

Exercise 2.1 (Revised) - Chapter 2 - Polynomials - Ncert Solutions class 10 - Maths

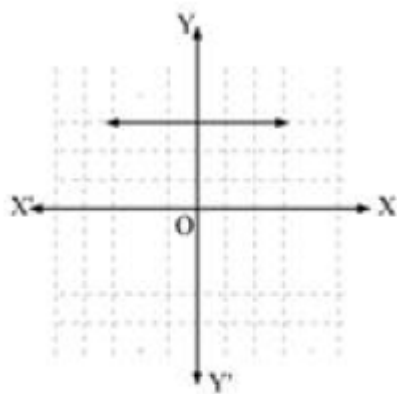
Updated On 11-02-2025 By Lithanya

NCERT Solutions Class 10 Maths: Chapter 2 - Polynomials | Comprehensive Answers

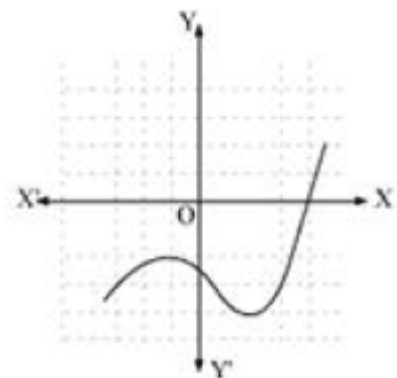
Ex 2.1 Question 1:

1. The graphs of $y = p(x)$ are given to us, for some polynomials $p(x)$. Find the number of zeroes of $p(x)$, in each case.

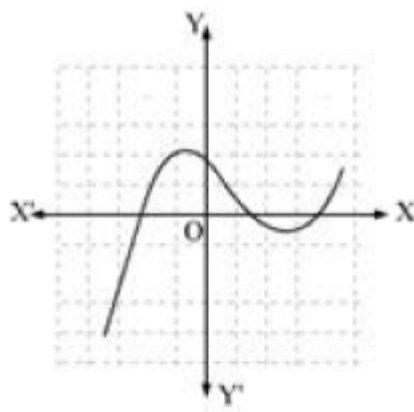
(i)



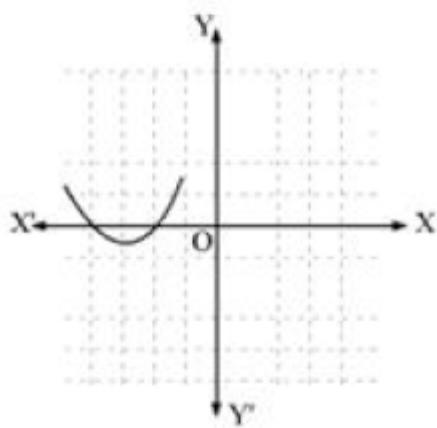
(ii)



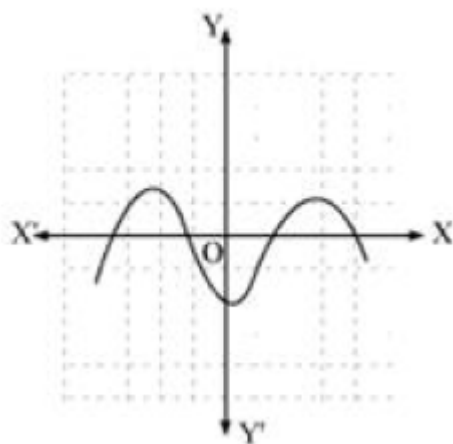
(iii)



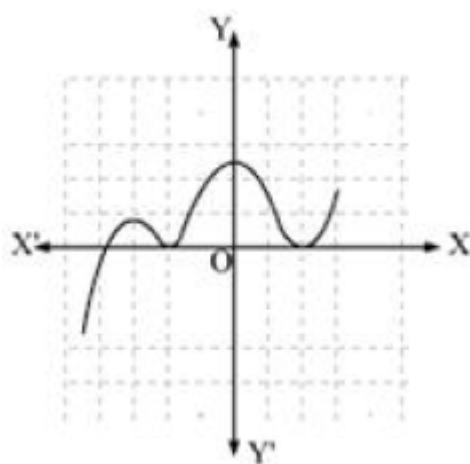
(iv)



(v)



(vi)



Answer.

- (i) The given graph does not intersect the x-axis at all. Hence, it does not have any zero.
- (ii) Given graph intersects the x-axis 1 time. It means this polynomial has 1 zero.
- (iii) Given graph intersects the x-axis 3 times. Therefore, it has 3 zeroes.
- (iv) Given graph intersects the x-axis 2 times. Therefore, it has 2 zeroes.
- (v) Given graph intersects the x-axis 4 times. It means it has 4 zeroes.
- (vi) Given graph intersects the x-axis 3 times. It means it has 3 zeroes.

Exercise 2.2 (Revised) - Chapter 2 - Polynomials - Ncert Solutions class 10 - Maths

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Ex 2.2 Question 1.

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

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

Comparing given polynomial with general form of quadratic polynomial $ax^2 + bx + c$,

We get $a = 1$, $b = -2$ and $c = -8$

We have, $x^2 - 2x - 8$

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

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

Equating this equal to 0 will find values of 2 zeroes of this polynomial.

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

$$\Rightarrow x = 4, -2 \text{ are two zeroes.}$$

$$\text{Sum of zeroes} = 4 + (-2) = 2 =$$

$$\Rightarrow \frac{-(-2)}{1} = \frac{-b}{a} = \frac{-\text{Coefficient of } x}{\text{Coefficient of } x^2}$$

$$\text{Product of zeroes} = 4 \times (-2) = -8$$

$$= \frac{-8}{1} = \frac{c}{a} = \frac{\text{Constant term}}{\text{Coefficient of } x^2}$$

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

Here, $a = 4$, $b = -4$ and $c = 1$

We have, $4s^2 - 4s + 1$

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

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

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

Equating this equal to 0 will find values of 2 zeroes of this polynomial.

$$\Rightarrow (2s - 1)(2s - 1) = 0$$

$$\Rightarrow s = \frac{1}{2}, \frac{1}{2}$$

Therefore, two zeroes of this polynomial are $\frac{1}{2}, \frac{1}{2}$

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

$$= \frac{-b}{a} = \frac{-\text{Coefficient of } x}{\text{Coefficient of } x^2}$$

$$\text{Product of Zeroes} = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$$

$$= \frac{c}{a} = \frac{\text{Constant term}}{\text{Coefficient of } x^2}$$

$$\text{(iii) } 6x^2 - 3 - 7x \Rightarrow 6x^2 - 7x - 3$$

Here, $a = 6$, $b = -7$ and $c = -3$

We have, $6x^2 - 7x - 3$

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

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

Equating this equal to 0 will find values of 2 zeroes of this polynomial.

$$\Rightarrow (2x - 3)(3x + 1) = 0$$

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

Therefore, two zeroes of this polynomial are $\frac{3}{2}, \frac{-1}{3}$

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

$$\text{Product of Zeroes} = \frac{3}{2} \times \frac{-1}{3} = \frac{-1}{2} = \frac{c}{a} = \frac{\text{Constant term}}{\text{Coefficient of } x^2}$$

$$\text{(iv) } 4u^2 + 8u$$

Here, $a = 4$, $b = 8$ and $c = 0$

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

Equating this equal to 0 will find values of 2 zeroes of this polynomial.

$$\Rightarrow 4u(u + 2) = 0$$

$$\Rightarrow u = 0, -2$$

Therefore, two zeroes of this polynomial are $0, -2$

$$\text{Sum of zeroes} = 0 - 2 = -2$$

$$= \frac{-2}{1} \times \frac{4}{4} = \frac{-8}{4} = \frac{-b}{a} = \frac{-\text{Coefficient of } x}{\text{Coefficient of } x^2}$$

$$\text{Product of Zeroes} = 0 \times -2 = 0$$

$$= \frac{0}{4} = \frac{c}{a} = \frac{\text{Constant term}}{\text{Coefficient of } x^2}$$

$$\text{(v) } t^2 - 15$$

Here, $a = 1$, $b = 0$ and $c = -15$

$$\text{We have, } t^2 - 15 \Rightarrow t^2 = 15 \Rightarrow t = \pm\sqrt{15}$$

Therefore, two zeroes of this polynomial are $\sqrt{15}, -\sqrt{15}$

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

$$\text{Product of Zeroes} = \sqrt{15} \times (-\sqrt{15}) = -15$$

$$= \frac{-15}{1} = \frac{c}{a} = \frac{\text{Constant term}}{\text{Coefficient of } x^2}$$

$$\text{(vi) } 3x^2 - x - 4$$

Here, $a = 3$, $b = -1$ and $c = -4$

$$\text{We have, } 3x^2 - x - 4 = 3x^2 - 4x + 3x - 4$$

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

Equating this equal to 0 will find values of 2 zeroes of this polynomial.

$$\Rightarrow (3x - 4)(x + 1) = 0$$

$$\Rightarrow x = \frac{4}{3}, -1$$

Therefore, two zeroes of this polynomial are $\frac{4}{3}, -1$

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

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

Ex 2.2 Question 2.

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

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

$$\text{(ii) } \sqrt{2}, 13$$

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

$$\text{(iv) } 1, 1$$

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

$$\text{(vi) } 4, 1$$

Answer.

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

Let quadratic polynomial be $ax^2 + bx + c$

Let α and β are two zeroes of above quadratic polynomial.

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

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

On comparing, we get
 $\therefore a = 4, b = -1, c = -4$

Putting the values of a, b and c in quadratic polynomial $ax^2 + bx + c$, we get
Quadratic polynomial which satisfies above conditions $= 4x^2 - x - 4$
(ii) $\sqrt{2}, \frac{1}{3}$

Let quadratic polynomial be $ax^2 + bx + c$
Let α and β be two zeros of above quadratic polynomial.

$$a + \beta = \sqrt{2} \times \frac{3}{3} = \frac{3\sqrt{2}}{3} = \frac{-b}{a}$$
$$\alpha \times \beta = \frac{1}{3} \text{ which is equal to } \frac{c}{a}$$

On comparing, we get
 $\therefore a = 3, b = -3\sqrt{2}, c = 1$

Putting the values of a, b and c in quadratic polynomial $ax^2 + bx + c$, we get
Quadratic polynomial which satisfies above conditions $= 3x^2 - 3\sqrt{2}x + 1$.
(iii) $0, \sqrt{5}$

Let quadratic polynomial be $cx^2 + bx + c$

Let α and β be two zeros of above quadratic polynomial.

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

On comparing, we get
 $\therefore a = 1, b = 0, c = \sqrt{5}$

Putting the values of a, b and c in quadratic polynomial $ax^2 + bx + c$, we get Quadratic polynomial which satisfies above conditions
 $= x^2 + \sqrt{5}$
(iv) $1, 1$

Let quadratic polynomial be $cx^2 + bx + c$

Let α and β be two zeros of above quadratic polynomial.

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

On comparing, we get
 $\therefore a = 1, b = -1, c = 1$

Putting the values of a, b and c in quadratic polynomial $ax^2 + bx + c$, we get
Quadratic polynomial which satisfies above conditions $= x^2 - x + 1$
(v) $\frac{-1}{4}, \frac{1}{4}$

Let quadratic polynomial be $cx^2 + bx + c$

Let α and β be two zeros of above quadratic polynomial.

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

On comparing, we get
 $\therefore a = 4, b = 1, c = 1$

Putting the values of a, b and c in quadratic polynomial $ax^2 + bx + c$, we get Quadratic polynomial which satisfies above conditions
 $= 4x^2 + x + 1$
(vi) $4, 1$

Let quadratic polynomial be $cx^2 + bx + c$

Let α and β be two zeros of above quadratic polynomial.

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

On comparing, we get
 $\therefore a = 1, b = -4, c = 1$

Putting the values of a, b and c in quadratic polynomial $ax^2 + bx + c$, we get
Quadratic polynomial which satisfies above conditions $= x^2 - 4x + 1$

