BOTSWANA EXAMINATIONS COUNCIL
Botswana General Certificate of Secondary Education

PHYSICS **0571/01**

Paper 1 Multiple Choice **October/November 2018**

1 hour

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

READ THESE INSTRUCTIONS FIRST

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

Read the instructions on the separate Answer Sheet very carefully.

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

Sign your name in the space provided on the Answer Sheet.

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 using a **soft pencil** on the separate Answer Sheet.

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.

Do not use staples, paper clips, highlighters, glue or correction fluid.

[Turn over

1 A micrometer screw gauge with a zero error of −0.03 mm is used to measure the diameter of a wire. The reading on the micrometer is 0.12 mm.

What is the diameter of the wire?

A 0.03 mm

B 0.09 mm

C 0.12 mm

D 0.15 mm

2 Which group of physical quantities consists of vectors only?

A acceleration, force, velocity

B acceleration, speed, velocity

C force, mass, time

D mass, speed, time

3 Which unit is the same as pascal?

A newton metre

B newton metre squared

C newton per metre

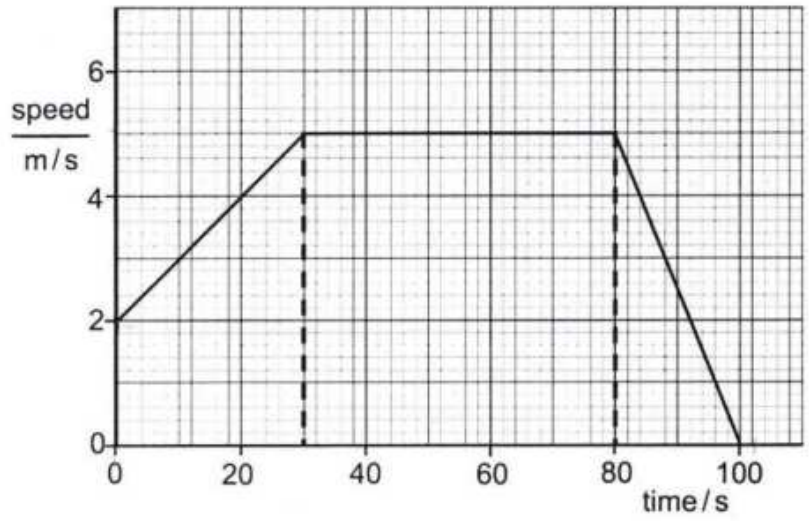
D newton per metre squared

4 An astronaut of mass 50 kg sits in a spaceship which is returning from the Moon back to the Earth.

How do his values of mass and weight on Earth compare with those on the Moon?

	mass	weight
A	larger	smaller
B	larger	larger
C	same	larger
D	same	smaller

5 The diagram shows a speed-time graph of a cyclist.



What is the distance covered by the cyclist?

A 367.5 m

B 375.0 m

C 405.0 m

D 412.5 m

6 An electric motor takes 10 s to lift a load of 400 N from the ground to a height of 6.0 m. The input power of the motor is 300 W.

What is the efficiency of the motor?

A 12.5%

B 45.0%

C 75.0%

D 80.0%

7 A force of 10.0 N is used to push a block of wood of mass 2.0 kg along a horizontal surface. The force of friction acting on the block is 4.0 N.

Which statement describes the motion of the block?

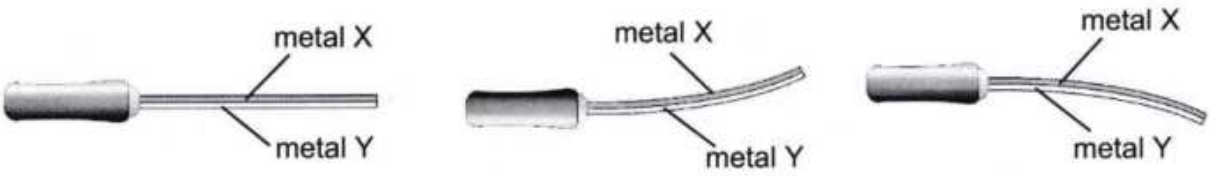
A constant acceleration of 3.0 m/s^2

B constant acceleration of 5.0 m/s^2

C constant velocity of 3.0 m/s

D constant velocity of 5.0 m/s

8 The diagrams show a bimetallic strip at room temperature, after heating and after cooling below room temperature.



at room temperature | after heating | after cooling

Which statement about metals X and Y is correct?

A Metal X contracts slower than metal Y.

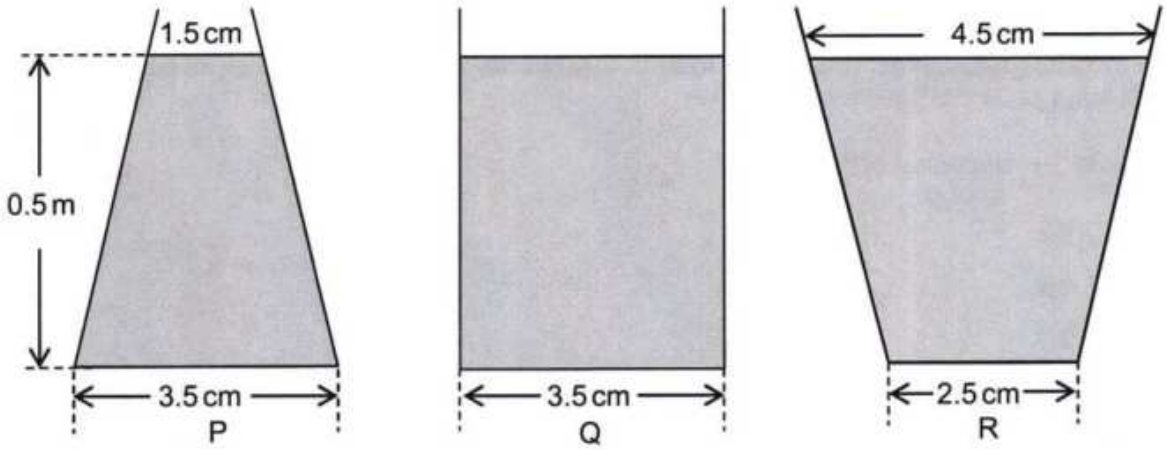
B Metal X expands faster than metal Y.

C Metal X contracts faster than metal Y.

D Metal X and metal Y expand at the same rate.

9 The diagrams show three containers containing the same liquid to the same depth. The vertical height of the liquid in each container is 0.5 m.

The diagrams are drawn to scale.



Which statement is correct about the pressure exerted by the liquid at the bottom of the containers?

A The pressure on P is smaller than the pressure on Q.

B The pressure on P is equal to the pressures on Q and R.

C The pressure on Q is larger than the pressure on R.

D The pressure on R is larger than the pressure on P and Q.

10 Which physical property is used to measure temperature in a liquid-in-glass thermometer?

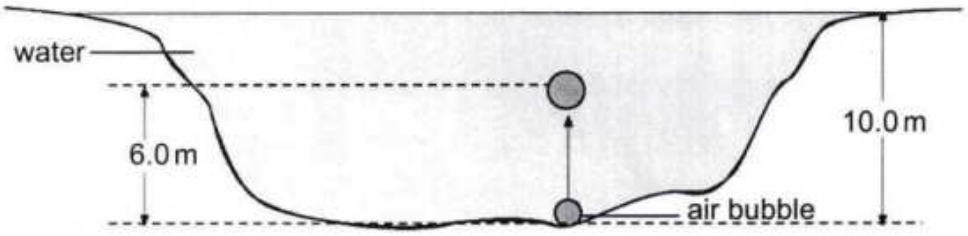
A colour

B pressure

C voltage

D volume

11 An air bubble of volume 0.5 cm^3 rises from the bottom of a lake which is 10.0 m deep as shown in the diagram.



The density of the water is 1000 kg / m^3. The atmospheric pressure is 100 000 Pa. (g = 10 m / s^2)

What is the volume of the bubble when it is 6.0 m above the bottom of the lake?

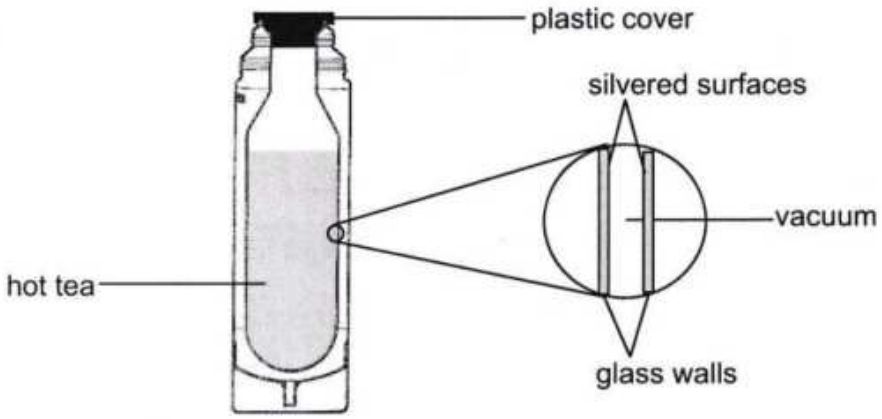
A 0.63 cm^3

B 0.71 cm^3

C 0.83 cm^3

D 1.25 cm^3

12 The diagram shows the features of a vacuum-flask.



The vacuum-flask contains hot tea.

Which feature mainly reduces transfer of thermal energy from the tea by radiation?

A glass walls

B plastic cover

C silvered surfaces

D vacuum

13 A block of ice at 0 °C absorbs latent heat and changes to water.

Which of the changes will **not** take place during the process?

A its density increases

B its temperature increases

C the average energy of the molecules increases

D the forces between the molecules decrease

14 A metal block of mass 2.0 kg has a specific heat capacity of 800 J / kg °C.
The block gains 2400 J of thermal energy.

What is the temperature rise of the block?

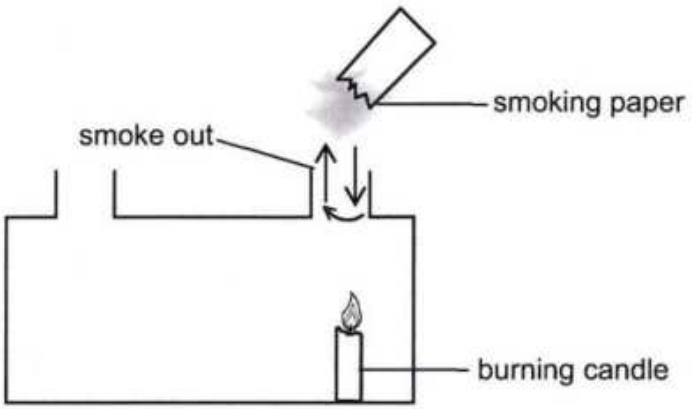
A 0.17 °C

B 0.67 °C

C 1.5 °C

D 6.0 °C

15 The diagram shows a burning candle placed in a glass box.
A smoking paper is placed above the chimney where the candle is burning.



The smoke from the paper does not enter the glass box.

Which statement explains why the smoke does not enter the glass box?

A the candle flame reflects the smoke

B the glass box is filled with air

C the smoking paper attracts the smoke

D the warm air pushes the smoke up

16 The diagram shows the electromagnetic spectrum.

P	X-rays	Q	visible light	R	microwaves	S

increasing wavelength

Which components of the electromagnetic spectrum are labelled P, Q and R?

	P	Q	R
A	gamma	ultraviolet	infrared
B	gamma	infrared	ultraviolet
C	radio-waves	ultraviolet	infrared
D	radio-waves	infrared	ultraviolet

17 Which statement is true about ultrasonic waves?

A They are longitudinal in nature.

B They have frequencies between 20 Hz and 20 kHz.

C They travel at a speed of 3×10^8 m/s.

D They travel in a vacuum.

18 A converging lens is used to form a virtual image.

What are the characteristics of the image formed?

A larger than the object and inverted

B larger than the object and upright

C smaller than the object and inverted

D smaller than the object and upright

19 Which statement defines the amplitude of a wave?

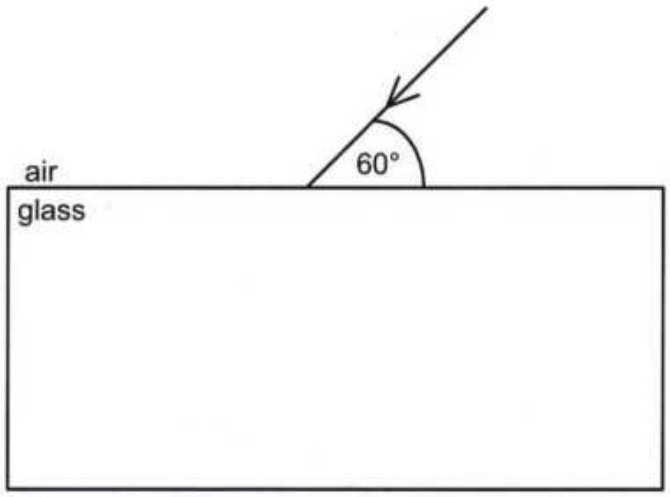
A The distance between wavefronts of a wave.

B The distance between two successive points which are in phase.

C The maximum displacement of a particle from crest to trough.

D The maximum displacement of a particle from its rest position.

20 The diagram shows a ray of light entering a glass block.



The refractive index of glass is 1.5.

What is the angle of refraction when the ray enters the block?

A 19.5°

B 30.0°

C 35.3°

D 48.6°

21 An observer hears thunder 1.70 s after seeing lightning during a thunderstorm.
The speed of sound in air is 340 m / s.

What is the distance between the observer and the thunderstorm?

A 100 m

B 200 m

C 578 m

D 1156 m

22 Which component is designed to show a change in resistance as its temperature increases?

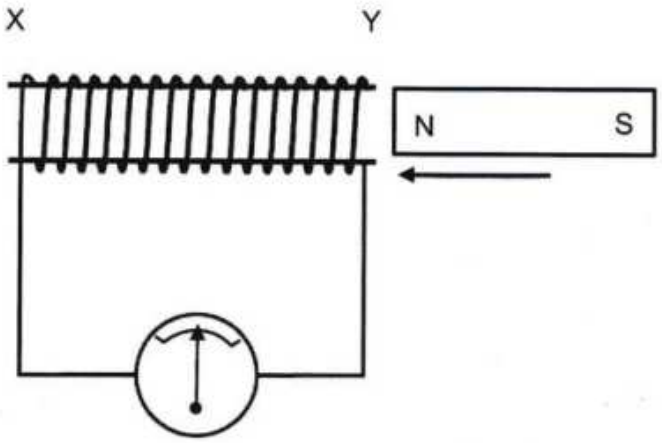
A diode

B light dependent resistor

C thermistor

D variable resistor

23 The north pole of a bar magnet is pushed into end Y of a coil of wire as shown in the diagram. The coil is connected to a galvanometer.



The galvanometer needle deflects to the right and back to zero.

Which movement will produce a similar deflection of the galvanometer needle?

A pulling the north pole from end Y of the coil

B pulling the south pole from end X of the coil

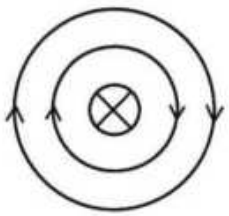
C pushing the north pole into end X of the coil

D pushing the south pole into end Y of the coil

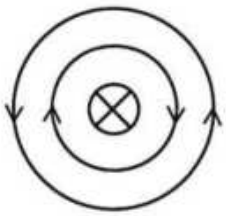
24 A straight wire carries current into a horizontal plane.

Which diagram shows the magnetic field pattern around the wire?

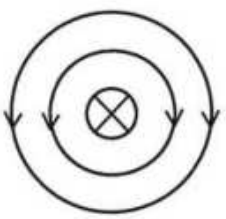
A



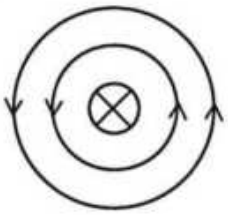
B



C



D



25 Which part of a simple direct current motor reverses the direction of current through its coil every half cycle?

A brushes

B soft-iron cylinder

C slip rings

D split ring

26 A household has some electrical appliances rated as shown in the table.

appliance	power / W	fuse / A
lamp	100	1
vacuum cleaner	1000	5
electric kettle	2000	8
electric fire	2500	13

The appliances are connected one at a time to the 240 V mains.

In which of the appliances will the fuse blow?

A electric fire

B electric kettle

C lamp

D vacuum cleaner

27 A wire of length 12.0 m has a resistance of 9.0 Ω.
Another wire made from the same material has four times the cross sectional area and a resistance of 6.0 Ω.

What is the length of the wire?

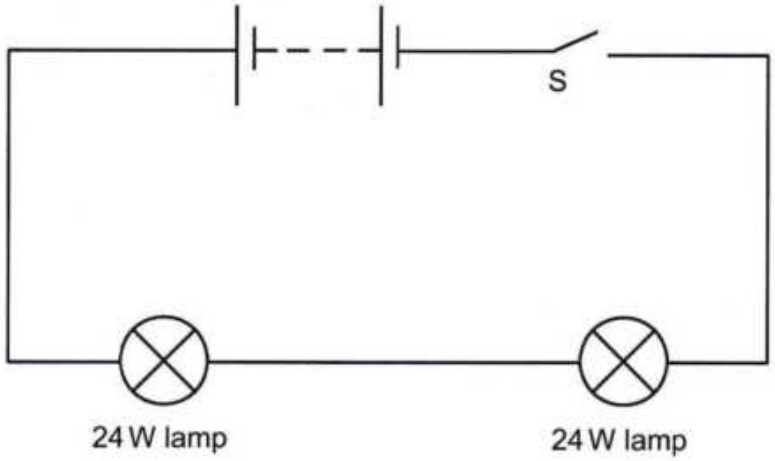
A 4.5 m

B 8.0 m

C 18.0 m

D 32.0 m

28 The diagram shows two 24 W lamps connected in series.



When switch S is closed, the battery provides 120 C of charge in 60 s.

What is the potential difference across each lamp?

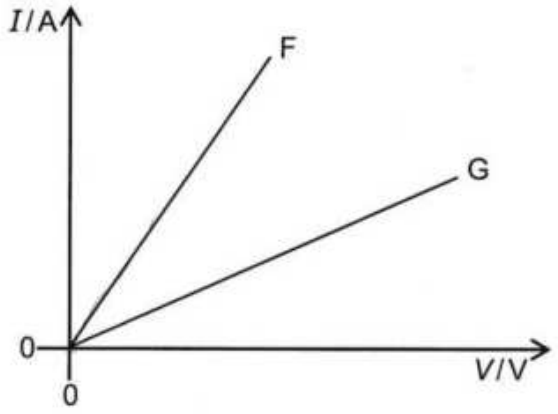
A 5 V

B 12 V

C 24 V

D 48 V

29 Conductors F and G are made from the same material and have the same cross-sectional area. The diagram shows the current-voltage graphs for conductors F and G.



Which statement is correct about the conductors?

A Conductor F has a lower resistance than conductor G.

B Conductor G has a lower resistance than conductor F.

C Conductor G has the same length as conductor F.

D The conductors have equal resistance.

30 Which electrical component changes alternating current to direct current?

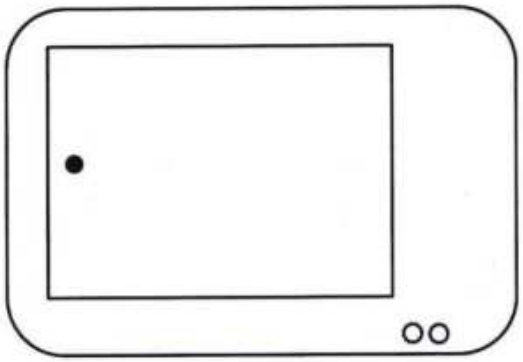
A diode

B reed-relay

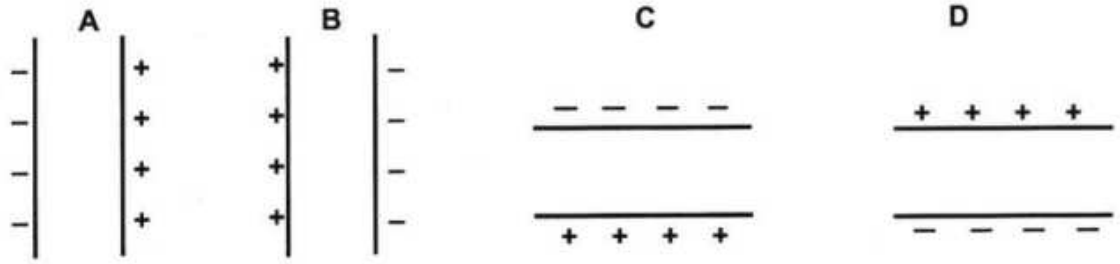
C thermistor

D transformer

31 The diagram shows a spot produced when cathode rays hit the screen of a cathode ray oscilloscope (C.R.O.) after deflection through an electric field.
The spot is deflected from the centre of the screen.



Which set of plates will cause the deflection shown in the diagram?



32 A house is fitted with two lamps rated 50 W each, connected in parallel.
The lamps are switched on for 2 hours every day.

What is the cost of using the lamps for 30 days? Electricity is charged at P0.75 per kWh.

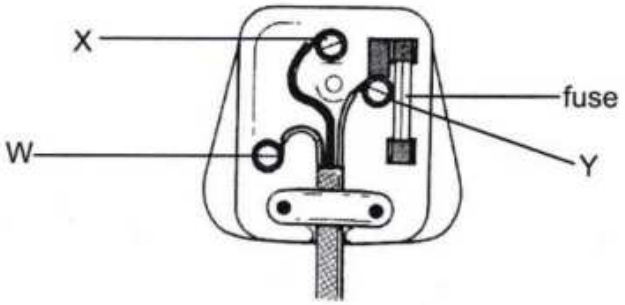
A P1.13

B P2.25

C P4.50

D P75.00

33 The diagram shows a three pin fused plug.



What are the colour codes of the wires connected to pins W, X and Y?

	W	X	Y
A	blue	yellow/green	brown
B	brown	yellow/green	blue
C	yellow/green	blue	brown
D	yellow/green	brown	blue

34 Which factor increases the turning effect of a current-carrying coil placed in a magnetic field?

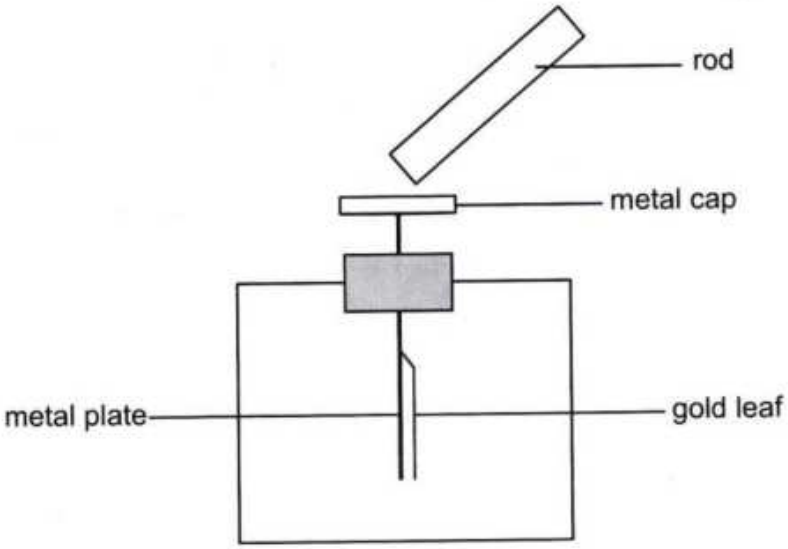
A decreasing the current in the coil

B using a coil with fewer turns

C using a soft-iron core

D using weaker magnets

35 The diagram shows a charged rod brought near the metal cap of a gold leaf electroscope.



Which combination of charges will produce the greatest deflection of the gold leaf from the metal plate when the rod is brought near the metal cap of the electroscope?

	charge of rod	charge of gold leaf and metal plate
A	negative	neutral
B	negative	positive
C	positive	neutral
D	positive	positive

36 Electric power in the national grid is transmitted efficiently at high voltage.

What is reduced by transmitting the power at high voltage?

A electrical energy loss

B resistance of cables

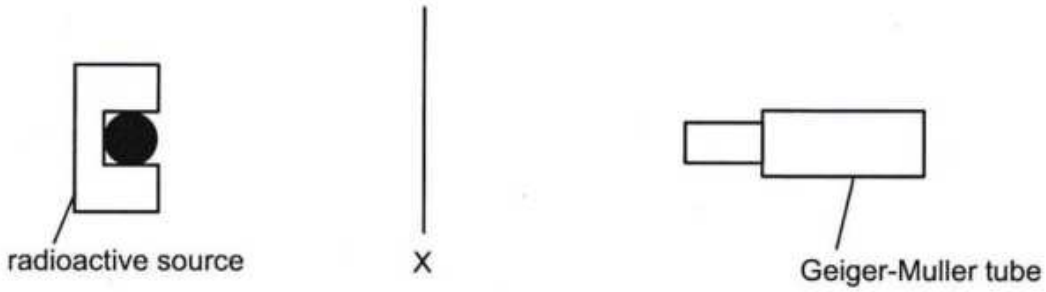
C time of transmission

D transmission distance

37 Which row gives the nature and the charge of an alpha particle?

	nature	charge
A	helium nucleus	neutral
B	helium nucleus	positive
C	helium atom	neutral
D	helium atom	positive

38 The diagram shows a radioactive source placed in front of a Geiger-Muller tube.



The table shows the count rate produced when different materials are placed at position X.

material	count rate / count / s
no material	8000
sheet of paper	8000
8mm sheet of aluminium	3000
thick lead	60

What is the count rate due to beta particles?

A 2400 counts / s

B 3000 counts / s

C 5000 counts / s

D 8000 counts / s

39 A radioactive nuclide $^{220}_{86}X$ decays into a new nuclide Y by emitting an alpha particle and a beta particle.

What is the nuclide notation of the resulting nuclide Y?

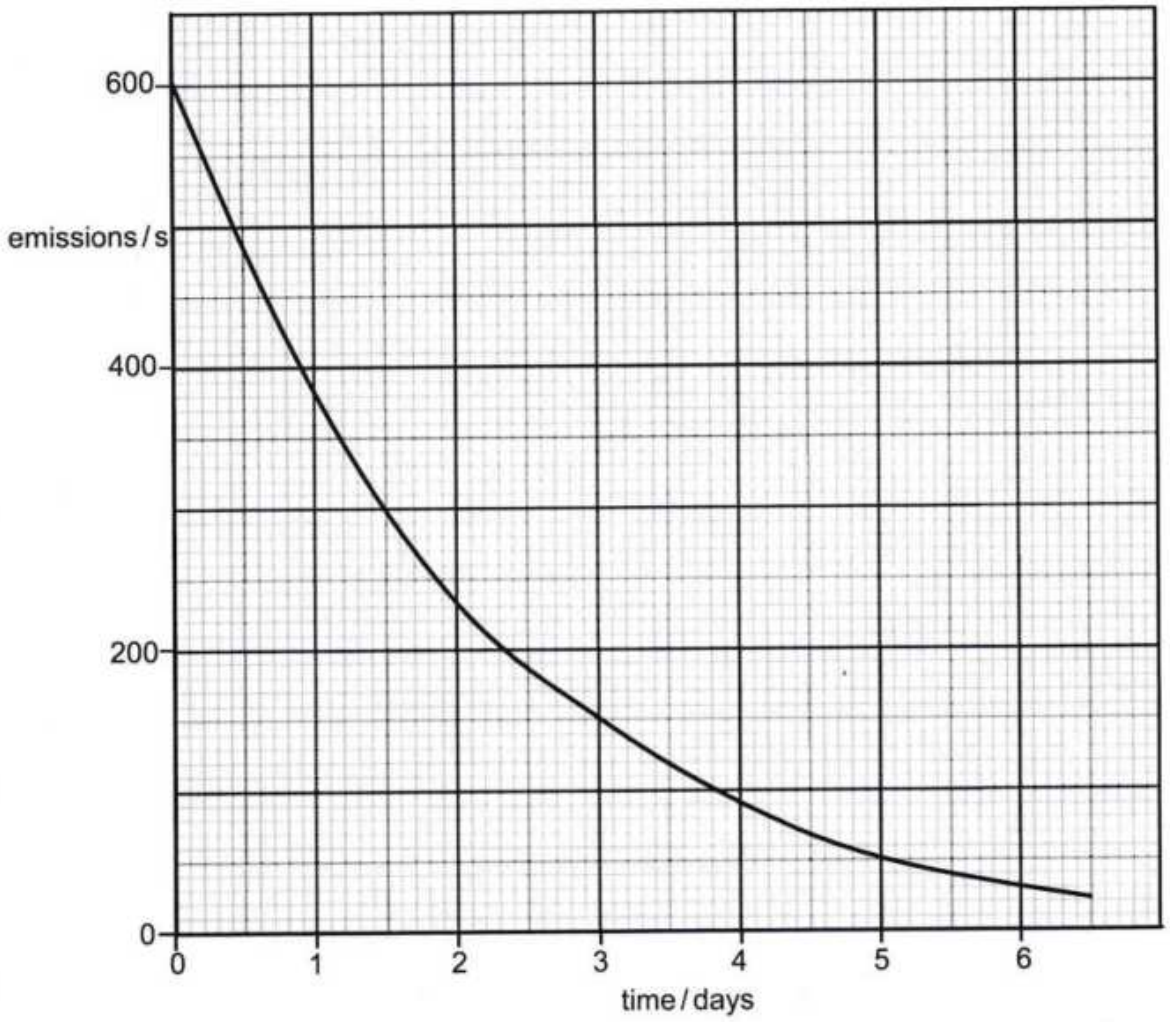
A $^{220}_{87}Y$

B $^{216}_{85}Y$

C $^{216}_{84}Y$

D $^{216}_{83}Y$

40 The diagram shows how the emissions of a radioactive isotope decreases with time.



What is the half-life of the radioisotope?

A 0.9 days

B 1.5 days

C 2.4 days

D 3.0 days