

# Constructing Graphs & Solving Equations Graphically

## Question Paper 11

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 11

**Time Allowed:** 66 minutes

**Score:** /55

**Percentage:** /100

**Grade Boundaries:**

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

- 1 (a) Complete the table for the function  $f(x) = \frac{x^3}{10} + 1$ .

$x$	-4	-3	-2	-1	0	1	2	3
$f(x)$		-1.7	0.2	0.9	1	1.1	1.8	

[2]

- (b) On the grid, draw the graph of  $y = f(x)$  for  $-4 \leq x \leq 3$ .



[4]

- (c) Complete the table for the function  $g(x) = \frac{4}{x}$ ,  $x \neq 0$ .

$x$	-4	-3	-2	-1	1	2	3
$g(x)$	-1	-1.3				2	1.3

[2]

(d) On the grid, draw the graph of  $y = g(x)$  for  $-4 \leq x \leq -1$  and  $1 \leq x \leq 3$ . [3]

(e) (i) Use your graphs to solve the equation  $\frac{x^3}{10} + 1 = \frac{4}{x}$ .

Answer(e)(i)  $x =$  ..... or  $x =$  ..... [2]

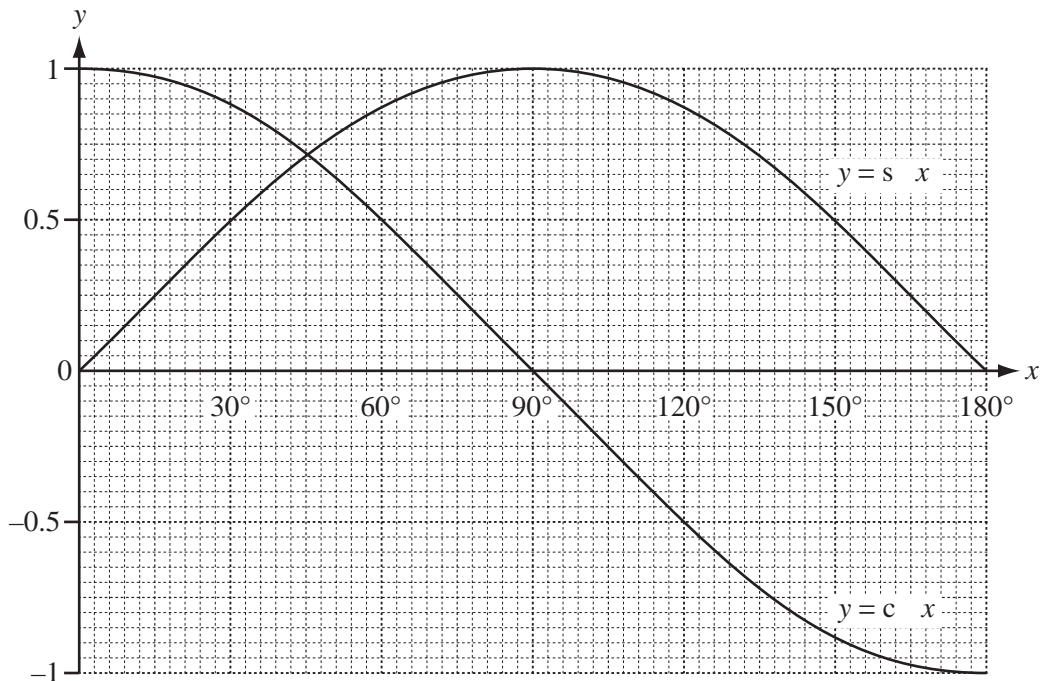
(ii) The equation  $\frac{x^3}{10} + 1 = \frac{4}{x}$  can be written as  $x^4 + ax + b = 0$ .

Find the values of  $a$  and  $b$ .

Answer(e)(ii)  $a =$  .....

$b =$  ..... [2]

2



The diagram shows accurate graphs of  $y = \sin x$  and  $y = \cos x$  for  $0^\circ \leq x \leq 180^\circ$ .

Use the graph to solve the equations

(a)  $\sin x - \cos x = 0$ ,

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

(b)  $\sin x - \cos x = 0.5$ .

Answer(b)  $x = \dots\dots\dots$  [2]

3 The braking distance,  $d$  metres, for Alex’s car travelling at  $v$  km/h is given by the formula

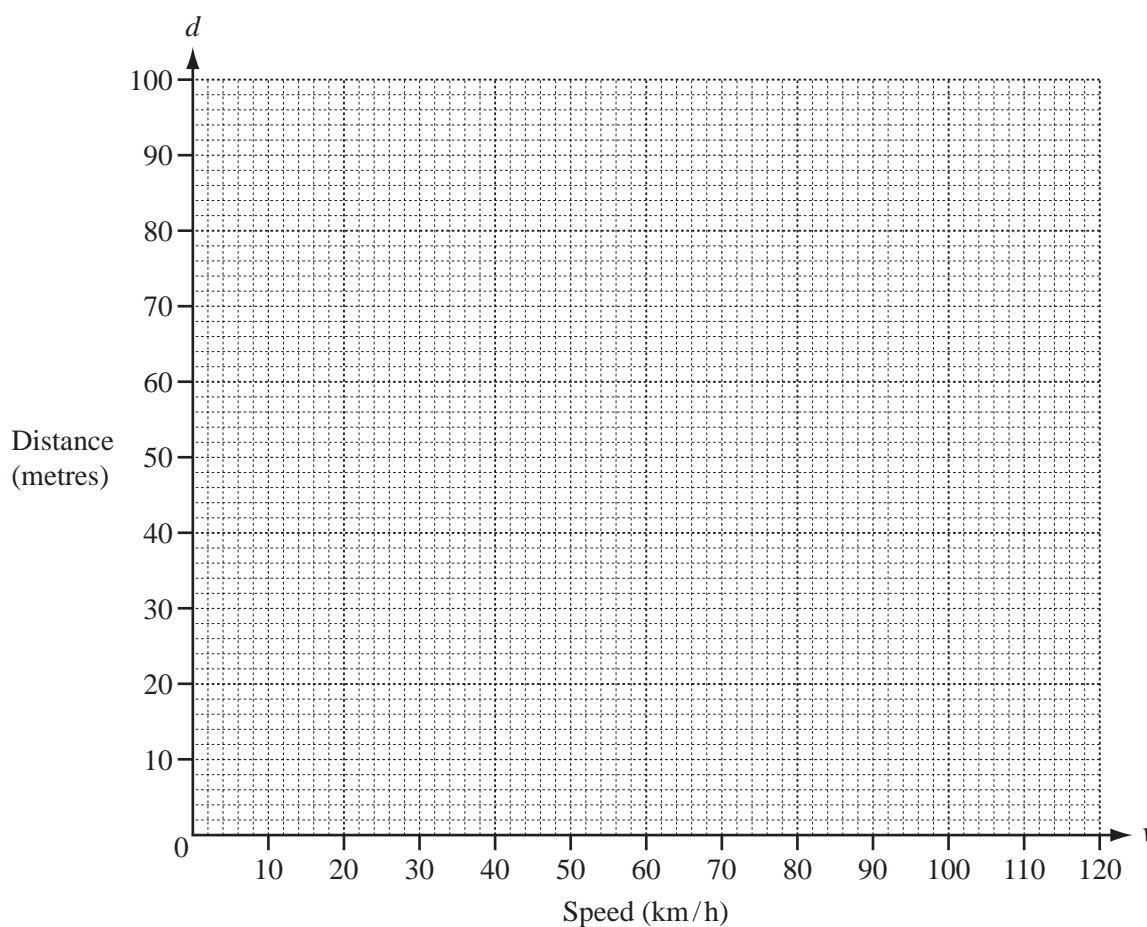
$$200d = v(v + 40).$$

(a) Calculate the missing values in the table.

$v$ (km/h)	0	20	40	60	80	100	120
$d$ (metres)	0		16		48		96

[2]

(b) On the grid below, draw the graph of  $200d = v(v + 40)$  for  $0 \leq v \leq 120$ .



[3]

(c) Find the braking distance when the car is travelling at 110 km/h.

Answer(c) ..... m [1]

(d) Find the speed of the car when the braking distance is 80 m.

Answer(d) ..... km/h [1]

4 (a)  $f(x) = 2^x$

Complete the table.

$x$	-2	-1	0	1	2	3	4
$y = f(x)$		0.5	1	2	4		

[3]

(b)  $g(x) = x(4 - x)$

Complete the table.

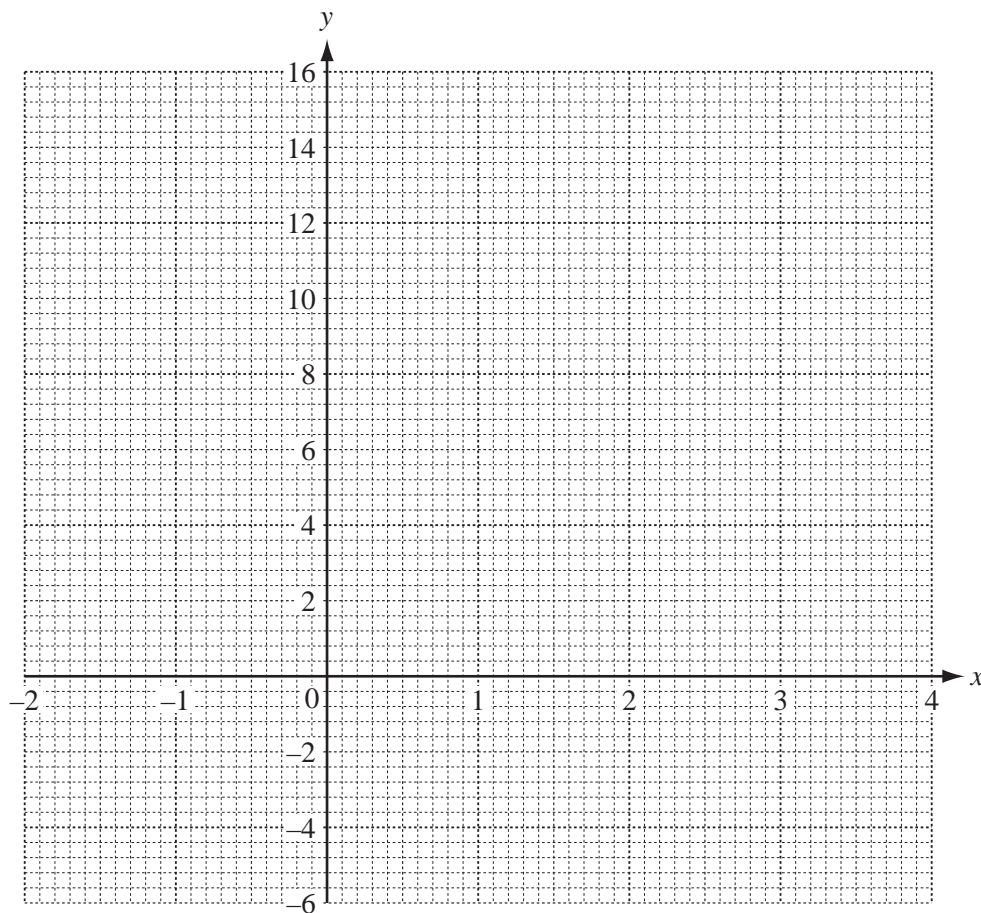
$x$	-1	0	1	2	3	4
$y = g(x)$		0	3		3	0

[2]

(c) On the grid, draw the graphs of

(i)  $y = f(x)$  for  $-2 \leq x \leq 4$ , [3]

(ii)  $y = g(x)$  for  $-1 \leq x \leq 4$ . [3]



(d) Use your graphs to solve the following equations.

(i)  $f(x) = 10$

Answer(d)(i)  $x = \dots\dots\dots$  [1]

(ii)  $f(x) = g(x)$

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

(iii)  $f^{-1}(x) = 1.7$

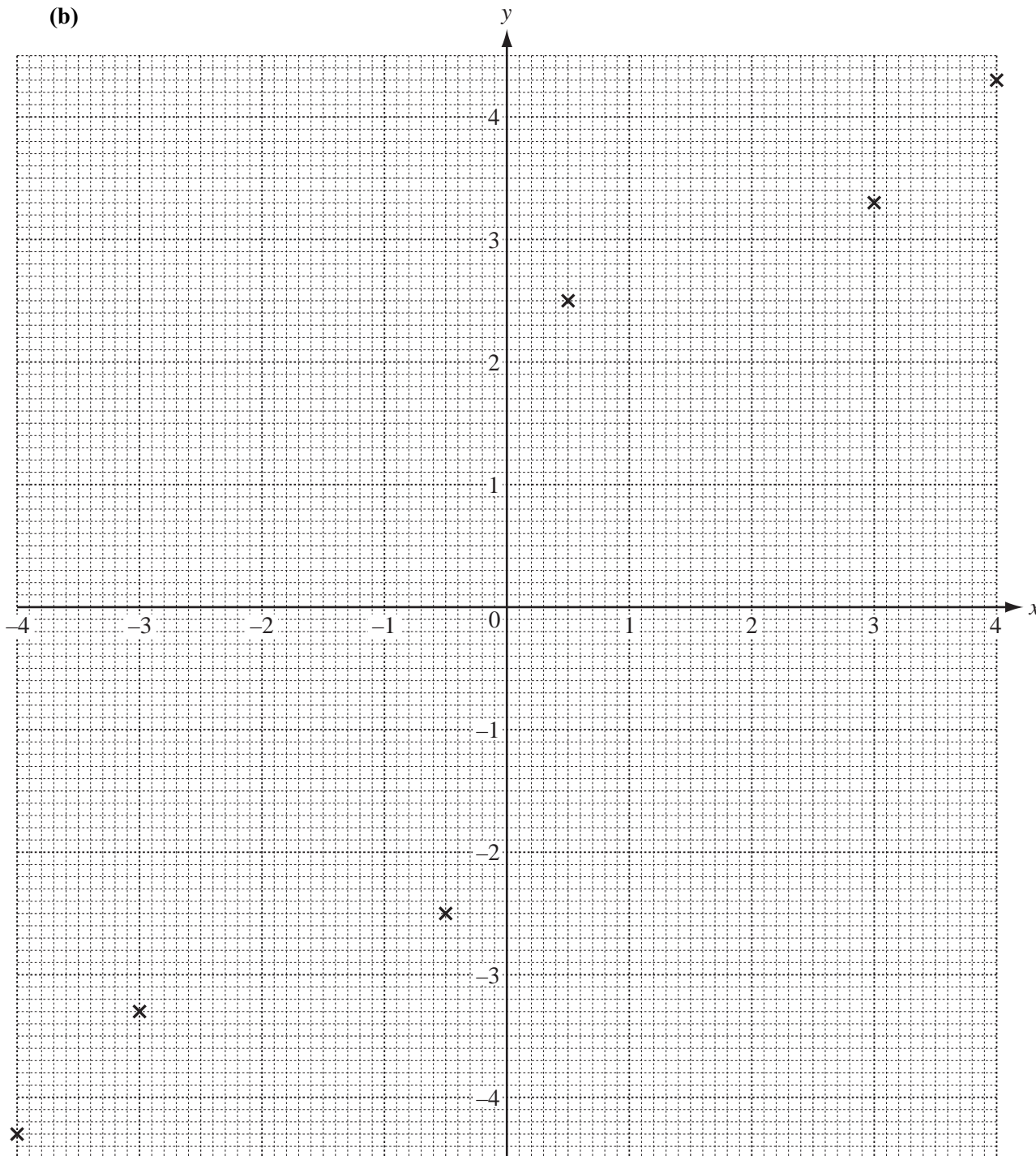
Answer(d)(iii)  $x = \dots\dots\dots$  [1]

5 (a) Complete the table of values for  $y = x + \frac{1}{x}$ .

$x$	-4	-3	-2	-1	-0.5	0.5	1	2	3	4
$y$	-4.3	-3.3			-2.5	2.5			3.3	4.3

[2]

(b)



On the grid, draw the graph of  $y = x + \frac{1}{x}$  for  $-4 \leq x \leq -0.5$  and  $0.5 \leq x \leq 4$ .

Six of the ten points have been plotted for you.

[3]



- (c) There are three integer values of  $k$  for which the equation  $x + \frac{1}{x} = k$  has **no** solutions.  
Write down these three values of  $k$ .

Answer(c)  $k =$  ..... or  $k =$  ..... or  $k =$  ..... [2]

- (d) Write down the ranges of  $x$  for which the gradient of the graph of  $y = x + \frac{1}{x}$  is positive.

Answer(d) ..... [2]

- (e) To solve the equation  $x + \frac{1}{x} = 2x + 1$ , a straight line can be drawn on the grid.

(i) Draw this line on the grid for  $-2.5 \leq x \leq 1.5$ . [2]

(ii) On the grid, show how you would find the solutions. [1]

(iii) Show how the equation  $x + \frac{1}{x} = 2x + 1$  can be rearranged into the form  $x^2 + bx + c = 0$  and find the values of  $b$  and  $c$ .

Answer(e)(iii)  $b =$  .....

$c =$  ..... [3]