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

(10 × 2 = 20 marks)
Circle the correct answer.

1. Which of the following is a vector quantity?
   a) Speed
   b) Distance
   c) Displacement
   d) Time
2. The formula for calculating density is:
   a) Mass × Volume
   b) Mass ÷ Volume
   c) Volume ÷ Mass
   d) Mass + Volume
3. What device measures electric current?
   a) Voltmeter
   b) Ammeter
   c) Ohmmeter
   d) Thermometer
4. The unit of frequency is:
   a) Hertz
   b) Newton
   c) Joule
   d) Watt
5. A freely falling object's acceleration is approximately:
   a) 5 m/s²
   b) 9.8 m/s²
   c) 12 m/s²
   d) 0 m/s²
6. Which physical quantity is represented by the area under a force-displacement graph?
   a) Power
   b) Work done
   c) Velocity
   d) Momentum
7. The acceleration of an object is zero when:
   a) Speed is zero
   b) Velocity is constant
   c) Force is applied
   d) Mass increases
8. A metal wire's resistance will increase if:
   a) It becomes longer
   b) Its thickness increases
   c) Temperature decreases
   d) It is shortened
9. The energy stored in a stretched spring is called:
   a) Kinetic energy
   b) Potential energy

c) Thermal energy
d) Elastic potential energy
10. Which of these is the correct symbol for resistance in a circuit diagram?
    a) △\triangle△
    b) Ω\OmegaΩ
    c) A zig-zag line
    d) A circle

SECTION B: SHORT ANSWERS

(5 × 4 = 20 marks)

1. Define **speed** and state its unit.

2. What is meant by **refraction** of light?

3. State Newton's Second Law of Motion.

4. Explain the difference between **mass** and **weight**.

5. What happens to the resistance if two resistors are connected in parallel?

SECTION C: CALCULATIONS

(5 × 6 = 30 marks)

1. A car travels 150 km in 3 hours. Calculate its average speed in km/h and m/s.
   Work:

Answer: _____ km/h
Answer: _____ m/s

2. A force of 50 N moves a box 4 m. Calculate the work done.
   Work:

Answer: _____ J

3. A 12 Ω resistor has a current of 2 A flowing through it. Find the voltage across the resistor.
   Work:

Answer: _____ V

4. An object of mass 5 kg is lifted to a height of 10 m. Calculate the potential energy gained. (Use g=9.8 m/s2g = 9.8 \, m/s^2g=9.8m/s2)
   Work:

Answer: _____ J

5. A spring stretches by 0.02 m when a force of 5 N is applied. Calculate the spring constant kkk.
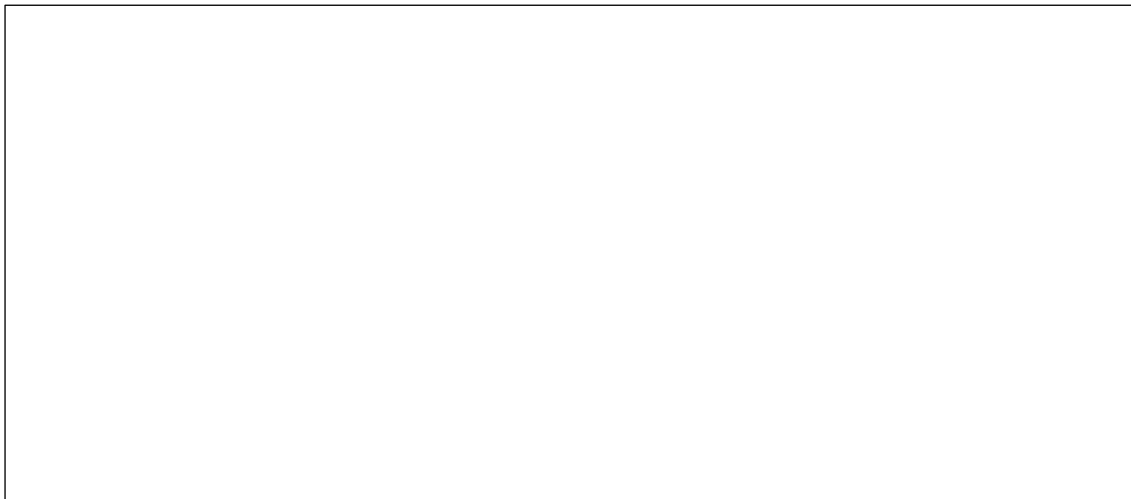   *Work:*

Answer: _____ N/m

SECTION D: DIAGRAMS AND APPLICATION

(3 × 10 = 30 marks)

1. **Draw a simple diagram of a ray of light passing from air into water showing refraction.**
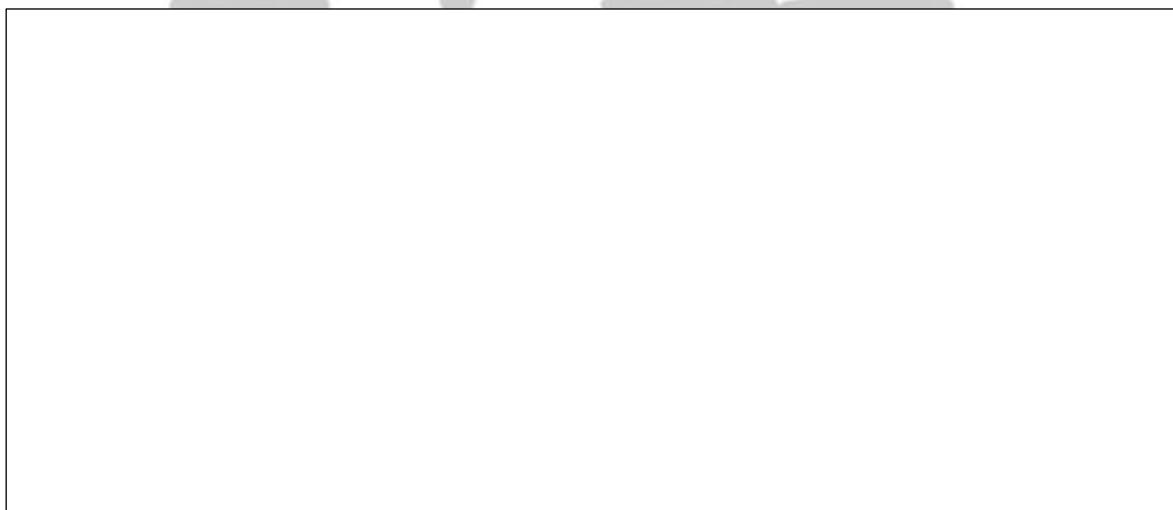   Label the:

   - Incident ray
   - Refracted ray
   - Normal line
   - Angle of incidence
   - Angle of refraction

2. A velocity-time graph shows an object starting from rest, accelerating uniformly to 20 m/s in 4 seconds.
   a) Sketch the graph.

   b) Calculate the acceleration.
   c) Calculate the distance traveled during this time.

3. Draw a simple circuit diagram showing:

- A battery (cell)
- A switch
- Two resistors in series
  Label all components and the direction of current flow.

End of Exam

TOTAL : 100

MEMO

SECTION A: MULTIPLE CHOICE

(10 × 2 = 20 marks)

Q#	Answer	Explanation (brief)
1	c	Displacement is a vector quantity.
2	b	Density = Mass ÷ Volume
3	b	Ammeter measures current.
4	a	Frequency is measured in Hertz.
5	b	Free fall acceleration ≈ 9.8 m/s²
6	b	Area under force-displacement = work done
7	b	Zero acceleration means constant velocity
8	a	Resistance increases with length
9	d	Elastic potential energy in springs
10	c	Resistance symbol is a zig-zag line

SECTION B: SHORT ANSWERS

(5 × 4 = 20 marks)

1. **Speed:**

- Speed is the distance traveled per unit time.
- Unit: meters per second (m/s) or kilometers per hour (km/h).

2. **Refraction:**

- Refraction is the bending of light as it passes from one medium to another with different densities.

3. **Newton's Second Law:**

- The acceleration of an object is directly proportional to the net force acting on it and inversely proportional to its mass.
- Formula: $F = ma$.

4. **Mass vs Weight:**

- Mass is the amount of matter in an object (kg), constant everywhere.
- Weight is the force due to gravity on the object (N), varies with gravity.

5. **Parallel resistors:**

- The total resistance decreases when resistors are connected in parallel.

SECTION C: CALCULATIONS

(5 × 6 = 30 marks)

1. Car speed:

- Average speed $= \frac{150 \, \text{km}}{3 \, \text{h}} = 50 \, \text{km/h}$
- Convert km/h to m/s: $50 \times \frac{1000}{3600} = 13.89 \, \text{m/s}$

2. Work done:

- $W = F \times d = 50 \times 4 = 200 \, J$

3. Voltage across resistor:

- $V = IR = 2 \times 12 = 24 \, V$

4. Potential energy gained:

- $PE = mgh = 5 \times 9.8 \times 10 = 490 \, J$

5. Spring constant k:

- Hooke's law: $F = kx \rightarrow k = \frac{F}{x} = \frac{5}{0.02} = 250 \, N/m$

SECTION D: DIAGRAMS AND APPLICATION

(3 × 10 = 30 marks)

1. **Refraction diagram:**

- Correct labeling of incident ray, refracted ray, normal, angle of incidence, angle of refraction.
- Ray bends towards the normal going from air (less dense) into water (more dense).
  (10 marks)

2. **Velocity-time graph:**

- a) Straight line from (0,0) to (4,20)
- b) $a = \frac{v-u}{t} = \frac{20-0}{4} = 5 \, \text{m/s}^2$
- c) Distance $d = ut + \frac{1}{2}at^2 = 0 + 0.5 \times 5 \times 16 = 40 \, m$

3. **Circuit diagram:**

- Battery symbol, switch symbol, two resistors in series (zig-zag lines), labeled current direction from positive terminal to negative terminal.
(10 marks)

Total: 100 Marks