



## RONDEBOSCH BOYS' HIGH SCHOOL

### GRADE 11 - MATHEMATICS PAPER 1 MEMORANDUM

#### Question 1

1.1  $x^2 - 5x - 24 = 0$

$$(x - 8)(x + 3) = 0 \checkmark$$

$$x = 8 \checkmark \text{ or } x = -3 \checkmark$$

(3)

1.2  $3x^2 - 4 = 5x$

$$3x^2 - 5x - 4 = 0 \checkmark$$

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

$$x = 2,26 \checkmark \text{ or } x = -0,59 \checkmark$$

(4)

1.3  $4 - x = \sqrt{x - 2}$

$$16 - 8x + x^2 = x - 2 \checkmark$$

$$x^2 - 9x + 18 = 0 \checkmark$$

$$(x - 6)(x - 3) = 0 \checkmark$$

$$x = 6 \text{ or } x = 3 \checkmark$$

$$x = 3 \checkmark$$

(5)

1.4  $(x^{\frac{1}{4}} + 9)(x^{\frac{1}{4}} - 3) = 0 \checkmark$

$$x^{\frac{1}{4}} = -9 \text{ or } x^{\frac{1}{4}} = 3 \checkmark$$

$$\text{No solution } \checkmark \quad x = 3^4 \checkmark$$

$$x = 81 \checkmark$$

(5)

$$1.5 \quad \frac{1}{x+1} + \frac{2x}{x-1} = 1$$

$$x - 1 + 2x(x + 1) = (x - 1)(x + 1) \checkmark$$

$$x - 1 + 2x^2 + 2x = x^2 - 1 \checkmark$$

$$x^2 + 3x = 0 \checkmark$$

$$x(x + 3) = 0 \checkmark$$

$$x = 0 \checkmark \text{ or } x = -3 \checkmark$$

(6)

$$1.6 \quad \frac{3}{x-4} \leq 2$$

$$\frac{3}{x-4} - 2 \leq 0 \checkmark$$

$$\frac{3-2(x-4)}{x-4} \leq 0 \checkmark$$

$$\frac{3-2x+8}{x-4} \leq 0 \checkmark$$

$$\frac{-2x+11}{x-4} \leq 0 \checkmark$$

$$x < 4 \checkmark \text{ or } x \geq \frac{11}{2} \checkmark$$

(6)

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## Question 2

2.1  $x - 2y - 1 = 0$  and  $y^2 + x^2 = 9 + 2xy$

$$x = 2y + 1 \checkmark$$

$$y^2 + (2y + 1)^2 = 9 + 2(2y + 1)y \checkmark$$

$$y^2 + 4y^2 + 4y + 1 \checkmark = 9 + 4y^2 + 2y \checkmark$$

$$y^2 + 2y - 8 = 0 \checkmark$$

$$(y + 4)(y - 2) = 0 \checkmark$$

$$y = -4 \quad \text{or} \quad y = 2 \checkmark$$

$$x = -7 \checkmark \quad \text{or} \quad x = 5 \checkmark$$

(9)

2.2  $\frac{1}{x} + \frac{1}{x-2} = \frac{1}{12/5} \checkmark \checkmark$

$$\frac{1}{x} + \frac{1}{x-2} = \frac{5}{12}$$

$$12(x - 2) + 12x = 5x(x - 2) \checkmark$$

$$12x - 24 + 12x = 5x^2 - 10x \checkmark$$

$$5x^2 - 34x + 24 = 0 \checkmark$$

$$(5x - 4)(x - 6) = 0 \checkmark$$

$$x = \frac{4}{5} \quad \text{or} \quad x = 6 \checkmark$$

$$\therefore x = 6 \checkmark$$

$\therefore$  Simon 6 hours and Kate 4 hours  $\checkmark$

(9)

[18]

### Question 3

$$3.1 \quad \frac{x-2}{2x} < 0 \checkmark$$

$$0 < x < 2 \checkmark \checkmark$$

(3)

$$3.2 \quad 4x^2 - 6x = 2t$$

$$4x^2 - 6x - 2t = 0$$

$$\Delta = (-6)^2 - 4(4)(-2t) \checkmark$$

$$\Delta = 36 + 32t$$

$$36 + 32t \geq 0 \checkmark \checkmark$$

$$32t \geq -36$$

$$t \geq -\frac{9}{8} \checkmark$$

(4)

[7]

### Question 4

$$4.1 \quad a = 12 \checkmark ; b = 35 \checkmark ; c = 26 \checkmark$$

(3)

$$4.2 \quad T_n = 2n + 2 \checkmark \checkmark$$

(2)

$$4.3 \quad (1)^2 + k(1) = 3 \checkmark$$

$$k = 2 \checkmark$$

(2)

$$4.4 \quad T_n = n^2 + 2n + 2 \checkmark \checkmark$$

(2)

$$4.5 \quad T_{17} = (17)^2 + 2(17) + 2$$

$$T_{17} = 325 \checkmark \checkmark$$

(2)

[11]

**Question 5**

$$x + 20 \quad 24 \quad x + 8 \quad 14$$

$$4 - x \quad x - 16 \quad 6 - x$$

$$2x - 20 \quad 22 - 2x \quad \checkmark$$

$$2x - 20 = 22 - 2x \quad \checkmark$$

$$x = \frac{21}{2} \quad \checkmark$$

$$2a = 1$$

$$3a + b = \frac{-13}{2} \quad \checkmark$$

$$a + b + c = \frac{61}{2} \quad \checkmark$$

$$\therefore a = \frac{1}{2} \quad \checkmark$$

$$\therefore b = -8 \quad \checkmark$$

$$c = 38 \quad \checkmark$$

$$\therefore T_n = \frac{1}{2}n^2 - 8n + 38 \quad \checkmark$$

**[9]****Question 6**

$$6.1 \quad S_2 = \frac{2}{3} \quad \checkmark$$

(1)

$$6.2 \quad S_3 = \frac{3}{4} \quad \checkmark$$

(1)

$$6.3 \quad S_4 = \frac{4}{5} \quad \checkmark$$

(1)

$$6.4 \quad S_n = \frac{n}{n+1} \quad \checkmark \checkmark$$

(2)

$$6.5 \quad S_{2013} = \frac{2013}{2014} \quad \checkmark \checkmark$$

(2)

**[7]**

### Question 7

$$7.1.1 \quad A = 36000 \left(1 + \frac{0.15}{12}\right)^{108} \checkmark \checkmark$$

$$A = R 137 710,15 \checkmark$$

(3)

$$7.1.2 \quad 1 + i_{eff} = \left(1 + \frac{0.15}{12}\right)^{12} \checkmark \checkmark$$

$$i_{eff} = \left(1 + \frac{0.15}{12}\right)^{12} - 1$$

$$i_{eff} = 0,1607545 \dots \checkmark$$

$$i_{eff} = 16,08\% \checkmark$$

(4)

$$7.2 \quad 5 822 734 = 4 524 264(1 + r)^{10} \checkmark$$

$$1,287001377 = (1 + r)^{10} \checkmark$$

$$\sqrt[10]{1,287 \dots} = 1 + r \checkmark$$

$$r = 0,02555 \dots$$

$$r = 2,56\% \checkmark$$

(4)

$$7.3 \quad P = \frac{600[1 - \left(1 + \frac{0,07}{12}\right)^{-96}]}{\frac{0,07}{12}} \checkmark \checkmark$$

$$P = R44 008,54 \checkmark \checkmark$$

(4)

$$7.4 \quad 94 069,21 = \frac{x \left[ \left(1 + \frac{0,085}{12}\right)^{120} - 1 \right]}{\frac{0,085}{12}} \checkmark \checkmark$$

$$A = R500,00 \checkmark \checkmark$$

(4)

[19]

### Question 8

8.1  $x \in R \checkmark; x \neq 5 \checkmark$

(2)

8.2  $\frac{5}{x-5} + 4 = 0$

$5 = -4(x-5) \checkmark$

$-15 = -4x \checkmark$

$x = \frac{15}{4} \checkmark$

(3)

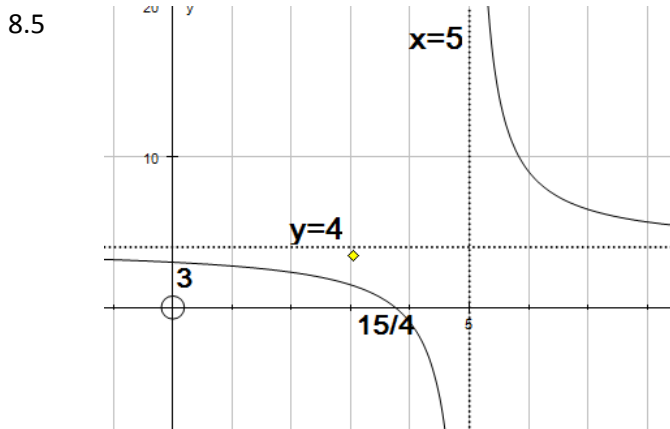
8.3  $p = \frac{5}{0-5} + 4$

$p = 3 \checkmark \checkmark$

(2)

8.4  $x = 5 \checkmark; y = 4 \checkmark$

(2)



$\checkmark$ asymptotes  $\checkmark$ shape & quadrants

$\checkmark$ x - intercept  $\checkmark$ y - intercept

(4)

8.6  $y = x + c$  or  $y = -x + c$

$4 = 5 + c$

$4 = -5 + c$

$c = -1$

$c = 9$

$y = x - 1 \checkmark \checkmark$

$y = -x + 9 \checkmark \checkmark$

(2)

8.7  $g(x) = \frac{5}{x-4} + 8 \checkmark$

(2)

[17]

**Question 9**

- 9.1  $E(2; 0) \checkmark \checkmark$  (2)
- 9.2  $y = a(x - 2)(x + 8) \checkmark$   
 $16 = a(0 - 2)(0 + 8) \checkmark$   
 $16 = -16a$   
 $a = -1 \checkmark$   
 $y = -(x - 2)(x + 8)$   
 $y = -(x^2 + 6x - 16) \checkmark$   
 $y = -x^2 - 6x + 16$  (4)
- 9.3  $-x^2 - 6x + 16 = -x + 2 \checkmark$   
 $x^2 + 5x - 14 = 0 \checkmark$   
 $(x + 7)(x - 2) = 0 \checkmark$   
 $x = -7 \text{ or } x = 2 \checkmark$   
 $\therefore B(-7; 9) \checkmark$  (5)
- 9.4  $x = -3 \checkmark$  (1)
- 9.5  $C(-3 \checkmark; 25 \checkmark \checkmark)$  (3)
- 9.6  $m = \frac{9-25}{-7-(-3)} \checkmark = 4 \checkmark$  (2)
- 9.7  $CF = -x^2 - 6x + 16 - (-x + 2) \checkmark$  OR  $g(-3) = -(-3) + 2 \checkmark$   
 $CF = -x^2 - 5x + 14 \checkmark$   $g(-3) = 5 \checkmark$   
 $CF = -(-3)^2 - 5(-3) + 14 \checkmark$   $CF = 25 - 5 \checkmark = 20 \checkmark$   
 $CF = 20 \checkmark$  (4)
- 9.8.1  $-8 \leq x \leq 2 \checkmark \checkmark$  (2)
- 9.8.2  $x > -8 \checkmark ; x \neq 2 \checkmark$  (2)
- 9.9  $y + 3 \checkmark = -(x - 2)^2 - 6(x - 2) + 16 \checkmark$   
 $y + 3 = -(x^2 - 4x + 4) - 6x + 12 + 16$   
 $y = -x^2 - 2x + 21 \checkmark \checkmark$  OR  $y = -(x + 1)^2 + 22$  (4)



**Question 10**

*Reflection in x – axis:*

$$-y = -x^2 + 6x - 5$$

$$y = x^2 - 6x + 5 \checkmark\checkmark$$

*Reflection in y – axis:*

$$y = (-x)^2 - 6(-x) + 5$$

$$y = x^2 + 6x + 5 \checkmark\checkmark$$

**[4]**