SMARTWIZ

GRADE 10 MATHEMATICS 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 7 pages including the cover page.

SECTION A: ALGEBRA AND EQUATIONS (30 MARKS)

Question 1: Simplify the following expressions (6 marks)

1.1 $(3x^2 - 2x + 5) - (x^2 + x - 3) =$ _____ (3)

1.2 $(2x + 3)(x - 4) =$ _____ (3)

Question 2: Solve for x (8 marks)

2.1 $2x - 5 = 3x + 4$ _____ (4)

2.2 $x^2 - 9x + 20 = 0$ _____ (4)

Question 3: Factorise completely (6 marks)

3.1 $x^2 - 16$ _____ (2)

3.2 $3x^2 + 6x$ _____ (2)

3.3 $x^2 + 5x + 6$ _____ (2)

Question 4: Word Problem (10 marks)

4.1 The product of two consecutive integers is 132. Find the integers.

(5)

4.2 A rectangle has a length of $(x + 3)$ and a width of $(x - 2)$. If the area is 60, find x.

(5)

SECTION B: FUNCTIONS AND GRAPHS (30 MARKS)

Question 5: Linear and Quadratic Graphs (15 marks)

5.1 Draw the graph of $y = 2x - 1$ for $x \in \{-2; -1; 0; 1; 2\}$ (Use the table below) (5)

x	-2	-1	0	1	2
y					

5.2 Draw the graph of $y = x^2 - 4$ on the same set of axes. (5)

5.3 Label the points of intersection with axes clearly. (5)

Question 6: Interpretation (15 marks)

6.1 What is the y-intercept of $y = 2x - 1$?
_____ (1)

6.2 At what x-value does $y = x^2 - 4$ intersect the x-axis?
_____ (2)

6.3 For which values of x does $x^2 - 4 < 0$?
_____ (2)

6.4 Find the coordinates of the turning point of $y = x^2 - 4$.
_____ (2)

6.5 Compare the shapes of the two graphs: Which one is a parabola and which one is a straight line?
_____ (2)

6.6 If the graph $y = x^2 - 4$ is shifted up by 3 units, write the new equation.
_____ (2)

6.7 State the domain of $y = 2x - 1$ if $x \in \{-2; -1; 0; 1; 2\}$
_____ (2)

SECTION C: GEOMETRY AND MEASUREMENT (40 MARKS)

Question 7: Geometry (20 marks)

7.1 In triangle ABC, AB = 6 cm, AC = 8 cm, and ∠A = 90°. Use the theorem of Pythagoras to calculate BC. _____ (4)

7.2 Prove: The angles in a triangle add up to 180°.

_____ (4)

7.3 A quadrilateral has interior angles of 85°, 95°, 110°, and x°. Find x.
_____ (2)

7.4 Name two properties of parallelograms.
_____ (2)

7.5 Draw and label a diagram of a rhombus. Show all equal sides and angles. (4)

7.6 Explain the difference between congruent and similar triangles.
_____ (4)

Question 8: Measurement (20 marks)

8.1 A cylinder has radius 5 cm and height 10 cm. Calculate:

8.1.1 Volume ($V = \pi r^2 h$) _____ (3)
8.1.2 Surface Area ($A = 2\pi r^2 + 2\pi rh$, use $\pi = 3.14$)
_____ (3)

8.2 A triangle has base 12 cm and height 7 cm. Find the area.
_____ (2)

8.3 A circle has a circumference of 31.4 cm. Use $C = 2\pi r$ to find the radius.
_____ (3)

8.4 A rectangular prism has dimensions 5 cm × 4 cm × 3 cm. Find the surface area.
_____ (3)

8.5 Convert 2.5 km to metres and millimetres.
_____ (2)

8.6 Convert 4000 m² to hectares. _____
(2)

TOTAL: 100 MARKS

MEMO

SECTION A: ALGEBRA AND EQUATIONS (30 MARKS)

Question 1 (6 marks)

1.1 $3x^2 - 2x + 5 - x^2 - x + 3 = 2x^2 - 3x + 8$ ✓✓✓ (3)

1.2 $(2x + 3)(x - 4) = 2x^2 - 8x + 3x - 12 = 2x^2 - 5x - 12$ ✓✓✓ (3)

Question 2 (8 marks)

2.1 $2x - 5 = 3x + 4 \rightarrow -5 - 4 = 3x - 2x \rightarrow x = -9$ ✓✓✓✓ (4)

2.2 $x^2 - 9x + 20 = 0 \rightarrow (x - 4)(x - 5) = 0 \rightarrow x = 4$ or $x = 5$ ✓✓✓✓ (4)

Question 3 (6 marks)

3.1 $x^2 - 16 = (x - 4)(x + 4)$ ✓✓ (2)

3.2 $3x^2 + 6x = 3x(x + 2)$ ✓✓ (2)

3.3 $x^2 + 5x + 6 = (x + 2)(x + 3)$ ✓✓ (2)

Question 4 (10 marks)

4.1 Let integers be x and $x + 1 \rightarrow x(x + 1) = 132 \rightarrow x^2 + x - 132 = 0 \rightarrow (x - 11)(x + 12) = 0 \rightarrow x = 11$ or $-12 \rightarrow$ Integers: 11 and 12 ✓✓✓✓✓ (5)

4.2 $(x + 3)(x - 2) = 60 \rightarrow x^2 + x - 6 = 60 \rightarrow x^2 + x - 66 = 0 \rightarrow (x - 6)(x + 11) = 0 \rightarrow x = 6$ or -11 ✓✓✓✓✓ (5)

SECTION B: FUNCTIONS AND GRAPHS (30 MARKS)

Question 5 (15 marks)

5.1 Table:

x	$-\frac{5}{2}$	$-\frac{3}{1}$	**0**	**1**	**2**
y	-5	-3	-1	1	3

✓✓✓✓✓ (5)

5.2 Graph of $y = x^2 - 4$: Points: $(-2, 0)$, $(-1, -3)$, $(0, -4)$, $(1, -3)$, $(2, 0)$ ✓✓✓✓✓ (5)

5.3 Points labeled correctly ✓✓✓✓✓ (5)

Question 6 (15 marks)

6.1 y-intercept = −1 ✓ (1)

6.2 $x^2 - 4 = 0 \rightarrow x = \pm 2$ ✓✓ (2)

6.3 $x^2 - 4 < 0 \rightarrow -2 < x < 2$ ✓✓ (2)

6.4 Turning point = (0, −4) ✓✓ (2)

6.5 Parabola = $x^2 - 4$, Straight line = $2x - 1$ ✓✓ (2)

6.6 New equation = $y = x^2 - 1$ ✓✓ (2)

6.7 Domain: $x \in \{-2, -1, 0, 1, 2\}$ ✓✓ (2)

SECTION C: GEOMETRY AND MEASUREMENT (40 MARKS)

Question 7 (20 marks)

7.1 $BC^2 = 6^2 + 8^2 = 36 + 64 = 100 \rightarrow BC = \sqrt{100} = 10$ ✓✓✓✓ (4)

7.2 Sum of angles in triangle: $\angle A + \angle B + \angle C = 180°$ (Prove using parallel lines or sum of interior angles) ✓✓✓✓ (4)

7.3 $x = 360 - (85 + 95 + 110) = 70°$ ✓✓ (2)

7.4 Parallelogram properties: Opposite sides are equal and parallel ✓✓ (2)

7.5 Correct rhombus drawing and labels ✓✓✓✓ (4)

7.6 Congruent: identical in shape and size; Similar: same shape, different size ✓✓✓✓ (4)

Question 8 (20 marks)

8.1.1 Volume = $\pi \times 25 \times 10 = 785\ cm^3$ ✓✓✓ (3)

8.1.2 SA = $2\pi r^2 + 2\pi rh = 2 \times 3.14 \times 25 + 2 \times 3.14 \times 5 \times 10 = 157 + 314 = 471\ cm^2$ ✓✓✓ (3)

8.2 Area = ½ × 12 × 7 = 42 cm^2 ✓✓ (2)

8.3 $C = 2\pi r \rightarrow r = C/(2\pi) = 31.4/6.28 = 5$ cm ✓✓✓ (3)

8.4 $SA = 2(20 + 15 + 12) = 2 \times 47 = 94$ cm² ✓✓✓ (3)

8.5 2.5 km = 2500 m = 2 500 000 mm ✓✓ (2)

8.6 4000 m² = 0.4 ha ✓✓ (2)

TOTAL: 100 MARKS