

EXAMINATIONS COUNCIL OF ZAMBIA

Examination for General Certificate of Education Ordinary Level

Physics

5054/1

Paper 1 Multiple Choice

Monday

31 JULY 2017

Additional Information:

Multiple Choice answer sheet

Soft clean eraser

Soft pencil (type B or HB is recommended)

Electronic Calculator/Mathematical tables

Time 1 hour

Instructions to Candidates

Look at the left hand side of your answer sheet. 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.

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 (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.

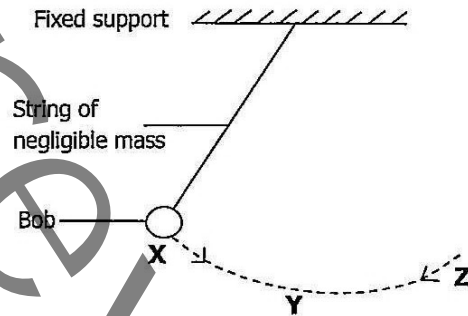
Any rough working should be done in this Question Paper.

Cell phones are not allowed in the examination room.

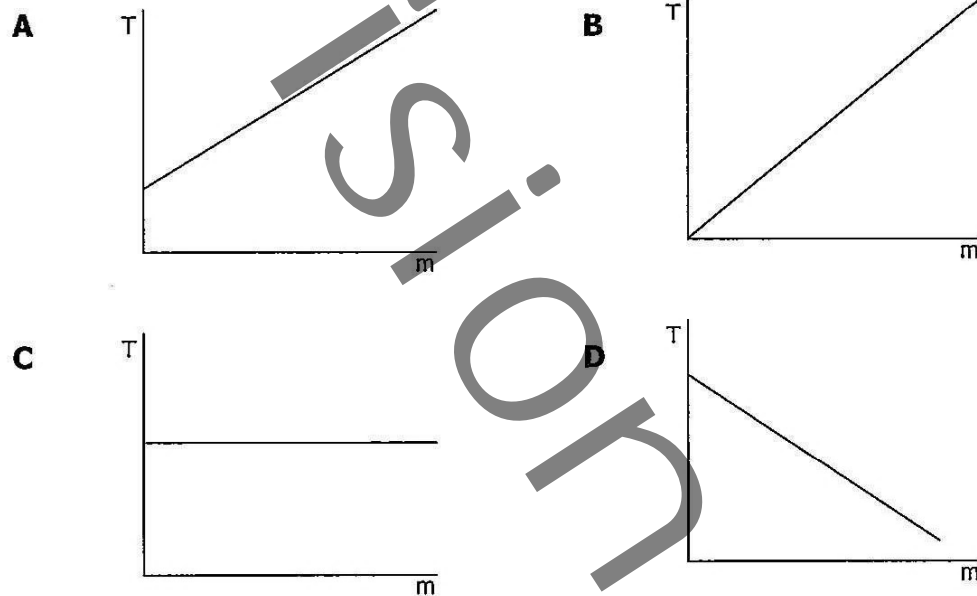
1 Which of the following times is the same in value as 1000 seconds?

- A 10^{-6}ms
- B 10^6ms
- C 10^3ms
- D 10^{-3}ms

2 The diagram below shows a swinging pendulum of length 0.51m.



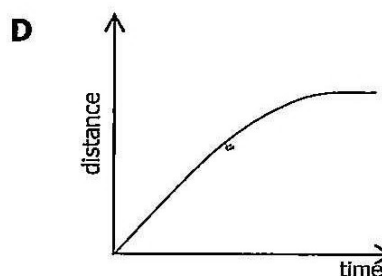
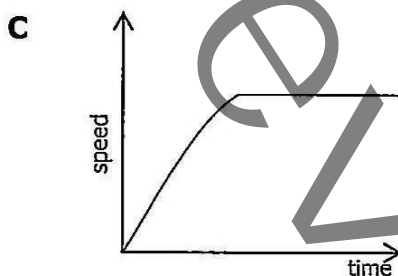
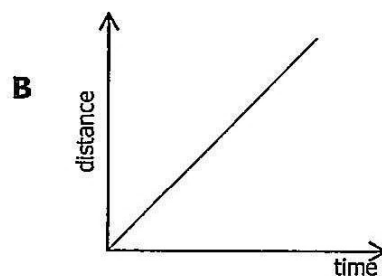
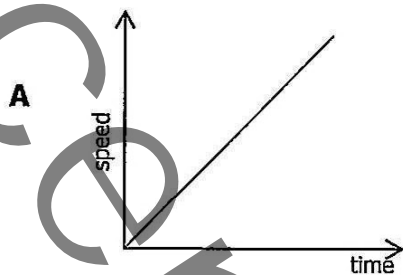
Which of the following graphs correctly shows how the period, T , varies with the mass, m , of the bob?



3 On the surface of the moon the gravitational field strength is 1.6N/kg . If an object is placed on the moon, which values of mass and weight given below apply to such an object?

	Mass/kg	Weight/N
A	20	32
B	20	1.6
C	32	20
D	16	10

- 4 Which graph shows the motion of a stone falling from a height of 3m?



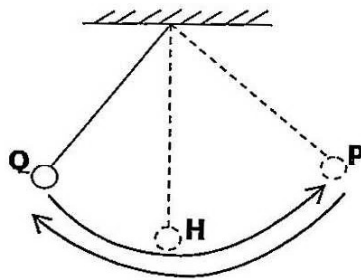
- 5 Which of the following is correct about relative density of a substance?

- A** $\frac{\text{density of substance}}{\text{density of water}}$
- B** $\frac{\text{mass of a substance}}{\text{volume of substance}}$
- C** $\frac{\text{volume of water}}{\text{volume of equal mass of water}}$
- D** $\frac{\text{volume of substance}}{\text{volume of equal mass of water}}$

- 6 A lump of cast iron weighs 5.6N in air and 4.8N in water.
Which of the following statements is correct about the lump of cast iron? It ...

- A** has a density of 56.0 kg/m^3 .
- B** has a volume of 56.0 m^3 .
- C** experiences an up thrust of 4.8N.
- D** displaces water of weight 0.8N.

- 7 The diagram below shows a pendulum oscillating between **Q** and **P** passing through **H**, the lowest point.



At what point does the pendulum have maximum potential energy and maximum kinetic energy?

	Maximum P.E	Maximum K.E
A	Q	P
B	P	Q
C	H	Q
D	P	H

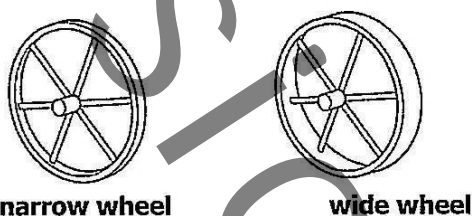
- 8 A learner uses a spring balance to pull an object horizontally along a rough ground. The spring balance reading is then multiplied by the distance moved by the object. What quantity is obtained from this calculation?
- A** Power generated
B Work done on the object
C Efficiency of the process
D Kinetic energy of the object
- 9 A learner performed an experiment to verify Hooke's Law and obtained the following results:

Length of spring (cm)	10	13	16	19	22	25	30	37	48
Load (N)	0	2	4	6	8	10	12	14	16

Between which loads did the learner find the limit of proportionality?

- A** 14N and 16N
B 4N and 8N
C 8N and 12N
D 0N and 4N

- 10** Nine donkeys can pull an ox-cart with a combined force of 800N at a speed of 1.5ms^{-1} for 360 minutes.
What is the average work done by each donkey?
- A** $4.8 \times 10^4\text{J}$
B $4.3 \times 10^5\text{J}$
C $2.6 \times 10^7\text{J}$
D $2.9 \times 10^6\text{J}$
- 11** How much work is done by a machine in lifting a mass of 1kg through a height of 5m?
- A** 50J
B 10J
C 2J
D 0.5J
- 12** A farmer has two ox-carts. The ox-carts have the same weight but one has four narrow wheels and the other has four wide wheels.

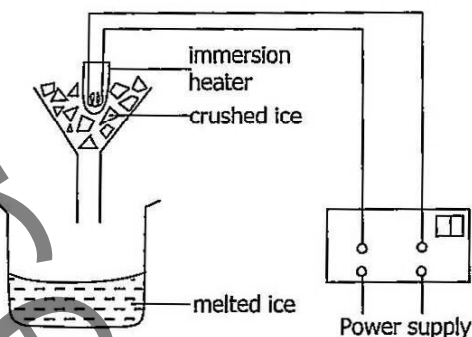


In rainy weather, which ox-cart sinks more into soft ground and why?

	Ox-cart wheels	Explanation
A	Narrow	Greater pressure on the ground.
B	Narrow	Less pressure on the ground.
C	Wide	Greater pressure on the ground.
D	Wide	Less pressure on the ground.

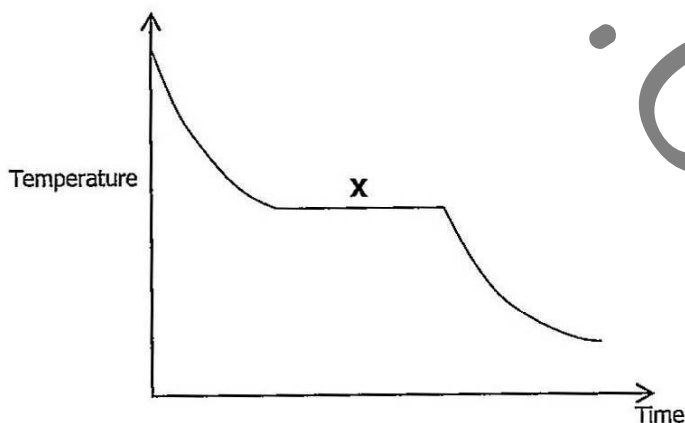
- 13** A car of mass 900kg is at rest. Each of its tyres is in contact with 0.3m^2 of the ground. What is the total pressure exerted by the car on the ground?
- A** 750Pa
B 3000Pa
C 7500Pa
D 30 000Pa

- 14** The diagram below shows the apparatus used in an experiment to determine the specific latent heat of fusion for ice. The joule meter is used to measure the amount of heat supplied to the ice.



What other quantity must be measured in order to determine the specific latent heat of fusion for ice?

- A** Time taken for the ice to melt
 - B** Final temperature of water
 - C** Temperature change of the ice
 - D** Mass of the melted ice
- 15** 4200J of heat energy is required to raise the temperature of 4 kilograms of a liquid by 1°C . A further 3300J of heat energy is required to change a unit mass of the same substance from liquid to vapour at the same temperature. Which of the following statements is correct? The ...
- A** heat capacity of the substance is 4200J.
 - B** substance is impure water.
 - C** latent heat of the substance is 13200J.
 - D** whole substance requires 7500J to change to vapour.
- 16** A hot liquid was poured in a beaker. The graph below shows how temperature of the liquid changes as it cools to room temperature.



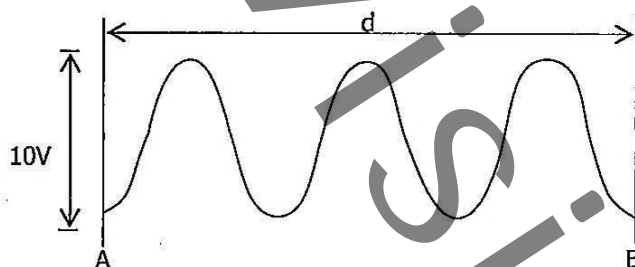
What is taking place at region **X**?

- A** Boiling and evaporation
- B** Condensation only
- C** Evaporation only
- D** Solidification and evaporation

- 17** A copper rod is heated on one end.
Which statement describes how heat transfer occurs in the rod?
Copper atoms ...

- A** move from the cooler end to the hotter end.
- B** move from the hotter end to the cooler end.
- C** vibrate more on the cooler end than the hotter end.
- D** vibrate more at the hotter end than the cooler end.

- 18** The diagram below shows a sound wave as seen on an oscilloscope.



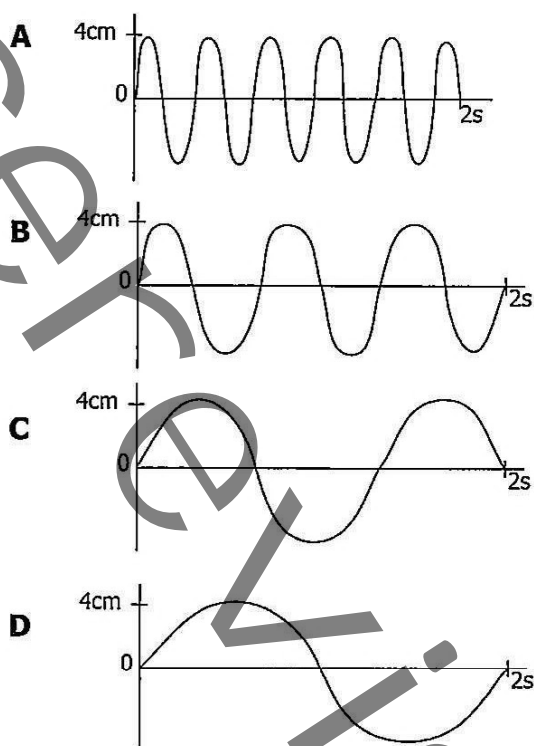
The period of the wave is 5.0×10^{-9} s and the speed of sound is 400 m/s.
Find the frequency, wavelength, distance and amplitude of the wave.

	Frequency/Hz	Wavelength/m	Distance, d/m	Amplitude/v
A	2.0×10^8	2.0×10^{-6}	6×10^{-6}	5
B	2.0×10^6	2.0×10^{-7}	6×10^{-6}	10
C	200×10^8	2.0×10^{-7}	6×10^{-7}	10
D	200×10^8	2.0×10^{-6}	6×10^{-6}	5

- 19** A wave of frequency 13 000 Hz travels 1300 m in 4.0 seconds.
What is the wavelength of the wave?

- A** 0.025 m
- B** 0.400 m
- C** 2.500 m
- D** 4.000 m

20 The following diagrams represent four sound waves.

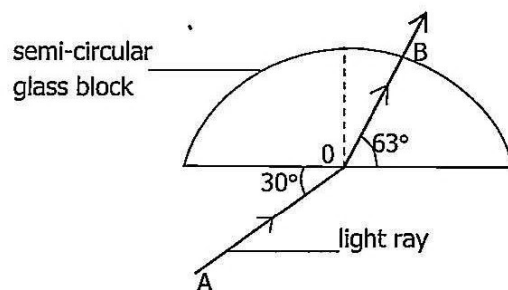


Which of the waves may be dangerous to the human ear?

21 A fire alarm is not loud enough. An engineer adjusts it so that it produces a note of the same pitch which is louder. What effect does this have on the amplitude and on the frequency of the sound?

	Amplitude	Frequency
A	Larger	Larger
B	Larger	Same
C	Same	Larger
D	Same	Same

22 The diagram below shows a ray of light AO incident at point O and refracted as OB.



Determine the angle of incidence and the refractive index.

	Angle of incidence	Refractive index
A	30°	0.56
B	30°	1.90
C	60°	1.90
D	60°	0.56

- 23 The diagram below represents the electromagnetic spectrum.

1	Micro-waves	2	3	Ultra-violet	4	5
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Which of the following correctly shows the wave bands 1, 2, 3, 4 and 5?

	1	2	3	4	5
A	Radio	Visible light	X-rays	Infra-red	Gamma
B	Gamma	X-rays	Visible light	Infra-red	Radio
C	Gamma	Infra-red	Visible light	X-rays	Radio
D	Radio	Infra-red	Visible light	X-rays	Gamma

- 24 Which of the following applications uses infra-red radiation?

- A** Detecting small cracks in metal joints.
- B** Controlling electronic circuits by remote.
- C** Vaccination of babies.
- D** Land phone communication.

- 25 A metal bar **PQ** hanging from a thin thread comes to rest with one same end always pointing in the same direction. Another bar **AB** of the same material and size settles in no definite direction after disturbance.

What would happen when the two bars are brought close to each other?

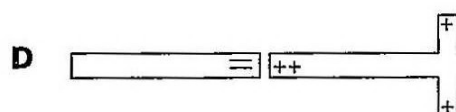
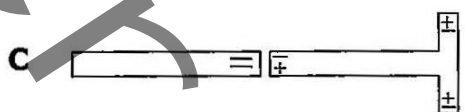
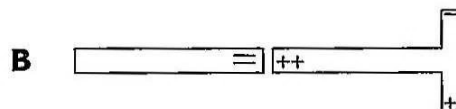
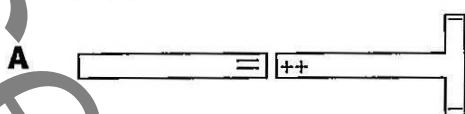
- A** End **P** and end **Q** will attract end **A**.
- B** End **P** attracts end **A** but repels end **B**.
- C** End **P** neither attracts nor repels end **A**.
- D** End **Q** repels both end **A** and end **B**.

- 26 When demagnetising a wrist watch using electrical method, it is important to ensure that no residual magnetism remains in the watch.

How can this state be achieved? By ...

- A** increasing the current in the solenoid.
- B** placing the solenoid in the East-West direction.
- C** insulating the solenoid containing the wrist watch.
- D** increasing the frequency of the changing flux.

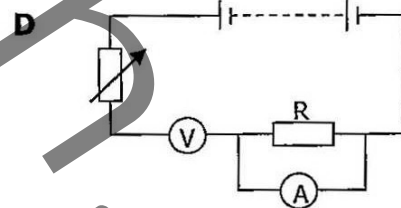
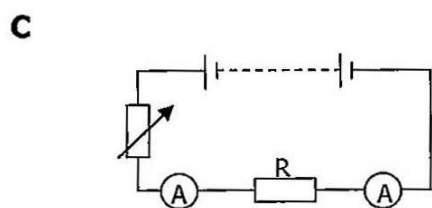
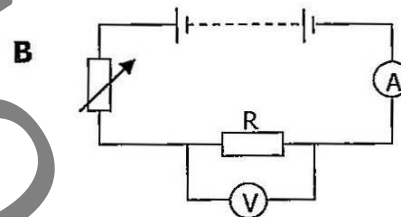
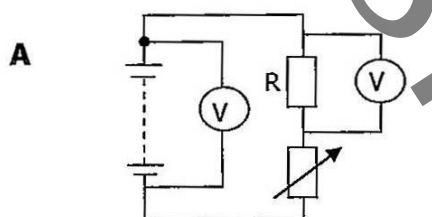
- 27** A negatively charged rod is brought close to an uncharged T-shaped piece of metal. Which diagram represents the correct arrangement of charge due to induction?



- 28** An electric lamp is rated 240V, 60W.
What current flows through the filament when the lamp is being used correctly?

- A** 4.00A
B 2.00A
C 0.50A
D 0.25A

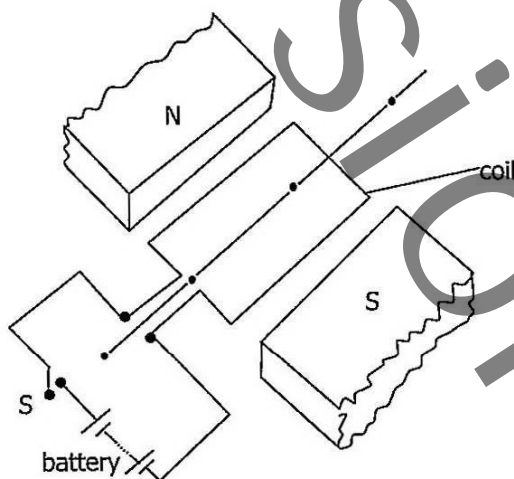
- 29** Which circuit diagram should be used in order to determine the resistance of resistor **R**?



- 30** What would be the best fuse to be used where an element rated 240V, 1000W is being used correctly?

- A** 3A
B 5A
C 10A
D 13A

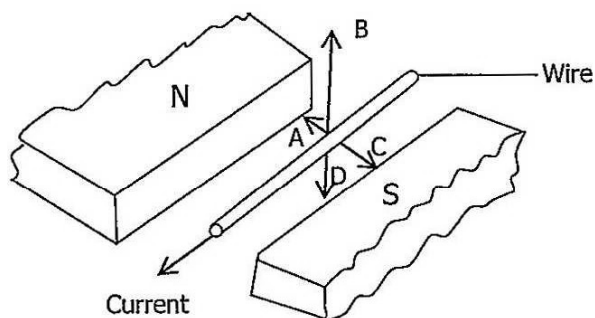
- 31** An electric cooker has an oven rated 3000W, a grill rated 2000W and two heater plates each rated 900W. The cooker operates from a 240V mains supply. If the cost of electricity is 55 ngwee per unit of electricity, what would be the cost of running the oven, the grill and the two heater plates for 5 hours?
- A** K18.70
B K16.23
C K3.74
D K3.25
- 32** Which of the following will cost the most if operated from the mains supply?
- A** 5000W electrical cooker for 1 minute.
B 1000W electric fire used for 10 minutes.
C 500W electric iron used for 1 hour.
D 100W lamp used for 1 day.
- 33** A simple model of a d.c motor is made but the split-rings are left out. The coil is however still connected to the battery as shown in the diagram below.



If the coil is able to turn, describe the movement of the coil once the switch **S** is closed. It ...

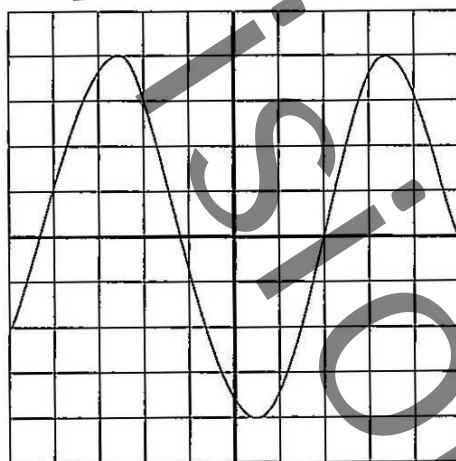
- A** does not move at all.
B moves upwards and out of the magnetic field.
C turns to the vertical position and stops there.
D turns to the vertical position, then comes back to the horizontal position.

- 34 The diagram below shows a current-carrying wire in a horizontal magnetic field.



Which arrow shows the direction of the force experienced by the wire?

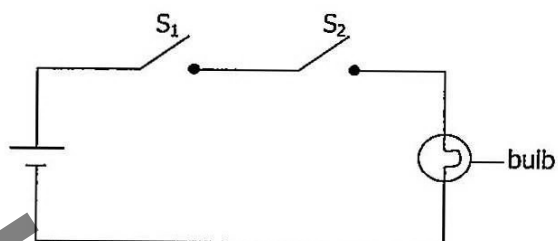
- 35 The diagram below shows a sine wave for an a.c. input on the screen of a cathode ray oscilloscope. The gain control is set at 0.50V/cm and the time base at 10ms/cm.



What is the peak voltage and frequency of the a.c. signal?

	Frequency	Peak voltage
A	16.7Hz	2.0V
B	16.7Hz	20V
C	1.67Hz	2.0V
D	1.67Hz	20V

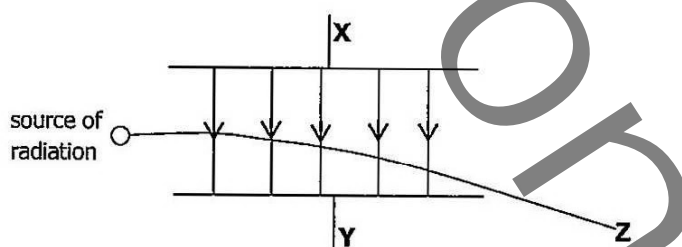
- 36** The diagram below shows an electronic circuit with a cell, two switches and a bulb all connected in series.



Which of the following logic gate does the combination of S_1 and S_2 switches represent which will make the bulb light?

- A**
- B**
- C**
- D**

- 37** The diagram below shows a radiation fired into an electric field.



What is the polarity of the terminals **X** and **Y** and the charge **Z** on the radiation?

	Terminal X	Terminal Y	Radiation Charge Z
A	Negative	Positive	Positive
B	Positive	Negative	Positive
C	Negative	Negative	Positive
D	Positive	Negative	Negative

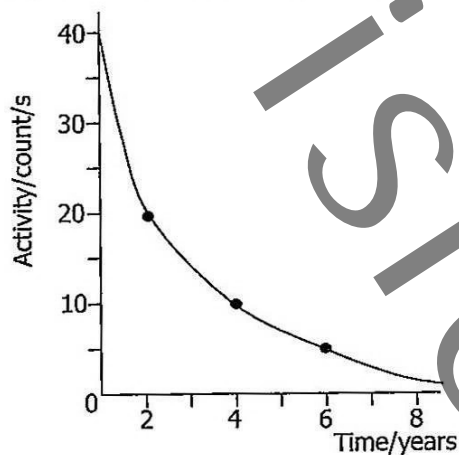
- 38 The diagram below shows a truth table of a logic gate.

Input 1	Input 2	Output
0	0	1
0	1	0
1	0	0
1	1	0

Which of the following logic gates produces the truth table above?

- A AND GATE
- B NOR GATE
- C NAND GATE
- D NOT GATE

- 39 The diagram below shows a decay curve for a radioactive nuclide **M**.



How long does it take for $\frac{15}{16}$ of **M** to decay?

- A 2 years
 - B 3 years
 - C 4 years
 - D 8 years
- 40 How many nucleons are in one neutral atom of Radium isotope $^{228}_{88}\text{Ra}$?
- A 88
 - B 140
 - C 176
 - D 228