SMARTWIZ

GRADE10 ENGINEERING GRAPHICS AND DESIGN (EGD) EXAM

MARKS: 100

MARKS	

TIME: 2 hours

SCHOOL _____

CLASS (e.g. 4A) _____

SURNAME _____

NAME _____

Instructions for Learners:

- Read all the instructions carefully before you begin the exam.
- Write your name and learner number clearly on the answer sheet/booklet.
- Answer all the questions unless otherwise instructed.
- Show all your work/calculations where applicable.
- Write neatly and legibly.
- Use only blue or black ink. *Do not use correction fluid or 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 learners during the exam.
- Any form of cheating will lead to disqualification.

This test consists of 6 pages including the cover page.

📝 SECTION A: GRAPHIC DRAWINGS & TECHNICAL SKILLS (40 MARKS)

QUESTION 1: SECTIONAL DRAWING (15 marks)

You are given the **front view** and **top view** of a block with an internal cylindrical hole. Draw the **front view in full section**.

Drawing Area:
📝 Draw in the box below.

QUESTION 2: FREEHAND ISOMETRIC SKETCH (10 marks)

Sketch a **freehand isometric** of an L-bracket with a flange and a hole.

Sketch Space:
📝 Use the space below to draw.

QUESTION 3: INTERPRETATION OF TECHNICAL DRAWINGS (15 marks)

3.1 What type of projection is used in the drawing?

3.2 Identify two drawing conventions used:

1. _____
2. _____

3.3 Name three components visible in the drawing:

1. _____
2. _____
3. _____

3.4 What is the function of the hole marked A?

_____

_____

3.5 Calculate the total width if each side is 20 mm and the center is 50 mm.

_____

3.6 What material is suitable for this part and why?

_____

_____

_____

💡 SECTION B: DESIGN PRINCIPLES & SYMBOLS (30 MARKS)

_____

QUESTION 4: INTERPRETING DESIGN SCENARIOS (15 marks)

Design a **metal step stool**.

4.1 State a suitable material and give a reason:
Material: _____
Reason: _____

4.2 Identify two design factors:

1. _____
2. _____

4.3 Draw a freehand **front view** of the stool below:

+--+
| |
| |
| |
| |
| |
| |
| |
+--+

4.4 Suggest a finish to protect the metal from rust:

_____

4.5 How would you test the stool for safety?

_____

_____

_____

QUESTION 5: SYMBOLS AND CONVENTIONS (15 marks)

Match each symbol to its meaning (write letter A–E):

5.1 Diameter _____
5.2 Radius _____
5.3 Thread size _____
5.4 Parallel _____
5.5 Perpendicular _____

Symbols:
A. ⊥ B. ⌀ C. M10 D. R10 E. ||

5.6 Draw and label a **square butt weld symbol**:

+--+
| |
| |
| |
| |
| |
| |
| |
+--+

5.7 Explain why line thickness is important in technical drawings:

_____

_____

_____

_____

🔧 SECTION C: MECHANICAL COMPONENTS & SAFETY (30 MARKS)

QUESTION 6: MECHANICAL ASSEMBLIES (15 marks)

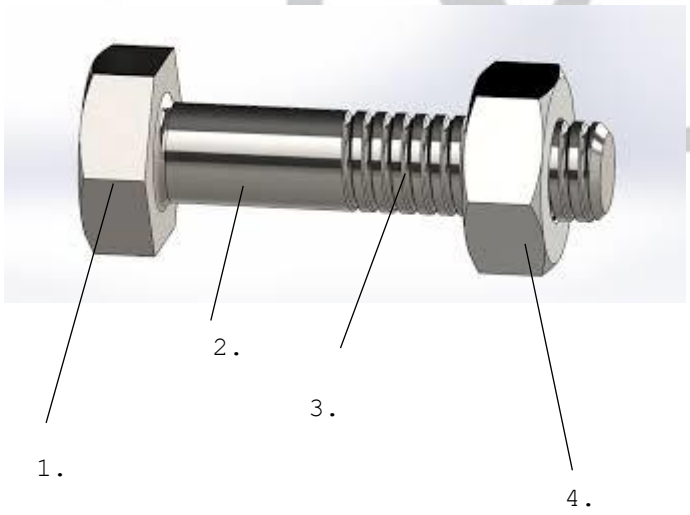
6.1 Name the following:
a) Locking fastener: _____
b) Used to align parts: _____
c) Shaft support: _____

6.2 Difference between a bolt and a screw:

6.3 Use for each:

- Cotter pin: _____
- Washer: _____

6.4 Label the parts of the **nut and bolt assembly** below:



1. _____
2. _____
3. _____
4. _____

6.5 What happens if a bolt is over-tightened?

QUESTION 7: SAFETY & CARE OF EQUIPMENT (15 marks)

7.1 List any **3 drawing room safety rules**:

1. _____
2. _____
3. _____

7.2 Why must a set square be stored properly?

_____

7.3 Give one reason for each:
a) Sharp pencil: _____
b) Not bending compass: _____
c) Clean hands: _____

7.4 How do you clean a dirty drawing instrument?

_____

7.5 Name any **three PPE items** used in a workshop:

1. _____
2. _____
3. _____

End of Exam ✅

TOTAL : 100

MEMO

📝 SECTION A: GRAPHIC DRAWINGS & TECHNICAL SKILLS (40 MARKS)

QUESTION 1: SECTIONAL DRAWING (15 marks)

- Correct front sectional view based on top view: 6
- Hatching applied properly: 3
- Line types (visible, hidden, cutting plane): 3
- Neatness and projection accuracy: 3

QUESTION 2: FREEHAND ISOMETRIC SKETCH (10 marks)

- Correct isometric layout (30° angles): 3
- Accurate proportions: 2
- Hole/sketch features shown: 2
- Neatness and clear presentation: 3

QUESTION 3: INTERPRETATION OF TECHNICAL DRAWINGS (15 marks)

3.1 Type of projection:
First-angle orthographic projection (2)

3.2 Drawing conventions:
Any two of:

- Centre lines
- Hidden detail
- Dimension lines
- Cutting plane lines
  (2 × 1 = 2)

3.3 Components visible:
Any three of: e.g., flange, bracket, fastener, hole (3 × 1 = 3)

3.4 Function of hole A:
Used for fasteners / alignment / fitting parts (2)

3.5 Width = 20 mm + 50 mm + 20 mm = **90 mm** (2)

3.6 Suitable material:
Mild steel or aluminium (1)
Reason: Strong, corrosion-resistant, easy to machine (1)

💡 SECTION B: DESIGN PRINCIPLES & SYMBOLS (30 MARKS)

QUESTION 4: INTERPRETING DESIGN SCENARIOS (15 marks)

4.1 Material: **Mild steel or aluminium**
Reason: Durable, load-bearing, corrosion resistance (2)

4.2 Design factors:

- Strength
- Stability
- Weight
- Safety
  (Any 2 × 1 = 2)

4.3 Sketch: (6 marks)

- Frame: 2
- Steps: 2
- Proportions: 1
- Neatness: 1

4.4 Finish:
Powder coating / galvanising / enamel paint (1)

4.5 Safety test explanation (any relevant):

- Apply load gradually
- Check for bending
- Visual inspection
  (3–4 logical steps = 4)

QUESTION 5: SYMBOLS AND CONVENTIONS (15 marks)

5.1 Diameter – B
5.2 Radius – D

5.3 Thread size – C
5.4 Parallel – E
5.5 Perpendicular – A
(5 × 1 = 5 marks)

5.6 Square butt weld symbol:

- Correct welding symbol (square): 2
- Reference line drawn: 1
- Arrow placement correct: 1
- Labelled appropriately: 1
  (Total: 5)

5.7 Purpose of line weight:

- Differentiate between visible and hidden detail
- Emphasize section outlines
- Improve readability (Any valid explanation: 3)

🔧 SECTION C: MECHANICAL COMPONENTS & SAFETY (30 MARKS)

QUESTION 6: MECHANICAL ASSEMBLIES (15 marks)

6.1 Component names:
a) Locking fastener – Lock nut / split pin (1)
b) Aligning part – Dowel pin (1)
c) Shaft support – Bearing (1)

6.2 Bolt has nut; screw threads into material directly (2)

6.3

- Cotter pin: Locks a shaft or bolt (1)
- Washer: Distributes load, protects surface (1)

6.4 Nut and bolt parts (4 × 1 = 4):

- Bolt head
- Threaded shaft
- Washer
- Nut

6.5 Over-tightening:

- Damages threads
- Deforms components
  (2)

QUESTION 7: SAFETY & CARE OF EQUIPMENT (15 marks)

7.1 Drawing room rules:
Any 3 of:

- No eating/drinking
- Keep tools clean
- Use sharp instruments properly
  (3 × 1 = 3)

7.2 Prevents damage, maintains shape and accuracy (2)

7.3
a) Clearer lines and details (1)
b) Prevent damage, keeps accuracy (1)
c) Prevents smudging (1)

7.4 Clean with soft cloth / use alcohol swabs / avoid water (2)

7.5 PPE:
Any 3 of:

- Safety glasses
- Gloves
- Overalls
- Safety shoes
  (3 × 1 = 3)

✅ **TOTAL: 100 MARKS**