EXAMINATIONS COUNCIL OF ZAMBIA

Examination for School Certificate Ordinary Level

Physics   5054/1

Paper 1 Multiple Choice

Wednesday   7 November 2018

Additional Materials:
Multiple Choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)
Electronic Calculator (non-programmable)

Time: 1 hour

Instructions to Candidates

Look at the left hand side of your Answer Card. Ensure that your **name**, the **school/centre name** and **subject paper** are printed. Also ensure that the **subject code**, paper number, **centre code**, **your examination number** and the **year** are printed and shaded. Do not change the already printed information.

There are **forty (40)** 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 Answer Card provided.

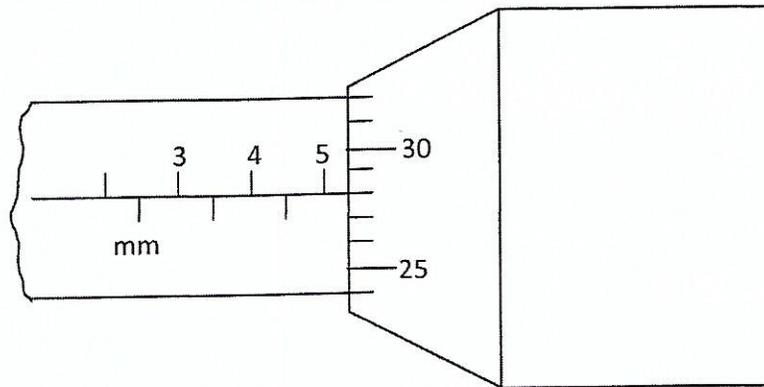## Information for Candidates

Each correct answer will score one mark.
Any rough working should be done in this Question Paper.

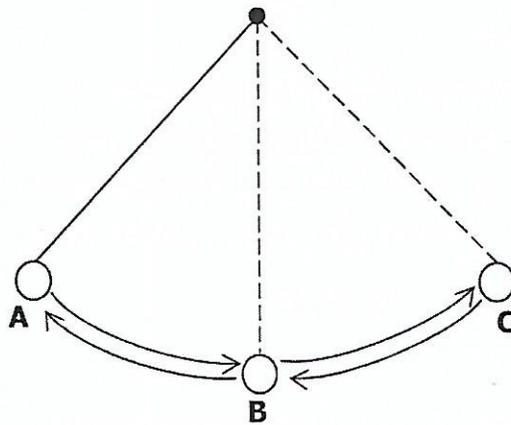**Cell phones are not allowed in the examination room.**

1   The diagram below shows an instrument being used to measure the diameter of a small ball bearing

If the instrument has a zero error of -0.02mm, what is the diameter of the wire?

A   5.26mm
B   5.28mm
C   5.30mm
D   5.83mm

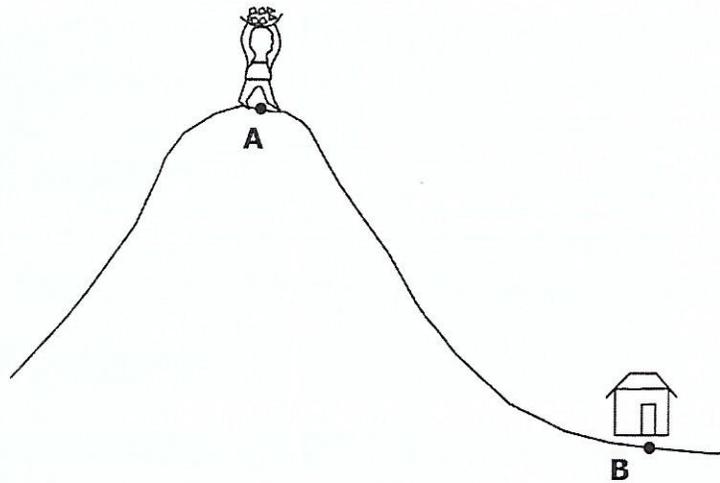2   The diagram below shows a pendulum with a bob swinging from **A** to **C** and back to **A**.

If it takes 10.4 seconds for 20 oscillations, how long does it take for the bob to move from **A** to **C**?

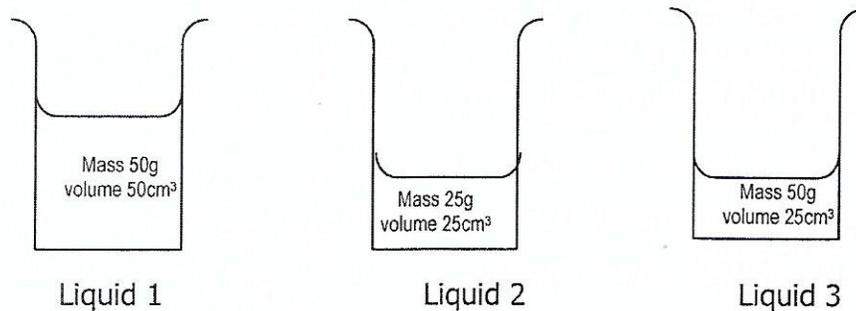A   0.26 sec
B   0.52 sec
C   1.92 sec
D   0.96 sec

3   The diagram below shows a potter carrying clay soil from point **A** to point **B**.

What changes occur to the mass and weight of the clay soil at **B**?

	Mass	**Weight**
A	increases	increases
B	decreases	decreases
C	remains same	increases
D	remains same	decreases

4   Three liquids were poured into beakers of the same mass as shown below.

Mass 50g volume 50cm³   Mass 25g volume 25cm³   Mass 50g volume 25cm³

Liquid 1   Liquid 2   Liquid 3

Which statement about the densities of the liquids is correct.

A   Liquid 1 has twice the density of liquid 3.

B   Liquid 3 has twice the density of liquid 2.

C   The liquids all have different densities.

D   The liquids all have the same density

5 The diagram below shows a strip of paper tape that has been pulled under a vibrating arm by a moving object. The arm is vibrating regularly, making 50 dots per second.

Direction of movement
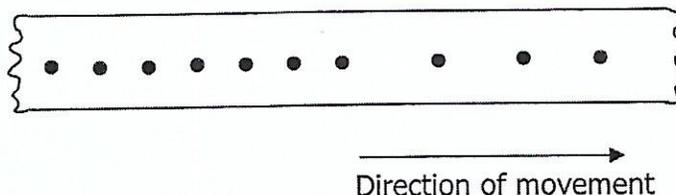
Which statement describes the motion of the object? It ...

A accelerated then moved at a steady speed.

B accelerated then slowed down.

C moved at a steady speed and then accelerated.

D moved at a steady speed and then slowed down.

6 A motor cycle, travelling at 20m/s takes 5 seconds to stop.

Its average retardation is ...

A $-4m/s^2$.

B $-5m/s^2$.

C $4m/s^2$.

D $5m/s^2$.

7 Which of the following has an acceleration of $5m/s^2$? A ...

A bicycle, when its speed changes from rest to 25m/s in 2 seconds.

B motorbike, when its speed changes from rest to 50m/s in 10 seconds.

C lorry, when its speed changes from rest to 15m/s in 5 seconds.

D car, when its speed changes from rest to 20m/s in 5 seconds.

8 A spring which obeys Hooke's Law extends from 10cm to 25cm by a force of 15N. What force extends the same spring by 13cm?

A 1.3N

B 1.5N

C 13N

D 15N.

9   The diagram below shows a uniform beam pivoted at its centre. It supports three weights W_1, W_2 and W_3, at D_1, D_2 and D_3 and also force F_1 at a distance D_4.
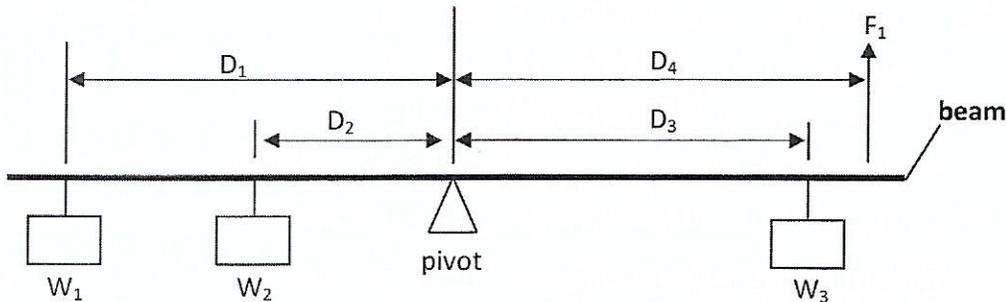
Which one of the following expressions can be used to determine F_1?

A $(W_1 \times D_1) + (W_2 \times D_2) = (W_3 \times D_3) + (F_1 \times D_4)$.

B $(W_1 \times D_1) + (W_2 \times D_2) + (F_3 \times D_4) = (W_3 \times D_3)$.

C $(W_1 \times D_1) + (W_2 \times D_2) - (F_1 \times D_4) = (W_3 \times D_3)$.

D $(W_1 \times D_1) + (W_2 \times D_2) = (W_3 \times D_3) + F_1$.

10   Which of the following is a correct statement when the mass of an object is increased?

Mass ...

A   and acceleration remains constant.

B   is inversely proportional to force.

C   is directly proportional to acceleration for a constant force.

D   is inversely proportional to acceleration for a constant force.

11   The diagram below shows a weight lifter lifting masses through a height of 1.8m (g = 10N/kg).

What is the mass being lifted if the gravitational potential energy increased by 4 500J?

A   25 Kg

B   250 Kg

C   450 Kg

D   810 Kg

12   A tennis ball is dropped onto a horizontal surface. As the ball bounces up and down, the height of each bounce gradually decreases.

During the motion of the ball, the ...

A   kinetic energy of the ball is constant.

B   potential energy of the ball is constant.

C   total energy of the ball, ground and air is constant.

D   sum of the kinetic and potential energies of the ball is constant.

13   At the construction site an escalator is used to carry 20 workers each of average mass 75kg through a height of 8.0m in 1 minute.

What power is needed to lift the workers to the working site?

A   100J/s

B   2 000J/s

C   6 000J/s

D   120 000J/s

14   The diagram below shows a wheel and axle used to raise a load of 280N by a force of 40N applied to the rim of the wheel.

R = 70 cm
r = 5 cm

E = 40N   L = 280N
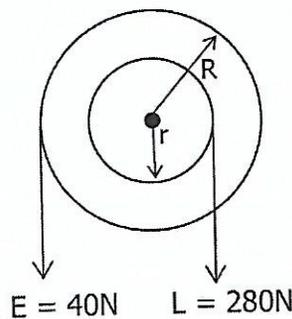
If the radius of the wheel and axle are 70cm and 5cm respectively, what is the Mechanical advantage and efficiency of the system.

	Mechanical advantage	Efficiency
A	7	50%
B	14	60%
C	7	70%
D	10	80%

15   The four tyres of a car of total weight 12 000N are at a pressure of 250 KPa. The area of each tyre in contact with the ground is ...

A $8.8 \times 10^4 m^2$.

B $6.0 \times 10^{-2} m^2$.

C $4.8 \times 10^{-2} m^2$.

D $1.2 \times 10^{-2} m^2$.

16 The drawing pin is easily pushed into the wooden board.

This is because the ...

    A   small area of the point increases the pressure.

    B   large area of the flat head increases the force.

    C   force produces a large moment about the point.

    D   flat head raises the centre of mass.

17 The diagram below shows a liquid in glass thermometer which consists of a bulb containing a liquid. The liquid can expand into a very thin capillary tube.

    bulb   capillary tube

If the liquid in the thermometer is replaced by another liquid that expands more for the same temperature rise, then the new thermometer will have ...

    A   greater range and quick response.

    B   less range and slow response.

    C   same range but less response.

    D   same range but quick response.

18 A boiling liquid absorbs thermal energy (heat) at a rate of 450W. The specific latent heat of vapourisation is 2.7×10^6 J/Kg.

How much liquid is vapourised in 9.0 minutes?

    A   1.5g

    B   11.0g

    C   90.0g

    D   5 400.0g

19 Which **one** of the following is the correct definition of temperature of an object?
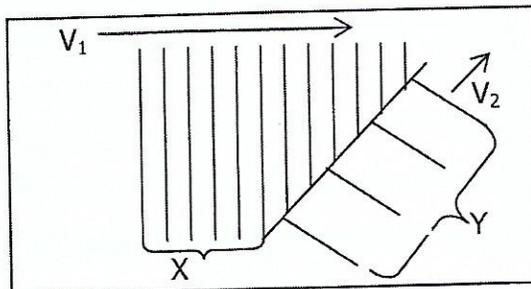
The temperature of an object is ... energy of the object.

    A   the kinetic

    B   the potential

    C   a measure of the internal

    D   a measure of the particles' kinetic

20 The wave length of sound is the ... media

    A   same in all

    B   longest in liquid

    C   shortest in liquid

    D   longest in solid

21 The diagram below shows the waves in a ripple tank in which water in parts **X** and **Y** is of different depths.

How do the wavelengths and the speeds **V₁** and **V₂** of the waves compare in **X** and **Y**.

	Wavelengths	Speeds
A	Greater in X	V_1 is greater
B	Greater in X	V_2 is greater
C	Greater in Y	V_1 is greater
D	Greater in Y	V_2 is greater

22 The diagram below shows how displacement varies with time as a wave passes through a fixed point.
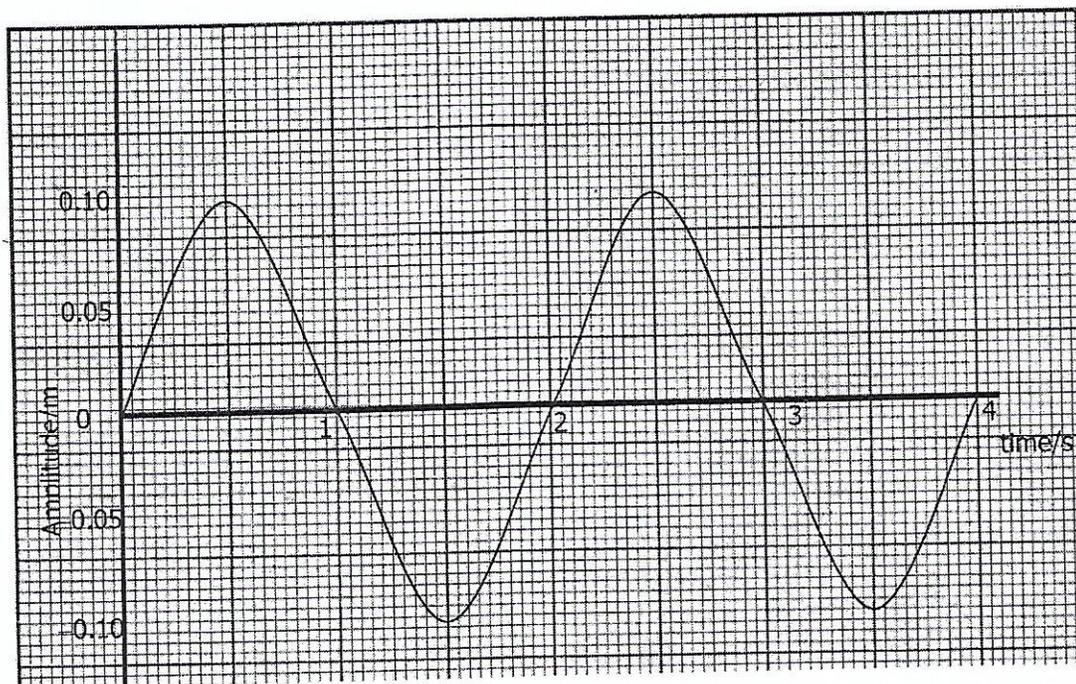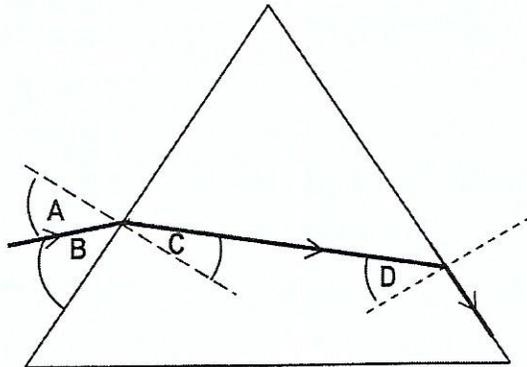

What is the frequency of this wave?

A   0.25Hz

B   0.50Hz

C   1.0Hz

D   2.0Hz

23 If the angle of incidence for light travelling from air to glass is 45° and the refractive index of a glass with respect to air is 1.51
What is the angle of refraction?

    A   28°
   **B**   45°
    C   67.5°
    D   18.6°

24 The diagram below shows the passage of a ray of light through a triangular glass block.

Which one **A, B, C** or **D** is the critical angle of light in the glass block?

25 The human eye contains a converging lens system which produces an image at the back of the eye. If the eye views a distant object, what type of image is produced?

    A   Real, erect, diminished
    B   Real, inverted, diminished
    C   Virtual, erect, diminished
    D   virtual, inverted, diminished

26 The diagram below shows a learner standing 165m in front of a wall. He claps his hands once.
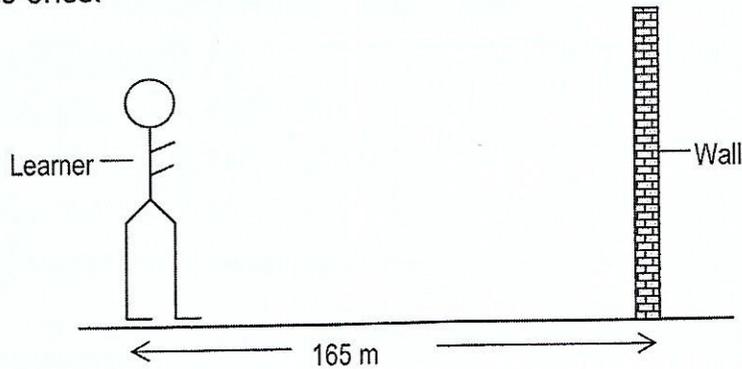
How long after the hand clap does he hear the echo? (speed of sound in air is 330m/s)

A   0.25 sec
B   0.50 sec
C   1.0 sec
D   2.0 sec

27 **N – S** is a magnet which is brought near two steel metal bars labelled **R – T** and **P – Q** as shown below.
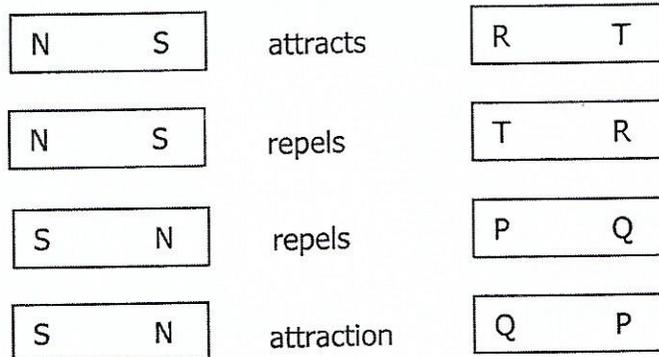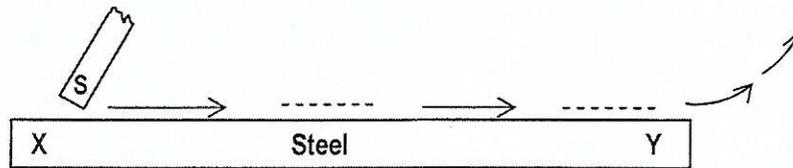

From this, it can be deduced that there is a permanent magnetic north pole at …

A   P only
B   T only
C   R and P
D   T and Q

28   A piece of steel can be magnetised by stroking it with a magnet as shown in the diagram below.


When the magnet is moved in the direction shown, which poles are produced at **X** and **Y**?

|	X	Y
A	North	North
B	North	South
C	South	South
D	South	North

29   What is static electricity?

A   Ability to attract small objects.

B   Ability to repel charges in an object.

C   When objects become positively charged.

D   An imbalance of electric charges within a material.

30   If electricity costs K0.60 per unit, what is the cost for heating a tank of water with a 3 000W immersion heater for 1 hour 30 minutes?

A   K7.20

B   K4.50

C   K2.70

D   K1.80

31   A light bulb needs 0.25 ampere to light brightly.

What charge has moved through the light bulb after it has been lighting for 10 minutes?

A   2.5 C

B   150 C

C   250 C

D   600 C

[Turn over

32   The diagram below shows high voltage cables used to transmit electrical energy.
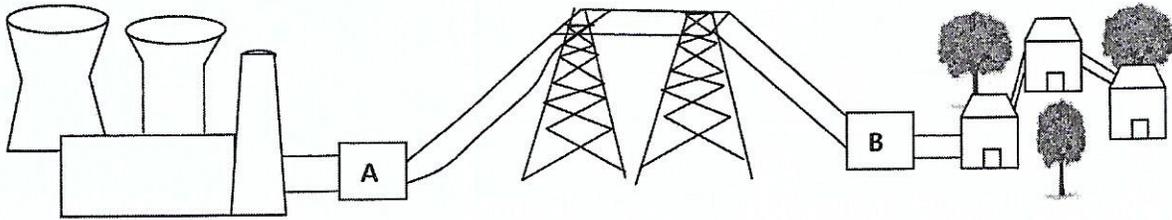

The purpose of transformer **B** is to ...

A   reduce heating loss in the cables.

B   step down the alternating voltage from high value to a low value.

C   step up the alternating voltage from a low value to a high value.

D   step down the alternating current from a high value to a low value.

33   A current flows in a wire hanging between the poles of a magnet. In which direction **A, B, C and D** does the wire move?
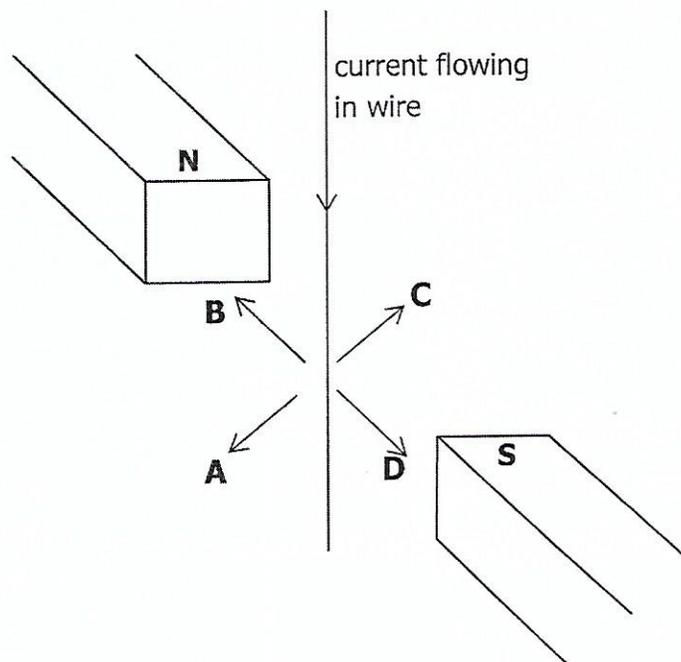
34 In a cathode ray oscilloscope (CRO), when the deflections of the spot with time base is on, which of the following diagrams shows **Y** input zero?

A   B   C   D
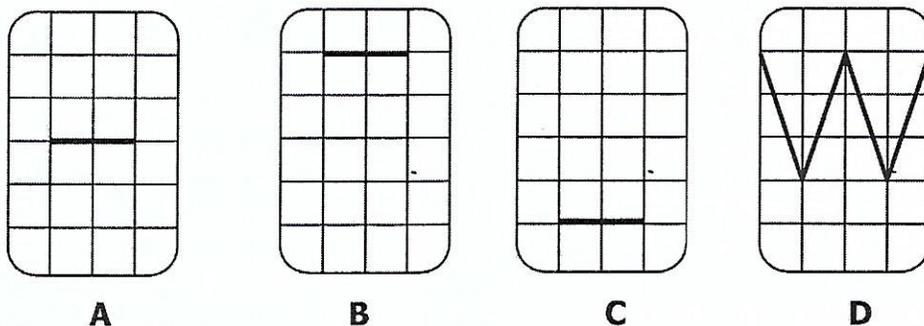
35 The diagram below shows some circuit symbols.

1   2   3
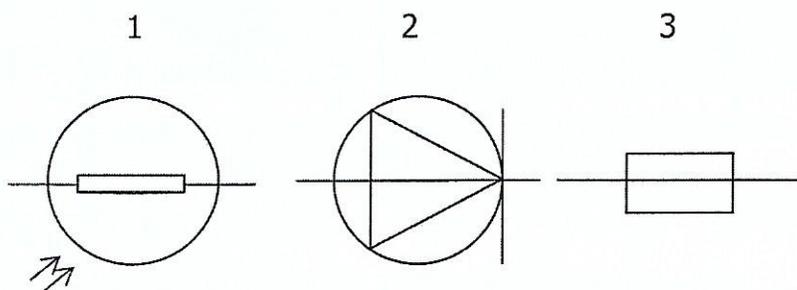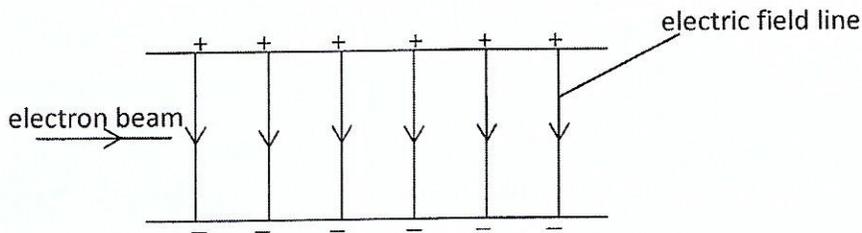

Which is the correct order of the symbols above?

	Diode	Light dependent resistor	Electric fuse
A	1	2	3
B	3	2	1
C	2	1	3
D	3	1	2

[Turn over

36 The diagram below shows a truth table

| Input A	Input B	Output C
0	0	0
0	1	1
1	0	1
1	1	1

Which gate is shown by the truth table?

A OR

B NOR

C NAND

D NOT

37 The diagram below shows a horizontal beam of electrons entering a region between two charged plates.

In which direction is the electron beam deflected?

A Upwards

B Downwards

C Into the diagram

D Out of the diagram

38 Which of the following is the correct statement for nuclear fusion? Mass is ...

A gained in the process and energy is released.

B lost in the process and energy is released.

C constant in the process and energy is released.

D lost in the process and energy is constant.

39 The graph shows the activity of a radioactive source over a period of time.
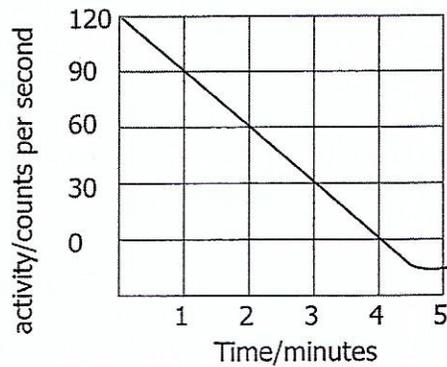
What is the half-life of the source?

A   1 minute

B   2 minutes

C $2\frac{1}{2}$ minutes

D   4 minutes

40 A powder contains 400mg of a radioactive isotope that emits particles.

The half-life of the isotope is 5 days. What mass of this isotope remains after 10 days.

A   0 mg

B   40 mg

C   100 mg

D   200 mg