

1. Factorise completely $x - 4x^3$

(3)

Q1

(Total 3 marks)



2. Express 8^{2x+3} in the form 2^y , stating y in terms of x .

(2)

Q2

(Total 2 marks)





Question 3 continued

(Total 6 marks)

Q3



Question 4 continued

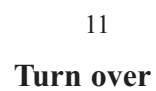
(Total 5 marks)

Q4





(Total 7 marks)



6.

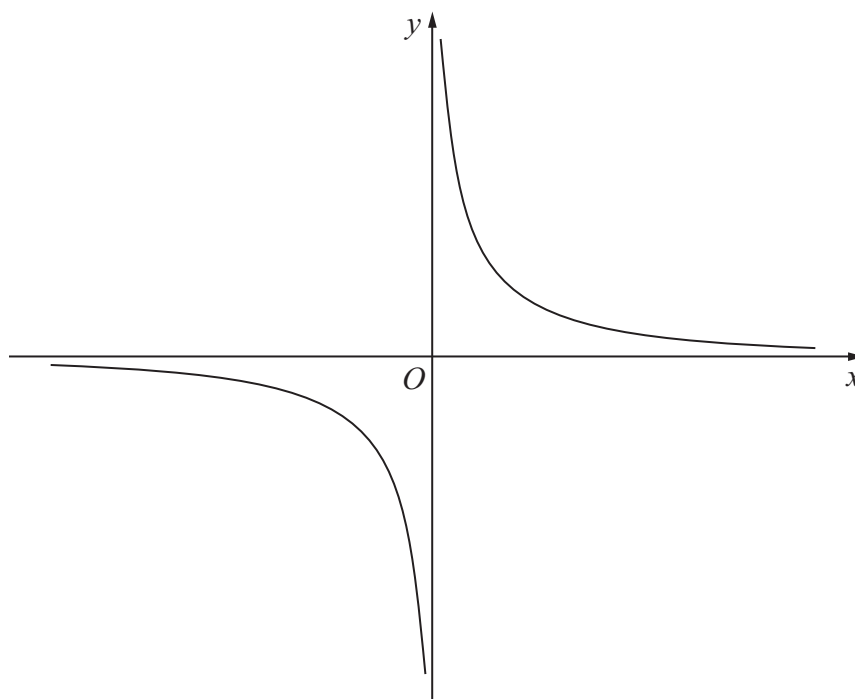


Figure 1

Figure 1 shows a sketch of the curve with equation $y = \frac{2}{x}$, $x \neq 0$

The curve C has equation $y = \frac{2}{x} - 5$, $x \neq 0$, and the line l has equation $y = 4x + 2$

- (a) Sketch and clearly label the graphs of C and l on a single diagram.

On your diagram, show clearly the coordinates of the points where C and l cross the coordinate axes.

(5)

- (b) Write down the equations of the asymptotes of the curve C .

(2)

- (c) Find the coordinates of the points of intersection of $y = \frac{2}{x} - 5$ and $y = 4x + 2$

(5)



Question 6 continued



Q6

7. Lewis played a game of space invaders. He scored points for each spaceship that he captured.

Lewis scored 140 points for capturing his first spaceship.

He scored 160 points for capturing his second spaceship, 180 points for capturing his third spaceship, and so on.

The number of points scored for capturing each successive spaceship formed an arithmetic sequence.

- Find the number of points that Lewis scored for capturing his 20th spaceship. **(2)**
- Find the total number of points Lewis scored for capturing his first 20 spaceships. **(3)**

Sian played an adventure game. She scored points for each dragon that she captured. The number of points that Sian scored for capturing each successive dragon formed an arithmetic sequence.

Sian captured n dragons and the total number of points that she scored for capturing all n dragons was 8500.

Given that Sian scored 300 points for capturing her first dragon and then 700 points for capturing her n th dragon,

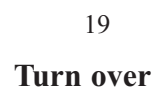
- (c) find the value of n . (3)







(Total 8 marks)



8.

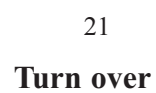
$$\frac{dy}{dx} = -x^3 + \frac{4x-5}{2x^3}, \quad x \neq 0$$

Given that $y = 7$ at $x = 1$, find y in terms of x , giving each term in its simplest form.

(6)



(Total 6 marks)



$(k + 3)x^2 + 6x + k = 5$, where k is a constant,

has two distinct real solutions for x .

(a) Show that k satisfies

$$k^2 - 2k - 24 < 0 \quad (4)$$

(b) Hence find the set of possible values of k . (3)



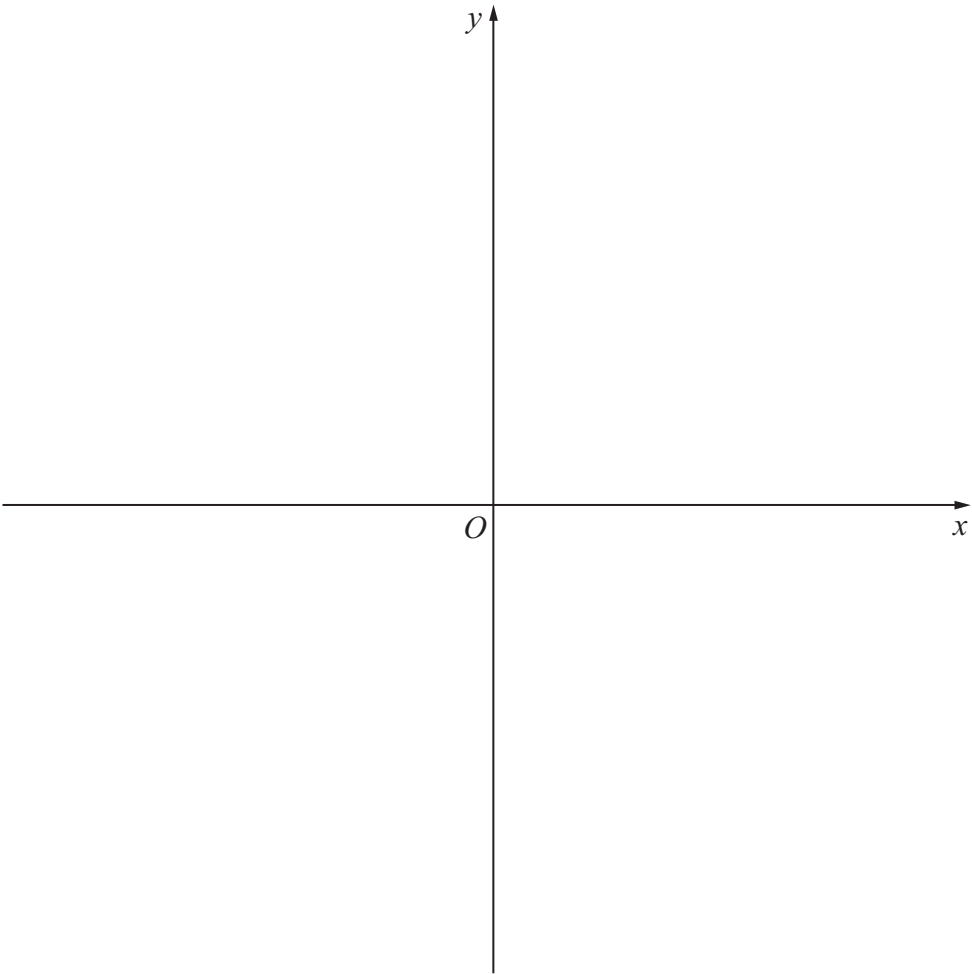




(Total 7 marks)



Question 10 continued



Below the coordinate system, there are 18 horizontal lines for writing the answer.



Q10



(Total 12 marks)

TOTAL FOR PAPER: 75 MARKS

END

