Grade 11 Mathematics: Memorandum Paper 1

1.1.1 $\sqrt{-9}$ ✔ 1

1.1.2 $x^{\frac{1}{3}}.x^{3} \quad x^{3\frac{1}{3}} = x^{\frac{10}{3}}$ ✔ ✔ 2

1.1.3 $5\sqrt{3} \quad 4\sqrt{3} = \sqrt{3}$ ✔ ✔ 2

1.1.4 No ✔
$\sqrt{3}.\sqrt{3} = 3$ ✔
$\sqrt{3}$ is irrational but 3 is rational ✔ 3

1.2.1 $T_6 = 17$ ✔ Arithmetic sequence 1

1.2.2 $T_6 = 2$ ✔ Geometric sequence 1

1.2.3 $T_6 = 36$ ✔ Squares 1

1.3 847,43 1

1.4.1 $g(x)$ ✔ 1

1.4.2 $x = -1$ ✔ or $x = 3$ ✔ 2

1.4.3 $y = 1$ ✔ 1

1.4.4 $y > 0$ ✔ 1

1.4.5 x –axis (only 1 mark) $y = 0$ ✔ ✔
Asks for an equation 2

1.4.6 $x = 1$ ✔ 1

1.5.1 A (120° ; 1) ✔ ✔ 2

1.5.2 D (-180°; 0,5) ✔ ✔
Using periodicity

E(60° ; 0,5) ✔ ✔
Using symmetry about $x = 120°$

C(-300°; 0,5) ✔ ✔
Using periodicity 6

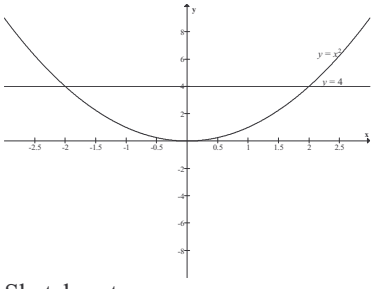
1.5.3 $y = -0,5$ ✔ 1

1.5.4 Amplitude = 1 ✔ 1

1.6.1
$$\frac{x+2}{6} = \frac{1}{2}$$
$x \quad 2 = 3$ ✔
$x = 1$ ✔ 2

1.6.2
$$\frac{(x \quad 2)(x+2)}{2(x-2)} = 7$$ ✔ ✔
$x \quad 2 = 14$ ✔
$x = 12$ ✔ 4

1.6.3 $(x \quad 5)(x \quad 3) = 0$ ✔ ✔
$x \quad 5$ ✔ or $x = 3$ ✔ 4

1.6.4


Sketch not necessary
$x \quad 2$ ✔ or ✔ $x > 2$ ✔ 3

2.1.1 $x = 7$ ✔ and $y = 9$ ✔ 2

2.1.2 $z = 11$ ✔ 1

2.1.3 $p = 27 + z$ ✔
$\therefore p = 38$ ✔ 2

2.1.4 All = 2 ✔ ✔ 2

2.1.5 2nd diff constant therefore quadratic ✔
$T_n \quad an^2 + c$ ✔ (by inspection)
$n^2 + 2$ ✔
$T_{10} = 102$ ✔ ✔ 4

2.2.1 $T_3 \quad T_2 \quad T_1 \quad 1 \quad 1 = 0 + k$ ✔
$T_4 \quad T_3 \quad T_2 \quad 2 \quad 1 = 3 + k$ ✔
$T_5 \quad T_4 \quad T_3 \quad 3 \quad 2 = 5 + k$ ✔ 3

2.2.2 Largest square = $T_6 = 8$ ✔ ✔ 2

2.2.3 $T_k^{\,2}$ = area of the kth square ✔
$T_1^{\,2} \quad T_2^{\,2} \quad \ldots \quad T_6^{\,2} =$ area of rectangle ✔
Width of rectangle = T_6 ✔
Length of rectangle = $T_6 \quad T_5 = T_7$ ✔
$T_1^{\,2} \quad T_2^{\,2} \quad \ldots \quad T_6^{\,2} \quad T_7 \times T_6 + k$ ✔ 5

3.1.1 The 1st year ✔ 1

3.1.2 $V = 100\,000(1 \quad 0,13)^5 = R49\,842,09$
✔ ✔ ✔ 3

3.1.3 $A = 100\,000(1 \quad 0,08)^5 = R146\,932,81$
✔ ✔ ✔ 3

3.1.4 Amount needed = A – V = R 97 090,72 ✔ 1

3.2.1 Option A: I = 0,145 x 10 000 = R 1 450 ✔
Option B: I = $10\,000(1 + \frac{0,14}{12})^{12} - 10\,000$
= R 1 493, 42 ✔ ✔
Thus Option B is better ✔
OR
$1 \quad i_e \quad (1 + \frac{0,14}{12})^{12}$
$i_e = 14,93\%$ 4

3.2.2 Option A: I = 0,075 x 10 000 = R 750 ✔
Option B: I = $10\,000(1 + \frac{0,14}{12})^{6} - 10\,000 =$
R 720,69 ✔ ✔
Yes, option A is better ✔ ✔
OR
Option A: $i \quad \frac{14,5}{2}\% = 7,25\%$ ✔
Option B:
$(1 \quad i_6) \quad (1 + \frac{0,14}{12})^{6}$ ✔ ✔
$i_6 = 7,21\%$
Yes, option A is better ✔ ✔ 5

4.1 $x = 7$ ✔ 1

4.2.1 $f(x) \quad (x^2 \quad 2x \quad 3) \quad (x \quad 3)(x+1)$ ✔ ✔ = 3

The roots are $x = 3$ or $x = -1$ ✔ ✔

4.2.2 Axis of symmetry: $x = \frac{3 + (-1)}{2}$

$= 1$ ✔ ✔ 2

4.2.3 $x = 1 \quad f(1) \quad 1 \quad 2 \quad 3 = 4$ ✔ $\therefore$

Thus TP (1 ; 4) ✔

(must write in co-ordinate form) 2

4.3.1 $4 \quad \frac{a}{1} \qquad a = 4$ ✔

1

4.3.2 Everywhere except at $x = 0$ ✔ ✔

OR

$x \in R \quad but \quad x \neq 0$ 2

4.3.3 $\frac{4}{x} \quad x - 1$ ✔

$x^2 \quad x \quad 4 = 0$ $\therefore$ ✔

$x = \frac{1 \quad \sqrt{1 + 16}}{2}$ ✔

$x = 2{,}56$ because $x > 0$ ✔

Thus P (2,56 ; 1,56) ✔ 5

4.3.4 $f(2{,}56) \quad (2{,}56)^2 \quad 2(2{,}56) \quad 3 = 1{,}56$ ✔

Thus P also lies on the parabola ✔ 2

4.4 $h(x) > g(x)$

x–coordinate of T = $\frac{1 - \sqrt{17}}{2} \quad -1{,}56$ ✔

$x \quad -1{,}56$ ✔ or $0 < x < 2{,}56$ ✔ ✔ 4

5.1 A(-1,5; -3) ✔ and B (0,5; -5) ✔

(substitute into formula) 2

5.2 Average gradient = $\frac{5 \quad (-3)}{0{,}5 \quad (-1{,}5)} \quad -1$ ✔ ✔

2

5.3 Axis of symmetry is the average of the roots

thus $x = -0{,}25$ ✔ ✔

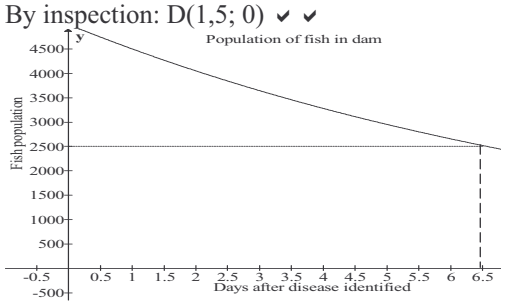
Thus f (x) is increasing on $x > 0{,}25$ ✔ 3

5.4 For average gradient to be 0, C must have same y-coordinate as A, ✔

Thus C(1; -3) ✔ 2

5.5 By inspection: D(1,5; 0) ✔ ✔ 2

6.1



✔ ✔ ✔

3

6.2 $4500 \quad A(1 - 0{,}1)^1$ ✔ ✔

$A = 5000$ ✔

3

6.3 $5000(1 \quad 0{,}1)^x = 2500$ ✔

$0{,}9^x = 0{,}5$ ✔

By trial and error: $0{,}9^6 = 0{,}53$ ✔ 5

$0{,}9^7 = 0{,}48$ ✔

Thus during the 7th day. ✔

7.1 $\frac{3}{x + 2} - \frac{x + 5}{(x \quad 2)(x + 2)} = 3$ ✔

$3(x \quad 2) \quad (x \quad 5) \quad 3(x^2 - 4)$ ✔ ✔

$3x \quad 6 \quad x \quad 5 \quad 3x^2 - 12$

$3x^2 \quad 2x \quad 1 = 0$

$(3x \quad 1)(x \quad 1) = 0$ ✔

$x \quad -\frac{1}{3}$ ✔ or $x = 1$ ✔ 6

7.2 $x + y + 7 = 0$ thus $x = -y - 7$ ✔

$(y \quad 7)^2 \quad y^2 = 25$ ✔

$y^2 \quad 14y \quad 49 \quad y^2 = 25$

$y^2 \quad 7y \quad 12 = 0$ ✔

$(y \quad 3)(y \quad 4) = 0$ ✔

$\therefore y = -3$ or $y = -4$ ✔

If $y = -3$ then $x \quad -4$

If $y = -4$ then $x \quad -3$ ✔ 7

8.1 a) $1 \leq x \leq 3$ ✔ ✔

b) $y \leq -2x + 10$ ✔ ✔

c) $y \geq 0{,}5x$ ✔ ✔ 6

8.2 A (1; 8) then P = 9 ✔

B (3; 4) then P = 7 ✔

Thus P = 9 is a maximum at point P ✔ 3

8.3 If gradient of T < gradient of AB then B is the point that would give a maximum. ✔ ✔

Thus k < -2 ✔ 3