

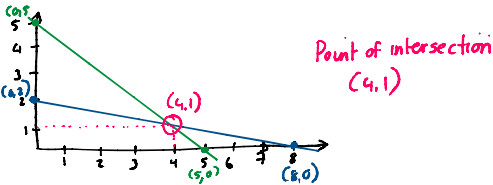
① Graphically

Graph the lines use x axis ($y=0$) and y axis ($x=0$)

Eg1) Find the points of intersection of the lines $x+y=5$ and $x+4y=8$

Solution:

$x+y=5$		$x+4y=8$	
cuts x axis $y=0$	cuts y axis $x=0$	cuts x axis $y=0$	cuts y axis $x=0$
$x+(0)=5$	$(0)+y=5$	$x+4(0)=8$	$(0)+4y=8$
$x=5$	$y=5$	$x=8$	$-4 y=2 \div -4$
$(5,0)$	$(0,5)$	$(8,0)$	$(0,2)$



Pg 225 Q4

$x+y=5$		$2x-y=1$	
cuts x axis $y=0$	cuts the y axis $x=0$	cuts x axis $y=0$	cuts y axis $x=0$
$x+(0)=5$	$(0)+y=5$	$2x-(0)=1$	$2(0)-y=1$
$x=5$	$y=5$	$2x=1$	$0-y=1$
$(5,0)$	$(0,5)$	$\div 2$ $x=\frac{1}{2}$	$\div -1$ $y=-1$
		$(\frac{1}{2}, 0)$	$(0, -1)$

Simultaneous Equations

Algebra method

- 1) You must get either the x parts or the y parts to cancel by getting the coefficients the same and the signs different.
- 2) When you have a value for either x or y you substitute this value back into the corresponding x or y part of either original equation and find the missing variable.

Eg1 Solve the simultaneous equations

Q5 Pg 225

$$\begin{array}{r} \textcircled{1} \quad 1x - 1y = 2 \\ \textcircled{2} \quad 2x + 1y = 7 \\ \hline 3x = 9 \\ \div 3 \quad | \quad x = 3 \quad | \quad \div 3 \text{ Solve for } x \end{array}$$

Sub the value for x back into either equation.

$$\begin{array}{r} x=3 \Rightarrow \textcircled{2} \quad 2x + 1y = 7 \\ 2(3) + y = 7 \\ 6 + y = 7 \\ -6 \quad | \quad y = 1 \quad | \quad -6 \text{ Solve for } y \end{array}$$

Point of intersection $(3,1)$

Eg2 Q6 Pg 225

$$\begin{array}{r} \textcircled{1} \quad 2x + 5y = 1 \\ \textcircled{2} \quad 1x - 3y = -5 \quad (-2) \\ \hline \end{array} \Rightarrow \begin{array}{r} 2x + 5y = 1 \\ -2x + 6y = 10 \\ \hline \end{array}$$

$$11y = 11$$

Add
together

$$\begin{array}{l} 11y = 11 \\ \div 11 \quad | \quad y = 1 \quad | \quad \div 11 \end{array}$$

$$y=1 \Rightarrow \textcircled{1} \quad 2x+5y=1$$

$$2x+5(1)=1$$

$$2x+5=1$$

$$\begin{array}{r|l} -5 & 2x = -4 \\ \div 2 & x = -2 \end{array} \quad \begin{array}{l} -5 \\ \div 2 \end{array}$$

Point of
(-2,

HW Pg 225 Graph Q5+6
 $x=0 \} y=0$

Simultaneous
Equations



TBT2 11.7
Intersectio...



TBT2 11.7
Intersectio...

Chapter 11 Coordinate Geometry - The Line

Section 11.7 Intersection of two lines 224

Example 1

Use simultaneous equations to find the point of intersection of the lines
 $x + y = 5$ and $2x - y = 4$.

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1)

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Algebra.

Exercise 11.7

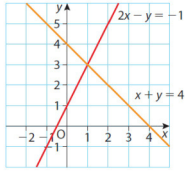
1. Using the one diagram, sketch the lines $x + y = 5$ and $x + 4y = 8$.

Use your sketch to write down the point of intersection of the two lines.

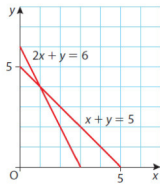


2. Use the diagram to solve these simultaneous equations:

$$\begin{aligned}x + y &= 4 \\ 2x - y &= -1\end{aligned}$$



3. A sketch of the lines $2x + y = 6$ and $x + y = 5$ is shown. Use the sketch to write down the point of intersection of the two lines. Now use simultaneous equations to verify your answer.



Use simultaneous equations to find the point of intersection of the following pairs of lines:

4. $x + y = 5$
 $2x - y = 1$

Use simultaneous equations to find the point of intersection of the following pairs of lines:

5. $x - y = 2$
 $2x + y = 7$

Use simultaneous equations to find the point of intersection of the following pairs of lines:

$$\begin{aligned} 6. \quad & 2x + 5y = 1 \\ & x - 3y = -5 \end{aligned}$$

Use simultaneous equations to find the point of intersection of the following pairs of lines:

$$\begin{aligned} 7. \quad & x + 2y = -1 \\ & 2x - 3y = -9 \end{aligned}$$

Use simultaneous equations to find the point of intersection of the following pairs of lines:

$$\begin{aligned} 8. \quad & x + 3y = 7 \\ & 2x - y = -7 \end{aligned}$$

Use simultaneous equations to find the point of intersection of the following pairs of lines:

$$\begin{aligned} 9. \quad & x - 7y = 4 \\ & 3x - y = -8 \end{aligned}$$

Use simultaneous equations to find the point of intersection of the following pairs of lines:

$$\begin{aligned} 10. \quad & 2x - 3y = 4 \\ & 2x + 3y = -8 \end{aligned}$$
$$\begin{array}{r} 2x - 3y = 4 \\ \underline{2x + 3y = -8} \\ 4x \quad \quad = -4 \end{array}$$
$$\div 4 \quad \left| \begin{array}{l} x = -1 \\ \end{array} \right| \div 4$$

$$x = -1 \Rightarrow 2x - 3y = 4 \quad \begin{matrix} x & y \\ (-1, & -2) \end{matrix}$$

$$\begin{aligned} & 2(-1) - 3y = 4 \\ & -2 - 3y = 4 \\ *2 \quad & -3y = 6 \quad \left| \begin{array}{l} +2 \\ \end{array} \right. \\ \div 3 \quad & y = -2 \quad \left| \begin{array}{l} \div 3 \end{array} \right. \end{aligned}$$

Use simultaneous equations to find the point of intersection of the following pairs of lines:

$$\begin{array}{l} 11. \quad 3x - 2y = 17 \quad (3) \\ \quad \quad 4x + 3y = 0 \quad (2) \end{array} \Rightarrow \begin{array}{l} 9x - 6y = 51 \\ \underline{8x + 6y = 0} \\ 17x = 51 \\ \div 17 \quad | \quad x = 3 \quad | \quad \div 17 \end{array}$$

$$\begin{array}{l} x = 3 \Rightarrow 3x - 2y = 17 \\ 3(3) - 2y = 17 \\ 9 - 2y = 17 \\ -9 \quad | \quad -2y = 8 \quad | \quad -9 \\ \div -2 \quad | \quad y = -4 \quad | \quad \div -2 \end{array} \quad \begin{array}{l} \text{Point of intersection} \\ (3, -4) \end{array}$$

Use simultaneous equations to find the point of intersection of the following pairs of lines:

$$\begin{array}{l} 12. \quad x + 3y = 13 \quad (-2) \\ \quad \quad 2x + 5y = 21 \end{array} \Rightarrow \begin{array}{l} -2x - 6y = -26 \\ \underline{2x + 5y = 21} \\ -1y = -5 \\ \div -1 \quad | \quad y = 5 \quad | \quad \div 1 \end{array}$$

$$\begin{array}{l} y = 5 \Rightarrow x + 3y = 13 \\ x + 3(5) = 13 \\ x + 15 = 13 \\ -15 \quad | \quad x = -2 \quad | \quad -15 \end{array} \quad \begin{array}{l} (-2, 5) \end{array}$$

H/W

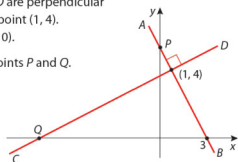
13. Use simultaneous equations to verify that the lines

$$2x + 3y = 12 \quad \text{and} \quad 3x - 4y = 1$$

intersect at the point (3, 2).

14. In the diagram, the lines AB and CD are perpendicular to each other and intersect at the point $(1, 4)$. The line AB crosses the x -axis at $(3, 0)$.

Calculate the coordinates of the points P and Q .



Answers

Exercise 11.7

- | | | |
|--------------|-------------|-------------|
| 1. (4, 1) | 2. (1, 3) | 3. (1, 4) |
| 4. (2, 3) | 5. (3, 1) | 6. (-2, 1) |
| 7. (-3, 1) | 8. (-2, 3) | 9. (-3, -1) |
| 10. (-1, -2) | 11. (3, -4) | 12. (-2, 5) |
14. P(0, 6), Q(-7, 0)

