SMARTWIZ

GRADE 9 MATHEMATICS EXAM
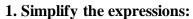
MARKS: 100

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: ALGEBRA & NUMBER OPERATIONS (30 MARKS)

1. Simplify the expressions:

a) $5x + 3 - 2(2x - 1)$

b) $(x + 4)^2$

c) $\frac{6ab^2}{3a^2b}$

(6)

2. Solve for x:

a) $4(x + 2) = 3x + 10$

b) $\frac{x - 1}{2} = 3$

(6)

3. Factorise completely:

a) $x^2 - 9x + 20$

b) $3x^2 - 12$

(4)

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4. Expand and simplify:
a) (x−5)(x+2)(x - 5)(x + 2)(x−5)(x+2)

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b) (3x+1)(x−4)(3x + 1)(x - 4)(3x+1)(x−4)

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(4)

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5. Word problem:
Twice a number added to 5 is equal to the number subtracted from 23. Find the number.

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(4)

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6. Scientific notation:
a) Write 0.00045 in scientific notation.

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b) Write 1 250 000 in scientific notation.

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(2)

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7. Approximation:
a) Round 749.82 to the nearest ten:

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b) Round 749.82 to two decimal places:

(2)

SECTION B: GEOMETRY AND MEASUREMENT (30 MARKS)

1. Definitions:
a) Define a trapezium.

b) List two properties of a rhombus.

(4)

2. Find the missing angles:
a) Triangle with angles: $x^\circ, 50^\circ, 60^\circ$

b) On a straight line: $2x^\circ$ and $(x+30)^\circ$

(6)

3. Pythagoras Theorem:
A triangle has a hypotenuse of 10 cm and one leg of 6 cm. Find the other leg.

(3)

4. Area and perimeter of a triangle:
Base = 10 cm, Height = 5 cm, Sides = 6 cm, 8 cm, 10 cm
Area: _____

Perimeter: _____
(4)

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5. Volume and surface area of a rectangular prism:
Length = 7 cm, Width = 4 cm, Height = 2 cm

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(5)

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6. Constructions (describe or draw):
a) Construct a bisected angle.
b) Construct an equilateral triangle.

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(4)

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7. Metric conversions:
a) 2.4 km = _____ m
b) 7500 g = _____ kg
(2)

SECTION C: DATA HANDLING AND PROBABILITY (20 MARKS)

1. Ages of learners: 13, 14, 15, 15, 16, 14, 13, 15
a) Mean: _____
b) Median: _____
c) Mode: _____
d) Range: _____
(6)

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2. Probability:
A bag has 3 red balls, 5 green balls, and 2 blue balls.
a) Total number of balls: _____

b) Probability of choosing:
   i) A red ball: _____
   ii) Not a green ball: _____
(4)

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3. Pie chart:

- 40% use taxi
- 30% walk
- 20% cycle
- 10% car
   a) What fraction cycle? _____
   b) If 240 learners surveyed, how many use taxi?

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(4)

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4. Histogram interpretation:
State two things a histogram can show about data:

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(4)

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5. Graph types:
List two types of graphs for numerical data:
a) _____
b) _____
(2)

SECTION D: FUNCTIONS & GRAPHS (20 MARKS)

1. Table for $y=-x+2y = -x + 2y=-x+2$

x	-2	-1	0	1	2
y					

(6)

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2. From the graph:
a) Y-intercept: _____
b) Gradient: _____
(2)

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3. Interpretation:
If a graph shows the cost per minute of a call, how would you find the cost for 10 minutes?

(2)

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4. Equation of line with gradient -4 and y-intercept 3:

(2)

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5. Pattern: 10, 8, 6, 4,...
a) Common difference: _____
b) General formula (Tn): _____
(4)

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6. Linear or not? Justify:
Given values of x: 1, 2, 3, 4
And y: 1, 4, 9, 16

(4)

TOTAL : 100

MEMO

SECTION A: ALGEBRA & NUMBER OPERATIONS (30 MARKS)

1. Simplify: (6)

a) $5x+3-2(2x-1)=5x+3-4x+2=x+5$ ✔✔

b) $(x+4)^2=x^2+8x+16$ ✔✔

c) $\frac{6ab^2}{3a^2b} = \frac{2b}{a}$ ✔✔

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2. Solve for x: (6)

a) $4(x+2)=3x+10 \Rightarrow 4x+8=3x+10 \Rightarrow x=2$ ✔✔

b) $\frac{x-1}{2}=3 \Rightarrow x-1=6 \Rightarrow x=7$ ✔✔

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3. Factorise: (4)

a) $x^2-9x+20=(x-5)(x-4)$ ✔✔

b) $3x^2-12=3(x^2-4)=3(x-2)(x+2)$ ✔✔

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4. Expand and simplify: (4)

a) $(x-5)(x+2)=x^2+2x-5x-10=x^2-3x-10$ ✔✔

b) $(3x+1)(x-4)=3x^2-12x+x-4=3x^2-11x-4$ ✔✔

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5. Word problem: (4)

Let number $= x$

$2x+5=23-x \Rightarrow 3x=18 \Rightarrow x=6$ ✔✔✔

Answer: 6 ✔

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6. Scientific notation: (2)

a) 4.5×10^{-4} ✔

b) 1.25×10^6 ✔

7. Approximation: (2)
a) 750 ✓
b) 749.82 ✓

SECTION B: GEOMETRY AND MEASUREMENT (30 MARKS)

1. Definitions: (4)
a) Trapezium = A quadrilateral with one pair of parallel sides ✓
b) Rhombus:

- All sides equal ✓
- Opposite angles equal ✓

2. Angles: (6)
a) $x + 50 + 60 = 180 \Rightarrow x = 70^\circ$ ✓✓
b) $2x + x + 30 = 180 \Rightarrow 3x = 150 \Rightarrow x = 50^\circ$ ✓✓

3. Pythagoras Theorem: (3)
$a^2 = 10^2 - 6^2 = 100 - 36 = 64 \Rightarrow a = 8 \, \text{cm}$ ✓✓✓

4. Triangle Area and Perimeter: (4)
Area $= \frac{1}{2} \times 10 \times 5 = 25 \, \text{cm}^2$ ✓
Perimeter $= 6 + 8 + 10 = 24 \, \text{cm}$ ✓

5. Rectangular prism: (5)
Volume $= 7 \times 4 \times 2 = 56 \, \text{cm}^3$ ✓✓
Surface area $= 2(7\times4 + 7\times2 + 4\times2) = 2(28 + 14 + 8) = 100 \, \text{cm}^2$ ✓✓✓

6. Constructions: (4)

✓ Correct method to bisect an angle ✓✓

✓ Equilateral triangle with equal sides and 60° angles ✓✓

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7. Conversions: (2)

a) 2400 m ✓

b) 7.5 kg ✓

SECTION C: DATA HANDLING AND PROBABILITY (20 MARKS)

1. Ages: (6)

Mean = $\frac{115}{8} = 14.375$ ✓

Median = 14.5 ✓

Mode = 15 ✓

Range = 16 - 13 = 3 ✓

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2. Probability: (4)

a) Total = 10 ✓

b.i) Red = $\frac{3}{10}$ ✓

b.ii) Not green = $\frac{5}{10} = \frac{1}{2}$ ✓

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3. Pie chart: (4)

a) $20\% = \frac{1}{5}$ ✓

b) $40\% \times 240 = 96$ learners ✓

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4. Histogram interpretation: (4)

✓ Frequency of data intervals ✓

✓ Shape of distribution (skewed/symmetric, etc.) ✓✓

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5. Graph types for numerical data: (2)

a) Histogram ✓

b) Line graph ✓

SECTION D: FUNCTIONS & GRAPHS (20 MARKS)

1. Table for $y=-x+2$: (6)

x	-2	-1	0	1	2
y	4	3	2	1	0

2. From the graph: (2)
a) Y-intercept = 2 ✓
b) Gradient = -1 ✓

3. Interpretation: (2)
✓ Read x = 10 on the horizontal axis and find y-value ✓✓

4. Equation of line: (2)
$y=-4x+3$ ✓✓

5. Pattern: (4)
a) Common difference = -2 ✓
b) $T_n = 12 - 2n$ ✓✓

6. Linear or not: (4)
✓ Not linear
✓ Second difference constant (values = perfect squares)
✓ Quadratic pattern ✓✓✓✓

TOTAL : 100