

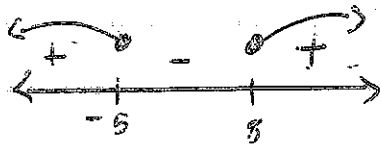
GRADE 11 MATHS PAPER 1

QUESTION 1

a. $(x-4)(x-3) = 0$
 $x=4$ or $x=3$ (2)

b. $6x-7 = \frac{4}{x}$
 $6x^2 - 7x - 4 = 0$ (4)
 $x = 1,59$ or $x = -0,42$

c. $x^2 - 3x - 40 \geq 0$
 $(x-8)(x+5) \geq 0$



$x \in (-\infty, -5] \cup [8, \infty)$ (A) method ✓
 numbers ✓

- d. Women $\frac{1}{3}$
 Girls $\frac{1}{4}$
 Men $\frac{1}{6}$
 Boys 6

$\frac{1}{3} + \frac{1}{4} + \frac{1}{6}$
 $= \frac{3+4+2}{12} = \frac{9}{12}$ (3) method ✓
 24 ✓

$\frac{1}{4}$ are boys

$\frac{1}{4} \rightarrow 6$ boys
 $\frac{4}{4} \rightarrow 24$ people ✓

QUESTION 2

a i) $\frac{9^x}{6^{x-1} \cdot 15^x}$ simplify ✓
 $= \frac{3^{2x} \cdot 5^{x-2} \cdot 2^{x-2}}{3^{x-1} \cdot 2^{x-1} \cdot 5^x \cdot 3^x}$ ✓ a
 $= \frac{3^{2x} \cdot 5^{x-2} \cdot 2^{x-2}}{3^{2x-1} \cdot 5^x \cdot 2^{x-1}}$ ✓ m collect like
 $= \frac{3}{5^2 \cdot 2}$ (4)
 $= \frac{3}{50}$ ✓ A

ii. $(\sqrt{2} + 2)^2 - 2\sqrt{8}$
 $= (\sqrt{2} + 2)(\sqrt{2} + 2) - 2 \cdot 2\sqrt{2}$
 $= 2 + 4\sqrt{2} + 4 - 4\sqrt{2}$ (3)
 $= 6$ ✓ a
 $6 - 4\sqrt{2}$ ✓
 $6 - 2\sqrt{8}$ 0
 6 0

b. $27^{x^2+x} = 3^{3x^2+2}$
 $3^{3x^2+3x} = 3^{3x^2+2}$ prime bases ✓
 $3x = 2$
 $x = \frac{2}{3}$ (3)

QUESTION 3

$f(x) = a^x$ sub $(-2; 9)^m$
 $9 = a^{-2}$
 $3^2 = (a)^{-2}$
 $\therefore \frac{1}{3} = a$ ✓ a (4)

$g(x) = \frac{k}{x}$ sub $(-2; 9)^m$
 $9 = \frac{k}{-2}$ $\therefore k = -18$ ✓ a

QUESTION 4

- a. VII $x = -2$ ✓
 b. VI $y = \frac{x}{2}$ ✓
 c. IV $y = 2^{x+1}$ ✓
 d. I $xy = 2$ ✓ (4)

QUESTION 5

$$3x(4x+1)(x^2-7)=0$$

$$x=0 \text{ or } x=-\frac{1}{4} \text{ or } x=\pm\sqrt{7}$$

- permuting
 a. $x=0$ ✓ (1)
 b. $x=0, x=-\frac{1}{4}$ ✓ (1)
 c. $x=0, x=-\frac{1}{4}, x=\pm\sqrt{7}$ ✓ (4)

QUESTION 6

a. $g(x) = -x^2 + 4x + 5$

$$p = -\frac{b}{2a} = \frac{-4}{2(-1)} = 2 \checkmark$$

$$q = -(2)^2 + 4(2) + 5$$

$$= 9 \checkmark \quad (3)$$

A(2; 9) ✓

b. $AB = -x^2 + 4x + 5 - (x^2 - 9)$
 $= -2x^2 + 4x + 14$
 $= -2(2)^2 + 4(2) + 14$ ✓
 $= 14 \checkmark \quad (3)$

c. x int: $0 = x^2 - 4x - 5$
 $0 = (x-5)(x+1)$
 $x = 5 \text{ or } x = -1$
 $F(5; 0) \checkmark a$

f(x) x int
 $0 = x^2 - 9$
 $0 = (x-3)(x+3)$
 $x = 3 \text{ or } x = -3$
 $E(-3; 0) \checkmark a \quad (4)$

$$EF = 3 \checkmark + 5 = 8 \checkmark a$$

d. $f(x) \cdot g(x) < 0$
 $x \in (-\infty; -3) \checkmark (-1; 3) \checkmark (5; \infty) \checkmark \quad (3)$

QUESTION 7 + 8

answer sheet

QUESTION 9

a. $T_6 \checkmark + T_7 \checkmark$
 $= -5(6) - 4 + -(7)^2 + 6$
 $= -30 - 4 - 49 + 6$
 $= -77 \checkmark a \quad (3)$

b. $-219 = -5n - 4$ ✓
 $-215 = -5n$ ✓
 $43 = n \checkmark a \quad (2)$
 but n cannot be 43, as it is even

c. $-219 = -n^2 + 6$ ✓
 $-225 = -n^2$
 $\pm 15 = n \checkmark a \quad (3)$
 $\therefore n = 15 \checkmark a$

fr. its answer

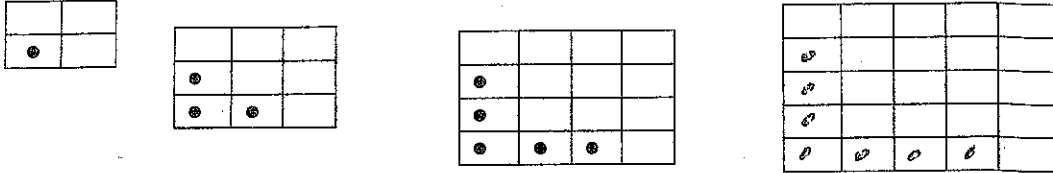
ANSWER SHEET:

EXAMINATION NUMBER: MEMO : TEACHERS NAME: _____

Question 7

Please detach this answer sheet and hand it in with Section B

a. Study the dotted -tiled pattern shown below and answer the following questions.



- i) Complete the 4th pattern in the diagram on your answer sheet. (2)
 ii) Complete the table below on the answer sheet: (1)

Pattern number	1	2	3	4	5	10
Blank tiles	3	6	11	18	27	38 102

- iii) Write a formula for finding the number of blank tiles T_n . (3)

$$3 \quad 6 \quad 11 \quad 18 \quad 27 \quad 38$$

$$\quad \underbrace{\quad} \quad \underbrace{\quad} \quad \underbrace{\quad} \quad \underbrace{\quad} \quad \underbrace{\quad}$$

$$\quad \quad \underbrace{\quad} \quad \underbrace{\quad} \quad \underbrace{\quad} \quad \underbrace{\quad} \quad \underbrace{\quad}$$

$$\quad \quad \quad \underbrace{\quad} \quad \underbrace{\quad} \quad \underbrace{\quad} \quad \underbrace{\quad} \quad \underbrace{\quad}$$

New: n^2 1; 4; 9; 16; 25; 36 ✓
 Old-New = 2; 2; 2; 2; 2 (3)

$$\therefore T_n = n^2 + 2n$$
 [6]

Question 8

a. Determine the value(s) of p so that $x^2 + 4x - 21 + p^2 = 0$ will have equal roots? (3)

$$x^2 + 4x - 21 + p^2 = 0$$

$$x^2 + 4x + k = 21 - p^2 + k$$
 in order for the equation to have real roots
 $k = 4$ ✓
 $4 = -21 + p^2$ ✓
 $25 = p^2$
 $\pm 5 = p$ ✓ (3)

b. Given $m + \frac{1}{m} = 3$

i. Determine the value of $m^2 - 1 + \frac{1}{m^2}$

$$\left(m + \frac{1}{m}\right)^2 = (3)^2 \quad \checkmark \text{ squaring}$$

$$m^2 + 2 + \frac{1}{m^2} = 9$$

$$m^2 + \frac{1}{m^2} = 7$$

$$m^2 - 1 + \frac{1}{m^2} = 7 - 1$$

$$m^2 - 1 + \frac{1}{m^2} = 6 \quad \checkmark \text{ answer}$$

$$m^2 - 3m + 1 = 0 \quad (3)$$

$$m = 3 \pm \sqrt{5} \quad \checkmark$$

sub. \checkmark

\checkmark rearranging

(3)

\checkmark

ii. Hence determine the value of $m^3 + \frac{1}{m^3}$

(2)

$$\left(m + \frac{1}{m}\right)\left(m^2 + \frac{1}{m^2}\right) = (3)(7)$$

$$m^3 + \frac{1}{m} + m + \frac{1}{m^3} = 21 \quad \checkmark$$

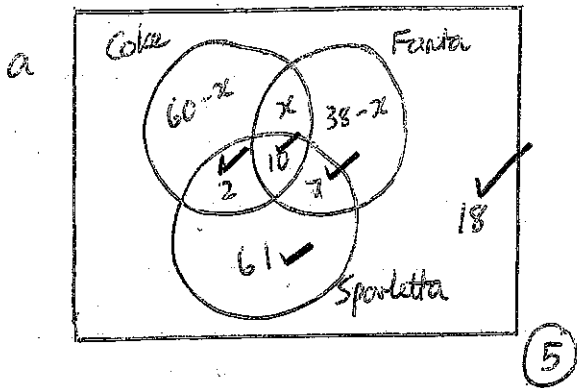
$$m^3 + \frac{1}{m^3} + \frac{1}{m} + m = 21$$

$$m^3 + \frac{1}{m^3} + 3 = 21$$

$$m^3 + \frac{1}{m^3} = 18 \quad \checkmark$$

(3)

QUESTION 10



b. $60 - x + x + 38 - x + 80 + 18 = 180$

$x = 16$

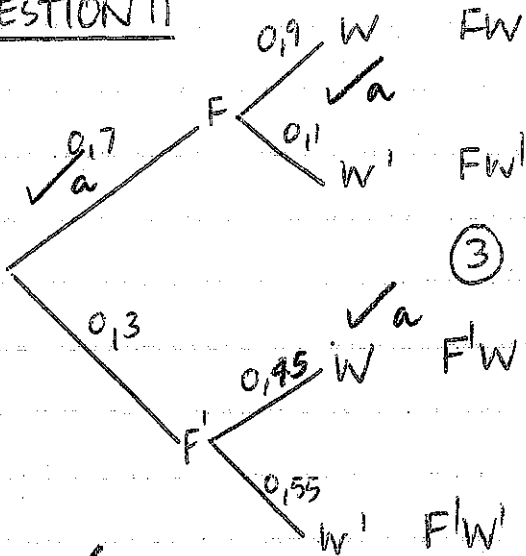
∴ 44 prefer coke only

c. $\frac{16 + 2 + 7}{180}$

$= \frac{25}{180}$

$= \frac{5}{36} = 0,139$

QUESTION 11



$\frac{30}{100} \times \frac{45}{100} + \frac{70}{100} \times \frac{90}{100}$
 $= \frac{153}{200} = 0,765$

b i) $P(FA) = \frac{6101}{10730} = 0,57$

ii) $\frac{731}{10730} = 0,07$

iii) $\frac{4222}{8120} = 0,52$

SECTION D QUESTION 12

a. $y = a(x + 2)(x - 5)$
 $-5 = a(2)(-5)$
 $\frac{1}{2} = a$

$\therefore y = \frac{1}{2}(x^2 - 3x - 10)$
 $= \frac{1}{2}x^2 - \frac{3}{2}x - 5$

b. New x intercepts
 $(1, 0)$ $(8, 0)$
 $y = \frac{1}{2}(x - 1)(x - 8)$
 $= \frac{1}{2}(x^2 - 9x + 8)$
 $= \frac{1}{2}x^2 - \frac{9}{2}x + 4$

QUESTION 13

$h(x) = -5t^2 + 13t + 6$

$p = \frac{-13}{-2(5)} = \frac{13}{10}$

$q = -5\left(\frac{13}{10}\right)^2 + 13\left(\frac{13}{10}\right) + 6$
 $= 14,45$

He needs to shoot 15m, therefore he will miss

QUESTION 14

a. $9304,60 = 7000 \left(1 + \frac{l}{4}\right)^{12}$

$1,329... = \left(1 + \frac{l}{4}\right)^{12}$

$1,02400... = 1 + \frac{l}{4}$

$0,02400... = \frac{l}{4}$ (3)

$0,096 = l$

$\therefore 9,6\%$ p.a. ✓

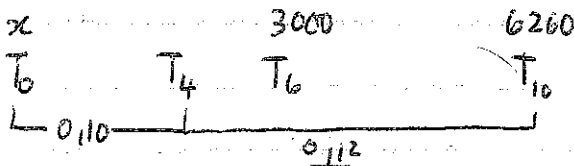
b. $1 + i_e = \left(1 + \frac{0,096}{4}\right)^4$ (4) (3)

$i_e = 9,95\%$ p.a. ✓

exactly

QUESTION 15

$A = 6260$



$x \left(1 + \frac{0,1}{4}\right)^4 \left(1 + \frac{0,12}{4}\right)^{24} + 3000 \left(1 + \frac{0,12}{4}\right)^{18} = 6260$

$x \left(1 + 0,1\right)^4 \left(1 + \frac{0,12}{4}\right)^{24} = 1445,88..$

$x = 485,81$ ✓ (6)

QUESTION 16

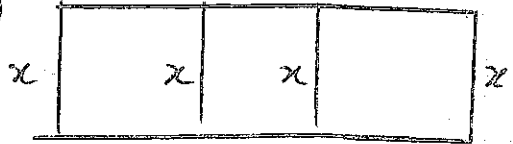
a. $f(x) = 3x$

$f\left(\frac{1}{x}\right) = \frac{3}{x}$ ✓

$\frac{6}{f(x)} = \frac{6}{3x} = \frac{2}{x}$ ✓ (4)

$f\left(\frac{1}{x}\right) + \frac{6}{f(x)} = \frac{3}{x} + \frac{2}{x} = \frac{5}{x}$ ✓

b. i)



$lx = 150$
 $l = \frac{150}{x}$

$\left(\frac{150}{x}\right) \times 2 + 4x = 80$

$\frac{300}{x} + 4x = 80$

$4x^2 - 80x + 300 = 0$ ✓

accelerating manipulation ✓

$\therefore 2x^2 - 40x + 150 = 0$ (3)
 $x^2 - 20x + 75 = 0$ ✓

ii) $x = 15$ or $x = 5$ (4)

iii) 5×30 or 15×10 (2)