higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

MATHEMATICS
(First paper)
NQF LEVEL 2

14 February 2025

This marking guideline consists of 12 pages.

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QUESTION 1

1.1 1.1.1 $1{,}04$

$$1{,}04 = \frac{1{,}04}{1} \times \frac{100}{100}$$

$$= \frac{104}{100}\checkmark$$

$\frac{104\div 2=52}{100\div 2=50}$ (Award full marks if student stops here)

$$= \frac{52 \div 2 = 26}{50 \div 2 = 25}$$

$$= \frac{26}{25} \quad (1)$$

1.1.2 $0,\dot{2}\dot{6}$

$Let: x = 0.\dot{2}\dot{6} - - -(1)$

$100x = 100(0,\dot{2}\dot{6})$

$100x = 26,\dot{2}\dot{6} - - -(2)\checkmark$

$100x - x = 26,\dot{2}\dot{6} - 0.\dot{2}\dot{6} - - -(3)$

$99x = 26$

$x = \frac{26}{99}\checkmark \quad (2)$

1.2 1.2.1 $\dfrac{(-9x^2y^2)^2 \times (3xy^{-2})^2 \times (x^2y)}{(6xy^3)^2(-3xy)^2}$

$$= \frac{81x^4y^4 \times 9x^2y^{-4} \times x^2y}{36x^2y^6 \times 9x^2y^2}$$

$$= \frac{81 \times 9x^4y^4 \times x^2y^{-4} \times x^2y}{36 \times 9x^2y^6 \times x^2y^2}$$

$$= \frac{9 \times x^{4+2+2}y^{4-4+1}}{4 \times x^{2+2}y^{6+2}}\checkmark$$

$$= \frac{9 \times x^8y^1}{4 \times x^4y^8}$$

$$= \frac{9 \times x^{8-4}y^{1-8}}{4}\checkmark$$

$$= \frac{9 \times x^4y^{-7}}{4}$$

$$= \frac{9x^4}{4y^7}\checkmark \quad (3)$$

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1.2.2 $\left(\frac{4a^{-3}b^2}{2a^{-2}b^{-3}}\right)^{-3}$

$= \left(\frac{4a^{-3+2}b^{2+3}}{2}\right)^{-3}$ ✓

$= (2a^{-1}b^5)^{-3}$

$= 2^{-3}a^3b^{-15}$ ✓

$= \frac{a^3}{2^3b^{15}}$

$= \frac{a^3}{8b^{15}}$ ✓ (3)

1.3 $\frac{\sqrt{20}+\sqrt{45}-\sqrt{80}+\sqrt{5}}{\sqrt{16}\times\sqrt{5}}$

$= \frac{\sqrt{4\times5}+\sqrt{9\times5}-\sqrt{16\times5}+\sqrt{5}}{\sqrt{16}\times\sqrt{5}}$ ✓

$= \frac{2\sqrt{5}+3\sqrt{5}-4\sqrt{5}+\sqrt{5}}{4\times\sqrt{5}}$

$= \frac{\sqrt{5}(2+3-4+1)}{\sqrt{5}(4)}$ ✓

$= \frac{(2)}{(4)}$

$= \frac{1}{2}$ ✓ (3)

1.4 $\frac{\sqrt{4}}{\sqrt{2}-3}$

$= \frac{2}{\sqrt{2}-3}\times\frac{\sqrt{2}+3}{\sqrt{2}+3}$ ✓

$= \frac{2\sqrt{2}+6}{2+3\sqrt{2}-3\sqrt{2}-9}$ ✓

$= \frac{2\sqrt{2}+6}{-7}$ ✓

$= -\frac{6+2\sqrt{2}}{7}$ (3)

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1.5 $V = \frac{4}{3}\pi r^3$

1.5.1 $(V) \times \frac{3}{4} = \left(\frac{4}{3}\pi r^3\right) \times \frac{3}{4}$✓

$\frac{3V}{4} = (\pi r^3)$

$\frac{3V}{4\pi} = r^3$✓

$\left(\frac{3V}{4\pi}\right)^{\frac{1}{3}} = (r^3)^{\frac{1}{3}}$

$r = \left(\frac{3V}{4\pi}\right)^{\frac{1}{3}}$✓ (Award full marks if students stop here)

$r = \sqrt[3]{\left(\frac{3V}{4\pi}\right)}$ (3)

1.5.2 V = 12 m^3, calculate `$r$`.

$r = \sqrt[3]{\left(\frac{3(12)}{4\pi}\right)}$✓

$r = \sqrt[3]{\left(\frac{9}{\pi}\right)}$

$r = 1{,}42\ m$✓ (2)

1.6 $a = 4$, $d = 2$ *and* $T_n = 26$

$T_n = a + (n-1)d$

$26 = 4 + (n-1)2$✓

$\frac{22}{2} = (n-1)$

$11 + 1 = n$✓

$n = 12$✓ (3)

1.7 $T_n = 2 + 4n$

$T_1 = 2 + 4(1) = 6$✓

$T_2 = 2 + 4(2) = 10$✓

$T_3 = 2 + 4(3) = 14$ ✓ (3)

1.8 $S_n = \frac{n}{2}[2a + (n-1)d]$

$n = 10$

$d = 2$

$S_n = 180$

$S_n = \frac{n}{2}[2a + (n-1)d]$

$180 = \frac{10}{2}[2a + (10-1)2]$ ✓

$180 = 5[2a + (9)2]$

$\frac{180}{5} = [2a + (9)2]$ ✓

$36 = [2a + 18]$

$36 - 18 = 2a$

$18 = 2a$

$a = 9$✓ (3)

[29]

QUESTION 2

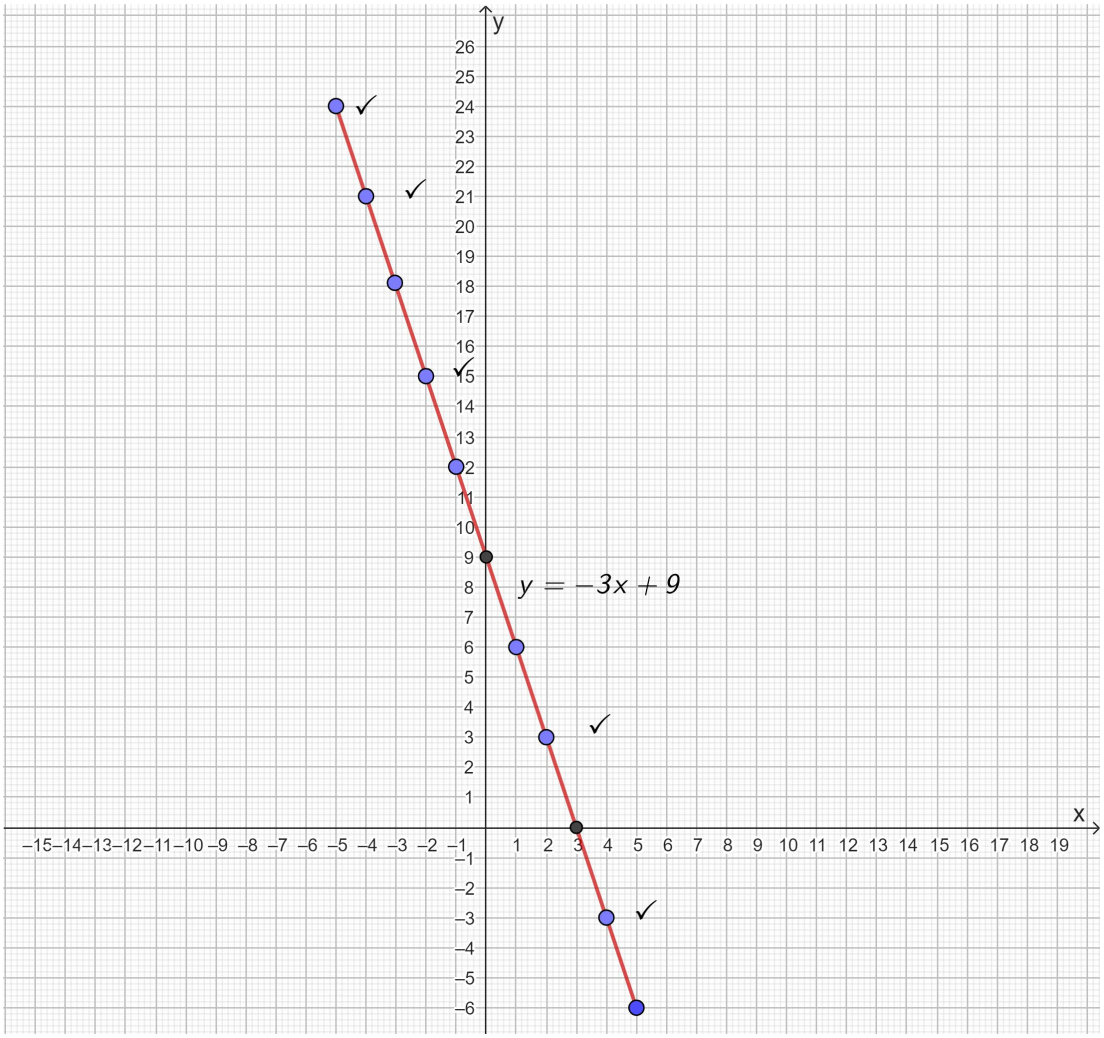
2.1 $y = -3x + 9$

2.1.1

x	-5	-4	-3	-2	-1	0	1	2	3	4	5
y	24✓	21✓	18	15✓	12	9	6	3✓	0	-3✓	-6

(5)

2.1.2



(Awarding of marks: ✓✓✓✓✓for the 5 correct points (see table) (-5;24);(-4;21); (-2;15);(2;3);(4;-3) (5)

2.1.3 Straight line graph✓ (1)

2.1.4 Negative✓ (1)

2.1.5 $y = -3x + 8$✓✓ (2)

2.2 2.2.1 Exponential graph or Exponential function✓ (1)

2.2.2 (0,1) ✓ or 1 or $y = 1$ (1)

2.2.3 Continuous ✓ (1)

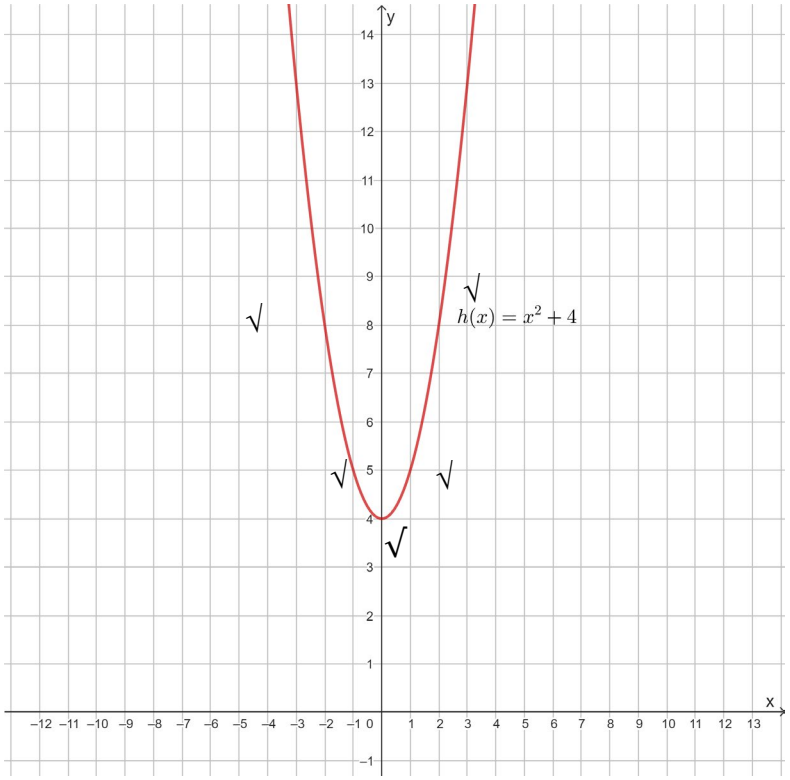
2.2.4 Function ✓It is a one-to-one function.
-for every *x*-value there is one *y*-value
- the vertical line test cuts the graph at one point only
-one-to-one mapping. ✓ (2)

2.3 Given is the graph of: $y = x^2+4$

2.3.1

x	-2	-1	0	1	2
$h(x) = x^2+4$	8 √	5 √	4 √	5 √	8 √

Sketch the graph of: $y = x^2+4$, given in Q2.3 above



Awarding of marks on the sketch: √√√√√ for the 5 correct points(see table) (5)
(-2;8);
(-1;5);(0;4);(1:5) and (2;8)

2.3.2 Range: [4 ; ∞)✓ (1)

2.3.3 Quadratic function or parabolic function ✓ (1)
[26]

QUESTION 3

3.1 3.1.1 $7k^2 - 63$

$= 7(k^2 - 9)$✓

$= 7(k^2 - 3^2)$

$= 7(k - 3)(k + 3)$✓

3.1.2 $2p^3 + p^2k - k^2(2p + k)$

$= p^2(2p + k) - k^2(2p + k)$✓

$= (p^2 - k^2)(2p + k)$

$= (p - k)(p + k)(2p + k)$✓

(2 × 2) (4)

3.2 3.2.1 $(-2x - 3)(-x^2 - 4x + 1) - 2x^3$

$= 2x^3 + 8x^2 - 2x + 3x^2 + 12x - 3 - 2x^3$✓

$= 2x^3 + 11x^2 + 10x - 3 - 2x^3$✓

$= 11x^2 + 10x - 3$✓

3.2.2 $\frac{x^2 - y^2}{x + y} + y$

$= \frac{(x-y)(x+y)}{x+y} + y$✓

$= \frac{(x - y)}{1} + y$

$= (x - y) + y$✓

$= x - y + y$

$= x$✓

3.2.3 $\frac{2x}{3} + \frac{x}{2} - \frac{5x}{6}$

$= \frac{2x}{3} \times \frac{2}{2} + \frac{x}{2} \times \frac{3}{3} - \frac{5x}{6} \times \frac{1}{1}$✓

$= \frac{4x}{6} + \frac{3x}{6} - \frac{5x}{6}$

$= \frac{4x+3x-5x}{6}$✓

$= \frac{7x - 5x}{6}$

$= \frac{2x}{6}$

$= \frac{x}{3}$✓

(3 × 3) (9)

3.3 $5x - 3y = 4 \; and \; y = -2x + 12$

$5x - 3y = 4 - - - (1)$

$y = -2x + 12 - - - (2)$

$Substitute \; (2) \; into \; (1): \quad 5x - 3(-2x + 12) = 4$

$5x - 3(-2x + 12) = 4$✓

$5x + 6x - 36 = 4$

$11x = 40$

$x = \frac{40}{11}$✓

$y = -2\left(\frac{40}{11}\right) + 12$✓

$y = -\frac{80}{11} + 12 \times \frac{11}{11}$

$y = -\frac{80}{11} + \frac{132}{11}$

$y = \frac{-80 + 132}{11}$

$y = \frac{52}{11}$✓ (4)

3.4 3.4.1 $3(x + 1) = 3(-x - 2) - 1$

$3x + 3 = -3x - 6 - 1$✓

$3x + 3x = -6 - 1 - 3$

$6x = -10$✓

$x = -\frac{10}{6}$

$x = -\frac{5}{3}$✓ (3)

3.4.2 $\frac{x}{3}+\frac{2x}{3}=\frac{1}{4}$

$\frac{x+2x}{3}=\frac{1}{4}$✓

$4(x+2x)=3(1)$

$4x+8x=3$✓

$12x=3$

$x=\frac{3}{12}$✓

$x=\frac{1}{4}$

OR

$\frac{x}{3}+\frac{2x}{3}=\frac{1}{4}$

✓$\frac{3x}{3}=\frac{1}{4}$✓

$x=\frac{1}{4}$✓

(3)

3.4.3 $8^x=16$

$(2^3)^x=2^4$✓

$2^{3x}=2^4$

$3x=4$

$x=\frac{4}{3}$✓

(2)
[25]

QUESTION 4

4.1 4.1.1 Lay-by over a period of 12 months

$= R1660 \times 12\ months$

$= R19920$✓

Adding the deposit:

$= total\ lay-by\ amount + deposit$

$= 19920 + 100$

$= 20020$ ✓ (2)

4.1.2 Bank loan of 17% interest

$A = P[1 + in]$

$P = 19999$

$r = \frac{i}{100}$

$= \frac{17}{100} = 0{,}17$✓

$n = 2\ and\ A =?$

$A = 19999[1 + 0{,}17 \times 2]$ ✓

$A = 19999[1{,}34]$

$A = R26798{,}66$✓ (3)

4.1.3 In-store credit of 25,25% compound interest

$A = P\ (1 + i)^n$

$P\ = 19999$

$n = 3\ years$

$r = 25{,}25\%$

$i = \frac{25{,}25}{100} = 0{,}2525$✓

$A = P\ (1 + i)^n$

$A = 17999\ (1 + 0{,}2525)^3$✓

$A = 17999\ (1{,}2525)^3$

$A = 35365{,}64$✓

$Monthly\ payment\ = \frac{35365{,}64}{36} = R982{,}38$✓ (4)

4.1.4 R850 per month over two years

$= R850\ \times 24$ ✓

$= R20400$ ✓ (2)

	4.1.5	Cash price = R19999✓	(1)
	4.1.6	In-store credit of 25,25% compound interest ✓	(1)
4.2	4.2.1	F✓	
	4.2.2	D✓	
	4.2.3	B✓	
	4.2.4	H✓	
	4.2.5	I✓	
	4.2.6	A✓	
		(6×1)	(6)
4.3		False, Compound interest actually grows faster than simple interest. This is because compound interest is calculated on both the principal amount and the accumulated interest from previous periods✓	(1)
			[20]
		TOTAL:	**100**

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