This is a Class 1 exam

Lebanon Evangelical School for Boys and Girls

Loueizeh - Baabda

SE01 Exam

10NOV2025

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

Subject :	A Level : Maths M1Pure
Class :	11A and 12A
Teacher :	Mrs.Claudine Eid
Duration :	1 hour 20 minutes

Calculators are allowed

You are to answer the questions to this exam on : This exam paper

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 questions. Write your answers in the space provided

1) Solve the following system

$$x(x-5) \geq 6$$
$$-x+2 > x-8$$

(4)

(Total for Question 1 is 4 marks)

2. (a) Solve the quadratic equation

$$12x^2 + 5x - 2 = 0$$ **(2)**

(b) Hence find all real solutions of

$$12(3y - 1)^2 + 5(3y - 1) - 2 = 0$$ **(2)**

(c) Find all real solutions of

$$12(t + 1)^4 + 5(t + 1)^2 - 2 = 0$$ **(3)**

(Total for Question 2 is 7 marks)

Continue 2

3.

In this question you must show all stages of your working.
Solutions relying on calculator technology are not acceptable.

Figure 3 shows

- the line l with equation $y - 5x = 75$
- the curve C with equation $y = 2x^2 + x - 21$

The line l intersects the curve C at the points P and Q, as shown in Figure 3.

(a) Find, using algebra, the coordinates of P and the coordinates of Q.

(4)

The region R, shown shaded in Figure 3, is bounded by C, l and the x-axis.

(b) Use inequalities to define the region R.

(3)

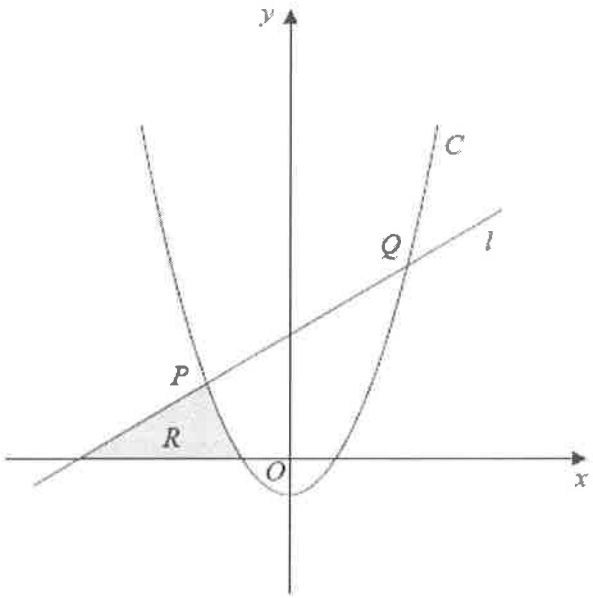


Figure 3

(Total for Question 3 is 7 marks)

Continue 3

4. In this question you must show all stages of your working.

Solutions relying on calculator technology are not acceptable.

(*a*) By substituting $p = 2^x$, show that the equation

$$2 \times 4^x - 2^{x+3} = 17 \times 2^{x-1} - 4$$

can be written in the form

$$4p^2 - 33p + 8 = 0$$

(3)

(*b*) Hence solve

$$2 \times 4^x - 2^{x+3} = 17 \times 2^{x-1} - 4$$

(3)

(Total for Question 4 is 6 marks)

Continue 4

5. The curve C_1 has equation $y = f(x)$.

Given that

- $f(x)$ is a quadratic expression
- C_1 has a maximum turning point at (2, 20)
- C_1 passes through the origin

(a) sketch a graph of C_1 showing the coordinates of any points where C_1 cuts the coordinate axes,

(2)

(b) find an expression for $f(x)$.

(3)

The curve C_2 has equation $y = x(x^2 - 4)$

Curve C_1 and C_2 meet at the origin, and at the points P and Q

Given that the x coordinate of the point P is negative,

(c) using algebra and showing all stages of your working, find the coordinates of P

(5)

(Total for Question 5 is 10 marks)

Continue 5

6. In this question you must show all stages of your working.
Solutions relying on calculator technology are not acceptable.

$$(k-1)x^6 + 4x^3 + (k-4) = 0 \qquad \text{where } k \text{ is a constant}$$

(a) Find the exact solutions to the given equation for $k = 4.5$

(3)

(b) Find the set of possible values of k for which the given equation has no real roots.

(4)

(Total for Question 6 is 7 marks)

Continue 6

7.(a) Express $6x - \frac{27}{4} - x^2$ in the form $a + b(x + c)^2$ where a, b and c are constants to be found.

(3)

The curve C_1 with equation

$$y = 6x - \frac{27}{4} - x^2$$

Given that the point P is the maximum point on C_1

(b) state the coordinates of P

(2)

(Total for Question 7 is 5 marks)

Continue 7

8. The curve C_1 has equation

$$y = x^2 + kx - 9$$

and the curve C_2 has equation

$$y = -3x^2 - 5x + k$$

where k is a constant.

Given that C_1 and C_2 meet at a single point P

(*a*) show that

$$k^2 + 26k + 169 = 0$$

(3)

(*b*) Hence find the coordinates of P

(3)

(Total for Question 8 is 6 marks)

Continue 8

9.Given that $x \neq 3$, *Find the set of values for which* $\frac{5}{x-3} < 2$

(6)

(Total for Question 9 is 6 marks)

Continue 9

TOTAL FOR PAPER IS 58 MARKS

Answer ALL questions. Write your answers in the space provided

1) Solve the following system $x(x-5) \geq 6$
$-x+2 > x-8$

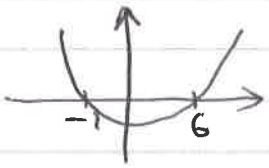
(4)

(Total for Question 1 is 4 marks)

$x^2 - 5x - 6 \geqslant 0$

$(x-6)(x+1) \geqslant 0$

$x = 6$ or $x = -1$



$x \leqslant -1$ or $x \geqslant 6$

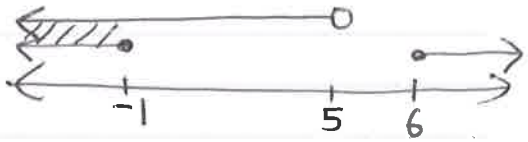
[1] [1]

$-x + 2 > x - 8$

$-2x > -10$

$x < 5$

[1]



$x \leqslant -1$

[1]

2. (a) Solve the quadratic equation

$12x^2 + 5x - 2 = 0$ **(2)**

(b) Hence find all real solutions of

$12(3y - 1)^2 + 5(3y - 1) - 2 = 0$ **(2)**

(c) Find all real solutions of

$12(t + 1)^4 + 5(t + 1)^2 - 2 = 0$ **(3)**

(Total for Question 2 is 7 marks)

a] $12x^2 + 5x - 2 = 0$

$12x^2 + 8x - 3x - 2 = 0$

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

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

$S = 5$

$P = -24$

$8, -3$

$x = \frac{-2}{3}$ or $x = \frac{1}{4}$ [1] [1]

b] let $3y - 1 = x \Rightarrow 12x^2 + 5x - 2 = 0$

$\Rightarrow x = \frac{-2}{3}$ or $x = \frac{1}{4}$

$3y - 1 = \frac{-2}{3}$ $\quad$ $3y - 1 = \frac{1}{4}$

$3y = \frac{-2}{3} + 1$ $\quad$ $3y = \frac{1}{4} + 1$

$3y = \frac{1}{3}$ [1] $\quad$ $3y = \frac{5}{4}$ [1]

$y = \frac{1}{9}$ $\quad$ $y = \frac{5}{12}$

Continue 2

c) let $(t+1)^2 = x$

$12x^2 + 5x - 2 = 0$

$x = \frac{-2}{3}$ or $x = \frac{1}{4}$

$(t+1)^2 = \frac{-2}{3}$ [1]

no values for t

$(t+1)^2 = \frac{1}{4}$

$t+1 = \frac{1}{2}$ or $t+1 = \frac{-1}{2}$ [1]

$t = \frac{-1}{2}$ or $t = \frac{-3}{2}$ [1]

3.

In this question you must show all stages of your working.
Solutions relying on calculator technology are not acceptable.

Figure 3 shows

- the line l with equation $y - 5x = 75$
- the curve C with equation $y = 2x^2 + x - 21$

The line l intersects the curve C at the points P and Q, as shown in Figure 3.

(a) Find, using algebra, the coordinates of P and the coordinates of Q.

(4)

The region R, shown shaded in Figure 3, is bounded by C, l and the x-axis.

(b) Use inequalities to define the region R.

(3)

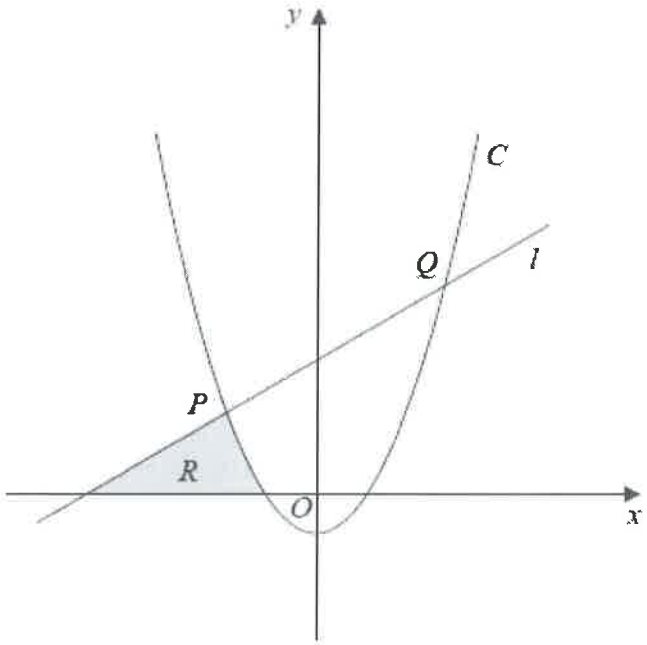


Figure 3

(Total for Question 3 is 7 marks)

a) $y = 75 + 5x \Rightarrow 2x^2 + x - 21 = 5x + 75$

$2x^2 - 4x - 96 = 0 \Rightarrow x^2 - 2x - 48 = 0$ [1] [1]

$(x-8)(x+6) = 0 \Rightarrow x = 8$ or $x = -6$

$x = 8 \Rightarrow y = 75 + 5(8) = 115$ [1]

$x = -6 \Rightarrow y = 75 + 5(-6) = 45$ [1]

$Q(8, 115)$

$P(-6, 45)$

Continue 3

b] $y - 5x \leq 75$ [1]

$y \leq 2x^2 + x - 21$ [1]

$y \geqslant 0$ [1]

4. In this question you must show all stages of your working.

Solutions relying on calculator technology are not acceptable.

(*a*) By substituting $p = 2^x$, show that the equation

$$2 \times 4^x - 2^{x+3} = 17 \times 2^{x-1} - 4$$

can be written in the form

$$4p^2 - 33p + 8 = 0$$

(3)

(*b*) Hence solve

$$2 \times 4^x - 2^{x+3} = 17 \times 2^{x-1} - 4$$

(3)

(Total for Question 4 is 6 marks)

a) $2(2^x)^2 - 2^x(8) = 17(2^x)(2^{-1}) - 4$ [1] [1] [1]

$2p^2 - 8p = \frac{17p}{2} - 4$

$4p^2 - 16p - 17p + 8 = 0$

$4p^2 - 33p + 8 = 0$

b) $4p^2 - 33p + 8 = 0$ $\quad S = -33$, $P = 32$, $-1, -32$

$4p^2 - p - 32p + 8 = 0$

$p(4p-1) - 8(4p-1) = 0$

$(4p-1)(p-8) = 0$

$p = \frac{1}{4}$ or $p = 8$ [1]

Continue 4

$2^x = \frac{1}{4}$ or $2^x = 8$

$x = -2$ or $x = 3$

[1] [1]

5. The curve C_1 has equation $y = f(x)$.

Given that

- $f(x)$ is a quadratic expression
- C_1 has a maximum turning point at (2, 20)
- C_1 passes through the origin

(a) sketch a graph of C_1 showing the coordinates of any points where C_1 cuts the coordinate axes,

(2)

(b) find an expression for $f(x)$.

(3)

The curve C_2 has equation $y = x(x^2 - 4)$

Curve C_1 and C_2 meet at the origin, and at the points P and Q

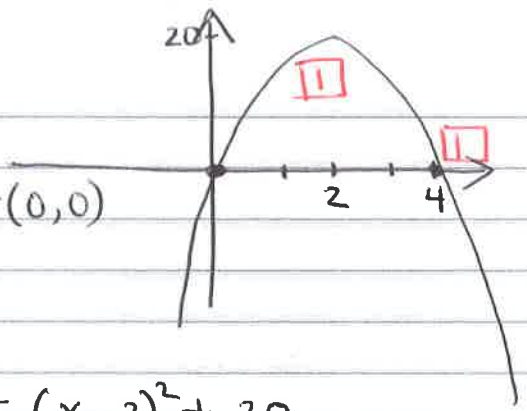
Given that the x coordinate of the point P is negative,

(c) using algebra and showing all stages of your working, find the coordinates of P

(5)

(Total for Question 5 is 10 marks)

a]



b] $y = a(x-2)^2 + 20$ $O(0,0)$

$0 = a(-2)^2 + 20$

$4a = -20$

$a = -5$

$y = -5(x-2)^2 + 20$

Continue 5

c] $y = y$

$x(x^2-4) = -5(x^2-4x+4)+20$

$x^3-4x = -5x^2+20x-20+20$

$x^3+5x^2-24x=0$ [1]

$x(x^2+5x-24)=0$

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

$x=0$ [1] or $x=-8$ [1] or $x=3$ [1]

$y=x(x^2-4)$

$y=-8((-8)^2-4)$

$y=-8(64-4)$

$y=-8(60)$

$y=-480$

$P(-8,-480)$ [1]

6. In this question you must show all stages of your working.
Solutions relying on calculator technology are not acceptable.

$(k-1)x^6 + 4x^3 + (k-4) = 0$ where k is a constant

(a) Find the exact solutions to the given equation for $k = 4.5$

(3)

(b) Find the set of possible values of k for which the given equation has no real roots.

(4)

(Total for Question 6 is 7 marks)

a) $k = 4.5$

$(4.5-1)\,x^6 + 4x^3 + (4.5-4) = 0$

$3.5x^6 + 4x^3 + 0.5 = 0$ [1] let $x^3 = a$

$3.5a^2 + 4a + 0.5 = 0$ OR

$(3.5a + 0.5)(a+1) = 0$ $7a^2 + 8a + 1 = 0$

$(a+1)(7a+1) = 0$

$a = -\frac{1}{7}$ or $a = -1$

$x^3 = -\frac{1}{7}$ or $x^3 = -1$

$x = \sqrt[3]{-\frac{1}{7}}$ or $x = -1$

[1] [1]

Continue 6

b] $\Delta = 4^2 - 4(k-1)(k-4) < 0$ [1]

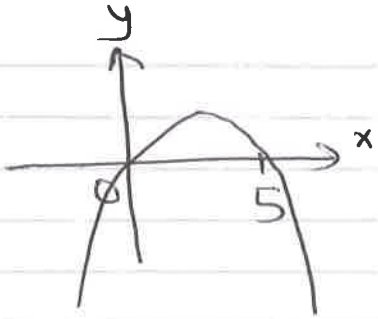
$16 - 4(k^2 - 5k + 4) < 0$

$16 - 4k^2 + 20k - 16 < 0$ [1]

$-4k^2 + 20k < 0$

$-4k(k-5) < 0$

$k = 0$ or $k = 5$



$k < 0$ or $k > 5$

[1] [1]

7.(a) Express $6x - \frac{27}{4} - x^2$ in the form $a + b(x + c)^2$ where a, b and c are constants to be found.

(3)

The curve C_1 with equation

$$y = 6x - \frac{27}{4} - x^2$$

Given that the point P is the maximum point on C_1

(b) state the coordinates of P

(2)

(Total for Question 7 is 5 marks)

a) $-x^2 + 6x - \frac{27}{4}$

$= -1\left(x^2 - 6x + (3)^2 - (3)^2\right) - \frac{27}{4}$

$= -1\left((x-3)^2 - 9\right) - \frac{27}{4}$

$= -1(x-3)^2 + 9 - \frac{27}{4}$

$= -1(x-3)^2 + \frac{9}{4}$

$a = \frac{+9}{4}$ [1]

$b = -1$ [1]

$c = -3$ [1]

b. $P\left(3, \frac{9}{4}\right)$

[2]

Continue 7

8. The curve C_1 has equation

$$y = x^2 + kx - 9$$

and the curve C_2 has equation

$$y = -3x^2 - 5x + k$$

where k is a constant.
Given that C_1 and C_2 meet at a single point P

(*a*) show that

$$k^2 + 26k + 169 = 0$$

(3)

(*b*) Hence find the coordinates of P

(3)

(Total for Question 8 is 6 marks)

a) $y = x^2 + kx + 9$

$y = -3x^2 - 5x + k$

$y = y$

$x^2 + kx - 9 = -3x^2 - 5x + k$ [1]

$4x^2 + kx + 5x - 9 - k = 0$

$4x^2 + x(k+5) - 9 - k = 0$

$\Delta = 0$ [1] single point

$\Delta = (k+5)^2 - 4(4)(-9-k) = 0$

$\Delta = k^2 + 10k + 25 + 144 + 16k = 0$

$= k^2 + 26k + 169 = 0$ [1]

Continue 8

b) $\Delta = 0$

$(k+13)^2 = 0$

$k = -13$ [1]

$x_1 = x_2 = -\frac{(k+5)}{2(4)}$

$x_1 = x_2 = -\frac{(-13+5)}{8} = 1$ [1]

$y = x^2 + kx - 9$

$y = 1^2 - 13(1) - 9 = -21$ [1]

$P(1, -21)$

9. Given that $x \neq 3$, *Find the set of values for which* $\frac{5}{x-3} < 2$

(6)

(Total for Question 9 is 6 marks)

$$\frac{5}{x-3} - 2 < 0$$

$$\frac{5-2(x-3)}{x-3} < 0$$

$$\frac{5-2x+6}{x-3} < 0$$

$$\frac{11-2x}{x-3} < 0 \quad [1]$$

x	$-\infty$		3		5.5		
$(11-2x)$ Num	+		+		0	−	[1]
$(x-3)$ deno	−		+		+		[1]
Fraction	−		+		0	−	[1]

$x < 3$ or $x > 5.5$

[1] [1]

Continue 9

TOTAL FOR PAPER IS 58 MARKS