

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

PHYSICS

5054/01

Paper 1 Multiple Choice

October/November 2004

1 hour

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

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper-clips, highlighters, 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.

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.

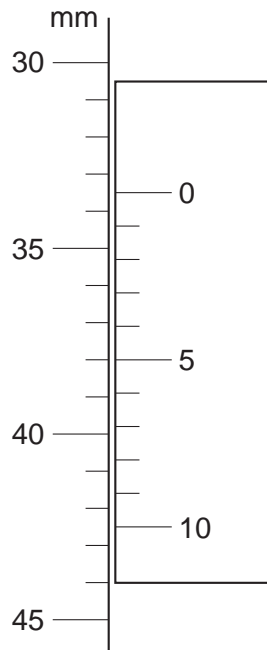
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

This document consists of **20** printed pages.



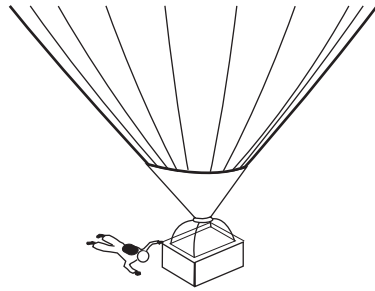
- 1 The diagram shows part of a vernier scale.



What is the correct reading?

- A** 30.5 mm **B** 33.5 mm **C** 38.0 mm **D** 42.5 mm
- 2 The diagrams show a parachutist in four positions after she jumps from a high balloon.
At which position does she have terminal velocity?

A not yet moving



B accelerating



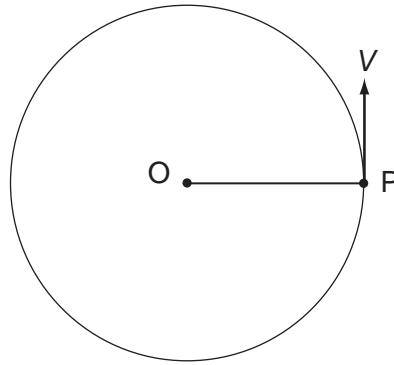
C not accelerating



D not moving

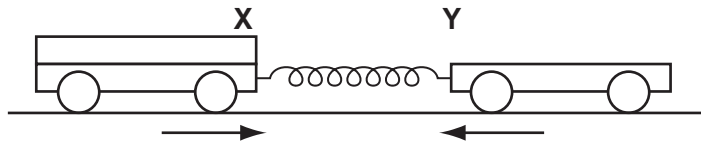


- 3 A particle P is moving in a horizontal circle about O. It moves at constant speed V .



Which statement is true?

- A** A force of constant size is acting in the direction of V .
B A force of constant size is acting towards O.
C The force on P varies in size as it moves around the circle.
D There are no forces acting on P.
- 4 Trolley X and trolley Y are joined by a stretched spring. Trolley X has twice the mass of trolley Y.

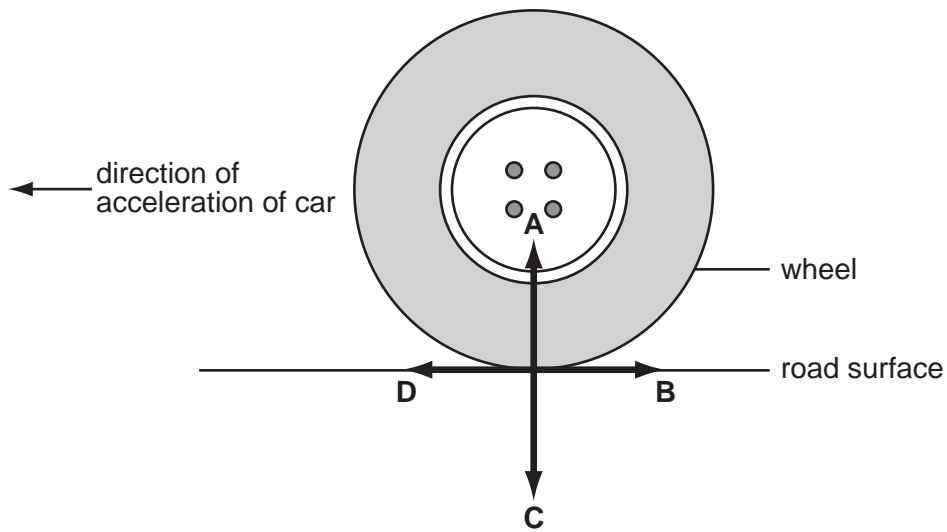


When the trolleys are released, the acceleration of X is 2 m/s^2 to the right.

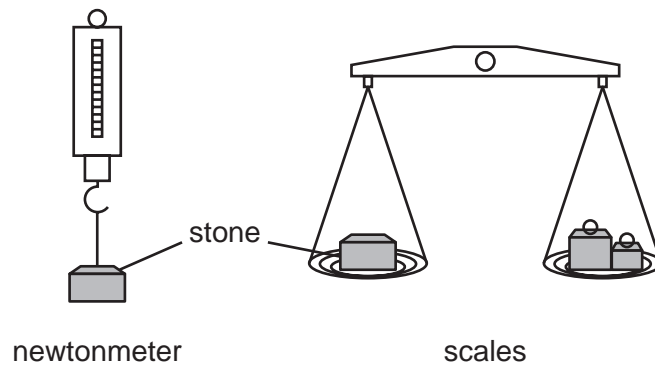
What is the initial acceleration of trolley Y to the left?

- A** 1 m/s^2 **B** 2 m/s^2 **C** 3 m/s^2 **D** 4 m/s^2

- 5 The wheel of a moving car is driven by the engine. The car is accelerating in the direction shown. In which direction does the frictional force act on the wheel?



- 6 A stone is weighed using a newtonmeter (spring balance) and a pair of scales (pan balance).



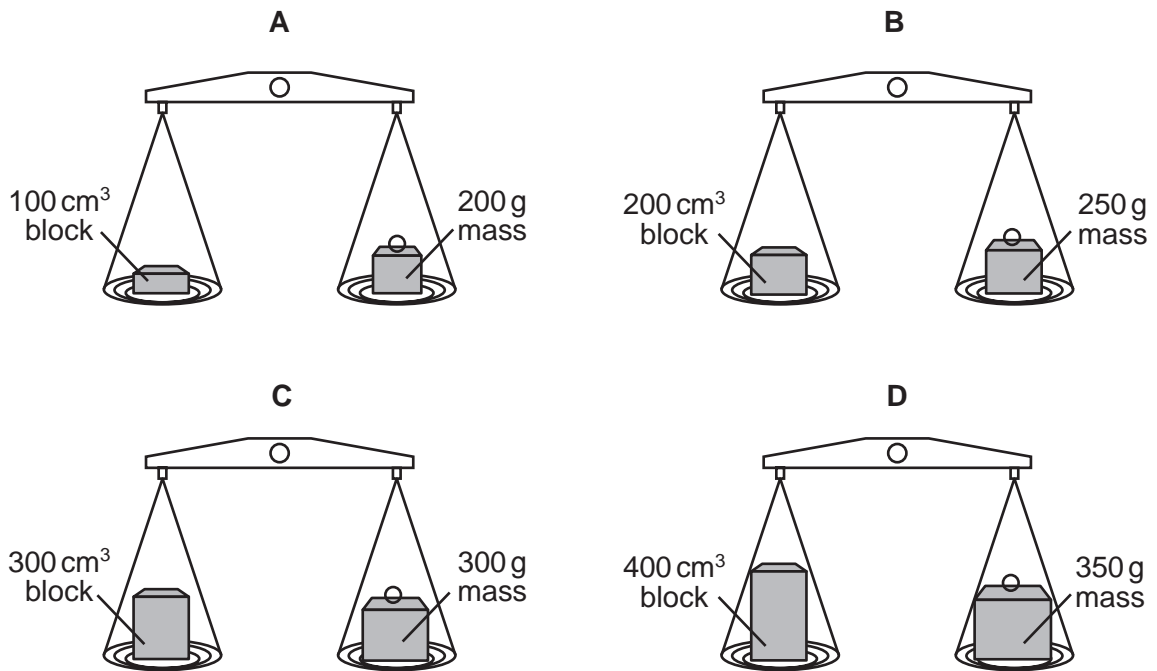
This experiment is repeated on the Moon.

Are the readings for each balance the same or different when taken on Earth and on the Moon?

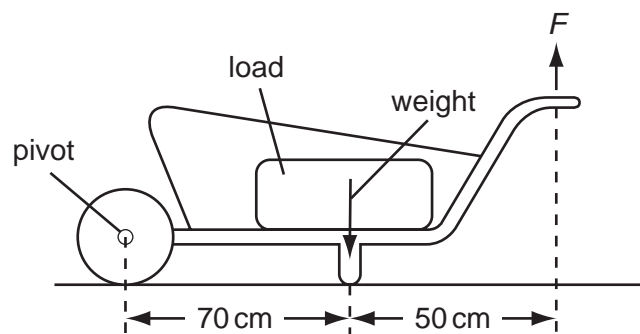
	reading on newtonmeter	reading on scales
A	different	different
B	different	same
C	same	different
D	same	same

- 7 Four blocks, each made from a different material, are placed on scales and balanced, as shown in the diagrams below.

In which diagram does the block have the greatest density?



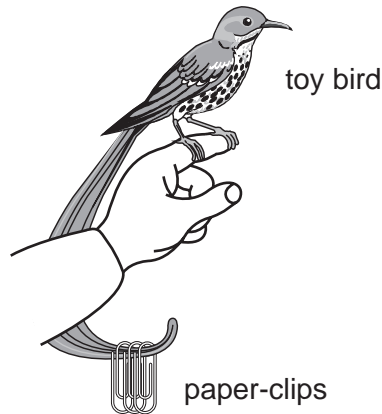
- 8 A load is to be moved using a wheelbarrow. The total mass of the load and wheelbarrow is 60 kg. The gravitational field strength is 10 N/kg.



What is the size of force F needed just to lift the loaded wheelbarrow?

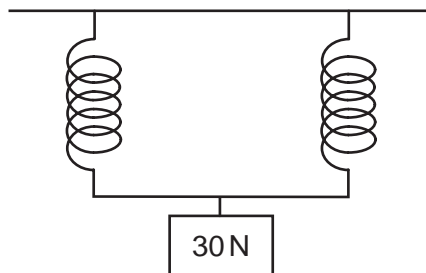
- A** 350 N **B** 430 N **C** 600 N **D** 840 N

- 9 A girl uses paper-clips to balance a toy bird on her finger as shown.



What is the effect of the paper-clips?

- A** They help to raise the centre of mass above her finger.
B They help to raise the centre of mass to her finger.
C They help to lower the centre of mass below her finger.
D They do not affect the centre of mass but increase the weight.
- 10 A spring extends by 4 cm when 10 N is suspended from it. Two of these springs are used as shown to carry a 30 N load.



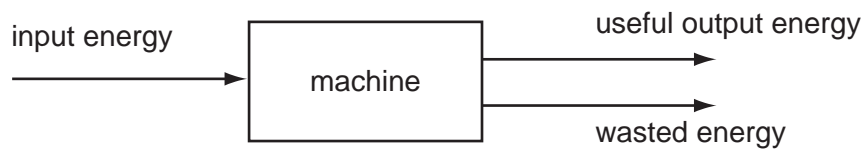
What is the extension of each spring?

- A** 4 cm **B** 6 cm **C** 8 cm **D** 12 cm
- 11 Hydroelectric, tidal and fossil fuels are three sources of energy.

Which of these are renewable energy sources?

	hydroelectric	tidal	fossil fuels
A	no	yes	yes
B	no	no	yes
C	yes	no	no
D	yes	yes	no

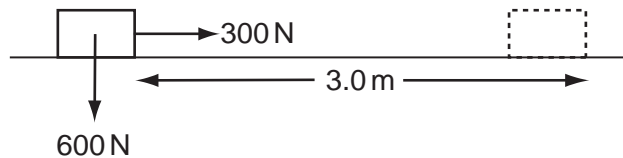
- 12 The diagram shows the energy transfer through a machine.



The machine is 50% efficient.

Which is correct?

- A** input energy = useful output energy
B useful output energy = input energy + wasted energy
C wasted energy = input energy + useful output energy
D wasted energy = useful output energy
- 13 When a 300 N force is applied to a box weighing 600 N, the box moves 3.0 m horizontally in 20 s.



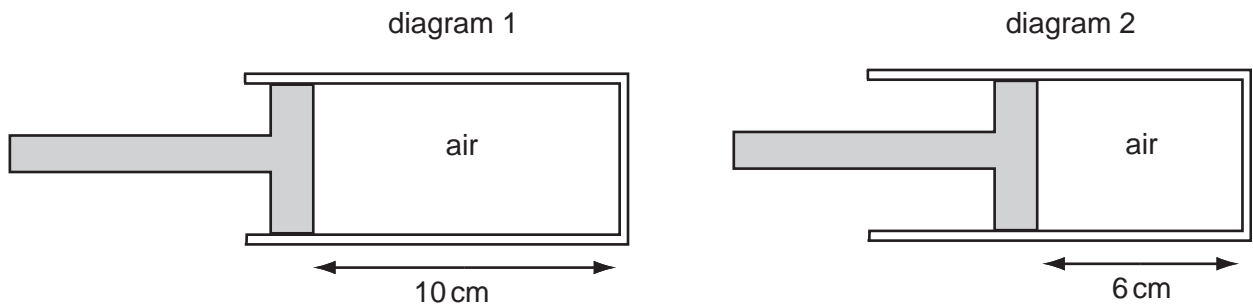
What is the average power?

- A** 45 W **B** 90 W **C** 900 W **D** 1800 W
- 14 Which would be the **least** likely to sink into soft ground?
- A** a loaded lorry with four wheels
B a loaded lorry with six wheels
C an empty lorry with four wheels
D an empty lorry with six wheels

15 Diagram 1 shows some air trapped in a cylinder.

Diagram 2 shows the same air after the piston has been pushed in slowly.

The air in diagram 1 is at atmospheric pressure P_A .

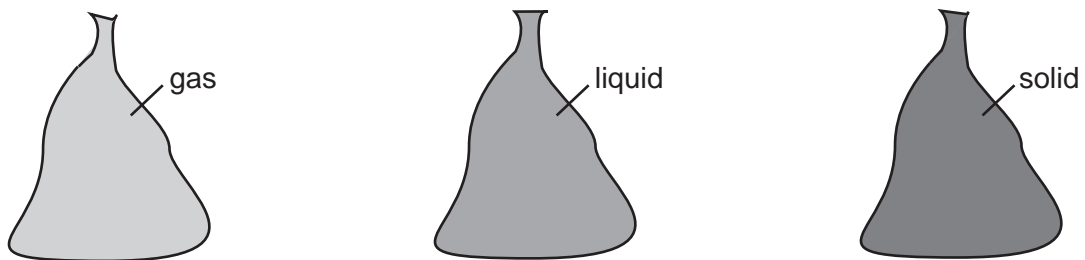


What is the pressure of the air in diagram 2?

- A $\frac{6}{10} \times P_A$
- B P_A
- C $\frac{10}{6} \times P_A$
- D $60 \times P_A$

16 A student has three sealed plastic bags. One bag is full of gas, one of liquid and one of solid.

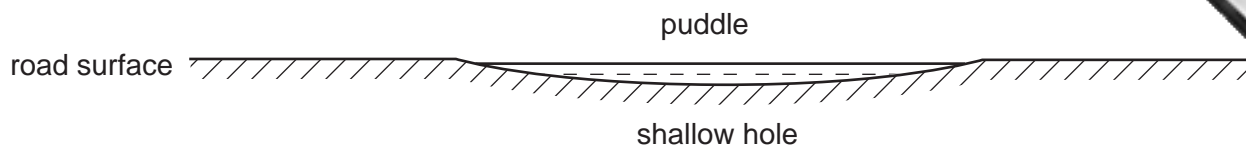
The student squeezes each bag to see if it changes shape, and warms each bag to see if it expands.



Which bag contains gas?

- A the one that changes shape easily and expands the least when heated
- B the one that changes shape easily and expands the most when heated
- C the one that is fixed in shape and expands the least when heated
- D the one that is fixed in shape and expands the most when heated

- 17 The diagram shows a cross-section through a rain-water puddle formed in a shallow hole in a road surface.

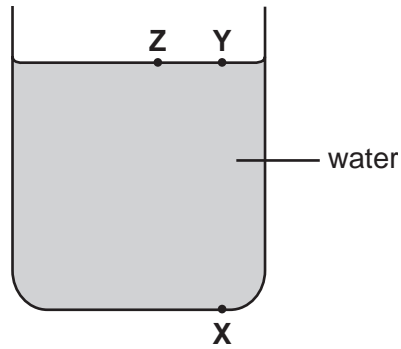


Over a period of time, air temperature, wind speed and wind direction remain constant.

What happens to the rate of evaporation of water from the puddle?

- A** It decreases, because the surface area decreases.
- B** It increases, because the puddle gets shallower.
- C** It increases, because the surface area decreases.
- D** It remains constant.
- 18 A new liquid is tested to decide whether it is suitable for use in a liquid-in-glass thermometer. It is found that the liquid does not expand uniformly with temperature. What will be the effect of this on the scale of the thermometer?
- A** It has a short range.
- B** It is not linear.
- C** The markings are too close together.
- D** The markings are too far apart.
- 19 The fillings for a hole in a tooth should be made from a material that
- A** expands more than the hole in the tooth.
- B** expands by the same amount as the hole in the tooth.
- C** expands less than the hole in the tooth.
- D** does not expand when heated.
- 20 Heat energy is supplied at the same rate to 100 g of paraffin and to 100 g of water in similar containers. Why does the temperature of the paraffin rise more quickly?
- A** The paraffin has a larger specific heat capacity than water.
- B** The paraffin has a smaller specific heat capacity than water.
- C** The paraffin is less dense than water.
- D** The paraffin is more dense than water.

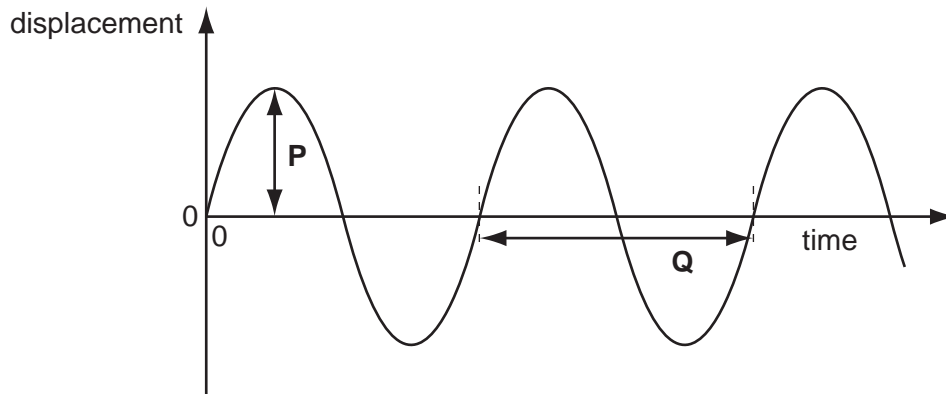
21 A teacher has a large tank of water in which he wants to set up a convection current.



Which of the following arrangements would do this?

- A cooling at X
- B cooling at Y
- C heating at Y
- D heating at Z

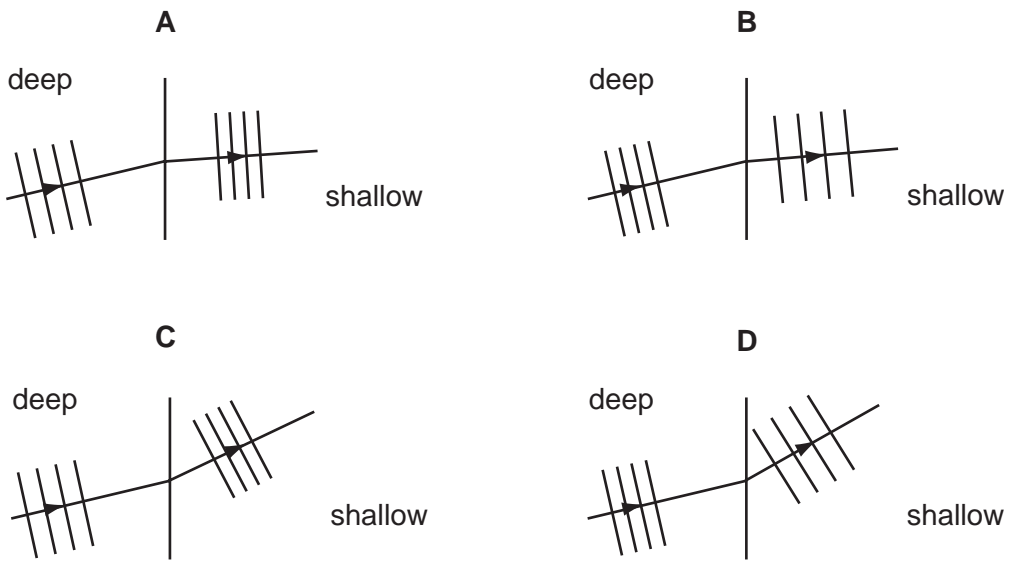
22 The diagram shows a graph of wave motion.



Which quantities are shown by distances **P** and **Q**?

	P	Q
A	amplitude	period
B	amplitude	wavelength
C	half the amplitude	period
D	half the amplitude	wavelength

23 Which diagram correctly shows water waves travelling through deep water to shallow



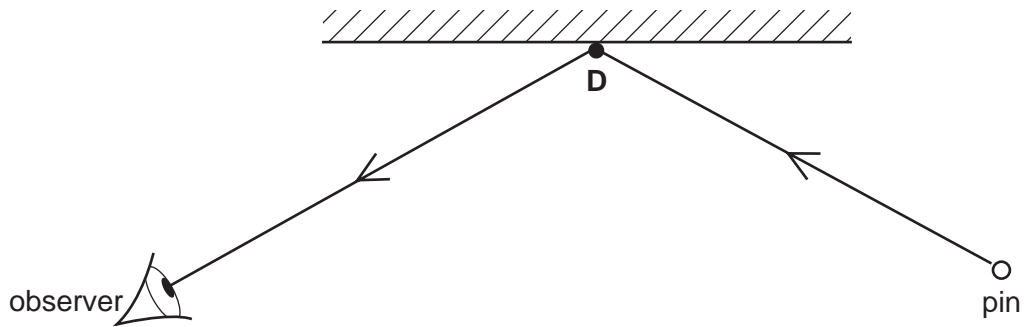
24 A pin is placed in front of, and to the right of, a plane mirror as shown.

Where is the image of the pin?

A ●

B ●

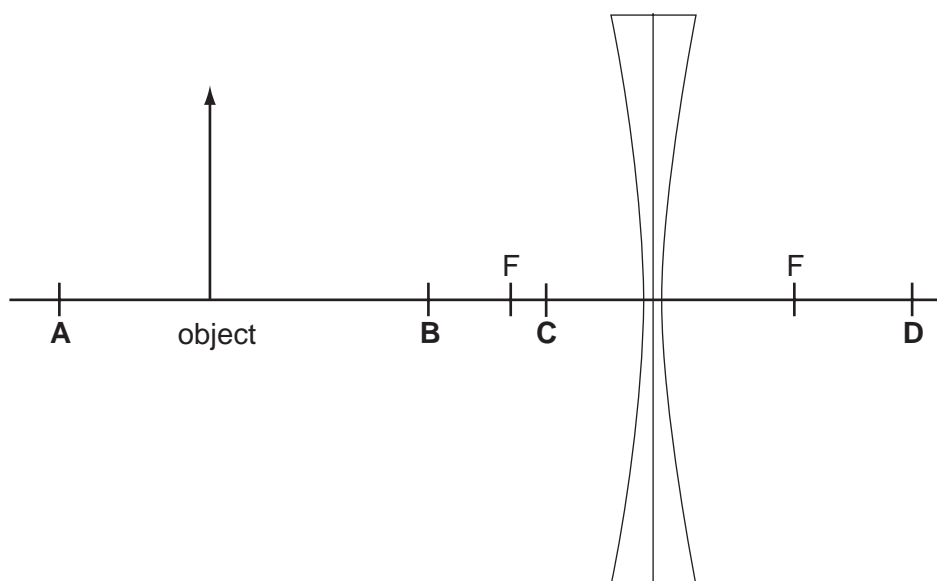
C ●



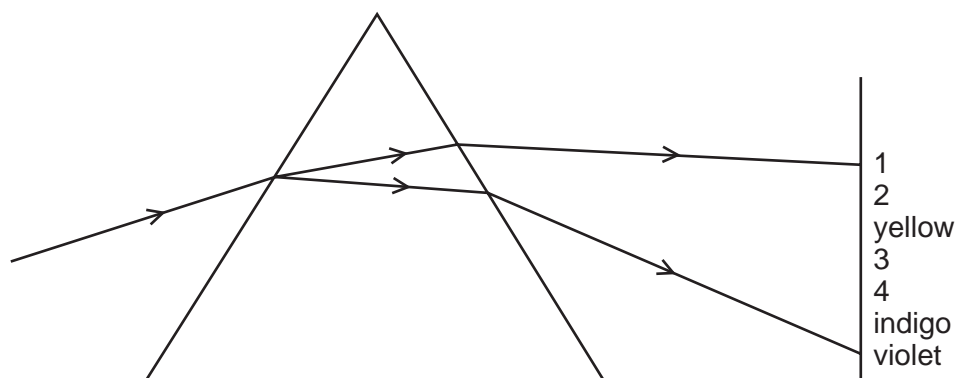
25 An object is placed in front of a diverging lens as shown on the scale diagram.

The principal focus F is marked on each side of the lens.

At which position will the image be formed?



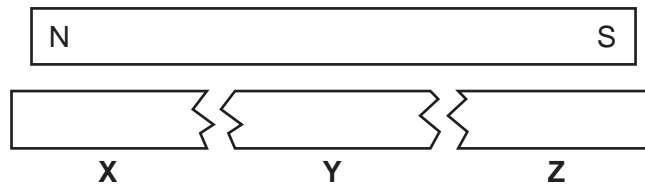
26 The diagram shows the spectrum produced when white light is dispersed by a glass prism.



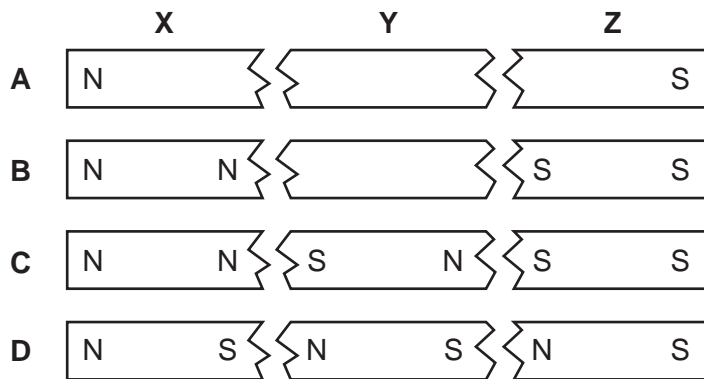
What are the numbered visible colours?

	1	2	3	4
A	infra-red	red	green	ultra-violet
B	red	green	orange	blue
C	red	orange	green	blue
D	red	orange	green	ultra-violet

27 A bar magnet is broken into three parts **X**, **Y** and **Z**.



Which diagram shows the poles in **X**, **Y** and **Z**?

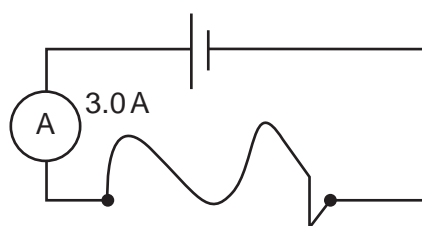


28 The potential difference between the ends of a conductor is 12V.

How much electrical energy is converted to other forms of energy in the conductor when 100C of charge flows through it?

- A** 0.12J **B** 8.3J **C** 88J **D** 1200J

- 29 A wire of length 1.0 m has a resistance of $2.0\ \Omega$. When connected to a cell, the current is 3.0 A.



1.0 m wire of resistance $2.0\ \Omega$

A 2.0 m length of the same wire is connected to the same cell.

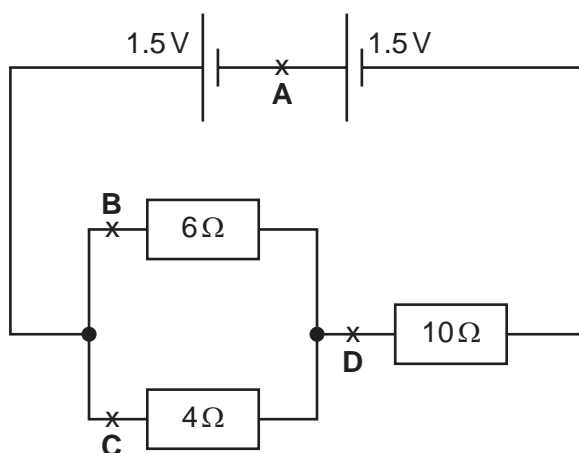


2.0 m wire

What is the resistance of the wire and the current in it?

	resistance	current
A	$1.0\ \Omega$	1.5 A
B	$1.0\ \Omega$	3.0 A
C	$4.0\ \Omega$	1.5 A
D	$4.0\ \Omega$	3.0 A

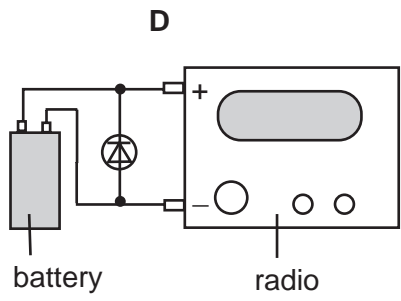
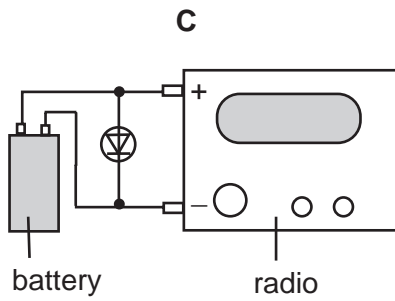
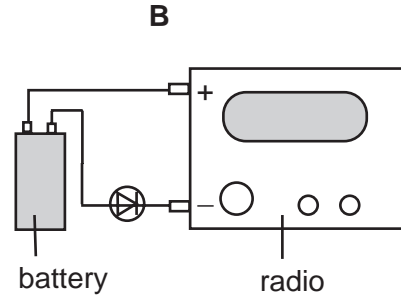
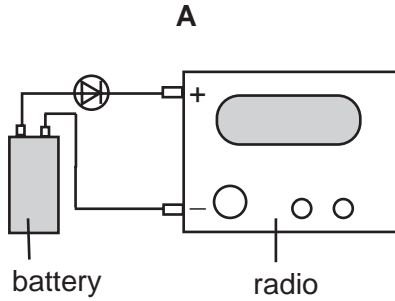
- 30 In the circuit shown, at which point is the current the smallest?



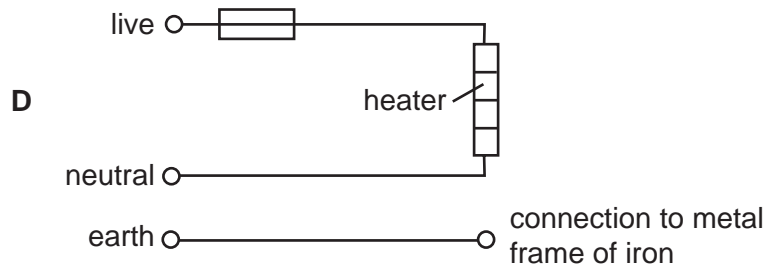
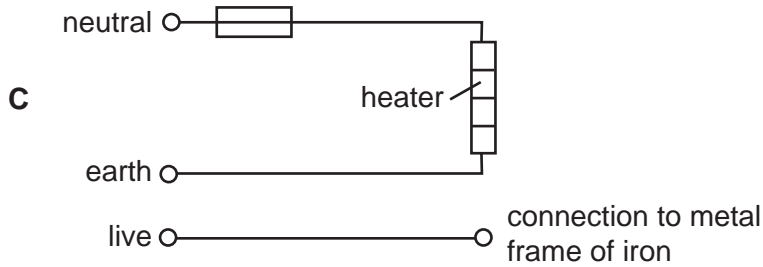
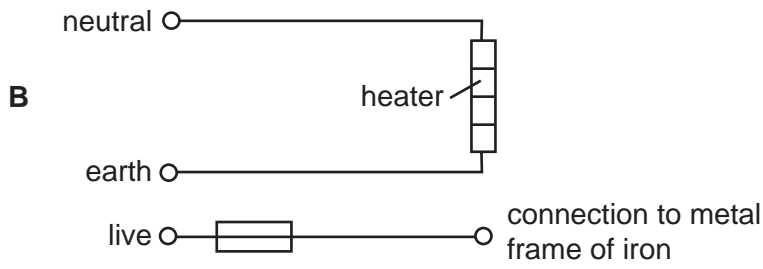
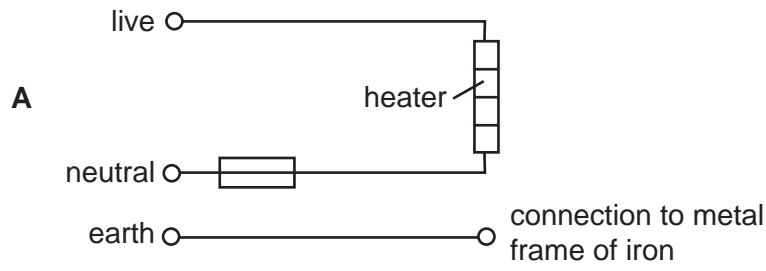
31 An electrical engineer connects a diode to a radio so that:

if the battery is connected the right way round the radio works,
if the battery is connected the wrong way there is no current.

Which diagram is correct?

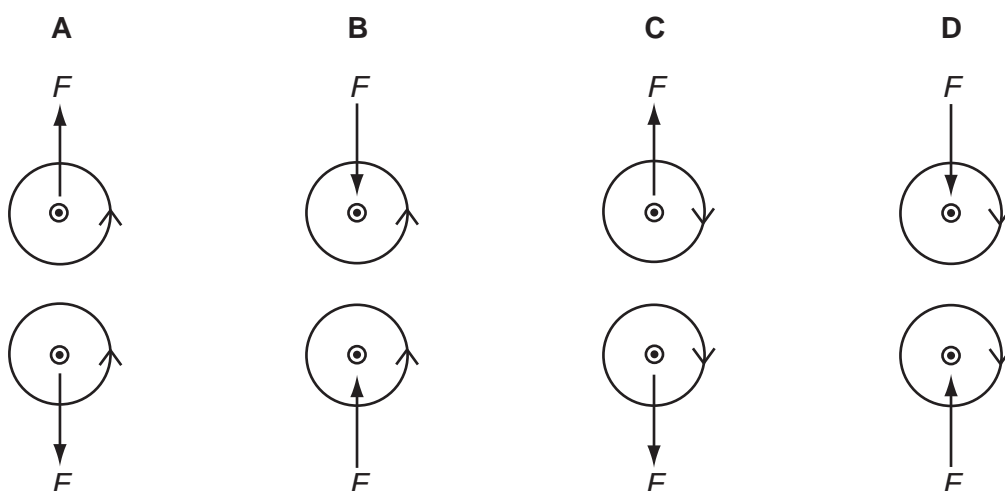


32 Which circuit shows how the heater in an electric iron and a fuse should be connected to the electricity supply?



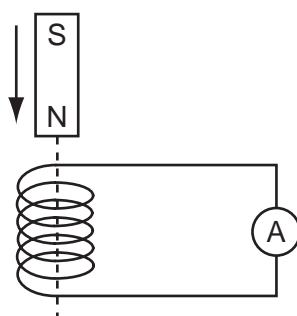
- 33 The diagrams show the forces F between two wires carrying currents out of the page. The magnetic fields close to the wires are also shown.

Which diagram is correct?



- 34 A small coil is connected to a sensitive ammeter. The ammeter needle can move to either side of the zero position.

When the magnet is allowed to fall towards the coil, the ammeter needle moves quickly to the right of the zero position.



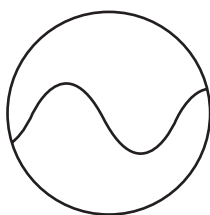
The magnet moves through the coil.

How does the ammeter needle move as the magnet falls away from the coil?

- A It does not move.
- B It gives a steady reading to the right.
- C It moves quickly to the left of the zero position and then returns to zero.
- D It moves quickly to the right of the zero position and then returns to zero.

35 A cathode-ray oscilloscope is connected to an a.c. generator.

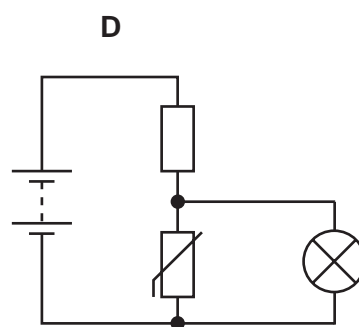
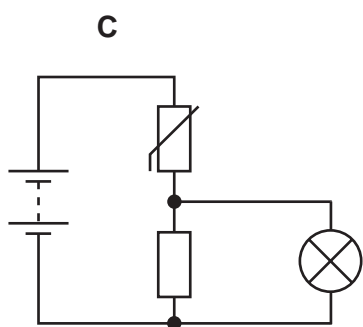
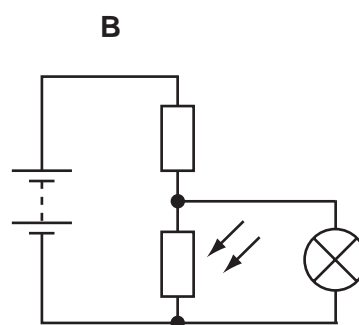
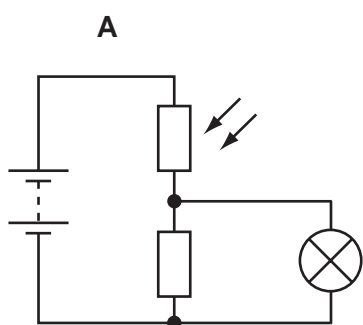
A wave is shown on the screen.



What is the effect on the trace if the generator's speed of rotation is doubled?

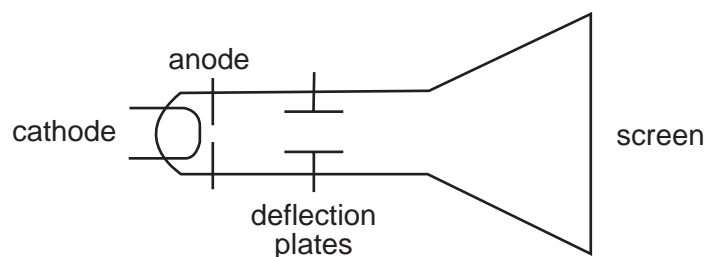
	number of waves on the screen	amplitude of waves on the screen
A	doubled	same
B	same	doubled
C	doubled	doubled
D	same	same

36 In which circuit will a lamp glow more brightly when less light shines on a light-dependent resistor?



37 The diagram shows the design of a cathode-ray oscilloscope tube.

There is a constant potential difference across the deflection plates.



Which change increases the deflection of the spot on the screen?

- A decreasing the distance from the deflection plates to the screen
 - B increasing the length of the deflection plates
 - C increasing the potential difference between cathode and anode
 - D increasing the separation of the deflection plates
- 38 When dealing with radioactive substances there are possible dangers.
- Which statement is correct?
- A Beta-particles can pass through skin and damage body cells.
 - B Gamma-radiation is more dangerous than alpha or beta because it has a longer half-life.
 - C Materials that emit only alpha-particles must be kept in thick lead containers.
 - D Radioactive materials are safe to handle after two half-lives.
- 39 A nucleus consists of 90 protons and 144 neutrons.
- After emitting two beta-particles followed by an alpha-particle, this nucleus has
- A 86 protons and 140 neutrons.
 - B 86 protons and 142 neutrons.
 - C 90 protons and 140 neutrons.
 - D 90 protons and 142 neutrons.

40 Deuterium ${}^2_1\text{H}$ and tritium ${}^3_1\text{H}$ are two isotopes of hydrogen.

Compared to a deuterium atom, how many protons and neutrons does a tritium atom have?

	protons	neutrons
A	more	more
B	more	same
C	same	more
D	same	same