GRADE 11 Maths P I Memo

1.1.1 $-2x^2 + 14x - 24 = 0$ [÷ -2]

$x^2 - 7x + 12 = 0$ ✓ std form

$(x - 3)(x - 4) = 0$ ✓ factors

$x = 3$ or 4 ✓ both

3

1.1.2 $x^2 - x - 1 = 0$ ✓ std form

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

$= \frac{-(-1) \pm \sqrt{(-1)^2 - 4(1)(-1)}}{2(1)}$ ✓ subst. into formula

$\frac{1 \pm \sqrt{5}}{2}$

$= 1,62$ or $-0,62$ ✓ both

4

1.1.3. $-2\sqrt{x - 3} = x - 3$ ✓ isolating √

$4(x - 3) = x^2 - 6x + 9$ ✓ squaring both sides

$4x - 12 = x^2 - 6x + 9$

$0 = x^2 - 10x + 21$ ✓ std form

$0 = (x - 7)(x - 3)$ ✓ factors

∴ $x = 7$ or 3 ✓

reject [-1 if 7 not rejected]

5

1.1.4. $3x^{\frac{1}{2}} = 4$ or $x^{\frac{1}{2}} = -3$ ✓ both

$(x^{\frac{1}{2}})^2 = (\frac{4}{3})^2$ No solution ✓

$x = \frac{16}{9}$ ✓ 1,78

3

1.1.5 $x^2 - x = 0$

$x(x - 1) = 0$ ✓ factors

∴ $x = 0$ or $x = 1$ ✓ both

$\frac{0}{2}$ if they divide by x

2

1.1.6. $2^{2x} + 3.2^x - 4 = 0$

$(2^x + 4)(2^x - 1) = 0$ ✓ factors

∴ $2^x = -4$ or $2^x = 1$ ✓ both

No solution ✓ $2^x = 2^0$

∴ $x = 0$ ✓

4

1.1.7. $5^x = 0$ | $x \; 5 = 0$

no soln | $x = 5$

no contribution

⊖ 0 +

5

✓✓ $x < 5$

or 0

2

1.2. $x = 2 - 3y$ ✓ .... ①

Sub into $y^2 + x = xy + y$ .... ②

$y^2 + 2 - 3y = y(2 - 3y) + y$ ✓ subst.

$y^2 + 2 - 3y = 2y - 3y^2 + y$

$4y^2 - 6y + 2 = 0$ [÷ 2]

$2y^2 - 3y + 1 = 0$ ✓ std form

$(2y - 1)(y - 1) = 0$ ✓ factors

∴ $y = \frac{1}{2}$ or 1 ✓ both

Sub back into eqn ①:

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

$x = 2 - 3(\frac{1}{2})$ $x = 2 - 3(1)$

$x = -1$

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

$x = \frac{1}{2}$ ✓ both.

6

1.3.1) $x+3$ contains a variable ✓ and could be positive or negative. If negative, we would reverse ✓ the inequality when × by the LCD

2

1.3.2) $(x+3)^2$ is always ✓ positive $[(x+3)^2 \geqslant 0]$ or equal to zero. (but $x \neq -3$ ∴ $x+3 \neq 0$)

1

1.3.3) $\frac{x-1}{x+3} \times (x+3)^2 \leq 0 \times (x+3)^2$

$(x-1)(x+3) \leq 0$

+ u/d − 0 +

−3 1

∴ $x \in (-3; 1]$ OR $-3 < x \leq 1$ →

values ✓

notation ✓

2

[35]

2.1. $\frac{\sqrt{25 \times 3} - \sqrt{3}}{\sqrt{9 \times 3}}$ ✓ ✓ ← This step MUST BE SHOWN

$= \frac{5\sqrt{3} - \sqrt{3}}{3\sqrt{3}}$

$= \frac{\sqrt{3}(5-1)}{3\sqrt{3}}$ or $\frac{4\sqrt{3}}{3\sqrt{3}}$ ✓ num

$= \frac{4}{3}$ ✓ →

4

2.2. $\frac{9 - 6\sqrt{3} + 3}{\sqrt{18}}$

$= \frac{12 - 6\sqrt{3}}{\sqrt{9 \times 2}}$ ✓ ✓ ✓ ← this must be shown or no mark here

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

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

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

$= \frac{4\sqrt{2} - 2\sqrt{6}}{2}$

$= \frac{\cancel{2}(2\sqrt{2} - \sqrt{6})}{\cancel{2}}$

$= 2\sqrt{2} - \sqrt{6}$ ✓ ✓ →

6

2.3. $\frac{2^{2011} . 2^2 - 6 . 2^{2011}}{2^{2020}}$

$= \frac{2^{2011}(2^2 - 6)}{2^{2011} . 2^9}$ ✓

$= \frac{4-6}{2^9}$ ✓ $= \frac{-2}{2^9} = \frac{-1}{2^8} = -\frac{1}{256}$ ✓ [13]

Alternatively

$(2^{2013} - 6.2^{2011}) \times 2^{-2020}$

$= 2^{-7} - 6.2^{-9}$ ✓

$= \frac{1}{2^7} - \frac{6}{2^9}$

$= \frac{2^2 - 6}{2^9}$

← Then

3

3.1.1 $2 - x = 0$

$-x = -2$

$x = 2$ ✓ 1

3.1.2. $7x - 1 \geq 0$ ✓

$7x \geq 1$

$x \geq 1/7$ ✓ (but $x \neq 2$) 2

3.2.1 $b^2 - 4ac = (-2)^2 - 4(8)(1)$ ✓ subst.

$= 4 - 32$

$= -28$ ✓ 2

3.2.2. Non real ✓ 1

3.3. $rx^2 + 4x - r + 1 + x^2 = 0$

$rx^2 + x^2 + 4x - r + 1 = 0$

$(r+1)x^2 + 4x - r + 1 = 0$ ✓ std form

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

$b^2 - 4ac = (4)^2 - 4(r+1)(1-r)$ ✓ subst.

$= 16 - 4(1 - r^2)$

$= 16 - 4 + 4r^2$

$= 12 + 4r^2$ ✓

$\forall r \in \mathbb{R}$:

$r^2 \geq 0$

$4r^2 \geq 0$

$4r^2 + 12 \geq 12$

$4r^2 + 12 > 0$

$\Delta > 0$ ✓

and the roots will be real for all real values of r. 4

[10]

4.1.1 54 ; 52 ✓ both 1

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

$= 56 + (n-1)(-2)$ ✓ subs. NB brackets (-2)

$= 56 - 2n + 2$

$= 58 - 2n$ ✓ 2

$$\boxed{\begin{array}{l} T_n = 56 + (n-1) - 2 \\ \quad = 58 - 2n \\ \qquad 0/2 \end{array}}$$

4.1.3. $T_{48} = 58 - 2(48)$ ✓

$= 58 - 96$

$= -38$ ✓ 2

4.1.4 $T_p = 58 - 2p$

$T_q = 58 - 2q$

$\therefore 58 - 2p + 58 - 2q = 2$ ✓ setting up equation

$116 - 2p - 2q = 2$

$-2(p+q) = -114$

$p + q = 57$ ✓ 2

4.2. $-2 \quad -7 \quad -16 \quad -29 \quad -46 \quad -67$

$-5 \quad -9 \quad -13 \quad -17 \quad -21$

$-4 \quad -4 \quad -4 \quad -4$

$\therefore$ Next two terms are -46 ✓ and -67 ✓ 2

.3. $x \quad 1 \quad -6 \quad y \quad -14$

$1-x \quad -7 \quad y+6 \quad -14-y$

$x-8 \quad y+13 \quad -2y-20$

$\therefore\ y+13 = -2y - 20$ ✓

$3y = -33$

$y = -11$ ✓

$x - 8 = y + 13$

$\therefore\ x - 8 = -11 + 13$ ✓

$x - 8 = 2$

$x = 10$ ✓

$\therefore$ [$\therefore$ Second difference is $10 - 8 = 2$

$\therefore\ y + 13 = 2$

$\therefore\ y = -11$]

4

[13]

.11 $g(x) = x + \frac{1}{2}$

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

$0 = x + \frac{1}{2}$

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

A $\left(-\frac{1}{2};\ 0\right)$ ✓ ✓

2

.12. A.S is $x = \frac{3}{4}$

A $\underbrace{\quad}_{1\frac{1}{4}}$ $\frac{3}{4}$ $\underbrace{\quad}_{1\frac{1}{4}}$ B

$\therefore$ B $(2;\ 0)$ ✓ ✓

or $\frac{x_B + \left(-\frac{1}{2}\right)}{2} = \frac{3}{4}$

$\therefore\ x_B + \left(-\frac{1}{2}\right) = \frac{3}{2}$

$\therefore\ x_B = 2$

2

5.2) $y = a\left(x + \frac{1}{2}\right)(x - 2)$ ✓

Sub $(1; -3)$

$-3 = a\left(1\frac{1}{2}\right)(-1)$

$-3 = -1\frac{1}{2}a$

$2 = a$ ✓

$\therefore\ y = 2\left(x^2 - 1\frac{1}{2}x - 1\right)$ ✓ must show this step

$\therefore\ f(x) = 2x^2 - 3x - 2$

3

3

5.3. $y = 2\left[x^2 - \frac{3}{2}x\right] - 2$ ✓

$= 2\left[x^2 - \frac{3}{2}x + \left(-\frac{3}{4}\right)^2 - \left(-\frac{3}{4}\right)^2\right] - 2$ ✓

$= 2\left[\left(x - \frac{3}{4}\right)^2 - \frac{9}{16}\right] - 2$ ✓

$= 2\left(x - \frac{3}{4}\right)^2 - \frac{9}{8} - 2$

$= 2\left(x - \frac{3}{4}\right)^2 - \frac{25}{8}$ ✓

4

5.4 $\left(\frac{3}{4};\ -\frac{25}{8}\right)$ ✓ ✓ OR $\left(\frac{3}{4};\ -3\frac{1}{8}\right)$

0,75 3,13

2

5.5 $h(x) = 2\left(x - \frac{3}{4} + 1\frac{3}{4}\right)^2 - \frac{25}{8}$ [NB C.A. here]

$\frac{7}{4}$

$2x^2 + 4x - \frac{9}{8} = 2(x+1)^2 - \frac{25}{8}$ ✓ ✓

2

5.6. $m = \frac{0-(-3)}{2-1}$ ✓

$m = 3$ ✓

$B(2;0)$ C.A.

$C(1;-3)$

2

[17]

Diagram Sheet A

Question 6 $f: y = \frac{-4}{x+2} + 4$

6.1 $0 = \frac{-4}{x+2} + 4$ ✓

$\therefore \frac{4}{x+2} = 4$

$\therefore 4 = 4(x+2)$

$\therefore 4 = 4x+8$

$\therefore -4 = 4x$

$-1 = x$ ✓

ie x int

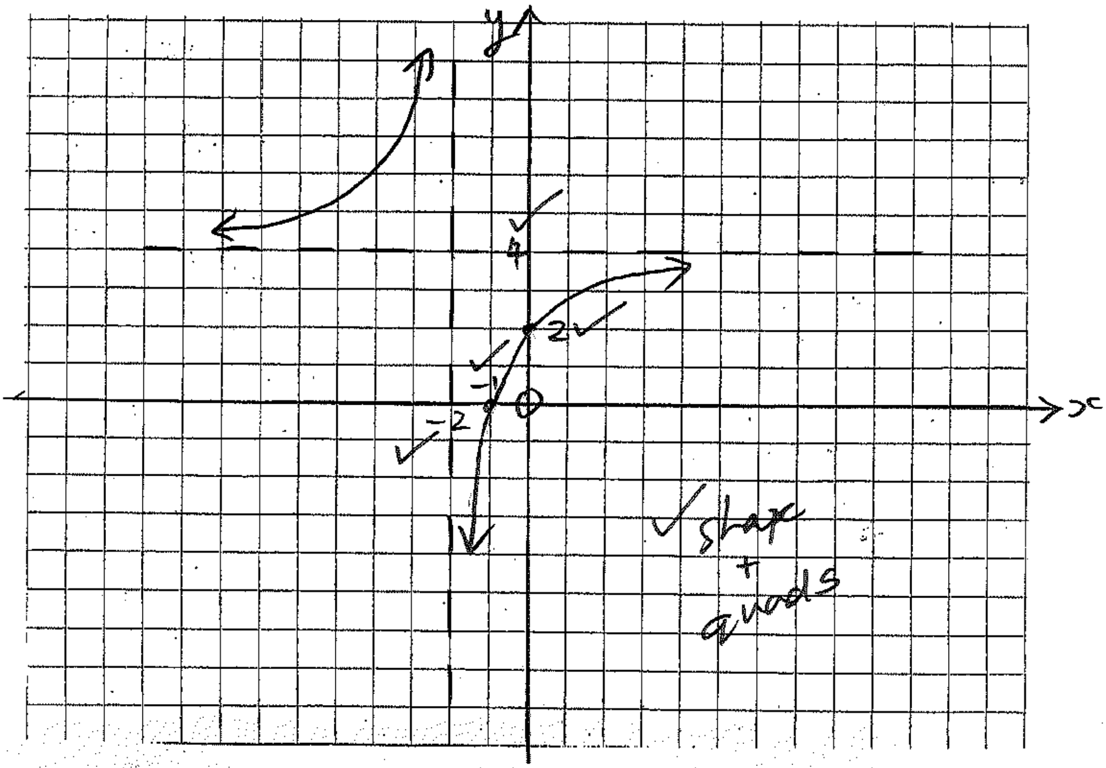
2

6.2 $f(0) = \frac{-4}{\sqrt{0}+2} + 4$

$y = 2$ ✓ ie y int

2

6.3



5

6.4 $y = -(x+2) + 4$

$= -x - 2 + 4$

$= -x + 2$ ✓

1

7. $y = 2^{x-p} - q$

$y = 2^{x-p} + 1$

sub $(0;1,5)$

$1,5 = 2^{0-p} + 1$ ✓

$\therefore \frac{1}{2} = 2^{-p}$

$2^{-1} = 2^{-p}$

$-1 = -p$

$1 = p$ ✓

$-q = +1$

$q = -1$ ✓

3