SMARTWIZ

GRADE 9 NATURAL SCIENCE EXAM

MARKS: 80

MARKS	

TIME: 2 hours

SCHOOL_____

CLASS (e.g. 4A) _____

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.

This test consists of 8 pages, excluding the cover page.

SECTION A: CHEMICAL REACTIONS & PARTICLE THEORY (30 MARKS)

QUESTION 1: TYPES OF CHEMICAL REACTIONS (15 MARKS)

1.1 Define a chemical reaction.

_____

_____ (2)

1.2 Identify and describe the following types of reactions:
a) Combustion
b) Neutralisation

_____

_____ (4)

1.3 Write a balanced chemical equation for the reaction between hydrochloric acid and sodium hydroxide.
_____ (3)

1.4 Study the diagram below showing the reaction setup of baking soda with vinegar producing carbon dioxide gas.

Explain what is happening in this reaction. Include the gas produced and its role in baking.

_____

_____ (6)

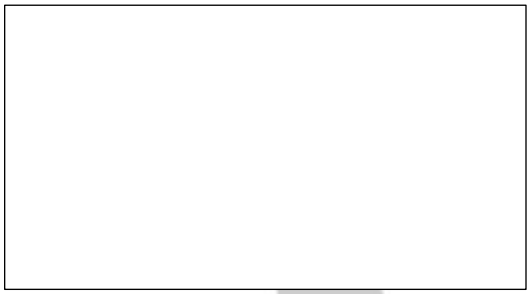
_____

QUESTION 2: PARTICLE THEORY OF MATTER (15 MARKS)

2.1 State the five main points of the particle theory of matter.

_____ (5)

2.2 Draw and label a diagram showing particles in:
a) Solid
b) Liquid
c) Gas (6)



2.3 Describe how temperature affects particle movement in solids, liquids, and gases.

_____ (4)

2.4 Explain why gases can be compressed but solids cannot.

_____ (2)

SECTION B: ECOLOGY & ENVIRONMENT (30 MARKS)

QUESTION 3: ECOSYSTEMS (15 MARKS)

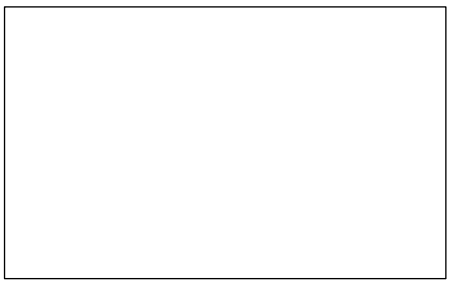
3.1 Define an ecosystem.

_____ (2)

3.2 Name three abiotic factors in an ecosystem and explain their importance.

_____ (6)

3.3 Draw and label a simple food chain with at least four organisms, including producers and consumers. (4)



3.4 Explain the role of decomposers in an ecosystem.

_____ (3)

QUESTION 4: HUMAN IMPACT ON THE ENVIRONMENT (15 MARKS)

4.1 List three human activities that contribute to pollution.

_____ (3)

4.2 Describe the effects of deforestation on the environment.

_____ (4)

4.3 Study the diagram below of a river polluted with waste and explain how pollution affects aquatic life.

_____ (4)

4.4 Suggest three ways to reduce pollution in local communities.

_____ (4)

SECTION C: ENERGY AND HEAT (20 MARKS)

QUESTION 5: ENERGY FORMS AND TRANSFER (20 MARKS)

5.1 Define kinetic and potential energy.

_____

_____ (4)

5.2 Describe how energy changes when a ball is thrown upwards and falls back down.

_____

_____ (4)

5.3 Study the diagram below showing a solar panel system.

Explain how solar energy is converted and used in this system.

_____

_____ (6)

5.4 Give two advantages and two disadvantages of using solar energy.
Advantages:

_____

Disadvantages:
_____ (6)

TOTAL : 80

MEMO

SECTION A: CHEMICAL REACTIONS & PARTICLE THEORY

QUESTION 1: TYPES OF CHEMICAL REACTIONS

1.1

- A chemical reaction is a process where substances (reactants) change into new substances (products) with different properties. (2)

1.2
a) Combustion: A reaction where a substance reacts with oxygen, releasing heat and light (e.g., burning wood).
b) Neutralisation: A reaction between an acid and a base that produces salt and water. (4)

1.3

- $HCl + NaOH \rightarrow NaCl + H_2O$ (3)

1.4

- Baking soda (sodium bicarbonate) reacts with vinegar (acetic acid) producing carbon dioxide gas (CO_2).
- The bubbles show CO_2 gas, which causes dough to rise when baking. (6)

QUESTION 2: PARTICLE THEORY OF MATTER

2.1

- Matter is made up of tiny particles.
- Particles are always moving.
- Particles in solids are tightly packed and vibrate in place.
- Particles in liquids are close but can move/slide past each other.
- Particles in gases are far apart and move freely at high speeds. (5)

2.2

- Diagrams should show:
  a) Solid: particles closely packed in a regular pattern, vibrating.
  b) Liquid: particles close but disorganized, sliding past each other.
  c) Gas: particles spread far apart, moving randomly. (6)

2.3

- Increasing temperature increases particle movement speed in all states.
- Solids vibrate faster, liquids flow faster, gases move faster and spread out more. (4)

2.4

- Gases can be compressed because particles are far apart and can be pushed closer.
- Solids cannot be compressed because particles are tightly packed and cannot move closer. (2)

SECTION B: ECOLOGY & ENVIRONMENT

QUESTION 3: ECOSYSTEMS

3.1

- An ecosystem is a community of living organisms interacting with each other and their non-living environment. (2)

3.2

- Abiotic factors: sunlight (energy source), water (needed for life), temperature (affects organism survival).
- Each is important for supporting life and ecosystem balance. (6)

3.3

- Example food chain: Grass (producer) → Grasshopper (primary consumer) → Frog (secondary consumer) → Snake (tertiary consumer). (4)

3.4

- Decomposers break down dead plants and animals, recycling nutrients back into the soil, keeping the ecosystem healthy. (3)

QUESTION 4: HUMAN IMPACT ON THE ENVIRONMENT

4.1

- Industrial pollution, deforestation, littering/waste disposal. (3)

4.2

- Deforestation removes trees that produce oxygen and provide habitat.

- It causes soil erosion, reduces biodiversity, and contributes to climate change. (4)

4.3

- Pollution introduces harmful substances into the river.
- It can kill aquatic plants and animals by poisoning or reducing oxygen levels in water. (4)

4.4

- Reduce waste production.
- Recycle and reuse materials.
- Plant trees and educate communities about pollution. (4)

SECTION C: ENERGY AND HEAT

QUESTION 5: ENERGY FORMS AND TRANSFER

5.1

- Kinetic energy is the energy of motion.
- Potential energy is stored energy due to position or state. (4)

5.2

- When the ball is thrown up, kinetic energy decreases as it slows; potential energy increases as it rises.
- At the highest point, kinetic energy is minimum, potential energy is maximum.
- As the ball falls, potential energy converts back to kinetic energy. (4)

5.3

- Solar panels convert sunlight into electrical energy.
- The electrical energy is stored in batteries and used to power the house. (6)

5.4

- Advantages: renewable, clean energy, reduces electricity bills.
- Disadvantages: initial cost is high, depends on sunlight (weather dependent). (6)

TOTAL ; 80