SMARTWIZ

GRADE11 PHYSICAL SCIENCE EXAM

MARKS: 100

MARKS	

TIME: 2 HOURS

SCHOOL _____

CLASS (eg. 4A) _____

SURNAME _____

NAME _____

Instructions for Learners:

• Read all instructions carefully before you begin the exam.

• Write your full name and student number clearly on the answer sheet/book.

• Answer all questions unless otherwise instructed.

• Show all your work/calculations where necessary.

• Write neatly and clearly.

• Use only a blue or black pen. Do not use correction fluid or tape.

• Electronic devices (calculators, cell phones, etc.) are not allowed unless explicitly permitted.

• Raise your hand if you have any questions.

• Do not talk to other learners during the exam.

• Any form of dishonesty will result in immediate disqualification from the exam.

This exam consists of five pages, including the cover page.

Section A: Multiple Choice Questions (20 marks)

Circle the correct answer.

1. What is the unit of electric current?
   a) Volt
   b) Ampere
   c) Ohm
   d) Watt
2. The acceleration due to gravity on Earth is approximately:
   a) 9.8 m/s²
   b) 10 m/s²
   c) 8.9 m/s²
   d) 9.2 m/s²
3. Which of the following is a scalar quantity?
   a) Velocity
   b) Acceleration
   c) Displacement
   d) Speed
4. Newton's third law states that:
   a) For every action, there is an equal and opposite reaction.
   b) Force equals mass times acceleration.
   c) An object in motion stays in motion unless acted upon.
   d) Energy cannot be created or destroyed.
5. The frequency of a wave is the:
   a) Distance between two crests
   b) Number of waves passing a point per second
   c) Time taken for one wave to pass
   d) Speed of the wave

Section B: Short Answer Questions (30 marks)

1. Define **velocity** and explain how it differs from speed. (5 marks)

2. A car accelerates from 0 m/s to 20 m/s in 5 seconds. Calculate its acceleration. (5 marks)

3. State and explain **Newton's first law of motion**. (5 marks)

4. What is **work done**? Write the formula and its units. (5 marks)

_____

_____

5. Describe the difference between **conductors** and **insulators**. Give two examples of each. (10 marks)

_____

_____

_____

Section C: Problems (30 marks)

1. A ball is thrown vertically upwards with an initial velocity of 15 m/s. Calculate:
    a) The time taken to reach the highest point. (3 marks)

    _____
    _____

    b) The maximum height reached. (4 marks)
    (Use g = 9.8 m/s²)

    _____
    _____
    _____

2. An object of mass 10 kg is moving at 5 m/s. Calculate its kinetic energy. (4 marks)

    _____
    _____
    _____

3. A circuit has a voltage of 12 V and a resistance of 4 Ω. Calculate the current flowing through the circuit. (4 marks)

    _____
    _____
    _____

4. A wave has a frequency of 50 Hz and a wavelength of 2 m. Calculate the speed of the wave. (5 marks)

    _____
    _____
    _____

Section D: Diagram and Explanation (20 marks)

1. Draw a labeled diagram of a simple electric circuit with a battery, resistor, and switch. (10 marks)

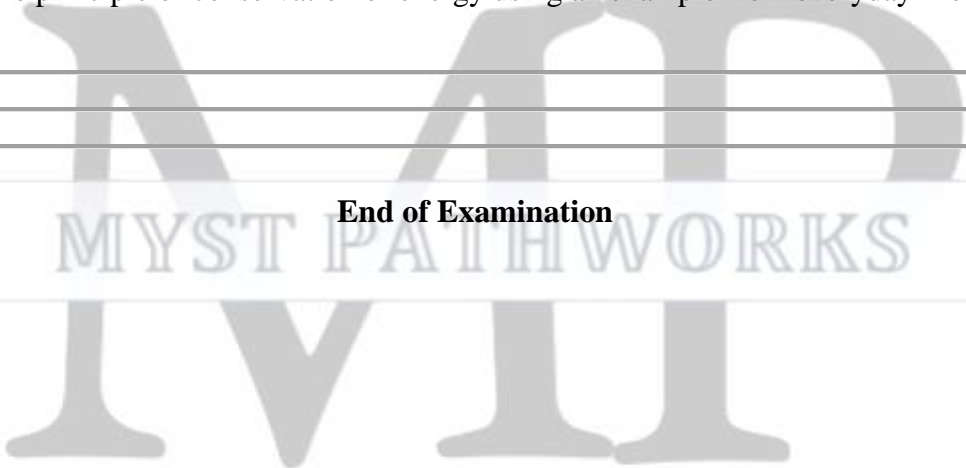2. Explain the principle of conservation of energy using an example from everyday life. (10 marks)

End of Examination

MEMO

Section A: Multiple Choice Questions *(20 marks – 4 marks each)*

1. **b) Ampere**
2. **a) 9.8 m/s²**
3. **d) Speed**
4. **a) For every action, there is an equal and opposite reaction.**
5. **b) Number of waves passing a point per second**

Section B: Short Answer Questions *(30 marks)*

1. **Velocity vs Speed** *(5 marks)*

   - **Velocity** is the rate of change of displacement with direction (vector).
   - **Speed** is the rate of change of distance without direction (scalar).
     (3 marks for definition, 2 marks for comparison)

2. **Acceleration Calculation** *(5 marks)*

   - Formula:
     $a = \frac{v - u}{t} = \frac{20 - 0}{5} = 4 \text{ m/s}^2$
     (1 mark formula, 1 mark substitution, 3 marks for correct answer with units)

3. **Newton's First Law** *(5 marks)*

   - An object will remain at rest or in uniform motion unless acted upon by an external force.
   - Also known as the law of inertia.
     (3 marks for statement, 2 marks for explanation)

4. **Work Done** *(5 marks)*

   - **Definition**: Work is done when a force moves an object in the direction of the force.
   - **Formula**: $W = F \times d$
   - **Unit**: Joule (J)
     (2 marks definition, 2 marks formula, 1 mark unit)

5. **Conductors vs Insulators** *(10 marks)*

   - **Conductors**: Materials that allow electricity to pass (e.g., copper, aluminum)
   - **Insulators**: Materials that do not allow electricity to pass (e.g., rubber, plastic)
     (2 marks for each definition, 1 mark for each example)

Section C: Problems *(30 marks)*

1. **Ball thrown upwards**
   a) **Time to reach highest point**:

   - $v = u + at \Rightarrow 0 = 15 + (-9.8)t \Rightarrow t = \frac{15}{9.8} \approx 1.53 \, \text{s}$
     (3 marks)

b) **Maximum height**:

   - $h = ut + \frac{1}{2}at^2 = 15 \times 1.53 - \frac{1}{2} \times 9.8 \times (1.53)^2 \approx 11.5 \, \text{m}$
     (4 marks)

2. **Kinetic Energy**

   - $KE = \frac{1}{2}mv^2 = \frac{1}{2} \times 10 \times 25 = 125 \, \text{J}$
     (4 marks)

3. **Current in Circuit**

   - $I = \frac{V}{R} = \frac{12}{4} = 3 \, \text{A}$
     (4 marks)

4. **Wave Speed**

   - $v = f \times \lambda = 50 \times 2 = 100 \, \text{m/s}$
     (5 marks)

Section D: Diagram and Explanation *(20 marks)*

1. **Electric Circuit Diagram** *(10 marks)*

   - Correct symbols for battery, resistor, switch.
   - Proper connections and labels.
     (2 marks each for correct symbols and overall layout)

2. **Conservation of Energy** *(10 marks)*

   - Energy cannot be created or destroyed; it only changes form.
   - Example: In a pendulum, energy changes from potential to kinetic and back.
   - Another example: A toaster converts electrical energy into heat.
     (4 marks explanation, 6 marks example with explanation)