



Pure Year 1 exam questions Edexcel

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Ch. 4: Graphs and Transformations

June 2022 Question 11 Paper 1 (A Level)

11.

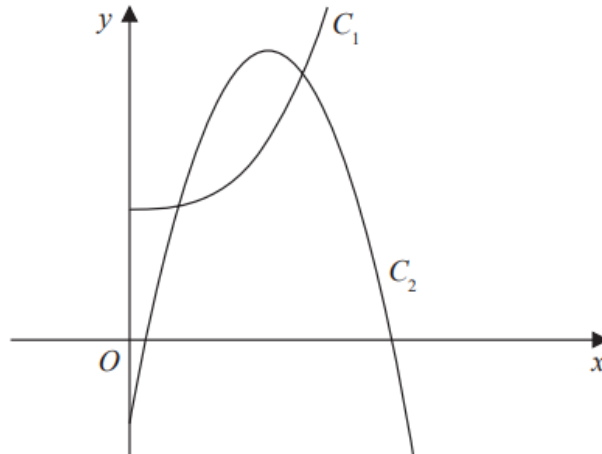


Figure 4

Figure 4 shows a sketch of part of the curve C_1 with equation

$$y = 2x^3 + 10 \quad x > 0$$

and part of the curve C_2 with equation

$$y = 42x - 15x^2 - 7 \quad x > 0$$

(a) Verify that the curves intersect at $x = \frac{1}{2}$

(2)

The curves intersect again at the point P

(b) Using algebra and showing all stages of working, find the exact x coordinate of P

(5)

ANSWER

Question	Scheme	Marks	AOs
11 (a)	Substitutes $x = \frac{1}{2}$ into $y = 2x^3 + 10$ and $y = 42x - 15x^2 - 7$ and finds the y values for both	M1	1.1b
	Achieves $\frac{41}{4}$ o.e. for both and makes a valid conclusion. *	A1*	2.4
		(2)	
(b)	Sets $42x - 15x^2 - 7 = 2x^3 + 10 \Rightarrow 2x^3 + 15x^2 - 42x + 17 = 0$	M1	1.1b
	Deduces that $(2x - 1)$ is a factor and attempts to divide	dM1	2.1
	$2x^3 + 15x^2 - 42x + 17 = (2x - 1)(x^2 + 8x - 17)$	A1	1.1b
	Solves their $x^2 + 8x - 17 = 0$ using suitable method	M1	1.1b
	Deduces $x = -4 + \sqrt{33}$ (see note)	A1	2.2a
	(5)		
			(7 marks)

Video solution:

https://youtu.be/aUIOj6-F_x8

June 2022 Question 7

7. (a) Factorise completely $9x - x^3$ (2)

The curve C has equation

$$y = 9x - x^3$$

- (b) Sketch C showing the coordinates of the points at which the curve cuts the x -axis. (2)

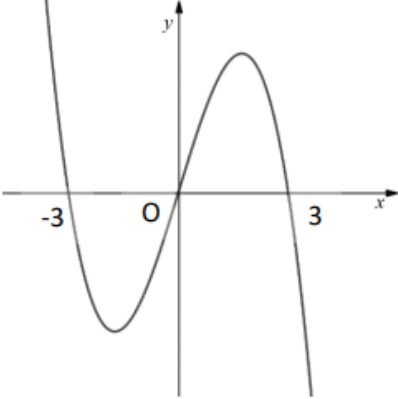
The line l has equation $y = k$ where k is a constant.

Given that C and l intersect at 3 distinct points,

- (c) find the range of values for k , writing your answer in set notation.

Solutions relying on calculator technology are not acceptable. (3)

ANSWER

Question	Scheme	Marks	AOs	
7(a)	$9x - x^3 = x(9 - x^2)$	M1	1.1b	
	$9x - x^3 = x(3 - x)(3 + x)$ oe	A1	1.1b	
		(2)		
(b)		A cubic with correct orientation	B1	1.1b
		Passes through origin, (3, 0) and (-3, 0)	B1	1.1b
			(2)	
(c)	$y = 9x - x^3 \Rightarrow \frac{dy}{dx} = 9 - 3x^2 = 0 \Rightarrow x = (\pm)\sqrt{3} \Rightarrow y = \dots$	M1	3.1a	
	$y = (\pm)6\sqrt{3}$	A1	1.1b	
	$\{k \in \mathbb{R} : -6\sqrt{3} < k < 6\sqrt{3}\}$ oe	A1ft	2.5	
		(3)		
(7 marks)				

Video solution:

<https://youtu.be/SEvw1T8kZbl>

June 2019 Question 7

7. The curve C has equation

$$y = \frac{k^2}{x} + 1 \quad x \in \mathbb{R}, x \neq 0$$

where k is a constant.

(a) Sketch C stating the equation of the horizontal asymptote.

(3)

The line l has equation $y = -2x + 5$

(b) Show that the x coordinate of any point of intersection of l with C is given by a solution of the equation

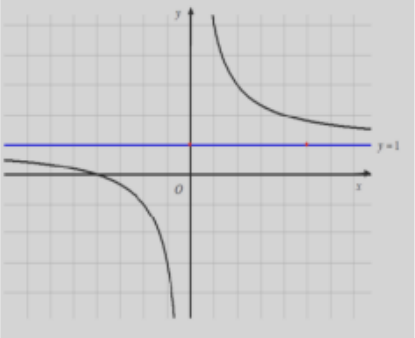
$$2x^2 - 4x + k^2 = 0$$

(2)

(c) Hence find the exact values of k for which l is a tangent to C .

(3)

ANSWER

Question	Scheme	Marks	AOs
7 (a)		M1	1.1b
		A1	1.1b
		B1	1.2
		(3)	
(b)	Combines equations $\Rightarrow \frac{k^2}{x} + 1 = -2x + 5$	M1	1.1b
	$(\times x) \Rightarrow k^2 + 1x = -2x^2 + 5x \Rightarrow 2x^2 - 4x + k^2 = 0^*$	A1*	2.1
		(2)	
(c)	Attempts to set $b^2 - 4ac = 0$	M1	3.1a
	$8k^2 = 16$	A1	1.1b
	$k = \pm\sqrt{2}$	A1	1.1b
		(3)	
(8 marks)			

June 2018 Question 9

9.

$$g(x) = 4x^3 - 12x^2 - 15x + 50$$

(a) Use the factor theorem to show that $(x + 2)$ is a factor of $g(x)$.

(2)

(b) Hence show that $g(x)$ can be written in the form $g(x) = (x + 2)(ax + b)^2$, where a and b are integers to be found.

(4)

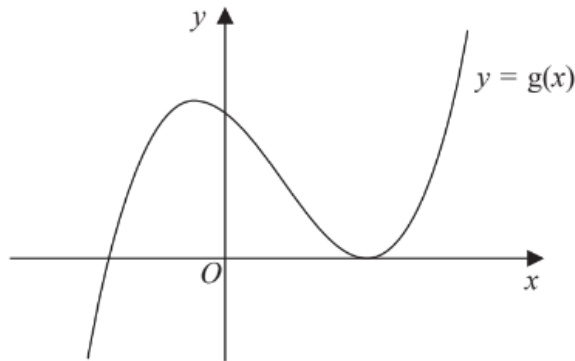


Figure 2

Figure 2 shows a sketch of part of the curve with equation $y = g(x)$

(c) Use your answer to part (b), and the sketch, to deduce the values of x for which

(i) $g(x) \leq 0$

(ii) $g(2x) = 0$

(3)

ANSWER

Question	Scheme	Marks	AOs
9(a)	$(g(-2)) = 4 \times -8 - 12 \times 4 - 15 \times -2 + 50$	M1	1.1b
	$g(-2) = 0 \Rightarrow (x+2)$ is a factor	A1	2.4
		(2)	
(b)	$4x^3 - 12x^2 - 15x + 50 = (x+2)(4x^2 - 20x + 25)$	M1 A1	1.1b 1.1b
	$= (x+2)(2x-5)^2$	M1 A1	1.1b 1.1b
		(4)	
(c)	(i) $x \leq -2, x = 2.5$	M1 A1ft	1.1b 1.1b
	(ii) $x = -1, x = 1.25$	B1ft	2.2a
		(3)	
			(9 marks)