

## LINEAR EQUATION IN TWO UNKNOWNNS

Form 2 Regular Course  
Vol 5

### Part 3 - Advanced problem

$$2. \quad (b) \quad \begin{cases} 2x + y - 120 = 20 + x \\ 20 + x = 2x - y \end{cases}$$

$$\begin{cases} x + y = 140 & \dots\dots (1) \\ 20 + y = x & \dots\dots (2) \end{cases}$$

$$\text{By(1), } 20 + y + y = 140$$

$$2y = 120$$

$$y = 60$$

$$\text{By(2), } 20 + y = x$$

$$x = 80$$

$$\therefore x = 80, \quad y = 60$$

$$(c) \quad \begin{cases} \frac{3x}{2} - y = 4 \dots\dots (1) \\ \frac{x}{2} + y = 4 \dots\dots (2) \end{cases}$$

$$(1) + (2),$$

$$\frac{3x}{2} + \frac{x}{2} = 8$$

$$2x = 8$$

$$x = 4$$

$$\text{By(1), } x = 4$$

$$\therefore x = 4, \quad y = 2$$

$$(d) \begin{cases} 8x+15y+1=2-4x-3y.....(1) \\ 8x+15y+1=x+25y+5.....(2) \end{cases}$$

$$\begin{cases} 12x+18y-1=0.....(1) \\ 7x-10y-4=0.....(2) \end{cases}$$

$$\text{From (1), } x = \frac{1-18y}{12}$$

$$\text{By(2), } 7\left(\frac{1-18y}{12}\right)-10y-4=0$$

$$7(1-18y)-120y-48=0$$

$$7-126y-120y-48=0$$

$$y = -\frac{1}{6}$$

$$x = \frac{1-18\left(-\frac{1}{6}\right)}{12} = \frac{1}{3}$$

$$\therefore x = \frac{1}{3}, \quad y = -\frac{1}{6}$$

$$3. (d) \begin{cases} 3x + y = 7 & \dots\dots (1) \\ 2x - 4y = 14 & \dots\dots (2) \end{cases}$$

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

$$\text{By(2), } 2x - 4y = 14$$

$$2x - 28 + 12x = 14$$

$$14x = 42$$

$$x = 3$$

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

$$y = -2$$

$$\therefore x = 3, y = -2$$

$$(e) \begin{cases} 2x - 15y = 30 & \dots\dots (1) \\ 6x - 40y = 80 & \dots\dots (2) \end{cases}$$

$$(2) - (1) \times 3$$

$$45y - 40 = 80 - 90$$

$$5y = -10$$

$$y = -2$$

$$\text{By(1), } 2x - 15y = 30$$

$$x = 0$$

$$\therefore x = 0, y = -2$$

$$4. \quad (a) \begin{cases} 4y + 4x = xy & \dots\dots (1) \\ 4y + 8x = 3xy & \dots\dots (2) \end{cases}$$

$$(2) - (1),$$

$$4x = 2xy$$

$$4 = 2y$$

$$y = 2$$

$$\text{By(1), } 4y + 4x = xy$$

$$8 + 4x = 2x$$

$$2x = -8$$

$$x = -4$$

$$\therefore x = -4, y = 2$$

$$(b) \begin{cases} 2y + 3x = -xy & \dots\dots (1) \\ 8y + 9x = -2xy & \dots\dots (2) \end{cases}$$

$$(2) - (1) \times 4$$

$$9x - 12x = -2xy + 4xy$$

$$-3x = 2xy$$

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

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

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

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

$$x = 2$$

$$\therefore x = 2, y = -\frac{3}{2}$$

$$(c) \begin{cases} 3y - 4x = 0 & \dots\dots (1) \\ 6y - 20x = -3xy & \dots\dots (2) \end{cases}$$

$$(2) - (1) \times 2$$

$$-20x + 8x = -3xy$$

$$-12x = -3xy$$

$$y = 4$$

$$\text{By(1), } 3y - 4x = 0$$

$$4x = 12$$

$$x = 3$$

$$\therefore x = 3, y = 4$$



$$5. \quad (a) \quad \begin{cases} y = x - 1 \dots\dots(1) \\ 2y = x \dots\dots(2) \end{cases}$$

$$(2) - (1), \quad y = 1$$

$$x = 2(1) = 2$$

$$(b) \quad \begin{cases} (m+1)n = (m-1)(n+2) \\ (m+6)(n+2) = (m+4)(n+3) \\ mn + n = mn - n + 2m - 2 \\ mn + 6n + 2m + 12 = mn + 4n + 3m + 12 \\ n = m - 1 \\ 2n = m \end{cases}$$

By (a),  $n = 1$  and  $m = 2$ .

$$7. \quad (a) \quad \begin{cases} 7x + 10y = -2 \dots\dots(1) \\ 4y - 3x = 5 \dots\dots(2) \end{cases}$$

$$3 \times (1) + 7 \times 2,$$

$$21x + 30y + 28y - 21x = -6 + 35$$

$$58y = 29$$

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

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

$$x = -1$$

$$(b) \quad \begin{cases} 7n + 5m = -2mn \\ 2m - 3n = 5mn \\ 7\left(\frac{1}{m}\right) + 10\left(\frac{1}{2n}\right) = -2 \\ 4\left(\frac{1}{2n}\right) - 3\left(\frac{1}{m}\right) = 5 \end{cases}$$

$$\text{By (a), } \frac{1}{m} = -1$$

$$m = -1$$

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

$$n = 1$$