

Constructing Graphs & Solving Equations Graphically

Question Paper 15

Level	IGCSE
Subject	Maths (0580)
Exam Board	Cambridge International Examinations (CIE)
Paper Type	Extended
Topic	Algebra and Graphs
Sub-Topic	Constructing Graphs & Solving Equations Graphically
Booklet	Question Paper 15

Time Allowed: 68 minutes

Score: /56

Percentage: /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	75%	60%	45%	35%	25%	<25%

1 Answer the whole of this question on a sheet of graph paper.

(a)
$$f(x) = \frac{12}{x+1}$$

x	0	1									10	11
$f(x)$	p	6			2.4	2	1.71	q	1.33	r	1.09	

- (i) Calculate the values of p , q and r . [3]
- (ii) Draw the graph of $y = f(x)$ for $0 \leq x \leq 11$.
Use a scale of 1cm to 1 unit on each axis. [5]
- (iii) By drawing a suitable line, find an estimate of the gradient of the graph at the point (3, 3). [3]
- (b) On the same grid draw the graph of $y = 8 - x$ for $0 \leq x \leq 8$. [2]
- (c) (i) Show that the equation $f(x) = 8 - x$ simplifies to $x^2 - 7x + 4 = 0$. [2]
- (ii) Use your graph to solve this equation, giving your answers correct to 1 decimal place. [2]

2 Answer all of this question on a sheet of graph paper.

(a) $f(x) = x^2 - x - 3$.

x	-3	-2	-1	0	1			
$f(x)$	p	3	-1	-3	q	-1	3	r

(i) Find the values of p , q and r . [3]

(ii) Draw the graph of $y = f(x)$ for $-3 \leq x \leq 4$.
Use a scale of 1 cm to represent 1 unit on each axis. [4]

(iii) By drawing a suitable line, estimate the gradient of the graph at the point where $x = -1$. [3]

(b) $g(x) = 6 - \frac{x^3}{3}$.

x	-2	-1	0	1		
$g(x)$	8.67	u	v	5.67	3.33	-3

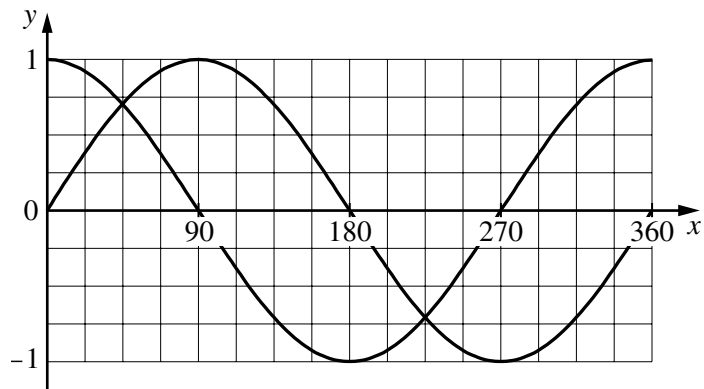
(i) Find the values of u and v . [2]

(ii) On the same grid as **part (a) (ii)** draw the graph of $y = g(x)$ for $-2 \leq x \leq 3$. [4]

(c) (i) Show that the equation $f(x) = g(x)$ simplifies to $x^3 + 3x^2 - 3x - 27 = 0$. [1]

(ii) Use your graph to write down a solution of the equation $x^3 + 3x^2 - 3x - 27 = 0$. [1]

- 3 The diagram shows the graphs of $y = \sin x^\circ$ and $y = \cos x^\circ$.



Find the values of x between 0 and 360 for which

(a) $\sin x^\circ = \cos x^\circ$,

Answer (a) $x = \dots\dots\dots$ or $x = \dots\dots\dots$ [2]

(b) $\sin x^\circ = \sin 22.5^\circ$ ($x \neq 22.5$).

Answer (b) $x = \dots\dots\dots$ [1]

4 Answer the whole of this question on a sheet of graph paper.

t	0	1	2	3	4	5	6	7
$f(t)$	0	25	37.5	43.8	46.9	48.4	49.2	49.6

- (a) Using a scale of 2 cm to represent 1 unit on the horizontal t -axis and 2 cm to represent 10 units on the y -axis, draw axes for $0 \leq t \leq 7$ and $0 \leq y \leq 60$.
Draw the graph of the curve $y = f(t)$ using the table of values above. [5]
- (b) $f(t) = 50(1 - 2^{-t})$.
- (i) Calculate the value of $f(8)$ and the value of $f(9)$. [2]
- (ii) Estimate the value of $f(t)$ when t is large. [1]
- (c) (i) Draw the tangent to $y = f(t)$ at $t = 2$ and use it to calculate an estimate of the gradient of the curve at this point. [3]
- (ii) The function $f(t)$ represents the speed of a particle at time t .
Write down what quantity the gradient gives. [1]
- (d) (i) On the same grid, draw $y = g(t)$ where $g(t) = 6t + 10$, for $0 \leq t \leq 7$. [2]
- (ii) Write down the range of values for t where $f(t) > g(t)$. [2]
- (iii) The function $g(t)$ represents the speed of a second particle at time t .
State whether the first or second particle travels the greater distance for $0 \leq t \leq 7$.
You **must** give a reason for your answer. [2]