

Tingkatan 4 Bab 3
Sistem Persamaan
Penyelesaian Lengkap

Praktis Formatif 3.1a

1 (a) $p+q+r=4 \dots (1)$
 $2p-q+6r=8 \dots (2)$
 $p+2q-3r=0 \dots (3)$

$$\begin{array}{r} p+q+r=4 \dots (1) \\ (+) 2p-q+6r=8 \dots (2) \\ \hline 3p+7r=12 \dots (4) \end{array}$$

$$\begin{array}{r} 2p+2q+2r=8 \dots (1) \times 2 \\ (-) p+2q-3r=0 \dots (3) \\ \hline p+5r=8 \dots (5) \end{array}$$

$$\begin{array}{r} 3p+7r=12 \dots (4) \\ (-) 3p+15r=24 \dots (5) \times 3 \\ \hline -8r=-12 \\ r=\frac{-12}{-8} \\ r=\frac{3}{2} \end{array}$$

Daripada (4) :

$$\begin{array}{l} 3p+7\left(\frac{3}{2}\right)=12 \\ 6p+21=24 \\ 6p=3 \\ p=\frac{1}{2} \end{array}$$

Daripada (1) :

$$\begin{array}{l} \frac{1}{2}+q+\frac{3}{2}=4 \\ q+2=4 \\ q=2 \end{array}$$

(b) $r+s+t=0 \dots (1)$
 $5r-3s+5t=12 \dots (2)$
 $10r+s-5t=6 \dots (3)$

$$\begin{array}{r} r+s+t=0 \dots (1) \\ (-) 10r+s-5t=6 \dots (2) \\ \hline -9r+6t=-6 \\ -3r+2t=-2 \dots (4) \end{array}$$

$$\begin{array}{r} 3r+3s+3t=0 \dots (1) \times 3 \\ (+) 5r-3s+5t=12 \dots (2) \\ \hline 8r+8t=12 \\ 2r+2t=3 \dots (5) \end{array}$$

$$\begin{array}{r} -3r+2t=-2 \dots (4) \\ (-) 2r+2t=3 \dots (5) \\ \hline -5r=-5 \\ r=1 \end{array}$$

Daripada (4) : $-3(1)+2t=-2$

$$\begin{array}{l} 2t=3-2 \\ t=\frac{1}{2} \end{array}$$

Daripada (1) : $1+s+\frac{1}{2}=0$
 $s=-1.5$

$$\begin{aligned}
 \text{(c) } 2b + 3d + m &= -1 \dots (1) \\
 b - d - m &= -8 \dots (2) \\
 3b + d + 4m &= 11 \dots (3) \\
 & \quad b - d - m = -8 \dots (2) \\
 (+) \quad 3b + d + 4m &= 11 \dots (3) \\
 \hline
 & 4b + 3m = 3 \dots (4) \\
 & \quad 2b + 3d + m = -1 \dots (1) \\
 (+) \quad 3b - 3d - 3m &= -24 \dots (2) \times 3 \\
 \hline
 & 5b - 2m = -25 \dots (5) \\
 & \quad 8b + 6m = 6 \dots (4) \times 2 \\
 (+) \quad 15b - 6m &= -75 \dots (5) \times 3 \\
 \hline
 & 23b = -69 \\
 & \quad b = -3
 \end{aligned}$$

$$\begin{aligned}
 \text{Daripada (4): } 4(-3) + 3m &= 3 \\
 3m &= 15 \\
 m &= 5
 \end{aligned}$$

$$\begin{aligned}
 \text{Daripada (1):} \\
 2(-3) + 3d + 5 &= -1 \\
 3d &= 0 \\
 d &= 0
 \end{aligned}$$

$$\begin{aligned}
 \text{2 (a) } h + k &= 2 - m \\
 h + k + m &= 2 \dots (1) \\
 2h + 3m &= k + 9 \\
 2h - k + 3m &= 9 \dots (2) \\
 & \quad k + 2 = -3h + 2m \\
 3h + k - 2m &= -2 \dots (3)
 \end{aligned}$$

$$\begin{aligned}
 & \quad h + k + m = 2 \dots (1) \\
 (+) \quad 2h - k + 3m &= 9 \dots (2) \\
 \hline
 & 3h + 4m = 11 \dots (4)
 \end{aligned}$$

$$\begin{aligned}
 & \quad h + k + m = 2 \dots (1) \\
 (-) \quad 3h + k - 2m &= -2 \dots (3) \\
 \hline
 & -2h + 3m = 4 \dots (5)
 \end{aligned}$$

$$\begin{aligned}
 & \quad 6h + 8m = 22 \dots (4) \times 2 \\
 (+) \quad -6h + 9m &= 12 \dots (5) \times 3 \\
 \hline
 & 17m = 34 \\
 & \quad m = 2
 \end{aligned}$$

$$\begin{aligned}
 \text{Daripada (4): } 3h + 4m &= 11 \\
 3h + 4(2) &= 11 \\
 3h &= 3 \\
 h &= 1
 \end{aligned}$$

$$\begin{aligned}
 \text{Daripada (1):} \\
 1 + k + 2 &= 2 \\
 k &= -1
 \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad & 2h + k = m - 2 \\ & 2h + k - m = -2 \quad \dots (1) \end{aligned}$$

$$\begin{aligned} & h - m = k - 6 \\ & h - k - m = -6 \quad \dots (2) \end{aligned}$$

$$\begin{aligned} & h - 7 = -2k - 3m \\ & h + 2k + 3m = 7 \quad \dots (3) \end{aligned}$$

$$\begin{aligned} & 2h + k - m = -2 \quad \dots (1) \\ (+) \quad & h - k - m = -6 \quad \dots (2) \\ \hline & 3h - 2m = -8 \quad \dots (4) \end{aligned}$$

$$\begin{aligned} & 4h + 2k - 2m = -4 \quad \dots (1) \times 2 \\ (-) \quad & h + 2k + 3m = 7 \quad \dots (3) \\ \hline & 3h - 5m = -11 \quad \dots (5) \end{aligned}$$

$$\begin{aligned} & 3h - 2m = -8 \quad \dots (4) \\ (-) \quad & 3h - 5m = -11 \quad \dots (5) \\ \hline & 3m = 3 \\ & m = 1 \end{aligned}$$

Daripada (4) : $3h - 2(1) = -8$
 $3h = -6$
 $h = -2$

Daripada (1) : $2(-2) + k - 1 = -2$
 $k = -2 + 4 + 1$
 $k = 3$

$$\begin{aligned} \text{(c)} \quad & 2h + 3k = 9 - m \\ & 2h + 3k + m = 9 \quad \dots (1) \end{aligned}$$

$$\begin{aligned} & h - 11 = k - 4m \\ & h - k + 4m = 11 \quad \dots (2) \end{aligned}$$

$$\begin{aligned} & k - 5m = -3h - 23 \\ & 3h + k - 5m = -23 \quad \dots (3) \end{aligned}$$

$$\begin{aligned} & h - k + 4m = 11 \quad \dots (2) \\ (+) \quad & 3h + k - 5m = -23 \quad \dots (3) \\ \hline & 4h - m = -12 \quad \dots (4) \end{aligned}$$

$$\begin{aligned} & 2h + 3k + m = 9 \quad \dots (1) \\ (+) \quad & 3h - 3k + 12m = 33 \quad \dots (2) \\ \hline & 5h + 13m = 42 \quad \dots (5) \end{aligned}$$

$$\begin{aligned} & 52h - 13m = -156 \quad \dots (4) \times 13 \\ (+) \quad & 5h + 13m = 42 \quad \dots (5) \\ \hline & 57h = -114 \\ & h = -2 \end{aligned}$$

Daripada (4) : $4(-2) - m = -12$
 $m = 4$

Daripada (1) : $2h + 3k + m = 9$
 $2(-2) + 3k + 4 = 9$
 $3k = 9 + 4 - 4$
 $k = 3$

Praktis Formatif 3.1b

1 Jumlah pelaburan dalam ASB, ASW dan ASM ialah RM40 000.

$$x + y + z = 40\,000 \dots (1)$$

Jumlah pelaburan dalam ASM adalah RM10 000 lebih banyak daripada ASW.

$$z - y = 10\,000 \dots (2)$$

Dividen = RM3 400

$$\frac{7}{100}x + \frac{9}{100}y + \frac{9}{100}z = 3\,400$$

$$7x + 9y + 9z = 340\,000 \dots (3)$$

$$7x + 7y + 7z = 280\,000 \dots (1) \times 7$$

$$(-) \quad 7x + 9y + 9z = 340\,000 \dots (3)$$

$$\hline -2y - 2z = -60\,000$$

$$-y - z = -30\,000 \dots (4)$$

$$z - y = 10\,000 \dots (2)$$

$$(-) \quad -y - z = -30\,000 \dots (4)$$

$$\hline 2z = 40\,000$$

$$z = 20\,000$$

$$\text{Daripada (2): } 20\,000 - y = 10\,000$$

$$y = 10\,000$$

$$\text{Daripada (1): } \quad \quad \quad x + y + z = 40\,000$$

$$x + 10\,000 + 20\,000 = 40\,000$$

$$x = 10\,000$$

$$2 \quad 2x + 2y + z = 46\,000 \dots (1)$$

$$3x + 4y + 2z = 82\,000 \dots (2)$$

$$4x + 4y + 3z = 100\,000 \dots (3)$$

$$3x + 4y + 2z = 82\,000 \dots (2)$$

$$(-) \quad 4x + 4y + 3z = 100\,000 \dots (3)$$

$$\hline -x - z = -18\,000 \dots (4)$$

$$4x + 4y + 2z = 92\,000 \dots (1) \times 2$$

$$(-) \quad 3x + 4y + 2z = 82\,000 \dots (2)$$

$$\hline x = 10\,000$$

$$\text{Daripada (4): } -x - z = -18\,000$$

$$-10\,000 - z = -18\,000$$

$$z = 8\,000$$

Daripada (1):

$$2x + 2y + z = 46\,000$$

$$2(10\,000) + 2y + 8\,000 = 46\,000$$

$$2y = 18\,000$$

$$y = 9\,000$$

$$\begin{aligned}
3 \quad & 60x + 80y + 70z = 1\,660 \dots (1) \\
& 80x + 30y + 50z = 1\,100 \dots (2) \\
& 30x + 20y + 10z = 430 \dots (3) \\
& \underline{60x + 80y + 70z = 1\,660 \dots (1)} \\
(-) \quad & \underline{60x + 40y + 20z = 860 \dots (3) \times 2} \\
& 40y + 50z = 800 \dots (4) \\
& \underline{480x + 640y + 560z = 13\,280 \dots (1) \times 8} \\
(-) \quad & \underline{480x + 180y + 300z = 6\,600 \dots (2) \times 6} \\
& 460y + 260z = 6\,680 \dots (5) \\
& 4y + 5z = 80 \dots (4) \times \frac{1}{10} \\
& 23y + 13z = 334 \dots (5) \times \frac{1}{20} \\
& \underline{4y + 5z = 80 \dots (6)} \\
& \underline{23y + 13z = 334 \dots (7)} \\
& \underline{52y + 65z = 1\,040 \dots (6) \times 13} \\
(-) \quad & \underline{115y + 65z = 1\,670 \dots (7) \times 5} \\
& -63y = -630 \\
& y = 10 \\
& \text{Daripada (6) : } 4(10) + 5z = 80 \\
& \qquad \qquad \qquad z = 8 \\
& \text{Daripada (1) :} \\
& 60x + 80(10) + 70(8) = 1\,660 \\
& \qquad \qquad \qquad x = 5
\end{aligned}$$

Praktis Formatif 3.2a

$$\begin{aligned}
1 \text{ (a)} \quad & x + y = 1 \qquad \dots (1) \\
& 2x^2 + 2y^2 = 17 \qquad \dots (2)
\end{aligned}$$

Daripada (1) :

$$y = 1 - x \quad (3)$$

Gantikan (3) ke dalam (2) :

$$2x^2 + 2(1-x)^2 = 17$$

$$2x^2 + 2(1 - 2x + x^2) - 17 = 0$$

$$2x^2 + 2 - 4x + 2x^2 - 17 = 0$$

$$4x^2 - 4x - 15 = 0$$

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

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

Daripada (3) :

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

Apabila $x = -\frac{3}{2}$, $y = 1 - \left(-\frac{3}{2}\right) = \frac{5}{2}$

$$(b) \quad x + 1 = 2y \qquad \dots (1)$$

$$x^2 + xy - 26 = 0 \qquad \dots (2)$$

Daripada (1) :

$$x = 2y - 1 \quad (3)$$

Gantikan (3) ke dalam (2) :

$$(2y - 1)^2 + (2y - 1)y - 26 = 0$$

$$4y^2 - 4y + 1 + 2y^2 - y - 26 = 0$$

$$6y^2 - 5y - 25 = 0$$

$$(2y - 5)(3y + 5) = 0$$

$$y = \frac{5}{2} \text{ atau } y = -\frac{5}{3}$$

Apabila $y = \frac{5}{2}$, $x = 2\left(\frac{5}{2}\right) - 1 = 4$

Apabila $y = -\frac{5}{3}$, $x = 2\left(-\frac{5}{3}\right) - 1 = -\frac{13}{3}$

$$(c) \quad 2x + y + 2 = 0 \quad \dots (1)$$

$$x^2 + y^2 + 2x + 6y + 1 = 0 \quad \dots (2)$$

Daripada (1) :

$$y = -2x - 2 \quad \dots (3)$$

Gantikan (3) ke dalam (2) :

$$x^2 + (-2x - 2)^2 + 2x + 6(-2x - 2) + 1 = 0$$

$$x^2 + 4x^2 + 8x + 4 + 2x - 12x - 12 + 1 = 0$$

$$5x^2 - 2x - 7 = 0$$

$$(5x - 7)(x + 1) = 0$$

$$x = \frac{7}{5} \text{ atau } x = -1$$

$$\text{Apabila } x = \frac{7}{5}, y = -2\left(\frac{7}{5}\right) - 2 = -\frac{24}{5}$$

$$\text{Apabila } x = -1, y = -2(-1) - 2 = 0$$

$$(d) \quad x + y = 2 \quad \dots (1)$$

$$x^2 + xy + y^2 = 12 \quad \dots (2)$$

Daripada (1) :

$$y = 2 - x \quad \dots (3)$$

Gantikan (3) ke dalam (2) :

$$x^2 + x(2 - x) + (2 - x)^2 = 12$$

$$x^2 + 2x - x^2 + 4 - 4x + x^2 - 12 = 0$$

$$x^2 - 2x - 8 = 0$$

$$(x - 4)(x + 2) = 0$$

$$x = 4 \text{ atau } x = -2$$

Daripada (3) :

$$\text{Apabila } x = 4, y = 2 - 4 = -2$$

$$\text{Apabila } x = -2, y = 2 - (-2) = 4$$

$$2 \text{ (a) } 2x + 3y = 2 \quad \dots (1)$$

$$12x^2 + 18y^2 = 5 \quad \dots (2)$$

Daripada (1) :

$$2x + 3y = 2$$

$$y = \frac{2 - 2x}{3} \quad \dots (3)$$

Gantikan (3) ke dalam (2) :

$$12x^2 + 18\left(\frac{2 - 2x}{3}\right)^2 = 5$$

$$12x^2 + 18\left(\frac{4 - 8x + 4x^2}{9}\right) - 5 = 0$$

$$12x^2 + 2(4 - 8x + 4x^2) - 5 = 0$$

$$12x^2 + 8 - 16x + 8x^2 - 5 = 0$$

$$20x^2 - 16x + 3 = 0$$

$$(2x - 1)(10x - 3) = 0$$

$$x = \frac{1}{2} \text{ atau } x = \frac{3}{10}$$

Daripada (3) :

$$\text{Apabila } x = \frac{1}{2}, y = \frac{2 - 2\left(\frac{1}{2}\right)}{3} = \frac{1}{3}$$

$$\text{Apabila } x = \frac{3}{10}, y = \frac{2 - 2\left(\frac{3}{10}\right)}{3} = \frac{7}{15}$$

$$(b) \quad 3x + 2y = 1 \quad \dots (1)$$

$$6xy + 12y^2 = 1 \quad \dots (2)$$

Daripada (1) :

$$x = \frac{1 - 2y}{3} \quad \dots (3)$$

Gantikan (3) ke dalam (2) :

$$6y\left(\frac{1 - 2y}{3}\right) + 12y^2 = 1$$

$$2y(1 - 2y) + 12y^2 - 1 = 0$$

$$2y - 4y^2 + 12y^2 - 1 = 0$$

$$8y^2 + 2y - 1 = 0$$

$$(4y - 1)(2y + 1) = 0$$

$$y = \frac{1}{4} \text{ atau } y = -\frac{1}{2}$$

Daripada (3) :

$$\text{Apabila } y = \frac{1}{4}, x = \frac{1 - 2\left(\frac{1}{4}\right)}{3} = \frac{1}{6}$$

$$\text{Apabila } y = -\frac{1}{2}, x = \frac{1 - 2\left(-\frac{1}{2}\right)}{3} = \frac{2}{3}$$

$$(c) \quad 2x + 3y = 4 \quad \dots (1)$$

$$x^2 + xy + y^2 = 3 \quad \dots (2)$$

Daripada (1) :

$$y = \frac{4 - 2x}{3} \quad \dots (3)$$

Gantikan (3) ke dalam (2) :

$$x^2 + x\left(\frac{4 - 2x}{3}\right) + \left(\frac{4 - 2x}{3}\right)^2 - 3 = 0$$

$$9x^2 + 3x(4 - 2x) + (4 - 2x)^2 - 27 = 0$$

$$9x^2 + 12x - 6x^2 + 16 - 16x + 4x^2 - 27 = 0$$

$$7x^2 - 4x - 11 = 0$$

$$(7x - 11)(x + 1) = 0$$

$$x = \frac{11}{7} \text{ atau } x = -1$$

Daripada (3) :

$$\text{Apabila } x = \frac{11}{7}, y = \frac{4 - 2\left(\frac{11}{7}\right)}{3} = \frac{2}{7}$$

$$\text{Apabila } x = -1, y = \frac{4 - 2(-1)}{3} = 2$$

3 (a) $x - \frac{1}{2}y = \frac{5}{2}$

$$2x - y = 5$$

$$y = 2x - 5 \dots (1)$$

$$2x + y = -\frac{2}{y}$$

$$2xy + y^2 = -2$$

$$2xy + y^2 + 2 = 0 \dots (2)$$

Gantikan (1) ke dalam (2) :

$$2x(2x - 5) + (2x - 5)^2 + 2 = 0$$

$$4x^2 - 10x + 4x^2 - 20x + 25 + 2 = 0$$

$$8x^2 - 30x + 27 = 0$$

$$(4x - 9)(2x - 3) = 0$$

$$x = \frac{9}{4} \text{ atau } x = \frac{3}{2}$$

Daripada (1) :

$$\text{Apabila } x = \frac{9}{4}, y = 2\left(\frac{9}{4}\right) - 5 = -\frac{1}{2}$$

$$\text{Apabila } x = \frac{3}{2}, y = 2\left(\frac{3}{2}\right) - 5 = -2$$

(b) $\frac{x}{4} + \frac{y}{3} = 1$

$$\frac{3x + 4y}{12} = 1$$

$$3x + 4y = 12$$

$$y = \frac{12 - 3x}{4} \dots (1)$$

$$\frac{3}{y} - \frac{2}{x} = \frac{7}{12}$$

$$\frac{3x - 2y}{xy} = \frac{7}{12}$$

$$36x - 24y = 7xy$$

$$36x - 7xy - 24y = 0 \dots (2)$$

Gantikan (1) ke dalam (2) :

$$36x - 7x\left(\frac{12 - 3x}{4}\right) - 24\left(\frac{12 - 3x}{4}\right) = 0$$

$$144x - 7x(12 - 3x) - 24(12 - 3x) = 0$$

$$144x - 84x + 21x^2 - 288 + 72x = 0$$

$$21x^2 + 132x - 288 = 0$$

$$7x^2 + 44x - 96 = 0$$

$$(7x - 12)(x + 8) = 0$$

$$x = \frac{12}{7} \text{ atau } x = -8$$

Daripada (1) :

$$\text{Apabila } x = \frac{12}{7}, y = \frac{12 - 3\left(\frac{12}{7}\right)}{4} = \frac{12}{7}$$

$$\text{Apabila } x = -8, y = \frac{12 - 3(-8)}{4} = 9$$

4 (a) $12y^2 - 5x^2 = 2y - 5x = 7$

$$2y - 5x = 7$$

$$y = \frac{7 + 5x}{2} \dots (1)$$

$$12y^2 - 5x^2 = 7 \dots (2)$$

Gantikan (1) ke dalam (2) :

$$12\left(\frac{5x + 7}{2}\right)^2 - 5x^2 - 7 = 0$$

$$12\left(\frac{25x^2 + 70x + 49}{4}\right) - 5x^2 - 7 = 0$$

$$3(25x^2 + 70x + 49) - 5x^2 - 7 = 0$$

$$75x^2 + 210x + 147 - 5x^2 - 7 = 0$$

$$70x^2 + 210x + 140 = 0$$

$$x^2 + 3x + 2 = 0$$

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

$$x = -1 \text{ atau } x = -2$$

Daripada (1) :

$$\text{Apabila } x = -1, y = \frac{7 + 5(-1)}{2} = 1$$

$$\text{Apabila } x = -2, y = \frac{7 + 5(-2)}{2} = -\frac{3}{2}$$

(b) $x^2 - xy + y^2 = 2x + 2y = 12$

$$2x + 2y = 12$$

$$x + y = 6$$

$$y = -x + 6 \dots (1)$$

$$x^2 - xy + y^2 = 12 \dots (2)$$

Gantikan (1) ke dalam (2) :

$$x^2 - x(-x + 6) + (-x + 6)^2 = 12$$

$$x^2 + x^2 - 6x + x^2 - 12x + 36 - 12 = 0$$

$$3x^2 - 18x + 24 = 0$$

$$x^2 - 6x + 8 = 0$$

$$(x - 4)(x - 2) = 0$$

$$x = 4 \text{ atau } x = 2$$

Daripada (1) :
 Apabila $x=4$, $y=-4+6=2$
 Apabila $x=2$, $y=-2+6=4$

5 $x+3y+1=0$
 $x=-3y-1 \dots (1)$

$x^2+xy+y^2=4 \dots (2)$
 Gantikan (1) ke dalam (2) :
 $(-3y-1)^2+y(-3y-1)+y^2-4=0$
 $9y^2+6y+1-3y^2-y+y^2-4=0$
 $7y^2+5y-3=0$
 $y = \frac{-5 \pm \sqrt{5^2 - 4(7)(-3)}}{2(7)}$
 $y = \frac{-5 \pm \sqrt{109}}{14}$
 $y = 0.3886$ atau $y = -1.103$

Daripada (1) :
 Apabila $y=0.3886$,
 $x=-3(0.3886)-1 = -2.166$
 Apabila $y=-1.103$,
 $x=-3(-1.103)-1 = 2.309$

6 $3x+y+6=x^2+x-y=2$
 $3x+y+6=2$
 $3x+y=-4$
 $y=-3x-4 \dots (1)$

$x^2+x-y=2$
 $y=x^2+x-2 \dots (2)$

Gantikan (2) ke dalam (1) :
 $3x+(x^2+x-2)=-4$
 $x^2+4x+2=0$
 $x = \frac{-4 \pm \sqrt{4^2 - 4(1)(2)}}{2}$
 $x = \frac{-4 \pm \sqrt{8}}{2}$
 $x = -0.586$ atau $x = -3.414$

Daripada (1) :
 Apabila $x=-0.586$,
 $y=-3(-0.586)-4 = -2.242$
 Apabila $x=-3.414$,
 $y=-3(-3.414)-4 = 6.242$

7 $my+kx=8$
 $2m+3k=8$
 $m = \frac{8-3k}{2} \dots (1)$

$m^2y-k^2x+10=0$
 $2m^2-3k^2+10=0 \dots (2)$

Gantikan (1) ke dalam (2) :

$2\left(\frac{8-3k}{2}\right)^2 - 3k^2 + 10 = 0$
 $2\left(\frac{64-48k+9k^2}{4}\right) - 3k^2 + 10 = 0$
 $64-48k+9k^2-6k^2+20=0$
 $3k^2-48k+84=0$
 $k^2-16k+28=0$
 $(k-2)(k-14)=0$
 $k=2$ atau $k=14$

Daripada (1) :
 Apabila $k=2$, $m = \frac{8-3(2)}{2} = 1$
 Apabila $k=14$, $m = \frac{8-3(14)}{2} = -17$

Praktis Formatif 3.2b

1 Katakan dua nombor itu masing-masing ialah x dan y .

$y-x=2$
 $y=x+2 \dots (1)$
 $x^2+y^2=20 \dots (2)$

Daripada (1) : $y=x+2 \dots (3)$

Gantikan (3) ke dalam (2) :

$x^2+(x+2)^2=20$
 $x^2+x^2+4x+4-20=0$
 $2x^2+4x-16=0$
 $x^2+2x-8=0$
 $(x-2)(x+4)=0$
 $x=2$ atau $x=-4$

$x=-4$ tidak diterima.
 Maka, $x=2$.
 Apabila $x=2$, daripada (3),
 $y=2+2=4$

Maka, dua nombor yang dikehendaki ialah 2 dan 4.

2 Perimeter = 48

$4(10x)+2y=48$
 $20x+y=24$
 $y=24-20x \dots (1)$

Luas = 144 cm^2

$$2\left(\frac{1}{2} \times 12x \times 8x\right) + 12xy = 144$$

$$96x^2 + 12xy = 144$$

$$8x^2 + xy - 12 = 0 \dots (2)$$

Gantikan (1) ke dalam (2) :

$$8x^2 + x(24 - 20x) = 12$$

$$8x^2 + 24x - 20x^2 = 12$$

$$-12x^2 + 24x - 12 = 0$$

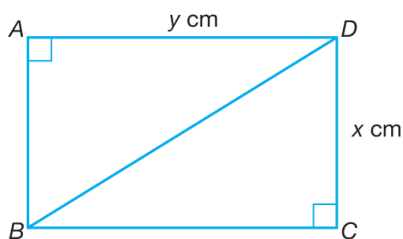
$$x^2 - 2x + 1 = 0$$

$$(x-1)^2 = 0$$

$$x = 1$$

Daripada (1) : $y = 24 - 20x = 24 - 20(1) = 4$

3



Perimeter = 18

$$2x + 2y = 18$$

$$x + y = 9$$

$$y = 9 - x \dots (1)$$

$$BD^2 = x^2 + y^2 = 45 \dots (2)$$

Gantikan (1) ke dalam (2) :

$$x^2 + (9-x)^2 = 45 \dots (2)$$

$$x^2 + 81 - 18x + x^2 - 45 = 0$$

$$2x^2 - 18x + 36 = 0$$

$$x^2 - 9x + 18 = 0$$

$$x = 6 \text{ atau } x = 3$$

$x = 6$ tidak diterima.

Maka, $x = 3$

Daripada (1), apabila $x = 3$, $y = 9 - 3 = 6$

Maka, panjang = 6 cm dan lebar = 3 cm

4

Perimeter = 56 cm

$$4(x+1) + 4(y-2) + 4(x+2) = 56$$

$$(x+1) + (y-2) + (x+2) = 14$$

$$2x + y = 13$$

$$y = 13 - 2x$$

Luas tapak = 15

$$(x+1)(y-2) = 15$$

$$xy - 2x + y - 2 - 15 = 0$$

$$x(13 - 2x) - 2x + (13 - 2x) - 17 = 0$$

$$-2x^2 + 13x - 2x - 2x + 13 - 17 = 0$$

$$-2x^2 + 9x - 4 = 0$$

$$2x^2 - 9x + 4 = 0$$

$$(x-4)(2x-1) = 0$$

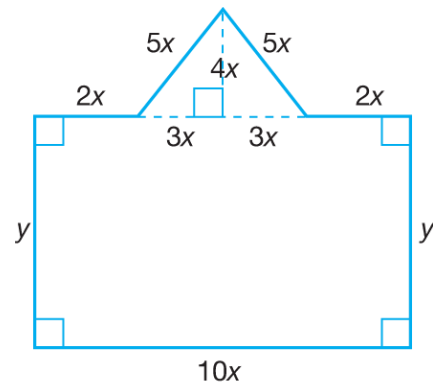
$$x = 4 \text{ atau } x = \frac{1}{2}$$

$x = \frac{1}{2}$ tidak diterima.

Maka, $x = 4$.

$$y = 13 - 2x = 13 - 2(4) = 5.$$

5



Perimeter = 36 m

$$10x + 4x + 10x + 2y = 36$$

$$24x + 2y = 36$$

$$12x + y = 18$$

$$y = 18 - 12x \dots (1)$$

Luas rantau yang dibatasi = 72

$$10xy + \frac{1}{2}(6x)(4x) = 72$$

$$10x(18 - 12x) + \frac{1}{2}(6x)(4x) = 72$$

$$10x(18 - 12x) + (3x)(4x) = 72$$

$$10x(2)(9 - 6x) + 12x^2 - 72 = 0$$

$$5x(9 - 6x) + 3x^2 - 18 = 0$$

$$45x - 30x^2 + 3x^2 - 18 = 0$$

$$-27x^2 + 45x - 18 = 0$$

$$9x^2 - 15x + 6 = 0$$

$$3x^2 - 5x + 2 = 0$$

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

$$x = 1 \text{ atau } x = \frac{2}{3}$$

Daripada (1) :

Apabila $x = 1$, $y = 18 - 12(1) = 6$

Apabila $x = \frac{2}{3}$, $y = 18 - 12\left(\frac{2}{3}\right) = 10$

6

Perimeter = 22 cm

$$3x + 4x + 5x + 2x + 2y = 22$$

$$14x + 2y = 22$$

$$7x + y = 11$$

$$y = 11 - 7x \dots (1)$$

Luas = 10 cm²

$$\frac{1}{2}(4x)(3x) + xy = 10$$

$$6x^2 + xy = 10$$

$$6x^2 + x(11 - 7x) = 10$$

$$6x^2 + 11x - 7x^2 - 10 = 0$$

$$-x^2 + 11x - 10 = 0$$

$$x^2 - 11x + 10 = 0$$

$$(x - 10)(x - 1) = 0$$

$$x = 10 \text{ atau } x = 1$$

$$x = 10 \text{ tidak diterima.}$$

$$x = 1$$

Daripada (1) : $y = 11 - 7(1) = 4$

Praktis Sumatif 3

1 $2(x + y) - 3z = 9$
 $2x + 2y - 3z = 9 \dots (1)$

$$3x - 5(y + z) = -10$$

$$3x - 5y - 5z = -10 \dots (2)$$

$$x + 2y + 3z = 3 \dots (3)$$

$$(1) + (3) : 3x + 4y = 12 \dots (4)$$

$$(1) \times 5 : 10x + 10y - 15z = 45 \dots (5)$$

$$(2) \times 3 : 9x - 15y - 15z = -30 \dots (6)$$

$$(5) - (6) : x + 25y = 75 \dots (7)$$

$$(7) \times 3 : 3x + 75y = 225 \dots (8)$$

$$(8) - (4) : 71y = 213$$

$$y = 3$$

Gantikan $y = 3$ ke dalam (8) :

$$3x + 75(3) = 225$$

$$x = 0$$

Gantikan $x = 0$ dan $y = 3$ ke dalam (1) :

$$2(0) + 2(3) - 3z = 9$$

$$z = -1$$

2 $2x + 6y + 5z + 1 = 0$
 $2x + 6y + 5z = -1 \dots (1)$

$$30(x - y - z) + 11 = 0$$

$$30x - 30y - 30z = -11 \dots (2)$$

$$6(x + y) - 10z - 9 = 0$$

$$6x + 6y - 10z = 9 \dots (3)$$

$$(1) \times 2 : 4x + 12y + 10z = -2 \dots (4)$$

$$(1) \times 6 : 12x + 36y + 30z = -6 \dots (5)$$

$$(3) + (4) : 10x + 18y = 7 \dots (6)$$

$$(2) + (5) : 42x + 6y = -17 \dots (7)$$

$$(7) \times 3 : 126x + 18y = -51 \dots (8)$$

$$(8) - (6) : 116x = -58$$

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

Gantikan $x = -\frac{1}{2}$ ke dalam (6) :

$$10\left(-\frac{1}{2}\right) + 18y = 7$$

$$18y = 12$$

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

Gantikan $x = -\frac{1}{2}$ dan $y = \frac{2}{3}$ ke dalam (1) :

$$2\left(-\frac{1}{2}\right) + 6\left(\frac{2}{3}\right) + 5z = -1$$

$$-1 + 4 + 5z = -1$$

$$5z = -4$$

$$z = -\frac{4}{5}$$

$$3 \quad \frac{1}{2}y + \frac{1}{3}z = 26$$

$$3y + 2z = 156 \dots (1)$$

$$\frac{1}{3}x + \frac{1}{4}z = 23$$

$$4x + 3z = 276 \dots (2)$$

$$\frac{1}{2}x + \frac{1}{4}y = 28$$

$$2x + y = 112 \dots (3)$$

$$y = -2x + 112 \dots (4)$$

Gantikan (4) ke dalam (1) :

$$3(-2x + 112) + 2z = 156$$

$$-6x + 336 + 2z = 156$$

$$-6x + 2z = -180$$

$$-3x + z = -90 \dots (5)$$

$$(5) \times 3 : -9x + 3z = -270 \dots (6)$$

$$(2) - (6) : \quad 13x = 546$$

$$x = 42$$

Gantikan $x = 42$ ke dalam (2) :

$$4(42) + 3z = 276$$

$$3z = 108$$

$$z = 36$$

Gantikan $x = 42$ ke dalam (4) :

$$y = -2(42) + 112 = 28$$

$$4 \quad 5x + 2y + 3z = 23.60 \dots (1)$$

$$3x + y + 2z = 14.20 \dots (2)$$

$$x + 3z = 4y \Rightarrow x - 4y + 3z = 0 \dots (3)$$

$$(2) \times 2 : 6x + 2y + 4z = 28.4 \dots (4)$$

$$(2) \times 4 : 12x + 4y + 8z = 56.8 \dots (5)$$

$$(4) - (1) : x + z = 4.8 \dots (6)$$

$$(3) + (5) : 13x + 11z = 56.8 \dots (7)$$

$$(6) \times 11 : 11x + 11z = 52.8 \dots (8)$$

$$(7) - (8) : 2x = 4$$

$$x = 2$$

Gantikan $x = 2$ ke dalam (7) :

$$13(2) + 11z = 56.8$$

$$11z = 30.8$$

$$z = 2.80$$

Gantikan $x = 2$ dan $z = 2.80$ ke dalam (1) :

$$5(2) + 2y + 3(2.8) = 23.60$$

$$2y = 5.2$$

$$y = 2.6$$

Maka, harga secawan kopi, secawan Milo dan segelas jus oren masing-masing ialah RM2.00, RM2.60 dan RM2.80.

$$5 \quad x + y + 2z = 260 \dots (1)$$

$$x + y + 4z = 340 \dots (2)$$

$$8x + 10y + 15z = 2200 \dots (3)$$

$$(2) - (1) : 2z = 80$$

$$z = 40$$

Gantikan $z = 40$ ke dalam (1) :

$$x + y + 2(40) = 260$$

$$x + y = 180 \dots (4)$$

Gantikan $z = 40$ ke dalam (3) :

$$8x + 10y + 15(40) = 2200$$

$$8x + 10y = 1600$$

$$4x + 5y = 800 \dots (5)$$

$$(4) \times 4 : 4x + 4y = 720 \dots (6)$$

$$(5) - (6) : y = 80$$

Gantikan $y = 80$ ke dalam (5) :

$$4x + 5(80) = 800$$

$$4x = 400$$

$$x = 100$$

Maka, bilangan perakam suara model P , Q dan R masing-masing ialah 100, 80 dan 40 buah.

$$6 \quad 5x + 3y + 4z = 360 \dots (1)$$

$$x + y + 2z = 120 \dots (2)$$

$$6x + 4y + 5z = 450 \dots (3)$$

$$(2) \times 5 : 5x + 5y + 10z = 600 \dots (4)$$

$$(2) \times 6 : 6x + 6y + 12z = 720 \dots (5)$$

$$(4) - (1) : 2y + 6z = 240 \dots (6)$$

$$(5) - (3) : 2y + 7z = 270 \dots (7)$$

$$(7) - (6) : z = 30$$

Gantikan $z = 30$ ke dalam (7) :

$$2y + 7(30) = 270$$

$$2y = 60$$

$$y = 30$$

Gantikan $y = 30$ dan $z = 30$ ke dalam (1) :

$$5x + 3(30) + 4(30) = 360$$

$$5x = 150$$

$$x = 30$$

Maka, bilangan sarung tangan nitril, vinil dan pembedahan yang dihasilkan masing-masing ialah 30, 30 dan 30 pasang.

7 $x + y + z = 240 \dots (1)$

$$x + y = 3z \Rightarrow x + y - 3z = 0 \dots (2)$$

$$3x + 2y + 4z = 700 \dots (3)$$

$$(1) - (2) :$$

$$4z = 240$$

$$z = 60$$

Gantikan $z = 60$ ke dalam (1) :

$$x + y + 60 = 240$$

$$x + y = 180 \dots (4)$$

Gantikan $z = 60$ ke dalam (3) :

$$3x + 2y + 4(60) = 700$$

$$3x + 2y = 460 \dots (5)$$

$$(4) \times 2 : 2x + 2y = 360 \dots (6)$$

$$(5) - (6) : x = 100$$

Gantikan $x = 100$ ke dalam (4) :

$$100 + y = 180$$

$$y = 80$$

Maka, bilangan oren, epal dan nanas yang dijual masing-masing ialah 100, 80 dan 60 biji.

8 (a) $y - 2x = 7 \dots (1)$

$$4x^2 + y^2 = 37 \dots (2)$$

Daripada (1) :

$$y = 2x + 7 \dots (3)$$

Gantikan (3) ke dalam (2) :

$$4x^2 + (2x + 7)^2 = 37$$

$$4x^2 + 4x^2 + 28x + 49 - 37 = 0$$

$$8x^2 + 28x + 12 = 0$$

$$4x^2 + 14x + 6 = 0$$

$$2x^2 + 7x + 3 = 0$$

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

$$x = -\frac{1}{2} \text{ atau } x = -3$$

Daripada (3) :

$$\text{Apabila } x = -\frac{1}{2}, y = 2\left(-\frac{1}{2}\right) + 7 = 6$$

$$\text{Apabila } x = -3, y = 2(-3) + 7 = 1$$

(b) $2x + y = 5 \dots (1)$

$$x^2 - xy = 12 \dots (2)$$

Daripada (1) :

$$y = 5 - 2x \dots (3)$$

Gantikan (3) ke dalam (2) :

$$x^2 - x(5 - 2x) - 12 = 0$$

$$x^2 - 5x + 2x^2 - 12 = 0$$

$$3x^2 - 5x - 12 = 0$$

$$(x - 3)(3x + 4) = 0$$

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

Daripada (3) :

$$\text{Apabila } x = 3, y = 5 - 2(3) = -1$$

$$\text{Apabila } x = -\frac{4}{3}, y = 5 - 2\left(-\frac{4}{3}\right) = \frac{23}{3}$$

(c) $3x - y = 7 \dots (1)$

$$x^2 - xy + y^2 = 7 \dots (2)$$

Daripada (1) :

$$y = 3x - 7 \dots (3)$$

Gantikan (3) ke dalam (2) :

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

$$x^2 - 3x^2 + 7x + 9x^2 - 42x + 49 - 7 = 0$$

$$7x^2 - 35x + 42 = 0$$

$$x^2 - 5x + 6 = 0$$

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

$$x = 3 \text{ atau } x = 2$$

Daripada (3) :

$$\text{Apabila } x = 3, y = 3(3) - 7 = 2$$

$$\text{Apabila } x = 2, y = 3(2) - 7 = -1$$

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

$$x^2 + y^2 = 7 - xy \dots (2)$$

Daripada (1) :

$$y = \frac{7 - 2x}{3} \dots (3)$$

Gantikan (3) ke dalam (2) :

$$x^2 + \left(\frac{7 - 2x}{3}\right)^2 - 7 + x\left(\frac{7 - 2x}{3}\right) = 0$$

$$x^2 + \left(\frac{49 - 28x + 4x^2}{9}\right) - 7 + x\left(\frac{7 - 2x}{3}\right) = 0$$

$$9x^2 + 49 - 28x + 4x^2 - 63 + 3x(7 - 2x) = 0$$

$$9x^2 + 49 - 28x + 4x^2 - 63 + 21x - 6x^2 = 0$$

$$7x^2 - 7x - 14 = 0$$

$$x^2 - x - 2 = 0$$

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

$$x = 2 \text{ atau } x = -1$$

Daripada (3) :

$$\text{Apabila } x = 2, y = \frac{7-2(2)}{3} = 1$$

$$\text{Apabila } x = -1, y = \frac{7-2(-1)}{3} = 3$$

(b) $2x + 3y = 1 \quad \dots (1)$

$$3x^2 + 4xy - y^2 - 6 = 0 \quad \dots (2)$$

$$\text{Daripada (1) : } y = \frac{1-2x}{3} \quad \dots (3)$$

Gantikan (3) ke dalam (2) :

$$3x^2 + 4x\left(\frac{1-2x}{3}\right) - \left(\frac{1-2x}{3}\right)^2 - 6 = 0$$

$$3x^2 + 4x\left(\frac{1-2x}{3}\right) - \frac{1-4x+4x^2}{9} - 6 = 0$$

$$27x^2 + 12x(1-2x) - (1-4x+4x^2) - 54 = 0$$

$$27x^2 + 12x - 24x^2 - 1 + 4x - 4x^2 - 54 = 0$$

$$-x^2 + 16x - 55 = 0$$

$$x^2 - 16x + 55 = 0$$

$$(x-5)(x-11) = 0$$

$$x = 5 \text{ atau } x = 11$$

Daripada (3) :

$$\text{Apabila } x = 5, y = \frac{1-2(5)}{3} = -3$$

$$\text{Apabila } x = 11, y = \frac{1-2(11)}{3} = -7$$

10 (a) $\frac{x}{3} + \frac{y}{4} = \frac{9}{2}$

$$4x + 3y = 54$$

$$y = \frac{54-4x}{3} \quad \dots (1)$$

$$\frac{3}{x} + \frac{4}{y} = 1$$

$$3y + 4x = xy \quad \dots (2)$$

Gantikan (1) ke dalam (2) :

$$3\left(\frac{54-4x}{3}\right) + 4x - x\left(\frac{54-4x}{3}\right) = 0$$

$$54 - 4x + 4x - x\left(\frac{54-4x}{3}\right) = 0$$

$$162 - x(54-4x) = 0$$

$$162 - 54x + 4x^2 = 0$$

$$2x^2 - 27x + 81 = 0$$

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

$$x = 9 \text{ atau } x = \frac{9}{2}$$

Daripada (1) :

$$\text{Apabila } x = 9, y = \frac{54-4(9)}{3} = 6$$

$$\text{Apabila } x = \frac{9}{2}, y = \frac{54-4\left(\frac{9}{2}\right)}{3} = 12$$

(b) $\frac{2y}{3} - \frac{x}{2} = \frac{2}{3}$

$$4y - 3x = 4$$

$$y = \frac{4+3x}{4} \quad \dots (1)$$

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

$$2y + 3x = 3xy$$

$$2y + 3x - 3xy = 0 \quad \dots (2)$$

Gantikan (1) ke dalam (2) :

$$2\left(\frac{4+3x}{4}\right) + 3x - 3x\left(\frac{4+3x}{4}\right) = 0$$

$$2(4+3x) + 12x - 3x(4+3x) = 0$$

$$8 + 6x + 12x - 12x - 9x^2 = 0$$

$$-9x^2 + 6x + 8 = 0$$

$$9x^2 - 6x - 8 = 0$$

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

$$x = \frac{4}{3} \text{ atau } x = -\frac{2}{3}$$

Daripada (1) :

$$\text{Apabila } x = \frac{4}{3}, y = \frac{4+3\left(\frac{4}{3}\right)}{4} = 2$$

$$\text{Apabila } x = -\frac{2}{3}, y = \frac{4+3\left(-\frac{2}{3}\right)}{4} = \frac{1}{2}$$

11 (a) $4y - 4x = 24$

$$y - x = 6$$

$$y = x + 6 \quad \dots (1)$$

$$3x^2 + y^2 - 4y = 24 \quad \dots (2)$$

Gantikan (1) ke dalam (2) :

$$3x^2 + (x+6)^2 - 4(x+6) - 24 = 0$$

$$3x^2 + x^2 + 12x + 36 - 4x - 24 - 24 = 0$$

$$4x^2 + 8x - 12 = 0$$

$$x^2 + 2x - 3 = 0$$

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

$$x = 1 \text{ atau } x = -3$$

Daripada (1) :

Apabila $x=1$, $y=1+6=7$

Apabila $x=-3$, $y=-3+6=3$

(b) $3(4x-3y)=45$

$$4x-3y=15$$

$$x = \frac{15+3y}{4} \dots (1)$$

$$8x^2 - 27y^2 = 45 \dots (2)$$

Gantikan (1) ke dalam (2) :

$$8\left(\frac{15+3y}{4}\right)^2 - 27y^2 = 45$$

$$8\left(\frac{225+90y+9y^2}{16}\right) - 27y^2 - 45 = 0$$

$$\left(\frac{225+90y+9y^2}{2}\right) - 27y^2 - 45 = 0$$

$$225+90y+9y^2 - 54y^2 - 90 = 0$$

$$-45y^2 + 90y + 135 = 0$$

$$45y^2 - 90y - 135 = 0$$

$$9y^2 - 18y - 27 = 0$$

$$3y^2 - 6y - 9 = 0$$

$$y^2 - 2y - 3 = 0$$

$$(y-3)(y+1) = 0$$

$$y=3 \text{ atau } y=-1$$

Daripada (1) :

$$\text{Apabila } y=3, x = \frac{15+3(3)}{4} = 6$$

$$\text{Apabila } y=-1, x = \frac{15+3(-1)}{4} = 3$$

12 $Q=P$

$$-2y=3-x$$

$$x=3+2y \dots (1)$$

$$Q=R$$

$$-2y=x(5+9y)$$

$$-2y=5x+9xy$$

$$-2y-5x-9xy=0 \dots (2)$$

Gantikan (1) ke dalam (2) :

$$-2y-5(2y+3)-9y(2y+3)=0$$

$$-2y-10y-15-18y^2-27y=0$$

$$-18y^2-39y-15=0$$

$$18y^2+39y+15=0$$

$$6y^2+13y+5=0$$

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

$$y = -\frac{5}{3} \text{ atau } -\frac{1}{2}$$

Daripada (1) :

$$\text{Apabila } y = -\frac{5}{3}, x = 3 + 2\left(-\frac{5}{3}\right) = -\frac{1}{3}$$

$$\text{Apabila } y = -\frac{1}{2}, x = 3 + 2\left(-\frac{1}{2}\right) = 2$$

13 $y+2x=4$

$$3k+2(2h)=4$$

$$3k+4h=4$$

$$k = \frac{4-4h}{3} \dots (1)$$

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

$$\frac{2}{3k} - \frac{3}{2(2h)} = 1$$

$$\frac{8h-9k}{12hk} = 1$$

$$8h-9k=12hk \dots (2)$$

Gantikan (1) ke dalam (2) :

$$9h-9\left(\frac{4-4h}{3}\right)=12h\left(\frac{4-4h}{3}\right)$$

$$8h-3(4-4h)=4h(4-4h)$$

$$8h-12+12h=16h-16h^2$$

$$16h^2+4h-12=0$$

$$4h^2+h-3=0$$

$$(4h-3)(h+1)=0$$

$$h = \frac{3}{4} \text{ atau } -1$$

Daripada (1) :

$$\text{Apabila } h = \frac{3}{4}, k = \frac{4-4\left(\frac{3}{4}\right)}{3} = \frac{1}{3}$$

$$\text{Apabila } h = -1, k = \frac{4-4(-1)}{3} = \frac{8}{3}$$

14 $x - \frac{1}{2}y = \frac{5}{2}$

$$2x - y = 5$$

$$y = 2x - 5 \dots (1)$$

$$2x + y = -\frac{2}{y}$$

$$2xy + y^2 = -2$$

$$2x(2x-5) + (2x-5)^2 + 2 = 0$$

$$4x^2 - 10x + 4x^2 - 20x + 25 + 2 = 0$$

$$8x^2 - 30x + 27 = 0$$

$$(4x-9)(2x-3) = 0$$

$$x = \frac{9}{4} \text{ atau } x = \frac{3}{2}$$

Daripada (1) :

$$\text{Apabila } x = \frac{9}{4}, y = 2\left(\frac{9}{4}\right) - 5 = -\frac{1}{2}$$

$$\text{Apabila } x = \frac{3}{2}, y = 2\left(\frac{3}{2}\right) - 5 = -2$$

15 $x - y = 1$

$$x = 1 + y \dots (1)$$

$$x^2 + 3y = 6 \dots (2)$$

Gantikan (1) ke dalam (2) :

$$(1 + y)^2 + 3y = 6$$

$$1 + 2y + y^2 + 3y - 6 = 0$$

$$y^2 + 5y - 5 = 0$$

$$y = \frac{-5 \pm \sqrt{5^2 - 4(1)(-5)}}{2(1)}$$

$$y = \frac{-5 \pm \sqrt{45}}{2(1)}$$

$$y = 0.854 \text{ atau } -5.854$$

$$\text{Apabila } y = 0.854, x = 1.854$$

$$\text{Apabila } y = -5.854, x = -4.851$$

16 $3x + y + 4 = 0$

$$y = -3x - 4 \dots (1)$$

$$xy + 40 = y^2$$

$$x(-3x - 4) + 40 - (-3x - 4)^2 = 0$$

$$-3x^2 - 4x + 40 - (9x^2 + 24x + 16) = 0$$

$$-3x^2 - 4x + 40 - 9x^2 - 24x - 16 = 0$$

$$-12x^2 - 28x + 24 = 0$$

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

$$x = -3 \text{ atau } x = \frac{2}{3}$$

Daripada (1) :

$$\text{Apabila } x = -3, y = -3(-3) - 4 = 5$$

$$\text{Apabila } x = \frac{2}{3}, y = -3\left(\frac{2}{3}\right) - 4 = -6$$

17 $m - 2n = -1$

$$m = 2n - 1 \dots (1)$$

$$mn + n - 3m = 0$$

$$n(2n - 1) + n - 3(2n - 1) = 0$$

$$2n^2 - n + n - 6n + 3 = 0$$

$$2n^2 - 6n + 3 = 0$$

$$n = \frac{6 \pm \sqrt{(-6)^2 - 4(2)(3)}}{2(2)}$$

$$n = \frac{6 \pm \sqrt{12}}{4}$$

$$n = 2.366 \text{ atau } n = 0.634$$

Daripada (1) :

$$\text{Apabila } n = 2.366, m = 2(2.366) - 1 = 3.732$$

$$\text{Apabila } n = 0.634, m = 2(0.634) - 1 = 0.268$$

18 Perimeter = 42

$$10 + x + y + 30 - 3y + x = 42$$

$$2x - 2y - 2 = 0$$

$$x - y - 1 = 0$$

$$x = y + 1 \dots (1)$$

$$\text{Luas} = 86 \text{ cm}^2$$

$$10x + (10 - y)^2 = 86$$

$$10x + 100 - 20y + y^2 - 86 = 0$$

$$10x + 14 - 20y + y^2 = 0$$

Gantikan $x = y + 1$,

$$10(y + 1) + 14 - 20y + y^2 = 0$$

$$10y + 10 + 14 - 20y + y^2 = 0$$

$$y^2 - 10y + 24 = 0$$

$$(y - 6)(y - 4) = 0$$

$$y = 6 \text{ atau } y = 4$$

Daripada (1) :

$$y = 6, x = 6 + 1 = 7$$

$$y = 4, x = 4 + 1 = 5$$

19 Perimeter = 70 cm

$$5x + y + 12x + y + 13x = 70$$

$$30x + 2y = 70$$

$$15x + y = 35$$

$$y = 35 - 15x \dots (1)$$

$$\text{Luas} = 240 \text{ cm}^2$$

$$\frac{1}{2} \times 12x \times 5x + 12xy = 240$$

$$30x^2 + 12xy = 240$$

$$10x^2 + 4xy = 80$$

$$5x^2 + 2xy = 40 \dots (2)$$

Gantikan (1) ke dalam (2) :

$$5x^2 + 2x(35 - 15x) = 40$$

$$5x^2 + 70x - 30x^2 - 40 = 0$$

$$-25x^2 + 70x - 40 = 0$$

$$5x^2 - 14x + 8 = 0$$

$$(x - 2)(5x - 4) = 0$$

$$x = 2 \text{ atau } x = \frac{4}{5}$$

Daripada (1) :

$$\text{Apabila } x = 2, y = 35 - 15(2) = 5$$

$$\text{Apabila } x = \frac{4}{5}, y = 35 - 15\left(\frac{4}{5}\right) = 23$$

20 Luas = 28 cm²

$$7xy = 28$$

$$xy = 4 \dots (1)$$

$$\text{Perimeter} = 26 \text{ cm}$$

$$7x + y + y + \left(\frac{22}{7} \times \frac{7}{2}x\right) = 26$$

$$7x + 2y + 11x = 26$$

$$18x + 2y = 26$$

$$9x + y = 13$$

$$y = 13 - 9x \dots (2)$$

Gantikan (2) ke dalam (1) :

$$x(13 - 9x) = 4$$

$$13x - 9x^2 = 4$$

$$9x^2 - 13x + 4 = 0$$

$$(x-1)(9x-4) = 0$$

$$x = 1 \text{ atau } x = \frac{4}{9}$$

$$x = \frac{4}{9} \text{ tidak diterima.}$$

$$\therefore x = 1$$

$$\text{Daripada (2) : } y = 13 - 9(1) = 4$$

21 Perimeter kolam ikan = 48 m

$$2(x-10) + 2(30-y) = 48$$

$$x-10+30-y=24$$

$$x-y=4$$

$$y=x-4 \dots (1)$$

Luas kawasan yang ditanam dengan betik = 460 m²

$$(30 \times 10) + y(x-10) = 460$$

$$-160 + xy - 10y = 0 \dots (2)$$

Gantikan (1) ke dalam (2) :

$$-160 + x(x-4) - 10(x-4) = 0$$

$$-160 + x^2 - 4x - 10x + 40 = 0$$

$$x^2 - 14x - 120 = 0$$

$$(x-20)(x+6) = 0$$

$$x = 20 \text{ atau } x = -6$$

$$x = -6 \text{ tidak diterima.}$$

Maka, $x = 20$

Apabila $x = 20$, $y = 20 - 4 = 16$

22 Perimeter = 30

$$x + (x+y) + (2x+3) = 30$$

$$4x + y = 27$$

$$y = 27 - 4x \dots (1)$$

Dengan menggunakan teorem Pythagoras,

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

$$x^2 + x^2 + 2xy + y^2 = 4x^2 + 12x + 9$$

$$2x^2 - 2xy - y^2 + 12x + 9 = 0 \dots (2)$$

$$2x^2 - 2x(27-4x) - (27-4x)^2 + 12x + 9 = 0$$

$$2x^2 - 54x + 8x^2 - (729 - 216x + 16x^2) + 12x + 9 = 0$$

$$-6x^2 + 174x - 720 = 0$$

$$6x^2 - 174x + 720 = 0$$

$$x^2 - 29x + 120 = 0$$

$$(x-5)(x-24) = 0$$

$$x = 5 \text{ atau } x = 24$$

$x = 24$ tidak diterima kerana ia akan menyebabkan nilai y menjadi negatif.

Maka, $x = 5$.

$$\text{Daripada (1) : } y = 27 - 4(5) = 7$$

Panjang sisi masing-masing ialah $x = 5$ m,

$(x+y) = 12$ m dan $(2x+3) = 13$ m.