higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

MATHEMATICS
(First paper)
NQF LEVEL 2

1 November 2022

This marking guideline consists of 9 pages.

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✓=1 mark √ = half mark

QUESTION 1

1.1 1.1.1 $0{,}14$

$= \frac{14}{100}\surd$

$= \frac{7}{50}\surd$ Full mark for answer only (1)

1.1.2 $4,2\dot{3}$

$x = 4{,}2333 \ldots\ldots\ldots\

1.3 $\frac{2\sqrt{24}-2\sqrt{6}+\sqrt{54}}{\sqrt{96}+\sqrt{6}}$

$= \frac{2\sqrt{6}\times\sqrt{4}-2\sqrt{6}+\sqrt{9}\times\sqrt{6}}{\sqrt{16}\times\sqrt{6}+\sqrt{6}}$

$= \frac{4\sqrt{6}\surd-2\sqrt{6}+3\sqrt{6}\surd}{4\sqrt{6}\surd+\sqrt{6}}$

$= \frac{5\sqrt{6}\surd}{5\sqrt{6}\surd}$

$= 1\surd$ Answer only: no marks (3)

1.4 $\frac{\sqrt{6}}{\sqrt{6}-\sqrt{5}}$

$= \frac{\sqrt{6}}{\sqrt{6}-\sqrt{5}} \times \frac{\sqrt{6}+\sqrt{5}}{\sqrt{6}+\sqrt{5}}$ ✓

$= \frac{6+\sqrt{30}\surd}{6+\sqrt{30}-\sqrt{30}-5\surd}$

$= 6+\sqrt{30}$✓ Answer only: no marks (3)

1.5 1.5.1 $$T = \frac{pr^2}{q}$$

$$\frac{q}{p} \times T = \frac{pr^2}{q} \times \frac{q}{p}$$ ✓

$$\frac{qT}{p} = r^2$$ ✓

$$r = \sqrt{\frac{qT}{p}}$$ ✓ (3)

1.5.2 $$r = \sqrt{\frac{qT}{p}}$$

$$= \sqrt{\frac{14\times 20}{12}}$$ ✓

$= 4{,}83$✓ (2)

1.6 Data: $S_{52} = 8\,788\,\surd, n = 52\,\surd, a = 16\,\surd$ and $d = ?$

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

$8\,788 = \frac{52}{2}[2(16) + (52-1)d]$ Correct substitution

$8\,788 = 26(32 + 51d)$

$8\,788 = 832 + 1\,326d$

$7\,956 = 1\,326d\surd$ Formula manipulation

$\therefore d = 6\surd$ (4)

1.7 1.7.1 Data: $n = 10\,\surd, a = 2\,\surd$ and $d = 3\surd$

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

$T_{10} = 2 + (10-1)3\,\surd$ Correct substitution

$= 29\checkmark$ Answer only full marks (3)

1.7.2 Data: $n = 25\,\surd, a = 2$ and $d = 3$

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

$S_{25} = \frac{25}{2}[2(2) + (25-1)3]\surd\surd\surd$ Correct substitution

$= 950\checkmark$ (3)
[30]

QUESTION 2

2.1 2.1.1 Parabola (1)

2.1.2 $(0; 0)$ (1)

2.1.3 $x = 0$ **OR** $y-$axis✓ (1)

2.1.4 Function:✓ Many-to-one mapping OR parallel line will cut the x-axis only once OR for every $x-$value there is only one $y-$value.✓ (2)

2.1.5 $y = x^2 - 2$ (1)

2.2 2.2.1 Hyperbola✓ (1)

2.2.2 $x = 2$ and $y = 4$

$xy = k\surd$

$2 \times 4 = k\surd$

$k = 8$✓

$\therefore y = \frac{8}{x}$✓ (3)

2.2.3 Exponential graph✓ (1)

2.2.4 $\surd \ \surd$

y-intercept coordinates: $(0\ ;\ 1)$ OR accept $y = 1$✓

$\surd \ \surd$

Domain: $x \in (-\infty\ ;\ \infty)$ **OR** $x \in R$✓

$\surd \ \surd$

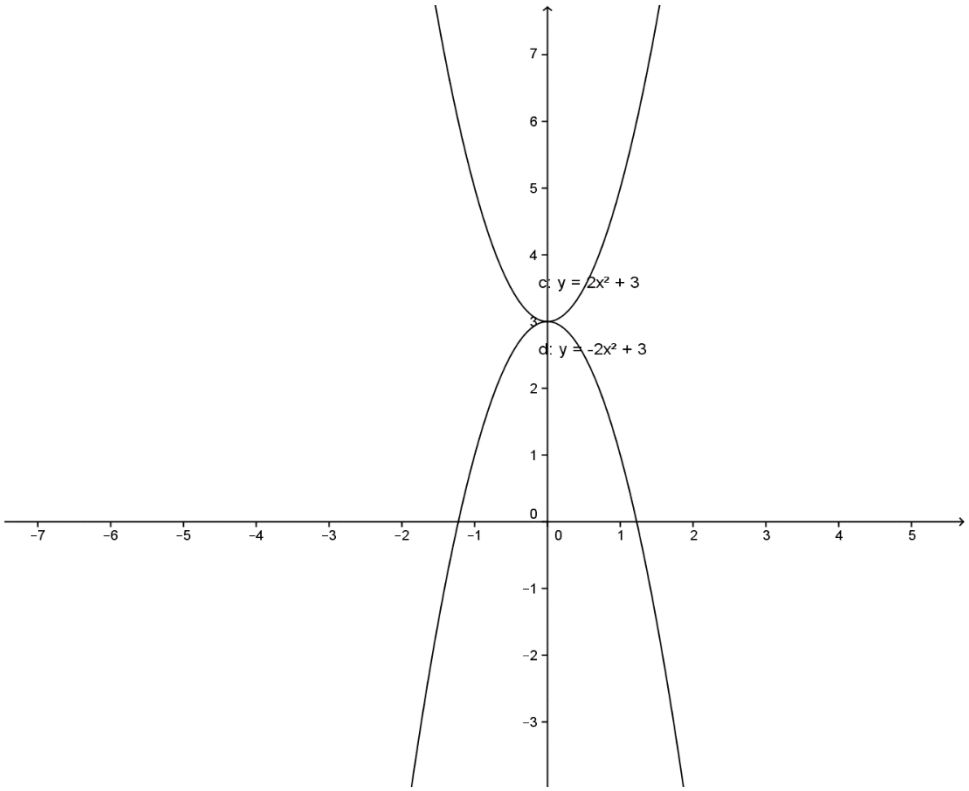
Range: $y \in (0\ ;\ \infty)$ **OR** $y\ > 0$✓ (3)

2.3 2.3.1

x	-2	-1	0	1	2
$f(x) = 2x^2 + 3$	11	5√	3√	5√	11√

(2)

2.3.2 & 2.3.4 The graphs of $f(x) = 2x^2 + 3$ and $g(x) = -2x^2 + 3$:



3 marks for each graph

One mark for y-intercepts/turning point (0;3)✓

One mark for shape✓

Half mark for labelling √ (3)

Half mark for smily face $(f(x))$ or sad face $(g(x))$ √ (3)

2.3 2.3.1

x	-2	-1	0	1	2
$g(x) = -2x^2 + 3$	-5√	1√	3√	1√	-5

(2)
[24]

QUESTION 3

3.1 3.1.1 $(p + q - 1)(p + q)$
$= p^2 + pq + pq + q^2 - p - q$ √√√ half mark for each 2 correct terms

$= p^2 + q^2 + 2pq - p - q$√ √√ minus half mark for each error (3)

3.1.2 $(a^3 - 1)^2 - 3a^3(a^3 + 2) - 6a^6$
√ √ √ √
$= a^6 - 2a^3 + 1 - 3a^6 - 6a^3 - 6a^6$
√ √
$= -8a^6 - 8a^3 + 1$ (3)

3.1.3 $(x^3)^2 \times x^4$
$= x^6 \times x^4$✓
$= x^{10}$✓ (2)

3.2 3.2.1 $2 - 32a^2$
√ √
$= 2(1 - 16a^2)$ √ each factor
√ √
$= 2(1 - 4a)(1 + 4a)$ √ each difference of squares factor (2)

3.2.2 $6(a - b) + 9a(b - a)$
√ √
$= 6(a - b) - 9a(a - b)$ √ Change sign
✓ ✓ √ Switch around
$= (6 - 9a)(a - b)$
√ √
$= 3(2 - 3a)(a - b)$ (4)

3.3 3.3.1 $a^x = 1$
$a^x = a^0$✓
$x = 0$✓ full marks for answer only (2)

3.3.2 $\frac{x}{2} = \frac{x - 3}{4}$
$4x = 2(x - 3)$✓
$4x = 2x - 6$✓
$2x = -6$
$x = -3$✓ (3)

3.4 $3x - 2 \leq 2x + 6$
$3x \leq 2x + 8$√
$3x - 2x \leq 2x - 2x + 8$√
$x \leq 8$✓ (2)

3.5 $x = 1 - 2y$ ... ... (1)
$x - 2y + 3 = 0$ ... ... (2)

Substitute (1) in (2):
$1 - 2y - 2y + 3 = 0$✓
$1 - 4y + 3 = 0$
$-4y = -4$
$y = 1$✓

Substitute $y = 1$ in (1):
$x = 1 - 2(1)$✓
$x = -1$✓

ALTERNATIVE
$x + 2y - 1 = 0$ ... ... (1)
$x - 2y + 3 = 0$ ... ... (2)

$2x + 2 = 0$ ... ... (1) + (2) ✓
$2x = -2$
$x = \frac{2}{-2} = -1$✓
Substitute $x = -1$ in (1):
$-1 + 2y - 1 = 0$✓
$2y = 2$
$y = \frac{2}{2} = 1$✓ (4)
[25]

QUESTION 4

4.1 4.1.1 B. An interest-bearing account held at a bank or other financial institution.

4.1.2 F. Money invested in a bank for a specific period.

4.1.3 E. A collective investment fund that is bought and sold in units.

4.1.4 C. Financial investments that can easily be converted to cash, typically within 5 years

4.1.5 D. Used to make payments for purchases so that money is immediately deducted from the consumer's account.

4.1.6 A. Money paid to the bank for the services it renders

(6 × 1) (6)

4.2 **INCOME AND EXPENDITURE STATEMENT**

INCOME AND EXPENDITURE: MAMASHELE A FARM WORKER	
INCOME	**AMOUNT**
Nett wage	
170 hours @ R50 per hour	R8 500✓
Nett monthly earnings	R8 500√
EXPENDITURE	**AMOUNT**
Rental of flat	R2 200√
Transport	R414√
Cellphone	R147√
Groceries	R1 800√
Clothing	R460√
Entertainment	R400√
Laundry service	R250√
TOTAL MONTHLY EXPENDITURE	**R5 671√**
Amount left after all the expenses have been paid:	**R2 829√**

(6)

4.3 4.3.1 $P = R12\,000$
$i = 16\%$
$n = 5$ years

Simple interest:

$A = P(1 + in)$

$= 12\,000(1 + 0{,}16 \times 5)$✓

$= R21\,600$✓ (2)

4.3.2 $A = P + I$

$I = 21\,600 - 12\,000$✓

$= R9\,600$✓ (2)

4.3.3 Compound interest:

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

$= 12\,000(1 + 0{,}16)^5$✓

$= \text{R}25\,204{,}10$✓ (2)

4.3.4 $\text{A} = \text{P} + \text{I}$

$\text{I} = \text{A} - \text{P}$

$= \text{R}25\,204{,}10 - 12\,000$✓

$= \text{R}13\,204{,}10$✓ (2)

4.3.5 Compound interest is better than simple interest because it yields more interest.✓ (1)
[21]

TOTAL: 100

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