Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

PHYSICS **5054/11**

Paper 1 Multiple Choice **May/June 2014**

1 hour

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

* 6 9 9 4 5 6 0 9 2 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.

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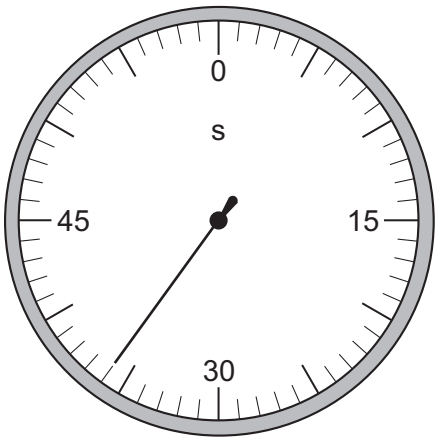
1 A workman measures, as **accurately** as possible, the length and internal diameter of a straight copper pipe.

The length is approximately 600 cm and the internal diameter is approximately 2 cm.

What is the best combination of instruments for the workman to use?

	internal diameter	length
A	ruler	ruler
B	ruler	tape
C	vernier calipers	ruler
D	vernier calipers	tape

2 The diagram shows a stopwatch.

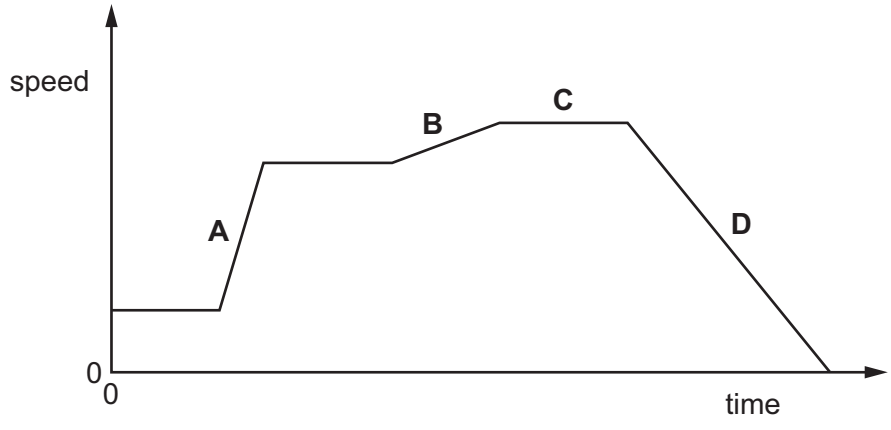


What is the reading on the stopwatch?

A 30.6 s **B** 33.0 s **C** 36.0 s **D** 36.6 s

3 The graph shows how the speed of a car travelling in a straight line changes with time.

Which section shows the largest acceleration?



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4 An object falls from rest through the air and the air resistance on it increases. The object reaches terminal velocity.

Which quantity **decreases** until its terminal velocity is reached?

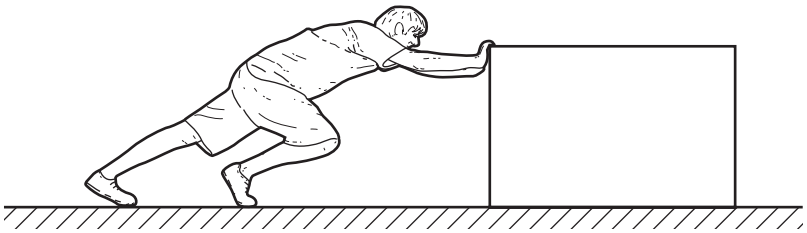
A acceleration

B kinetic energy

C speed

D weight

5 A man pushes a heavy box along the ground.



A force acts between the man's hands and the box.

Another force acts between the man's feet and the floor.

In which direction do these forces act on the man?

	force on man's hands	force on man's feet
A	towards the left	towards the left
B	towards the left	towards the right
C	towards the right	towards the left
D	towards the right	towards the right

6 In which situation is the resultant force on the body equal to zero?

A a car turning a corner at constant speed

B a rock falling freely on the Moon

C a train going up a straight hill at constant speed in a straight line

D an aircraft accelerating along a runway in a straight line

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7 A satellite is orbiting the Earth.

What is the direction of the force on the satellite causing this circular motion?

A away from the centre of the Earth

B in the direction of motion of the satellite

C in the opposite direction to the motion of the satellite

D towards the centre of the Earth

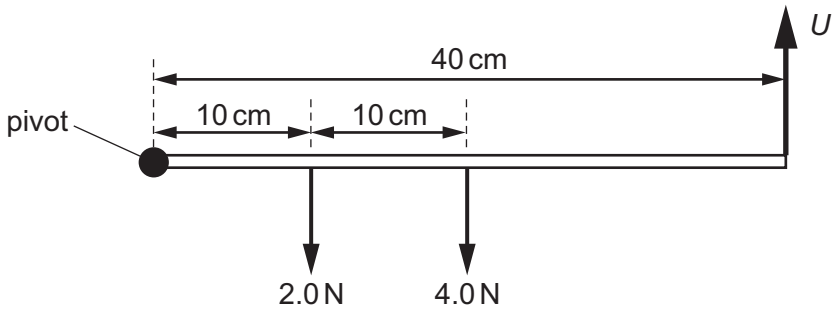
8 Four objects are situated in places with different gravitational field strengths.

Which object has the greatest weight?

	$\frac{\text{mass}}{\text{kg}}$	$\frac{\text{gravitational field strength}}{\text{N/kg}}$
A	3.0	10.4
B	3.5	9.5
C	4.0	10.2
D	4.5	9.0

9 A beam of length 40 cm is pivoted at one end.

The weight of the beam is 4.0 N and acts at a point 20 cm from the pivot. A 2.0 N weight hangs 10 cm from the pivot.



An upward force *U* is needed to keep the beam horizontal.

What is the size of *U*?

A 0.5 N **B** 1.5 N **C** 2.5 N **D** 6.0 N

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10 A car is designed to be stable.

To achieve good stability, where is the centre of mass of the car?

A above the front wheels

B above the rear wheels

C as high in the car as possible

D as low in the car as possible

11 A force is applied to a body.

Which property of the body **cannot** be changed by the force?

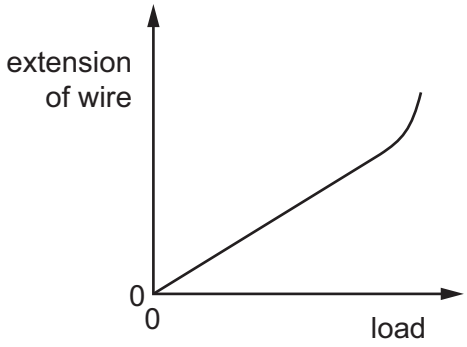
A its mass

B its shape

C its size

D its velocity

12 The graph shows the extension of a piece of copper wire as the load on it is increased.



What does the graph show?

A At a certain load the wire becomes easier to extend.

B At a certain load the wire becomes harder to extend.

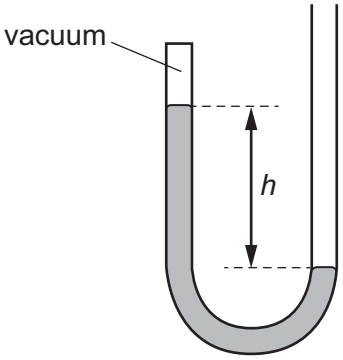
C The load and extension are directly proportional for all loads.

D The load and extension are inversely proportional for all loads.

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13 The diagram shows a manometer containing mercury that is sealed at one end.



What happens to the distance *h* when the manometer is taken to the top of a mountain?

A It decreases, because atmospheric pressure decreases with height.

B It decreases, because atmospheric pressure increases with height.

C It increases, because atmospheric pressure decreases with height.

D It increases, because atmospheric pressure increases with height.

14 A gas occupies a volume of 2.0 m^3 in a cylinder at a pressure of 240 kPa. A piston compresses the gas until the volume is 0.50 m^3, the temperature remaining constant.

What is the new pressure of the gas?

A 60 kPa **B** 240 kPa **C** 480 kPa **D** 960 kPa

15 Where is energy released by the fusion of hydrogen nuclei to form helium?

A in a nuclear power station

B in a radioactive isotope emitting alpha-particles

C in the core of the Earth

D in the core of the Sun

16 A crane lifts a load of 6000 N through a vertical distance of 15 m in 30 s.

What is the average useful power during this operation?

A 200 W **B** 400 W **C** 3000 W **D** 12 000 W

17 A javelin has a mass of 0.80 kg.

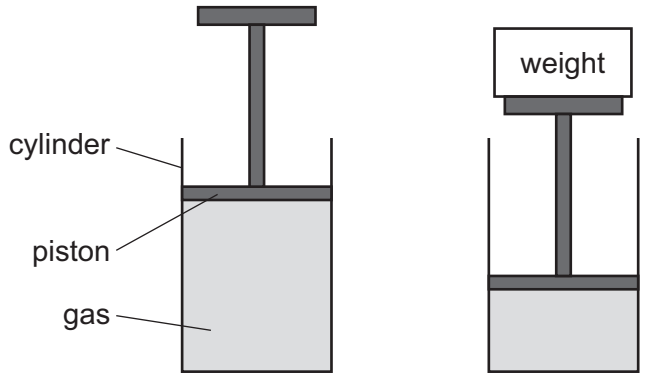
The javelin is released with 250 J of kinetic energy.

What is the speed of the javelin?

A 13 m / s **B** 18 m / s **C** 25 m / s **D** 630 m / s

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18 A piston is supported by gas trapped in a cylinder.



A weight is put on the piston. The volume of gas supporting the piston decreases but the temperature of the gas is unchanged.

What happens to the molecules?

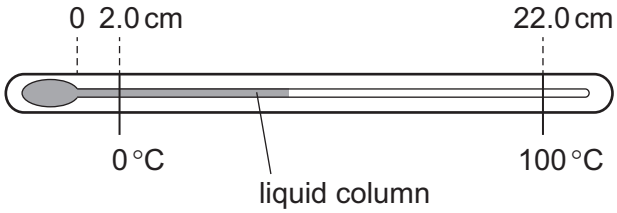
A They hit the piston more frequently.

B They move more slowly.

C They have a smaller size.

D They have more kinetic energy.

19 The diagram shows a liquid-in-glass thermometer.



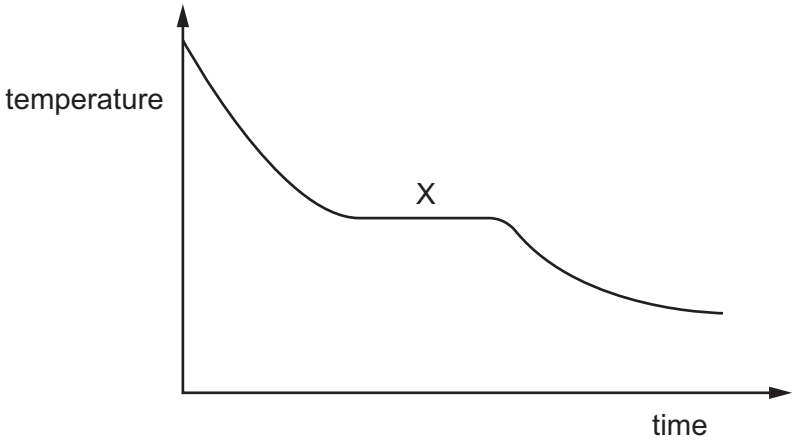
At 0 °C, the length of the liquid column is 2.0 cm. At 100 °C, the length of the liquid column is 22.0 cm.

What is the length of the liquid column at 40 °C?

A 6.0 cm **B** 8.0 cm **C** 8.8 cm **D** 10.0 cm

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20 A hot liquid is poured into a beaker. The graph shows how the temperature of the liquid changes as it cools towards room temperature.



What is occurring at region X?

A boiling and evaporation

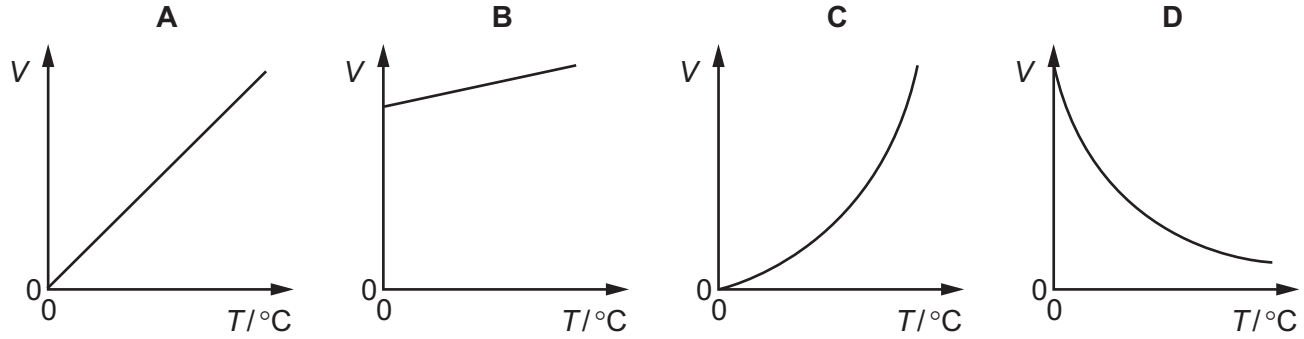
B condensation only

C evaporation only

D solidification and evaporation

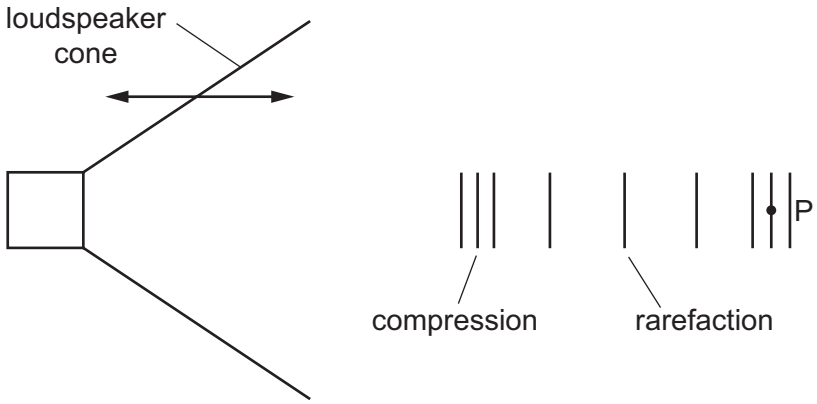
21 A fixed mass of gas in a syringe at 0 °C is heated at constant pressure.

Which graph shows the variation of volume *V* with temperature *T*, measured in °C?



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22 Compressions and rarefactions are sent out from a loudspeaker cone as it vibrates backwards and forwards. The frequency of vibration is 50 Hz.



A compression is at point P. How much time elapses before the next rarefaction arrives at P?

A 0.010 s **B** 0.020 s **C** 25 s **D** 50 s

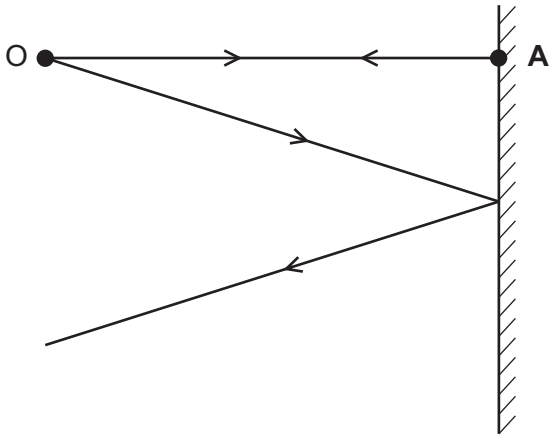
23 Water waves refract at a boundary between deep water and shallow water.

What is the effect on the frequency, wavelength and speed of the waves at the boundary?

	frequency	wavelength	speed
A	changes	changes	stays the same
B	changes	stays the same	stays the same
C	stays the same	changes	changes
D	stays the same	stays the same	changes

24 The diagram shows two divergent rays of light from an object O being reflected from a plane mirror.

At which position is the image formed?



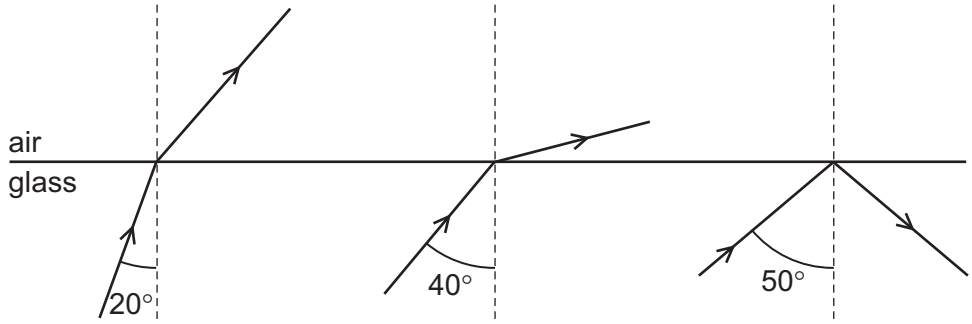
● **B**

● **C**

● **D**

25 Three rays of light are incident on the boundary between a glass block and air.

The angles of incidence are different.



What is a possible critical angle for light in the glass?

A 15° **B** 30° **C** 45° **D** 60°

26 Which statement is correct?

A Gamma rays have a longer wavelength than ultra-violet waves.

B Infra-red waves have a lower frequency than radio waves.

C Microwaves have a longer wavelength than visible light.

D X-rays have a higher speed in air than visible light.

27 Which row applies to a short-sighted eye viewing a distant object?

	position of the image	lens needed for correction
A	behind the retina	converging lens
B	behind the retina	diverging lens
C	in front of the retina	converging lens
D	in front of the retina	diverging lens

28 Which statement about the speed of sound is correct?

A sound travels fastest in a vacuum

B sound travels fastest in gases

C sound travels fastest in liquids

D sound travels fastest in solids

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29 A piece of electrical equipment is sensitive to magnetic fields and is screened from them. To do this, it is enclosed in a box.

Which material should be used to make the box?

A copper

B iron

C plastic

D steel

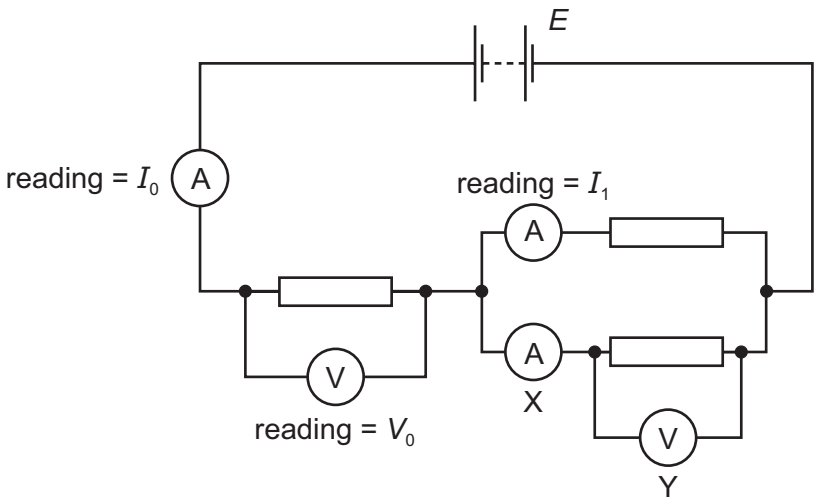
30 A piece of wire has a resistance of 16 Ω.

Another wire made from the same metal has four times the length and twice the cross-sectional area.

What is the resistance of the wire?

A 8 Ω **B** 32 Ω **C** 96 Ω **D** 128 Ω

31 A battery of e.m.f. E is connected in a circuit containing three resistors.



The readings of two ammeters and a voltmeter are shown.

Which readings are shown on ammeter X and on voltmeter Y?

	X	Y
A	$I_0 - I_1$	$E - V_0$
B	$I_0 - I_1$	$E + V_0$
C	$I_0 + I_1$	$E + V_0$
D	$I_0 + I_1$	$E - V_0$

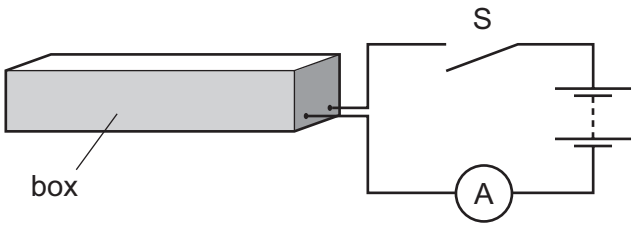
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32 One kilowatt-hour of energy costs $0.24.

How much does it cost to run a 2 kW heater for three hours?

A $0.24 **B** $0.48 **C** $0.72 **D** $1.44

33 A single electrical component is placed inside a box. Two leads from the component emerge from the box. These leads are connected in series to an open switch S, a battery and an ammeter.



The switch S is closed and the ammeter registers a current. For a few minutes, the size of the current gradually increases.

What is the component inside the box?

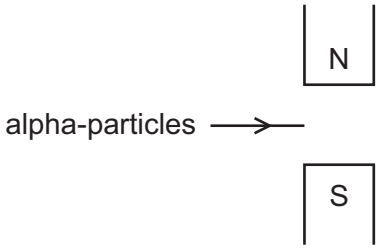
A a capacitor

B a filament lamp

C a fixed resistor

D a thermistor

34 A beam of alpha-particles enters the magnetic field between the poles of a magnet.



In which direction is the magnetic force on the beam?

A down the page

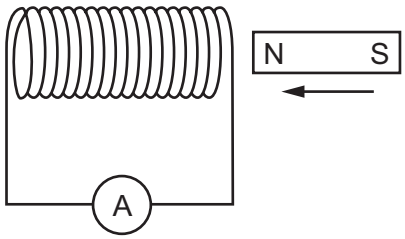
B into the page

C out of the page

D up the page

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35 As a magnet is moved into the coil of wire as shown, there is a small reading on the sensitive ammeter.



Which change increases the size of the reading?

A moving the opposite pole into the coil

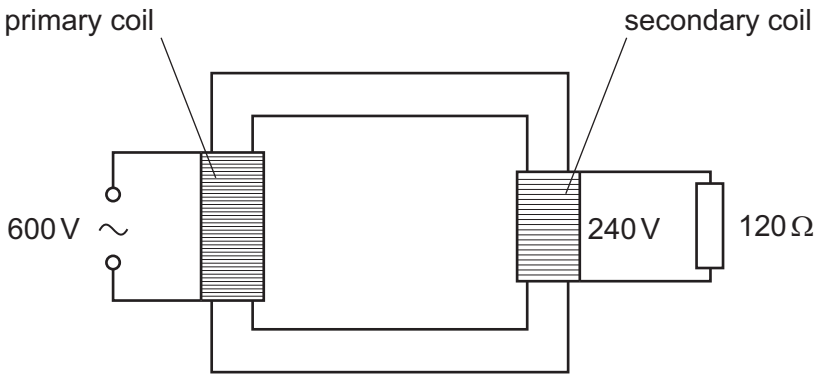
B pulling the magnet out of the coil

C pushing the magnet in faster

D unwinding some of the turns of wire

36 An ideal transformer has a primary voltage of 600 V and a secondary voltage of 240 V.

The secondary coil is attached to a resistor of resistance 120 Ω.



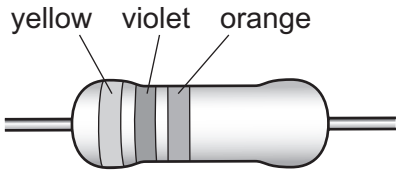
What is the power dissipated in the resistor and the current in the primary coil?

	power / W	current / A
A	120	0.20
B	120	5.0
C	480	0.80
D	480	1.3

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37 A resistor is marked with three coloured bands.

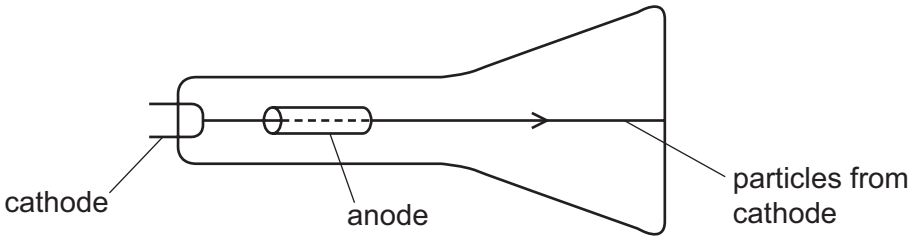


black	brown	red	orange	yellow	green	blue	violet
0	1	2	3	4	5	6	7

Using the key provided, what is the resistance of the resistor?

A $374\,\Omega$ **B** $473\,\Omega$ **C** $47 \times 10^3\,\Omega$ **D** $37 \times 10^4\,\Omega$

38 The diagram shows part of a cathode-ray oscilloscope.



Which particles are emitted by the cathode?

A electrons

B helium nuclei

C neutrons

D protons

39 Which row gives the range and electrical charge of an alpha-particle?

	range in air	electrical charge
A	a few centimetres	negative
B	a few centimetres	positive
C	a few metres	negative
D	a few metres	positive

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40 $^{14}_{6}C$ represents a nuclide of the element carbon and $^{14}_{7}N$ a nuclide of nitrogen.

How does a neutral atom of $^{14}_{7}N$ differ from a neutral atom of $^{14}_{6}C$?

A The nitrogen atom has one electron less than the carbon atom.

B The nitrogen atom has one neutron more than the carbon atom.

C The nitrogen atom has one proton less than the carbon atom.

D The nitrogen atom has one proton more than the carbon atom.

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