

CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

PHYSICS

PAPER 1 Multiple Choice

5054/1

MAY/JUNE SESSION 2002

1 hour

Additional materials:

Multiple Choice answer sheet

Soft clean eraser

Soft pencil (Type B or HB is recommended)

TIME 1 hour

INSTRUCTIONS TO CANDIDATES

Do not open this booklet until you are told to do so.

Write your name, Centre number and candidate number on the answer sheet in the spaces provided unless this has already been done for you.

There are **forty** questions in 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 very carefully the instructions on the answer sheet.

INFORMATION FOR CANDIDATES

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 question paper consists of 18 printed pages and 2 blank pages.

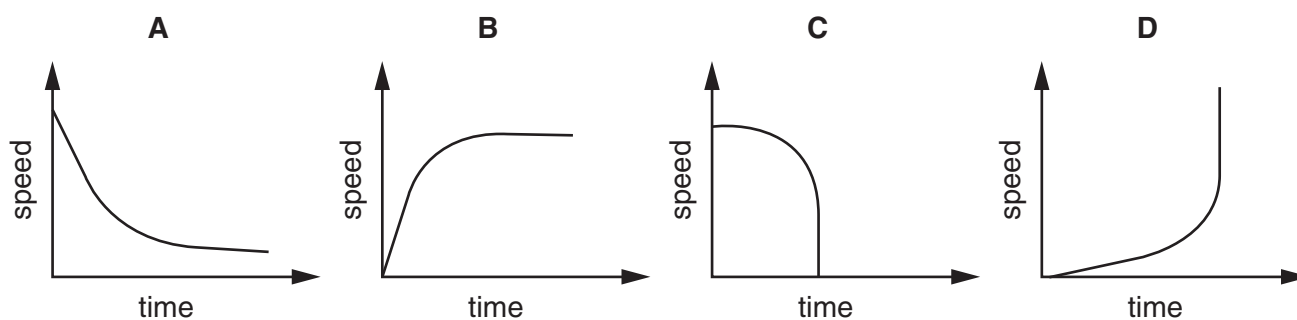


- 1 A plumber needs to measure the internal diameter of a water pipe as accurately as possible.

Which instrument should be used?

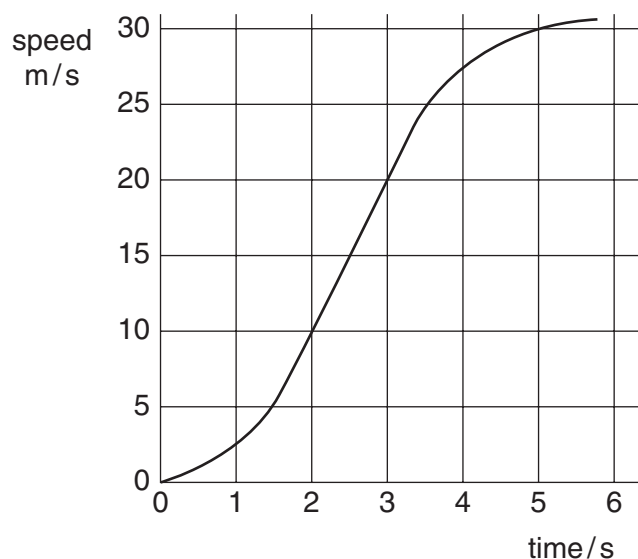
- A measuring tape
- B metre rule
- C micrometer
- D vernier calipers

- 2 Which graph represents the motion of a body falling vertically that reaches a terminal speed?



- 3 The graph shows the speed of a car as it accelerates from rest.

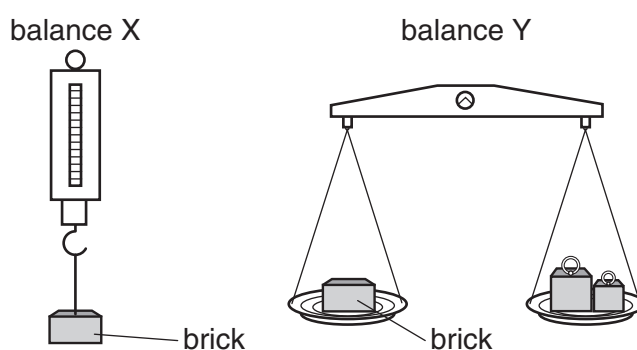
During part of this time the acceleration is uniform.



What is the size of this uniform acceleration?

- A 5 m/s^2
- B 6 m/s^2
- C 10 m/s^2
- D 20 m/s^2

- 4 A brick is placed on a newton balance X and then on a beam balance Y.



What is measured by each balance?

balance X

balance Y

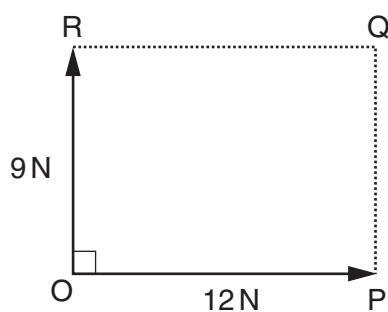
- | | | |
|----------|--------|--------|
| A | mass | mass |
| B | mass | weight |
| C | weight | mass |
| D | weight | weight |
- 5 A body is moving in a circle at a constant speed.
- Which of the following statements about the body is true?
- A** There is no acceleration.
- B** There is a force acting at a tangent to the circle.
- C** There is a force acting away from the centre of the circle.
- D** There is a force acting towards the centre of the circle.
- 6 The table shows how the extension of a spring varies with load.

load / N	0	2	4	6	8	10	12	14	16
extension / cm	0	3	6	9	12	15	20	27	38

Between which two loads would you find the limit of proportionality?

- A** 0 N and 2 N
- B** 8 N and 10 N
- C** 10 N and 12 N
- D** 14 N and 16 N

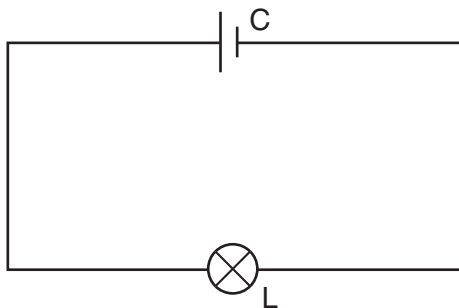
- 7 Two forces act at right angles at a point O as shown.



What is the resultant of the forces?

	magnitude	direction
A	15 N	OQ
B	15 N	PR
C	21 N	OQ
D	21 N	PR

- 8 The diagram shows an electric circuit in which a cell C is used to light a lamp L.

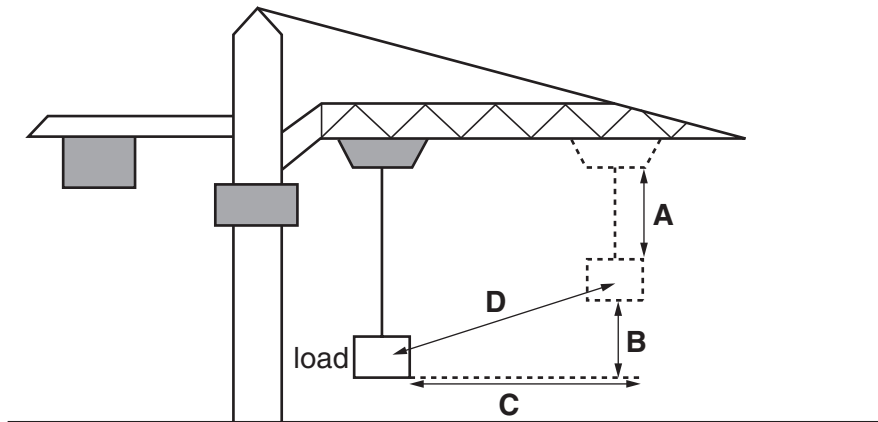


Which form of energy is **not** involved?

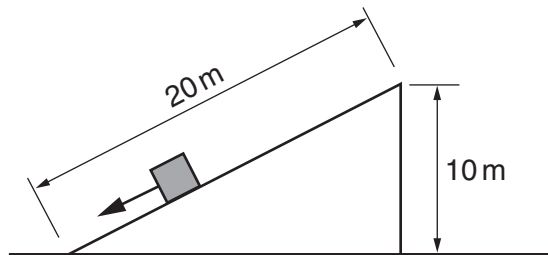
- A** chemical
- B** light
- C** solar
- D** thermal

- 9 A crane moves its load diagonally, as shown.

By which distance must the weight of the load be multiplied in order to find the increase in gravitational potential energy of the load?



- 10 A block of mass 2 kg slides from rest through a distance of 20 m down a frictionless slope, as shown.



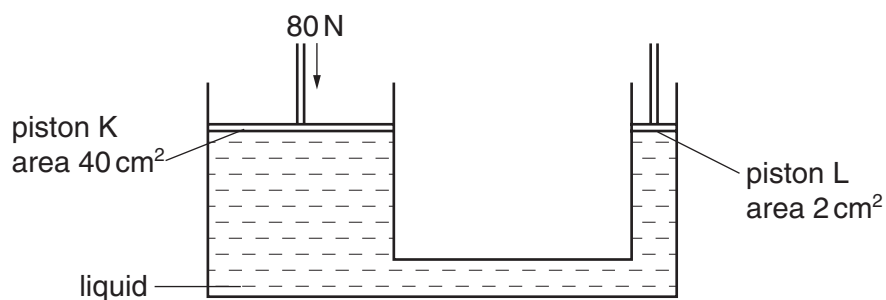
What is the kinetic energy of the block at the bottom of the slope?

[The acceleration of free fall is 10 m/s^2 .]

- A** 20 J **B** 40 J **C** 200 J **D** 400 J




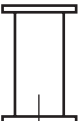
- 11 The system shown in the diagram contains an incompressible liquid.

A downward force of 80 N is exerted on the piston K.

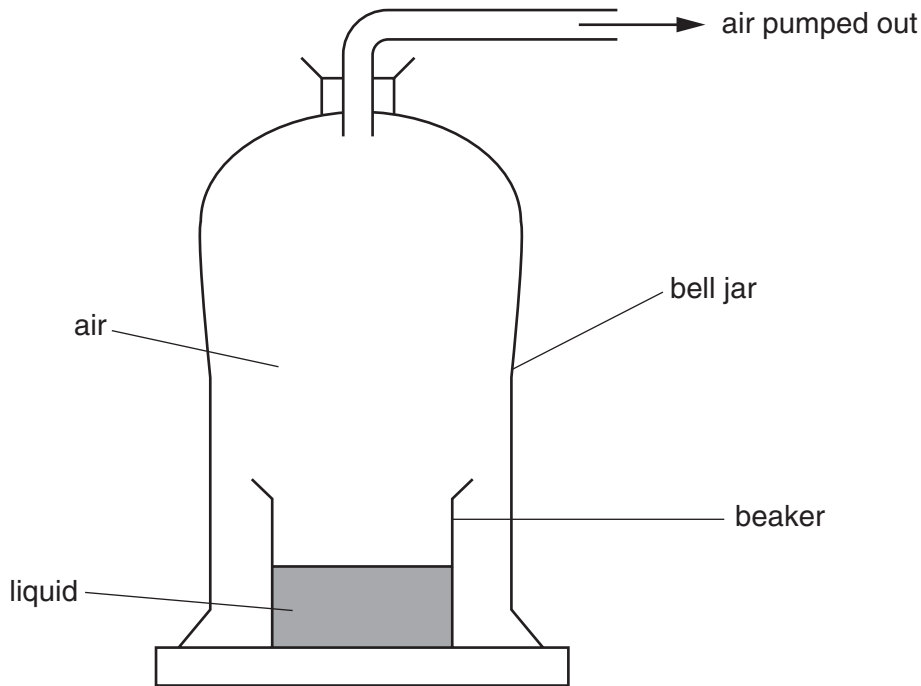


What will be the upward force on piston L?

- A 1 N
 - B 4 N
 - C 80 N
 - D 1600 N
- 12 Which of the following contains the molecules with the highest average speed?

A	B	C	D
			
ice cube at -10°C	water at room temperature	wood at room temperature	steam at 110°C

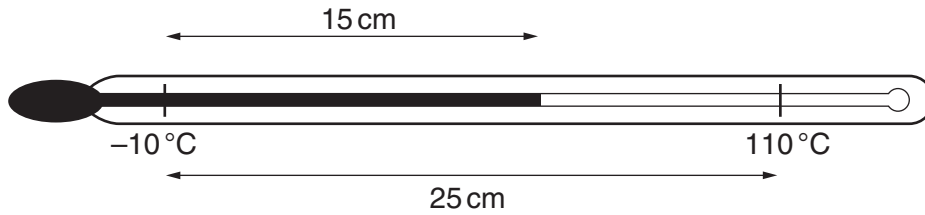
- 13 A beaker of liquid is placed under a bell jar. The pressure of the air above the liquid is reduced and some of the liquid evaporates. This causes the liquid to become colder.



Why does the temperature of the liquid fall?

- A The air molecules blow away the liquid molecules.
 - B The air molecules cool down the liquid.
 - C The higher energy molecules leave the liquid.
 - D There are fewer molecules of liquid in the beaker.
- 14 What is the name given to the amount of energy needed to turn 1 kg of water at 100 °C into steam at 100 °C?
- A heat capacity
 - B latent heat
 - C specific heat capacity
 - D specific latent heat

- 15 The diagram shows a mercury-in-glass thermometer. The distance between the -10°C and the 110°C markings is 25 cm.



At which temperature is the end of the mercury thread 15 cm from the -10°C mark?

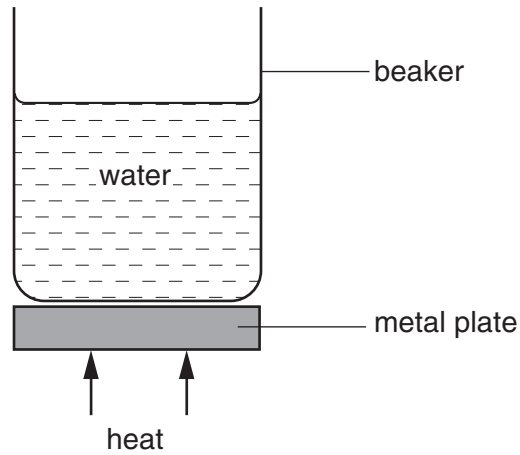
- A** 50°C **B** 60°C **C** 62°C **D** 72°C
- 16 The earliest Ford cars were always painted black. This was because black paint dried more quickly than lighter colours when the cars were left in the sun to dry.

Which property of black paint makes it dry more quickly?

- A** It is the best absorber of heat.
B It is the best conductor of heat.
C It is the best insulator of heat.
D It is the best reflector of heat.

- 17** Four beakers containing the same amount of water at the same temperature are placed on hot metal plates. The lower surfaces of the metal plates are kept at the same temperature.

The plates are all the same size but are made from four different metals.



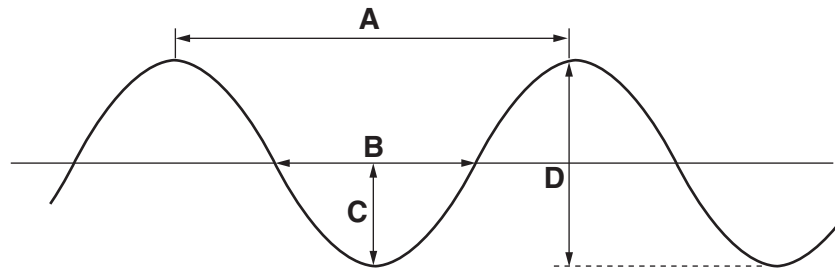
The times taken to produce stated temperature rises are given below.

Which metal is the poorest conductor?

plate	temperature rise	time
A	10 °C	100 s
B	12 °C	100 s
C	15 °C	200 s
D	18 °C	200 s

- 18** The diagram shows the cross-section of a water wave.

Which distance is the amplitude of the wave?



- 19** A surf-board moves at a speed of 5 m/s on the crest of a wave. The distance between wave crests is 10 m.

What is the frequency of the wave motion?

- A** 0.5 Hz **B** 2 Hz **C** 5 Hz **D** 10 Hz

- 20** The diagram represents some of the main parts of the electromagnetic spectrum.

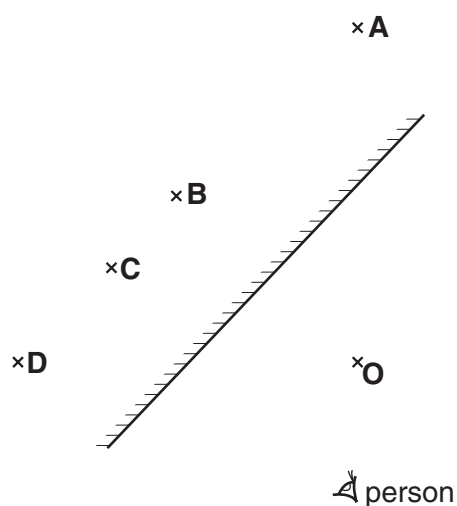
1	infra-red	2	3	4	gamma rays
---	-----------	---	---	---	------------

What are the numbered parts?

- | | 1 | 2 | 3 | 4 |
|----------|---------------|---------------|---------------|-------------|
| A | radio waves | ultraviolet | visible light | X-rays |
| B | radio waves | visible light | ultraviolet | X-rays |
| C | visible light | ultraviolet | X-rays | radio waves |
| D | visible light | ultraviolet | radio waves | X-rays |

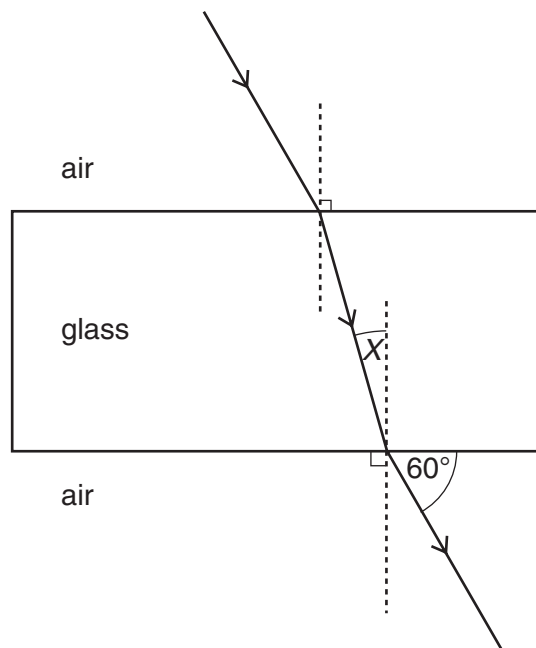
- 21** An object **O** is placed in front of a plane mirror. A person looks into the mirror as shown in the diagram.

In which position is the image of **O** seen?



- 22 For a certain parallel-sided glass block, the value of $\frac{\sin i}{\sin r}$ is 1.50.

A ray of light passes through the block and emerges at an angle of 60° to the surface of the block.



What is the value of the angle marked X ?

- A** 19.5° **B** 35° **C** 40° **D** 48.5°
- 23 In which of the following frequency ranges is ultrasound found?
- A** 1 Hz – 1 kHz
B 2 kHz – 10 kHz
C 11 kHz – 20 kHz
D 21 kHz – 30 kHz

- 24** A trumpet and a flute are played by two students. The note from the trumpet is louder and has a lower pitch than the note from the flute.

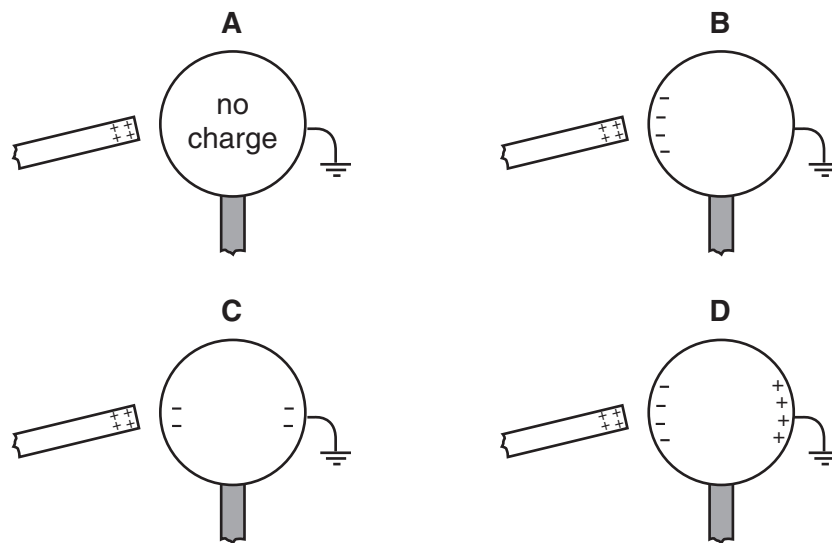
How do the amplitude and frequency of the sound from the trumpet compare to the amplitude and frequency from the flute?

<i>trumpet's amplitude</i>	<i>trumpet's frequency</i>
----------------------------	----------------------------

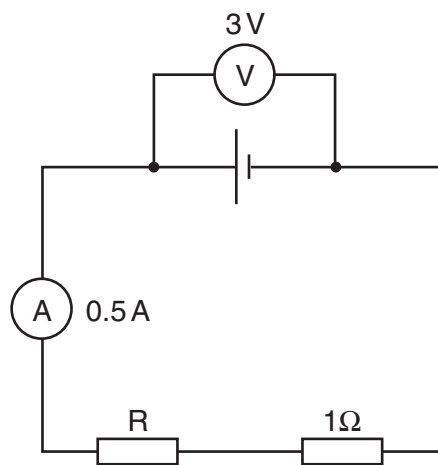
- | | | |
|----------|---------|--------|
| A | larger | higher |
| B | larger | lower |
| C | smaller | higher |
| D | smaller | lower |
- 25** Which of the following is an example of induced magnetism?
- A** a compass needle pointing north
 - B** a north pole attracting iron filings
 - C** a north pole repelling a north pole
 - D** the coil of a motor turning in a magnetic field
- 26** What is measured by the energy dissipated when a source drives a unit charge round a complete circuit?
- A** electromotive force
 - B** potential difference
 - C** power
 - D** resistance

- 27** A metal ball is charged by induction. To do this, a charged rod is held close to one side of the ball and the other side is earthed.

Which diagram shows the charge distribution at this stage of the experiment?



- 28** A circuit is set up as shown in the diagram.



Assuming that the ammeter has negligible resistance, what is the value of the resistor R?

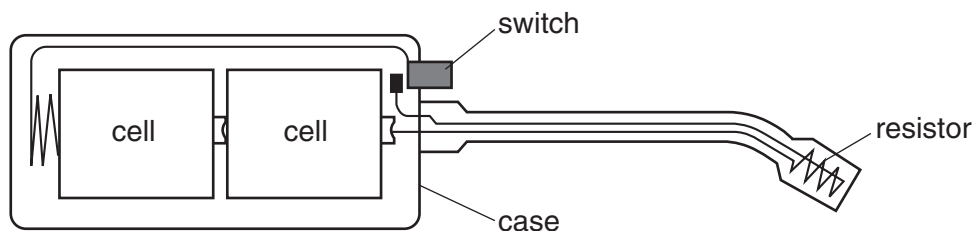
- A** 0.5Ω **B** 1.5Ω **C** 5Ω **D** 6Ω

- 29** A student has a set of 20 festive lights. The lights are wired in series and connected to the mains. One bulb burns out and all the lights go out.

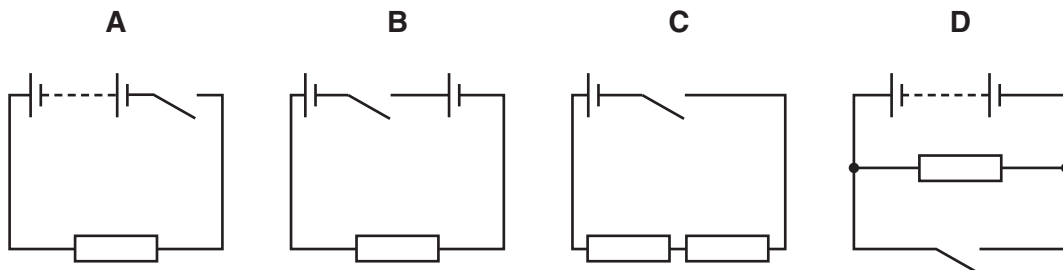
The student's parents ask her to find the faulty bulb and replace it.

Where should the student begin?

- A** Anywhere, because the current will have been the same everywhere.
 - B** At the live end, because the current will have been greatest there.
 - C** At the middle, because the current will have been greatest there.
 - D** At the neutral end, because the current will have been greatest there.
- 30** The diagram shows the components of a lighter for a gas cooker.



Which circuit diagram for this lighter is correct?



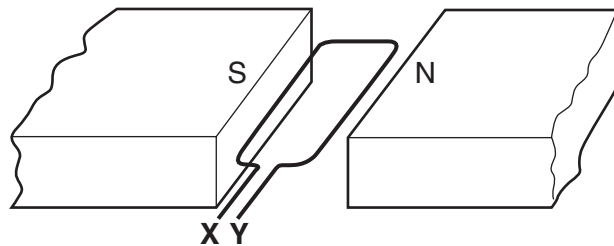
- 31** Which of these appliances is the most powerful that can safely be connected to the 240 V mains supply using a plug with a 3 A fuse?
- A** a 60 W light bulb
 - B** a 100 W light bulb
 - C** a 200 W television
 - D** a 500 W heater

- 32 A person uses a 3 kW electric fire for 2 hours and a 2 kW heater for 4 hours.

What is the total cost if the price of electrical energy is 5.0 cents per kilowatt-hour?

- A 30 cents
- B 40 cents
- C 60 cents
- D 70 cents

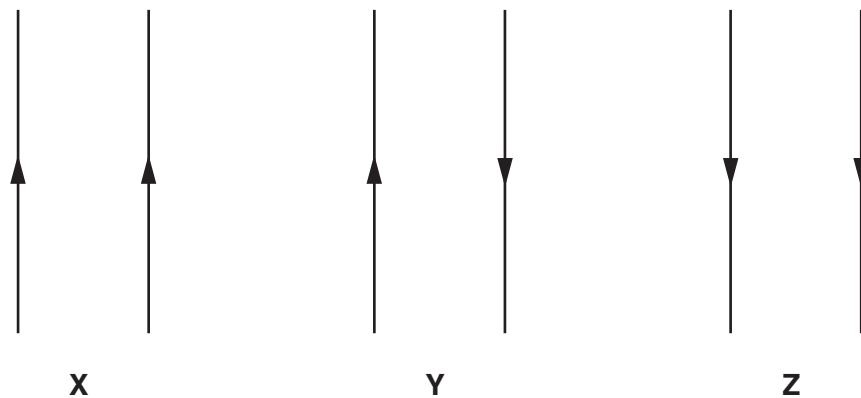
- 33 The diagram shows a coil in a magnetic field.



When the coil is part of a d.c. motor, what must be connected directly to **X** and **Y**?

- A d.c. supply
- B slip rings
- C soft-iron core
- D split-ring commutator

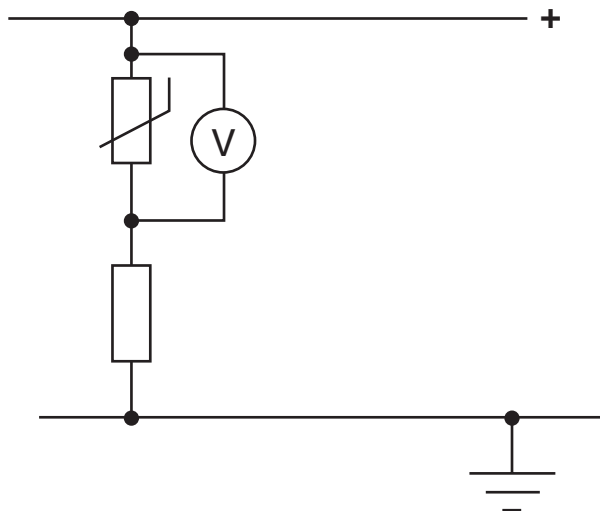
- 34 The diagram shows three pairs of parallel wires with the currents in the directions shown.



Which forces do the pairs of wires experience?

	X	Y	Z
A	attraction	none	repulsion
B	attraction	repulsion	attraction
C	none	attraction	none
D	repulsion	attraction	repulsion

- 35 The diagram shows a thermistor connected in a potential divider circuit.



The resistance of the thermistor decreases when its temperature rises. The thermistor is heated.

What happens to the reading on the voltmeter?

- A** decreases but not to zero
- B** decreases to zero
- C** increases
- D** stays the same

- 36 How do the ionising abilities of beta particles and gamma rays compare with the ionising ability of alpha particles?

	<i>beta particles</i>	<i>gamma rays</i>
--	-----------------------	-------------------

- | | | |
|----------|------|------|
| A | less | less |
| B | less | more |
| C | more | less |
| D | more | more |

- 37 A company built five identical houses in different parts of the same country. When a radioactivity count was carried out in each house, one of them had a much higher reading than the others.

What is most likely to cause this higher reading?

- A** the Sun's radioactivity
- B** the time of year when the reading was taken
- C** a nuclear power station ten miles away from the house
- D** background radiation from rocks under the house

- 38 What conclusion can be drawn from the Geiger-Marsden alpha-particle scattering experiment?

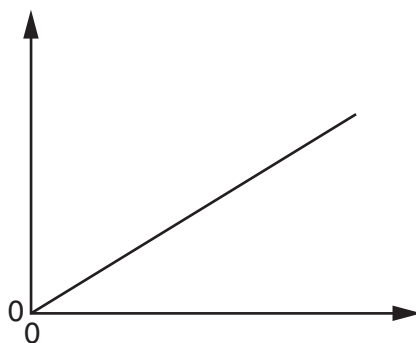
- A** A positive charge is spread throughout the atom.
- B** Electrons are arranged in orbits.
- C** Electrons are negatively charged.
- D** There is a dense nucleus in the atom.

- 39 Which types of nuclear reaction release thermal energy in the Sun and in nuclear power stations?

	<i>the Sun</i>	<i>nuclear power stations</i>
--	----------------	-------------------------------

- | | | |
|----------|---------|---------|
| A | fission | fission |
| B | fission | fusion |
| C | fusion | fission |
| D | fusion | fusion |

40 Which variation would produce a graph of the shape shown?



- A** count rate against time for radioactive decay
- B** current against potential difference for a metal obeying Ohm's law
- C** pressure against volume for a gas at constant temperature
- D** speed against time for a car moving at constant speed

BLANK PAGE