Cambridge Assessment International Education

Cambridge O Level

PHYSICS **5054/11**

Paper 1 Multiple Choice **October/November 2022**

1 hour

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

INSTRUCTIONS

- 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 multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.

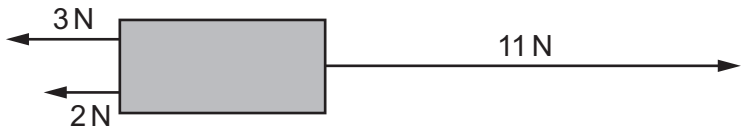
INFORMATION

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.

This document has **16** pages. Any blank pages are indicated.

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1 The diagram shows three forces acting on a block. The resultant force is 6 N to the right.



Which additional force produces a resultant force of 3 N to the left?

A 3 N to the left

B 9 N to the left

C 6 N to the right

D 13 N to the right

2 Velocity is given by the change in displacement divided by the change in time.

How many vector quantities appear in this statement?

A 0 **B** 1 **C** 2 **D** 3

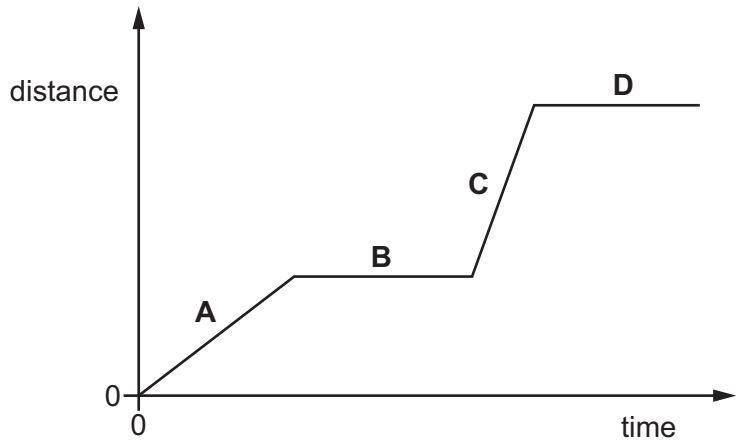
3 A car of mass 1000 kg is travelling down a steep hill. The brakes fail and the driver uses a horizontal sand-filled safety road to stop the car.

The car enters the sand at a speed of 10 m / s and experiences a constant stopping force of 2500 N.

How far does the car travel in the sand before coming to rest?

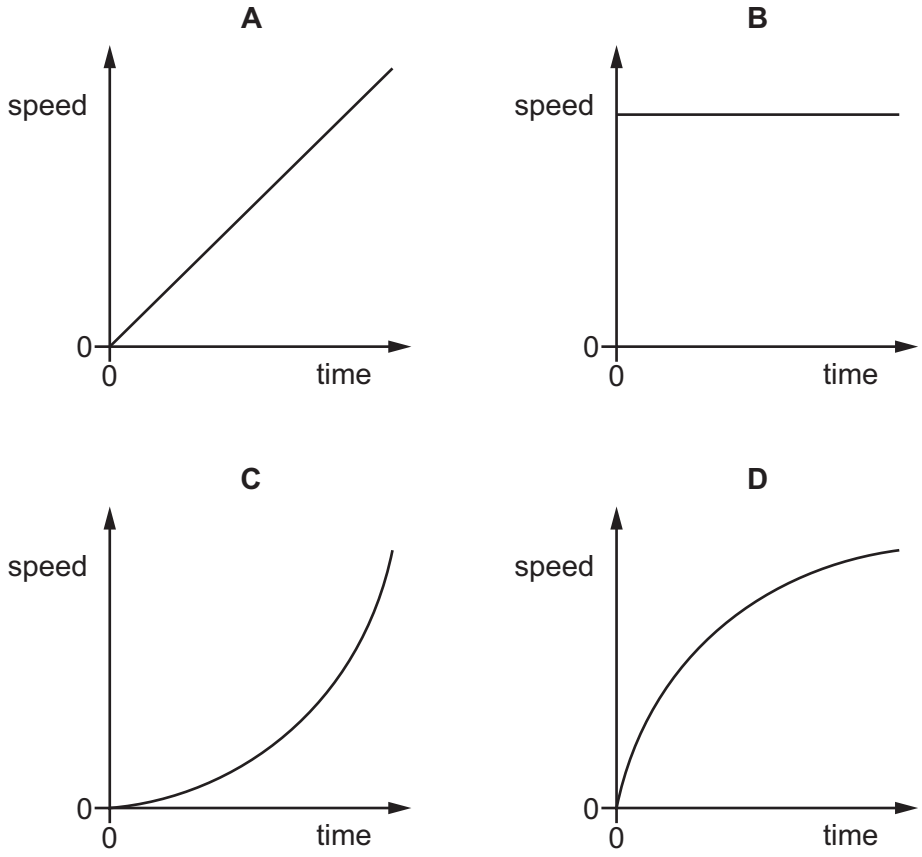
A 2.0 m **B** 4.0 m **C** 20 m **D** 40 m

4 Which part of the distance–time graph shows the fastest constant speed?



5 An object is accelerating along a straight, horizontal track. The acceleration is uniform.

Which speed–time graph represents the motion of the object?



6 What causes the frictional effects experienced by a cyclist to increase?

A using a lighter bicycle

B travelling at greater speed

C a smoother tyre surface

D a road surface covered in oil

7 The diagram shows a car at the moment the driver sees a hazard ahead.



Which expression is equal to the stopping distance?

A braking distance + thinking distance

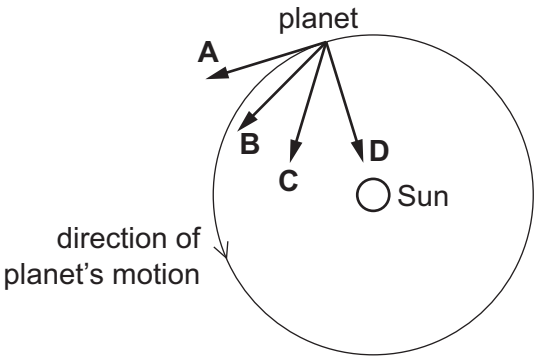
B braking distance – thinking distance

C braking distance × thinking distance

D braking distance ÷ thinking distance

8 A planet orbits the Sun. The planet moves in a circular path at constant speed, but is accelerating because it is changing direction.

In which direction does the resultant force act to cause this acceleration?



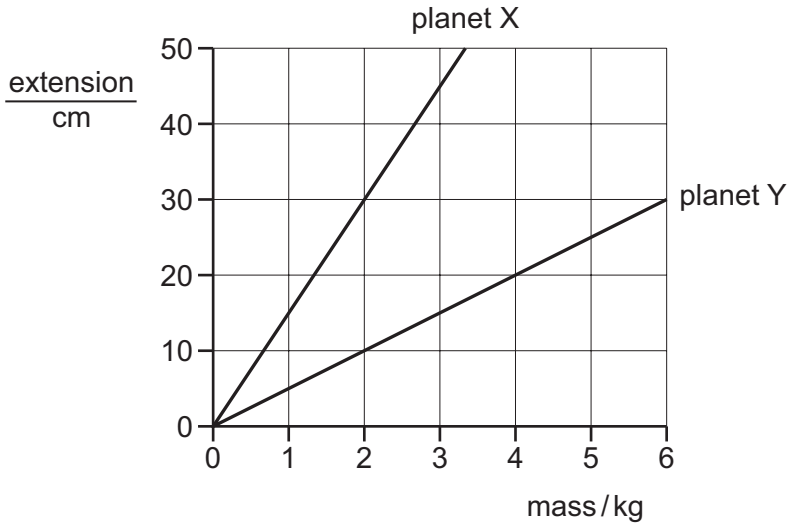
9 X is the result of Y divided by Z.

What are X, Y and Z?

	X	Y	Z
A	mass	weight	gravitational field strength
B	weight	mass	gravitational field strength
C	mass	gravitational field strength	weight
D	weight	gravitational field strength	mass

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10 The graph shows how the extension of a spring changes with the masses suspended from it when the spring is on planet X and when the spring is on planet Y.



Which conclusion can be drawn from these graphs?

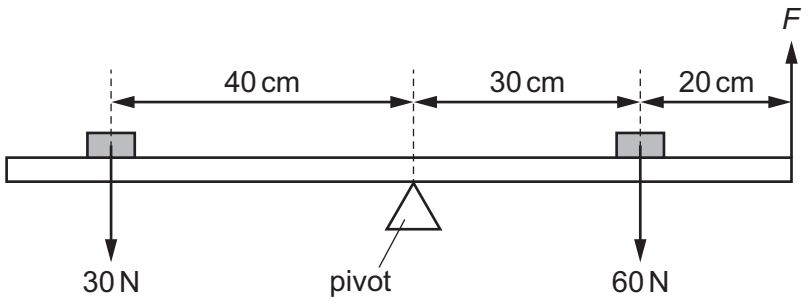
A It is not possible to compare the gravitational field strengths on planets X and Y.

B The gravitational field strength on planet X is equal to the gravitational field strength on planet Y.

C The gravitational field strength on planet X is one third of the gravitational field strength on planet Y.

D The gravitational field strength on planet X is three times the gravitational field strength on planet Y.

11 A uniform beam is pivoted at its centre. Two weights are placed on the beam in the positions shown and the beam is balanced by an upward force *F*.

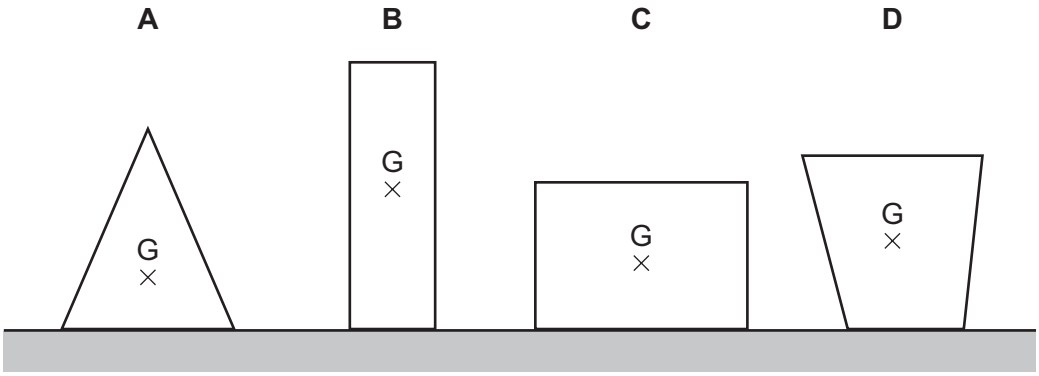


What is the size of *F*?

A 6.0 N **B** 12 N **C** 30 N **D** 60 N

12 Four objects of equal mass rest on a table. The centre of mass of each object is labelled G.

Which object is the least stable?



13 Each tyre of a car has an area of 100 cm^2 in contact with the ground.

The car has a mass of 1600 kg. The weight of the car is equally distributed amongst the four tyres.

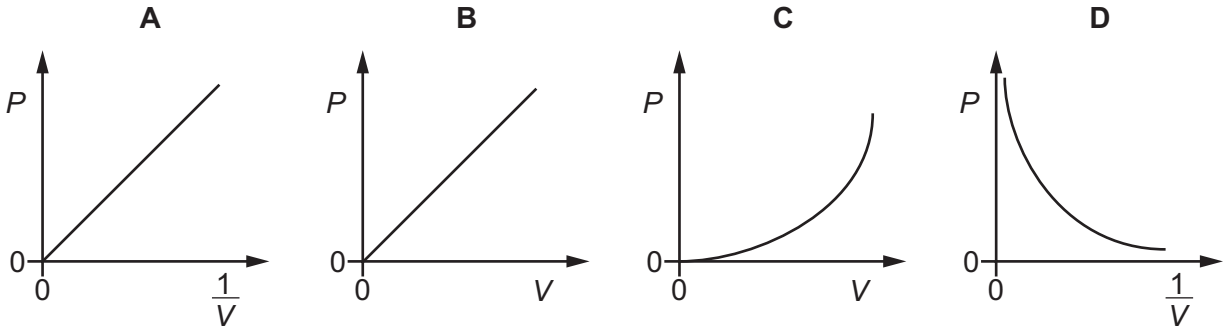
The gravitational field strength g is 10 N / kg.

What is the pressure exerted on the ground?

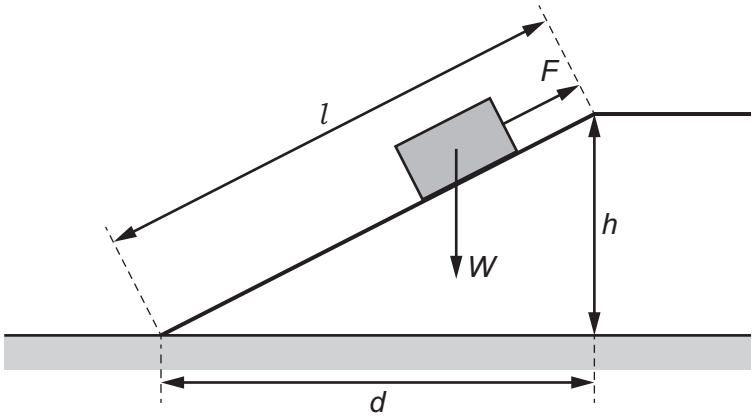
A 4.0 N / cm^2 **B** 16 N / cm^2 **C** 40 N / cm^2 **D** 160 N / cm^2

14 The pressure P of some trapped air is varied. The mass and the temperature of the trapped air remain constant.

Which graph shows how the volume V of the air varies with the pressure P?



15 A constant force *F* pulls a block of weight *W* up the slope shown.



How much work is done by *F* in pulling the block up the slope?

A $F \times h$ **B** $F \times l$ **C** $W \times d$ **D** $W \times l$

16 X and Y are both 40 W, 240 V lamps. Lamp X is more efficient than lamp Y.

Which statement correctly compares X with Y?

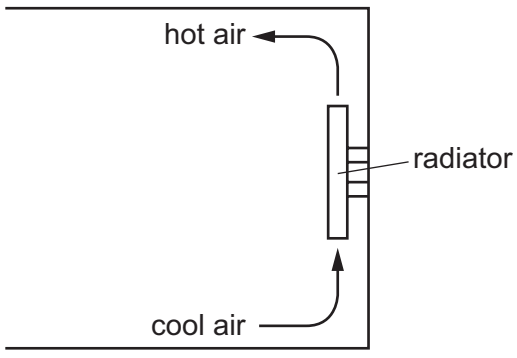
A X is more expensive to run.

B X has a lower electrical resistance.

C X produces less light energy.

D X produces less thermal energy.

17 The diagram shows a radiator heating the air in a room.



What is the name of this process?

A conduction

B convection

C evaporation

D expansion

18 What is a process of heat transfer that can take place in a vacuum?

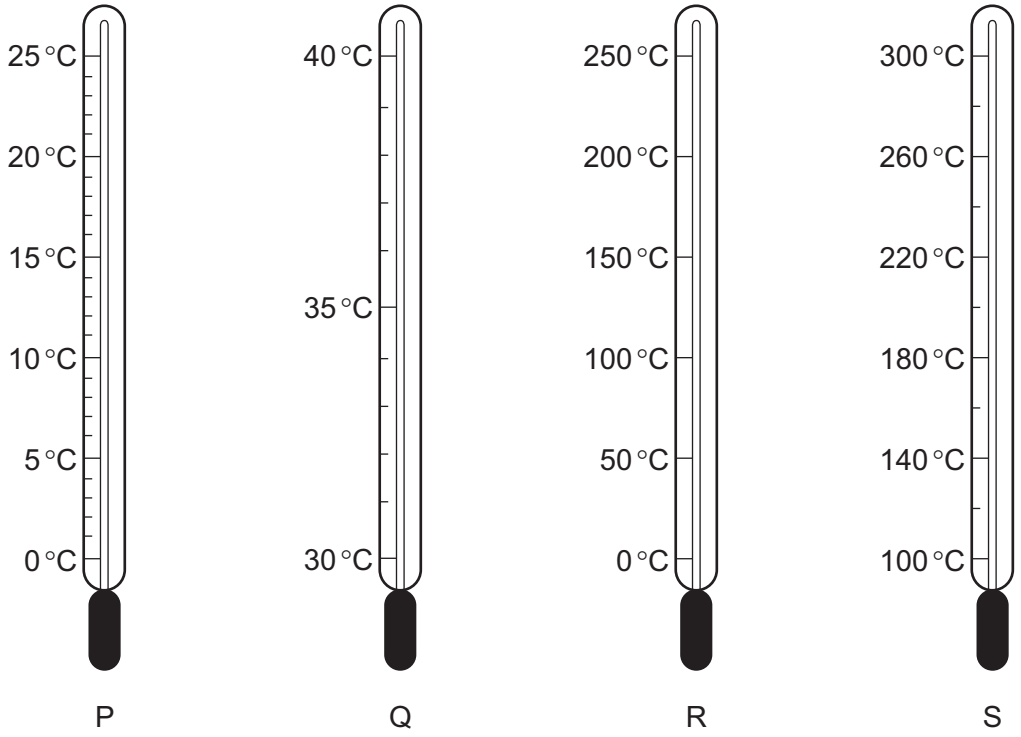
A conduction

B convection

C evaporation

D radiation

19 The diagrams represent four thermometers.



Which thermometer has the greatest sensitivity and which thermometer has the greatest range?

	greatest sensitivity	greatest range
A	P	R
B	P	S
C	Q	R
D	Q	S

20 A piece of iron of mass m is placed in a mixture of ice and water.

Its temperature decreases from θ_1 to θ_2.

How much thermal energy is lost by the piece of iron?

A $m \times$ specific heat capacity of iron $\times (\theta_1 - \theta_2)$

B $m \times$ specific heat capacity of iron $\times \theta_2$

C $m \times$ heat capacity of piece of iron $\times (\theta_1 - \theta_2)$

D $m \times$ heat capacity of piece of iron $\times \theta_2$

21 A kilogram of a substance has a fixed shape.

Thermal energy supplied to the substance weakens the forces of attraction between its molecules.

What is happening?

A A gas is being heated.

B A liquid is at its boiling point.

C A liquid is evaporating.

D A solid is at its melting point.

22 Which conditions produce the greatest rate of evaporation from a liquid?

A high temperature, draught and large surface area of liquid

B high temperature, no draught and large surface area of liquid

C low temperature, draught and small surface area of liquid

D low temperature, no draught and small surface area of liquid

23 Which statement is correct?

A Both longitudinal waves and transverse waves can travel at the speed of light.

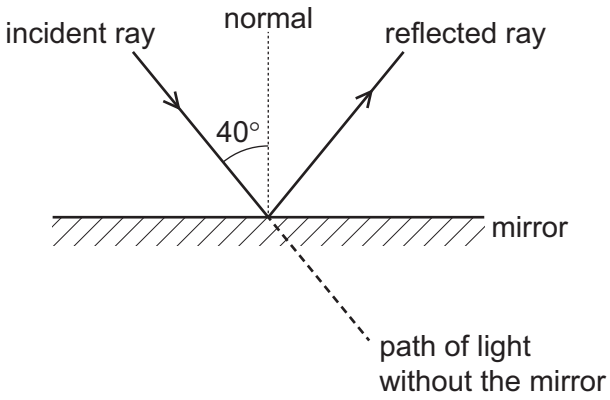
B Both longitudinal waves and transverse waves of similar wavelengths must have similar frequencies.

C Both longitudinal waves and transverse waves can travel in a vacuum.

D Both longitudinal waves and transverse waves can travel in water.

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24 A mirror is placed in the path of a ray of light.



Through which angle does the direction of the ray of light change?

A 40° **B** 90° **C** 100° **D** 140°

25 An oscilloscope is used to demonstrate a sound.

Which feature of the oscilloscope trace is affected by the quality (timbre) of the sound?

A amplitude

B frequency

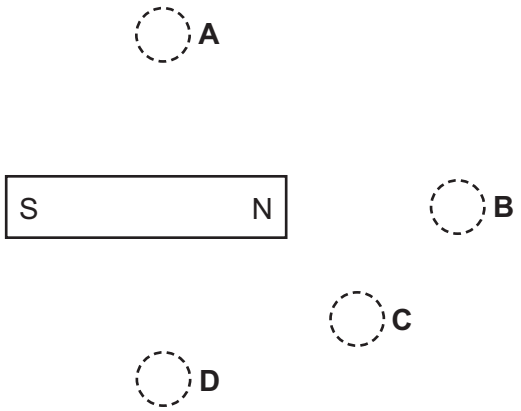
C shape

D wavelength

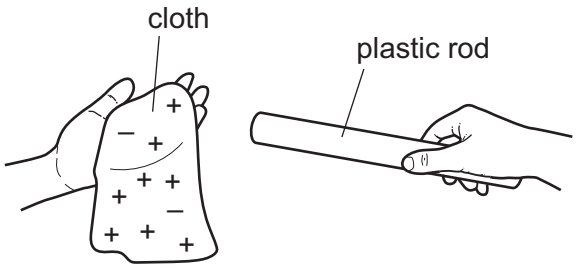
26 Four plotting compasses are placed near a bar magnet. Ignore any effects of the Earth's magnetic field.

One compass appears like this .

What is a possible position for this compass?



27 A plastic rod and a cloth are initially uncharged. The rod is then rubbed with the cloth and the cloth becomes positively charged.



What is the sign of the charge on the plastic rod and why does it become charged?

	charge on rod	reason why rod becomes charged
A	negative	electrons move from the cloth to the rod
B	negative	protons move from the rod to the cloth
C	positive	electrons move from the rod to the cloth
D	positive	protons move from the cloth to the rod

28 Which expression gives the electromotive force (e.m.f.) of a battery?

A work done × time

B work done × charge

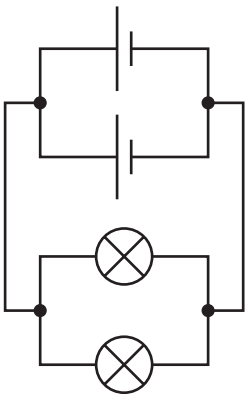
C $\frac{\text{work done}}{\text{time}}$

D $\frac{\text{work done}}{\text{charge}}$

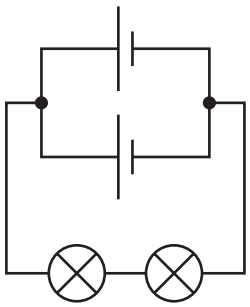
29 A circuit contains two cells and two lamps. The cells are new and are fully charged.

In which arrangement of the cells and lamps do the cells discharge the most quickly?

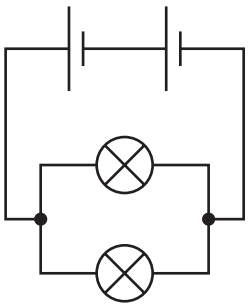
A



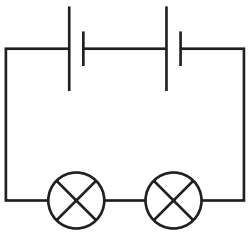
B



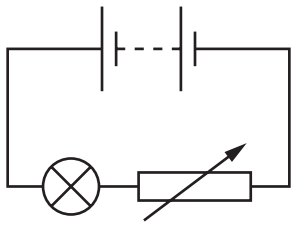
C



D



30 A lamp is connected in series with a battery and a variable resistor. The resistance of the variable resistor is decreased gradually.



Which statement is correct?

A The current in the lamp increases.

B The current in the variable resistor decreases.

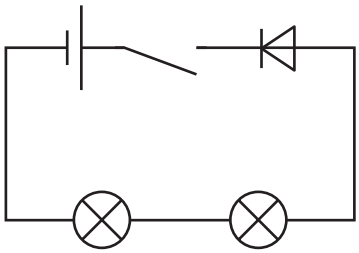
C The e.m.f. of the battery decreases.

D The total resistance in the circuit increases.

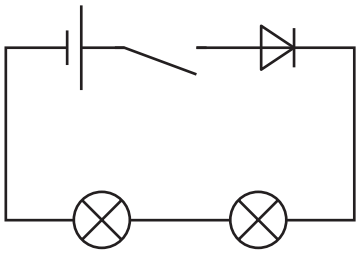
31 In the circuits shown all the cells are identical and all the lamps are identical. The switches are closed.

In which circuit are both lamps the brightest?

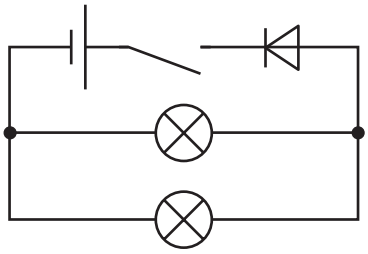
A



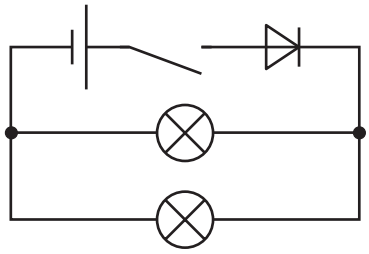
B



C



D



32 Why is a fuse used in an electrical appliance?

A to earth the appliance

B to protect the appliance

C to change the power of the appliance

D to change the voltage supplied to the appliance

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33 Which statement about a transformer is correct?

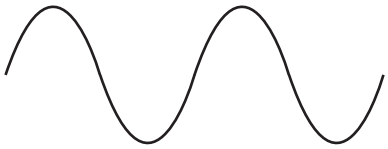
A The changing magnetic field in the transformer induces an e.m.f. in the secondary coil.

B The core of the transformer is made of iron because iron is a good electrical conductor.

C The transformer converts alternating current to direct current.

D The transformer converts direct current to alternating current.

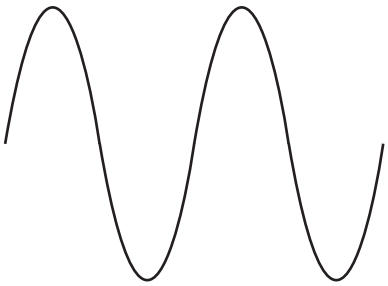
34 The diagram shows the output from an a.c. generator displayed on an oscilloscope screen.



The generator is turned at a slower rate. The settings on the oscilloscope controls are not changed.

Which diagram shows the new output?

A



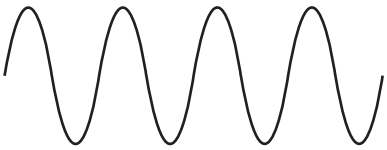
B



C

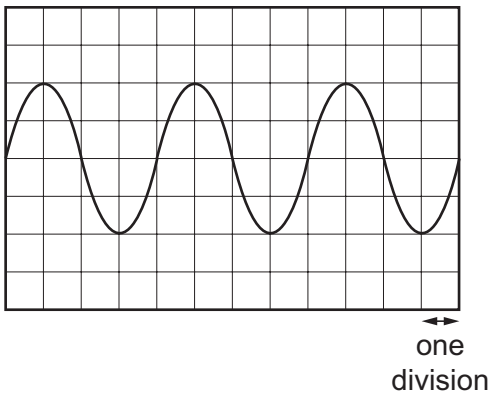


D



35 The sound wave produced by a note is displayed on the screen of a cathode-ray oscilloscope.

The time-base is set at 5 ms for one division.



What is the frequency of the note?

A 20 Hz **B** 50 Hz **C** 60 Hz **D** 150 Hz

36 Three types of radiation emitted by unstable nuclei are helium nuclei, short wavelength electromagnetic waves and electrons.

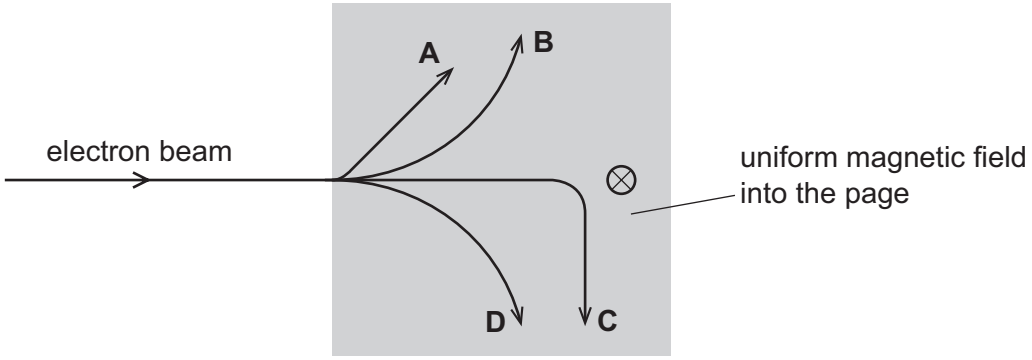
What are these three types of radiation?

	helium nuclei	electromagnetic waves	electrons
A	alpha	gamma	beta
B	beta	gamma	alpha
C	gamma	alpha	beta
D	gamma	beta	alpha

37 A beam of electrons is fired into a uniform magnetic field as shown.

The direction of the magnetic field is into the page.

Which path do the electrons follow?



38 Which statement about all three types of radioactive emissions is correct?

A They are all completely absorbed by a thin aluminium sheet.

B They are all deflected by electric fields.

C They are all deflected by magnetic fields.

D They all cause ionisation of gases.

39 What is meant by the half-life of a radioactive substance?

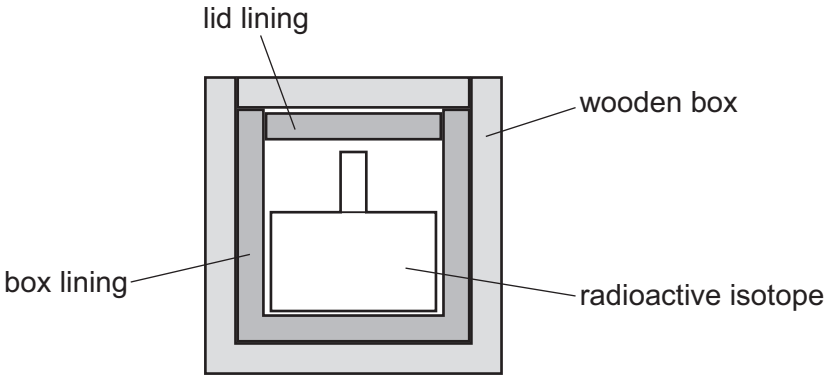
A half the time for all the unstable nuclei to decay

B half the time it takes an unstable nucleus to emit radiation

C the time for half the unstable nuclei to decay

D the time for the nucleon number to halve

40 Radioactive isotopes that emit alpha-particles, beta-particles and gamma rays are stored in wooden boxes that are lined with a material that prevents most radiation escaping from the box.



Which material is used for the lining?

A copper

B glass

C lead

D plastic

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