# NCERT Solution For Class 10 Maths Chapter 2- Polynomials

## Exercise 2.2 Page: 33

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

**Solutions:**

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

$\Rightarrow x^2 - 4x + 2x - 8 = x(x-4) + 2(x-4) = (x-4)(x+2)$

Therefore, zeroes of polynomial equation $x^2 - 2x - 8$ are {4, -2}

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

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

$\Rightarrow 4s^2 - 2s - 2s + 1 = 2s(2s-1) - 1(2s-1) = (2s-1)(2s-1)$

Therefore, zeroes of polynomial equation $4s^2 - 4s + 1$ are $\{\frac{1}{2}, \frac{1}{2}\}$.

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

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

$\Rightarrow 6x^2 - 7x - 3 = (3x + 1)(2x - 3)$

Therefore, zeroes of polynomial equation $6x^2 - 3 - 7x$ are $\{-\frac{1}{3}, \frac{3}{2}\}$

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

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

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$\Rightarrow 4u(u+2)$ Therefore zeroes of polynomial equation $4u^2 + 8u$ are {0, -2}.

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

**(v) $t^2 - 15$**

$\Rightarrow t^2 = 15 \; or \; t = \pm\sqrt{15}$
Therefore zeroes of polynomial equation $t^2 - 15$ are $\{\sqrt{15}, -\sqrt{15}\}$.

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

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

$\Rightarrow 3x^2 - 4x + 3x - 4 = x(3x - 4) + 1(3x - 4) = (3x - 4)(x + 1)$

Therefore zeroes of polynomial equation $3x^2 - x - 4$ are $\{\frac{4}{3}, -1\}$

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

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

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

**Solution:**

From the formulas of sum and product of zeroes, we know,
Sum of zeroes = α + β
Product of zeroes = α β

Sum of zeroes = α + β = $\frac{1}{4}$
Product of zeroes = α β = -1

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∴ If α and β are zeroes of any quadratic polynomial, then the quadratic polynomial equation can be written directly as:-

$x^2 – (α+β)x + αβ = 0$

$x^2 – (1/4)x + (-1) = 0$

$4x^2 – x - 4 = 0$

Thus, $4x^2 – x – 4$ is the quadratic polynomial.

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

**Solution:**

Sum of zeroes = $α + β = \sqrt{2}$

Product of zeroes = $α β = \frac{1}{3}$

∴ If α and β are zeroes of any quadratic polynomial, then the quadratic polynomial equation can be written directly as:-

$x^2 – (α+β)x + αβ = 0$

$x^2 – (\sqrt{2})x + \frac{1}{3} = 0$

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

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

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

**Solution:**

Given,

Sum of zeroes = $α + β = 0$

Product of zeroes = $α β = \sqrt{5}$

∴ If α and β are zeroes of any quadratic polynomial, then the quadratic polynomial equation can be written directly as:-

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$x^2 - (\alpha+\beta)x + \alpha\beta = 0$

$x^2 - (0)x + \sqrt{5} = 0$

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

**(iv)1, 1**

**Solution:**

Given,
Sum of zeroes = α + β = 1
Product of zeroes = α β = 1

∴ If α and β are zeroes of any quadratic polynomial, then the quadratic polynomial equation can be written directly as:-
$x^2 - (\alpha+\beta)x + \alpha\beta = 0$

$x^2 - x + 1 = 0$

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

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

**Solution:**

Given, Sum of zeroes = α + β = $-\frac{1}{4}$
Product of zeroes = α β = $\frac{1}{4}$

∴ If α and β are zeroes of any quadratic polynomial, then the quadratic polynomial equation can be written directly as:-

$x^2 - (\alpha+\beta)x + \alpha\beta = 0$

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

$4x^2 + x + 1 = 0$

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

**(vi) 4, 1**

**Solution:**

Given,
Sum of zeroes = α + β = 4
Product of zeroes = α β = 1

∴ If α and β are zeroes of any quadratic polynomial, then the quadratic polynomial equation can be written directly as:-

$x^2 - (\alpha+\beta)x + \alpha\beta = 0$

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

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