5i $(3x^2)^4 = 3^4 \times x^{2\times4}$

$= 81x^8$

5j $(6x^5)^2 = 6^2 \times x^{5\times2}$

$= 36x^{10}$

5k $\sqrt{x^3} = (x^3)^{\frac{1}{2}}$

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

5l $\sqrt[4]{x^5} = (x^5)^{\frac{1}{4}}$

$= x^{\frac{5}{4}}$

5m $\dfrac{5\sqrt{x}}{x} = \dfrac{5x^{\frac{1}{2}}}{x^1}$

$= 5\times x^{\frac{1}{2}}x^{-1}$

$= 5\times x^{\frac{1}{2}-1}$

$= 5x^{-\frac{1}{2}}$

5n $2x\sqrt{x} = 2\times x^1 \times x^{\frac{1}{2}}$

$= 2\times x^{1+\frac{1}{2}}$

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

5o $\dfrac{x^2}{3\sqrt{x}} = \dfrac{x^3}{3x^{\frac{1}{2}}}$

$= \dfrac{1}{3}\times x^{3-\frac{1}{2}}$

$= \dfrac{1}{3}x^{\frac{3}{2}}$

5p $x^3(x^5-1) = x^{3+5} - x^3$

$= x^8 - x^3$

5q $x^3(\sqrt{x}+2) = x^3(x^{\frac{1}{2}}+2)$

$= x^{3+\frac{1}{2}} + 2x^3$

$= x^{\frac{7}{2}} + 2x^3$

5r $\dfrac{x+2}{x^3} = \dfrac{x}{x^3} + \dfrac{2}{x^3}$

$= x^{1-3} + 2x^{-3}$

$= x^{-2} + 2x^{-3}$

5s $\dfrac{\sqrt{x}+3}{x} = \dfrac{x^{\frac{1}{2}}+3}{x^1}$

$= \dfrac{x^{\frac{1}{2}}}{x^1} + \dfrac{3}{x^1}$

$= x^{\frac{1}{2}-1} + 3x^{-1}$

$= x^{-\frac{1}{2}} + 3x^{-1}$

5t $\dfrac{3-x^3}{\sqrt{x}} = \dfrac{3-x^3}{x^{\frac{1}{2}}}$

$= \dfrac{3}{x^{\frac{1}{2}}} - \dfrac{x^3}{x^{\frac{1}{2}}}$

$= 3x^{-\frac{1}{2}} - x^{3-\frac{1}{2}}$

$= 3x^{-\frac{1}{2}} - x^{\frac{5}{2}}$

5u $(\sqrt{x}+3)^2 = x + 3\sqrt{x} + 3\sqrt{x} + 9$

$= x + 6\sqrt{x} + 9$

5v $\dfrac{3+\sqrt{x}}{x^2} = \dfrac{3}{x^2} + \dfrac{x^{\frac{1}{2}}}{x^2}$

$= 3x^{-2} + x^{\frac{1}{2}-2}$

$= 3x^{-2} + x^{-\frac{3}{2}}$

5w $\dfrac{1-x}{2\sqrt{x}} = \dfrac{1}{2x^{\frac{1}{2}}} - \dfrac{x}{2x^{\frac{1}{2}}}$

$= \dfrac{1}{2}\times\dfrac{1}{x^{\frac{1}{2}}} - \dfrac{1}{2}\times x^{1-\frac{1}{2}}$

$= \dfrac{1}{2}x^{-\frac{1}{2}} - \dfrac{1}{2}x^{\frac{1}{2}}$

5x $\dfrac{\sqrt{x}+2}{3x^3} = \dfrac{x^{\frac{1}{2}}}{3x^3} + \dfrac{2}{3x^3}$

$= \dfrac{1}{3}\times x^{\frac{1}{2}-3} + \dfrac{2}{3}\times x^{-3}$

$= \dfrac{1}{3}x^{-\frac{5}{2}} + \dfrac{2}{3}x^{-3}$

Try it 1B

1 $3x+8 = 5x-6$

$8 = 2x-6 \Rightarrow 2x = 14$

$\Rightarrow x = 7$

2 $7x-4 > x+8$

$6x-4 > 8 \Rightarrow 6x > 12$

$\Rightarrow x > 2$

3 $3(x+A)=Bx+1$

$3x+3A=Bx+1 \Rightarrow 3x-Bx=1-3A$

$\Rightarrow x(3-B)=1-3A$

$\Rightarrow x=\dfrac{1-3A}{3-B}$

4 $2x+5y=1, \quad 3x-2y=-27$

Multiply first equation by 3 and second equation by 2 to give:

$3\times(2x+5y)=3\times1$

$6x+15y=3 \qquad (1)$

$2\times(3x-2y)=2\times(-27)$

$6x-4y=-54 \qquad (2)$

$(1)-(2)$:

$(6x+15y)-(6x-4y)=3-(-54)$

$\Rightarrow 19y=57$

$\Rightarrow y=3$

Substitute y value into one of the original equations, for $2x+5y=1$:

$2x+5(3)=1$

$2x+15=1$

$2x=-14$

$\Rightarrow x=-7$

5 $y=3x+4, \quad y=6x-2$

Substitute for y:

$3x+4=6x-2$

$4=3x-2$

$3x=6$

$\Rightarrow x=2$

Substitute x value into one of the original equations, for $y=3x+4$:

$y=3(2)+4$

$=6+4$

$\Rightarrow y=10$

So the lines intersect at (2, 10)

Bridging Exercise 1B

1a $3(2x+9)=7$

$6x+27=7$

$6x=-20$

$x=-\dfrac{20}{6}$

$=-\dfrac{10}{3}$

1b $7-3x=12$

$-3x=5$

$x=-\dfrac{5}{3}$

1c $\dfrac{x+4}{5}=7$

$x+4=35$

$x=31$

1d $2x+7=5x-6$

$7=3x-6$

$3x=13$

$x=\dfrac{13}{3}$

1e $8x-3=2(3x+1)$

$8x-3=6x+2$

$2x-3=2$

$2x=5$

$x=\dfrac{5}{2}$

$=2.5$

1f $\dfrac{2x+9}{12}=x-1$

$2x+9=12x-12$

$9=10x-12$

$10x=21$

$x=\dfrac{21}{10}$

$=2.1$

1g $2(3x-7)=4x$

$6x-14=4x$

$2x=14$

$x=7$

1h $7-2x=3(4-5x)$

$7-2x=12-15x$

$7-13x=12$

$13x=5$

$x=\dfrac{5}{13}$

2a $\dfrac{x}{2}+7\geq5$

$\dfrac{x}{2}\geq-2$

$x\geq-4$

2b $3-4x<15$

$-4x<12$

$-12<4x$

$x>-3$

2c $5(x-1)>12+x$

$5x-5>12+x$

$4x>17$

$x>\dfrac{17}{4}$

2d $\frac{x+1}{3} > 2$

$x+1 > 6$

$x > 5$

2e $8x-1 \leq 2x-5$

$6x-1 \leq -5$

$6x \leq -4$

$x \leq -\frac{2}{3}$

2f $3(x+1) \geq \frac{x-3}{2}$

$6(x+1) \geq x-3$

$6x+6 \geq x-3$

$5x+6 \geq -3$

$5x \geq -9$

$x \geq -1.8$

2g $3(2x-5) < 1-x$

$6x-15 < 1-x$

$7x-15 < 1$

$7x < 16$

$x < \frac{16}{7}$

2h $x-(3+2x) \geq 2(x+1)$

$x-3-2x \geq 2x+2$

$-3-x \geq 2x+2$

$-3-3x \geq 2$

$-5 \geq 3x$

$x \leq -\frac{5}{3}$

3a $2x+5 = 3A-1$

$2x = 3A-6$

$x = \frac{3A-6}{2}$

3b $x+u = vx+3$

$x-vx = 3-u$

$x(1-v) = 3-u$

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

3c $\frac{3x-1}{k} = 2x$

$3x-1 = 2kx$

$3x-2kx = 1$

$x(3-2k) = 1$

$x = \frac{1}{3-2k}$

3d $5(x-3m) = 2nx-4$

$5x-15m = 2nx-4$

$5x-2nx = 15m-4$

$x(5-2n) = 15m-4$

$x = \frac{15m-4}{5-2n}$

3e $(1-3x)^2 = t$

$1-3x = \pm\sqrt{t}$

$-3x = -1 \pm \sqrt{t}$

$3x = 1 \pm \sqrt{t}$

$x = \frac{1 \pm \sqrt{t}}{3}$

3f $\frac{1}{x} = \frac{1}{p} + \frac{1}{q}$

$pq = px + qx$

$pq = x(p+q)$

$x = \frac{pq}{p+q}$

3g $\frac{1}{x^2+k} - 6 = 4$

$\frac{1}{x^2+k} = 10$

$x^2+k = \frac{1}{10}$

$x^2 = \frac{1}{10} - k$

$x = \pm\sqrt{\frac{1}{10}-k}$

3h $\sqrt{x+A} = 2B$

$x+A = (2B)^2$

$x+A = 4B^2$

$x = 4B^2 - A$

4a $5x+12y = -6$ (1)

$x+5y = 4$

Multiply second equation by 5:

$5 \times (x+5y) = 5 \times 4$

$5x+25y = 20$ (2)

Then (2) – (1):

$(5x+25y) - (5x+12y) = 20 - (-6)$

$\Rightarrow 13y = 26$

$\Rightarrow y = 2$

Substitute y value into one of the original equations, for $x+5y=4$:

$$x+5(2)=4$$
$$x+10=4$$
$$\Rightarrow x=-6$$

4b $7x+5y=14,\ 3x+4y=19$

Multiply first equation by 4:

$4\times(7x+5y)=4\times14$

$28x+20y=56$ (1)

Multiply second equation by 5:

$5\times(3x+4y)=5\times19$

$15x+20y=95$ (2)

(1) – (2):

$(28x+20y)-(15x+20y)=56-95$

$$\Rightarrow 13x=-39$$
$$\Rightarrow x=-3$$

Substitute x value into one of the original equations, for $7x+5y=14$:

$$7(-3)+5y=14$$
$$-21+5y=14$$
$$\Rightarrow y=7$$

4c $2x-5y=4,\ 3x-8y=5$

Multiply first equation by 3:

$3\times(2x-5y)=3\times4$

$6x-15y=12$ (1)

Multiply second equation by 2:

$2\times(3x-8y)=2\times5$

$6x-16y=10$ (2)

(1) – (2):

$(6x-15y)-(6x-16y)=12-10$

$$\Rightarrow y=2$$

Substitute y value into one of the original equations, for $2x-5y=4$:

$$2x-5(2)=4$$
$$2x-10=4$$
$$\Rightarrow x=7$$

4d $3x-2y=2,\ 8x+3y=4.5$

Multiply first equation by 3:

$3\times(3x-2y)=3\times2$

$9x-6y=6$ (1)

Multiply second equation by 2:

$2\times(8x+3y)=2\times4.5$

$16x+6y=9$ (2)

(1) + (2):

$(9x-6y)+(16x+6y)=6+9$

$$\Rightarrow 25x=15$$
$$\Rightarrow x=\frac{3}{5}$$

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

$$\Rightarrow 3\left(\frac{3}{5}\right)-2y=2$$
$$\frac{9}{5}-2y=2$$
$$-2y=\frac{1}{5}$$
$$\Rightarrow y=-\frac{1}{10}$$

4e $5x-2y=11,\ -2x+3y=22$

Multiply the first equation by 2:

$2\times(5x-2y)=2\times11$

$10x-4y=22$ (1)

Multiply the second equation by 5:

$5\times(-2x+3y)=5\times22$

$-10x+15y=110$ (2)

(1) + (2):

$(10x-4y)+(-10x+15y)=22+110$

$$\Rightarrow 11y=132$$
$$\Rightarrow y=12$$

Substitute y value into one of the original equations, for $5x-2y=11$:

$$\Rightarrow 5x-2(12)=11$$
$$5x-24=11$$
$$5x=35$$
$$\Rightarrow x=7$$

4f $8x+5y=-0.5,\ -6x+4y=-3.5$

Multiply first equation by 3:

$3\times(8x+5y)=3\times-0.5$

$24x+15y=-1.5$ (1)

Multiply second equation by 4:

$4\times(-6x+4y)=4\times-3.5$

$-24x+16y=-14$ (2)

(1) + (2):

$(24x+15y)+(-24x+16y)=-1.5+-14$

$$\Rightarrow 31y=-15.5$$
$$\Rightarrow y=-\frac{1}{2}$$

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

$$\Rightarrow 8x+5\left(-\frac{1}{2}\right)=-0.5$$

$$8x-\frac{5}{2}=-\frac{1}{2}$$

$$8x=2$$

$$\Rightarrow x=\frac{1}{4}$$

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

Substitute for y:

$$2-5x=8-3x$$

$$-6=2x$$

$$x=-3$$

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

$$\Rightarrow y=8-3(-3)$$

$$=8+9$$

$$=17$$

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

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

Substitute for y:

$$3x-2=7x-4$$

$$2=4x$$

$$x=\frac{1}{2}$$

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

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

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

$$=-\frac{1}{2}$$

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

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

Substitute for y:

$$5-x=2x+3$$

$$3x=2$$

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

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

$$\Rightarrow y=5-\frac{2}{3}$$

$$=\frac{13}{3}$$

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

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

Substitute for y:

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

$$8x=12$$

$$x=1.5$$

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

$$\Rightarrow y=-5(1.5)+7$$

$$=-0.5$$

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

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

Substitute for y:

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

$$\frac{5}{2}x=2$$

$$x=0.8$$

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

$$\Rightarrow y=5-2(0.8)$$

$$=5-1.6$$

$$=3.4$$

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

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

Substitute for y:

$$3x+6=7-2x$$

$$5x=1$$

$$x=0.2$$

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

$$\Rightarrow y=7-2(0.2)$$

$$=7-0.4$$

$$=6.6$$

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 $5x^2+21x+4=5x^2+20x+x+4$

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

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