

MATHEMATICS  
GRADE 11  
EXAM PAPER 1  
9 Nov 2015

QUESTION 1

$$\begin{aligned} \text{(a)} \quad & \frac{2}{x-4} - \frac{1}{x+2} \\ &= \frac{2(x+2) - (x-4)}{(x-4)(x+2)} \quad \checkmark \\ &= \frac{x+8}{(x-4)(x+2)} \quad \checkmark \end{aligned}$$

(3)

$$\begin{aligned} \text{(b)} \quad & \sqrt{\frac{2^{x+3} - 2^{x+2}}{2^{x-2}}} \\ &= \sqrt{\frac{2^x(2^3 - 2^2)}{2^x \cdot 2^{-2}}} \quad \checkmark \\ &= \sqrt{\frac{8-4}{\frac{1}{4}}} \quad \checkmark \\ &= \sqrt{16} \quad \checkmark \\ &= 4 \quad \checkmark \end{aligned}$$

(4)

[7]

QUESTION 2

$$\begin{aligned} \text{(a)} \quad & (2x-1)(x+3) = -5 \\ & 2x^2 + 5x + 2 = 0 \quad \checkmark \\ & (2x+1)(x+2) = 0 \quad \checkmark \\ & x = -\frac{1}{2} \quad \text{or} \quad x = -2 \quad \checkmark \end{aligned}$$

(3)

(b)

$$2x^2 - 3x - 7 = 0$$

$$x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(2)(-7)}}{2(2)} \checkmark$$

$$= \frac{3 \pm \sqrt{65}}{4} \checkmark$$

$$x \approx 2,8 \quad \text{or} \quad x \approx -1,3 \checkmark$$

(3)

(c)

$$\sqrt{x+5} + 5 = \frac{14}{\sqrt{x+5}}$$

$$\text{Set } k = \sqrt{x+5}$$

$$k + 5 = \frac{14}{k} \checkmark$$

x k:

$$k^2 + 5k - 14 = 0 \checkmark$$

$$(k+7)(k-2) = 0 \checkmark$$

$$\sqrt{x+5} \neq -7 \checkmark \quad \text{or} \quad \sqrt{x+5} = 2$$

N.A.

$$x+5 = 4 \checkmark$$

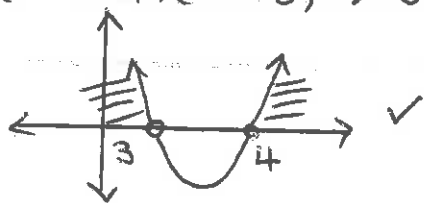
$$x = -1 \checkmark$$

(6)

(d)

$$x^2 - 7x + 12 > 0$$

$$(x-4)(x-3) > 0 \checkmark$$



$$x < 3 \checkmark \quad \text{or} \quad x > 4 \checkmark$$

(4)

(e)

$$(5^x - 1)(5^x - 25) = 0$$

$$5^x = 1 \quad \text{or} \quad 5^x = 25 \checkmark$$

$$5^x = 5^0 \quad 5^x = 5^2$$

$$x = 0 \checkmark$$

$$x = 2 \checkmark$$

(3)

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### QUESTION 3

(a)  $4 - 20k \geq 0$  ✓  
 $k \leq \frac{1}{5}$  ✓

(b)  $x - 2y - 3 = 0$   $4x^2 - 5xy + y^2 = 0$  (2)  
 $x = 2y + 3$  — (1) L (2)

Sub. (1) into (2):  $4(2y+3)^2 - 5y(2y+3) + y^2 = 0$  ✓  
 $16y^2 + 48y + 36 - 10y^2 - 15y + y^2 = 0$  ✓  
 $7y^2 + 33y + 36 = 0$  ✓  
 $(7y+12)(y+3) = 0$  ✓  
 $y = -\frac{12}{7}$  or  $y = -3$  ✓

$x = 2\left(-\frac{12}{7}\right) + 3$  or  $x = 2(-3) + 3$   
 $= -\frac{3}{7}$  ✓  $= -3$  ✓  
 $\left(-\frac{3}{7}, -\frac{12}{7}\right)$   $(-3; -3)$   
(7)

[9]

### QUESTION 4

(a) (1)  $\frac{16}{125}$  ✓

(2)  $T_n = \frac{n^2}{(n+1)^3}$  ✓ (1)

(b)  $d = T_2 - T_1 = T_3 - T_2$  (2)  
 $2x+2 - (x+2) = 4x-1 - (2x+2)$  ✓  
 $x = 2x-3$

$x = 3$  ✓  
 $\dots; 5; 8; 11; \dots$  ✓  
 $d = 3$  ✓ and  $a = -4$  ✓ (5)

(3)

[8]

## QUESTION 5

(a) (1) R70 000 ✓

(1)

(2) Straight line depreciation ✓

(1)

(3)  $8\ 750 = 70\ 000 (1 - i)^7$  ✓

$$i = 1 - \sqrt[7]{\frac{8\ 750}{70\ 000}}$$
 ✓

$$i = 0,2570028 \dots$$

$$i = 25,7\%$$
 ✓

(3)

(b) (1)  $1 + i_{\text{eff}} = \left(1 + \frac{0,072}{12}\right)^{12}$  ✓

$$i_{\text{eff}} = 0,07442 \dots$$

$$i_{\text{eff}} = 7,44\%$$
 ✓

(2)

(2)  $12\ 450 = P \left(1 + \frac{0,072}{12}\right)^{5 \times 12}$  ✓

$$P = \frac{12\ 450}{1,431786 \dots}$$
 ✓

$$P = R8\ 695,42$$
 ✓

(3)

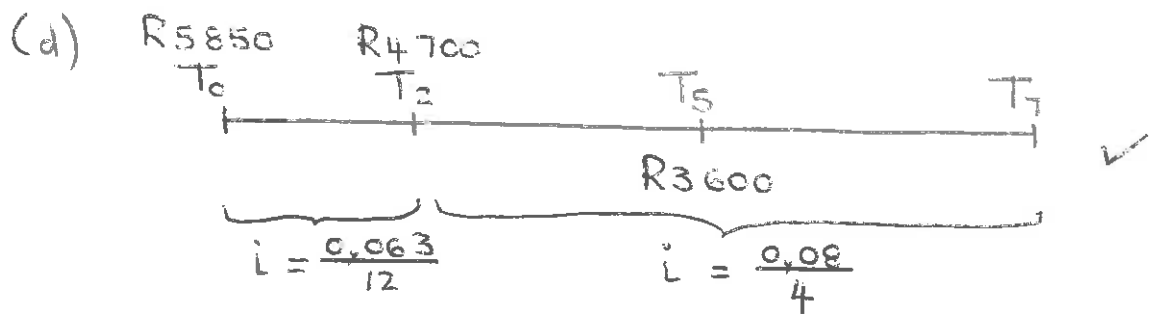
(c)  $P = 11\ 599 \times 0,85$   
 $= R9\ 859,15$  ✓

$$A = 9\ 859,15 (1 + 0,185(2))$$
 ✓  
 $= R13\ 507,0355$  ✓

$$\text{Monthly payment} = \frac{13\ 507,0355}{24}$$
  
 $= R562,79$  ✓

(4)

(4)



$$5850 \left(1 + \frac{0.063}{12}\right)^{24} \left(1 + \frac{0.08}{4}\right)^{20} + 4700 \left(1 + \frac{0.08}{4}\right)^{20} - 3600 \left(1 + \frac{0.08}{4}\right)^8$$

$$= R12622,81 \quad \checkmark$$

(6)

[20]

### QUESTION 6

(a)

$$A_1 = \frac{1}{2}bh \quad \checkmark(M)$$

$$= \frac{1}{2}(2)(2)$$

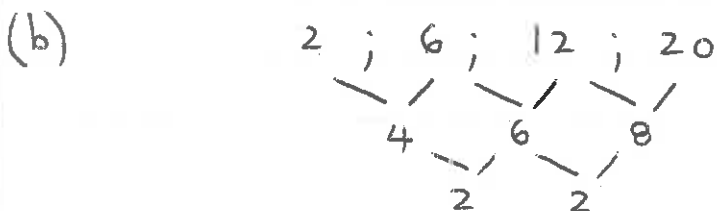
$$= 2 \text{ cm}^2$$

$$A_2 = 6 \text{ cm}^2$$

$$A_3 = 12 \text{ cm}^2 \quad \checkmark(A_1 \text{ to } A_3)$$

$$A_4 = 20 \text{ cm}^2 \quad \checkmark(A_4)$$

(3)



$$2a = 2 \quad \checkmark \quad 3a + b = 4 \quad \checkmark \quad a + b + c = 2$$

$$a = 1 \quad \checkmark \quad 3(1) + b = 4 \quad \checkmark \quad 1 + 1 + c = 2$$

$$b = 1 \quad \checkmark \quad c = 0 \quad \checkmark$$

$$A_n = T_n = n^2 + n$$

$$A_{98} = T_{98} = 98^2 + 98$$

$$= 9702 \text{ cm}^2 \quad \checkmark$$

OR:

$$A_n = T_n = \frac{1}{2}(2n)(n+1)$$

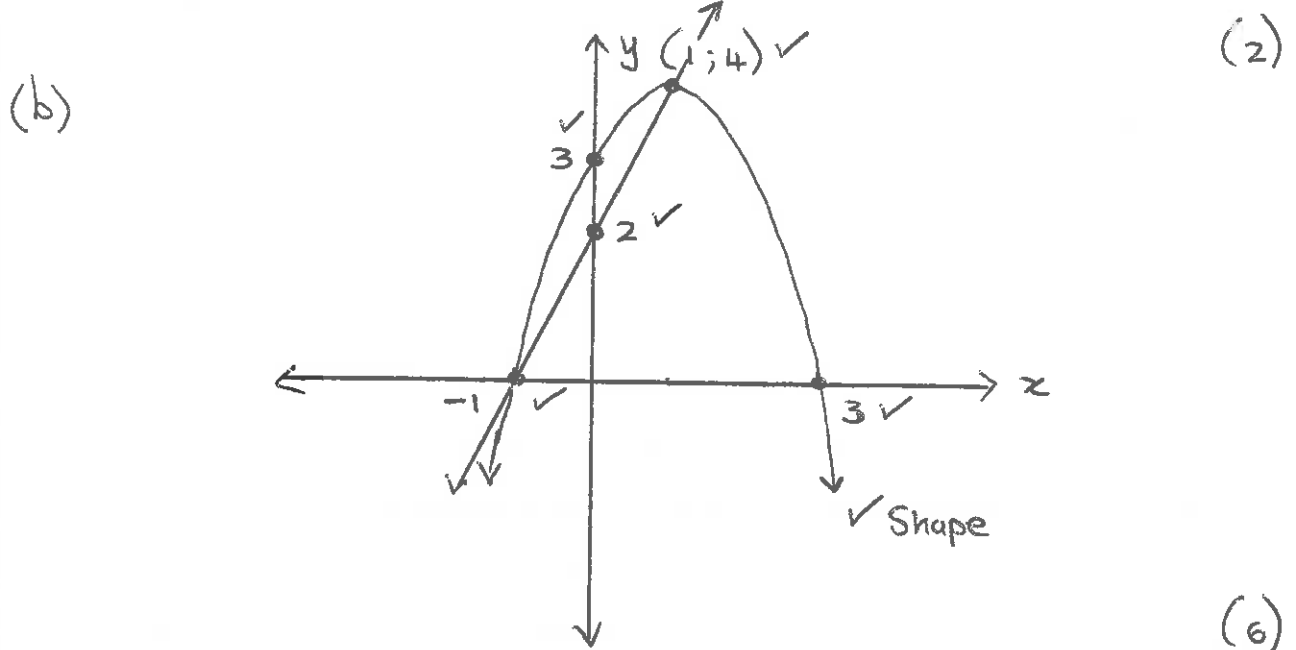
$$A_{98} = T_{98} = \frac{1}{2}(2(98))(98+1) = 9702 \text{ cm}^2 \quad \checkmark \quad (4)$$

(5)

[7]

### QUESTION 7

(a)  $(3; 0) \checkmark^a$  and  $(-1; 0) \checkmark^a$   
or  $x = 3$  and  $x = -1$



(c)  $y \in (-\infty; 4] \checkmark^{\checkmark} \text{ca}$  or  $y \leq 4$

(d)  $k_1 = 1 \checkmark^{\checkmark} \text{ca}$

(6)

(2)

(2)

[12]

### QUESTION 8

(a)  $\frac{-4}{x+2} - 4 = 0 \checkmark^M$   
 $-4 = 4x + 8 \checkmark$   
 $4x = -12$   
 $x = -3$

A  $(-3; 0) \checkmark$  DIAGRAM

(3)

(b)  $q = -4 \checkmark^a$   
 $0 = 2^{-(-3)+p} - 4 \checkmark$   
 $2^2 = 2^{3+p} \checkmark$   
 $2 = 3 + p \checkmark$   
 $p = -1 \checkmark$

$g(x) = 2^{-x-1} - 4$

(5)

$$(c) \quad f(c) = -6 \quad g(c) = -3\frac{1}{2} \sqrt{ca}$$

$$BC = -3\frac{1}{2} - (-6) \\ = 2\frac{1}{2} \text{ units } \sqrt{ca}$$

$$(d) \quad x = 3 \sqrt{a} \quad y = 5 \sqrt{a}$$

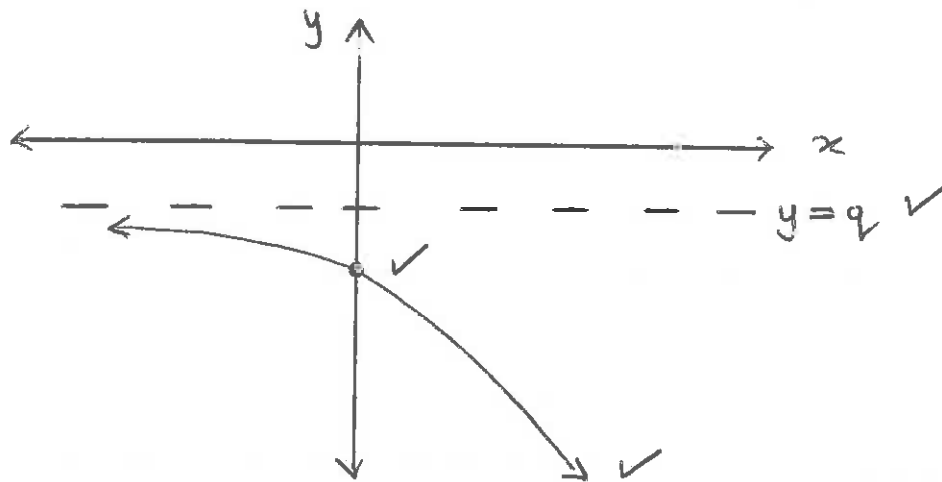
$$(e) \quad x \in (-2; \infty) \quad \text{or} \quad x > -2$$

(3)

(2)

(2)

[15]

QUESTION 9

[3]

QUESTION 10

$$(a) \quad (1) \quad \frac{16}{18} = \frac{8}{9} = 0,889$$

(2)

$$(2) \quad P(S \text{ and } R) = \frac{28}{120} = 0,233$$

$$P(S) \times P(R) = \frac{44}{120} \times \frac{102}{120} = 0,312$$

Not independent.

$$\text{OR: } P(S \text{ and } L) = \frac{16}{120} = 0,133$$

$$P(S) \times P(L) = \frac{44}{120} \times \frac{18}{120} = 0,055$$

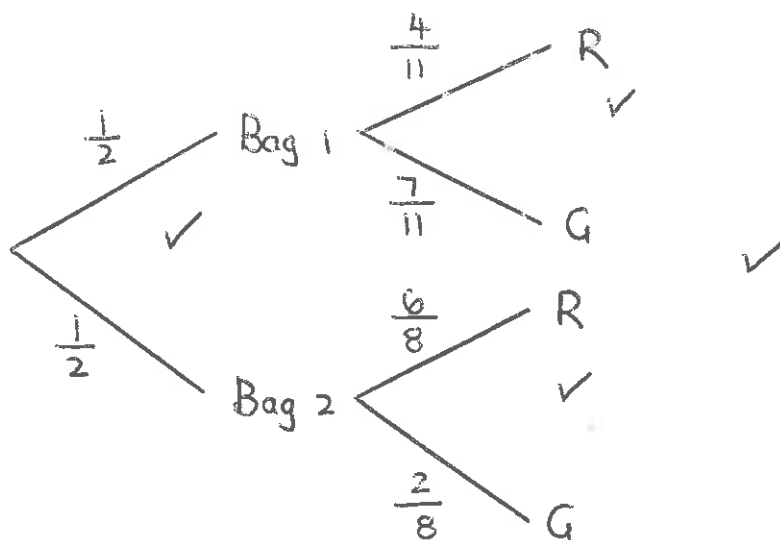
Not independent

$$\text{OR: } P(A \text{ and } R) \neq P(A) \times P(R)$$

(3)

$$(7) \quad \text{OR: } P(A \text{ and } L) \neq P(A) \times P(L)$$

(b) (1)



$$(2) \quad P(R) = \left(\frac{1}{2} \times \frac{4}{11}\right) + \left(\frac{1}{2} \times \frac{6}{8}\right) \\ = 0,557$$

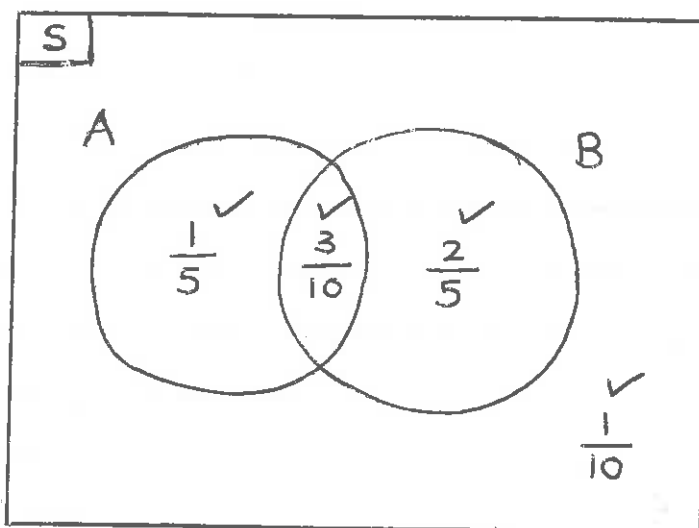
(4)

(3)

[12]

### QUESTION 11

(a)



(b)

$$P(B) = \frac{3}{10} + \frac{2}{5} \\ = \frac{7}{10} \\ = 0,7$$

(4)

(2)

[6]



QUESTION 12

$$y = \frac{a}{x+p} \quad \checkmark$$

OR  $h = \frac{a}{t+p}$

$$2 = \frac{a}{0+p}$$

$$a = 2p \quad \checkmark$$

$$3 = \frac{a}{3+p}$$

$$a = 9 + 3p \quad \checkmark$$

$$2p = 9 + 3p \quad \checkmark$$

$$p = -9 \quad \checkmark$$

$$a = -18 \quad \checkmark$$

$$\therefore h \text{ or } y = \frac{-18}{8,6-9} \\ = 45 \text{ m} \quad \checkmark$$

[7]

TOTAL: [125]