

# EXAMINATIONS COUNCIL OF ZAMBIA



Examination for School Certificate Ordinary Level

## Physics

5054/1

### Paper 1 Multiple Choice

2020

#### Additional Materials:

Multiple Choice answer sheet

Soft clean eraser

Soft pencil (type B or HB is recommended)

Electronic Calculator (non-programmable)

**Time: 1 hour**

**Marks: 40**

#### Instructions to Candidates

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- 1 Ensure that the **school/centre name, subject paper, subject code, paper number, centre code, your examination number** and the **year** are correctly printed and shaded on the Answer Sheet. Do not change the already printed information.
- 2 There are **forty** questions in this paper. **Answer all questions.**
- 3 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 Sheet provided.

#### Information for Candidates

- 1 Each correct answer will score one mark.
- 2 Any rough working should be done in this Question Paper.
- 3 **Cell phones are not allowed in the examination room.**



1 Which instrument below can accurately measure the length of 0.023m?

- A Metre ruler
- B Measuring tape
- C Micrometer screw gauge
- D Vernier callipers

2 What is the name and value of the unit of current written as mA?

|   | Name      | Value             |
|---|-----------|-------------------|
| A | Mega Amp  | $10^{-3}\text{A}$ |
| B | Milli Amp | $10^{-3}\text{A}$ |
| C | Mega Amp  | $10^6\text{A}$    |
| D | Milli Amp | $10^6\text{A}$    |

3 Ten identical steel balls, each of mass 27g, were immersed in a measuring cylinder containing  $20\text{cm}^3$  of water. If the water level rose to  $50\text{cm}^3$ , what was the density of the steel?

- A  $13.5\text{g/cm}^3$
- B  $9.0\text{g/cm}^3$
- C  $8.1\text{g/cm}^3$
- D  $0.9\text{g/cm}^3$

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4 A learner was given a beaker containing 1 000 cubic centimetres of mercury. Given that the density of mercury is  $13.6\text{g/cm}^3$ , what was the mass of the mercury?

- A 1.36g
- B 13.6g
- C 1 360g
- D 13 600g

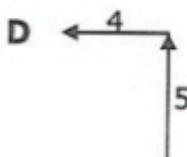
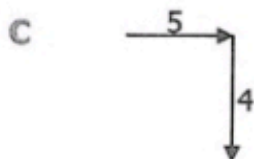
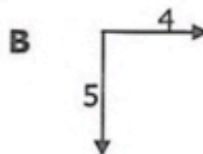
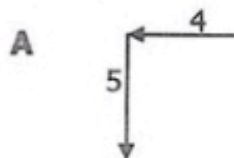
5 Which combination below shows vector and scalar quantities?

|   | Scalar   | Vector  | Scalar |
|---|----------|---------|--------|
| A | Momentum | Weight  | Power  |
| B | Work     | Current | Power  |
| C | Momentum | Weight  | Moment |
| D | Work     | Current | Moment |

- 6 The diagram below shows a resultant vector of magnitude 6.4N in the direction shown.



Which diagram shows the components of the above vector?



- 7 A learner drops a table tennis ball in air. What happens to the velocity and to the acceleration of the ball during the first few seconds after being released?

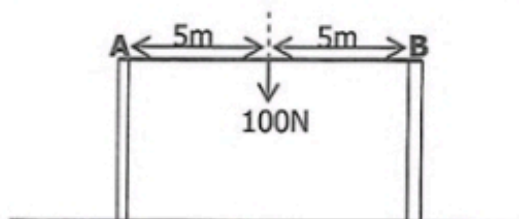
|   | Velocity  | Acceleration     |
|---|-----------|------------------|
| A | Increases | Decreases        |
| B | Decreases | Increases        |
| C | Increases | Remains the same |
| D | Decreases | Remains the same |

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- 8 A car starting from rest travels 45m in 4s. What is the car's acceleration and velocity at this time?

|   | Acceleration ( $\text{m/s}^2$ ) | Velocity ( $\text{m/s}$ ) |
|---|---------------------------------|---------------------------|
| A | 3.000                           | 20.0                      |
| B | 5.625                           | 22.5                      |
| C | 6.000                           | 25.0                      |
| D | 10.625                          | 32.5                      |

- 9 The diagram below shows a uniform metal bar **AB** on a goal post of length 10m and weight 100N.

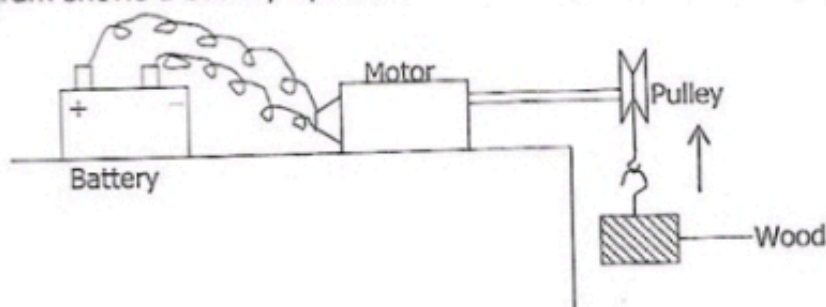


What is the upward force at **B**?

- A 4N  
B 10N  
C 20N  
D 50N

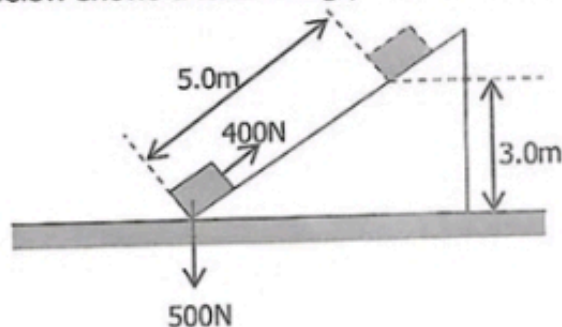
- 10 A body of mass 25kg was pulled across a level ground with a horizontal force of 60N. If the constant frictional force was 20N, what was the acceleration of the body?
- A  $1.2\text{m/s}^2$   
 B  $1.6\text{m/s}^2$   
 C  $2.4\text{m/s}^2$   
 D  $3.2\text{m/s}^2$

- 11 The diagram shows a battery-operated motor lifting a block of wood at constant speed.



What is the overall energy change taking place?

- A Chemical  $\rightarrow$  gravitational potential  $\rightarrow$  mechanical  
 B Gravitational potential  $\rightarrow$  electrical  $\rightarrow$  mechanical  
 C Chemical  $\rightarrow$  electrical  $\rightarrow$  mechanical  
 D Kinetic  $\rightarrow$  electrical  $\rightarrow$  mechanical
- 12 The diagram below shows a load being pulled along an inclined plane.



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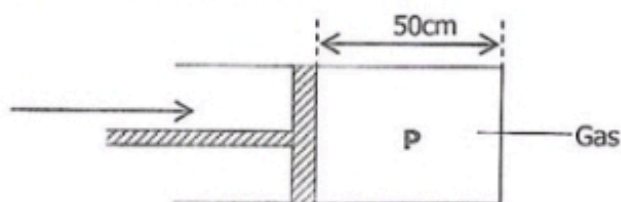
What is the gravitational potential energy (E) and the work done (W) against friction?

|   | E/J   | W/J   |
|---|-------|-------|
| A | 1 200 | 2 500 |
| B | 1 500 | 2 000 |
| C | 2 000 | 1 500 |
| D | 2 500 | 2 500 |

- 13 Which formula gives the efficiency of an energy conversion?
- A Efficiency = total energy input – useful energy output  
 B Efficiency = useful energy output – total energy input  
 C Efficiency =  $\frac{\text{useful energy output}}{\text{total energy input}}$   
 D Efficiency =  $\frac{\text{total energy input}}{\text{useful energy output}}$

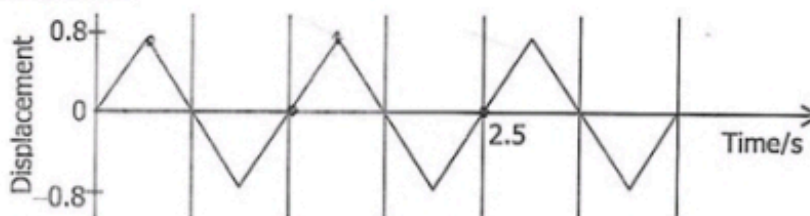


- 14 A gas is trapped inside a cylinder by a movable piston. The length of the gas column is 50cm and the pressure inside the cylinder is  $P$ . The piston is pushed in a distance of 30cm, so that the length of the gas column is now 20cm. The temperature of the gas does not change.



What is the new pressure of the gas?

- A 2.5P  
 B 1.5P  
 C 0.6P  
 D 0.4P
- 15 Which statement is incorrect when a liquid is heated? The molecules ...  
 A expand.  
 B gain energy.  
 C move faster.  
 D move further apart.
- 16 A metal lid fits tightly on a glass jar. Which process makes it easier to remove the lid from the jar?  
 A Cool the lid only  
 B Warm the jar only  
 C Warm the lid only  
 D Put the jar in a refrigerator
- 17 A block of metal has a mass of 2.0kg. Its specific heat capacity is  $800\text{J}/(\text{kg}^\circ\text{C})$ . The block is supplied with 2 400J of energy. What is the rise in temperature?  
 A  $1.5^\circ\text{C}$   
 B  $3.0^\circ\text{C}$   
 C  $4.5^\circ\text{C}$   
 D  $6.0^\circ\text{C}$
- 18 The diagram below shows variation of displacement of a wave with time at a particular point along the wave.



What is the frequency of the wave?

- A 0.625Hz  
 B 0.800Hz  
 C 1.250Hz  
 D 2.500Hz

24 Which expression gives the distance travelled by an echo?

A Distance =  $2 \times \text{speed} \times \text{time}$

B Distance =  $\frac{2 \times \text{speed}}{\text{time}}$

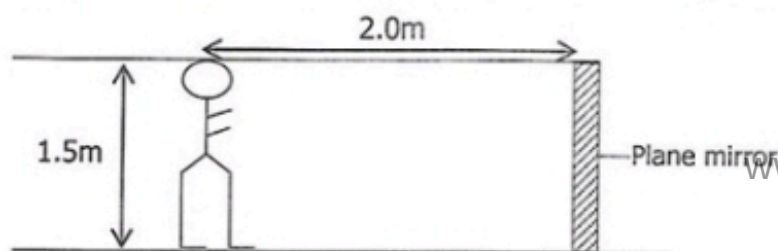
C Distance =  $\frac{2 \times \text{time}}{\text{speed}}$

D Distance =  $\frac{\text{speed} \times \text{time}}{2}$

25 Which row shows parts of the electromagnetic spectrum in order of increasing wavelength?

|   |              |            |              |
|---|--------------|------------|--------------|
| A | Ultra violet | Infra-red  | Microwaves   |
| B | Infra-red    | Microwaves | Ultra violet |
| C | Ultra violet | Microwaves | Infra-red    |
| D | Microwaves   | Infra-red  | Ultra violet |

26 The diagram below shows a learner standing 2.0m in front of a plane mirror.



How far from the person is the image?

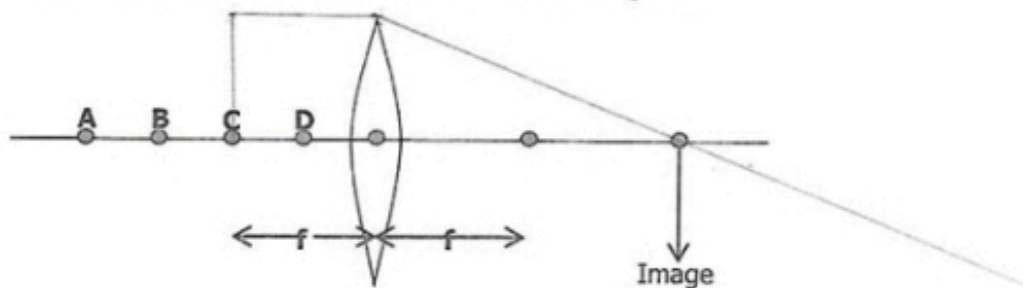
A 2.0m

B 3.0m

C 3.5m

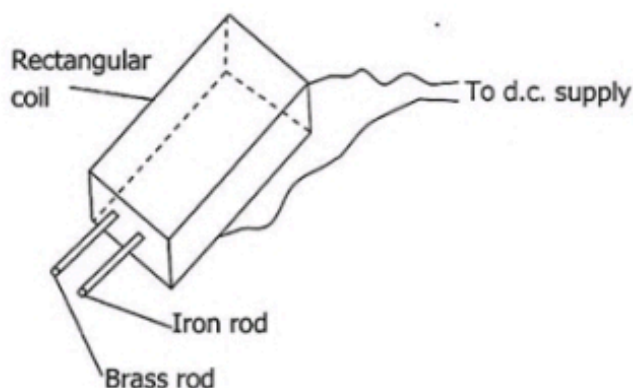
D 4.0m

27 The diagram below shows a converging lens of focal length  $f$ .



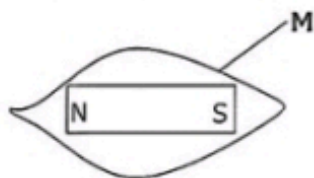
Where should the object be placed in order to produce the image shown?

- 28 The diagram below shows a brass rod and an iron rod beside each other at the bottom of a rectangular coil.



What happens when a direct current (d.c) passes through the rectangular coil?

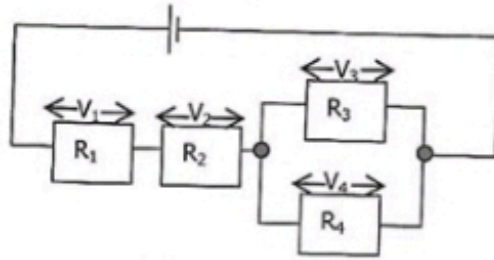
- A The two rods attract each other.
  - B The two rods repel each other.
  - C Only the iron rod is magnetised.
  - D Only the brass rod is magnetised.
- 29 The diagram below shows a magnet enclosed in a piece of metal **M**. A compass brought near the metal is unaffected by the magnet.



What material is metal **M** made of?

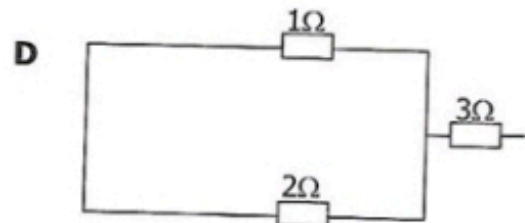
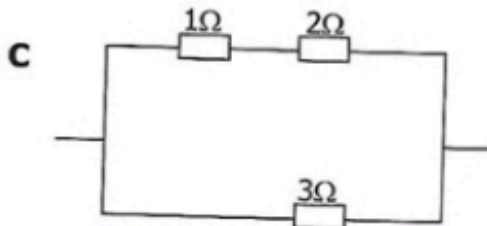
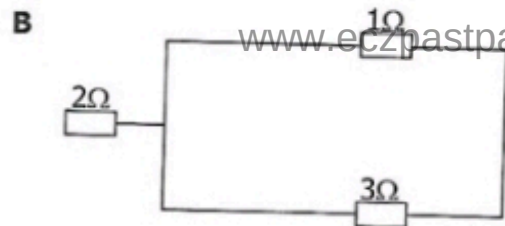
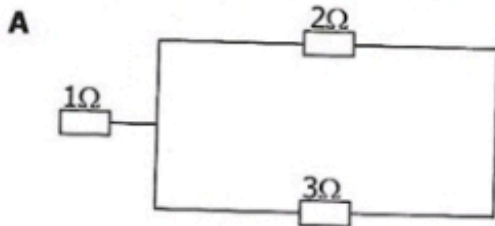
- A Copper
  - B Iron
  - C Silver
  - D Zinc
- 30 When a charge of 10C flows through a lamp, a current of 2A is observed on the ammeter. How much time does the charge take to flow through the lamp?
- A 5s
  - B 12s
  - C 20s
  - D 40s

- 31 The diagram below shows a circuit with a battery. Resistors  $R_1$  and  $R_2$  are connected in series while  $R_3$  and  $R_4$  are connected in parallel. The potential difference across the resistors are  $V_1$ ,  $V_2$ ,  $V_3$  and  $V_4$ .

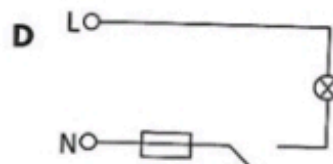
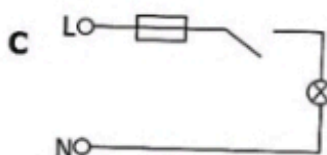
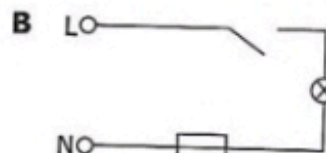
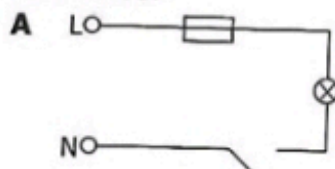


What is the potential difference (p.d) supplied by the battery?

- A  $V_1 + V_2 + \frac{1}{V_3} + \frac{1}{V_4}$
- B  $V_1 + V_2 + V_3 + V_4$
- C  $V_1 + V_2 + V_3$
- D  $V_1 + V_2$
- 32 In an experiment, a resistance of  $1.5\Omega$  is required to determine the current, but resistors available are  $1\Omega$ ,  $2\Omega$  and  $3\Omega$ . Which one of the following arrangements **A**, **B**, **C** or **D** would give the required resistance?



- 33 Which circuit shows the correct positions for the fuse and the switch in the lighting circuit of a house?



Key:

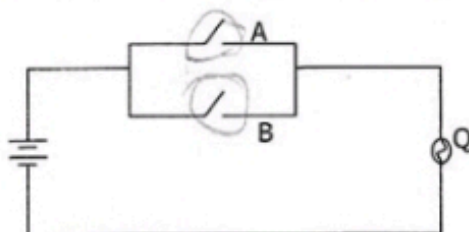
L = Live wire

N = Neutral wire



- 34** A household uses an electric fire rated 3kW and an electric kettle rated 2kW. If electrical energy costs K5.00 per unit, how long did it take the household to accrue a bill of K70.00?
- A** 2 hours  
**B** 4 hours  
**C** 5 hours  
**D** 6 hours

- 35** The diagram below shows a circuit diagram for a logic gate.



Which of the following truth tables has such a circuit?

**A**

| A | B | Q |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 1 |

**B**

| A | B | Q |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 1 |

**C**

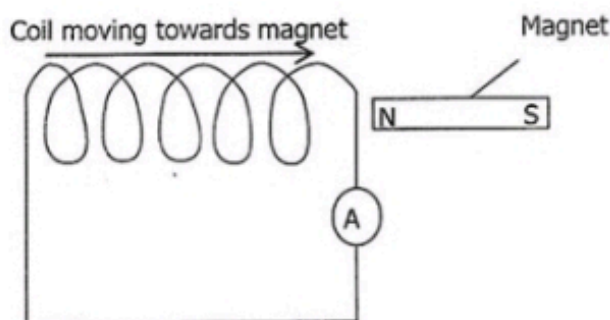
| A | B | Q |
|---|---|---|
| 0 | 0 | 1 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 0 |

**D**

| A | B | Q |
|---|---|---|
| 0 | 0 | 1 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

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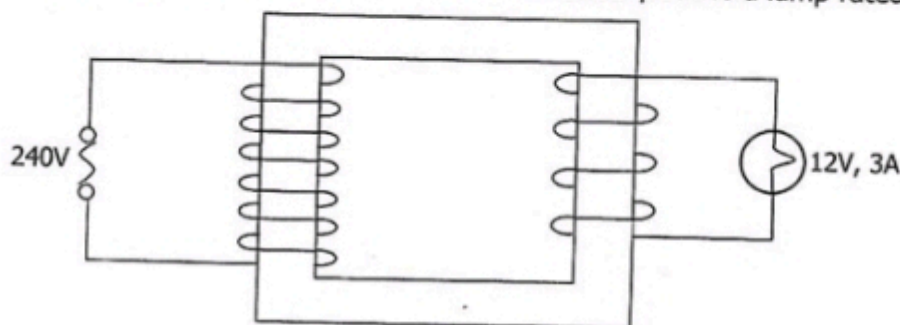
- 36** The diagram shows how a magnet and a coil may be used to induce an electric current.



How could the ammeter reading be increased?

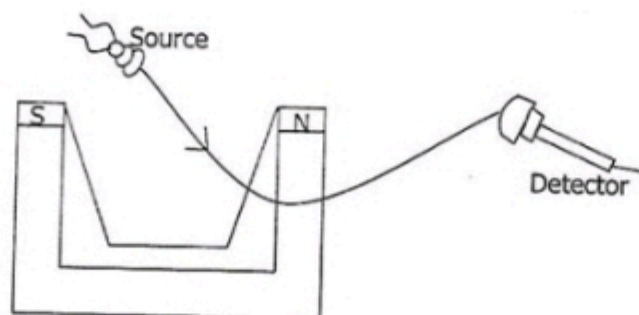
- A** Use a coil with more turns.  
**B** Move the coil more slowly.  
**C** Put a resistor in series with the ammeter.  
**D** Turn the magnet round, then move the coil.

- 37 The diagram below shows a transformer that operates a lamp rated 12V, 3A.



If the transformer has a 240V supply and it is 100% efficient, what current will flow in the supply?

- A 12A
  - B 3.0A
  - C 0.15A
  - D 0.013A
- 38 The diagram shows one type of radiation passing between the poles of a strong magnet and being detected.



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Which type of radiation is being detected?

- A Alpha-particles only
  - B Beta-particles only
  - C Gamma rays only
  - D Alpha and beta-particles
- 39 How many protons, neutrons and electrons are there in an atom of Radium ( $^{226}_{88}\text{Ra}$ )?

|   | No. of protons | No. of neutrons | No. of electrons |
|---|----------------|-----------------|------------------|
| A | 138            | 226             | 88               |
| B | 88             | 88              | 138              |
| C | 138            | 88              | 88               |
| D | 88             | 138             | 88               |

- 40** The half life of a radioactive substance is 3 minutes. What fraction of the radioactive substance will remain after 15 minutes?

- A**  $\frac{1}{4}$
- B**  $\frac{1}{8}$
- C**  $\frac{1}{16}$
- D**  $\frac{1}{32}$