higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

MATHEMATICS
(First paper)
NQF LEVEL 2

9 November 2023

This marking guideline consists of 7 pages.

Copyright reserved

QUESTION 1

Note: Full mark ✓
Half mark √

1.1 1.1.1 Answer only, full mark
0,58
$\frac{58}{100}$ $\sqrt{\frac{29}{50}}$ √ (1)

1.1.2 $0,\dot{4}8\dot{6}$
Equation 1: $x = 0{,}486486486\ldots$ √
Equation 2: $1000x = 486{,}486486486\ldots$ √

Equation 2 - Equation 1 : $999x = 486$
$\therefore x = \frac{486}{999}$ √
$= \frac{18}{37}$ √ (2)

1.2 1.2.1
$$\frac{27r^{-3}s^{-2}}{3^{-(-2)}r^2 \times 3s^{-3}}$$
$$= \frac{3^3 r^{-3} s^{-2}\ \sqrt{}}{3^2 r^2\ \times\ 3s^{-3}\ \sqrt{}}$$
$$= 3^{3-(2+1)} r^{-3\ -2}\, s^{-2\ -(-3)}\ \checkmark$$
$$= 3^0 r^{-5} s^1$$
$$= \frac{s}{r^5}\ \checkmark$$ (3)

1.2.2
$$5s^2(r^0s^0)^8\ \times\ 3 \times \sqrt[3]{\frac{64\,r^9}{729\,r^3s^6}}$$
$$= 5s^2(1 \times 1)^8\checkmark\ \times 3 \times \frac{\sqrt[3]{4^3} \times \sqrt[3]{r^9}}{\sqrt[3]{9^3} \times \sqrt[3]{r^3} \times \sqrt[3]{s^6}}\ \checkmark$$
$$= 5s^2\ \times 3 \times \frac{4 \times r^3}{9 \times r \times s^2}\ \checkmark$$
$$= \frac{20r^2}{3}\ \checkmark$$ (4)

1.3
$$\frac{\sqrt{125}\ +\ \sqrt{45}\ -\ \sqrt{20}}{2\sqrt{80}}$$
$$= \frac{5\sqrt{5} + 3\sqrt{5} - 2\sqrt{5}}{8\sqrt{5}}\ \checkmark$$
$$= \frac{6\sqrt{5}}{8\sqrt{5}}\ \checkmark$$
$$= \frac{3}{4}\ \checkmark$$ (3)

Copyright reserved

1.4
$$\frac{\sqrt{36a^2}}{\sqrt{5}-\sqrt{6}}$$
$$= \frac{\sqrt{36a^2}}{\sqrt{5}-\sqrt{6}} \times \frac{\sqrt{5}+\sqrt{6}}{\sqrt{5}+\sqrt{6}} \checkmark$$
$$= \frac{6a(\sqrt{5}+\sqrt{6})}{5+\sqrt{5}\sqrt{6}-\sqrt{5}\sqrt{6}-6} \checkmark$$
$$= \frac{6a\sqrt{5}+6a\sqrt{6}}{-1} \checkmark$$
$$= -6a\sqrt{5}-6a\sqrt{6} \checkmark \quad (4)$$

1.5 1.5.1
$$Z = \frac{2pq}{r+2}$$
$$Z(r+2) = 2pq \checkmark$$
$$q = \frac{Z(r+2)}{2p} \checkmark$$
$$= \frac{Zr+2Z}{2p}$$
$$= \frac{Zr}{2p} + \frac{Z}{p} \quad (2)$$

1.5.2
$$q = \frac{Zr}{2p} + \frac{Z}{p}$$
$$= \frac{(20)(4)}{2(10)} + \frac{20}{(10)} \checkmark \quad \text{(Substitution into any equation)}$$
$$= 6 \checkmark \quad (2)$$

1.6 Data: $S_{16} = 166;\ n = 16;\ d = 3;\ a = ?$

$$S_n = \frac{n}{2}[2a + (n-1)d]$$
$$166 = \frac{16}{2}[2a + (16-1)(3)] \checkmark$$
$$166 = 8(2a + 45) \checkmark$$
$$166 = 16a + 360$$
$$-194 = 16a \checkmark$$
$$a = -12.125 \checkmark \quad (4)$$

1.7 1.7.1 -2 ✓ (1)

1.7.2 $a = 7; d = -3;\ T_n = -26\ and\ n = ?$
$$T_n = a + (n-1)d \checkmark$$
$$-26 = 7 + (n-1)(-3) \checkmark$$
$$-26 = 7 - 3n + 3$$
$$-3n = -26 - 7 - 3 \checkmark$$
$$-3n = -36$$
$$n = \frac{-36}{-3} = 12 \checkmark \quad (4)$$

[30]

Copyright reserved

QUESTION 2

2.2 2.1.1 Quadratic function (1)

2.1.2 Continuous (1)

2.1.3 $x = 0\ or\ y - axis$ (1)

2.1.4 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.✓ (2)

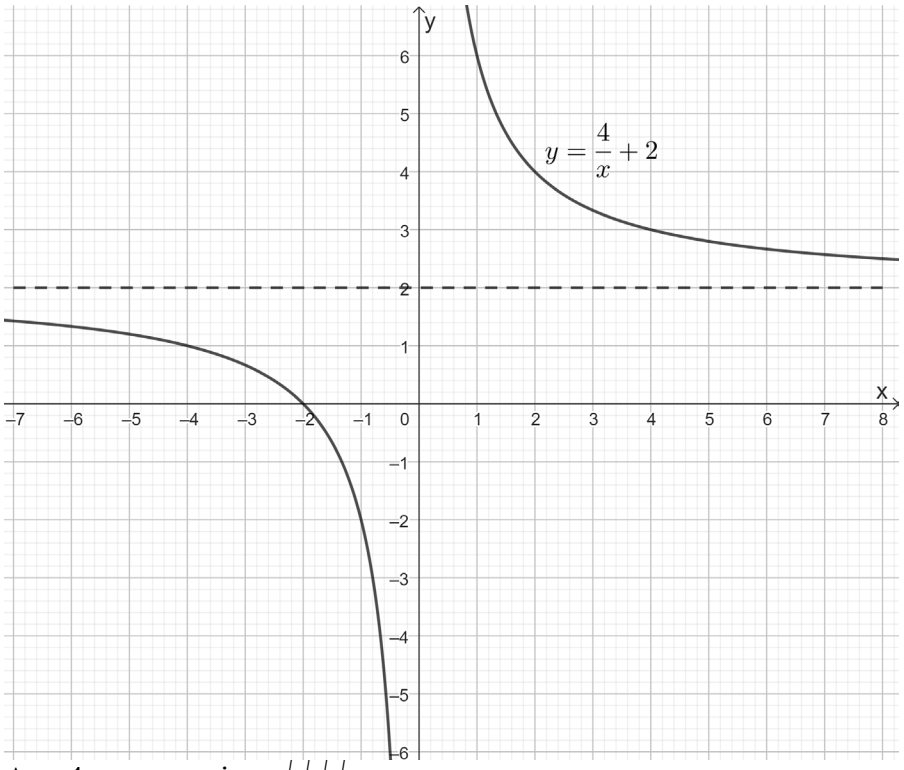
2.1.5 Domain: $(-\infty; \infty)$✓
Range: $(0\ ;\ \infty)$✓ (2)

2.1.6 y-intercept = 0✓ (1)

2.1.7 $g(x) = x^2 - 1$ ✓✓ (2)

2.2 2.2.1 Hyperbola✓ (1)

2.2.2



Any 4 correct points √√√√
Asymptote ✓
Shape ✓ (4)

2.2.3 $y \in (-\infty\ ;\ \infty)\ but\ y \neq 2$✓ (1)

2.2.4 The graph is discontinuous✓ (1)

Copyright reserved

2.3 Substitute point (2;1) in the standard equation:

$y = ax^2 + q$

$1 = a(2)^2 + q$✓

$\therefore 1 = 4a + q \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (A)$✓

Substitute point (-1; 4) in the standard equation:

$y = ax^2 + q$

$4 = a(-1)^2 + q$✓

$\therefore 4 = a + q \ldots\ldots\ldots\ldots\ldots\ldots\ldots (B)$✓

Equation (B) − (A):

$3 = -3a$ ✓

$a = -1$✓

Substitute $a = -1$ into equation (A)

$1 = 4(-1) + q$

$q = 4 + 1)$

$q = 5$ ✓

$\therefore$ The equation of the parabola is: $y = -x^2 + 5$ ✓ (8)

[25]

QUESTION 3

3.1.1 $(r + s - 1)(r + s)$

$= r^2 + rs + rs + s^2 - r - s$

√ √ √ √

$= r^2 + s^2 + 2rs - r - s$ (2)

3.1.2 $(p^3 - 1)^2 - 3p^3(p^3 + 2) - 6p^6$

√ √ √ √

$= p^6 - 2p^3 + 1 - 3p^6 - 6p^3 - 6p^6$

√ √

$= -8p^6 - 8p^3 + 1$ (3)

3.1.3 $(a^3)^2 \times a^4$

$= a^6 \times a^4$✓

$= a^{10}$✓ (2)

3.2 3.2.1 $2 - 32p^2$

√ √

$= 2(1 - 16p^2)$ Half mark for each factor

√ √

$= 2(1 - 4p)(1 + 4p)$ Half mark for each factor (2)

Copyright reserved

3.2.2 $6(p-q)+9p(q-p)$

$= 6(p-q) - 9p(p-q)$ Half mark: Change sign and Half mark: Switch around

$= (6-9p)(p-q)$

$= 3(2-3p)(p-q)$ (4)

3.3 3.3.1 $p^{3x-6} = 1$

$p^{3x-6} = p^0$ ✓

$3x - 6 = 0$ √

$3x = 6$

$x = 2$ √ (2)

3.3.2 $\frac{x+4}{2} = \frac{2x+7}{3}$

$3(x+4) = 2(2x+7)$✓

$3x + 12 = 4x + 14$

$3x - 4x = 14 - 12$✓

$-x = 2$

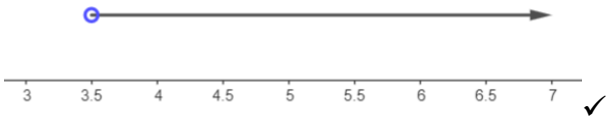
$\therefore x = -2$✓ (3)

3.4 $2(3x-1) > 4x+5$

$6x - 2 > 4x + 5$✓

$2x > 7$

$x > \frac{7}{2}$✓



✓ (3)

3.5 $4x - 1 = y$ ……. (A) √

$-x + 1 = y$ ……. (B) √

Let equation (A) = Equation (B)

$4x - 1 = -x + 1$ ✓

$5x = 2$

$x = \frac{2}{5}$ ✓

Subst. $x = \frac{2}{5}$ *in* (A)

$4(\frac{2}{5}) - 1 = y$

$y = \frac{8}{5} - 1 = 0.6$ ✓ (4)

[25]

Copyright reserved

QUESTION 4

4.1
4.1.1 D
4.1.2 E
4.1.3 F
4.1.4 G
4.1.5 A
4.1.6 C

(6 × 1) (6)

4.2
A R332,50
B R105,00
C R1 350,00
D R440,00
E R1077,50 (5)

4.3 Deposit = 10% of R 19000

$= \frac{10}{100} \times$ R 19000

$= R\ 1900$ ✓

Amount financed = R 19000 – R 1900 = R 17 100 ✓

$A = P\ (1 + in)$

$= 17100\ [1 + (0{,}12 \times 3)]$ √

$=$ R 23256 √

Total amount paid = R 1900 + R 23256 + R$(35 \times 3 \times 12)$ ✓ 1 mark for total insurance

= R 26 416 ✓

(5)

4.4 $A = P(1 + i)^n$

$1\ 466 = 1300(1 + i)^3$√

$\frac{1\ 466}{1\ 300} = (1 + i)^3$√

$1.12769 = (1 + i)^3$ √

$1 + i = \sqrt[3]{1.12769}$ √

$1 + i = 1.0408702036$ √

$i = 0.0409$√

$r = 0.0409 \times 100 = 4.09\%$ ✓

(4)
[20]

TOTAL: 100

Copyright reserved