higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

MATHEMATICS N1

20 November 2023

This marking guideline consists of 11 pages.

Copyright reserved

QUESTION 1

1.1 $\frac{15x^6y^{-4}z^3}{20x^3y^4z^6} \times \sqrt{64y^8} \times \left(\frac{1}{2}+\frac{1}{2}\right)^3$

$= \frac{3x^3 \checkmark}{4y^8z^3 \checkmark} \times (8^2y^8)^{\frac{1}{2}} \checkmark \times \mathbf{1} \checkmark$

$= \frac{3x^3}{4y^8z^3} \times \mathbf{8y^4} \checkmark$

$= \frac{3x^3.2 \checkmark}{y^4 \checkmark z^3}$

Instructions:
- 1 mark for the numerator $3x^3$
- 1 mark for the denominator $4y^8z^3$
- 1 mark exponent
- 1 mark for simplifying $\left(\frac{1}{2}+\frac{1}{2}\right)^3$
- 1 mark for $\mathbf{8y^4}$

2 marks for final answer (7)

1.2 $\log_6 4 + 2\log_6 3$

$= \log_6 4 + \log_6 3^2 \surd$

$= \log_6(4 \times 9) \surd$

$= \log_6 36 \checkmark$

$= \log_6 6^2$

$= 2\log_6 6 \checkmark$

$= 2 \checkmark$

Instructions:
- Allocate marks as indicated
- Half mark for 3^2
- Half mark for (4×9)
- 1 mark for $\log_6 36$
- 1 mark for $2\log_6 6$
- 1 mark for answer
- Only answer no marks (4)

1.3 $3x = \log_2 64$

$3x = \log_2 2^6$

$3x = 6\log_2 2 \checkmark$

$3x = 6(1) \checkmark$

$3x = 6 \checkmark$

$x = \frac{6}{3}$

$x = 2 \checkmark$

Instructions:
- Allocate marks as indicated
- ($3x = 6$ only 1 mark, question states without a calculator)

Alternative answer:

$2^{3x} = 64$

$2^{3x} = 2^6$

$3x = 6$

$x = \frac{6}{3}$

$x = 2$

Instructions for alternative answer:
- 1 mark for 2^{3x}
- 1 mark for 2^6
- 1 mark for $3x = 6$
- 1 mark for $x = 2$

(4)
[15]

QUESTION 2

2.1

$$y - 3 \;\overline{)\; y^3 + \mathbf{0y^2} - 6y + 20 \checkmark}$$

$y^2 \checkmark + 3y \checkmark + 3 \checkmark$

$-(y^3 - 3y^2) \checkmark$

$3y^2 - 6y$

$-(3y^2 - 9y) \checkmark$

$3y + 20$

$-(3y - 9) \checkmark$

29

$\therefore\ y^2 + 3y + 3 + \frac{29}{y-3}$

Instructions:
- Allocate marks as indicated

(7)

2.2

$10x^2 - 5xy + 2y^2$

$-4x^2 + 4xy + 5y^2$

$3x^2 - 2xy - 6y^2$

$9x^2 \checkmark - 3xy \checkmark + y^2 \checkmark$ or $+1y^2$

Instructions:
- Allocate marks as indicated
- (3 marks for answer only)
- Sign in front of term must be correct

Alternative answer:

$= 10x^2 - 4x^2 + 3x^2 - 5xy + 4xy - 2xy + 2y^2 + 5y^2 - 6y^2$

$= 9x^2 \checkmark - 3xy \checkmark + 1y^2 \checkmark$

Instructions:
- Allocate marks as indicated
- (3 marks for answer only)
- Sign in front of term must be correct

(3)
[10]

QUESTION 3

3.1

$2x(c-d) + 6y(c-d) - 8z(c-d)$

$= (c-d) \checkmark (2x + 6y - 8z) \checkmark$

$= 2 \checkmark (c-d)(x + 3y - 4z)$

Instructions:
- Allocate marks as indicated

(3)

3.2

$$\frac{5a}{b} - \frac{3a}{2b} + \frac{a}{3b}$$

$$= \frac{5a(6) - 3a(3) + a(2)}{6b}$$

$$= \frac{30a \checkmark - 9a \checkmark + 2a \checkmark}{6b \checkmark}$$

$$= \frac{13a}{6b} \checkmark$$

Instructions:
- 1 mark for denominator / LCM $6b$
- 1 mark for numerator $30a$
- 1 mark for numerator $-9a$
- 1 mark for numerator $2a$
- 1 mark for final answer

(5)

3.3 3.3.1

$16a^4b^8 = 2^4 \times a^4b^8$ ✓

$8a^3b^7 = 2^3 \times a^3b^7$ ✓

$36a^2b^3 = 2^2 \times 3^2 \times a^2b^2$ ✓

Alternative answer:

2	2	2	2			a	a	a	a	b	b	b	b	b	b	b	b	✓
2	2	2				a	a	a		b	b	b	b	b	b	b		✓
2	2			3	3	a	a			b	b							✓
2	**2**	**2**	**2**	**3**	**3**	**a**	**a**	**a**	**a**	**b**	**b**	**b**	**b**	**b**	**b**	**b**	**b**	

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

(3)

3.3.2 LCM $= 2^4 \times 3^2 \times a^4b^8$

LCM $= 144$ ✓a^4b^8 ✓

Instructions:
- 1 mark for 144
- 1 mark for a^4b^8

(2)

3.3.3 HCF $= 2^2 \times a^2b^3$

HCF $= 4$ ✓a^2b^3 ✓

Instructions:
- 1 mark for 4
- 1 mark for a^2b^3

(2)
[15]

QUESTION 4

4.1

$$(x+1)^2 = x^2 - 6x + 17$$
$$(x+1)(x+1) = x^2 - 6x + 17$$
$$x^2 + x + x + 1 = x^2 - 6x + 17$$
$$x^2 \checkmark + 2x \checkmark + 1 \checkmark = x^2 - 6x + 17$$
$$x^2 + 2x - x^2 + 6x = 17 - 1$$
$$8x \checkmark = 16 \checkmark$$
$$x = \frac{16}{8}$$
$$x = 2 \checkmark$$

Instructions:
- 3 marks for simplifying brackets
- 2 marks for simplifying like terms RHS and LHS
- 1 mark for final answer

(6)

4.2

$$p = m^2 - \frac{x}{2}$$
$$\frac{x}{2} = m^2 - p \checkmark$$
$$x = 2(m^2 - p) \checkmark$$

Instructions:
- 1 mark for $\frac{x}{2} = m^2 - p$
- 1 mark for $x = 2(m^2 - p)$
- Do not penalise if the subject is on the RH. side $2(m^2 - p) = x$

Alternative answer:

$$\frac{x}{2} = m^2 - p \checkmark$$
$$x = 2m^2 - 2p \checkmark$$

Instructions for alternative answer:
- 1 mark for $\frac{x}{2} = m^2 - p$
- 1 mark for $x = 2m^2 - 2p$

Alternative answer:

$$p - m^2 = -\frac{x}{2} \checkmark$$
$$m^2 - p = \frac{x}{2}$$
$$x = 2m^2 - 2p \checkmark or\ x = 2(m^2 - p)$$

Instructions for alternative answer:
- 1 mark for $-\frac{x}{2} = p - m^2$
- 1 mark for $x = 2m^2 - 2p$

(2)

4.3

$$v = \frac{s}{t}$$
$$t = \frac{s}{v} \checkmark$$
$$t = \frac{1\,261}{988} \checkmark$$
$$t = 1{,}276 \text{ hours} \checkmark$$

$$1 \text{ hour} \checkmark 16 \text{ minutes} \checkmark 34 \text{ seconds} \checkmark$$

Instructions:
- 1 mark for manipulated formula
- 1 mark for substitution
- 1 mark for the answer
- 3 marks for conversion

(6)

4.4 $v = \pi DN$

$N = \frac{v}{\pi D}$ ✓

$N = \frac{18,3}{\pi \times 0,8}$ ✓

$N = 7,281\ r/s$ ✓

Instructions:
- 1 mark for manipulated formula
- 1 mark for substitution
- 1 mark for the answer

(3)

[17]

QUESTION 5

5.1 5.1.1 $y = mx + c$ ✓

Alternative answers:

$\frac{x}{a} + \frac{y}{b} = 1$ ✓

$ax + by + c = 0$ ✓

$y - y_1 = m(x - x_1)$ ✓

$\frac{y - y_1}{x - x_1} = \frac{y_2 - y_1}{x_2 - x_1}$ ✓

Instructions:
- 1 mark for answer only
- Any of alternative answer 1 mark

5.1.2 $(0; 2)$ ✓

Instructions:
- 1 mark for answer only

5.1.3 $(-2; 0)$ ✓

Instructions:
- 1 mark for answer only

5.1.4 $m = -1$ ✓

Instructions:
- 1 mark for answer only

5.1.5 $m = -1$

$c = 2$

$\therefore y = -1x + 2$ ✓

Instructions:
- 1 mark for answer only

(5 × 1) (5)

5.2 5.2.1 Hyperbola ✓
or
Rectangular Hyperbola

Instructions:
- 1 mark for answer only

5.2.2 $y = \frac{a}{x}$ ✓

Instructions:
- 1 mark for answer only

Alternative answers:

$xy = c$

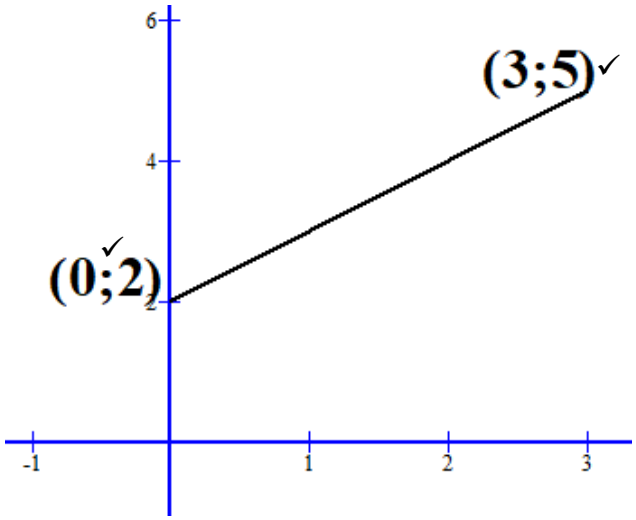
$x = \frac{c}{y}$

5.2.3 2nd and 4th quadrant ✓

Instructions:
- 1 mark for answer only

(3 × 1) (3)

5.3



Instructions:
- 1 mark for (3; 5)
- 1 mark for (0; 2)

$m = \frac{y_2 - y_1}{x_{2-}x_1}$

$m = \frac{2-5}{0-3}$

$m = \frac{-3}{-3} = \mathbf{1}$ ✓

$c = \mathbf{2}$ ✓

$\therefore \boldsymbol{y = x + 2}$ ✓

Instructions:
1 mark m-value
1 mark c-value
1 mark equation

(5)
[13]

QUESTION 6

6.1 6.1.1

$$\frac{AB}{DE} = \frac{BC}{EC}$$

$$\frac{AB}{182,88} \checkmark = \frac{1371,6}{274,32} \checkmark$$

$$AB = \frac{1371,6}{274,32} \times 182,88$$

$$AB = 914,4 \text{ cm} \checkmark$$

Alternative answer:

$$\frac{DE}{AB} = \frac{EC}{BC}$$

$$\frac{182,88}{AB} = \frac{274,32}{1371,6}$$

$$274,32\,AB = (182,88)(1371,6)$$

$$AB = \frac{(182,88)(1371,6)}{274,32}$$

$$AB = 914,4 \text{ cm}$$

Instructions:
- 1 mark for LH. side $\frac{AB}{182,88}$
- 1 mark for RH. side $\frac{1371,6}{274,32}$
- 1 mark for final answer
- (2 marks for answer only)
- Do not penalise if the unit is not indicated

Instructions for alternative answer:
- 1 mark for LH. side $\frac{182,88}{AB}$
- 1 mark for RH. side $\frac{274,32}{1371,6}$
- 1 mark for final answer
- (2 marks for answer only)
- Do not penalise if the unit is not indicated

(3)

6.1.2

$$\tan \hat{C} \checkmark = \frac{182,88}{274,32} \checkmark$$

$$\hat{C} = \tan^{-1}\left(\frac{182,88}{274,32}\right)$$

$$\hat{C} = 33,690° \checkmark$$

Instructions:
- 1 mark for LH. side $\tan \hat{C}$
- 1 mark for RH. side $\frac{182,88}{274,32}$
- 1 mark for final answer
- (2 marks for answer only)
- Do not penalise if the unit is not indicated

(3)

6.1.3

$$\hat{A} + \hat{B} + \hat{C}$$

$$= 180° \checkmark (\text{Interior angles of } \Delta)$$

$$\hat{A} = 180° - 90° - 33,690°$$

$$\hat{A} = 56,310° \checkmark$$

Alternative answer:

$$\tan \hat{A} = \frac{1371,6}{914,4}$$

$$\hat{A} = tan^{-1}\left(\frac{1371,6}{914,4}\right)$$

$$\hat{A} = 56,310°$$

Instructions:
- 1 mark for theorem
- 1 mark for final answer
- No marks are allocated for calculations

(3)

6.2 $GH^2 = GI^2 + IH^2$
$GI^2 = GH^2 - IH^2$ ✓
$GI^2 = (54{,}5)^2 - (25{,}3)^2$ ✓
$GI = \sqrt{2330{,}16}$
$GI = 48{,}273$ ✓

Instructions:
- 1 mark for the manipulated theorem
- 1 mark for substitution
- 1 mark for answer

(3)
[12]

QUESTION 7

7.1 7.1.1 $cos315{,}2° \times tan22{,}6°$
$= 0{,}295$ ✓

Instructions:
- 1 mark answer only

7.1.2 $\dfrac{tan115{,}678°}{\sqrt{sin26{,}587°}} + cos^2257{,}519°$
$= -3{,}06$ ✓

Instructions:
- 1 mark for answer only

(2 × 1) (2)

7.2 7.2.1 $tan\theta = \dfrac{5}{12}$ ✓

Instructions:
- 1 mark for answer only

7.2.2 $cos\theta = \dfrac{13}{12}$ ✓

Instructions:
- 1 mark for answer only

7.2.3 $sin\theta = \dfrac{5}{13}$ ✓

Instructions:
- 1 mark for answer only

(3 × 1) (3)
[5]

QUESTION 8

8.1 8.1.1 $\text{Minor axis} = \dfrac{4 \times \text{Area}}{\pi \times \text{Major axis}}$
$\text{Minor axis} = \dfrac{4(3758{,}130)}{87\pi}$ ✓✓
Minor axis $= 55$ m ✓

Instructions:
- 2 marks for substituting values
- 1 mark for final answer
- Do not penalise if the unit is not indicated

(3)

8.1.2 3758,130 rounded up to 3759 m^2

Cost $= 3759 \times 60$ ✓
Cost = R225 540,00 ✓

Instructions:
- 1 mark for calculation
- 1 mark for final answer
- (2 marks for answer only)
- Do not penalise if the unit is not indicated

(2)

8.2 $Volume = \pi r^2 h$

$h = \frac{V}{\pi r^2}$ ✓

$h = \frac{1099,6}{\pi(5)^2}$ ✓

$h = 14,001$ ✓cm

Alternative answer:

$Volume = \frac{\pi D^2}{4} \times h$

$h = \frac{4V}{\pi D^2}$ ✓

$h = \frac{4(1099,6)}{\pi(10)^2}$ ✓

$h = 14,001\ cm$ ✓

Instructions:
- 1 mark for the manipulated formula
- 1 mark for substitution
- 1 mark for answer

(3)

8.3 $A = \pi r^2$

$A = \pi(10,5)^2$ ✓

$A = 346,360\ m^2$ ✓$\times 100$

$A = 346360\ cm^2$ ✓

Alternative answer:

$A = \pi(105)^2$

$A = 34636,059\ cm^2$

Instructions:
- 1 mark for substitution
- 1 mark for answer
- 1 mark final answer in cm^2

(3)

8.4 Tax amount:

= R1 438 $\times \frac{20}{100}$ ✓

= R287,60 ✓

Instructions:
- 1 mark for calculation
- 1 mark for final answer
- Do not penalise if the unit is not indicated

(2)
[13]

TOTAL: 100

Copyright reserved