SMARTWIZ

GRADE 9 TECHNOLOGY 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: STRUCTURES (20 MARKS)

QUESTION 1: MATERIALS & PROPERTIES (10 MARKS)

1.1 Define the term **material property**.

_____ (2)

1.2 Match each property with its correct definition (Write only the letter):
a) Ductility
b) Malleability
c) Brittleness
d) Elasticity

i) Ability to return to original shape after being stretched
ii) Can be stretched into wires
iii) Breaks easily without bending
iv) Can be hammered into thin sheets

a → _____
b → _____
c → _____
d → _____ (4)

1.3 Give two reasons why **steel** is commonly used in structural design.
a) _____
b) _____ (2)

1.4 Name one material that is biodegradable and one that is non-biodegradable.
Biodegradable: _____
Non-biodegradable: _____ (2)

QUESTION 2: ENVIRONMENTAL IMPACT OF STRUCTURES (10 MARKS)

2.1 What does the term “sustainable building” mean?

_____ (2)

2.2 Explain how poor structural design can negatively impact the environment.

_____ (2)

2.3 Identify two materials that can be reused or recycled in construction.
a) _____
b) _____ (2)

2.4 Study the following scenario and answer the questions:

A school is planning to build classrooms using bricks and concrete. The area is prone to flooding and has little drainage.

a) Suggest one material that would be more environmentally suitable than bricks.
_____ (1)

b) Suggest one structural feature to improve water drainage.
_____ (1)

2.5 Name two features of "green architecture."
a) _____
b) _____ (2)

⚙ SECTION B: MECHANICAL SYSTEMS & CONTROL (30 MARKS)

QUESTION 3: TYPES OF MOVEMENT (12 MARKS)

3.1 Define **reciprocating motion** and give an example.
Definition: _____
Example: _____ (2)

3.2 Match the motion types with examples. Write the correct letter only.
a) Oscillating
b) Linear
c) Rotary
d) Reciprocating

i) Windshield wiper
ii) Elevator
iii) Fan
iv) Sewing machine needle

a → _____
b → _____
c → _____
d → _____ (4)

3.3 Describe two differences between rotary and linear motion.

_____

_____ (2)

3.4 Identify the motion in the following devices:
a) Clock hands – _____
b) Drawer opening – _____ (2)

3.5 What component is often used to convert rotary motion to reciprocating motion?
_____ (2)

_____

QUESTION 4: LINKAGES & SYSTEMS (18 MARKS)

4.1 What is a linkage system?
_____ (2)

4.2 Study the diagram provided in class (or imagine a simple scissor-jack).
a) Name the type of movement produced: _____ (1)
b) Which component acts as a pivot? _____ (1)

4.3 Explain the role of the **effort**, **load**, and **fulcrum** in a first-class lever.
Effort: _____
Load: _____
Fulcrum: _____ (3)

4.4 Give two everyday examples of first-class levers.
a) _____
b) _____ (2)

4.5 What is mechanical advantage and why is it important in machines?

_____

_____ (3)

4.6 Identify whether each is a simple or compound machine:
a) Bicycle – _____
b) Door hinge – _____ (2)

4.7 State two advantages of using mechanical systems.
a) _____
b) _____ (2)

SECTION C: ELECTRICAL SYSTEMS (30 MARKS)

QUESTION 5: ELECTRICAL COMPONENTS (14 MARKS)

5.1 Name and describe the function of these components:
a) Switch – _____
b) Fuse – _____
c) Resistor – _____ (6)

5.2 What is an electric circuit?
_____ (2)

5.3 Draw a series circuit that includes:

- One battery
- One resistor
- One switch
- One light bulb

Label all parts clearly. (4)

5.4 Name two reasons why series circuits are not ideal for household wiring.
a) _____
b) _____ (2)

QUESTION 6: ENERGY SOURCES & SAFETY (16 MARKS)

6.1 Name and describe two types of energy sources used in homes.
a) _____ – _____
b) _____ – _____ (4)

6.2 Identify whether the following are renewable or non-renewable:
a) Coal – _____
b) Wind – _____
c) Natural gas – _____
d) Solar – _____ (4)

6.3 Why is electrical insulation important in appliances?

_____ (2)

6.4 What safety device is used in a household to prevent overcurrent?
_____ (1)

6.5 Give two examples of poor electrical practices that should be avoided.
a) _____
b) _____ (2)

6.6 What does "load shedding" mean and why is it implemented?

_____ (3)

TOTAL : 80

MEMO

SECTION A: STRUCTURES (20 MARKS)

QUESTION 1: MATERIALS & PROPERTIES (10 MARKS)

1.1

- A material property is a characteristic that defines how a material behaves (e.g., strength, flexibility). ✓✓

1.2
a → ii ✓
b → iv ✓
c → iii ✓
d → i ✓ (4 marks)

1.3

- Strong ✓
- Durable/resistant to corrosion ✓

1.4

- Biodegradable: Paper / Wood / Cotton ✓
- Non-biodegradable: Plastic / Styrofoam / Metal ✓

QUESTION 2: ENVIRONMENTAL IMPACT (10 MARKS)

2.1

- Sustainable building refers to designing structures in a way that conserves resources and reduces environmental impact. ✓✓

2.2

- Poor designs can cause erosion, increase pollution, waste materials, or damage ecosystems. ✓✓

2.3

- Bricks

- Glass
- Metal ✓✓ (Any two)

2.4
a) Wood / Recycled plastic / Bamboo ✓
b) Drainage channels / Raised foundation / Sloped floor ✓

2.5

- Solar panels ✓
- Rainwater collection ✓
  (Other acceptable answers: natural lighting, green roofs, recycled materials)

⚙️ SECTION B: MECHANICAL SYSTEMS & CONTROL (30 MARKS)

QUESTION 3: TYPES OF MOVEMENT (12 MARKS)

3.1

- Reciprocating motion is movement that goes back and forth in a straight line.
- Example: piston in a car ✓✓

3.2
a → i ✓
b → ii ✓
c → iii ✓
d → iv ✓

3.3

- Rotary motion spins around a central axis.
- Linear motion moves in a straight line. ✓✓

3.4
a) Rotary ✓
b) Linear ✓

3.5

- Crank ✓
  (Also acceptable: cam or connecting rod)

QUESTION 4: LINKAGES & SYSTEMS (18 MARKS)

4.1

- A linkage is a system of connected parts that transfers motion and force. ✓✓

4.2
a) Linear ✓
b) Central pin / joint ✓

4.3
Effort: Force applied to do work ✓
Load: Object being moved ✓
Fulcrum: Pivot point of the lever ✓

4.4

- Seesaw ✓
- Scissors ✓
  (Other acceptable examples: crowbar, pliers)

4.5

- Mechanical advantage is the ratio of output force to input force in a machine.
- It helps reduce the amount of effort needed. ✓✓✓

4.6
a) Compound ✓
b) Simple ✓

4.7

- Saves time and effort ✓
- Increases productivity ✓

SECTION C: ELECTRICAL SYSTEMS (30 MARKS)

QUESTION 5: ELECTRICAL COMPONENTS (14 MARKS)

5.1
a) Switch – Opens or closes the circuit ✓✓
b) Fuse – Protects circuit by breaking when current is too high ✓✓
c) Resistor – Limits current flow ✓✓

5.2

- A circuit is a path through which electric current flows. ✓✓

5.3

- Drawing must show:
  ✓ Battery
  ✓ Resistor
  ✓ Switch
  ✓ Light bulb
  ✓ Correct circuit layout (series)
  (1 mark per element = 4)

5.4

- One broken bulb stops the whole circuit ✓
- Cannot control each component separately ✓

QUESTION 6: ENERGY SOURCES & SAFETY (16 MARKS)

6.1
a) Electricity – Powers lights/appliances ✓✓
b) Gas – Used for cooking/heating ✓✓

6.2
a) Non-renewable ✓
b) Renewable ✓
c) Non-renewable ✓
d) Renewable ✓

6.3

- Prevents electric shock / Protects users from live wires ✓✓

6.4

- Fuse / Circuit breaker ✓

6.5
a) Wet hands near plugs ✓
b) Overloading plug points ✓
(Any other unsafe practice acceptable)

6.6

- Load shedding is the deliberate shutdown of power to prevent overloading the grid.
- It's done when electricity demand exceeds supply. ✓✓✓

TOTAL : 80