higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

MATHEMATICS N1

14 November 2022

This marking guideline consists of 9 pages.

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QUESTION 1

1.1 $128x^{-3} \times x^{-6} \div 16x^{-9}$

$= 2^{7}\sqrt{x^{-9}} \div 2^{4}\sqrt{x^{-9}}$ or $= \frac{2^7x^{-9}}{2^4x^{-9}}$

$= 2^{3}\sqrt{x^{-9+9}}\sqrt{}$

$= 2^3x^{-9+9}$

$= 2^3\boldsymbol{x^0}$ ✓

$= 2^3(\mathbf{1})$

$= 2^3 / 8$ ✓

Instructions:
- Half mark each for rewrite into exponent form
- Half mark each exponent law 2
- 1 mark for x^0 *or* 1
- 1 mark answer

(4)

1.2 $\frac{3\log x + \log x}{\log x^2}$

$= \frac{4\log x}{2\log x}$ ✓ ✓

$= 2$ ✓

Alternative answer:

$= \frac{\log x^3 + \log x}{\log x^2}$

$= \frac{\log(x^3 \times x)}{\log x^2}$

$= \frac{\log x^4}{\log x^2}$ ✓

$= \frac{4\log x}{2\log x}$ ✓

$= \frac{4}{2}$

$= 2$ ✓

Instructions:
- 1 mark for the numerator
- 1 mark for the denominator
- (No marks for answer only, question states without a calculator)

Alternative Instructions:
- 1 mark for the numerator
- 1 mark for the denominator $x^4 or\ 4x$
- (No marks for answer only, question states without a calculator)

(3)

1.3 $\log_x \sqrt{3} = \frac{1}{2}$

$x^{\frac{1}{2}}$ ✓ $= \sqrt{3}$ ✓ or $\sqrt{3} = x^{\frac{1}{2}}$

Instructions:
- 1 mark for LH side
  1 mark for RH side

(2)

1.4 1.4.1 $-2x^5 - 5x^4 - \frac{3x^2}{4} + 7x - 4$ ✓

Instructions:
- Allocate marks as indicated

1.4.2 -4 ✓

Instructions:
Allocate marks as indicated

1.4.3 $-\frac{3}{4}$ ✓

Instructions:
- Allocate marks as indicated
- If negative sign left out, no marks.

(3 × 1) (3)

1.5 $lnx = lne\checkmark - \frac{1}{2}ln(0{,}45)\checkmark$
$lnx = 1{,}399$
$antilnx = 4{,}052\checkmark$

Instructions:
- Allocate marks as indicated
- If using log, subtract one mark

(3)
[15]

QUESTION 2

2.1
$$\begin{array}{r} 2x^2\checkmark + 3xy\checkmark - y^2\checkmark \\ 2x - 4y \overline{)\ 4x^3 - 2x^2y - 14xy^2 + 4y^3} \\ \underline{-(4x^3 - 8x^2y)\checkmark} \\ 6x^2y - 14xy^2 \\ \underline{-(6x^2y - 12xy^2)\checkmark} \\ -2xy^2 + 4y^3 \\ \underline{-(-2xy^2 + 4y^3)\checkmark} \\ 0 \end{array}$$

Instructions:
- Allocate marks as indicated

(6)

2.2
$$\begin{array}{l} -5x^2 - 3x + 5 \\ \underline{-(2x^2 + x - 3)} \\ \underline{-7x^2\checkmark - 4x\checkmark + 8\checkmark} \end{array}$$

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

(3)
[9]

QUESTION 3

3.1 $2x + 2y + 3a(y - x)$
$= 2(x - y)\checkmark - 3a(x - y)\checkmark$
$= (x - y)\checkmark(2 - 3a)\checkmark$

Instructions:
- 1 mark for grouping and factorising $2(x - y)$
- 1 mark for changing sign $-3a(x - y)$
- 2 marks for final answer

(4)

3.2 $\dfrac{12x^3y - 3(3xy - 5y^2x)}{3xy}$

$= \dfrac{12x^3y - 9xy\surd + 15xy^2\surd}{3xy}$

$= \dfrac{12x^3y}{3xy} - \dfrac{9xy}{3xy} + \dfrac{15xy^2}{3xy}$

$= 4x^2 \checkmark - 3 \checkmark + 5y \checkmark$

Instructions:
- 1 mark for simplifying brackets
- 3 marks for final answer

Alternative answer:

$= \dfrac{12x^3y - 9xy + 15xy^2}{3xy}$

$= \dfrac{3xy \checkmark (4x^2 - 3 + 5y)}{3xy}$

$= 4x^2 \checkmark - 3 \checkmark + 5y \checkmark$

Instructions for alternative answer:
- 1 mark for common factor
- 3 marks for final answer

(4)

3.3 $\dfrac{36abc - 54a^2b^3c}{162abc}$

$= \dfrac{18abc \checkmark (2 - 3ab^2) \checkmark}{162abc}$

$= \dfrac{(2 - 3ab^2)}{9} \checkmark$

Instructions:
- 1 mark for common factor and bracket
- 1 mark for answer

Alternative answer:

$= \dfrac{36abc}{162abc} - \dfrac{54a^2b^3c}{162abc}$

$= \dfrac{2}{9} \checkmark - \dfrac{1ab^2 \checkmark}{3 \checkmark}$

Alternative Instructions:
- Allocate marks as indicated

(3)

3.4 3.4.1

$68xy^2z^6 = 2 \times 2 \times 17 \times xy^2z^6 \checkmark$

$16x^4y^5z^3 = 2^4 \times x^4y^5z^3 \checkmark$

or

2	2			17	*x*				*y*	*y*				*z*	*z*	*z*	*z*	*z*	*z* ✓
2	2	2	2		*x*	*x*	*x*	*x*	*y*	*y*	*y*	y	y	*z*	*z*	*z*			✓
2	**2**	**2**	**2**	**17**	***x***	***x***	***x***	***x***	***y***	***y***	***y***	**y**	**y**	***z***	***z***	***z***	***z***	***z***	***z***

Instructions:
- Allocate marks as indicated, row one and row two.
- Do not allocate marks if the variables are missing

3.4.2 LCM $= 2^4 \times 17 \times x^4y^5z^6$

LCM $= 272 \checkmark x^4y^5z^6 \checkmark$

Instructions:
- 1 mark for 272
- 1 mark for $x^4y^5z^6$
- (2 marks for answer only)

3.4.3 HCF $= 4\checkmark xy^2z^3\checkmark$

Instructions:
- 1 mark for 4
- 1 mark for xy^2z^3
- (2 marks for answer only)

(3 × 2) (6)

[17]

QUESTION 4

4.1
$$3(5x-2) = 2(4x+11)$$
$$15x\checkmark - 6\checkmark = 8x\checkmark + 22\checkmark$$
$$15x - 8x = 22 + 6$$
$$7x = 28\checkmark$$
$$x = \frac{28}{7}$$
$$x = 4\checkmark$$

Instructions:
- 4 marks for simplifying brackets
- 1 mark for simplifying like terms
- 1 mark for final answer

(6)

4.2
$$u^2 + 2as = v^2$$
$$2as = v^2 - u^2\checkmark$$
$$s = \frac{v^2-u^2}{2a}\checkmark$$

Instructions:
- Allocate marks as indicated
- Do not penalise if the subject is on the RH side

$$\frac{v^2-u^2}{2a} = s$$

(2)

4.3
$$s = \frac{v^2-u^2}{2a}$$
$$s = \frac{(5)^2-0}{2(3)}\checkmark$$
$$s = 4{,}167 \text{ m}\checkmark$$

Alternative answer:
$$s = \frac{25}{6} \text{ m}$$

Instructions:
- 1 mark for substitution
- 1 mark for final answer
- (1 mark for answer only)

(2)

4.4 349 hours 38 minutes
$$= 349 + \frac{38}{60}$$
$$= 349{,}633 \text{ hours}\checkmark$$

$$s = v \times t$$
$$s = (30)(349{,}633)\checkmark$$
$$s = 10\,488{,}99 \text{ km}\checkmark$$
$$s = 10\,488{,}99 \times 1\,000 = 10\,488\,990\ m\checkmark$$

Instructions:
- 1 mark for conversion to hours
- 1 mark for substitution
- 1 mark for answer in km
- 1 mark for answer in meter

(4)

4.5 $560r/min = \frac{560}{60}$ ✓

$n = 9{,}333r/s$ ✓

Instructions:
- Allocate marks as indicated

(2)
[16]

QUESTION 5

5.1 5.1.1 $\frac{x}{2} + \frac{y}{3} = 1$

$\frac{y}{3} = -\frac{x}{2} + 1$

$y = -\frac{3}{2}x$ ✓ $+ 3$ ✓

Instructions:
- Allocate marks as indicated

(2)

5.1.2 $m = -\frac{3}{2}$ ✓

Instructions:
- Allocate marks as indicated

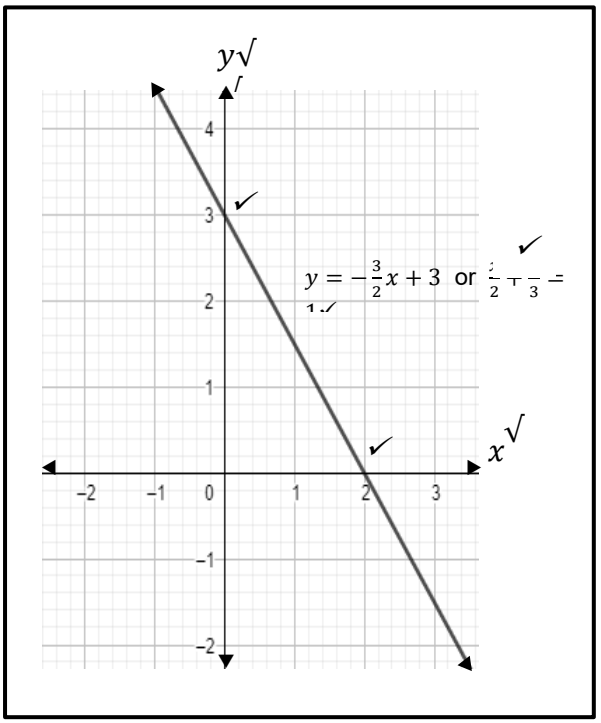
(1)

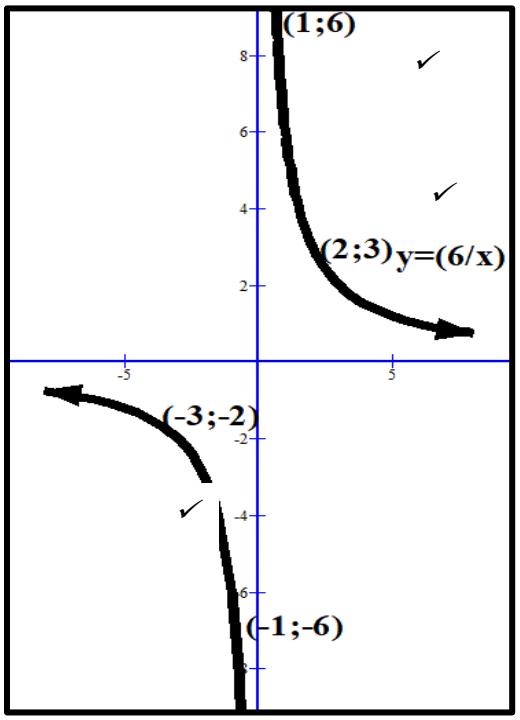
5.1.3 $(0$ ✓$; 3$ ✓$)$

Instructions:
- Allocate marks as indicated

(2)

5.1.4 Instructions for straight line
- 1 mark for the correct x-intercept
- 1 mark for the correct y-intercept
- 1 mark for writing the equation, $\frac{x}{2} + \frac{y}{3} = 1$ or $y = -\frac{3}{2}x + 3$ next to the graph
- 1 mark for indicating the x-axis and y-axis (4)





Instructions for hyperbola
- 2 marks for the correct shape, quadrant 1 and 3
- 1 mark for writing the equation next to the graph (3)

[12]

QUESTION 6

6.1 The symbol is used to indicate **similar** triangles. ✓ (1)

6.2 (S,S,S) ✓
(A,A,A) ✓ (2)

6.3
$$DE^2 = AD^2 - AE^2$$
$$DE = \sqrt{8^2 + 6^2} \checkmark$$
$$DE = \sqrt{100}$$
$$DE = 10 \text{ m} \checkmark$$

Instructions:
- 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)

6.4
$$\frac{BC}{DE} = \frac{AB}{AD}$$
$$\frac{BC}{10} \checkmark = \frac{18}{8} \checkmark$$
$$8BC = 180$$
$$DE = \frac{180}{8}$$
$$DE = 22{,}5 \text{ m} \checkmark$$

Instructions:
- 1 mark for LH side $\frac{BC}{10}$
- 1 mark for RH side $\frac{18}{8}$
- 1 mark for final answer
- (2 marks for answer only)
- Do not penalise if the unit is not indicated

Alternative answer:
$$\frac{DE}{BC} = \frac{AD}{AB}$$
$$\frac{10}{BC} = \frac{8}{18}$$
$$8BC = 180$$
$$BC = \frac{180}{8}$$
$$BC = 22{,}5 \text{ m}$$

Instructions for alternative answer:
- 1 mark for LH side $\frac{10}{BC}$
- 1 mark for RH side $\frac{8}{180}$
- 1 mark for final answer
- (2 marks for answer only)
- Do not penalise if the unit is not indicated (3)

6.5
$$\hat{A} + \hat{B} + \hat{C} = 180° \text{ (Sum of interior angles of } \Delta) \checkmark$$
$$\hat{C} = 180° - 90° - 63°$$
$$\hat{D} = 27° \checkmark$$

Instructions:
- 1 mark for theorem/reason
- 1 mark for final answer
- No marks are allocated for calculations (2)

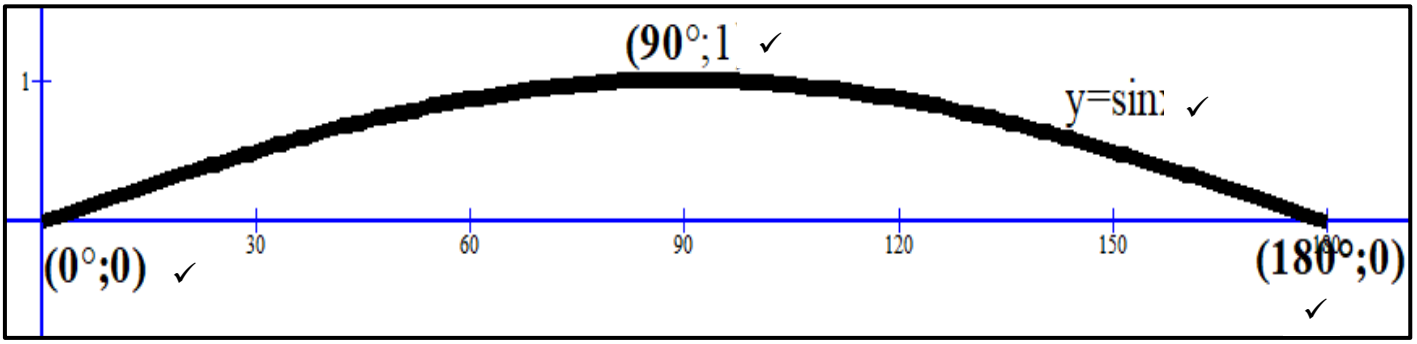
[10]

QUESTION 7

7.1 Instructions:

- 1 mark for each of the following coordinates indicated on the graph:
  $(0°; 0)$ $(90°; 1)$ $(180°; 0)$
- 1 mark for indicating the equation next to the graph

(4)



7.2 $\frac{AC}{12}$ ✓ $= \tan 20°$ ✓

$AC = 12 \tan 20°$

$AC = 4{,}368$ cm ✓

Instructions:

- 1 mark for $\frac{AC}{12}$
- 1 mark for $\tan 20°$
- 1 mark for final answer
- Do not penalise if the unit is not indicated

Alternative answer:

$\frac{12}{AC} = \cot 20°$

$AC \cot 20° = 12$

$AC = \frac{12}{\cot 20°}$

$AC = 12 \tan 20°$

$AC = 4{,}368$ cm

Instructions for alternative answer:

- 1 mark for $\frac{12}{AC}$
- 1 mark for $\cot 20°$
- 1 mark for final answer
- Do not penalise if the unit is not indicated

(3)
[7]

QUESTION 8

8.1 $BF^2 = BD^2 - DF^2$

$BF = \sqrt{10^2 - 8^2}$

$BF = 6$ cm ✓

$V = \frac{1}{2} b \times \perp h \times l$ ✓

$V = (0{,}5)(8)(6)(2)$ ✓

$V = 48$ cm^3 ✓

Instructions:

- 1 mark for calculating BF ($h = 6$ or $BF = 6$)
- 1 mark for formula
- 1 mark for substitution
- 1 mark for final answer
- (2 marks for answer only)
- Do not penalise if the unit is not indicated

(4)

8.2 8.2.1 $A = L \times B$
$7m \times 3\,m$ ✓ $= 21\,m^2$ ✓Area of floor

Instructions:
- 1 mark for substituting values
- 1 mark for answer

8.2.2 $A = L \times B$
$0{,}3 \times 0{,}3$ ✓ $= 0{,}09\,m^2$ ✓Area of 1 tile

Instructions:
- 1 mark for substituting values
- 1 mark for answer

Alternative answer:
$300\,mm \times 300\,mm$ ✓ $= 90\,000\,mm^2$
$90\,000\,mm^2 \div 1\,000\,000 = 0{,}09\,m^2$ ✓

Instructions for alternative answer:
- 1 mark for substituting values
- 1 mark for final answer

8.2.3 Tiles needed $= \frac{21}{0{,}09}$ ✓ $= 233{,}333 tiles$ ∴
$234\ tiles$ ✓

Instructions:
- Allocate marks as indicated
- Mark 233,333 or 234

8.2.4 $234 \times \frac{2}{100}$ ✓
$= 4{,}68\ or\ 5\ tiles$ ✓

Alternative answer:
$233 \times \frac{2}{100}$ ✓
$= 4{,}66\ or\ 5\ tiles$ ✓

Instructions:
- Allocate marks as indicated
- Mark 4,68 or 5

Instructions for alternative answer:
- Allocate marks as indicated
- Mark 4,66 or 5

(4 × 2) (8)

8.3 $2\,500\,000\,mm^3$ to m^3
$= 2\,500\,000 \div 1\,000^3$ ✓
$= 0{,}0025$ or $\frac{1}{400}m^3$ ✓

Instructions:
- Allocate marks as indicated
- Only answer: full marks

(2)
[14]

TOTAL: 100

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