RD Sharma Solutions Class 10 Maths Chapter 2 Exercise 2.3: Chapter 2, Exercise 2.3 in RD Sharma's Class 10 Maths textbook focuses on polynomials, particularly on solving equations that involve finding the zeros of a polynomial.

This exercise emphasizes understanding the relationship between a polynomial's zeros and its coefficients, specifically for quadratic polynomials. Problems include calculating zeros and verifying that they satisfy the given polynomial. It also covers the concepts of factorization and the Factor Theorem, which helps students break down polynomials into simpler linear or quadratic factors, deepening their foundational understanding of algebraic expressions and polynomial functions.

RD Sharma Solutions Class 10 Maths Chapter 2 Exercise 2.3 Overview

Students can better grasp basic polynomial principles by working through the problems in Exercise 2.3 of RD Sharma's Class 10 Maths Chapter 2. By working through these problems, students gain vital algebraic skills such as determining a polynomial's zeros and comprehending the connection between the zeros and the polynomial's coefficients.

Their factorisation abilities, which are essential for decomposing complicated expressions and resolving equations, are strengthened by this practice. These skills are extremely significant in advanced mathematics since solving these issues provides a strong basis for more complex algebraic topics including quadratic equations, calculus, and graphing polynomial functions.

RD Sharma Solutions Class 10 Maths Chapter 2 Exercise 2.3 Polynomials

Below is the RD Sharma Solutions Class 10 Maths Chapter 2 Exercise 2.3 Polynomials -

1. Apply division algorithm to find the quotient q(x) and remainder r(x) on dividing f(x) by g(x) in each of the following:

(i) $f(x) = x^3 - 6x^2 + 11x - 6$, $g(x) = x^2 + x + 1$

Solution:

Given,

$f(x) = x^3 - 6x^2 + 11x - 6$, $g(x) = x^2 + x + 1$

$$
\begin{array}{r|rrrr}
 & x & -7 & & \\
x^2 + x + 1 & x^3 & -6x^2 & +11x & -6 \\
 & - & & & \\
 & x^3 & +x^2 & +x & \\
\hline
 & & -7x^2 & +10x & -6 \\
 & & - & & \\
 & & -7x^2 & -7x & -7 \\
\hline
 & & & 17x & +1
\end{array}
$$

Thus,

q(x) = x – 7 and r(x) = 17x +1

(ii) f(x) = $10x^4 + 17x^3 - 62x^2 + 30x - 3$, g(x) = $2x^2 + 7x + 1$

Solution:

Given,

f(x) = $10x^4 + 17x^3 - 62x^2 + 30x - 3$ and g(x) = $2x^2$ **+ 7x + 1**

$$
\begin{array}{r|rrrrr}
 & 5x^2 & -9x & -2 & & \\
\hline
2x^2+7x+1 & 10x^4 & +17x^3 & -62x^2 & +30x & -3 \\
- & 10x^4 & +35x^3 & +5x^2 & & \\
\hline
 & & -18x^3 & -67x^2 & +30x & -3 \\
 & - & -18x^3 & -63x^2 & -9x & \\
\hline
 & & & -4x^2 & +39x & -3 \\
 & & - & -4x^2 & -14x & -2 \\
\hline
 & & & & 53x & -1
\end{array}
$$

Thus,

$q(x) = 5x^2 – 9x – 2$ and $r(x) = 53x – 1$

(iii) $f(x) = 4x^3 + 8x^2 + 8x + 7$, $g(x)= 2x^2 – x + 1$

Solution:

Given,

$f(x) = 4x^3 + 8x^2 + 8x + 7$ and $g(x)= 2x^2 – x + 1$

$$
\begin{array}{lllll}
 & 2x & +5 & & \\
2x^2 - x + 1 & \big) 4x^3 & +8x^2 & +8x & +7 \\
 & - & & & \\
 & 4x^3 & -2x^2 & +2x & \\
\hline
 & & 10x^2 & +6x & +7 \\
 & & - & & \\
 & & 10x^2 & -5x & +5 \\
\hline
 & & & 11x & +2
\end{array}
$$

Thus,

q(x) = 2x + 5 and r(x) = 11x + 2

(iv) f(x) = 15x^3 – 20x^2 + 13x – 12, g(x) = x^2 – 2x + 2

Solution:

Given,

f(x) = 15x^3 – 20x^2 + 13x – 12 and g(x) = x^2 – 2x + 2

$$
\begin{array}{lllll}
 & 15x & +10 & & \\
x^2 - 2x + 2 & \big) 15x^3 & -20x^2 & +13x & -12 \\
 & - & & & \\
 & 15x^3 & -30x^2 & +30x & \\
\hline
 & & 10x^2 & -17x & -12 \\
 & & - & & \\
 & & 10x^2 & -20x & +20 \\
\hline
 & & & 3x & -32
\end{array}
$$

Thus,

q(x) = 15x + 10 and r(x) = 3x – 32

2. Check whether the first polynomial is a factor of the second polynomial by applying the division algorithm:

(i) $g(t) = t^2 - 3$; $f(t) = 2t^4 + 3t^3 - 2t^2 - 9t - 12$

Solution:

Given,

$g(t) = t^2 - 3$; $f(t) = 2t^4 + 3t^3 - 2t^2 - 9t - 12$

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

Since, the remainder $r(t) = 0$ we can say that **the first polynomial is a factor of the second polynomial.**

(ii) $g(x) = x^3 - 3x + 1$; $f(x) = x^5 - 4x^3 + x^2 + 3x + 1$

Solution:

Given,

$g(x) = x^3 - 3x + 1$; $f(x) = x^5 - 4x^3 + x^2 + 3x + 1$

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

Since, the remainder r(x) = 2 and not equal to zero we can say that **the first polynomial is not a factor of the second polynomial.**

(iii) g(x) = $2x^2$– x + 3; f(x) = $6x^5 - x^4 + 4x^3 - 5x^2 - x - 15$

Solution:

Given,

g(x) = $2x^2$– x + 3; f(x)=$6x^5 - x^4 + 4x^3 - 5x^2 - x - 15$

$$
\begin{array}{r|llllll}
 & 3x^3 & +x^2 & -2x & -5 & & \\
2x^2 - x + 3 & 6x^5 & -x^4 & +4x^3 & -5x^2 & -x & -15 \\
- & 6x^5 & -3x^4 & +9x^3 & & & \\
\hline
 & & 2x^4 & -5x^3 & -5x^2 & -x & -15 \\
 & - & 2x^4 & -x^3 & +3x^2 & & \\
\hline
 & & & -4x^3 & -8x^2 & -x & -15 \\
 & & - & -4x^3 & +2x^2 & -6x & \\
\hline
 & & & & -10x^2 & +5x & -15 \\
 & & & - & -10x^2 & +5x & -15 \\
\hline
 & & & & & & 0
\end{array}
$$

Since, the remainder r(x) = 0 we can say that **the first polynomial is not a factor of the second polynomial.**

3. Obtain all zeroes of the polynomial f(x)= $2x^4 + x^3 – 14x^2 – 19x–6$, if two of its zeroes are -2 and -1.

Solution:

Given,

f(x)= $2x^4 + x^3 – 14x^2 – 19x – 6$

If the two zeros of the polynomial are -2 and -1, then its factors are (x + 2) and (x + 1)

⇒ $(x+2)(x+1) = x^2 + x + 2x + 2 = x^2 + 3x +2$ …… (i)

This means that (i) is a factor of f(x). So, performing division algorithm we get,

$$
\begin{array}{l|rrrrr}
 & & & 2x^2 & -5x & -3 \\
\hline
x^2+3x+2 & 2x^4 & +x^3 & -14x^2 & -19x & -6 \\
 & - & & & & \\
 & 2x^4 & +6x^3 & +4x^2 & & \\
\hline
 & & -5x^3 & -18x^2 & -19x & -6 \\
 & & - & & & \\
 & & -5x^3 & -15x^2 & -10x & \\
\hline
 & & & -3x^2 & -9x & -6 \\
 & & & - & & \\
 & & & -3x^2 & -9x & -6 \\
\hline
 & & & & & 0
\end{array}
$$

The quotient is $2x^2 – 5x – 3$.

⇒ $f(x)= (2x^2 – 5x – 3)(x^2 + 3x +2)$

For obtaining the other 2 zeros of the polynomial

We put,

$2x^2 – 5x – 3 = 0$

⇒ $(2x + 1)(x – 3) = 0$

∴ $x = -1/2$ or 3

Hence, all the zeros of the polynomial are -2, -1, -1/2 and 3.

4. Obtain all zeroes of $f(x) = x^3 + 13x^2 + 32x + 20$, if one of its zeros is -2.

Solution:

Given,

f(x)= $x^3 + 13x^2 + 32x + 20$

And, -2 is one of the zeros. So, $(x + 2)$ is a factor of $f(x)$, Performing division algorithm, we get

$$
\begin{array}{rrrrr}
 & x^2 & +11x & +10 & \\
\cline{2-5}
x+2 \,\big) & x^3 & +13x^2 & +32x & +20 \\
- & & & & \\
 & x^3 & +2x^2 & & \\
\hline
 & & 11x^2 & +32x & +20 \\
 & - & & & \\
 & & 11x^2 & +22x & \\
\hline
 & & & 10x & +20 \\
 & & - & & \\
 & & & 10x & +20 \\
\hline
 & & & & 0
\end{array}
$$

⇒ f(x)= (x^2 + 11x + 10)(x + 2)

So, putting x^2 + 11x + 10 = 0 we can get the other 2 zeros.

⇒ (x + 10)(x + 1) = 0

∴ x = -10 or -1

Hence, all the zeros of the polynomial are -10, -2 and -1.

5. Obtain all zeroes of the polynomial f(x) = x^4 – $3x^3$ – x^2 + 9x – 6, if the two of its zeroes are −√3 and √3.

Solution:

Given,

f(x) = x^4 – $3x^3$ – x^2 + 9x – 6

Since, two of the zeroes of polynomial are −√3 and √3 so, (x + √3) and (x–√3) are factors of f(x).

⇒ $x^2 – 3$ is a factor of f(x). Hence, performing division algorithm, we get

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

⇒ $f(x) = (x^2 – 3x + 2)(x^2 – 3)$

So, putting $x^2 – 3x + 2 = 0$ we can get the other 2 zeros.

⇒ $(x – 2)(x – 1) = 0$

∴ x = 2 or 1

Hence, all the zeros of the polynomial are $−\sqrt{3}$, 1, $\sqrt{3}$ and 2.

6. Obtain all zeroes of the polynomial $f(x)= 2x^4 – 2x^3 – 7x^2 + 3x + 6$, if the two of its zeroes are $−\sqrt{(3/2)}$ and $\sqrt{(3/2)}$.

Solution:

Given,

$f(x)= 2x^4 – 2x^3 – 7x^2 + 3x + 6$

Since, two of the zeroes of polynomial are $−\sqrt{(3/2)}$ and $\sqrt{(3/2)}$ so, $(x + \sqrt{(3/2)})$ and $(x –\sqrt{(3/2)})$ are factors of f(x).

⇒ $x^2 – (3/2)$ is a factor of f(x). Hence, performing division algorithm, we get

$$
\begin{array}{r|rrrrr}
 & 2x^2 & -2x & -4 & & \\
\hline
x^2 - \frac{3}{2} & 2x^4 & -2x^3 & -7x^2 & +3x & +6 \\
- & 2x^4 & +0x^3 & -3x^2 & & \\
\hline
 & & -2x^3 & -4x^2 & +3x & +6 \\
- & & -2x^3 & +0x^2 & +3x & \\
\hline
 & & & -4x^2 & +0x & +6 \\
- & & & -4x^2 & +0x & +6 \\
\hline
 & & & & & 0
\end{array}
$$

⇒ $f(x) = (2x^2 – 2x – 4)(x^2 – 3/2) = 2(x^2 – x – 2)(x^2 – 3/2)$

So, putting $x^2 – x – 2 = 0$ we can get the other 2 zeros.

⇒ $(x – 2)(x + 1) = 0$

∴ $x = 2$ or -1

Hence, all the zeros of the polynomial are $-\sqrt{(3/2)}$, -1, $\sqrt{(3/2)}$ and 2.

7. Find all the zeroes of the polynomial $x^4 + x^3 – 34x^2 – 4x + 120$, if the two of its zeros are 2 and -2.

Solution:

Let,

$f(x) = x^4 + x^3 – 34x^2 – 4x + 120$

Since, two of the zeroes of polynomial are −2 and 2 so, $(x + 2)$ and $(x – 2)$ are factors of f(x).

⇒ $x^2 – 4$ is a factor of f(x). Hence, performing division algorithm, we get

$$
\begin{array}{r|llllll}
 & x^2 & +x & -30 & & \\
\hline
x^2 - 4 & x^4 & +x^3 & -34x^2 & -4x & +120 \\
 & - & & & & \\
 & x^4 & +0x^3 & -4x^2 & & \\
\hline
 & & x^3 & -30x^2 & -4x & +120 \\
 & & - & & & \\
 & & x^3 & +0x^2 & -4x & \\
\hline
 & & & -30x^2 & +0x & +120 \\
 & & & - & & \\
 & & & -30x^2 & +0x & +120 \\
\hline
 & & & & & 0
\end{array}
$$

⇒ $f(x) = (x^2 + x - 30)(x^2 - 4)$

So, putting $x^2 + x - 30 = 0$, we can get the other 2 zeros.

⇒ $(x + 6)(x - 5) = 0$

∴ $x = -6$ or 5

Hence, all the zeros of the polynomial are 5, -2, 2 and -6.

Benefits of Solving RD Sharma Solutions Class 10 Maths Chapter 2 Exercise 2.3

Solving the RD Sharma Solutions for Class 10 Maths, specifically Chapter 2 Exercise 2.3 on Polynomials, offers several benefits for students:

Concept Clarity: It reinforces the fundamental concepts of polynomials, ensuring students understand their properties, operations, and applications.

Step-by-Step Guidance: The solutions provide a systematic approach to problem-solving, helping students grasp the methods used to tackle various polynomial problems.

Varied Problem Types: The exercise includes a range of problems, from basic to complex, allowing students to build confidence and proficiency in handling different scenarios.

Self-Assessment: Working through the solutions enables students to assess their understanding and identify areas needing improvement.

Exam Preparation: The comprehensive practice prepares students for exams, enhancing their ability to solve questions under time constraints.

Enhanced Problem-Solving Skills: Regular practice with these solutions helps develop critical thinking and analytical skills, which are essential for higher-level mathematics.