RD Sharma Solutions Class 10 Maths Chapter 2 Exercise 2.2: Students explore polynomials in Chapter 2, Exercise 2.2 of RD Sharma's Class 10 Maths, emphasizing their algebraic identities and factorization strategies. Important ideas including polynomial zeroes, the connection between a polynomial's coefficients and zeroes, and the division procedure for polynomials are covered in this exercise.

Students learn how to discover the roots of polynomials, identify and solve them, and simplify difficult statements using algebraic identities. This strengthens their comprehension of algebraic manipulation, which is essential for resolving more complex polynomial problems in subsequent assignments.

RD Sharma Solutions Class 10 Maths Chapter 2 Exercise 2.2 Overview

The polynomial problems in RD Sharma's Class 10 Maths Chapter 2, Exercise 2.2 are essential for laying a strong algebraic foundation. They aid students in comprehending factorisation methods, the links between coefficients and zeroes, and the behaviour of polynomials.

Since polynomials are fundamental to algebra and are used widely in advanced mathematics, physics, engineering, and computer science, it is imperative that these ideas be understood. Students gain analytical abilities and accuracy in algebraic manipulation by solving these problems, two things that are essential for acing board examinations and becoming ready for competitive exams, which heavily emphasise polynomial equations.

RD Sharma Solutions Class 10 Maths Chapter 2 Exercise 2.2 Polynomials

Below is the RD Sharma Solutions Class 10 Maths Chapter 2 Exercise 2.2 Polynomials -

1. Verify that the numbers given alongside of the cubic polynomials below are their zeroes. Also, verify the relationship between the zeros and coefficients in each of the following cases:

(i) $f(x) = 2x^3 + x^2 – 5x + 2$; 1/2, 1, -2

Solution:

Given, $f(x) = 2x^3 + x^2 – 5x + 2$, where a= 2, b= 1, c= -5 and d= 2

For x = 1/2

$f(1/2) = 2(1/2)^3 + (1/2)^2 – 5(1/2) + 2$

$= 1/4 + 1/4 – 5/2 + 2 = 0$

⇒ $f(1/2) = 0$, hence $x = 1/2$ is a root of the given polynomial.

For $x = 1$

$f(1) = 2(1)^3 + (1)^2 – 5(1) + 2$

$= 2 + 1 – 5 + 2 = 0$

⇒ $f(1) = 0$, hence $x = 1$ is also a root of the given polynomial.

For $x = -2$

$f(-2) = 2(-2)^3 + (-2)^2 – 5(-2) + 2$

$= -16 + 4 + 10 + 2 = 0$

⇒ $f(-2) = 0$, hence $x = -2$ is also a root of the given polynomial.

Now,

Sum of zeros = $-b/a$

$1/2 + 1 – 2 = – (1)/2$

$-1/2 = -1/2$

Sum of the products of the zeros taken two at a time = c/a

$(1/2 \times 1) + (1 \times -2) + (1/2 \times -2) = -5/ 2$

$1/2 – 2 + (-1) = -5/2$

$-5/2 = -5/2$

Product of zeros = $– d/a$

$1/2 \times 1 \times (– 2) = -(2)/2$

$-1 = -1$

Hence, the relationship between the zeros and coefficients is verified.

(ii) $g(x) = x^3 – 4x^2 + 5x – 2$; 2, 1, 1

Solution:

Given, $g(x) = x^3 – 4x^2 + 5x – 2$, where a= 1, b= -4, c= 5 and d= -2

For x = 2

$g(2) = (2)^3 – 4(2)^2 + 5(2) – 2$

$= 8 – 16 + 10 – 2 = 0$

⇒ f(2) = 0, hence x = 2 is a root of the given polynomial.

For x = 1

$g(1) = (1)^3 – 4(1)^2 + 5(1) – 2$

$= 1 – 4 + 5 – 2 = 0$

⇒ g(1) = 0, hence x = 1 is also a root of the given polynomial.

Now,

Sum of zeros = -b/a

1 + 1 + 2 = – (-4)/1

4 = 4

Sum of the products of the zeros taken two at a time = c/a

(1 x 1) + (1 x 2) + (2 x 1) = 5/ 1

1 + 2 + 2 = 5

5 = 5

Product of zeros = – d/a

1 x 1 x 2 = -(-2)/1

2 = 2

Hence, the relationship between the zeros and coefficients is verified.

2. Find a cubic polynomial with the sum, sum of the product of its zeroes taken two at a time, and product of its zeros as 3, -1 and -3 respectively.

Solution:

Generally,

A cubic polynomial say, f(x) is of the form $ax^3 + bx^2 + cx + d$.

And, can be shown w.r.t its relationship between roots as.

⇒ f(x) = k [x^3 – (sum of roots)x^2 + (sum of products of roots taken two at a time)x – (product of roots)]

Where, k is any non-zero real number.

Here,

$f(x) = k [x^3 – (3)x^2 + (-1)x – (-3)]$

$\therefore f(x) = k [x^3 – 3x^2 – x + 3)]$

where, k is any non-zero real number.

3. If the zeros of the polynomial $f(x) = 2x^3 – 15x^2 + 37x – 30$ are in A.P., find them.

Solution:

Let the zeros of the given polynomial be α, β and γ. (3 zeros as it's a cubic polynomial)

And given, the zeros are in A.P.

So, let's consider the roots as

α = a – d, β = a and γ = a +d

Where, a is the first term and d is the common difference.

From given f(x), a= 2, b= -15, c= 37 and d= 30

⇒ Sum of roots = α + β + γ = (a – d) + a + (a + d) = 3a = (-b/a) = -(-15/2) = 15/2

So, calculating for a, we get 3a = 15/2 ⇒ a = 5/2

⇒ Product of roots = (a – d) x (a) x (a + d) = $a(a^2 – d^2)$ = -d/a = -(30)/2 = 15

⇒ $a(a^2 – d^2) = 15$

Substituting the value of a, we get

⇒ $(5/2)[(5/2)^2 – d^2] = 15$

⇒ $5[(25/4) – d^2] = 30$

⇒ $(25/4) – d^2 = 6$

⇒ $25 – 4d^2 = 24$

⇒ $1 = 4d^2$

∴ $d = 1/2$ or $-1/2$

Taking $d = 1/2$ and $a = 5/2$

We get,

the zeros as 2, 5/2 and 3

Taking $d = -1/2$ and $a = 5/2$

We get,

the zeros as 3, 5/2 and 2

Benefits of Solving RD Sharma Solutions Class 10 Maths Chapter 2 Exercise 2.2

Solving RD Sharma Solutions for Class 10 Maths Chapter 2, Exercise 2.2 on Polynomials offers several key benefits:

Strong Algebra Foundation: This exercise strengthens understanding of polynomials, vital for advanced algebra and calculus.

Problem-Solving Skills: By practicing different types of polynomial problems, students improve their analytical and problem-solving abilities.

Exam Preparation: It aligns well with board exam syllabi, providing structured practice for exam-level questions.

Competitive Exam Readiness: Builds skills required for entrance exams, where polynomial concepts frequently appear.

Boosts Accuracy and Speed: Regular practice enhances speed in calculations and accuracy in identifying solutions.