

Mathematics

(www.tiwariacademy.in)
(Chapter - 2) (Polynomials)
(Class X)

Exercise 2.2

Question 1:

Find the zeroes of the following quadratic polynomials and verify the relationship between the zeroes and the coefficients.

(i). $x^2 - 2x - 8$

(ii). $4s^2 - 4s + 1$

(iii). $6x^2 - 3 - 7x$

(iv). $4u^2 + 8u$

(v). $t^2 - 15$

(vi). $3x^2 - x - 4$

Answer 1:

(i) $x^2 - 2x - 8$

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

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

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

The value of $x^2 - 2x - 8$ is zero if $x + 2 = 0$ or $x - 4 = 0$

$$\Rightarrow x = -2 \text{ or } x = 4$$

Therefore, the zeroes of $x^2 - 2x - 8$ are -2 and 4 . Now

$$\text{Sum of zeroes} = -2 + 4 = 2 = \frac{-(-2)}{1} = \frac{-(\text{Coefficient of } x)}{\text{Coefficient of } x^2}$$

$$\text{Product of zeroes} = (-2) \times 4 = -8 = \frac{-8}{1} = \frac{\text{Constant term}}{\text{Coefficient of } x^2}$$

(ii) $4s^2 - 4s + 1$

$$= 4s^2 - 2s - 2s + 1$$

$$= 2s(2s - 1) - 1(2s - 1)$$

$$= (2s - 1)(2s - 1)$$

The value of $4s^2 - 4s + 1$ is zero if $2s - 1 = 0 \Rightarrow s = \frac{1}{2}$.

Therefore, the zeroes of $4s^2 - 4s + 1$ are $\frac{1}{2}$ and $\frac{1}{2}$. Now

$$\text{Sum of zeroes} = \frac{1}{2} + \frac{1}{2} = 1 = \frac{-(4)}{4} = \frac{-(\text{Coefficient of } s)}{\text{Coefficient of } s^2}$$

$$\text{Product of zeroes} = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4} = \frac{1}{4} = \frac{\text{Constant term}}{\text{Coefficient of } s^2}$$

(iii) $6x^2 - 3 - 7x$

$$= 6x^2 - 7x - 3$$

$$= 6x^2 - 9x + 2x - 3$$

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

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

The value of $6x^2 - 7x - 3$ is zero if $3x + 1 = 0$ or $2x - 3 = 0$.

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

Therefore, the zeroes of $6x^2 - 7x - 3$ are $-\frac{1}{3}$ and $\frac{3}{2}$. Now

$$\text{Sum of zeroes} = -\frac{1}{3} + \frac{3}{2} = \frac{-2 + 9}{6} = \frac{7}{6} = \frac{-(-7)}{6} = \frac{-(\text{Coefficient of } x)}{\text{Coefficient of } x^2}$$

$$\text{Product of zeroes} = \left(-\frac{1}{3}\right) \times \frac{3}{2} = -\frac{1}{2} = \frac{-3}{6} = \frac{\text{Constant term}}{\text{Coefficient of } x^2}$$

Mathematics

(www.tiwariacademy.in)
(Chapter - 2) (Polynomials)
(Class X)

(iv) $4u^2 + 8u$

$$= 4u^2 + 8u$$

$$= 4u(u + 2)$$

The value of $4u^2 + 8u$ is zero if $4u = 0$ or $u + 2 = 0$.

$$\Rightarrow u = 0 \text{ or } u = -2.$$

Therefore, the zeroes of $4u^2 + 8u$ are 0 and -2. Now

$$\text{Sum of zeroes} = 0 + (-2) = -2 = \frac{-(8)}{4} = \frac{-(\text{Coefficient of } u)}{\text{Coefficient of } u^2}$$

$$\text{Product of zeroes} = 0 \times (-2) = 0 = \frac{0}{4} = \frac{\text{Constant term}}{\text{Coefficient of } u^2}$$

(v) $t^2 - 15$

$$= t^2 - (\sqrt{15})^2$$

$$= (t + \sqrt{15})(t - \sqrt{15})$$

The value of $t^2 - 15$ is zero if $t + \sqrt{15} = 0$ or $t - \sqrt{15} = 0$.

$$\Rightarrow x = -\sqrt{15} \text{ or } x = \sqrt{15}.$$

Therefore, the zeroes of $t^2 - 15$ are $-\sqrt{15}$ and $\sqrt{15}$. Now

$$\text{Sum of zeroes} = -\sqrt{15} + \sqrt{15} = 0 = \frac{-(0)}{1} = \frac{-(\text{Coefficient of } t)}{\text{Coefficient of } t^2}$$

$$\text{Product of zeroes} = (-\sqrt{15}) \times \sqrt{15} = -15 = \frac{-15}{1} = \frac{\text{Constant term}}{\text{Coefficient of } t^2}$$

(vi) $3x^2 - x - 4$

$$= 3x^2 - 4x + 3x - 4$$

$$= x(3x - 4) + 1(3x - 4)$$

$$= (3x - 4)(x + 1)$$

The value of $3x^2 - x - 4$ is zero if $3x - 4 = 0$ or $x + 1 = 0$.

$$\Rightarrow x = \frac{4}{3} \text{ or } x = -1.$$

Therefore, the zeroes of $3x^2 - x - 4$ are $\frac{4}{3}$ and -1 . Now

$$\text{Sum of zeroes} = \frac{4}{3} + (-1) = \frac{4 - 3}{3} = \frac{1}{3} = \frac{-(-1)}{3} = \frac{-(\text{Coefficient of } x)}{\text{Coefficient of } x^2}$$

$$\text{Product of zeroes} = \frac{4}{3} \times (-1) = -\frac{4}{3} = \frac{-4}{3} = \frac{\text{Constant term}}{\text{Coefficient of } x^2}$$

Question 2:

Find a quadratic polynomial each with the given numbers as the sum and product of its zeroes respectively.

(i). $\frac{1}{4}, -1$

(ii). $\sqrt{2}, \frac{1}{3}$

(iii). $0, \sqrt{5}$

(iv). $1, 1$

(v). $-\frac{1}{4}, \frac{1}{4}$

(vi). $4, 1$

Answer 2

(i) Let α and β are the zeroes of the polynomial $ax^2 + bx + c$, then we have

$$\alpha + \beta = \frac{1}{4} = \frac{-b}{a}$$

www.tiwariacademy.in
A Free web support in Education

Mathematics

(www.tiwariacademy.in)
(Chapter - 2) (Polynomials)
(Class X)

$$\alpha\beta = -1 = \frac{-4}{4} = \frac{c}{a}$$

On comparing,

$$a = 4, \quad b = -1 \text{ and } c = -4$$

Hence, the required quadratic polynomial is $4x^2 - x - 4$.

(ii) Let α and β are the zeroes of the polynomial $ax^2 + bx + c$, then we have

$$\alpha + \beta = \sqrt{2} = \frac{3\sqrt{2}}{3} = \frac{-b}{a}$$
$$\alpha\beta = \frac{1}{3} = \frac{c}{a}$$

On comparing,

$$a = 3, \quad b = -3\sqrt{2} \text{ and } c = 1$$

Hence, the required quadratic polynomial is $3x^2 - 3\sqrt{2}x + 1$.

(iii) Let α and β are the zeroes of the polynomial $ax^2 + bx + c$, then we have

$$\alpha + \beta = 0 = \frac{0}{1} = \frac{-b}{a}$$
$$\alpha\beta = \sqrt{5} = \frac{\sqrt{5}}{1} = \frac{c}{a}$$

On comparing,

$$a = 1, \quad b = 0 \text{ and } c = \sqrt{5}$$

Hence, the required quadratic polynomial is $x^2 + 0.x + \sqrt{5}$.

(iv) Let α and β are the zeroes of the polynomial $ax^2 + bx + c$, then we have

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

On comparing,

$$a = 1, \quad b = -1 \text{ and } c = 1$$

Hence, the required quadratic polynomial is $x^2 - x + 1$.

(v) Let α and β are the zeroes of the polynomial $ax^2 + bx + c$, then we have

$$\alpha + \beta = \frac{-1}{4} = \frac{-b}{a}$$
$$\alpha\beta = \frac{1}{4} = \frac{c}{a}$$

On comparing,

$$a = 4, \quad b = 1 \text{ and } c = 1$$

Hence, the required quadratic polynomial is $4x^2 + x + 1$.

(vi) Let α and β are the zeroes of the polynomial $ax^2 + bx + c$, then we have

$$\alpha + \beta = 4 = \frac{4}{1} = \frac{-b}{a}$$
$$\alpha\beta = 1 = \frac{1}{1} = \frac{c}{a}$$

On comparing,

$$a = 1, \quad b = -4 \text{ and } c = 1$$

Hence, the required quadratic polynomial is $x^2 - 4x + 1$.