A & C S - 6

# Cl - 10 Maths Ch 2

## Section A

1. $(2)^2 + 3(2) + k = 0$

$k = -10$ (b)

2. $(2)^2 + (a+1)(2) + b = 0$

$4 + 2a + 2 + b = 0$

$2a + b = -6 \rightarrow (1)$

$(-3)^2 + (a+1)(-3) + b = 0$

$9 - 3a - 3 + b = 0$

$-3a + b = -6 \rightarrow (2)$

From (1) & (2)

$5a = 0 \therefore a = 0$

From (2), $b = -6$

$a = 0, b = -6$ (d)

3. (a) 1

4. (b) $x^2 + 9x + 20$

5. (c) both negative

$x^2 - (-20)x + (-15)(-5)$

6. $x^2 - \sqrt{2}x + \frac{1}{3} = 0$.

(a) $3x^2 - 3\sqrt{2}x + 1$

7. (d) product of zeroes

8. (c) sum of zeroes

9. zeroes 6, −6.

as sum is 0.

$x^2 - 0x - 36$

(b) $x^2 - 36$

10. (d) (not a parabola)

11. (b) 12. (a)

Section B

1. $f(x) = x^2 + 4x + 4 = 0$

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

$x + 2 = 0.$

$x = -2, -2.$

2. $3(-2)^2 + 4(-2) + 2k = 0.$

$2k = -12 + 8.$

$2k = -4 \quad \therefore k = -2$

3. sum of zeroes $= 0$

product of zeroes $= -9.$

$\therefore$ polynomial

$x^2 - 9.$

4. $x^2 - 4x + 4$

5. $x^2 + 6x + 9 = (x+3)^2.$

zeroes are $-3, -3.$

$\alpha = -3, \quad \beta = -3$

$-\alpha = 3, \quad -\beta = 3$

polynomial $= x^2 - 6x + 9.$

6. $2x^2 - 3x + 1$.

$\alpha + \beta = \frac{3}{2}$. $\alpha . \beta = \frac{1}{2}$.

$3(\alpha+\beta) = \frac{9}{2}$ $9\alpha.\beta = \frac{9}{2}$.

$3\alpha + 3\beta = \frac{9}{2}$ $3\alpha . 3\beta = \frac{9}{2}$

$x^2 - \frac{9}{2}x + \frac{9}{2}$

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

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

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

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

$x = 4, -2$

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

$x(x-2) = 0$

$x = 0, 2$

9. $x^2 - 6x + y$

$\alpha + \beta = 6,$ $\alpha . \beta = y$

$3\alpha + 2\beta = 20 \longrightarrow ①$

$3\alpha + 3\beta = 18 \longrightarrow ②$

$-\beta = 2. \quad \therefore \beta = -\underline{\underline{2}}$

$\alpha = 8.$

$y = -16.$

10. $x^2 - \frac{1}{4}x - 1.$

$4x^2 - x - 1.$

# Section C.

1. $4u^2 + 8u = 0 \quad a=4, b=8, c=0$

$4u(u+2) = 0$

$u = 0 \quad$ or $\quad u = -2.$

Sum of zeroes $= -2$

$$\frac{-b}{a} = \frac{-8}{4} = -2.$$

sum of zeroes $= -\frac{b}{a}$

product of zeroes $= 0.$

$$\frac{c}{a} = \frac{0}{4} = 0$$

product of zeroes $= \frac{c}{a}$

Hence verified

2. $5x^2 + 13x + k.$

$a = 5, \quad b = 13, \quad c = k.$

Let $\alpha, \beta$ be zeroes

$$\beta = \frac{1}{\alpha}.$$

$$\alpha + \frac{1}{\alpha} = \frac{-13}{5}.$$

$$\alpha \cdot \frac{1}{\alpha} = \frac{k}{5}.$$

$$k = 5$$

3. $2y^2 + 7y + 5 = 0$

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

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

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

$y = -1, \quad -\frac{5}{2}$

Let $\alpha = -1, \quad \beta = -\frac{5}{2}$

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

$-1 + \frac{5}{2} + \frac{5}{2}$.

$-1 + 5$

$\underline{\underline{4}}$

4. $x^2 - 5x + k = 0$.

$a = 1, \quad b = -5, \quad c = k$.

$\alpha + \beta = -5 \rightarrow (1)$

$\alpha - \beta = 1 \rightarrow (2)$

$\alpha - \beta = k$.

Add ①, ②

$2\alpha = -4$

$\alpha = -2$.

$-2 - \beta = 1$

$-\beta = 3$. $\beta = -3$.

$\alpha \cdot \beta = \frac{c}{a} = \frac{k}{1}$.

$k = \underline{\underline{6}}$.

5. $ax^2 - 6x - 6$

$a = a \quad b = -6, \quad c = -6$

$$\alpha \cdot \beta = \frac{c}{a} = -\frac{6}{a}$$

$$4 = -\frac{6}{a}$$

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

$$\frac{3}{2}x^2 - 6x - 6$$

$$\alpha + \beta = -\frac{(-6)}{\frac{3}{2}}$$

$$= \frac{6 \times 2}{3} = 4$$

## Section C

1. $p(x) = 2x^2 + 5x + k$

$a = 2, \quad b = 5, \quad k.$

$\alpha + \beta = \frac{-5}{2} \qquad \alpha \cdot \beta = \frac{k}{2}$

$$(\alpha + \beta)^2 = \frac{25}{4}$$

$$\alpha^2 + \beta^2 + 2\alpha\beta = \frac{25}{4}$$

$$(\alpha^2 + \beta^2 + \alpha\beta) + \alpha\beta = \frac{25}{4}$$

$$\frac{21}{4} + \frac{k}{2} = \frac{25}{4}$$

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

$$k = 2$$

$$k = -1662$$

2. $ax^2 + bx + c$.

$\alpha, \beta$ be its zeroes.

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

polynomial whose zeroes are $\frac{1}{\alpha}, \frac{1}{\beta}$

$$\frac{1}{\alpha}+\frac{1}{\beta} = \frac{\alpha+\beta}{\alpha\beta} = \frac{-b/a}{c/a}$$

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

$$\frac{1}{\alpha}\cdot\frac{1}{\beta} = \frac{1}{\alpha\beta} = \frac{1}{\frac{c}{a}} = \frac{a}{c}.$$

polynomial.

$$x^2 + \frac{b}{c}x + \frac{a}{c},$$

$$cx^2 + bx + a$$

3. $p(x) = kx^2 + 4x + 4$

$a = k,\quad b = 4,\quad c = 4.$

$\alpha+\beta = -\frac{4}{k} \qquad \alpha\cdot\beta = \frac{4}{k}$

$$(\alpha+\beta)^2 = \frac{16}{k^2}$$

$$\alpha^2+\beta^2+2\alpha\beta = \frac{16}{k^2}$$

$$24 + 2\left(\frac{4}{k}\right) = \frac{16}{k^2}$$

$$24 + \frac{8}{k} = \frac{16}{k^2}$$

$$24k^2 + 8k = 16$$

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

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

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

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

$k+1=0$ or $3k-2=0$

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

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

$a = 1, \quad b = p, \quad c = q$

$p + q = -p. \qquad p \cdot q = q.$

$q = -2p. \qquad p = \underline{\underline{1}}.$

5. $9x^2 - 3x - 2$

$\alpha + \beta = \frac{3}{9} = \frac{1}{3}$

$\alpha\beta = \frac{-2}{9}$

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

$$= \frac{1/3}{-2/9} = \frac{1}{-2/3}$$

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

Section E.

1\. (i) $-2$ and $8$

(ii) $x^2 - (-2+8)x + (-2)(8)$

$$x^2 - 6x - 16$$

(iii) $(4)^2 - 6(4) - 16$

$$-24$$

2.

(i) quadratic

(ii) 0

(iii) $\alpha + \beta = \alpha\beta$

$$-\frac{5}{a} = \frac{3a}{a}$$

$$a = -\frac{5}{3} \quad \text{as } a \neq 0$$