2$

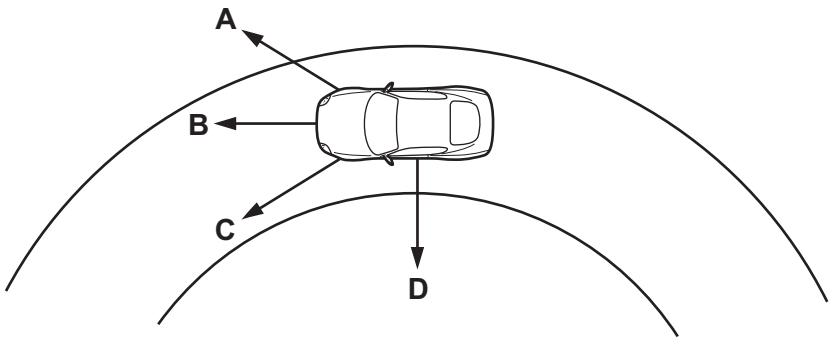
B constant at $10\,m/s^2$

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

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

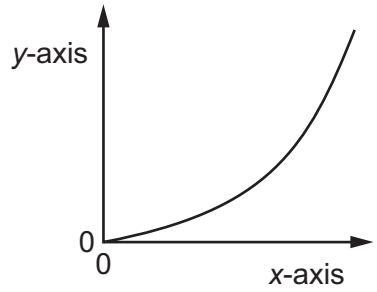
3 The diagram shows a car going around a circular track at constant speed.

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



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4 A car has stopped at a red light. When the light changes to green, the car starts moving with a constant acceleration. The graph represents this motion.



Which quantity is plotted on the *x*-axis and which quantity is plotted on the *y*-axis?

	x-axis	*y*-axis
A	distance	time
B	speed	time
C	time	distance
D	time	speed

5 Which statement about mass and weight is correct?

A A mass experiences a weight due to a gravitational field.

B Mass and weight are different types of force.

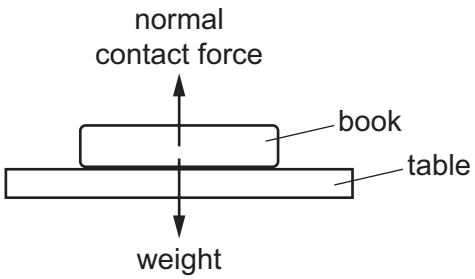
C Mass and weight have the same unit.

D When an object expands, its mass changes but its weight stays the same.

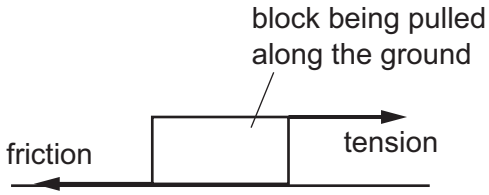
6 Each diagram shows two forces that are equal in magnitude.

Which diagram shows two forces that are a Newton's third law pair of forces?

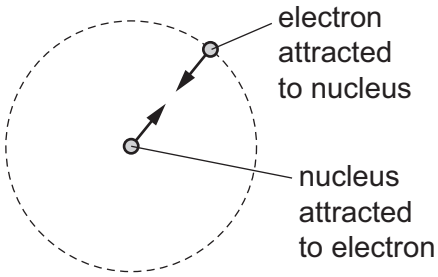
A



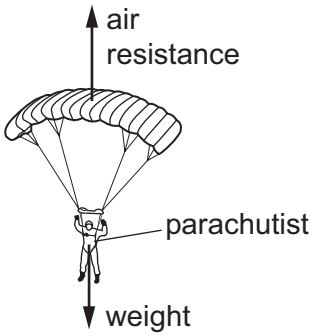
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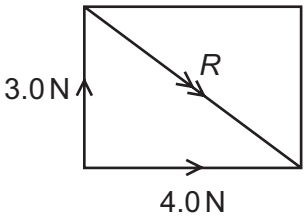
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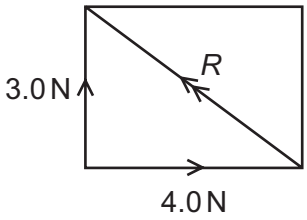
7 Two forces of 3.0 N and 4.0 N act at right-angles to each other.

Which diagram shows the resultant *R* of these forces?

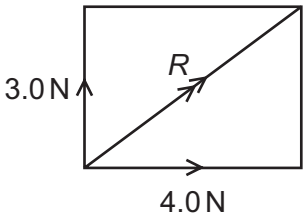
A



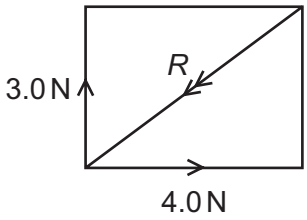
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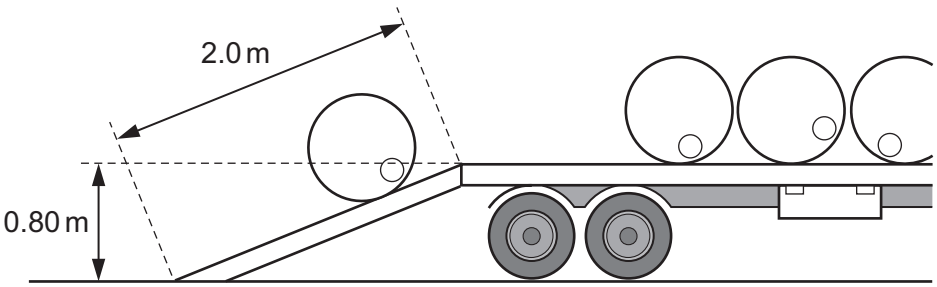
C



D



8 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

9 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

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10 A weightlifter lifts some masses through a height of 1.8 m.



The gravitational field strength *g* is 10 N / kg.

During the lift, the gravitational potential energy of the masses increases by 4500 J.

What is the total mass lifted?

A 25 kg **B** 250 kg **C** 450 kg **D** 810 kg

11 Which expression is used to calculate power?

A $\frac{\text{distance}}{\text{work done}}$

B work done × distance

C $\frac{\text{work done}}{\text{time taken}}$

D work done × time taken

12 The pressure of the atmosphere is 100 000 Pa.

What force does the atmosphere exert on the upper surface of a pond of surface area 20 m^2?

A 5000 N **B** 100 000 N **C** 100 020 N **D** 2 000 000 N

13 Oil of density 8.5×10^2 kg / m^3 is stored in a large tank.

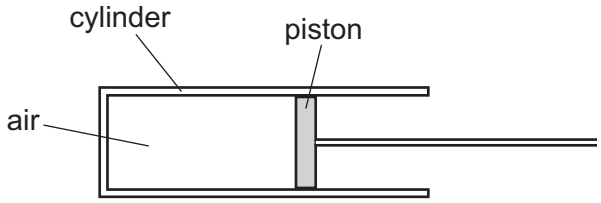
The gravitational field strength *g* is 10 N / kg.

What is the pressure due to the oil 6.0 m below its surface?

A 51 Pa **B** 510 Pa **C** 5100 Pa **D** 51 000 Pa

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14 Air is trapped in a cylinder by a piston.



The piston is pushed further into the cylinder.

How do the pressure and the volume of the air in the syringe change?

	pressure	volume
A	decrease	decrease
B	decrease	increase
C	increase	decrease
D	increase	increase

15 Which statement explains how a pressure is exerted by a gas on a container?

A Gas molecules collide with other gas molecules in the container.

B Gas molecules collide with the walls of the container.

C Gas molecules exert strong attractive forces on each other.

D Gas molecules exert strong repulsive forces on each other.

16 When a liquid evaporates, molecules escape from its surface.

Which molecules escape, and what happens to the average kinetic energy of the molecules remaining in the liquid?

A The less energetic molecules escape and the average kinetic energy decreases.

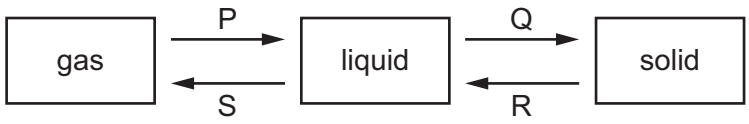
B The less energetic molecules escape and the average kinetic energy increases.

C The more energetic molecules escape and the average kinetic energy decreases.

D The more energetic molecules escape and the average kinetic energy increases.

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17 The diagram shows changes of state.



What are the names of the changes of state P, Q, R and S?

	P	Q	R	S
A	condensation	melting	solidification	boiling
B	condensation	solidification	melting	boiling
C	boiling	melting	solidification	condensation
D	boiling	solidification	melting	condensation

18 A boiling liquid absorbs thermal energy (heat) at a rate of 450 W.

The specific latent heat of vaporisation is 2.7×10^6 J / kg.

How much liquid is vaporised in 9.0 minutes?

A 1.5 g **B** 11 g **C** 90 g **D** 5400 g

19 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.

20 Which statement about the transfer of thermal energy is correct?

A Transfer by radiation does not require a medium.

B Transfer is from a region of lower temperature to one of higher temperature.

C Transfer upwards in fluids is mainly through the vibrations of neighbouring particles.

D Transfer in solids is by means of density changes in the material.

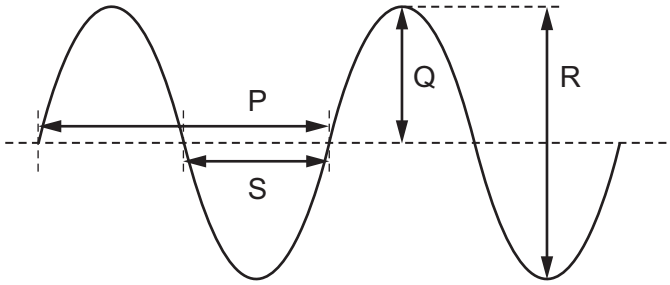
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21 A phone rings and lights up.

Which types of wave are associated with the phone's operation?

	light	sound
A	longitudinal	longitudinal
B	longitudinal	transverse
C	transverse	longitudinal
D	transverse	transverse

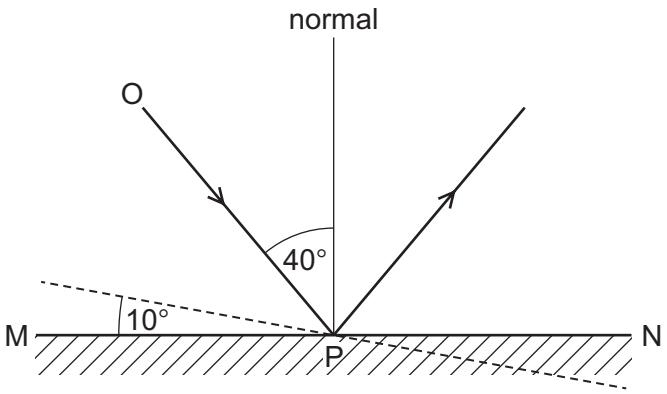
22 The diagram shows the surface of water as a wave passes across a ripple tank.



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

23 The angle of incidence of ray OP on the plane mirror MN is 40°.



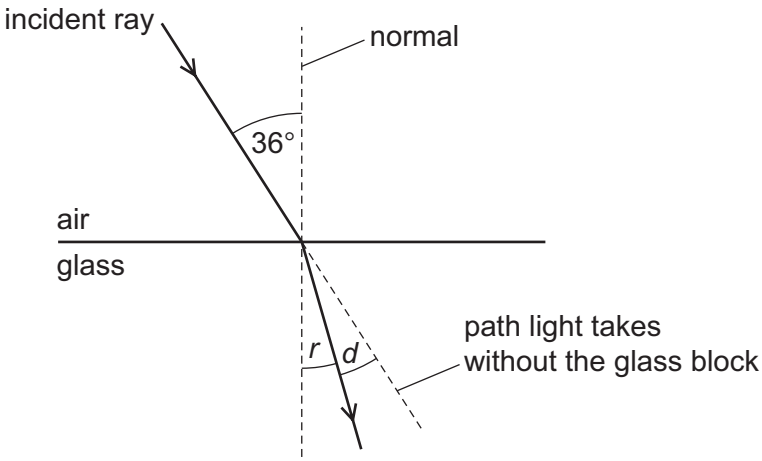
The mirror is rotated through 10°, as shown by the dashed line. The direction of the incident ray OP does not change.

What is the new angle of incidence?

A 30° **B** 40° **C** 50° **D** 60°

24 A ray of light is incident on the surface of a glass block. The diagram is not drawn to scale.

The refractive index of the glass is 1.5.



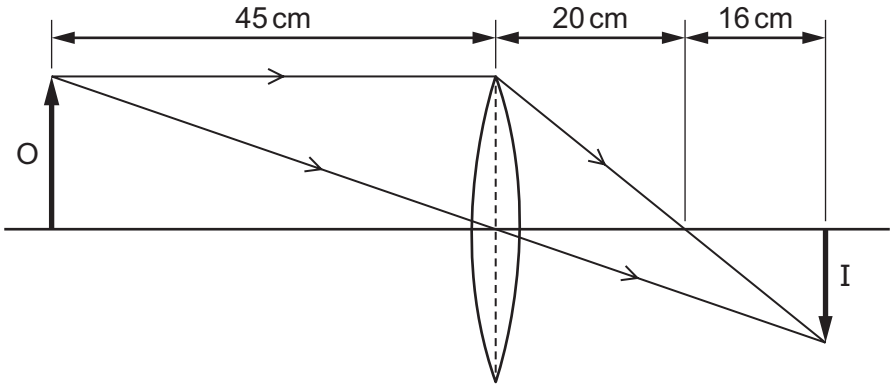
The angle of refraction is *r*. The angle between the refracted ray and the path the light takes without the glass block is *d*.

What are *r* and *d*?

	r / °	*d* / °
A	23	12
B	24	12
C	23	13
D	24	13

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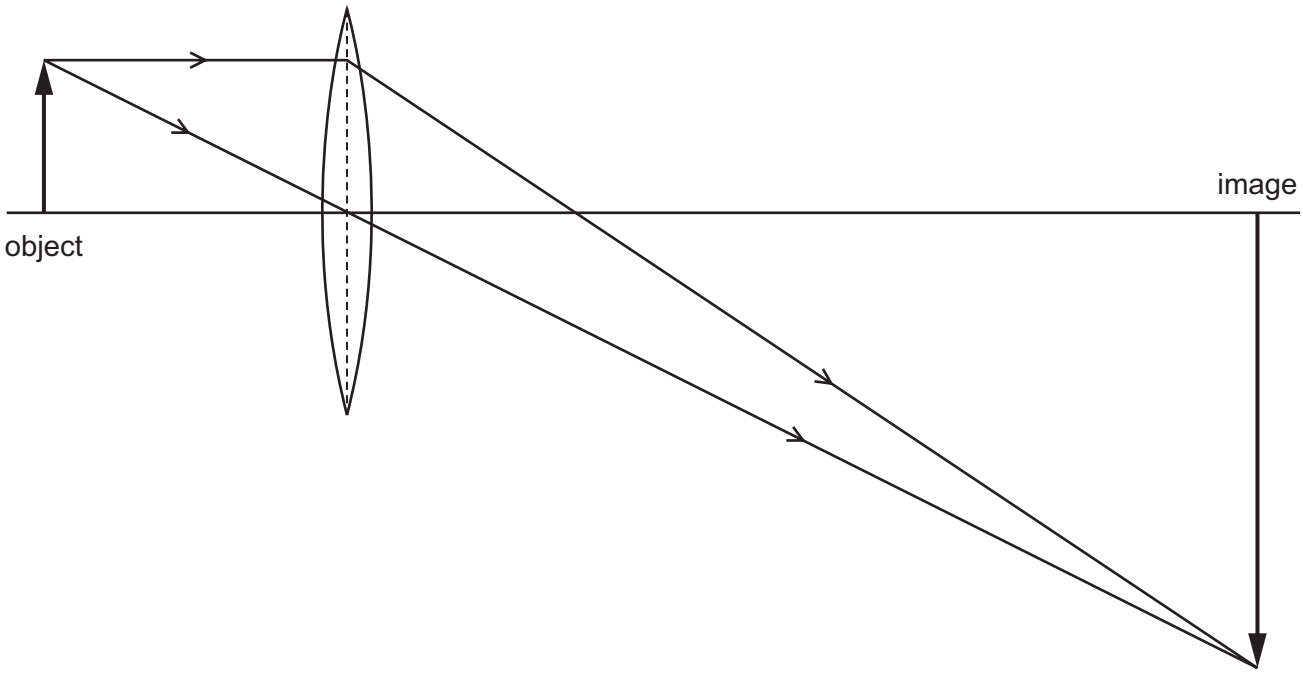
25 In the diagram, a convex lens forms an image I of an object O. The diagram is not drawn to scale.



What is the focal length of the lens?

A 16 cm **B** 20 cm **C** 36 cm **D** 45 cm

26 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

27 Blue and yellow are colours in the visible spectrum.

Which colour has the lower frequency and which colour has the longer wavelength?

	lower frequency	longer wavelength
A	blue	blue
B	blue	yellow
C	yellow	blue
D	yellow	yellow

28 Which two types of electromagnetic radiation are both used to kill cancerous cells and are both used to detect cracks in metals?

A gamma-rays and microwaves

B gamma-rays and X-rays

C microwaves and ultra-violet radiation

D ultra-violet radiation and X-rays

29 Which property of a sound wave increases as the loudness of the sound increases?

A amplitude

B frequency

C speed

D wavelength

30 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.

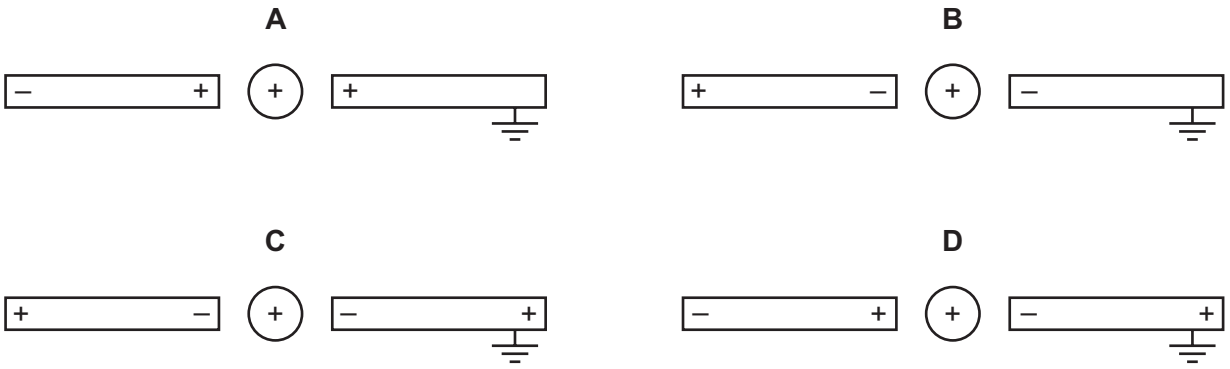
C Polythene is used because it is a good electrical insulator.

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

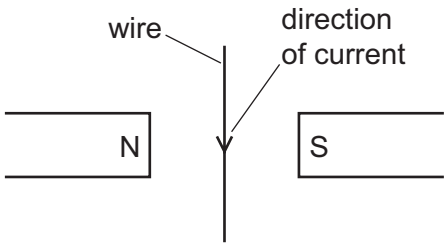
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31 A positively charged metal sphere is placed midway between two previously uncharged metal rods, one of which is connected to earth.

Which diagram shows the charges on the rods?



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



What is the direction of the force on the wire?

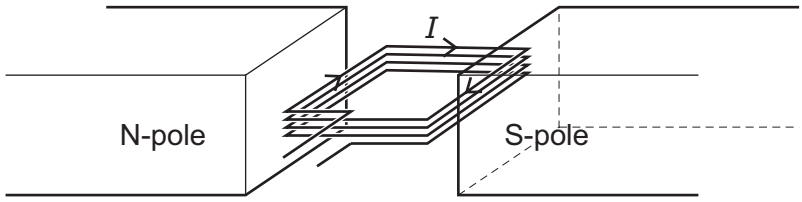
A into the plane of the paper

B out of the plane of the paper

C towards the left

D towards the right

33 A coil P of N turns is made from a length L of wire. The coil carries a current I when between two magnetic poles.

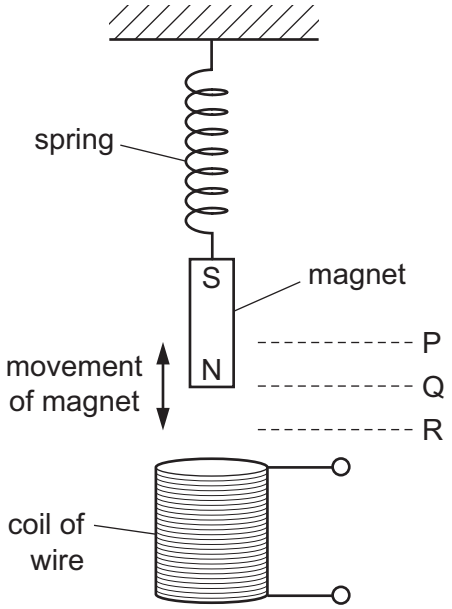


A similar coil Q of $2N$ turns is made from a length $2L$ of identical wire. It also carries a current I when between the two magnetic poles.

Which coil has the greater resistance and which coil experiences the greater turning effect?

	greater resistance	greater turning effect
A	P	P
B	P	Q
C	Q	P
D	Q	Q

34 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

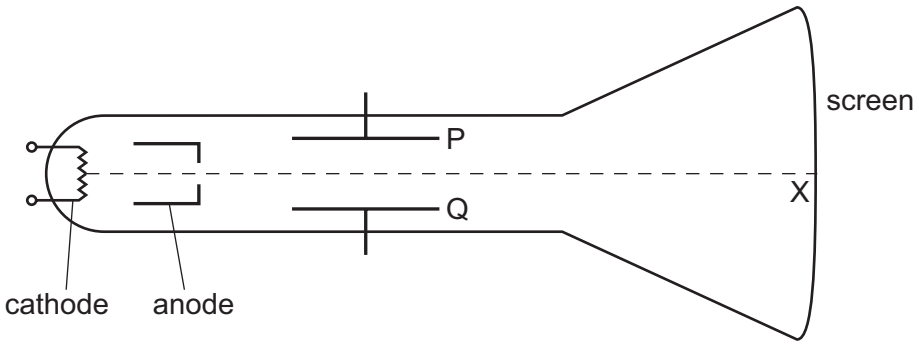
D at R only

35 Which material is most suitable for the core of a transformer and which material is most suitable for the coils in the transformer?

	material for core	material for coils
A	iron	copper
B	iron	steel
C	steel	copper
D	steel	iron

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36 The diagram shows a cathode-ray tube. The dotted line shows the path of a beam of electrons. The beam hits the screen at point X and produces a bright spot. P and Q are horizontal plates on each side of the beam.



Which change will move the bright spot to a different position on the screen?

A Apply a voltage between metal plates P and Q.

B Decrease the positive voltage of the anode.

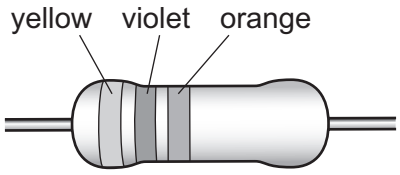
C Increase the positive voltage of the anode.

D Increase the voltage between the terminals of the cathode.

37 The table gives the colour code used for marking resistors.

black	brown	red	orange	yellow	green	blue	violet
0	1	2	3	4	5	6	7

What is the resistance of the resistor in the diagram?



A 4.73 Ω **B** 473 Ω **C** 4700 Ω **D** 47 000 Ω

38 Which types of radiation may be emitted by radioactive nuclei?

A beta and gamma

B microwaves and infra-red

C radio waves and microwaves

D ultra-violet and X-rays

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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 Which number is always equal to the proton number of a neutral atom of a radioactive isotope?

A the number of electrons in the atom

B the number of neutrons in the atom

C the number of nucleons in the atom

D the number of particles in the atom

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