

1. $b(x) = x^2 + 4x + 2a$

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

~~$$x B = \frac{e}{a}$$~~

~~$$x \times \frac{2}{x} = \frac{2a}{1}$$~~

~~$$2 = 2a$$~~

$$\boxed{a = 1}$$

$$\begin{array}{r} 25 \\ \hline 25 \\ \hline \end{array}$$

184

2. 5 zeroes

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

$$x = 0, B = 2$$

$$x + 0 = 0$$

$$x = 0$$

$$x - 2 = 0$$

$$x = 2$$

4. $x = -2$

~~$$b(x) = 3x^2 + 4x + 2k$$~~

~~$$b(-2) = 3(-2)^2 + 4(-2) + 2k$$~~

~~$$0 = 12 - 8 + 2k$$~~

~~$$\frac{-4}{2} = k$$~~

$$\boxed{k = -2}$$

5. $x = -3$

$$b(-3) = (k-1)(-3)^2 + k(-3) + 1$$

$$0 = 9k - 9 - 3k + 1$$

$$8 = 6k$$

$$\boxed{k = \frac{4}{3}}$$

6. (a) $\alpha + \beta = -2\sqrt{3}$
 $\alpha\beta = -9$

$$\text{Poly}^n = k(x^2 - (\alpha + \beta)x + \alpha\beta)$$

$$= \boxed{k(x^2 + 2\sqrt{3}x - 9)}$$

(b) $\alpha + \beta = -\frac{3}{2\sqrt{5}}$

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

$$\text{Poly}^n = k[x^2 - (\alpha + \beta)x + \alpha\beta]$$

$$= k\left[x^2 + \frac{3x}{2\sqrt{5}} - \frac{1}{2}\right]$$

$$= k\left[x^2 + \frac{3\sqrt{5}x}{10} - \frac{1}{2}\right]$$

$$\textcircled{2} = \frac{1}{10} [10x^2 + 3\sqrt{5}x - 5]$$

$$= \boxed{10x^2 + 3\sqrt{5}x - 5}$$

7. $p(x) = x^2 + 2\sqrt{2}x - 6$
 $= x^2 + 3\sqrt{2}x - \sqrt{2}x - 6$
 $= x(x + 3\sqrt{2}) - \sqrt{2}(x + 3\sqrt{2})$
 $= (x - \sqrt{2})(x + 3\sqrt{2})$

$$3 \times 1 \times \sqrt{2} \times \sqrt{2}$$

$$= 6$$

$\textcircled{2}$

∴ $x - \sqrt{2} = 0$

$$x = \sqrt{2}$$

$$\alpha = \sqrt{2}$$

$$x + 3\sqrt{2} = 0$$

$$x = -3\sqrt{2}$$

$$\beta = -3\sqrt{2}$$

8. Given, $\alpha = 7\beta$

$$p(x) = 3x^2 + 8x + 2k + 1$$

$$a = 3, b = 8, c = 2k + 1$$

$$\alpha\beta = \frac{c}{a}$$

$$\alpha + \beta = \frac{-b}{a}$$

$$7\beta(\beta) = \frac{2k+1}{3}$$

$$7\beta + \beta = \frac{-8}{3}$$

$$7\beta^2 \times 3 = 2k+1$$

$$\cancel{8\beta} = \frac{-8}{3}$$

$$\beta^2 = \frac{2k+1}{21}$$

$$\boxed{\beta = -\frac{1}{3}} \quad \text{--- ①}$$

From ①,

$$7\left(-\frac{1}{3}\right)^2 = \frac{2k+1}{21}$$

$$\frac{1 \times 21^7}{9 \times 3} = 2k+1$$

$$\frac{7-1}{3} = 2k$$

$$\frac{7-3}{3} = 2k$$

$$\frac{4 \times 2}{3 \times 2} = k$$

$$\boxed{k = \frac{2}{3}}$$

②

9. $p(x) = x^2 - (k+6)x + 2(2k-1)$, $a=1$, $b=-(k+6)$
 $c = 2(2k-1)$

$$\alpha + \beta = \frac{1}{2} \alpha \beta$$

$$\frac{-b}{a} = \frac{1}{2} \times \frac{c}{a}$$

$$\frac{-(k+6)}{1} = \frac{1}{2} \times \frac{2(2k-1)}{1}$$

$$k+6 = 2k-1$$

$$7 = 2k - k$$

$$\boxed{k = 7}$$

③

$$10. \quad p(x) = x^2 - 4\sqrt{3}x + 3$$

$$\alpha + \beta - \alpha\beta$$

$$= -\frac{b}{a} - \frac{c}{a}$$

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

$$= -\cancel{4\sqrt{3}} - \frac{3}{1}$$

$$= 4\sqrt{3} - 3$$

$$= \sqrt{3}(4 - \sqrt{3})$$

3

$$11. \quad p(x) = 5\sqrt{5}x^2 + 30x + 8\sqrt{5}$$

$$40 \times 5$$

$$= 5\sqrt{5}x^2 + 20x + 10x + 8\sqrt{5}$$

$$20 \times 10$$

$$(II) \quad = 5x(\sqrt{5}x + 4) + 2\sqrt{5}(\sqrt{5}x + 4)$$

$$= (5x + 2\sqrt{5})(\sqrt{5}x + 4)$$

$$5x + 2\sqrt{5} = 0$$

$$5x = -2\sqrt{5}$$

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

$$\alpha = -\frac{2\sqrt{5}}{5}$$

$$\sqrt{5}x + 4 = 0$$

$$\sqrt{5}x = -4$$

$$x = -\frac{4}{\sqrt{5}}$$

$$\beta = -\frac{4\sqrt{5}}{5}$$

$$\text{Sum: } \alpha + \beta = -\frac{b}{a}$$

$$-\frac{2\sqrt{5}}{5} + \left(-\frac{4\sqrt{5}}{5}\right) = -\frac{30}{5\sqrt{5}}$$

$$-\frac{2\sqrt{5} - 4\sqrt{5}}{5} = -\frac{30 \times 6}{8\sqrt{5}}$$

$$-\frac{6\sqrt{5}}{5} = -\frac{30 \times 6}{8\sqrt{5}}$$

$$-\frac{6\sqrt{5}}{5} = -\frac{6 \times \sqrt{5}}{\sqrt{5} \times \sqrt{5}}$$

$$-\frac{6\sqrt{5}}{5} = -\frac{6\sqrt{5}}{5}$$

$$L.H.S = R.H.S$$

Product:

$$\alpha \beta = \frac{c}{a}$$

$$\frac{-2\sqrt{3}}{5\sqrt{3}} \times \frac{-4\sqrt{3}}{5} = \frac{8\sqrt{3}}{5\sqrt{3}}$$

$$\Rightarrow \frac{8}{5} = \frac{8}{5}$$

$$L.H.S = R.H.S$$

~~B~~

12.

$$p(y) = 7y^2 - \frac{11}{3}y - \frac{2}{3}$$

$$0 = \frac{21y^2 - 11y - 2}{3}$$

$$= 21y^2 - 11y - 2$$

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

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

$$7y+1=0$$

$$y = -\frac{1}{7}$$

$$\boxed{\alpha = -\frac{1}{7}}$$

$$3y-2=0$$

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

$$\boxed{\beta = \frac{2}{3}}$$

Sum:

$$\alpha + \beta = -\frac{b}{a}$$

$$-\frac{1}{7} + \frac{2}{3} = -\left(\frac{-11}{3}\right)$$

$$\frac{-3+14}{21} = \frac{11}{3 \times 7}$$

$$\frac{11}{21} = \frac{11}{21}$$

$$L.H.S = R.H.S$$

Product:

$$\alpha \beta = \frac{c}{a}$$

$$\cancel{-\frac{1}{7}} \times \cancel{\frac{2}{3}} = \frac{-2}{3 \times 7}$$

$$\frac{-2}{21} = \frac{-2}{3 \times 7}$$

$$\frac{-2}{21} = \frac{-2}{21}$$

4

$$L.H.S = R.H.S$$

11.
(I)

$$p(x) = x^2 + px + q$$

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

α, β
 α', β'

$$\alpha + \beta = 2 (\alpha' + \beta')$$

$$-p = \cancel{2} \frac{5}{\cancel{2}}$$

$$\boxed{p = -5}$$

$$\cancel{\alpha \beta} = \cancel{\alpha + \beta} = \cancel{-\frac{b}{a}}$$

$$\cancel{\alpha'} + \alpha' + \beta' = \frac{-3}{2}$$

$$\frac{\cancel{\alpha} + \beta}{\cancel{2}} = \frac{-3}{\cancel{2}}$$

$$-p = -3$$