This is a Class 1 exam

Lebanon Evangelical School
for Boys and Girls
Loueizeh - Baabda

Stage Exam 04

27MAR2023

Do NOT write in this box. Your MARK will be placed here.

Subject :	A Level : Maths M0
Class :	11A and 12A
Teacher :	Farhan B.
Duration :	1 hour
Calculators NOT ALLOWED	

Your name :		*Time taken to complete exam*
Your Class :		
Exam Room :		
How many sheets, including cover sheet :		

- Do not open this paper until the teacher in charge instructs you to do so.
- The most important thing to remember in taking an exam is NEVER PANIC.
- If you are caught cheating in this exam, you will be awarded zero for ALL exams that are taken on this day.

Answer all ELEVEN questions.
Write your answers in the spaces provided.
You must write down all the stages in your working

№ 1

(a) Write 8×10^4 as an ordinary number.

.....(1)

(b) Work out $(3.5 \times 10^5) \div (7 \times 10^8)$ Give your answer in standard form.

.....(2)

(Total for Question 1 is 3 marks)

№ 2

(a) Simplify $y^5 \times y^9$

.....(1)

(b) Simplify $(2m^3)^4$

.....(2)

(c) Solve $5(x + 3) = 3x - 4$
Show clear algebraic working.

$x =$.....(3)

(Total for Question 2 is 6 marks)

№ 3

(a) Make a the subject of the formula $M = ac - bd$

..... (2)

(b) Solve the inequality $5x - 4 < 39$

..... (2)

(c) Factorize fully $18e^2f^3 - 12e^3f$

..... (2)

(Total for Question 3 is 6 marks)

№ 4

(a) Factorise $x^2 + 2x - 24$

..... (2)

(b) Hence, solve $x^2 + 2x - 24 = 0$

..... (1)

(Total for Question 4 is 3 marks)

№ 5

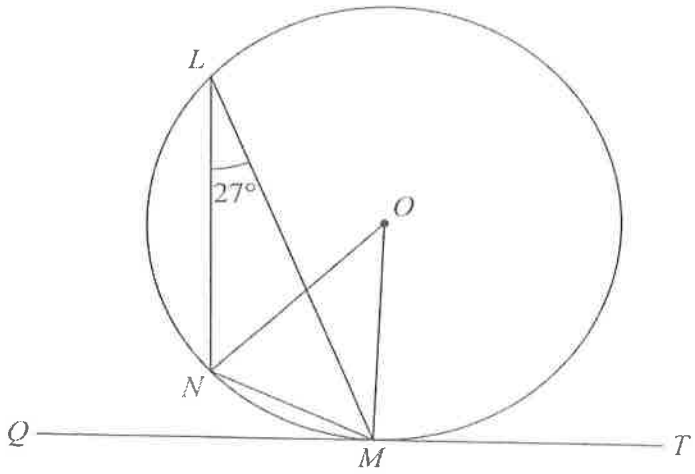


Diagram **NOT** accurately drawn

L, M and N are points on a circle, center O.
QMT is the tangent to the circle at M.

(a) (i) Find the size of angle NOM.

..... °

(ii) Give a reason for your answer.

.....

.....

(2)

(b) (i) Find the size of angle NMQ.

..... °

(ii) Give a reason for your answer.

.....

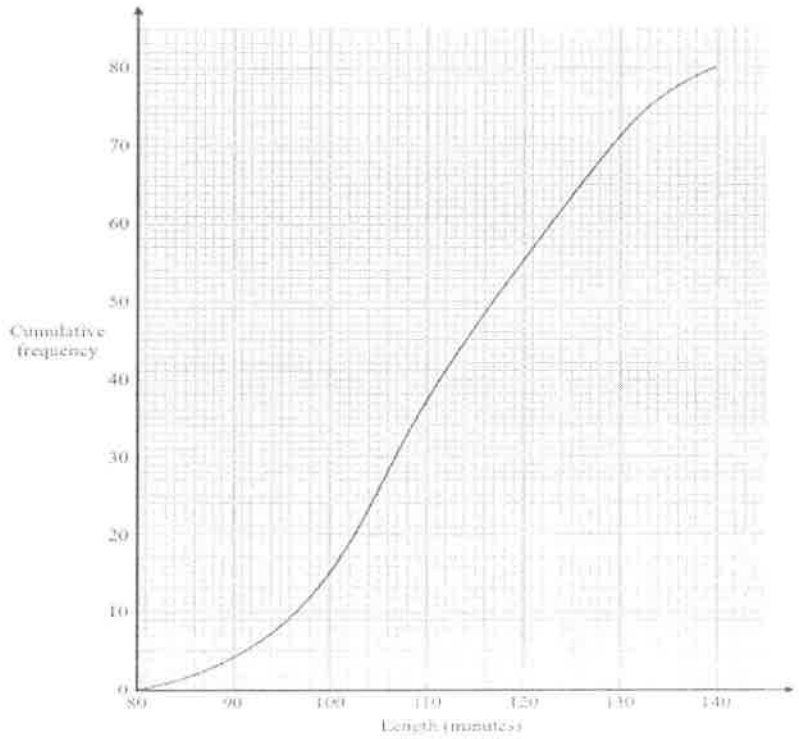
.....

(2)

(Total for Question 6 is 4 marks)

№ 6

The cumulative frequency graph shows information about the length, in minutes, of each of 80 films.



(a) Use the graph to find an estimate for the interquartile range.

.. .. minutes. (2)

Clare says, "More than 35% of these films are over 120 minutes long."

(b) Is Clare correct?
Give a reason for your answer.

.....

.....

.....

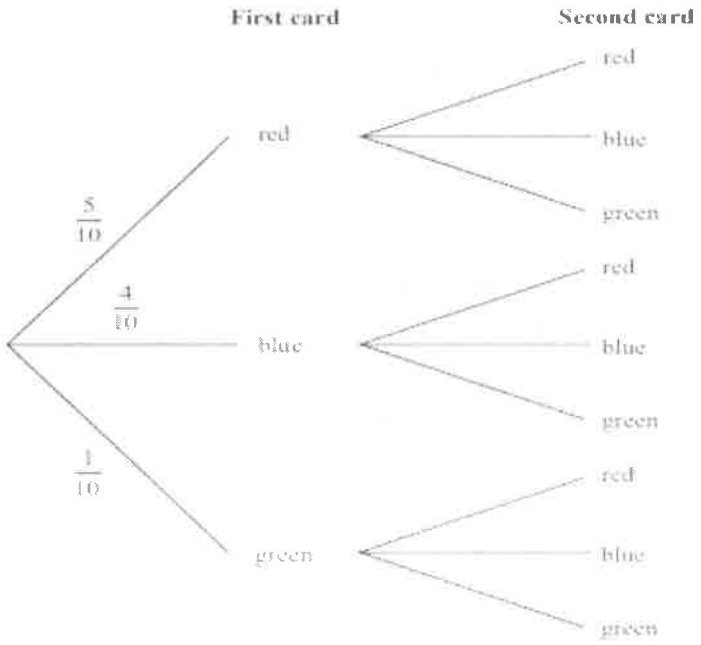
(3)

(Total for Question 6 is 5 marks)

№ 7

Felix has 10 cards.
There are 5 red cards, 4 blue cards and 1 green card.
Felix takes at random one of the cards.
He does not replace the card.
Felix then takes at random a second card.

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that Felix takes at least one blue card and no green card

.....

.....

.....

.....

(3)

(Total for Question 7 is 5 marks)

№ 8

The function f is such that

$$f(x) = \frac{3x - 5}{4}$$

(a) Find f (–7).

.....(1)

(b) Express the inverse function f^{-1} in the form $f^{-1}(x) =$

$f^{-1}(x) =$.....(2)

The function g is such that

$$g(x) = \sqrt{19 - x}$$

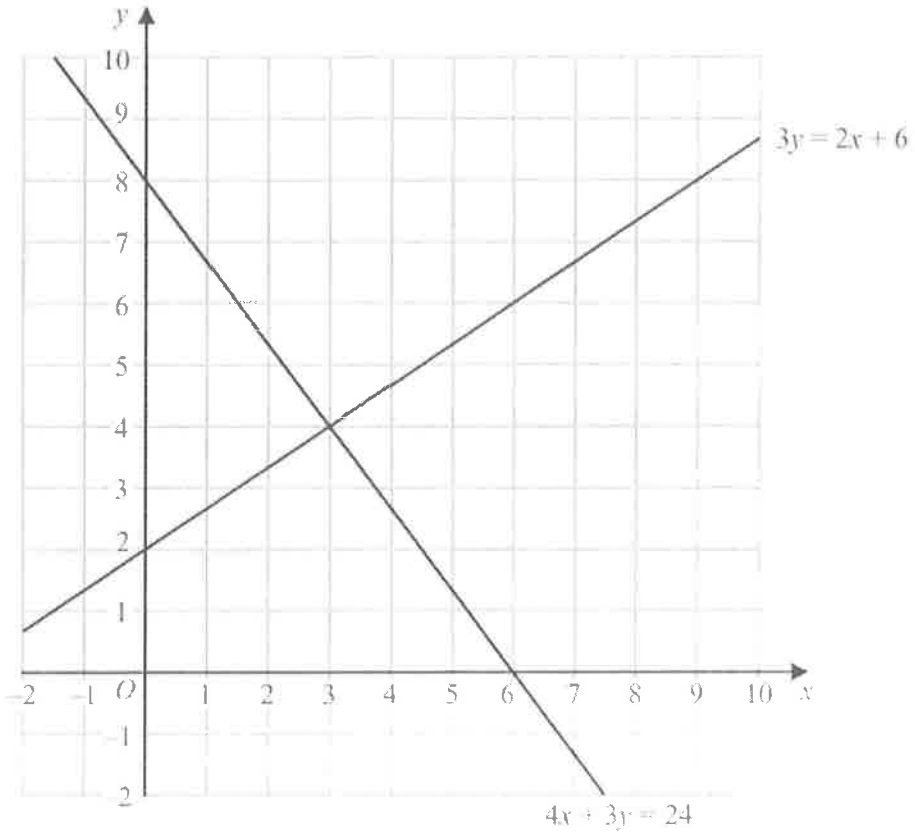
(c) Find $f(g(3))$

..... (2)

(Total for Question 8 is 5 marks)

№ 9

The diagram shows two straight lines drawn on a grid.



(a) Write down the solution of the simultaneous equations

$$\begin{cases} 3y = 2x + 6 \\ 4x + 3y = 24 \end{cases}$$

x = ...

y = ...

(1)

(b) Show, by shading on the grid, the region defined by all five of the inequalities

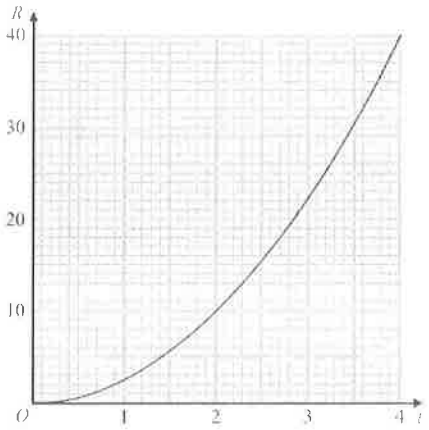
$x \geq 0, \quad y \geq 0, \quad x + y \geq 4, \quad 3y \leq 2x + 6, \quad 4x + 3y \leq 24$

Label the region R

(Total for Question 9 is 4 marks)

№ 10

R is proportional to t^2 The graph shows the relationship between R and t for $0 \leqslant t \leqslant 4$



(a) Find a formula for R in terms of t.

..... (3)

Given also that $R = \frac{8}{5x}$

(b) show that t is inversely proportional to the square root of x for t > 0

..... (2)

(Total for Question 10 is 5 marks)

№ 11

$$A = 3^5 \times 5 \times 7^3, \qquad B = 2^3 \times 3 \times 7^4$$

(a) (i) Find the Highest Common Factor (HCF) of A and B.

.....

(ii) Find the Lowest Common Multiple (LCM) of A and B.

.....(2)

$$A = 3^5 \times 5 \times 7^3, \qquad B = 2^3 \times 3 \times 7^4, C = 2^p \times 5^q \times 7^r$$

Given that the HCF of B and C is $2^3 \times 7$ the LCM of A and C is $2^4 \times 3^5 \times 5^2 \times 7^3$

p =.....
q = ...
r = ...
(2)
(Total for Question 11 is 4 marks)

(Total for this paper is 50 marks)

.....

Answer all ELEVEN questions.
Write your answers in the spaces provided.
You must write down all the stages in your working

№ 1

(a) Write 8×10^4 as an ordinary number.

80000 (1)

(b) Work out $(3.5 \times 10^5) \div (7 \times 10^8)$ Give your answer in standard form.

$3.5 \div 7 = 0.5$
$10^5 \div 10^8 = 10^{-3}$
$0.5 \times 10^{-3} = 5 \times 10^{-4}$

5×10^{-4} (2)

(Total for Question 1 is 3 marks)

№ 2

(a) Simplify $y^5 \times y^9$

y^{14} (1)

(b) Simplify $(2m^3)^4$

$16m^{12}$ (2)

(c) Solve $5(x + 3) = 3x - 4$
Show clear algebraic working.

$5x + 15 = 3x - 4$
$5x - 3x = -4 - 15$
$2x = -19$

$x = -19/2$ (3)

(Total for Question 2 is 6 marks)

№ 3

(a) Make a the subject of the formula $M = ac - bd$

$M + bd = ac$

$a = \frac{M+bd}{c}$

..... (2)

(b) Solve the inequality $5x - 4 < 39$

$5x < 39 + 4$

$5x < 43$

$x < \frac{43}{5}$

..... (2)

(c) Factorize fully $18e^2f^3 - 12e^3f$

$6e^2f(3f^2 - 2e)$ ..... (2)

(Total for Question 3 is 6 marks)

№ 4

(a) Factorise $x^2 + 2x - 24$

$(x+6)(x-4)$ ..... (2)

(b) Hence, solve $x^2 + 2x - 24 = 0$

$x + 6 = 0$ or $x - 4 = 0$

$x = -6$ or $x = 4$

$x = -6$ or $x = 4$ ..... (1)

(Total for Question 4 is 3 marks)

№ 5

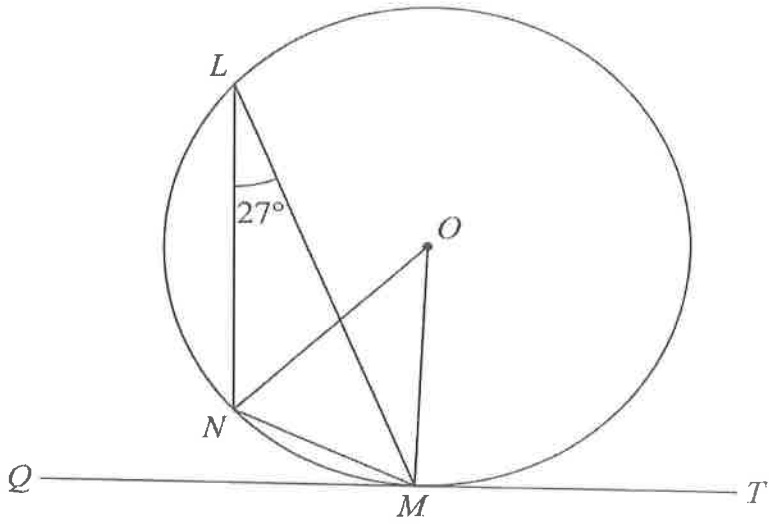


Diagram **NOT** accurately drawn

L, M and N are points on a circle, center O.
QMT is the tangent to the circle at M.

(a) (i) Find the size of angle NOM.

$2 \times 27° = 54°$

54 °

(ii) Give a reason for your answer.

Central angle = 2 x inscribed angle subtending same arc

(2)

(b) (i) Find the size of angle NMQ.

27 °

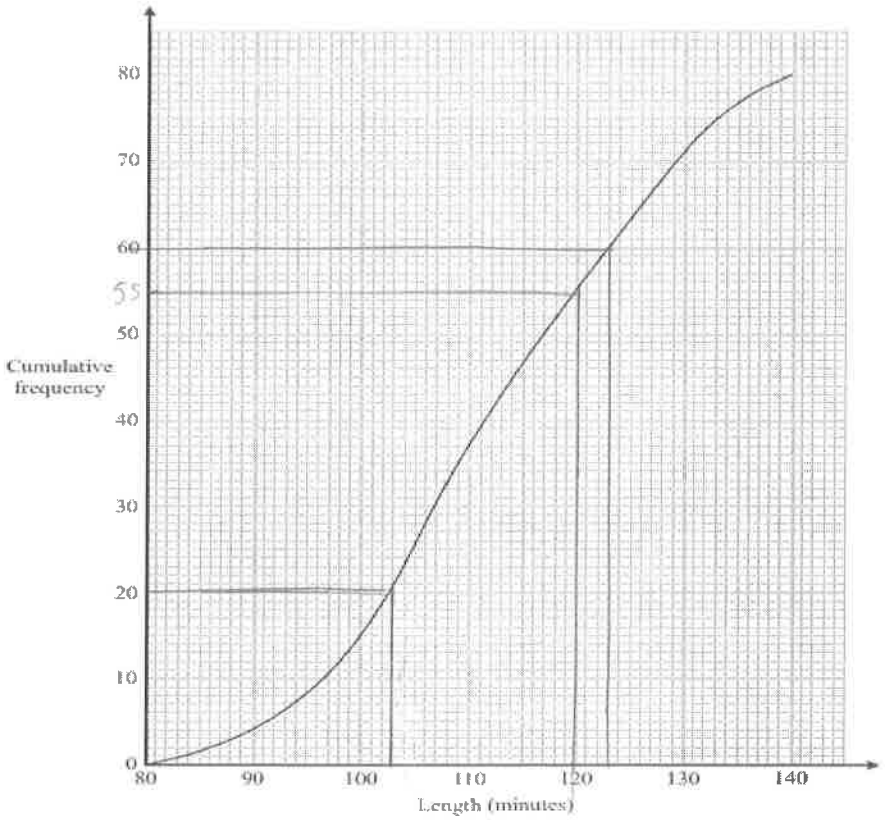
(ii) Give a reason for your answer.

Angle of chord and tangent subtending same arc as an inscribed angle

(2)
(Total for Question 6 is 4 marks)

№ 6

The cumulative frequency graph shows information about the length, in minutes, of each of 80 films.



(a) Use the graph to find an estimate for the interquartile range.

UQ = $(\frac{3}{4} \times 80)$ = 60th term = 123

LQ = $(\frac{1}{4} \times 80)$ = 20th term = 103

IQR = 123 − 103 = 20 minutes. (2)

Clare says, "More than 35% of these films are over 120 minutes long."

(b) Is Clare correct?
Give a reason for your answer.

55 films are up until 120 minutes long

80 − 55 = 25 films are over 120 minutes

$\frac{25}{80} \times 100 = 31.25\%$, No she is wrong

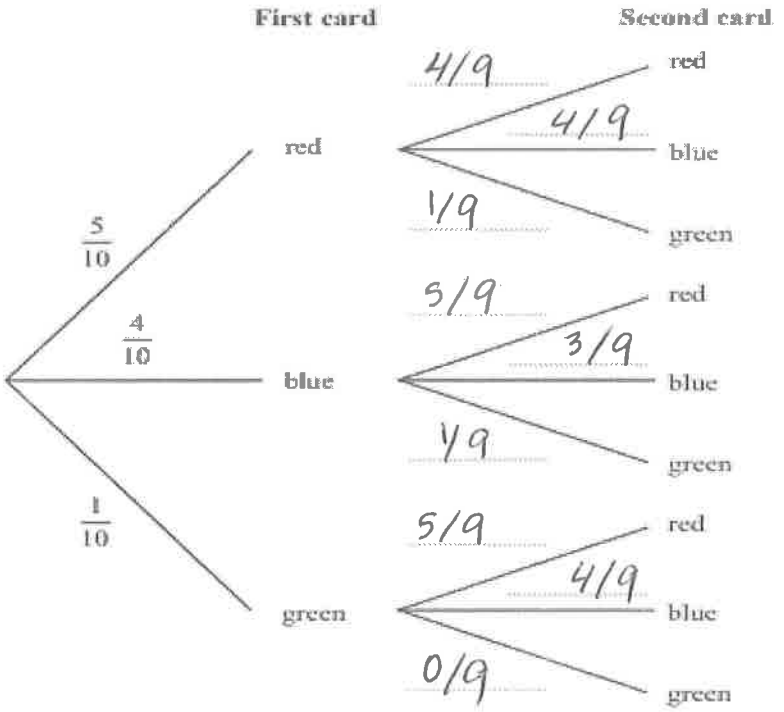
(3)

(Total for Question 6 is 5 marks)

№ 7

Felix has 10 cards.
There are 5 red cards, 4 blue cards and 1 green card.
Felix takes at random one of the cards.
He does not replace the card.
Felix then takes at random a second card.

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that Felix takes at least one blue card and no green card

= P(blue, blue) + P(blue, red) + P(red, blue)

$= \frac{4}{10} \times \frac{3}{9} + \frac{4}{10} \times \frac{5}{9} + \frac{5}{10} \times \frac{4}{9} = \frac{12+20+20}{90}$

$= \frac{52}{90} = \frac{26}{45}$

(3)
(Total for Question 7 is 5 marks)

№ 8

The function f is such that

$$f(x) = \frac{3x - 5}{4}$$

(a) Find f (–7).

$= \frac{3(-7)-5}{4} = \frac{-21-5}{4} = -\frac{26}{4} = -\frac{13}{2}$

$-13/2$ .....(1)

(b) Express the inverse function f^{-1} in the form $f^{-1}(x) =$

$y = \frac{3x-5}{4}$

$4y = 3x - 5$

$4y + 5 = 3x$

$x = \frac{4y+5}{3}$

$f^{-1}(x) = \frac{4x+5}{3}$ .....(2)

The function g is such that

$$g(x) = \sqrt{19 - x}$$

(c) Find $f(g(3))$

$g(3) = \sqrt{19-3} = \sqrt{16} = 4$

$f(g(3)) = f(4) = \frac{3(4)-5}{4}$

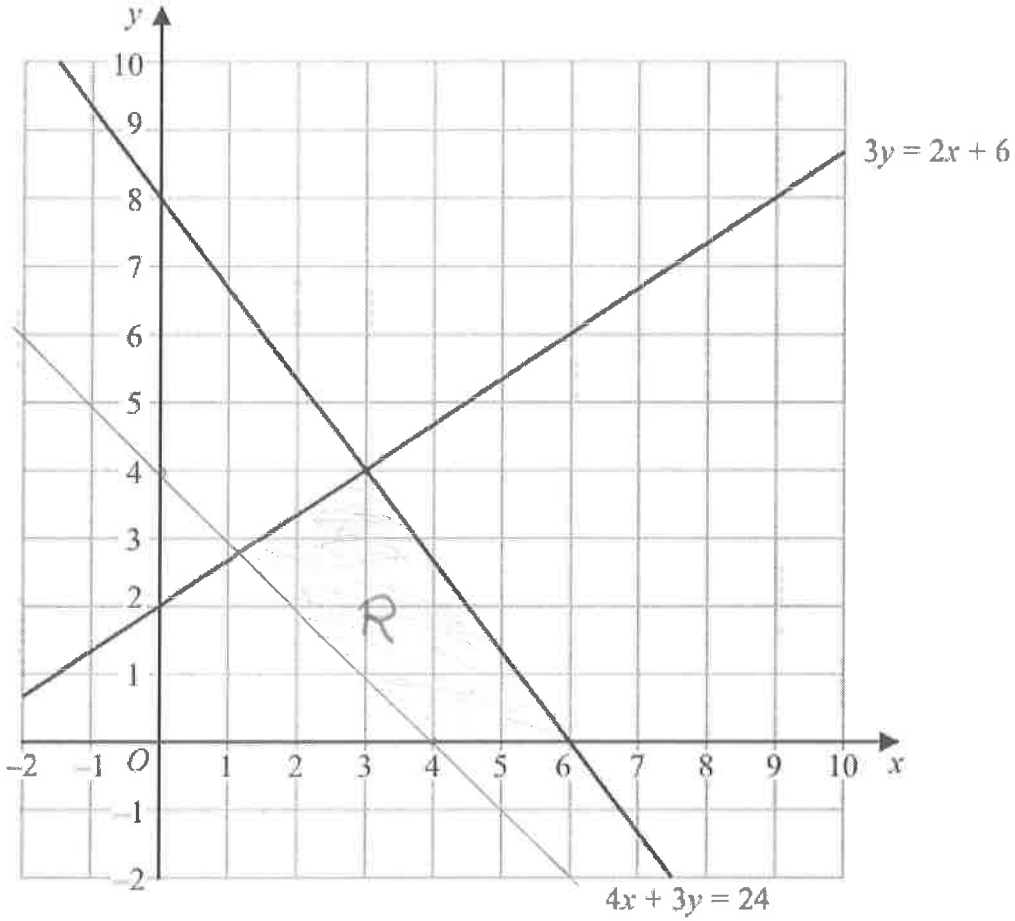
$= \frac{12-5}{4} = \frac{7}{4}$

$\frac{7}{4}$ ..... (2)

(Total for Question 8 is 5 marks)

№ 9

The diagram shows two straight lines drawn on a grid.



(a) Write down the solution of the simultaneous equations

$$\begin{cases} 3y = 2x + 6 \\ 4x + 3y = 24 \end{cases}$$

x = 3

y = 4

(1)

(b) Show, by shading on the grid, the region defined by all five of the inequalities

$x \geq 0, \quad y \geq 0, \quad x + y \geq 4, \quad 3y \leq 2x + 6, \quad 4x + 3y \leq 24$

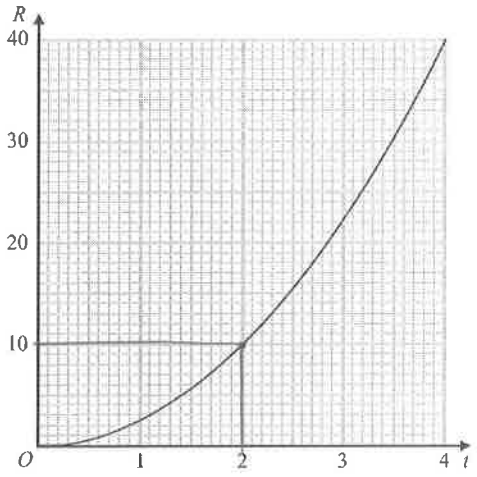
Label the region R

(0, 4) (4, 0) (0, 2) (−3, 0) (6, 0) (0, 8)

(Total for Question 9 is 4 marks)

№ 10

R is proportional to t^2 The graph shows the relationship between R and t for $0 \leqslant t \leqslant 4$



(a) Find a formula for R in terms of t.

$R \propto t^2$; $R = kt^2$; when $t = 2$, $R = 10$

$10 = k(2)^2$; $k = \frac{10}{4} = \frac{5}{2}$

$R = \frac{5}{2}t^2$

..... (3)

Given also that $R = \frac{8}{5x}$

(b) show that t is inversely proportional to the square root of x for t > 0

$\frac{5}{2}t^2 = \frac{8}{5x}$

$5t^2 = \frac{16}{5x}$

$t^2 = \frac{16}{25x}$

$t = \sqrt{\frac{16}{25x}} = \frac{4}{5\sqrt{x}}$

$= \frac{4}{5} \cdot \frac{1}{\sqrt{x}}$

$t \propto \frac{1}{\sqrt{x}}$

..... (2)

(Total for Question 10 is 5 marks)

№ 11

$$A = 3^5 \times 5 \times 7^3, \qquad B = 2^3 \times 3 \times 7^4$$

(a) (i) Find the Highest Common Factor (HCF) of A and B.

$HCF(A,B) = 3 \times 7^3$

(ii) Find the Lowest Common Multiple (LCM) of A and B.

$LCM(A,B) = 2^3 \times 3^5 \times 5 \times 7^4$ (2)

$$A = 3^5 \times 5 \times 7^3, \qquad B = 2^3 \times 3 \times 7^4, C = 2^p \times 5^q \times 7^r$$

Given that the HCF of B and C is $2^3 \times 7$ the LCM of A and C is $2^4 \times 3^5 \times 5^2 \times 7^3$

$p > 3$
$r = 1$

$p = 4$
$q = 2$

p = 4
q = 2
r = 1

(2)

(Total for Question 11 is 4 marks)

(Total for this paper is 50 marks)