SMARTWIZ

GRADE 10 Physical Science EXAM

MARKS: 150

MARKS	

TIME: 2 **hour**

SCHOOL_____

CLASS (e.g. 10A) _____

SURNAME_____

NAME_____

Instructions for Students:

> Read all instructions carefully before beginning the exam.

> Write your name and student ID clearly on the answer sheet/booklet.

> Answer all questions unless otherwise stated.

> Show all your work/calculations where applicable.

> Write clearly and legibly.

> Use blue or black ink only. * Do not use correction fluid/tape.

> No electronic devices (calculators, phones, etc.) are allowed unless explicitly permitted.

> Raise your hand if you have any questions.

> Do not talk to other students during the exam.

> Any form of cheating will result in disqualification.

QUESTION 1: MULTIPLE CHOICE [10 × 2 = 20 MARKS]

Circle the correct answer.

1.1 Which of the following quantities is a vector?
A. Mass B. Distance C. Speed D. Displacement

1.2 The unit of work is:
A. Newton B. Joule C. Watt D. Meter

1.3 Which law explains why we wear seatbelts?
A. Newton's First Law B. Newton's Second Law C. Newton's Third Law D. Law of conservation of energy

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1.4 A car is moving at constant velocity. What is the net force acting on it?
A. Zero B. Equal to its weight C. Changing D. Equal to acceleration

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1.5 Which of the following devices converts electrical energy into mechanical energy?
A. Bulb B. Solar panel C. Motor D. Battery

1.6 Frequency is measured in:
A. Watts B. Hertz C. Meters D. Joules

1.7 What is the main energy transformation in a wind turbine?
A. Kinetic to chemical B. Heat to mechanical C. Kinetic to electrical D. Light to electrical

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1.8 Sound cannot travel through:
A. Air B. Steel C. Vacuum D. Water

1.9 What is the resistance of a conductor with 3 A of current and 12 V voltage?
A. 15 Ω B. 36 Ω C. 4 Ω D. 0.25 Ω

1.10 Which wave type does NOT require a medium to travel?
A. Sound wave B. Seismic wave C. Water wave D. Light wave

QUESTION 2: MATCHING DEFINITIONS [10 MARKS]

Match Column A with Column B. Write only the question number and the correct letter.

COLUMN A		COLUMN B
2.1 Speed		A. Energy due to position
2.2 Kinetic Energy		B. Measured in Hertz
2.3 Potential Energy		C. Movement of electric charges
2.4 Power		D. Work done per unit time
2.5 Work		E. Rate of motion
2.6 Frequency		F. Depends on mass and velocity
2.7 Circuit Breaker		G. Prevents overheating in circuits
2.8 Amplitude		H. Height of wave from rest position
2.9 Conduction		I. Heat transfer in solids
2.10 Voltage		J. Potential difference

QUESTION 3: MOTION AND FORCES [30 MARKS]

3.1 Define Newton's Second Law of Motion. (2)

3.2 A box of mass 10 kg is pushed with a force of 30 N. Calculate its acceleration. (3)

3.3 A car increases its speed from 0 m/s to 20 m/s in 8 seconds. Calculate its acceleration. (3)

3.4 What is the difference between mass and weight? (4)

3.5 A stone is dropped from a height. How long will it take to fall 20 m? Use $g = 9.8\ m/s^2$. (3)

3.6 Explain the effect of friction on moving objects. (3)

3.7 State two ways to reduce friction. (2)

3.8 Define balanced forces and give an example. (3)

3.9 Describe how airbags in cars reduce injury during collisions. (4)

QUESTION 4: WAVES, SOUND AND LIGHT [20 MARKS]

4.1 Define a wave. (2)

4.2 Identify the wave type used in:
a) Radios
b) Microwaves
(2)

4.3 A sound wave has a frequency of 170 Hz and travels at 340 m/s. Calculate its wavelength. (3)

4.4 Name two parts of a transverse wave and describe them. (4)

4.5 What happens to sound waves as they move away from the source? (3)

4.6 Give one use of sound waves in medicine. (2)

4.7 What is the speed of light in a vacuum? (2)

4.8 Explain how light behaves when it moves from air into water. (2)

QUESTION 5: ELECTRICITY [30 MARKS]

5.1 What is the function of a fuse in a circuit? (2)

5.2 Define current and write its unit. (3)

5.3 Draw a simple parallel circuit with two light bulbs and a battery. (4)

5.4 Calculate the power used by a device that draws 5 A at 220 V. (3)

5.5 State one advantage and one disadvantage of using a parallel circuit in a home. (4)

5.6 Calculate the cost of using a 2000 W heater for 3 hours if the cost is R1.20 per kWh. (4)

5.7 List two safety measures when working with electricity. (2)

5.8 State Ohm’s Law. (2)

5.9 A 12 V battery supplies a current of 3 A. What is the resistance in the circuit? (2)

5.10 What is meant by electrical energy? (2)

QUESTION 6: ENERGY AND POWER [30 MARKS]

6.1 Define mechanical energy. (2)

6.2 State the Law of Conservation of Energy. (2)

6.3 A boy pushes a cart with 60 N of force for a distance of 5 m. Calculate the work done. (3)

6.4 Explain the difference between renewable and non-renewable energy sources. (4)

6.5 Give two examples of renewable energy sources. (2)

6.6 A person uses a 100 W light bulb for 2.5 hours. How much energy in kWh is used? (3)

6.7 List two reasons why saving energy is important. (2)

6.8 Name two ways to save energy at home. (2)

6.9 Calculate the power output of a motor that does 400 J of work in 5 seconds. (3)

6.10 What form of energy is stored in food? (2)

TOTAL :150 MARKS

GRADE 10 PHYSICAL SCIENCES EXAM MEMO

QUESTION 1: MULTIPLE CHOICE [20 MARKS]

1.1 D
1.2 B
1.3 A
1.4 A
1.5 C
1.6 B
1.7 C
1.8 C
1.9 C
1.10 D

QUESTION 2: MATCHING DEFINITIONS [10 MARKS]

2.1 – E
2.2 – F
2.3 – A
2.4 – D
2.5 – C
2.6 – B
2.7 – G
2.8 – H
2.9 – I
2.10 – J

QUESTION 3: MOTION AND FORCES [30 MARKS]

3.1 Force = mass × acceleration (F = ma)
3.2 a = F/m = 30/10 = **3 m/s²**
3.3 a = (v – u)/t = (20 – 0)/8 = **2.5 m/s²**
3.4 Mass is the amount of matter; weight is the gravitational force on an object.
3.5 t = √(2h/g) = √(2×20/9.8) ≈ **2.02 s**
3.6 Friction resists motion and slows down moving objects.
3.7 Lubrication; smooth surfaces.
3.8 Balanced forces are equal and opposite; object remains still or moves at constant velocity. Example: book on a table.
3.9 Airbags increase the time taken to stop, reducing the force and injury.

QUESTION 4: WAVES, SOUND AND LIGHT [20 MARKS]

4.1 A wave is a disturbance that transfers energy.
4.2 a) Radio – radio waves; b) Microwaves – microwave radiation.
4.3 $\lambda = v/f = 340/170 =$ **2 m**
4.4 Crest: highest point; Trough: lowest point.
4.5 Amplitude and loudness decrease with distance.
4.6 Ultrasound scanning (e.g. for pregnancies).
4.7 3×10^8 m/s
4.8 It bends (refracts) and slows down.

QUESTION 5: ELECTRICITY [30 MARKS]

5.1 A fuse breaks the circuit if current is too high.
5.2 Current is the flow of electric charge; unit = Ampere (A)
5.3 (Accept correct labeled parallel circuit diagram)
5.4 $P = V \times I = 220 \times 5 =$ **1100 W**
5.5 Advantage: devices work independently; Disadvantage: uses more wiring.
5.6 Energy = $(2000 \times 3)/1000 = 6$ kWh; Cost = $6 \times 1.20 =$ **R7.20**
5.7 Dry hands; don't overload plugs.
5.8 $V = I \times R$
5.9 $R = V/I = 12/3 =$ **4 Ω**
5.10 Energy used by an electric device.

QUESTION 6: ENERGY AND POWER [30 MARKS]

6.1 Mechanical energy = potential + kinetic energy
6.2 Energy cannot be created or destroyed, only changed from one form to another.
6.3 $W = F \times d = 60 \times 5 =$ **300 J**
6.4 Renewable: can be replaced (solar, wind); Non-renewable: will run out (coal, oil)
6.5 Solar, wind
6.6 $E = 100 \times 2.5 = 250$ Wh = **0.25 kWh**
6.7 Save money; protect environment
6.8 Switch off unused appliances; use energy-saving bulbs
6.9 $P = W/t = 400/5 =$ **80 W**
6.10 Chemical energy