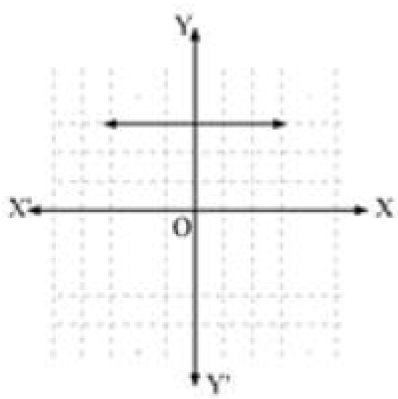
Updated On 11-02-2025 By Lithanya

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

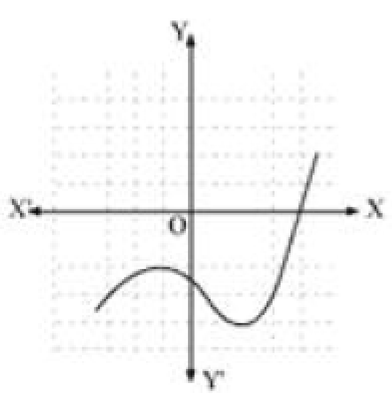
Ex 2.1 Question 1:

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

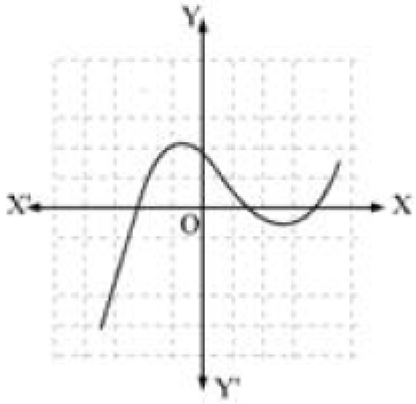
(i)



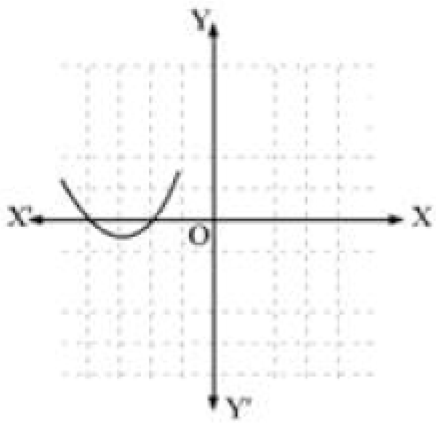
(ii)



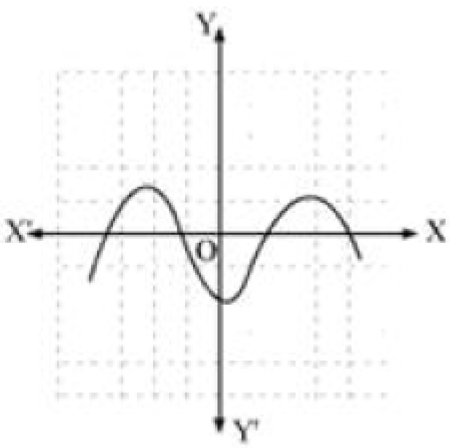
(iii)



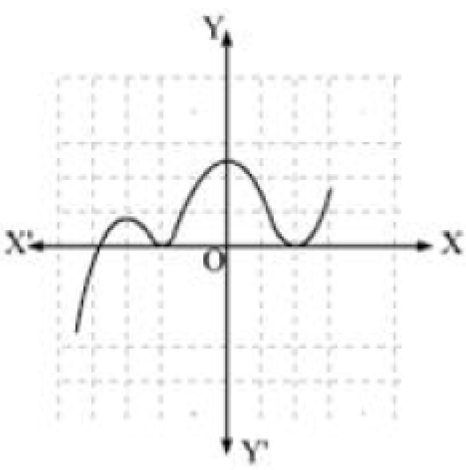
(iv)



(v)



(vi)



Answer.

(i) The given graph does not intersects x-axis at all. Hence, it does not have any zero.
(ii) Given graph intersects x-axis 1 time. It means this polynomial has 1 zero.
(iii) Given graph intersects x-axis 3 times. Therefore, it has 3 zeroes.
(iv) Given graph intersects x-axis 2 times. Therefore, it has 2 zeroes.
(v) Given graph intersects x-axis 4 times. It means it has 4 zeroes.
(vi) Given graph intersects 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 $\mathrm{a}=1,\ \mathrm{b}=-2$ and $\mathrm{c}=-8$
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.
$(x-4)(x+2)=0$
$\Rightarrow x=4,-2$ are two zeroes.

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

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

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

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

(iii) $6x^2 - 3 - 7x \quad \Rightarrow \quad 6x^2 - 7x - 3$

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

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

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

(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 $0, -2$

Sum of zeroes $= 0 - 2 = -2$

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

Product of Zeroes $= 0 \times -2 = 0$

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

(v) $t^2 - 15$

Here, $\mathrm{a} = 1,\ \mathrm{b} = 0$ and $\mathrm{c} = -15$

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

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

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

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

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

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

Here, $\mathrm{a} = 3,\ \mathrm{b} = -1$ and $\mathrm{c} = -4$

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 $\frac{4}{3}, -1$

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

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.

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

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

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

(iv) 1,1

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

(vi) 4,1

Answer.

(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.
$\alpha+\beta=\sqrt{2}\times\frac{3}{3}=\frac{3\sqrt{2}}{3}=\frac{-b}{a}$
$\alpha\times\beta=\frac{1}{3}$ 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 $=x^2-4x+1$