Exercise 4.3

Question 1:

Solve the following equations:

(a) $2y+\frac{5}{2}=\frac{37}{2}$ (b) $5t+28=10$ (c) $\frac{a}{5}+3=2$

(d) $\frac{q}{4}+7=5$ (e) $\frac{5}{2}x=10$ (f) $\frac{5}{2}x=\frac{25}{4}$

(g) $7m+\frac{19}{2}=13$ (h) $6z+10=-2$ (i) $\frac{3l}{2}=\frac{2}{3}$

(j) $\frac{2b}{3}-5=3$

Answer 1:

(a) $2y+\frac{5}{2}=\frac{37}{2}$

$\Rightarrow 2y=\frac{37}{2}-\frac{5}{2}$ $\Rightarrow 2y=\frac{37-5}{2}$ $\Rightarrow 2y=\frac{32}{2}$

$\Rightarrow 2y=16$ $\Rightarrow y=\frac{16}{2}$ $\Rightarrow y=8$

(b) $5t+28=10$

$\Rightarrow 5t=10-28$ $\Rightarrow 5t=-18$ $\Rightarrow t=\frac{-18}{5}$

(c) $\frac{a}{5}+3=2$

$\Rightarrow \frac{a}{5}=2-3$ $\Rightarrow \frac{a}{5}=-1$ $\Rightarrow a=-1\times 5$

$\Rightarrow a=-5$

(d) $\frac{q}{4}+7=5$

$\Rightarrow \frac{q}{4}=5-7$ $\Rightarrow \frac{q}{4}=-2$ $\Rightarrow q=-2\times 4$

$\Rightarrow q=-8$

(e) $\frac{5}{2}x=10$

$\Rightarrow 5x=10\times 2$ $\Rightarrow 5x=20$ $\Rightarrow x=\frac{20}{5}$

$\Rightarrow x=4$

(f) $\frac{5}{2}x=\frac{25}{4}$

$\Rightarrow 5x=\frac{25}{4}\times 2$ $\Rightarrow 5x=\frac{25}{2}$ $\Rightarrow x=\frac{25}{2\times 5}$

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

(g) $7m+\frac{19}{2}=13$

$\Rightarrow \quad 7m=13-\frac{19}{2} \qquad \Rightarrow 7m=\frac{26-19}{2} \qquad \Rightarrow 7m=\frac{7}{2}$

$\Rightarrow \quad m=\frac{7}{2\times 7} \qquad \Rightarrow m=\frac{1}{2}$

(h) $6z+10=-2$

$\Rightarrow \quad 6z=-2-10 \qquad \Rightarrow 6z=-12 \qquad \Rightarrow z=\frac{-12}{6}$

$\Rightarrow \quad z=-2$

(i) $\frac{3l}{2}=\frac{2}{3}$

$\Rightarrow \quad 3l=\frac{2}{3}\times 2 \qquad \Rightarrow 3l=\frac{4}{3} \qquad \Rightarrow l=\frac{4}{3\times 3}$

$\Rightarrow \quad l=\frac{4}{9}$

(j) $\frac{2b}{3}-5=3$

$\Rightarrow \quad \frac{2b}{3}=3+5 \qquad \Rightarrow \frac{2b}{3}=8 \qquad \Rightarrow 2b=8\times 3$

$\Rightarrow \quad 2b=24 \qquad \Rightarrow b=\frac{24}{2} \qquad \Rightarrow b=12$

Question 2:

Solve the following equations:

(a) $2(x+4)=12$ (b) $3(n-5)=21$

(c) $3(n-5)=-21$ (d) $3-2(2-y)=7$

(e) $-4(2-x)=9$ (f) $4(2-x)=9$

(g) $4+5(p-1)=34$ (h) $34-5(p-1)=4$

Answer 2:

(a) $2(x+4)=12$

$\Rightarrow \quad x+4=\frac{12}{2} \qquad \Rightarrow x+4=6 \qquad \Rightarrow x=6-4 \qquad \Rightarrow x=2$

(b) $3(n-5)=21$

$\Rightarrow \quad n-5=\frac{21}{3} \qquad \Rightarrow n-5=7 \qquad \Rightarrow n=7+5 \qquad \Rightarrow n=12$

(c) $3(n-5)=-21$

$\Rightarrow \quad n-5=\frac{-21}{3} \qquad \Rightarrow n-5=-7 \qquad \Rightarrow n=-7+5 \qquad \Rightarrow n=-2$

(d) $3-2(2-y)=7$

$\Rightarrow \quad -2(2-y)=7-3 \quad \Rightarrow -2(2-y)=4 \quad \Rightarrow 2-y=\dfrac{4}{-2}$

$\Rightarrow \quad 2-y=-2 \quad \Rightarrow -y=-2-2 \quad \Rightarrow -y=-4 \quad \Rightarrow y=4$

(e) $-4(2-x)=9$

$\Rightarrow \quad -4\times 2-x\times(-4)=9 \quad \Rightarrow -8+4x=9 \quad \Rightarrow 4x=9+8$

$\Rightarrow \quad 4x=17 \quad \Rightarrow x=\dfrac{17}{4}$

(f) $4(2-x)=9$

$\Rightarrow \quad 4\times 2-x\times(4)=9 \quad \Rightarrow 8-4x=9 \quad \Rightarrow -4x=9-8$

$\Rightarrow \quad -4x=1 \quad \Rightarrow x=\dfrac{-1}{4}$

(g) $4+5(p-1)=34$

$\Rightarrow \quad 5(p-1)=34-4 \quad \Rightarrow 5(p-1)=30 \quad \Rightarrow p-1=\dfrac{30}{5}$

$\Rightarrow \quad p-1=6 \quad \Rightarrow p=6+1 \quad \Rightarrow p=7$

(h) $34-5(p-1)=4$

$\Rightarrow \quad -5(p-1)=4-34 \quad \Rightarrow -5(p-1)=-30 \quad \Rightarrow p-1=\dfrac{-30}{-5}$

$\Rightarrow \quad p-1=6 \quad \Rightarrow p=6+1 \quad \Rightarrow p=7$

Question 3:

Solve the following equations:

(a) $4=5(p-2)$ (b) $-4=5(p-2)$

(c) $-16=-5(2-p)$ (d) $10=4+3(t+2)$

(e) $28=4+3(t+5)$ (f) $0=16+4(m-6)$

Answer 3:

(a) $4=5(p-2)$

$\Rightarrow \quad 4=5\times p-5\times 2 \quad \Rightarrow 4=5p-10 \quad \Rightarrow 5p-10=4$

$\Rightarrow \quad 5p=4+10 \quad \Rightarrow 5p=14 \quad \Rightarrow p=\dfrac{14}{5}$

(b) $-4=5(p-2)$

$\Rightarrow \quad -4=5\times p-5\times 2 \quad \Rightarrow -4=5p-10 \quad \Rightarrow 5p-10=-4$

$\Rightarrow \quad 5p=-4+10 \quad \Rightarrow 5p=6 \quad \Rightarrow p=\dfrac{6}{5}$

(c) $-16=-5(2-p)$

$\Rightarrow \quad -16 = -5\times 2 - (-5)\times p \quad \Rightarrow -16 = -10 + 5p \quad \Rightarrow -10 + 5p = -16$

$\Rightarrow \quad 5p = -16 + 10 \quad \Rightarrow 5p = -6 \quad \Rightarrow p = \frac{-6}{5}$

(d) $10 = 4 + 3(t+2)$

$\Rightarrow \quad 10 - 4 = 3(t+2) \quad \Rightarrow 6 = 3(t+2) \quad \Rightarrow \frac{6}{3} = t + 2$

$\Rightarrow \quad 2 = t + 2 \quad \Rightarrow 2 - 2 = t \quad \Rightarrow 0 = t \quad \Rightarrow t = 0$

(e) $28 = 4 + 3(t+5)$

$\Rightarrow \quad 28 - 4 = 3(t+5) \quad \Rightarrow 24 = 3(t+5) \quad \Rightarrow \frac{24}{3} = t + 5$

$\Rightarrow \quad 8 = t + 5 \quad \Rightarrow 8 - 5 = t \quad \Rightarrow 3 = t \quad \Rightarrow t = 3$

(f) $0 = 16 + 4(m-6)$

$\Rightarrow \quad 0 - 16 = 4(m-6) \quad \Rightarrow -16 = 4(m-6) \quad \Rightarrow \frac{-16}{4} = m - 6$

$\Rightarrow \quad -4 = m - 6 \quad \Rightarrow -4 + 6 = m \quad \Rightarrow 2 = m$

$\Rightarrow \quad m = 2$

Question 4:

(a) Construct 3 equations starting with $x = 2$.

(b) Construct 3 equations starting with $x = -2$.

Answer 4:

(a) 3 equations starting with $x = 2$.

(i) $x = 2$

Multiplying both sides by 10, $10x = 20$

Adding 2 both sides

$10x + 2 = 20 + 2 \;=\; 10x + 2 = 22$

(ii) $x = 2$

Multiplying both sides by 5, $5x = 10$

Subtracting 3 from both sides

$5x - 3 = 10 - 3 \;\Rightarrow\; 5x - 3 = 7$

(iii) $x = 2$

Dividing both sides by 5, $\frac{x}{5} = \frac{2}{5}$

(b) 3 equations starting with $x = -2$.

(i) $x = -2$

Multiplying both sides by 3, $3x = -6$

(ii) $x = -2$

Multiplying both sides by 3, $3x = -6$

Adding 7 to both sides

$3x + 7 = -6 + 7 \;\Rightarrow\; 3x + 7 = 1$

(iii) $x = -2$

Multiplying both sides by 3, $3x = -6$

Adding 10 to both sides

$3x + 10 = -6 + 10 \;=\; 3x + 10 = 4$