NCERT Solutions for Class 10 Maths Chapter 2 Exercise 2.3: Chapter 2 of NCERT Class 10 Maths, Polynomials, focuses on understanding and solving problems related to polynomials of degrees up to three. Exercise 2.3 specifically emphasizes the concept of the relationship between zeros and coefficients of a polynomial. Students learn to derive formulas for quadratic and cubic polynomials and verify relationships practically.

This exercise also includes finding polynomials when the zeros or their relationships are provided. It helps build a strong foundation for algebraic concepts and prepares students for higher-level problem-solving in algebra. Practicing Exercise 2.3 enhances analytical thinking and mathematical reasoning skills.

NCERT Solutions for Class 10 Maths Chapter 2 Exercise 2.3 Overview

NCERT Class 10 Maths Chapter 2, Polynomials, introduces key algebraic concepts essential for higher studies. Exercise 2.3 focuses on understanding the relationship between zeros and coefficients of polynomials, particularly quadratic and cubic equations. This topic is crucial as it forms the foundation for solving polynomial equations in advanced mathematics.

By practicing these problems, students develop analytical skills to identify patterns and apply formulas effectively. Understanding this relationship is not only essential for board exams but also lays the groundwork for competitive exams like JEE and beyond. Mastering Exercise 2.3 enhances logical reasoning and problem-solving abilities, vital for academic success.

NCERT Solutions for Class 10 Maths Chapter 2 Exercise 2.3 Polynomials

Below is the NCERT Solutions for Class 10 Maths Chapter 2 Exercise 2.3 Polynomials -

1. Divide the polynomial p(x) by the polynomial g(x) and find the quotient and remainder in each of the following.

(i) $p(x) = x^3-3x^2+5x-3$, $g(x) = x^2-2$

Solution:

Given,

Dividend = $p(x) = x^3-3x^2+5x-3$

Divisor = $g(x) = x^2-2$

$$
\begin{array}{r|rrrr}
 & x & -3 & & \\
\hline
x^2 - 2 & x^3 & -3x^2 & +5x & -3 \\
 & - & & & \\
 & x^3 & +0x^2 & -2x & \\
\hline
 & & -3x^2 & +7x & -3 \\
 & & - & & \\
 & & -3x^2 & +0x & +6 \\
\hline
 & & & 7x & -9
\end{array}
$$

Therefore, upon division, we get

Quotient = x–3

Remainder = 7x–9

(ii) p(x) = x^4-3x^2+4x+5 , g(x) = x^2+1-x

Solution:

Given,

Dividend = p(x) = x^4 – 3x^2 + 4x +5

Divisor = g(x) = x^2 +1-x

$$
\begin{array}{r|rrrrr}
 & x^2 & +x & -3 & & \\
\hline
x^2 - x + 1 & x^4 & +0x^3 & -3x^2 & +4x & +5 \\
- & & & & & \\
 & x^4 & -x^3 & +x^2 & & \\
\hline
 & & x^3 & -4x^2 & +4x & +5 \\
 & & - & & & \\
 & & x^3 & -x^2 & +x & \\
\hline
 & & & -3x^2 & +3x & +5 \\
 & & & - & & \\
 & & & -3x^2 & +3x & -3 \\
\hline
 & & & & & 8
\end{array}
$$

Therefore, upon division, we get

Quotient = $x^2 + x - 3$

Remainder = 8

(iii) $p(x) = x^4 - 5x + 6$, $g(x) = 2 - x^2$

Solution:

Given,

Dividend = $p(x) = x^4 - 5x + 6 = x^4 + 0x^2 - 5x + 6$

Divisor = $g(x) = 2 - x^2 = -x^2 + 2$

$$
\begin{array}{r|lllll}
 & -x^2 & -2 & & & \\
\hline
-x^2+2 & x^4 & +0x^3 & +0x^2 & -5x & +6 \\
 & - & & & & \\
 & x^4 & +0x^3 & -2x^2 & & \\
\hline
 & & & 2x^2 & -5x & +6 \\
 & & & - & & \\
 & & & 2x^2 & +0x & -4 \\
\hline
 & & & & -5x & +10
\end{array}
$$

Therefore, upon division, we get

Quotient = $-x^2-2$

Remainder = $-5x + 10$

2. Check whether the first polynomial is a factor of the second polynomial by dividing the second polynomial by the first polynomial.

(i) t^2-3, $2t^4+3t^3-2t^2-9t-12$

Solutions:

Given,

First polynomial = t^2-3

Second polynomial = $2t^4+3t^3-2t^2-9t-12$

$$
\begin{array}{r|rrrrr}
 & 2t^2 & +3t & +4 & & \\
\hline
t^2 - 3 & 2t^4 & +3t^3 & -2t^2 & -9t & -12 \\
 & - & & & & \\
 & 2t^4 & +0t^3 & -6t^2 & & \\
\hline
 & & 3t^3 & +4t^2 & -9t & -12 \\
 & & - & & & \\
 & & 3t^3 & +0t^2 & -9t & \\
\hline
 & & & 4t^2 & +0t & -12 \\
 & & & - & & \\
 & & & 4t^2 & +0t & -12 \\
\hline
 & & & & & 0
\end{array}
$$

As we can see, the remainder is left as 0. Therefore, we say that t^2-3 is a factor of $2t^4 +3t^3-2t^2$ -9t-12

(ii)x^2+3x+1 , $3x^4+5x^3-7x^2$+2x+2

Solutions:

Given,

First polynomial = x^2+3x+1

Second polynomial = $3x^4+5x^3-7x^2$+2x+2

$$
\begin{array}{r|llllll}
 & 3x^2 & -4x & +2 & & \\
\hline
x^2+3x+1 & 3x^4 & +5x^3 & -7x^2 & +2x & +2 \\
- & 3x^4 & +9x^3 & +3x^2 & & \\
\hline
 & & -4x^3 & -10x^2 & +2x & +2 \\
- & & -4x^3 & -12x^2 & -4x & \\
\hline
 & & & 2x^2 & +6x & +2 \\
- & & & 2x^2 & +6x & +2 \\
\hline
 & & & & & 0
\end{array}
$$

As we can see, the remainder is left as 0. Therefore, we say that $x^2 + 3x + 1$ is a factor of $3x^4+5x^3-7x^2+2x+2$

(iii) x^3-3x+1, x^5-4x^3+x^2+3x+1

Solutions:

Given,

First polynomial = x^3-3x+1

Second polynomial = $x^5-4x^3+x^2+3x+1$

$$
\begin{array}{r|llllll}
 & x^2 & -1 & & & & \\
\hline
x^3-3x+1 & x^5 & +0x^4 & -4x^3 & +x^2 & +3x & +1 \\
- & x^5 & +0x^4 & -3x^3 & +x^2 & & \\
\hline
 & & & -x^3 & +0x^2 & +3x & +1 \\
- & & & -x^3 & +0x^2 & +3x & -1 \\
\hline
 & & & & & & 2
\end{array}
$$

As we can see, the remainder is not equal to 0. Therefore, we say that x^3-3x+1 is not a factor of x^5-4x^3+x^2+3x+1

3. Obtain all other zeroes of 3x^4+6x^3-2x^2-10x-5, if two of its zeroes are √(5/3) and – √(5/3).

Solutions:

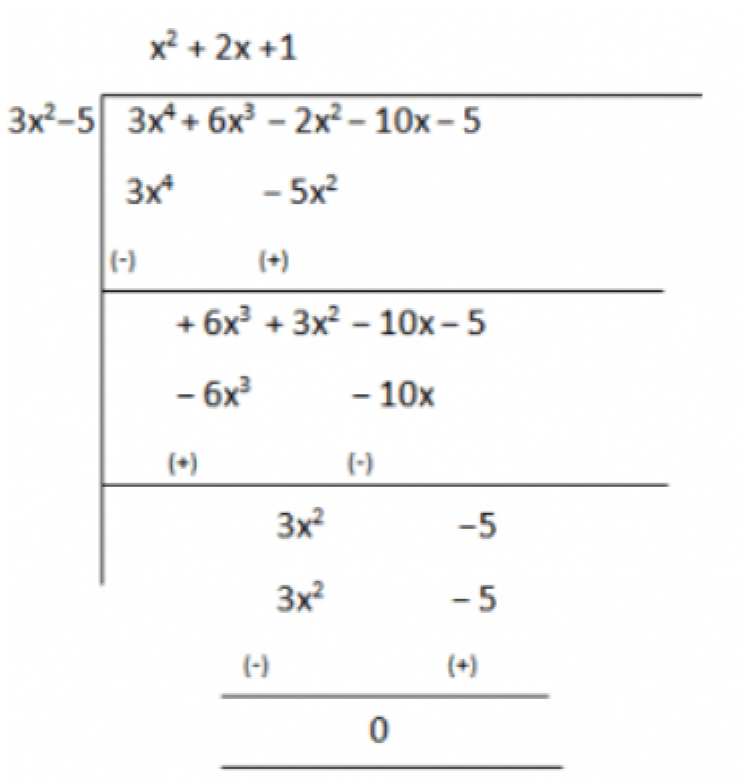
Since this is a polynomial equation of degree 4, there will be a total of 4 roots.

√(5/3) and – √(5/3) are zeroes of polynomial f(x).

∴ (x –√**(5/3)**) (x+√**(5/3)** = x^2-(5/3) = 0

(3x^2−5)=0, is a factor of given polynomial f(x).

Now, when we will divide f(x) by (3x^2−5), the quotient obtained will also be a factor of f(x), and the remainder will be 0.



Therefore, 3x^4 +6x^3 −2x^2 −10x–5 = (3x^2 –5)**(x^2+2x+1)**

Now, on further factorising (x^2+2x+1), we get

x^2+2x+1 = x^2+x+x+1 = 0

$x(x+1)+1(x+1) = 0$

$(x+1)(x+1) = 0$

So, its zeroes are given by: **$x= -1$** and **$x = -1$**

Therefore, all four zeroes of the given polynomial equation are

$\sqrt{(5/3)}$,- $\sqrt{(5/3)}$, -1 and -1

Hence, the above-given solution is the answer.

4. On dividing x^3-3x^2+x+2 by a polynomial g(x), the quotient and remainder were x–2 and –2x+4, respectively. Find g(x).

Solution:

Given,

Dividend, $p(x) = x^3-3x^2+x+2$

Quotient = $x-2$

Remainder = $-2x+4$

We have to find the value of Divisor, g(x) =?

As we know,

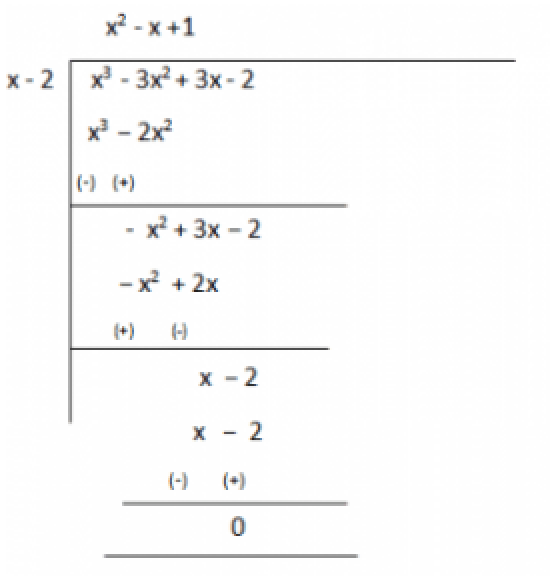
Dividend = Divisor × Quotient + Remainder

$\therefore\ x^3-3x^2+x+2 = g(x)\times(x-2) + (-2x+4)$

$x^3-3x^2+x+2-(-2x+4) = g(x)\times(x-2)$

Therefore, $g(x) \times (x-2) = x^3-3x^2+3x-2$

Now, for finding g(x), we will divide x^3-3x^2+3x-2 with $(x-2)$



Therefore, **g(x) = (x^2–x+1)**

5. Give examples of polynomials p(x), g(x), q(x) and r(x), which satisfy the division algorithm and

(i) deg p(x) = deg q(x)

(ii) deg q(x) = deg r(x)

(iii) deg r(x) = 0

Solutions:

According to the division algorithm, dividend p(x) and divisor g(x) are two polynomials, where g(x)≠0. Then, we can find the value of quotient q(x) and remainder r(x) with the help of below-given formula.

Dividend = Divisor × Quotient + Remainder

∴ p(x) = g(x)×q(x)+r(x)

Where r(x) = 0 or degree of r(x)< degree of g(x)

Now, let us prove the three given cases, as per the division algorithm, by taking examples for each.

(i) deg p(x) = deg q(x)

The degree of dividend is equal to the degree of the quotient only when the divisor is a constant term.

Let us take an example: $p(x) = 3x^2+3x+3$ is a polynomial to be divided by $g(x) = 3$

So, $(3x^2+3x+3)/3 = x^2+x+1 = q(x)$

Thus, you can see the degree of quotient $q(x) = 2$, which is also equal to the degree of dividend $p(x)$.

Hence, the division algorithm is satisfied here.

(ii) deg q(x) = deg r(x)

Let us take an example: $p(x) = x^2 + 3$ is a polynomial to be divided by $g(x) = x – 1$

So, $x^2 + 3 = (x – 1)×(x) + (x + 3)$

Hence, quotient $q(x) = x$

Also, remainder $r(x) = x + 3$

Thus, you can see the degree of quotient $q(x) = 1$, which is also equal to the degree of remainder $r(x)$.

Hence, the division algorithm is satisfied here.

(iii) deg r(x) = 0

The degree of remainder is 0 only when the remainder left after the division algorithm is constant.

Let us take an example: $p(x) = x^2 + 1$ is a polynomial to be divided by $g(x) = x$.

So, $x^2 + 1 = (x)×(x) + 1$

Hence, quotient $q(x) = x$

And, remainder $r(x) = 1$

Clearly, the degree of remainder here is 0.

Hence, the division algorithm is satisfied here.

Benefits of Using NCERT Solutions for Class 10 Maths Chapter 2 Exercise 2.3 Polynomials

Using NCERT Solutions for Class 10 Maths Chapter 2 Exercise 2.3 on Polynomials offers several benefits:

Concept Clarity: Provides a step-by-step approach to understanding the relationship between zeros and coefficients of polynomials.

Exam Preparedness: Helps students practice and master important questions frequently asked in board exams.

Error-Free Learning: Offers accurate solutions aligned with the NCERT syllabus.

Time Management: Improves problem-solving speed with structured methods.

Competitive Exam Foundation: Strengthens algebraic concepts essential for exams.

Self-Assessment: Facilitates independent learning and evaluation through systematic practice.