

02 Linear Equations in Two Variables

Name: Class: Date:

2.1 GRAPHS OF LINEAR EQUATIONS IN TWO VARIABLES ($ax + by = c$)

Key Skills Checklist	Confidence Level					Related Questions
	1	2	3	4	5	
Find the gradient and y -intercept from a linear graph						1, 3, 6, 7
Draw a linear graph given the equation						1, 2, 4, 5, 7
Determine the coordinates of points lying on a graph						1, 2, 3, 4, 5, 7

WORD TOOLBOX

linear equation in two variables

$x + y = 3$ is a **linear equation in two variables** as it contains two variables, x and y , both of which have an index of 1.

Some examples of linear equations in two variables are:

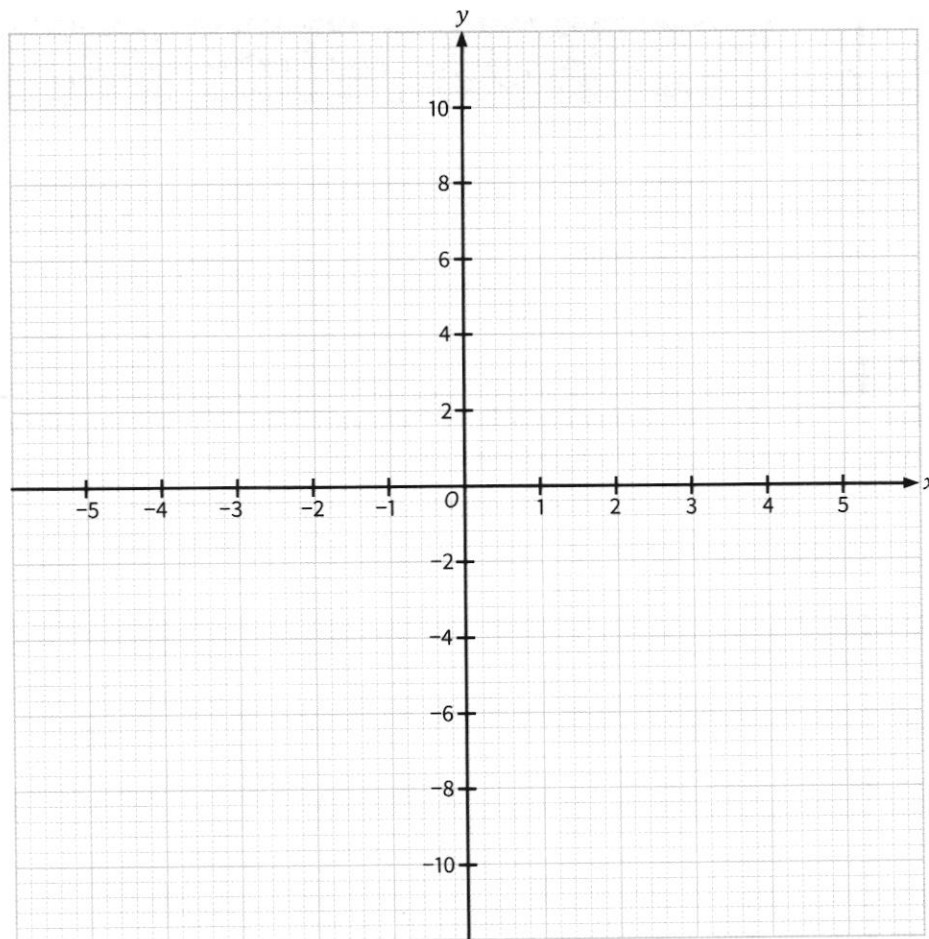
- $x - 3y = 2$
- $4x + 3y - 6 = 0$

BASIC MASTERY

- 1 (a) Complete the table of values of x and y for the equation $2x + y = -1$.

x	-4	-2	0	2
y				

- (b) On the axes below, draw the graph of $2x + y = -1$.



- (c) Write down

(i) the gradient,

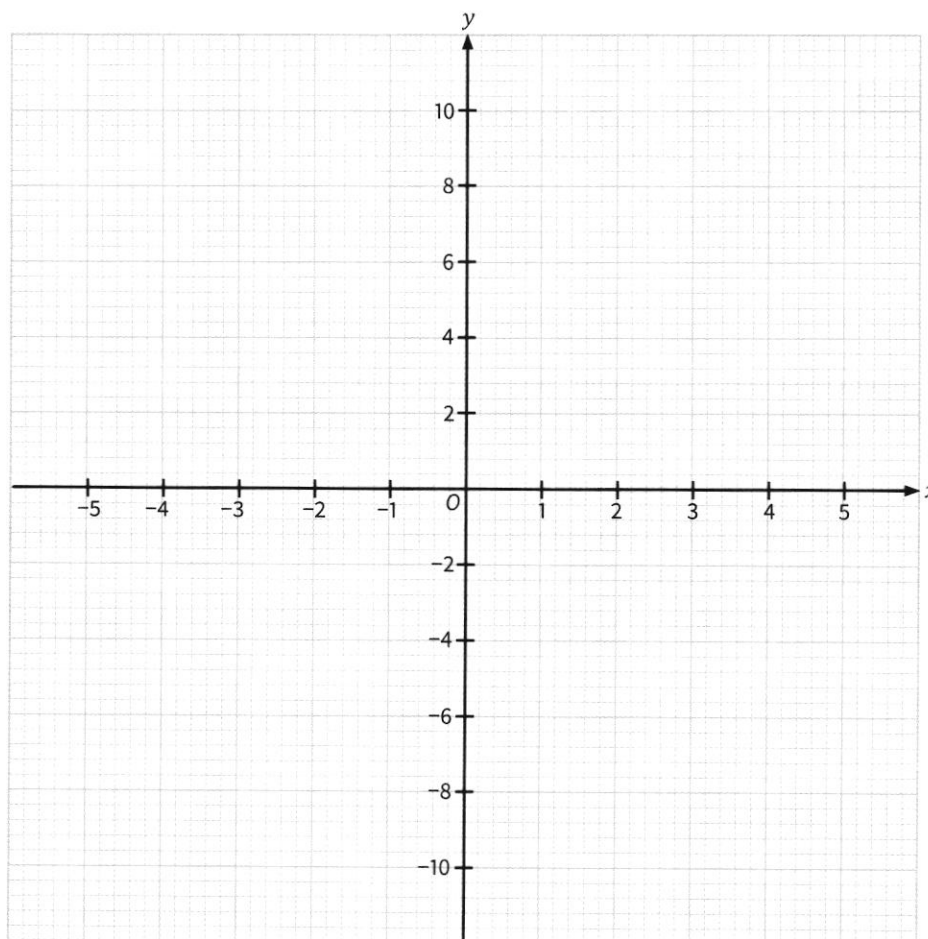
(ii) the y -intercept
of the graph.

- (d) Use your graph to find the value of k if the point $(-1, k)$ lies on the graph.

- 2 (a) Complete the table of values of x and y for the equation $2y + 3x = 6$.

x	-4	-2	0	2
y				

- (b) On the axes below, draw the graph of $2y + 3x = 6$.



- (c) Using your graph, find
- (i) the coordinates of the point where the graph cuts the x -axis,

 - (ii) the value of k if the point $(k, -3)$ lies on the graph.

3 For each case, determine whether the given ordered pair is a solution of the equation.

(a) $2x + 5y = -4$; (1, -1)

(b) $3y - 4x = 24$; (-3, 4)

INTERMEDIATE

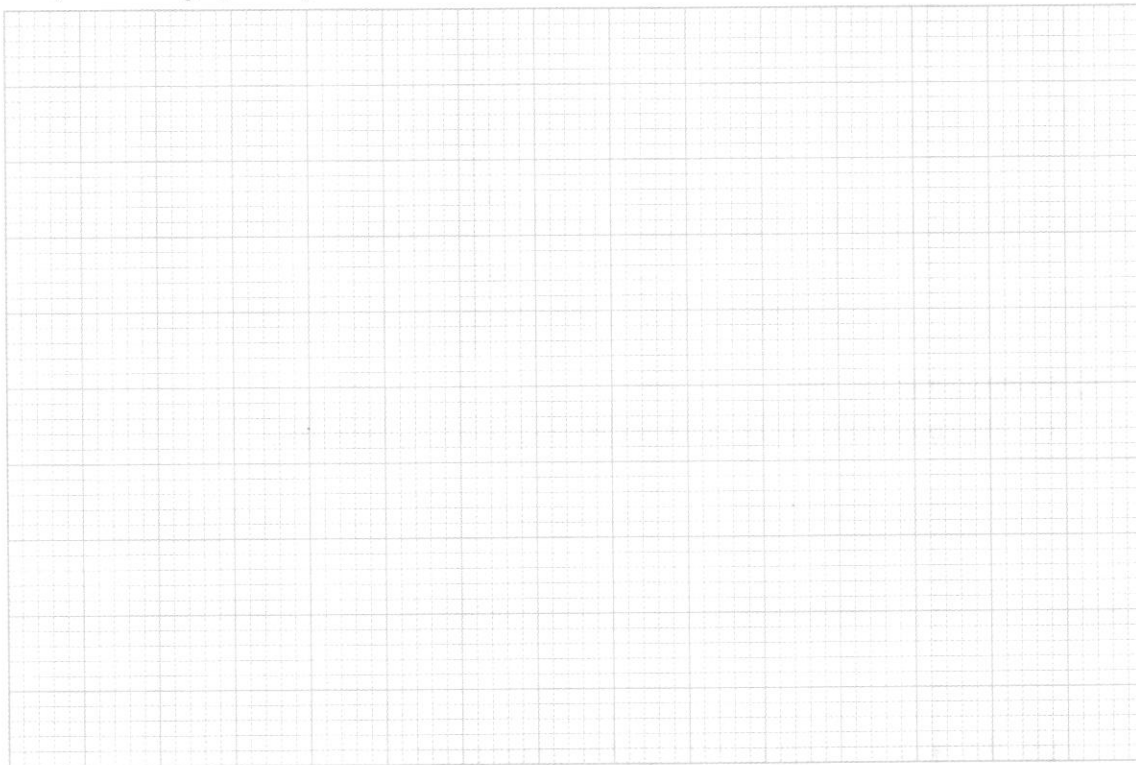
4 It is given that (1, 2.5) is a solution of the equation $2y + kx - 6 = 0$.

(a) Find the value of k .

(b) Complete the table of values for the equation $2y + kx - 6 = 0$.

x	-1	0	1	2	3
y	3.5				1.5

(c) Taking 2 cm to represent 1 unit on the x -axis for $-1 \leq x \leq 3$ and 2 cm to represent 1 unit on the y -axis, draw the graph of $2y + kx - 6 = 0$.



(d) Using your graph, find the coordinates of the point on the graph where

(i) the graph cuts the y -axis,

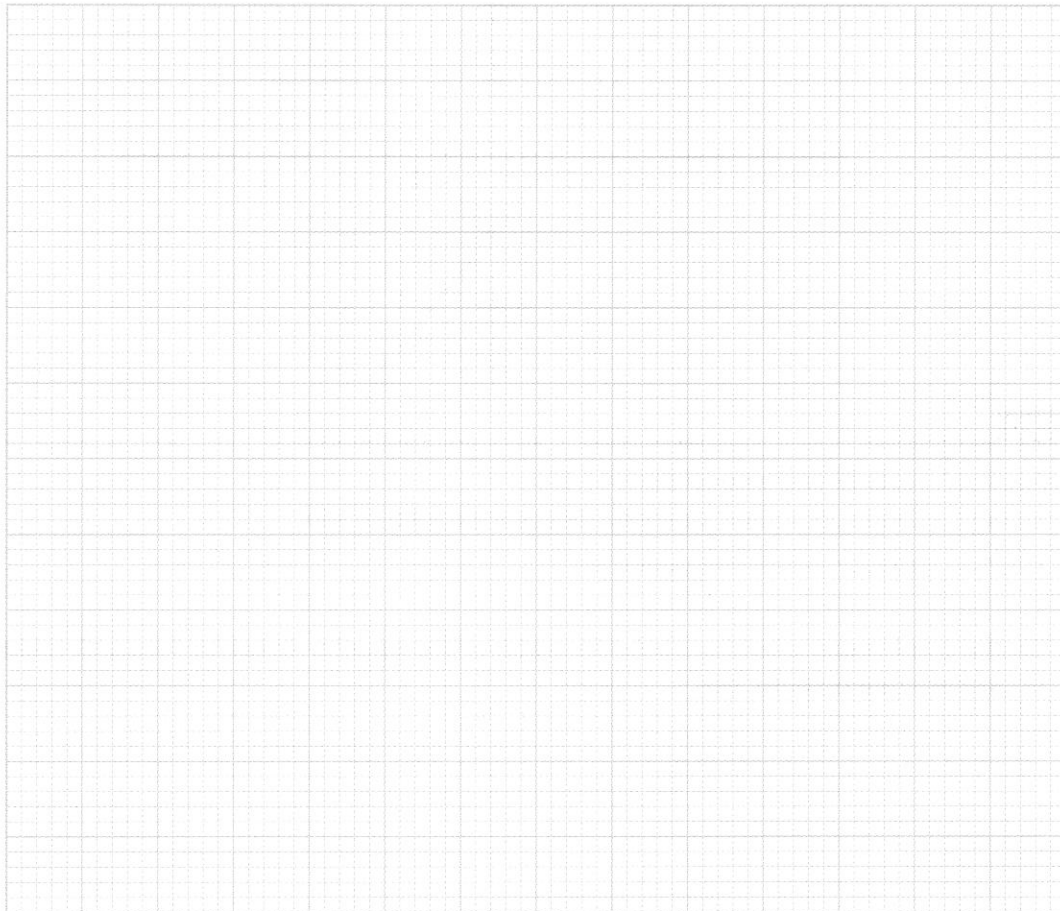
(ii) the x -coordinate is 1.5.

5 The variables x and y are connected by the equation $2y - 3x = 6$.

(a) Complete the table of values for the equation $2y - 3x = 6$.

x	-2	0	2
y			

(b) Taking 2 cm to represent 1 unit on the x -axis for $-2 \leq x \leq 4$ and 1 cm to represent 1 unit on the y -axis, draw the graph of $2y - 3x = 6$.



Using your graph,

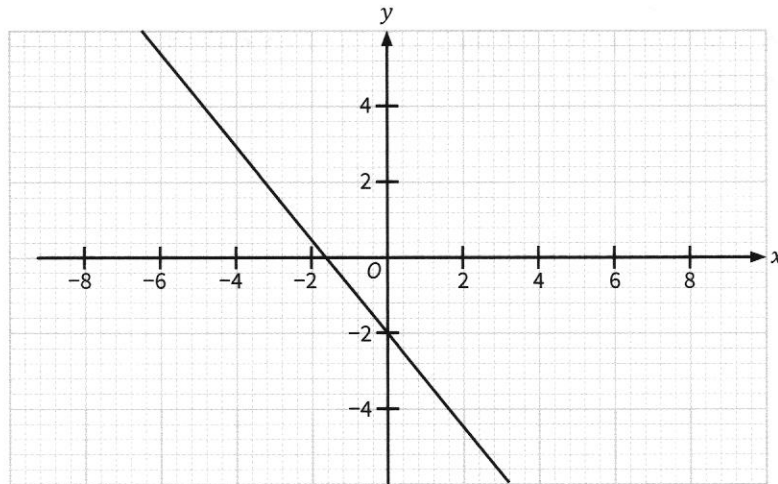
(c) find the value of q if the point $(q, 3.6)$ lies on the graph,

(d) explain whether $x = -1$ and $y = 4$ is a solution of the equation $2y - 3x = 6$.

6 The variables x and y are connected by the linear graph as shown on the Cartesian plane.

(a) Find the gradient of the graph.

(b) Hence write down the equation of the linear graph in the form $ax + by = c$, where a , b and c are constants.



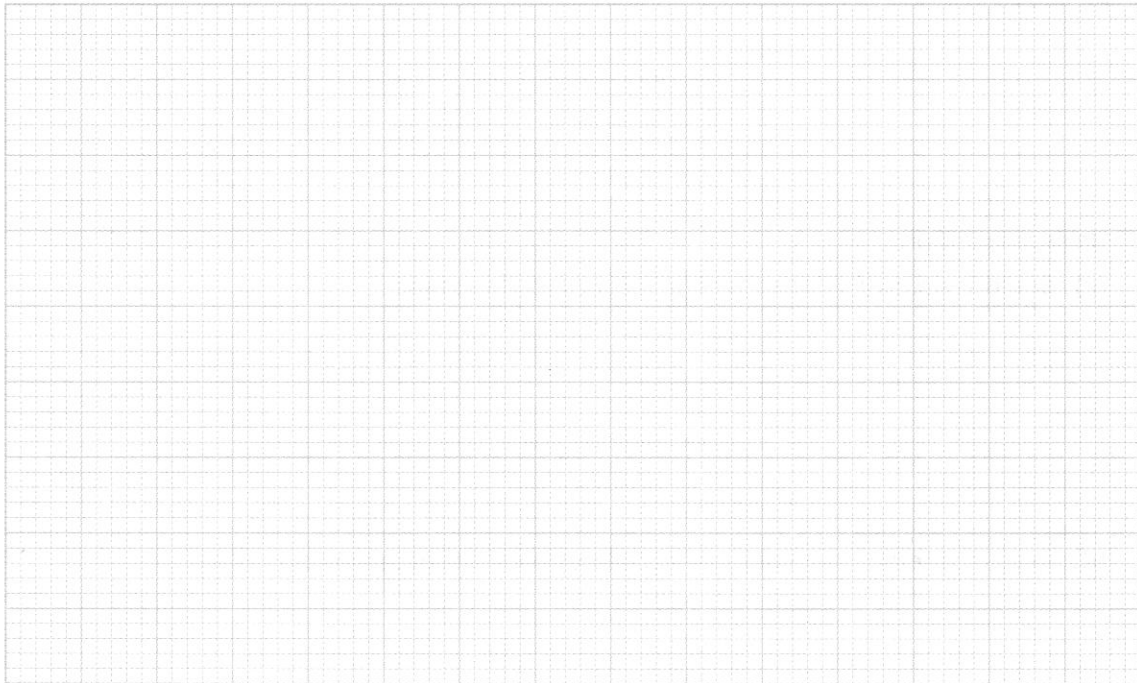
ADVANCED

7 A comic book costs \$5 and a novel costs \$7.50.

Shawn buys x comic books and y novels. He spends a total of \$50.

(a) Form an equation connecting x and y .

(b) On the graph paper provided, draw the graph of the equation in (a) for $0 \leq x \leq 10$, taking 1 cm to represent 1 unit on both axes.



(c) If Shawn buys 2 novels, use your graph to find the number of comic books he buys.

(d) What does the y -intercept of the graph in (b) represent?

2.2 SOLVING SIMULTANEOUS LINEAR EQUATIONS BY THE GRAPHICAL METHOD

Key Skills Checklist	Confidence Level					Related Questions
	1	2	3	4	5	
Solve simultaneous linear equations by the graphical method						1, 2, 3, 4
Determine the number of solutions for two simultaneous linear equations						5, 6

WORD TOOLBOX

simultaneous linear equations

A pair of linear equations in two variables x and y are given:

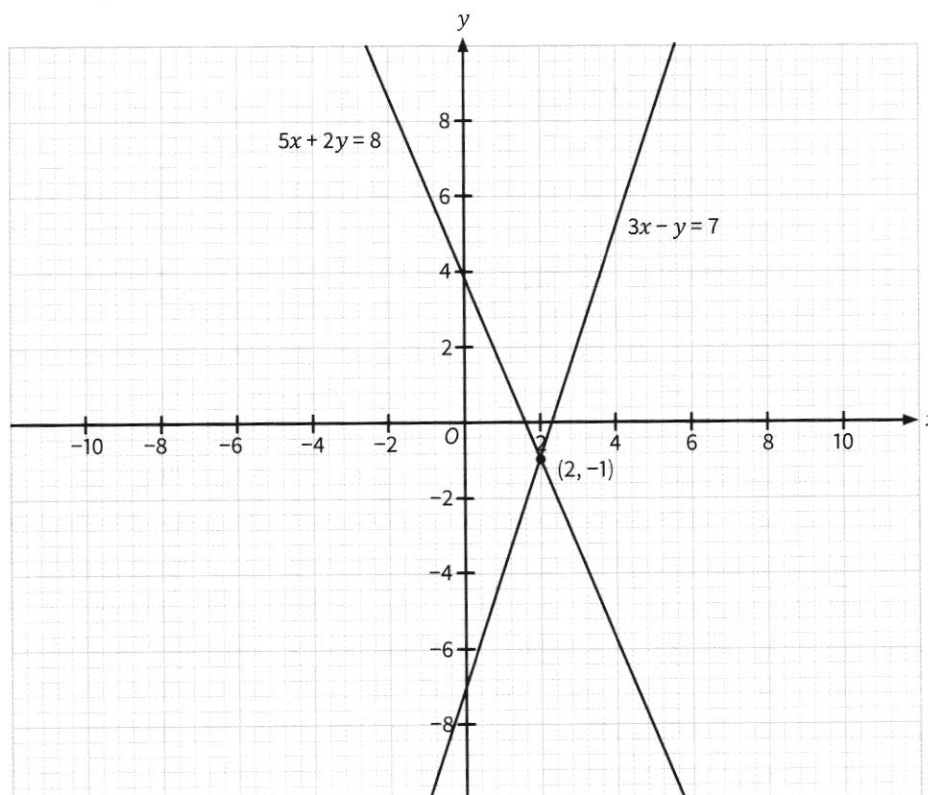
$$3x - y = 7$$

$$5x + 2y = 8$$

$x = 2$ and $y = -1$ is the solution to the pair of linear equations. Since the solution satisfies both equations, the pair of linear equations is also known as **simultaneous linear equations**.

graphical method

The graph of $3x - y = 7$ and the graph of $5x + 2y = 8$ are shown on the Cartesian plane below.



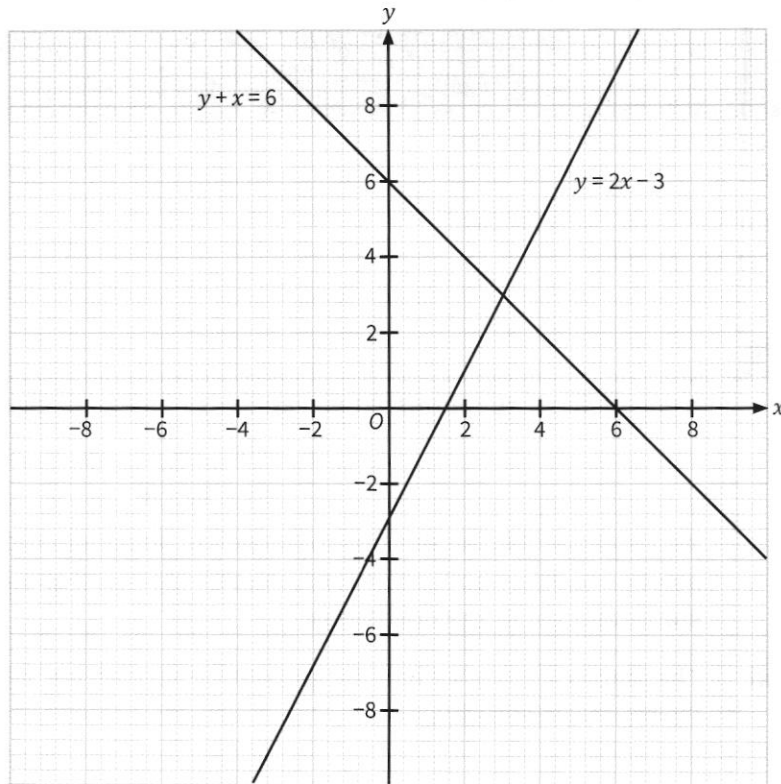
The two linear graphs intersect at the point $(2, -1)$.

Using the **graphical method**, the solution of the simultaneous linear equations $3x - y = 7$ and $5x + 2y = 8$ is $x = 2$ and $y = -1$.

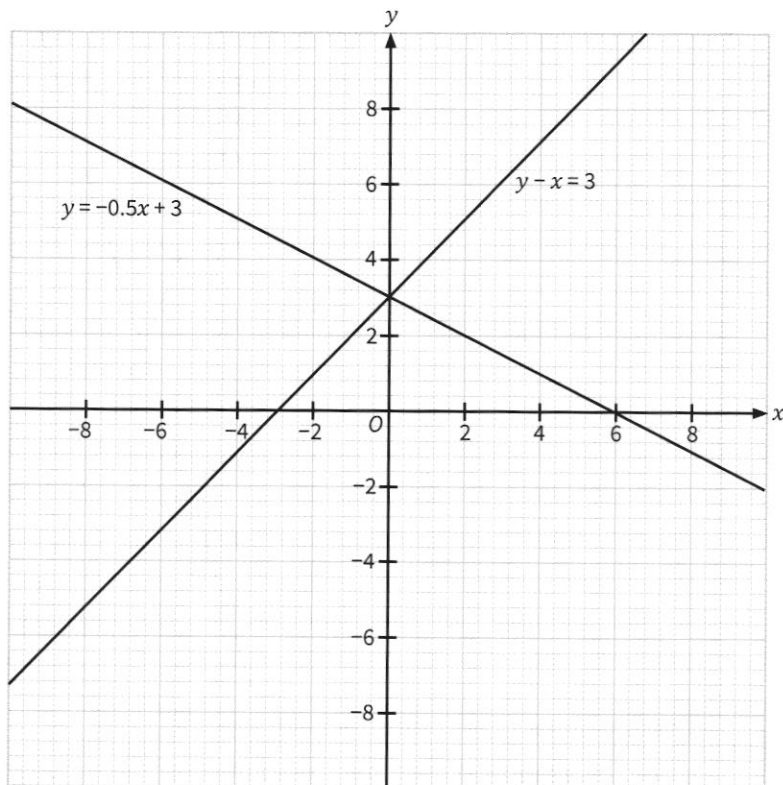
BASIC MASTERY

1 Solve the following simultaneous equations using the given graphs.

(a) $y + x = 6$ and $y = 2x - 3$



(b) $y = -0.5x + 3$ and $y - x = 3$



2 Using the graphical method, solve the following simultaneous equations.

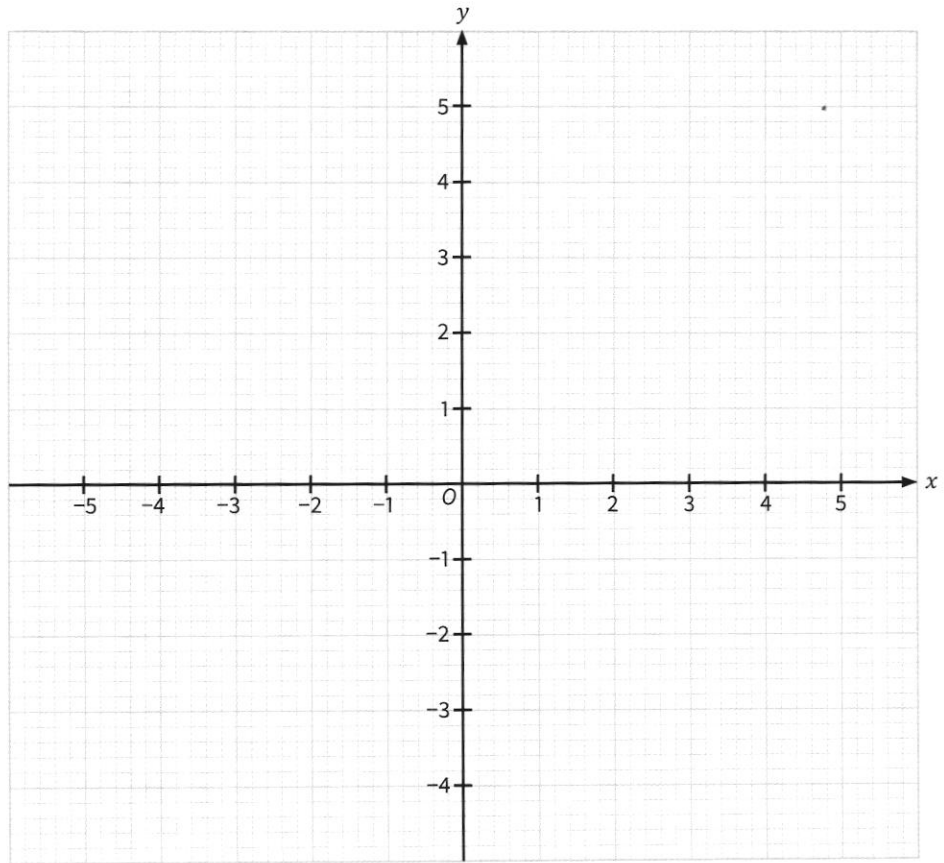
(a) $x + y = 3$
 $2x - y = 3$

$x + y = 3$

x	-2	0	2
y			

$2x - y = 3$

x	0	2	4
y			



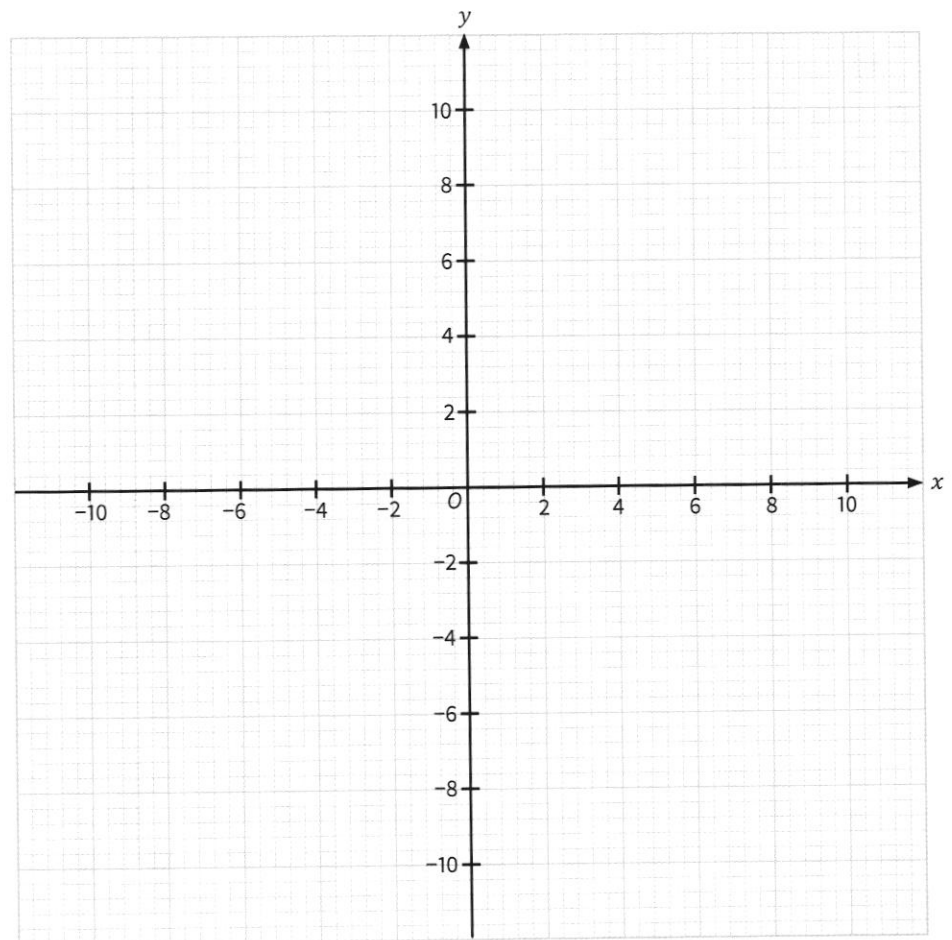
(b) $y = x + 2$
 $y - 2x = -4$

$y = x + 2$

x	-2	0	2
y			

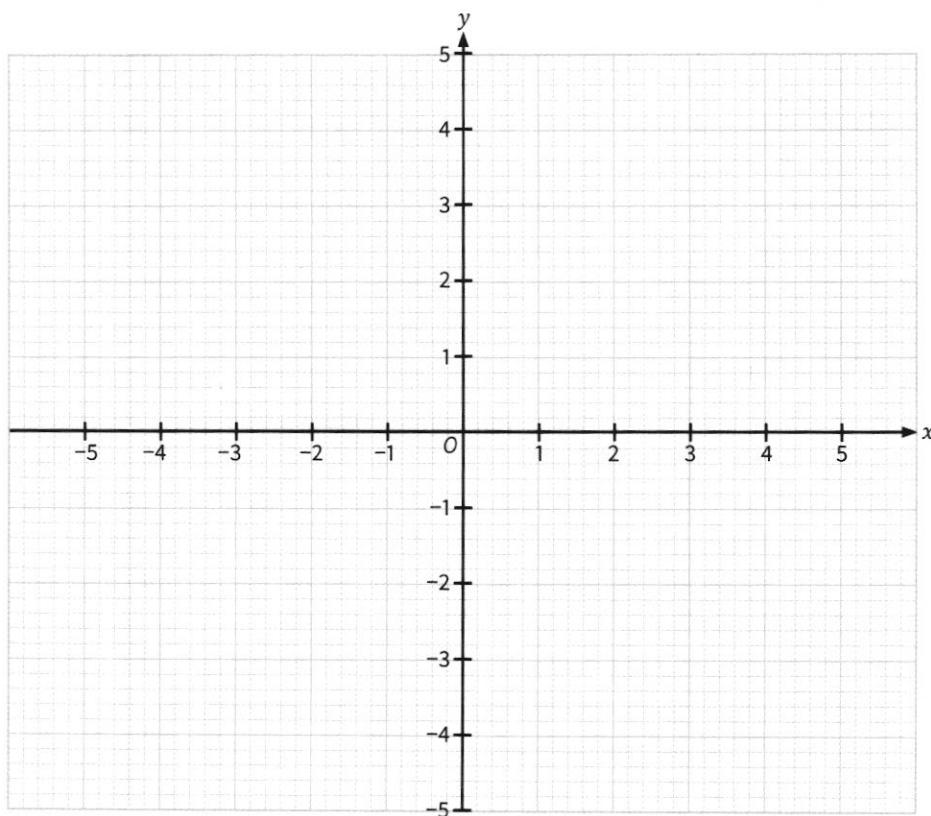
$y - 2x = -4$

x	-2	0	2
y			

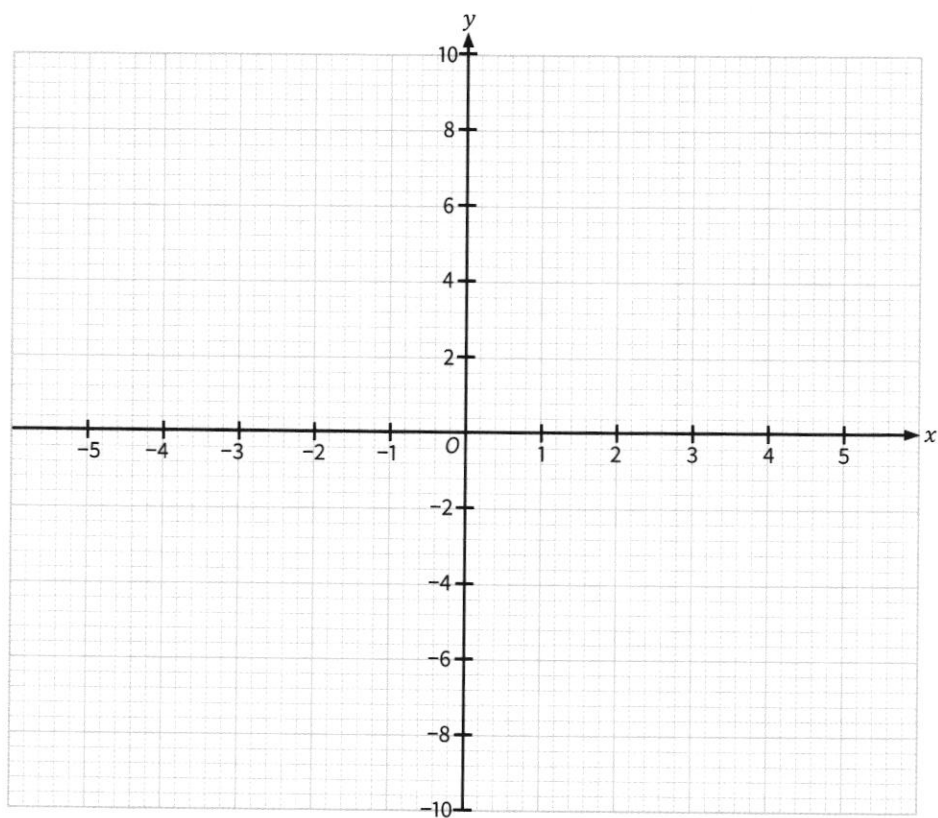


3 Solve the following simultaneous equations using the graphical method.

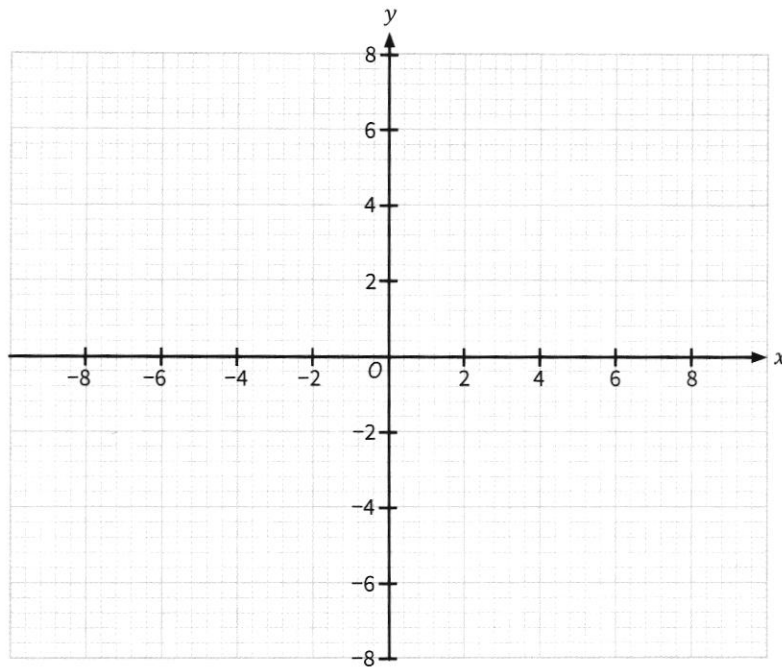
(a) $x - 2y = 4$
 $y + 2x - 3 = 0$



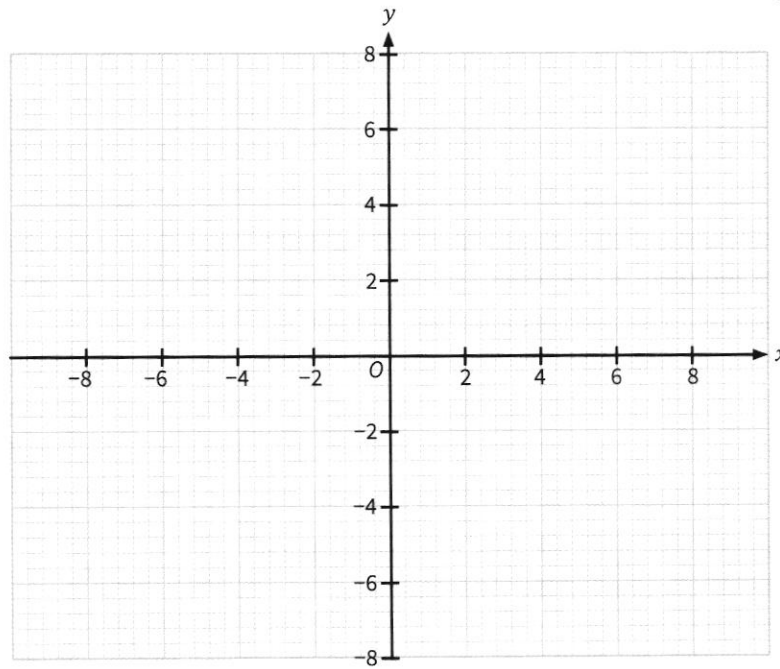
(b) $x - y - 4 = 0$
 $3y + 2x - 3 = 0$



(c) $3x - 2y = -14$
 $3y + 4x = 4$



- 4 (a) Using the graphical method, solve the simultaneous equations $y + x = 4$ and $y - \frac{1}{2}x = 1$.



- (b) Find the area of the triangle bounded by $y + x = 4$, $y - \frac{1}{2}x = 1$ and the y-axis.

ADVANCED

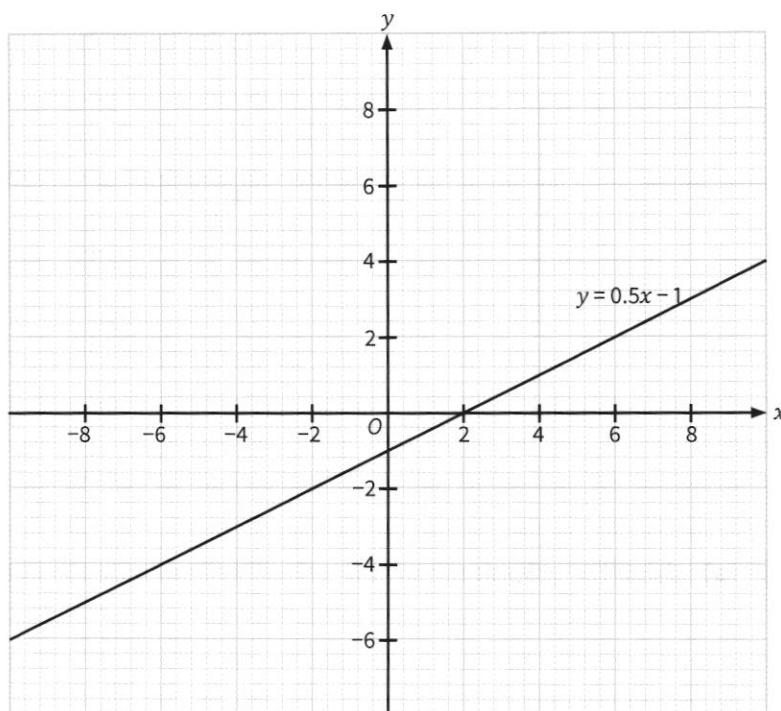
5 The diagram below shows the graph of $y = 0.5x - 1$.

Another linear graph $y = mx + 1$, where m is a constant, is to be drawn.

Suggest a value for m such that the simultaneous equations $y = 0.5x - 1$ and $y = mx + 1$ have

(a) a single solution,

(b) no solutions.



6 The diagram below shows the graphs of $y = ax + b$ and $y = cx + d$, where a, b, c and d are constants.

The two graphs intersect at $(-3, -1)$.

(a) Suggest one set of possible values for a, b, c and d .

(b) If the value of a changes such that $a = c$, write down the number of solutions of the two equations.

