

Substitute y value into one of the original equations, for $8x + 5y = -0.5$:

$$\begin{aligned}\Rightarrow 8x + 5\left(-\frac{1}{2}\right) &= -0.5 \\ 8x - \frac{5}{2} &= -\frac{1}{2} \\ 8x &= 2 \\ \Rightarrow x &= \frac{1}{4}\end{aligned}$$

5a $y = 8 - 3x$, $y = 2 - 5x$

Substitute for y :

$$\begin{aligned}2 - 5x &= 8 - 3x \\ -6 &= 2x \\ x &= -3\end{aligned}$$

Substitute x value into one of the original equations, for $y = 8 - 3x$:

$$\begin{aligned}\Rightarrow y &= 8 - 3(-3) \\ &= 8 + 9 \\ &= 17\end{aligned}$$

So the lines intersect at $(-3, 17)$

5b $y = 7x - 4$, $y = 3x - 2$

Substitute for y :

$$\begin{aligned}3x - 2 &= 7x - 4 \\ 2 &= 4x \\ x &= \frac{1}{2}\end{aligned}$$

Substitute x value into one of the original equations, for $y = 3x - 2$:

$$\begin{aligned}\Rightarrow y &= 3\left(\frac{1}{2}\right) - 2 \\ &= \frac{3}{2} - 2 \\ &= -\frac{1}{2}\end{aligned}$$

So the lines intersect at $\left(\frac{1}{2}, -\frac{1}{2}\right)$

5c $y = 2x + 3$, $y = 5 - x$

Substitute for y :

$$\begin{aligned}5 - x &= 2x + 3 \\ 3x &= 2 \\ x &= \frac{2}{3}\end{aligned}$$

Substitute x value into one of the original equations, for $y = 5 - x$:

$$\begin{aligned}\Rightarrow y &= 5 - \frac{2}{3} \\ &= \frac{13}{3}\end{aligned}$$

So the lines intersect at $\left(\frac{2}{3}, \frac{13}{3}\right)$

5d $y + 5 = 3x$, $y = -5x + 7$

Substitute for y :

$$\begin{aligned}3x - 5 &= -5x + 7 \\ 8x &= 12 \\ x &= 1.5\end{aligned}$$

Substitute x value into one of the original equations, for $y = -5x + 7$:

$$\begin{aligned}\Rightarrow y &= -5(1.5) + 7 \\ &= -0.5\end{aligned}$$

So the lines intersect at $(1.5, -0.5)$

5e $y = \frac{1}{2}x + 3$, $y = 5 - 2x$

Substitute for y :

$$\begin{aligned}\frac{1}{2}x + 3 &= 5 - 2x \\ \frac{5}{2}x &= 2 \\ x &= 0.8\end{aligned}$$

Substitute x value into one of the original equations, for $y = 5 - 2x$:

$$\begin{aligned}\Rightarrow y &= 5 - 2(0.8) \\ &= 5 - 1.6 \\ &= 3.4\end{aligned}$$

So the lines intersect at $(0.8, 3.4)$

5f $y = 3(x + 2)$, $y = 7 - 2x$

Substitute for y :

$$\begin{aligned}3x + 6 &= 7 - 2x \\ 5x &= 1 \\ x &= 0.2\end{aligned}$$

Substitute x value into one of the original equations, for $y = 7 - 2x$:

$$\begin{aligned}\Rightarrow y &= 7 - 2(0.2) \\ &= 7 - 0.4 \\ &= 6.6\end{aligned}$$

So the lines intersect at $(0.2, 6.6)$

Try it 1C

1a $14x^2 - 7x = 7x(2x - 1)$

1b $x^2 - 5x + 4 = (x - 4)(x - 1)$

1c $x^2 - 25 = (x + 5)(x - 5)$

2a $5x^2 + 21x + 4 = 5x^2 + 20x + x + 4$
 $= 5x(x + 4) + (x + 4)$
 $= (5x + 1)(x + 4)$

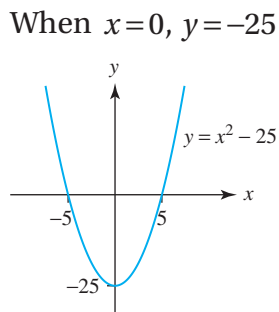
$$\begin{aligned} 2b \quad 6x^2 + 7x - 3 &= 6x^2 + 9x - 2x - 3 \\ &= 3x(2x + 3) - (2x + 3) \\ &= (3x - 1)(2x + 3) \end{aligned}$$

$$\begin{aligned} 2c \quad 8x^2 - 22x + 5 &= 8x^2 - 2x - 20x + 5 \\ &= 2x(4x - 1) - 5(4x - 1) \\ &= (2x - 5)(4x - 1) \end{aligned}$$

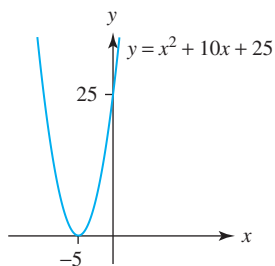
$$\begin{aligned} 3a \quad 6x^2 - 12x &= 6x(x - 2) \\ 6x(x - 2) &= 0 \\ 6x = 0 \text{ or } x - 2 &= 0 \\ x &= 0 \\ \text{or } x &= 2 \end{aligned}$$

$$\begin{aligned} 3b \quad 4x^2 - 23x + 15 &= 0 \\ 4x^2 - 23x + 15 &= 4x^2 - 20x - 3x + 15 \\ &= 4x(x - 5) - 3(x - 5) \\ &= (4x - 3)(x - 5) \\ (4x - 3)(x - 5) &= 0 \\ 4x - 3 = 0 \text{ or } x - 5 &= 0 \\ x &= \frac{3}{4} \\ \text{or } x &= 5 \end{aligned}$$

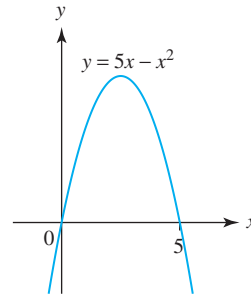
$$\begin{aligned} 4a \quad x^2 - 25 &= (x + 5)(x - 5) \\ \text{When } y = 0, x^2 - 25 &= 0 \\ (x + 5)(x - 5) &= 0 \\ x &= \pm 5 \end{aligned}$$



$$\begin{aligned} 4b \quad x^2 + 10x + 25 &= (x + 5)^2 \\ \text{When } y = 0, (x + 5)^2 &= 0 \Rightarrow x = -5 \\ \text{When } x = 0, y = 5^2 &\Rightarrow y = 25 \end{aligned}$$



$$\begin{aligned} 4c \quad \text{When } y = 0, 5x - x^2 &= 0 \\ x(5 - x) &= 0 \\ \Rightarrow x = 0 \text{ or } x &= 5 \end{aligned}$$



Bridging Exercise 1C

$$1a \quad 3x^2 + 5x = x(3x + 5)$$

$$1b \quad 8x^2 - 4x = 4x(2x - 1)$$

$$1c \quad 17x^2 + 34x = 17x(x + 2)$$

$$1d \quad 18x^2 - 24x = 6x(3x - 4)$$

$$2a \quad x^2 + 5x + 6 = (x + 2)(x + 3)$$

$$2b \quad x^2 - 7x + 10 = (x - 5)(x - 2)$$

$$2c \quad x^2 - 5x - 6 = (x - 6)(x + 1)$$

$$2d \quad x^2 + 3x - 28 = (x + 7)(x - 4)$$

$$2e \quad x^2 - x - 72 = (x - 9)(x + 8)$$

$$2f \quad x^2 + 2x - 48 = (x + 8)(x - 6)$$

$$2g \quad x^2 - 12x + 11 = (x - 11)(x - 1)$$

$$2h \quad x^2 - 5x - 24 = (x - 8)(x + 3)$$

$$3a \quad x^2 - 100 = (x + 10)(x - 10)$$

$$3b \quad x^2 - 81 = (x + 9)(x - 9)$$

$$3c \quad 4x^2 - 9 = (2x + 3)(2x - 3)$$

$$3d \quad 64 - 9x^2 = (8 + 3x)(8 - 3x)$$

$$\begin{aligned} 4a \quad 3x^2 + 7x + 2 &= 3x^2 + 6x + x + 2 \\ &= 3x(x + 2) + (x + 2) \\ &= (3x + 1)(x + 2) \end{aligned}$$

$$\begin{aligned} 4b \quad 6x^2 + 17x + 12 &= 6x^2 + 9x + 8x + 12 \\ &= 3x(2x + 3) + 4(2x + 3) \\ &= (3x + 4)(2x + 3) \end{aligned}$$

$$\begin{aligned} 4c \quad 4x^2 - 13x + 3 &= 4x^2 - 12x - x + 3 \\ &= 4x(x - 3) - (x - 3) \\ &= (4x - 1)(x - 3) \end{aligned}$$

$$\begin{aligned} 4d \quad 2x^2 - 7x - 15 &= 2x^2 - 10x + 3x - 15 \\ &= 2x(x - 5) + 3(x - 5) \\ &= (2x + 3)(x - 5) \end{aligned}$$

$$4e \quad 2x^2 + 3x - 5 = 2x^2 - 2x + 5x - 5$$

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

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

$$4f \quad 7x^2 + 25x - 12 = 7x^2 + 28x - 3x - 12$$

$$= 7x(x+4) - 3(x+4)$$

$$= (7x-3)(x+4)$$

$$4g \quad 8x^2 - 22x + 15 = 8x^2 - 12x - 10x + 15$$

$$= 4x(2x-3) - 5(2x-3)$$

$$= (4x-5)(2x-3)$$

$$4h \quad 12x^2 + 17x - 5 = 12x^2 + 20x - 3x - 5$$

$$= 4x(3x+5) - (3x+5)$$

$$= (4x-1)(3x+5)$$

$$5a \quad 16x^2 - 25 = (4x+5)(4x-5)$$

$$5b \quad 4x^2 - 16x = 4x(x-4)$$

$$5c \quad x^2 + 13x + 12 = (x+12)(x+1)$$

$$5d \quad 3x^2 + 16x - 35 = 3x^2 + 21x - 5x - 35$$

$$= 3x(x+7) - 5(x+7)$$

$$= (3x-5)(x+7)$$

$$5e \quad x^2 + x - 12 = (x+4)(x-3)$$

$$5f \quad 100 - 9x^2 = (10+3x)(10-3x)$$

$$5g \quad 2x^2 - 14x = 2x(x-7)$$

$$5h \quad 20x^2 - 3x - 2 = 20x^2 + 5x - 8x - 2$$

$$= 5x(4x+1) - 2(4x+1)$$

$$= (5x-2)(4x+1)$$

$$6a \quad 21x^2 - 7x = 7x(3x-1)$$

$$7x(3x-1) = 0$$

$$x = 0 \quad \text{or} \quad x = \frac{1}{3}$$

$$6b \quad x^2 - 36 = (x+6)(x-6)$$

$$(x+6)(x-6) = 0$$

$$x = -6 \quad \text{or} \quad x = 6$$

$$6c \quad 17x^2 + 34x = 17x(x+2)$$

$$17x(x+2) = 0$$

$$x = 0 \quad \text{or} \quad x = -2$$

$$6d \quad 6x^2 + 13x + 5 = 6x^2 + 10x + 3x + 5$$

$$= 2x(3x+5) + (3x+5)$$

$$= (2x+1)(3x+5)$$

$$(2x+1)(3x+5) = 0$$

$$x = -\frac{1}{2} \quad \text{or} \quad x = -\frac{5}{3}$$

$$6e \quad 4x^2 - 49 = (2x+7)(2x-7)$$

$$(2x+7)(2x-7) = 0$$

$$x = -\frac{7}{2} \quad \text{or} \quad x = \frac{7}{2}$$

$$6f \quad x^2 - 7x - 18 = 0$$

$$x^2 - 7x - 18 = (x-9)(x+2)$$

$$(x-9)(x+2) = 0$$

$$x = 9 \quad \text{or} \quad x = -2$$

$$6g \quad x^2 - 7x + 6 = (x-6)(x-1)$$

$$(x-6)(x-1) = 0$$

$$x = 6 \quad \text{or} \quad x = 1$$

$$6h \quad 21x^2 + x - 2 = 0$$

$$21x^2 + x - 2 = 21x^2 + 7x - 6x - 2$$

$$= 7x(3x+1) - 2(3x+1)$$

$$= (7x-2)(3x+1)$$

$$(7x-2)(3x+1) = 0$$

$$x = \frac{2}{7} \quad \text{or} \quad x = -\frac{1}{3}$$

$$6i \quad 5x^2 - 17x + 6 = 0$$

$$5x^2 - 17x + 6 = 5x^2 - 15x - 2x + 6$$

$$= 5x(x-3) - 2(x-3)$$

$$= (5x-2)(x-3)$$

$$(5x-2)(x-3) = 0$$

$$x = \frac{2}{5} \quad \text{or} \quad x = 3$$

$$6j \quad 16x^2 + 24x + 9 = 16x^2 + 12x + 12x + 9$$

$$= 4x(4x+3) + 3(4x+3)$$

$$= (4x+3)^2$$

$$(4x+3)^2 = 0$$

$$4x+3 = 0$$

$$x = -\frac{3}{4}$$

$$6k \quad 9x^2 - 12x + 4 = 0$$

$$9x^2 - 12x + 4 = 9x^2 - 6x - 6x + 4$$

$$= 3x(3x-2) - 2(3x-2)$$

$$= (3x-2)^2$$

$$(3x-2)^2 = 0$$

$$3x-2 = 0$$

$$x = \frac{2}{3}$$

6l $40x^2 + x - 6 = 0$

$$40x^2 + x - 6 = 40x^2 + 16x - 15x - 6$$

$$= 8x(5x+2) - 3(5x+2)$$

$$= (8x-3)(5x+2)$$

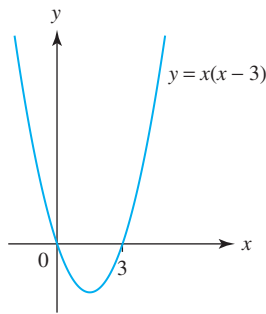
$$(8x-3)(5x+2) = 0$$

$$x = \frac{3}{8} \text{ or } x = -\frac{2}{5}$$

7a $y = x(x-3)$

When $y = 0$, $x(x-3) = 0 \Rightarrow x = 0$ or $x = 3$

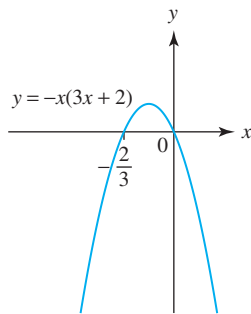
When $x = 0$, $y = 0$



7b $y = -x(3x+2)$

When $y = 0$, $-x(3x+2) = 0 \Rightarrow x = 0$ or $x = -\frac{2}{3}$

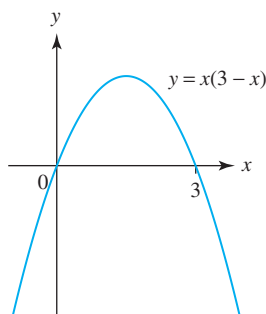
When $x = 0$, $y = 0$



7c $y = x(3-x)$

When $y = 0$, $x(3-x) = 0 \Rightarrow x = 0$ or $x = 3$

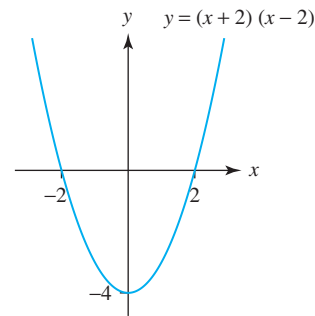
When $x = 0$, $y = 0$



7d $y = (x+2)(x-2)$

When $y = 0$, $(x+2)(x-2) = 0 \Rightarrow x = \pm 2$

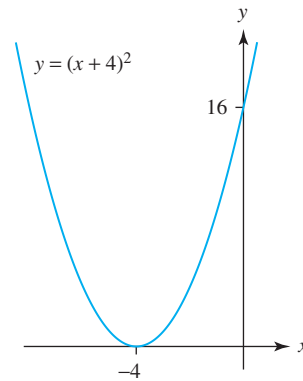
When $x = 0$, $y = 2 \times -2 = -4$



7e $y = (x+4)^2$

When $y = 0$, $(x+4)^2 = 0 \Rightarrow x = -4$

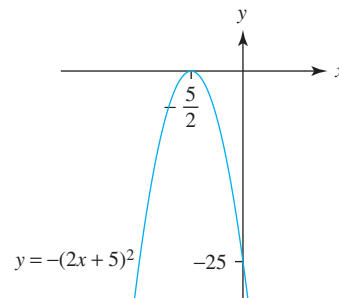
When $x = 0$, $y = 4^2 = 16$



7f $y = -(2x+5)^2$

When $y = 0$, $-(2x+5)^2 = 0 \Rightarrow x = -\frac{5}{2}$

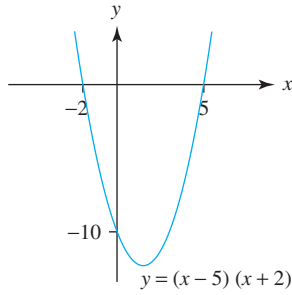
When $x = 0$, $y = -5^2 = -25$



7g $y = (x-5)(x+2)$

When $y = 0$, $(x-5)(x+2) = 0 \Rightarrow x = 5$ or $x = -2$

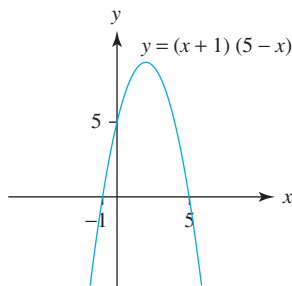
When $x = 0$, $y = -5 \times 2 = -10$



7h $y = (x+1)(5-x)$

When $y=0$, $(x+1)(5-x)=0 \Rightarrow x=-1$ or $x=5$

When $x=0$, $y=1 \times 5=5$

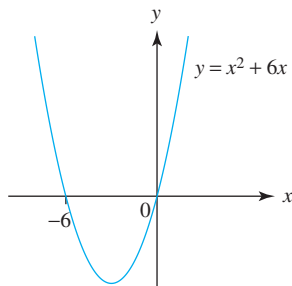


8a $y = x^2 + 6x$

$$x^2 + 6x = x(x+6)$$

When $y=0$, $x(x+6)=0 \Rightarrow x=0$ or $x=-6$

When $x=0$, $y=0$

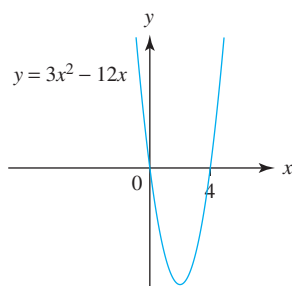


8b $y = 3x^2 - 12x$

$$3x^2 - 12x = 3x(x-4)$$

When $y=0$, $3x(x-4)=0 \Rightarrow x=0$ or $x=4$

When $x=0$, $y=0$

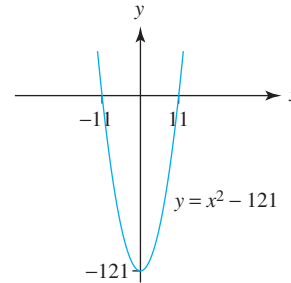


8c $y = x^2 - 121$

$$x^2 - 121 = (x+11)(x-11)$$

When $y=0$, $(x+11)(x-11)=0 \Rightarrow x=\pm 11$

When $x=0$, $y=-121$

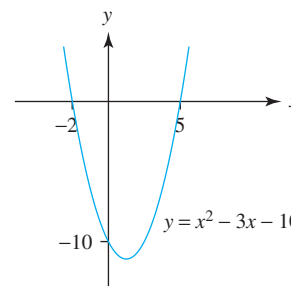


8d $y = x^2 - 3x - 10$

$$x^2 - 3x - 10 = (x-5)(x+2)$$

When $y=0$, $(x-5)(x+2)=0 \Rightarrow x=5$ or $x=-2$

When $x=0$, $y=-10$

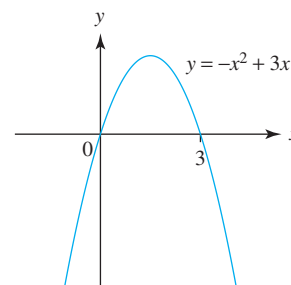


8e $y = -x^2 + 3x$

$$-x^2 + 3x = -x(x-3)$$

When $y=0$, $-x(x-3)=0 \Rightarrow x=0$ or $x=3$

When $x=0$, $y=0$

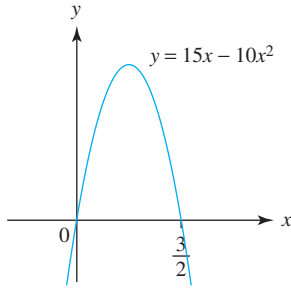


8f $y = 15x - 10x^2$

$$15x - 10x^2 = 5x(3-2x)$$

When $y=0$, $5x(3-2x)=0 \Rightarrow x=0$ or $x=\frac{3}{2}$

When $x=0$, $y=0$

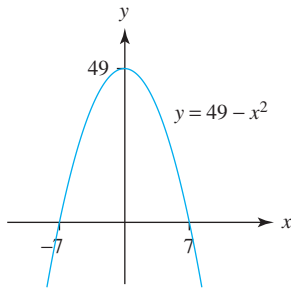


8g $y = 49 - x^2$

$$49 - x^2 = (7 - x)(x + 7)$$

When $y = 0$, $(7 - x)(7 + x) = 0 \Rightarrow x = \pm 7$

When $x = 0$, $y = 49$

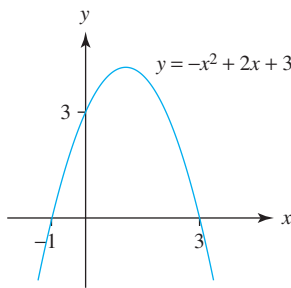


8h $y = -x^2 + 2x + 3$

$$\begin{aligned} -x^2 + 2x + 3 &= -(x^2 - 2x - 3) \\ &= -(x - 3)(x + 1) \end{aligned}$$

When $y = 0$, $-(x - 3)(x + 1) = 0 \Rightarrow x = 3$ or $x = -1$

When $x = 0$, $y = 3$

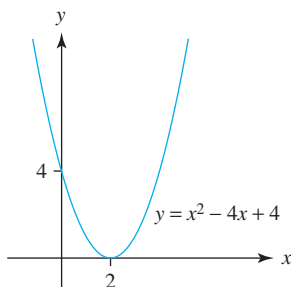


8i $y = x^2 - 4x + 4$

$$x^2 - 4x + 4 = (x - 2)^2$$

When $y = 0$, $(x - 2)^2 = 0 \Rightarrow x = 2$

When $x = 0$, $y = 4$

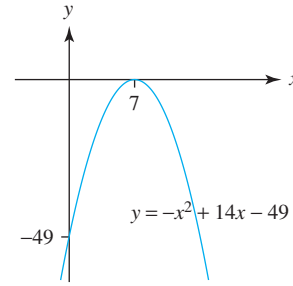


8j $y = -x^2 + 14x - 49$

$$\begin{aligned} -x^2 + 14x - 49 &= -(x^2 - 14x + 49) \\ &= -(x - 7)^2 \end{aligned}$$

When $y = 0$, $-(x - 7)^2 = 0 \Rightarrow x = 7$

When $x = 0$, $y = -49$



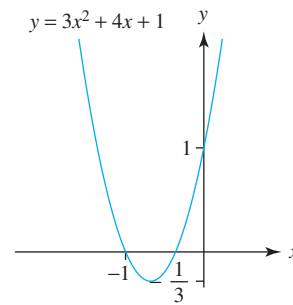
8k $y = 3x^2 + 4x + 1$

$$\begin{aligned} 3x^2 + 4x + 1 &= 3x^2 + 3x + x + 1 \\ &= 3x(x + 1) + (x + 1) \\ &= (3x + 1)(x + 1) \end{aligned}$$

When $y = 0$, $(3x + 1)(x + 1) = 0 \Rightarrow x = -1$ or

$$x = -\frac{1}{3}$$

When $x = 0$, $y = 1$



8l $y = -2x^2 + 11x - 12$

$$\begin{aligned} -2x^2 + 11x - 12 &= -(2x^2 - 11x + 12) \\ &= -(2x^2 - 8x - 3x + 12) \\ &= -(2x(x - 4) - 3(x - 4)) \\ &= -(2x - 3)(x - 4) \end{aligned}$$

When $y = 0$, $-(2x - 3)(x - 4) = 0 \Rightarrow x = \frac{3}{2}$ or $x = 4$

When $x = 0$, $y = -12$

