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 6 pages including the cover page.

SECTION A: ALGEBRAIC EXPRESSIONS AND EQUATIONS (30 MARKS)

Question 1 (10 marks) Simplify the following expressions:

1.1 $(2x^2 - 3x + 1) - (x^2 + 2x - 4)$ .... (3)

1.2 Factorise completely: $x^2 - 9x + 20$ .... (3)

1.3 Solve for x: $3(x - 2) = 2x + 4$ .... (4)

Question 2 (10 marks)

2.1 Expand and simplify: $(x - 3)(x + 5) - x^2$ .... (3)

2.2 Solve: $x^2 + 2x - 8 = 0$ .... (3)

2.3 Solve the inequality: $2x - 5 < 3x + 4$ .... (4)

Question 3 (10 marks)

3.1 Simplify: $(2x^2y \times 3xy^2) \div (6x^3y)$ .... (4)

3.2 Rationalise: .... (2)

3.3 Expand and simplify: $(x - 2)^2 - (x + 1)(x - 1)$ .... (4)

SECTION B: FUNCTIONS AND GRAPHS (30 MARKS)

Question 4 (15 marks)

4.1 Complete the table for $y = -x^2 + 2x$:

x	0	1	2	3
y				

.... (4)

4.2 Draw the graph of $y = -x^2 + 2x$ using the table above. (5)

4.3 Identify the:

a) x-intercepts .... (2)

b) Turning point .... (2)

c) Axis of symmetry .... (2)

Question 5 (15 marks)

5.1 Given: $y = 3x - 2$

a) Find the gradient and y-intercept .... (2)

b) Draw the graph for $x \in [-1; 3]$ .... (5)

5.2 Find the point of intersection of $y = 3x - 2$ and $y = x^2$ (4)

5.3 Explain how the graph of $y = x^2 - 4$ is related to $y = x^2$. (4)

SECTION C: GEOMETRY AND MEASUREMENT (40 MARKS)

Question 6 (20 marks)

6.1 In triangle ABC, AB = 6 cm, AC = 10 cm and $\angle B = 90°$

a) Use Pythagoras to calculate BC .... (3)

b) Determine the area of triangle ABC .... (3)

c) Find ∠C using trigonometric ratios .... (4)

6.2 Given parallelogram PQRS:

a) List two properties of a parallelogram .... (2)

b) Justify if PQRS can be a rhombus .... (3)

c) Name two conditions for congruent triangles .... (2)

d) Sketch a trapezium and mark unequal sides .... (3)
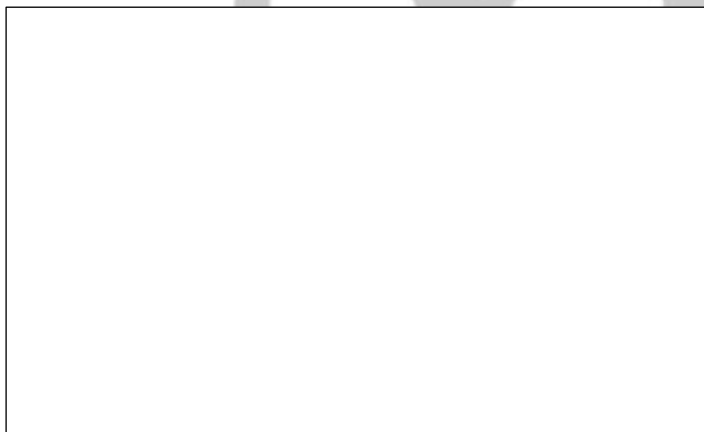
Question 7 (20 marks)

7.1 A cone has a radius of 7 cm and a height of 15 cm.

a) Volume = : Calculate volume .... (4)

b) Surface area (use curved + base) .... (4)

_____

_____

7.2 A circle has area 154 cm². Find the radius. Use $\pi = 3.14$ (3)

_____

_____

7.3 Convert: a) 0.75 hectares to m² .... (2)

_____

b) 3.5 km to mm .... (2)

_____

7.4 A rectangle has sides 9 cm and 5 cm.

 Calculate: a) Perimeter .... (2)

_____

b) Diagonal using Pythagoras .... (3)

_____

_____

TOTAL: 100 MARKS

MEMO

SECTION A: ALGEBRAIC EXPRESSIONS AND EQUATIONS (30 MARKS)

Question 1

1.1 Simplify:
$(2x^2 - 3x + 1) - (x^2 + 2x - 4)$
$= 2x^2 - 3x + 1 - x^2 - 2x + 4$
$= (2x^2 - x^2) + (-3x - 2x) + (1 + 4)$
$= x^2 - 5x + 5$

1.2 Factorise:
$x^2 - 9x + 20$
Factors of 20 that add to −9 are −5 and −4
$= (x - 5)(x - 4)$

1.3 Solve: $3(x - 2) = 2x + 4$
$3x - 6 = 2x + 4$
$3x - 2x = 4 + 6$
$x = 10$

Question 2

2.1 Expand and simplify:
$(x - 3)(x + 5) - x^2$
$= (x^2 + 5x - 3x - 15) - x^2$
$= (x^2 + 2x - 15) - x^2$
$= 2x - 15$

2.2 Solve: $x^2 + 2x - 8 = 0$
Factorise: $(x + 4)(x - 2) = 0$
$x = -4$ or $x = 2$

2.3 Solve inequality: $2x - 5 < 3x + 4$
$2x - 3x < 4 + 5$
$-x < 9$
$x > -9$ (flip inequality sign)

Question 3

3.1 Simplify:
$(2x^2y \times 3xy^2) \div (6x^3y)$

$= (6x^3y^3) \div (6x^3y)$
$= y^2$

3.2 Rationalise:
$\frac{5}{\sqrt{2}} = \frac{5}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{5\sqrt{2}}{2}$

3.3 Expand and simplify:
$(x - 2)^2 - (x + 1)(x - 1)$
$= (x^2 - 4x + 4) - (x^2 - 1)$
$= x^2 - 4x + 4 - x^2 + 1$
$= -4x + 5$

SECTION B: FUNCTIONS AND GRAPHS (30 MARKS)

Question 4

4.1 Calculate $y = -x^2 + 2x$ for $x = 0,1,2,3$:

- x=0: $y = 0$
- x=1: $y = -1 + 2 = 1$
- x=2: $y = -4 + 4 = 0$
- x=3: $y = -9 + 6 = -3$

4.3 Identify:

a) x-intercepts: points where y=0 → x=0 and x=2
b) Turning point: vertex at $x = -b/2a = -2/(2 \times -1) = 1$
y at x=1 is 1 → turning point (1; 1)
c) Axis of symmetry: $x = 1$

Question 5

5.1 a) $y = 3x - 2$
Gradient = 3, y-intercept = −2

5.2 Intersection points between $y = 3x - 2$ and $y = x^2$:
Set equal: $x^2 = 3x - 2 \rightarrow x^2 - 3x + 2 = 0$
$(x - 1)(x - 2) = 0 \rightarrow x = 1$ or 2
Points: (1;1) and (2;4)

5.3 $y = x^2 - 4$ is a vertical shift of $y = x^2$ down by 4 units.

SECTION C: GEOMETRY AND MEASUREMENT (40 MARKS)

Question 6

6.1 a) BC = $\sqrt{(AC^2 - AB^2)} = \sqrt{(10^2 - 6^2)} = \sqrt{(100 - 36)} = \sqrt{64} = 8$ cm
b) Area = ½ × AB × BC = ½ × 6 × 8 = 24 cm²
c) ∠C: Use tan(∠C) = opposite/adjacent = AB/BC = 6/8 = 0.75
∠C = tan⁻¹(0.75) ≈ 36.87°

6.2 a) Properties of parallelogram: opposite sides parallel; opposite sides equal
b) For PQRS to be a rhombus, all sides must be equal
c) Congruent triangles conditions: SSS, SAS, ASA, RHS
d) (Sketch of trapezium with two unequal sides marked)

Question 7

7.1 a) Volume = ⅓ × π × 7² × 15 = ⅓ × 3.14 × 49 × 15 ≈ 769.7 cm³
b) Surface area = πr(r + l), l = $\sqrt{(r^2 + h^2)} = \sqrt{(7^2 + 15^2)} = \sqrt{(49 + 225)} = \sqrt{274} \approx 16.55$ cm
Surface area = 3.14 × 7 × (7 + 16.55) = 3.14 × 7 × 23.55 ≈ 516.8 cm²

7.2 Area = πr² → r = $\sqrt{(Area/\pi)} = \sqrt{(154/3.14)} = \sqrt{49} = 7$ cm

7.3 a) 0.75 hectares = 0.75 × 10 000 = 7 500 m²
b) 3.5 km = 3.5 × 1 000 000 = 3 500 000 mm

7.4 a) Perimeter = 2(9 + 5) = 2(14) = 28 cm
b) Diagonal = $\sqrt{(9^2 + 5^2)} = \sqrt{(81 + 25)} = \sqrt{106} \approx 10.3$ cm

TOTAL : 100