



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

MATHEMATICS N1

3 April 2024

This marking guideline consists of 9 pages.

QUESTION 1

1.1

1.1.1

$$\left(\frac{1}{4}\right)^{-2}$$

$$= 4^2 \checkmark \text{ or } 16 \checkmark$$

Alternative answer:

$$\left(\frac{1}{4}\right)^{-2}$$

$$= (4^{-1})^{-2}$$

$$= 4^2 \checkmark \text{ or } 16 \checkmark$$

Instructions:

- Allocate marks as indicated

(1)

1.1.2

$$x^{-2}(x^2y^3)^4(yz)^5$$

$$= x^{-2} \cdot x^8 y^{12} \checkmark \cdot y^5 z^5 \checkmark$$

$$= x^6 y^{17} z^5 \checkmark$$

Alternative answer:

$$= x^6 \checkmark y^{17} \checkmark z^5 \checkmark$$

Instructions:

- Allocate marks as indicated

Instructions for alternative answer

- 3 marks for answer only

(3)

1.2

1.2.1

$$\log_7 \frac{1}{7} + \log_8 64$$

$$= \log_7 7^{-1} + \log_8 8^2$$

$$= -\log_7 7 \checkmark + 2 \log_8 8 \checkmark$$

$$= -1 + 2(1) \checkmark$$

$$= 1 \checkmark$$

Instructions:

- Allocate marks as indicated
- (1 mark for answer only; question states without a calculator)

(4)

1.2.2

$$\frac{2 \log 81}{\sqrt{5} \log 3 \sqrt{5}}$$

$$= \frac{2 \log 3^4 \checkmark}{(\sqrt{5})(\sqrt{5}) \checkmark \log 3}$$

$$= \frac{(2)(4) \log 3}{5 \log 3}$$

$$= \frac{8 \cancel{\log 3}}{5 \cancel{\log 3}}$$

$$= \frac{8}{5} \checkmark$$

Instructions:

- Allocate marks as indicated
- (1 mark for answer only; question states without a calculator)

(4)

1.3

$$\log_3(x + 5) = 4$$

$$x + 5 = 3^4 \checkmark$$

$$x = 81 - 5$$

$$x = 76 \checkmark$$

Instructions:

- 1 mark for writing in exponential form
- 1 mark for solving x

QUESTION 2

2.1

$$\begin{array}{r}
 2x^2 \checkmark - 3xy \checkmark + 3y^2 \checkmark \\
 2x + 3y \overline{) 4x^3 + 0x^2 - 3xy^2 + 9y^3} \\
 \underline{= (4x^3 \pm 6x^2y)} \\
 \quad -6x^2y - 3xy^2 \\
 \underline{= (-6x^2y \pm 9xy^2)} \\
 \quad \quad 6xy^2 + 9y^3 \\
 \underline{= (6xy^2 \pm 9y^3)} \\
 \quad \quad \quad 0
 \end{array}$$

Alternative answer:

$$\begin{aligned}
 & (2x + 3y)(2x^2 - 3xy + 3y^2) \\
 &= 4x^3 - 6x^2y + 6xy^2 + 6x^2y - 9xy^2 + 9y^3 \\
 &= 4x^3 - 3xy^2 + 9y^3
 \end{aligned}$$

Instructions:

- 3 marks for long division

Instructions for alternative answer:

- 3 marks for final answer when multiplying the divider by the answer given

(3)

2.2

$$\begin{aligned}
 & 12x^2y - 16xy + 14xy^2 \\
 & - 4x^2y - 8xy + 21xy^2 \\
 & \underline{= 19x^2y \pm 7xy = 3xy^2} \\
 & \underline{= 11x^2y \checkmark - 17xy \checkmark + 32xy^2 \checkmark}
 \end{aligned}$$

Instructions:

- Allocate marks as indicated
- (3 marks for answer only)

(3)

2.3

$$\begin{aligned}
 & (x + 2)(x - 3)^2 \\
 &= (x + 2)(x - 3)(x - 3) \\
 &= (x + 2)(x^2 - 3x - 3x + 9) \\
 &= (x + 2)(x^2 - 6x + 9) \\
 &= x^3 - 6x^2 + 9x + 2x^2 - 12x + 18 \\
 &= x^3 \checkmark - 4x^2 \checkmark - 3x \checkmark + 18 \checkmark
 \end{aligned}$$

Alternative answer:

$$\begin{aligned}
 &= (x - 3)(x - 3)(x + 2) \\
 &= (x - 3)(x^2 + 2x - 3x - 6) \\
 &= (x - 3)(x^2 - x - 6) \\
 &= x^3 - x^2 - 6x - 3x^2 + 3x + 18 \\
 &= x^3 - 4x^2 - 3x + 18
 \end{aligned}$$

Instructions:

- Allocate marks as indicated
- (4 marks for answer only)

Instructions for alternative answer:

- 4 marks for final answer
- (4 marks for answer only)

(4)

[10]

QUESTION 3

3.1 3.1.1 $\frac{1}{3}x - 4y$
 $= \frac{1}{3} \checkmark (x \checkmark - 12y \checkmark)$ (3)

Instructions:

- Allocate marks as indicated

3.1.2 $3x^4 + 9x^2 - 6x^3 - 18x$
 $= 3x(x^3 + 3x - 2x^2 - 6)$
 $= 3x[(x^3 + 3x) \checkmark + (-2x^2 - 6) \checkmark]$
 $= 3x[x(x^2 + 3) - 2(x^2 + 3)]$
 $= 3x \checkmark (x^2 + 3) \checkmark (x - 2) \checkmark$

Instructions:

- Allocate marks as indicated
- Subtract 1 mark if not fully factorised with HCF of $3x$

Alternative answer:

$$= 3x \checkmark (x^3 + 3x - 2x^2 - 6)$$

$$= 3x[(x^3 - 2x^2) + (3x - 6)]$$

$$= 3x[x^2(x - 2) \checkmark + 3(x - 2) \checkmark]$$

$$= 3x(x - 2) \checkmark (x^2 + 3) \checkmark$$

Instructions for alternative answer:

- Allocate marks as indicated
- Subtract 1 mark if not fully factorised with HCF of $3x$

Alternative answer:

$$= (3x^4 + 9x^2) + (-6x^3 - 18x)$$

$$= 3x^2(x^2 + 3) - 6x(x^2 + 3)$$

$$= (x^2 + 3) \checkmark (3x^2 - 6x) \checkmark$$

$$= 3x \checkmark (x^2 + 3) \checkmark (x - 2) \checkmark$$

Alternative answer:

$$= (3x^4 - 6x^3) + (9x^2 - 18x)$$

$$= 3x^3(x - 2) - 9x(x - 2)$$

$$= (x - 2) \checkmark (3x^2 - 9x) \checkmark$$

$$= 3x \checkmark (x - 2) \checkmark (x^2 + 3) \checkmark$$

(5)

3.2 $\frac{4 - 3x}{2x} - \frac{4}{10y}$
 $= \frac{5y(4 - 3x) - x(4)}{10xy \checkmark}$
 $= \frac{20y \checkmark - 15xy \checkmark - 4x \checkmark}{10xy}$ (4)

Instructions:

- 3 marks for numerator
- 1 mark for denominator

3.3 3.3.1 $56x^4y^5z = 2^3 \times 7 \times x^4y^5z \checkmark$
 $32x^7yz^8 = 2^5 \times x^7yz^8 \checkmark$ (2)

Instructions:

- Allocate marks as indicated
- Do not allocate marks if the variables are missing

$$3.3.2 \quad \text{LCM} = 2^5 \times 7 \times x^7 y^5 z^8$$

$$\text{LCM} = 224 \checkmark x^7 y^5 z^8 \checkmark$$

Instructions:

- 1 mark for 224
- 1 mark for $x^7 y^5 z^8$
- (2 marks for answer only) (2)

$$3.3.3 \quad \text{HCF} = 2^3 \times x^4 yz$$

$$\text{HCF} = 8 \checkmark x^4 yz \checkmark$$

Instructions:

- 1 mark for 8
- 1 mark for $x^4 yz$
- (2 marks for answer only) (2)

[18]

QUESTION 4

$$4.1 \quad 3x - 12 \checkmark = -24 + x$$

$$2x = -24 + 12$$

$$2x = -12 \checkmark$$

$$x = \frac{-12}{2}$$

$$x = -6 \checkmark$$

Instructions:

- Allocate marks as indicated

(3)

$$4.2 \quad \frac{a}{4x - 3y} = 3$$

$$a = 3(4x - 3y) \checkmark$$

$$a = 12x - 9y \checkmark$$

$$9y = 12x - a \checkmark$$

$$y = \frac{12x - a}{9} \checkmark \text{ or } y = \frac{12x}{9}$$

$$-\frac{a}{9}$$

Instructions:

- Allocate marks as indicated
 - 1 mark per step shown
 - Do not penalise if the subject is on the RH. side
- $$\frac{12x - a}{9} = y$$

Alternative answer:

$$a = 3(4x - 3y) \checkmark$$

$$\frac{a}{3} \checkmark = 4x - 3y$$

$$3y = 4x - \frac{a}{3} \checkmark$$

$$y = \frac{4x}{3} - \frac{a}{9} \checkmark$$

Instructions for alternative answer:

- 1 mark per step shown
 - Do not penalise if the subject is on the RH. side
- $$\frac{4x}{3} - \frac{a}{9} = y$$

(4)

$$4.3 \quad y = \frac{12(2) - (-3)}{9} \checkmark$$

$$y = 3 \checkmark$$

Instructions:

- 1 mark for substitution
- 1 mark for the answer
- (1 mark for answer only) (2)

$$\begin{aligned}
 3x + 4x - 2 &= 61 \checkmark \\
 7x &= 61 + 2 \\
 7x &= 63 \checkmark \\
 x &= \frac{63}{7} \\
 x &= 9 \checkmark
 \end{aligned}$$

Instructions:

- 2 marks for equation
- 1 mark for simplifying like terms
- 1 mark for final answer
- (2 marks for answer only)

(4)

4.5 $1,789 \times 60 = 107,34 \checkmark$ rotation per minute

Instructions:

- 1 mark for the answer
- Do not penalise if the unit is not indicated

(1)

4.6 $10,83 \times 3,6 = 38,988 \checkmark$ km per hour

Instructions:

- 1 mark for the answer
- Do not penalise if the unit is not indicated

(1)

[15]

QUESTION 5

5.1 5.1.1 *Hyperbola* $\checkmark$
Rectangular hyperbola

Instructions:

- Allocate marks as indicated

(1)

5.1.2 Quadrant 1 $\checkmark$ and 3 $\checkmark$

Instructions:

- Allocate marks as indicated

(2)

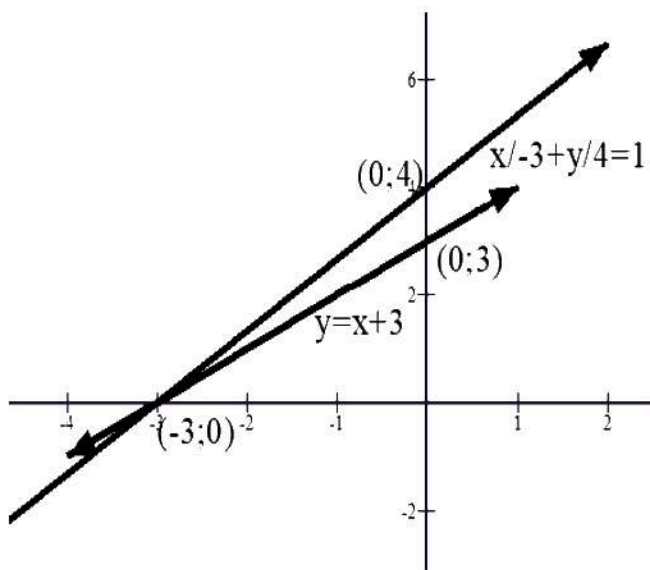
5.1.3 No x-intercepts $\checkmark$

Instructions:

- Allocate marks as indicated
- If written 0, no marks

(1)

5.2



Instructions:

- 1 mark for plotting (0;4)
- 1 mark for plotting (-3;0) the coordinate must be located on both graphs
- 1 mark for plotting (0;3)
- 1 mark for plotting (-1;2)
- 1 mark for plotting (-2;1)
- 1 mark for plotting (-4;1)
- If coordinates are in a table, full marks

(6)

(-3; 0) ✓

Instructions:

- Allocate marks as indicated
- If only -3, one mark

[12]

QUESTION 6

6.1 $TG = GA$ (Isosceles $\triangle$, $\hat{T} = \hat{A}$) ✓
 $x = 8,4 \text{ cm}$ ✓

Instructions:

- 1 mark for reason
- 1 mark for final answer

(2)

6.2 $\frac{MK}{TA} = \frac{FK}{GA}$
 $\frac{y}{16} \checkmark = \frac{3,5}{8,4} \checkmark$
 $8,4y = 56$
 $y = \frac{56}{8,4}$
 $y = 6,667 \text{ cm}$ ✓

Instructions:

- 1 mark for LH. side $\frac{y}{16}$
- 1 mark for RH. side $\frac{3,5}{8,4}$
- 1 mark for final answer
- (2 marks for answer only)
- Do not penalise if the unit is not indicated

Alternative answer:

$$\frac{TA}{MK} = \frac{GA}{FK}$$

$$\frac{16}{y} = \frac{8,4}{3,5}$$

$$8,4y = 56$$

$$y = \frac{56}{8,4}$$

$$y = 6,667 \text{ cm}$$

Instructions for alternative answer:

- 1 mark for LH. side $\frac{16}{y}$
- 1 mark for RH. side $\frac{8,4}{3,5}$
- 1 mark for final answer
- (2 marks for answer only)
- Do not penalise if the unit is not indicated

(3)

6.3 $\hat{G} = 180^\circ - 51^\circ - 51^\circ$ (Interior $\angle$'s of $\triangle$) ✓
 $\hat{G} = 78^\circ$ ✓

Instructions:

- 1 mark for reason
- 1 mark for final answer

(2)

[7]

QUESTION 7

7.1 7.1.1 $\cos 86^\circ \checkmark = \frac{CB}{30,5} \checkmark$
 $CB = 30,5 \cos 86^\circ$
 $CB = 2,128 \text{ m}$ ✓

Alternative answer:

Instructions:

- 1 mark for LH. side
- 1 mark for RH. side
- 1 mark for final answer
- (1 mark for answer only)
- Do not penalise if the unit is not indicated

$$\begin{aligned}\sec 86^\circ &= \frac{30,5}{CB} \\ CB \sec 86^\circ &= 30,5 \\ CB &= \frac{30,5}{\sec 86^\circ} \\ CB &= 30,5 \cos 86^\circ \\ CB &= 2,128 \text{ m}\end{aligned}$$

Instructions for alternative answer:

- 1 mark for LH. side
- 1 mark for RH. side
- 1 mark for final answer
- (1 mark for answer only)
- Do not penalise if the unit is not indicated

7.1.2 $AD = CF - CB - EF$
 $AD = 61 - 2,128 - 2,128$
 $AD = 56,744 \text{ m} \checkmark$

Instructions:

- 1 mark for final answer
- (1 mark for answer only)

(1)

7.1.3 $\sin 86^\circ \checkmark = \frac{DE}{30,5} \checkmark$
 $DE = 30,5 \sin 86^\circ$
 $DE = 30,426 \text{ m} \checkmark$

Instructions:

- 1 mark for LH. side
- 1 mark for RH. side
- 1 mark for final answer
- (1 mark for answer only)
- Do not penalise if the unit is not indicated

Instructions for alternative answer:

Alternative answer:
 $DE^2 = DF^2 - EF^2 \text{ (Pythagoras)}$
 $DE = \sqrt{(30,5)^2 - (2,128)^2}$
 $DE = 30,426 \text{ m}$

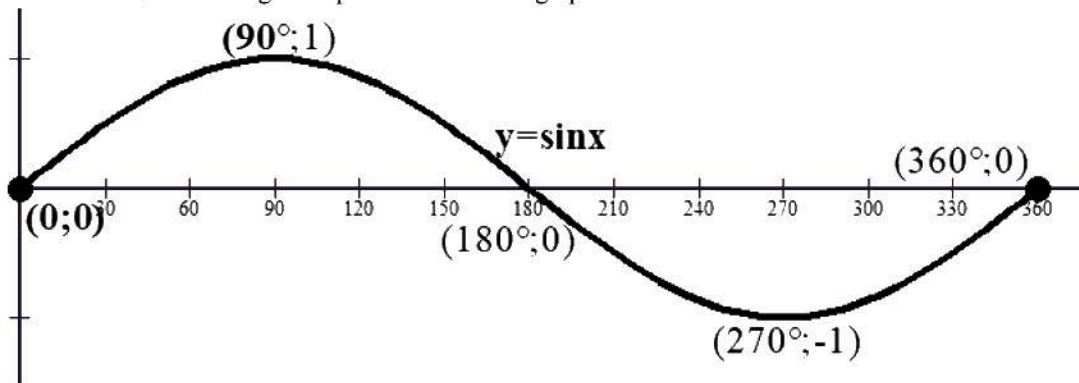
- 1 mark for correct Pythagoras equation
- 1 mark for substituting values
- 1 mark for final answer
- (1 mark for answer only)
- Do not penalise if the unit is not indicated

(2)

7.2

Instructions:

- 1 mark for each of the following coordinates indicated on the graph $(0^\circ;0)$; $(180^\circ;0)$; $(360^\circ;0)$
- 1 mark for indicating the equation next to the graph



(4)
[10]

QUESTION 8

8.1 $b = 1\,800 \div 1\,000$
 $b = 1,8\text{ m} \checkmark$

$$A = l \times b$$
$$A = 11,5 \times 1,8 \checkmark$$
$$A = 20,7\text{ m}^2 \checkmark$$

8.2 $b = 600 \div 1\,000$
 $b = 0,6\text{ m} \checkmark$

$$A = l \times b$$
$$A = 1,9166 \times 0,6 \checkmark$$
$$A = 1,150\text{ m}^2 \checkmark$$

Number of panels:
 $= \text{Area of glass inlay} \div \text{Area of panel}$
 $= 20,7 \div 1,150 \checkmark$
 $= 18\text{ panels} \checkmark$

8.3 **Adult ticket:**
 $R174,85 \times 32,559\% \checkmark$
 $= R56,929 \checkmark \text{ or } R\,56,93$
 $\therefore R174,85 + 56,929 = R231,779 \checkmark \text{ or } R231,78$
Child's ticket:
 $R174,85 \times 18\% \checkmark$
 $= R31,473 \checkmark \text{ or } R\,31,47$
 $= R174,85 - R\,31,473$
 $= R143,377 \checkmark \text{ or } R143,38$

Instructions:

- 1 mark for converting 1 800 cm to 1,8 m
- 1 mark for substituting values
- 1 mark for final answer
- (1 marks for answer only)
- Do not penalise if the unit is not indicated

(3)

Instructions:

- 1 mark for converting 600 cm to 0,6 m

Calculating area of panel:

- 1 mark for substituting values
- 1 mark for final answer
- (1 mark for answer only)
- Do not penalise if the unit is not indicated

Calculating amount of panel:

- 1 mark for calculation
- 1 mark for final answer
- (2 marks for answer only)

(5)

Instructions:

- Allocate marks as indicated

(6)

[14]

TOTAL: 100