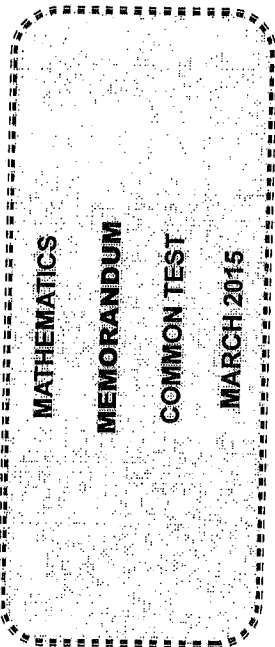




Basic Education

KwaZulu-Natal Department of Basic Education
REPUBLIC OF SOUTH AFRICA



NATIONAL SENIOR CERTIFICATE

GRADE 11

N.B. This memorandum consists of 9 pages including this page.

QUESTION ONE

1.1

$$1.1.1 \quad (3)^{-4} = 3^4 = 81$$

OR

$$(9^{-2})^2 = 9^2 = 81$$

OR

$$(3^{-6})^{\frac{2}{3}} = 3^4 = 81$$

✓ 1A for simplification
✓ 1CA for correct answer

✓ 9²

✓ 81

✓ 3⁻⁶

✓ 81

(2)

$$1.1.2 \quad \frac{5^{2-m} \cdot 2^m \cdot 5^m}{2^{m-1}}$$

= 5^{2-m+m} · 2^{m-m+1}

= 5² · 2

= 50

✓ Same bases

✓ 5² · 2

✓ 50

(3)

$$1.1.3 \quad \frac{2^2(5 \cdot 2^2 - 1)}{2^2(2^2)}$$

= $\frac{9}{2}$

= 18

✓ Factorising

✓ Simplifying

✓ 18

(5)

1.2
$$\frac{9-3\sqrt{6}}{6\sqrt{2}}$$

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

$$= \frac{3-\sqrt{6}}{2\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}$$

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

$$\text{L.H.S} = \frac{9-3\sqrt{6}}{6\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}$$

$$= \frac{9\sqrt{2}-3\sqrt{12}}{12}$$

$$= \frac{3(3\sqrt{2}-2\sqrt{3})}{12}$$

$$= \frac{3\sqrt{2}-2\sqrt{3}}{4} = \text{RHS}$$

QUESTION TWO

2.1

2.1.1 $x=0$ or $x=\frac{1}{2}$

2.1.2 $5x^2 - 3x - 4 = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-(-3) \pm \sqrt{(-3)^2 - 4(5)(-4)}}{2(5)}$$

$$= 1,24 \text{ or } -0,64$$

2.1.3 $\sqrt{7x+2} = 2x$

$$7x + 2 = 4x^2$$

$$4x^2 - 7x - 2 = 0$$

$$(4x+1)(x-2) = 0$$

$$x = -\frac{1}{4} \text{ or } 2$$

$$SS = \{2\}$$

✓✓ Answer (2)

✓ 1M for correct formula

✓ 1A for substitution

✓ 2CA for each value of x (4)

✓ 1A for squaring both sides

✓ 1CA for correct factorization

✓ 1CA for both values of x

✓ 1CA for correct solution (4)

✓ 1CA for factorisation

✓ 1CA for rationalising

✓ 1CA for correct simplification

✓ Rationalising

✓ Multiplying

✓ Factorising

(3)

[11]

2.2 $x = 6 - y$

$$(6-y)^2 + 2y(6-y) - 8y^2 = 0$$

$$36 - 12y + y^2 + 12y - 2y^2 - 8y^2 = 0$$

$$-9y^2 + 36 = 0$$

$$y^2 - 4 = 0$$

$$(y-2)(y+2) = 0$$

$$y = 2 \text{ or } y = -2$$

$$x = 4 \text{ or } x = 8$$

OR $y = 6 - x \rightarrow (3)$

$$x^2 + 2x(6-x) - 8(6-x)^2 = 0$$

$$x^2 + 12x - 2x^2 - 8(36 - 12x + x^2) = 0$$

$$-x^2 + 12x - 288 + 96x - 8x^2 = 0$$

$$-9x^2 + 108x - 288 = 0$$

$$x^2 - 12x + 32 = 0$$

$$(x-4)(x-8) = 0$$

$$x = 4 \text{ or } x = 8$$

$$y = 2 \text{ or } y = -2$$

2.3

$$-2x(x-3) \leq 4$$

$$-2x^2 + 6x - 4 \leq 0$$

$$x^2 - 3x + 2 \geq 0$$

$$(x-2)(x-1) \geq 0$$

CVs $x = 2$ or $x = 1$

$$\frac{+}{-} \quad \frac{-}{+} \quad \frac{+}{-} \quad \frac{-}{+}$$

SS $x \in \mathbb{R}, \{x \geq 2\} \cup \{x \leq 1\}$

2.4

2.4.1 $m + 6 < 0$
 $m < -6$

2.4.2 $x^2 - 5x + p = 0$
 $b^2 - 4ac \geq 0$
 $(-5)^2 - 4(1)(p) \geq 0$
 $25 - 4p \geq 0$
 $-4p \geq -25$
 $p \leq \frac{25}{4}$ or $6\frac{1}{4}$

✓ $m + 6 < 0$
 ✓ Answer

✓ 1A for ≥ 0
 ✓ 1A for correct substitution

✓ ICA for correct answer
 [25]

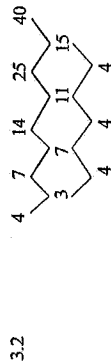
(2)

(6)

✓ ICA for each correct value of x (4)

QUESTION THREE

3.1 $m = 40$



$2a = 4$

$a = 2$

$3a + b = 3$

$b = -3$

$a + b + c = 4$

$c = 5$

$T_n = 2n^2 - 3n + 5$

3.3 T_n of 1st difference = $4n - 1$

$T_n - T_{n-1} = 87$

$4n - 1 = 87$

$n = 22$

$\therefore T_{22} - T_{21} = 87$

$T_{22} = 2(22)^2 - 3(22) + 5 = 907$

$T_{23} = 2(23)^2 - 3(23) + 5 = 994$

OR

$T_n = 4n - 1$

$87 = 4n - 1$

$22 = n$

The 22nd and the 23rd terms

3.4 $T_n = 4855$

$2n^2 - 3n + 5 = 4855$

$2n^2 - 3n - 4850 = 0$

$(2n + 97)(n - 50) = 0$

$\therefore n = 50$

QUESTION FOUR

4.1 $C = \left(\frac{6+4}{2}; \frac{-5+5}{2} \right)$
 $= \left(\frac{10}{2}; \frac{0}{2} \right)$
 $= (5; 0)$

✓ 1A for 5 and ✓ 1A for 0 (2)

4.2 $m_{PD} = \frac{1 - (-5)}{-6 - 6}$
 $= \frac{6}{-12}$
 $= -\frac{1}{2}$

✓ 1A for correct substitution

✓ 1CA for correct answer (2)

4.3 $y = mx + c$

$1 = -\frac{1}{2}(-6) + c$ OR $-5 = -\frac{1}{2}(6) + c$

✓ 1A for correct substitution

$c = -2$

✓ 1CA for correct value of c

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

✓ 1CA for correct equation

OR $y - y_1 = m(x - x_1)$
 $y - 1 = \frac{-1}{2}x(x + 6)$

✓ 1A for correct substitution

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

✓ 1A for simplification

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

✓ 1CA for correct answer

OR $y + 5 = \frac{-1}{2}(x - 6)$

✓ 1A for correct substitution

$y + 5 = \frac{-1}{2}x + 3$

✓ 1CA for simplification

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

✓ 1CA for correct answer (3)

✓ 2A for correct answer (2)

✓ 1A for finding the difference

✓ a-value

✓ b-value

✓ c-value

✓ Answer (4)

✓ $T_n = 87$

✓ $n = 22$

✓ T_{22} value

✓ T_{23} value

✓ 1CA for finding the nth term of the first difference

✓ 1CA for correct substitution

✓ 1CA for each term (4)

✓ $T_n = 4855$

✓ Standard form

✓ 1CA for correct factorization

✓ 1CA for correct answer (4) [14]

$$\begin{aligned}
 4.4 \quad PR &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\
 &= \sqrt{(4 + 6)^2 + (5 - 1)^2} \\
 &= \sqrt{116} \\
 &= 2\sqrt{29}
 \end{aligned}$$

$$\begin{aligned}
 4.5 \quad B &= (0; -2) \text{ and } C = (5; 0) \\
 \therefore BC &= \sqrt{(5 - 0)^2 + (0 + 2)^2} \\
 &= \sqrt{29} \\
 \therefore PR &= 2 BC
 \end{aligned}$$

$$\begin{aligned}
 4.6 \quad B &= (0; -2) \\
 C &= (5; 0) \\
 M_{BC} &= \frac{2}{5} \\
 M_{PR} &= \frac{4}{10} = \frac{2}{5}
 \end{aligned}$$

$\therefore BC \parallel PR$ (equal gradients)

$$\begin{aligned}
 4.7 \quad \tan \theta &= m \\
 \tan \theta &= -5 \quad [RA = 78,7^\circ] \\
 \theta_1 &= 101,3^\circ \\
 \tan \theta &= m \\
 \tan \theta &= \frac{2}{3} \quad [RA = 26,6^\circ] \\
 \therefore \theta_1 &= 153,4^\circ \\
 \therefore \alpha &= 52,1^\circ
 \end{aligned}$$

$$\begin{aligned}
 4.8 \quad M_{PQ} &= \frac{-1}{2} \\
 \therefore M \perp \text{ a line } &= 2 \\
 y &= mx + c \quad (-6; 1) \\
 1 &= 2(-6) + c \\
 c &= 13 \\
 \therefore y &= 2x + 13
 \end{aligned}$$

- ✓ 1M for formula
- ✓ 1A for correct substitution
- ✓ 1CA for correct answer (3)
- ✓ 1A for co-ordinates of B
- ✓ 1CA for correct substitution
- ✓ 1CA for correct answer (3)
- ✓ 1CA for gradient of BC
- ✓ 1CA for gradient PR
- ✓ Equal gradients (3)
- ✓ 1A for 78,7°
- ✓ 1CA for 101,3°
- ✓ 1A for 26,6°
- ✓✓ 2CA for correct answer (5)
- ✓ 1A for gradient
- ✓ 1CA for correct substitution
- ✓ 1CA for c value
- ✓ 1CA for correct answer (4)

TOTAL MARKS: 75 [25]

