SMARTWIZ

GRADE 9 TECHNOLOGY EXAM

MARKS: 80

MARKS	

TIME: 2 hours

SCHOOL_____

CLASS (e.g. 4A) _____

SURNAME_____

NAME_____

MYST PATHWORKS

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: BASIC STRUCTURE CONCEPTS (10 marks)

1.1 What does the term **load** mean in building structures?

_____

_____

1.2 Name and explain two forms of **load** that can act on a building.
a) _____ – _____
b) _____ – _____

1.3 What is the function of a **foundation** in a building?

_____

_____

1.4 Give two examples of materials commonly used for foundations and why.
a) _____ – _____
b) _____ – _____

_____

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QUESTION 2: STRUCTURAL FAILURE AND PREVENTION (10 marks)

2.1 Define the term **structural failure**.

_____

2.2 What is the difference between a **brittle** and a **ductile** failure?

_____

_____

2.3 List three common causes of structural failure in buildings.
a) _____
b) _____
c) _____

2.4 Explain how engineers reduce the risk of structural failure in construction.

_____

_____

_____

SECTION B: MECHANICAL SYSTEMS (30 MARKS)

QUESTION 3: SIMPLE MACHINES (15 marks)

3.1 Name and describe the six simple machines.
a) _____ – _____
b) _____ – _____
c) _____ – _____
d) _____ – _____
e) _____ – _____
f) _____ – _____

3.2 Explain how an inclined plane makes work easier.

_____

_____

3.3 Identify a practical example of a wheel and axle mechanism and explain its use.

_____

_____

3.4 Describe the mechanical advantage of a lever and how it helps in lifting heavy loads.

_____

_____

_____

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QUESTION 4: MOTION AND ENERGY (15 marks)

4.1 Define **rotary motion** and **reciprocating motion** and give an example of each.
a) Rotary motion: _____
b) Reciprocating motion: _____

4.2 What is the role of a **cam** in a mechanical system?

_____

4.3 Describe the difference between a **gear train** and a **belt drive** system.

_____

_____

4.4 How does increasing the size of the driver gear affect the output in a gear train?

_____

4.5 What safety precautions should be taken when working with moving mechanical parts?

_____

SECTION C: ELECTRICAL SYSTEMS (30 MARKS)

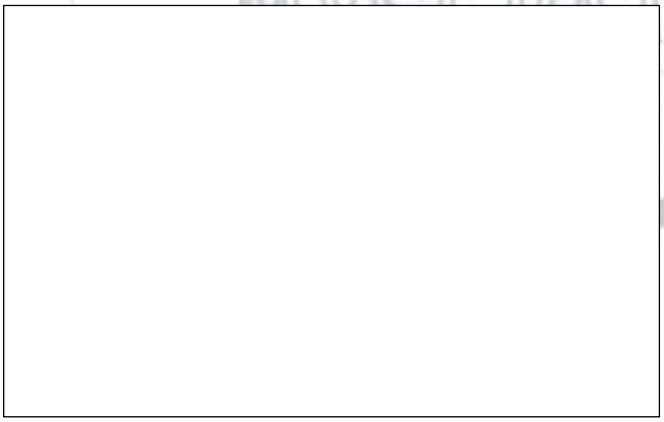
QUESTION 5: ELECTRICAL COMPONENTS AND CIRCUITS (15 marks)

5.1 Define the term **electric current**.

5.2 Name three electrical components and their functions.
a) _____ – _____
b) _____ – _____
c) _____ – _____

5.3 What is the difference between a **series** and a **parallel** circuit?

5.4 Draw and label a simple series circuit containing a battery, two bulbs, and a switch.



5.5 Explain what happens to the brightness of bulbs when one bulb is removed from a series circuit.

QUESTION 6: ENERGY SOURCES AND SAFETY (15 marks)

6.1 List two examples each of **renewable** and **non-renewable** energy sources.
Renewable: a) _____ b) _____
Non-renewable: a) _____ b) _____

6.2 Why is it important to use energy-efficient appliances?

6.3 What are two environmental impacts of using fossil fuels?
a) _____
b) _____

6.4 Explain the purpose of a **circuit breaker** in electrical installations.

6.5 What is **electrical earthing** and why is it important?

TOTAL : 80

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SECTION A: STRUCTURES (20 Marks)

QUESTION 1: BASIC STRUCTURE CONCEPTS (10 marks)

1.1

- Load means the weight or force that a structure must support. ✓✓

1.2
a) Dead load – The permanent weight of the structure itself (e.g., walls, roof). ✓✓
b) Live load – Temporary or moving loads like people, furniture, or vehicles. ✓✓

1.3

- The foundation supports the entire building and transfers the load to the ground. ✓✓

1.4
a) Concrete – Strong and durable to support heavy loads. ✓✓
b) Steel – Provides strength and flexibility for foundations. ✓✓

MYST PATHWORKS

QUESTION 2: STRUCTURAL FAILURE AND PREVENTION (10 marks)

2.1

- Structural failure is when a building or structure collapses or becomes unsafe. ✓✓

2.2

- Brittle failure: sudden break without warning (e.g., glass).
- Ductile failure: deformation before breaking (e.g., steel). ✓✓

2.3
a) Poor design ✓
b) Using weak or inappropriate materials ✓
c) Natural disasters (earthquakes, floods) ✓

2.4

- Engineers use strong materials, proper design, safety factors, and regular inspections to reduce failure risk. ✓✓

SECTION B: MECHANICAL SYSTEMS (30 Marks)

QUESTION 3: SIMPLE MACHINES (15 marks)

3.1
a) Lever – A rigid bar pivoted on a fulcrum used to lift or move loads. ✓
b) Inclined plane – A sloped surface that reduces the effort needed to raise objects. ✓
c) Wheel and axle – A wheel attached to a central axle that helps move or lift loads. ✓
d) Pulley – A wheel with a rope that changes direction or multiplies force. ✓
e) Screw – An inclined plane wrapped around a cylinder used to hold objects or lift loads. ✓
f) Wedge – A device that splits or cuts objects apart by applying force. ✓

3.2

- An inclined plane allows heavy objects to be raised with less force by increasing the distance over which the force is applied. ✓✓

3.3

- Example: A car steering wheel; it helps turn the wheels with less effort. ✓✓

3.4

- Mechanical advantage is how much a machine multiplies the input force, allowing heavy loads to be lifted more easily. ✓✓

MYST PATHWORKS

QUESTION 4: MOTION AND ENERGY (15 marks)

4.1
a) Rotary motion – Circular movement around an axis (e.g., a spinning wheel). ✓
b) Reciprocating motion – Back-and-forth movement in a straight line (e.g., piston in an engine). ✓

4.2

- A cam converts rotary motion into reciprocating motion in machines. ✓

4.3

- Gear train uses interlocking gears to transmit motion; belt drive uses a belt and pulleys to transfer motion without direct contact. ✓✓

4.4

- Increasing the driver gear size increases torque but decreases speed at the driven gear. ✓✓

4.5

- Keep loose clothing away, use guards, switch off machines before adjustments, and follow safety protocols. ✓✓

SECTION C: ELECTRICAL SYSTEMS (30 Marks)

QUESTION 5: ELECTRICAL COMPONENTS AND CIRCUITS (15 marks)

5.1

- Electric current is the flow of electric charge through a conductor. ✓✓

5.2
a) Battery – Provides electrical energy ✓
b) Switch – Opens or closes the circuit ✓
c) Bulb – Converts electrical energy into light ✓

5.3

- Series circuit: Components are connected in a single path; if one fails, all stop working.
- Parallel circuit: Components are connected on separate branches; if one fails, others keep working. ✓✓

5.4

- (Accept correct labeled drawing of a battery, two bulbs in series, and a switch) ✓✓✓✓

5.5

- The bulbs become dimmer or stop glowing because the circuit is broken, stopping current flow. ✓✓

QUESTION 6: ENERGY SOURCES AND SAFETY (15 marks)

6.1
Renewable:
a) Solar energy ✓
b) Wind energy ✓
Non-renewable:
a) Coal ✓
b) Oil ✓

6.2

- Energy-efficient appliances reduce electricity use, save money, and lessen environmental impact. ✓✓

6.3

a) Air pollution ✓

b) Global warming due to greenhouse gas emissions ✓

6.4

- A circuit breaker automatically cuts off electricity when current exceeds safe levels to prevent damage or fire. ✓✓

6.5

- Electrical earthing provides a safe path for excess current to flow into the ground, preventing electric shocks. ✓✓

TOTAL : 80

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