RD Sharma Solutions Class 10 Maths Chapter 2 Exercise 2.1: Polynomials are covered in Chapter 2 of RD Sharma's Class 10 Math textbook, emphasizing their types, degrees, and characteristics. Basic ideas including polynomial definitions, a polynomial's degree, and its categorization into monomials, binomials, and trinomials according to the number of terms are introduced in Exercise 2.1.

It also divides polynomials into cubic, quadratic, and linear degrees. Students are encouraged to recognize different kinds of polynomials, calculate their degrees, and assess polynomial values at particular times in time. This fundamental knowledge is essential because polynomials are the building blocks of more complicated equations and functions in algebra and calculus.

RD Sharma Solutions Class 10 Maths Chapter 2 Exercise 2.1 Overview

Students can benefit greatly from the RD Sharma solutions for Class 10 Maths Chapter 2, Exercise 2.1 on polynomials. These answers aid in the simplification of difficult ideas by providing students with detailed instructions on how to recognise and classify polynomials according to their degree and terms.

Students can improve their knowledge of the fundamentals of polynomials, acquire efficient problem-solving strategies, and gain confidence in solving polynomial equations which are essential to algebra, by going through these solutions. Students that practise these RD Sharma Solutions Class 10 Maths Chapter 2 Exercise 2.1 are better prepared for higher mathematical courses, where polynomial functions are important in many applications, as well as for tests.

RD Sharma Solutions Class 10 Maths Chapter 2 Exercise 2.1 Polynomials

Below is the RD Sharma Solutions Class 10 Maths Chapter 2 Exercise 2.1 Polynomials -

1. Find the zeros of each of the following quadratic polynomials and verify the relationship between the zeros and their coefficients:

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

Solution:

Given,

$f(x) = x^2 - 2x - 8$

To find the zeros, we put f(x) = 0

⇒ $x^2 – 2x – 8 = 0$

⇒ $x^2 – 4x + 2x – 8 = 0$

⇒ $x(x – 4) + 2(x – 4) = 0$

⇒ $(x – 4)(x + 2) = 0$

This gives us 2 zeros, for

x = 4 and x = -2

Hence, the zeros of the quadratic equation are 4 and -2.

Now, for verification

Sum of zeros = – coefficient of x / coefficient of x^2

4 + (-2)= – (-2) / 1

2 = 2

Product of roots = constant / coefficient of x^2

4 x (-2) = (-8) / 1

-8 = -8

Therefore, the relationship between zeros and their coefficients is verified.

(ii) g(s) = $4s^2 – 4s + 1$

Solution:

Given,

g(s) = $4s^2 – 4s + 1$

To find the zeros, we put g(s) = 0

⇒ $4s^2 – 4s + 1 = 0$

⇒ $4s^2 – 2s – 2s + 1= 0$

⇒ $2s(2s – 1) – (2s – 1) = 0$

⇒ $(2s – 1)(2s – 1) = 0$

This gives us 2 zeros, for

$s = 1/2$ and $s = 1/2$

Hence, the zeros of the quadratic equation are 1/2 and 1/2.

Now, for verification

Sum of zeros = – coefficient of s / coefficient of s^2

$1/2 + 1/2 = – (-4) / 4$

$1 = 1$

Product of roots = constant / coefficient of s^2

$1/2 \times 1/2 = 1/4$

$1/4 = 1/4$

Therefore, the relationship between zeros and their coefficients is verified.

(iii) $h(t)=t^2 – 15$

Solution:

Given,

$h(t) = t^2 – 15 = t^2 +(0)t – 15$

To find the zeros, we put $h(t) = 0$

⇒ $t^2 – 15 = 0$

⇒ $(t + \sqrt{15})(t – \sqrt{15})= 0$

This gives us 2 zeros, for

$t = \sqrt{15}$ and $t = -\sqrt{15}$

Hence, the zeros of the quadratic equation are $\sqrt{15}$ and $-\sqrt{15}$.

Now, for verification

Sum of zeros = – coefficient of t / coefficient of t^2

$\sqrt{15} + (-\sqrt{15}) = -(0) / 1$

$0 = 0$

Product of roots = constant / coefficient of t^2

$\sqrt{15} \times (-\sqrt{15}) = -15/1$

$-15 = -15$

Therefore, the relationship between zeros and their coefficients is verified.

(iv) $f(x) = 6x^2 - 3 - 7x$

Solution:

Given,

$f(x) = 6x^2 - 3 - 7x$

To find the zeros, we put $f(x) = 0$

$\Rightarrow 6x^2 - 3 - 7x = 0$

$\Rightarrow 6x^2 - 9x + 2x - 3 = 0$

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

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

This gives us 2 zeros, for

$x = 3/2$ and $x = -1/3$

Hence, the zeros of the quadratic equation are 3/2 and -1/3.

Now, for verification

Sum of zeros = – coefficient of x / coefficient of x^2

$3/2 + (-1/3) = -(-7) / 6$

$7/6 = 7/6$

Product of roots = constant / coefficient of x^2

$3/2 \times (-1/3) = (-3) / 6$

$-1/2 = -1/2$

Therefore, the relationship between zeros and their coefficients is verified.

(v) $p(x) = x^2 + 2\sqrt{2}x - 6$

Solution:

Given,

$p(x) = x^2 + 2\sqrt{2}x - 6$

To find the zeros, we put $p(x) = 0$

$\Rightarrow x^2 + 2\sqrt{2}x - 6 = 0$

$\Rightarrow x^2 + 3\sqrt{2}x - \sqrt{2}x - 6 = 0$

$\Rightarrow x(x + 3\sqrt{2}) - \sqrt{2}(x + 3\sqrt{2}) = 0$

$\Rightarrow (x - \sqrt{2})(x + 3\sqrt{2}) = 0$

This gives us 2 zeros, for

$x = \sqrt{2}$ and $x = -3\sqrt{2}$

Hence, the zeros of the quadratic equation are $\sqrt{2}$ and $-3\sqrt{2}$.

Now, for verification

Sum of zeros = – coefficient of x / coefficient of x^2

$\sqrt{2} + (-3\sqrt{2}) = -(2\sqrt{2}) / 1$

$-2\sqrt{2} = -2\sqrt{2}$

Product of roots = constant / coefficient of x^2

$\sqrt{2} \times (-3\sqrt{2}) = (-6) / 2\sqrt{2}$

$-3 \times 2 = -6/1$

$-6 = -6$

Therefore, the relationship between zeros and their coefficients is verified.

(vi) $q(x)=\sqrt{3}x^2 + 10x + 7\sqrt{3}$

Solution:

Given,

q(x) = √3x^2 + 10x + 7√3

To find the zeros, we put q(x) = 0

⇒ √3x^2 + 10x + 7√3 = 0

⇒ √3x^2 + 3x +7x + 7√3x = 0

⇒ √3x(x + √3) + 7 (x + √3) = 0

⇒ (x + √3)(√3x + 7) = 0

This gives us 2 zeros, for

x = -√3 and x = -7/√3

Hence, the zeros of the quadratic equation are -√3 and -7/√3.

Now, for verification

Sum of zeros = – coefficient of x / coefficient of x^2

-√3 + (-7/√3) = – (10) /√3

(-3-7)/ √3 = -10/√3

-10/ √3 = -10/√3

Product of roots = constant / coefficient of x^2

(-√3) x (-7/√3) = (7√3) / √3

7 = 7

Therefore, the relationship between zeros and their coefficients is verified.

(vii) f(x) = x^2 – (√3 + 1)x + √3

Solution:

Given,

f(x) = x^2 – (√3 + 1)x + √3

To find the zeros, we put f(x) = 0

⇒ $x^2 – (\sqrt{3} + 1)x + \sqrt{3} = 0$

⇒ $x^2 – \sqrt{3}x – x + \sqrt{3} = 0$

⇒ $x(x – \sqrt{3}) – 1 (x – \sqrt{3}) = 0$

⇒ $(x – \sqrt{3})(x – 1) = 0$

This gives us 2 zeros, for

$x = \sqrt{3}$ and $x = 1$

Hence, the zeros of the quadratic equation are $\sqrt{3}$ and 1.

Now, for verification

Sum of zeros = – coefficient of x / coefficient of x^2

$\sqrt{3} + 1 = – (-(\sqrt{3} +1)) / 1$

$\sqrt{3} + 1 = \sqrt{3} +1$

Product of roots = constant / coefficient of x^2

$1 \times \sqrt{3} = \sqrt{3} / 1$

$\sqrt{3} = \sqrt{3}$

Therefore, the relationship between zeros and their coefficients is verified.

(viii) $g(x)=a(x^2+1)–x(a^2+1)$

Solution:

Given,

$g(x) = a(x^2+1)–x(a^2+1)$

To find the zeros, we put g(x) = 0

⇒ $a(x^2+1)–x(a^2+1) = 0$

⇒ $ax^2 + a − a^2x – x = 0$

⇒ $ax^2 − a^2x – x + a = 0$

⇒ $ax(x - a) - 1(x - a) = 0$

⇒ $(x - a)(ax - 1) = 0$

This gives us 2 zeros, for

$x = a$ and $x = 1/a$

Hence, the zeros of the quadratic equation are a and 1/a.

Now, for verification

Sum of zeros = – coefficient of x / coefficient of x^2

$a + 1/a = -(-(a^2 + 1)) / a$

$(a^2 + 1)/a = (a^2 + 1)/a$

Product of roots = constant / coefficient of x^2

$a \times 1/a = a / a$

$1 = 1$

Therefore, the relationship between zeros and their coefficients is verified.

(ix) $h(s) = 2s^2 - (1 + 2\sqrt{2})s + \sqrt{2}$

Solution:

Given,

$h(s) = 2s^2 - (1 + 2\sqrt{2})s + \sqrt{2}$

To find the zeros, we put $h(s) = 0$

⇒ $2s^2 - (1 + 2\sqrt{2})s + \sqrt{2} = 0$

⇒ $2s^2 - 2\sqrt{2}s - s + \sqrt{2} = 0$

⇒ $2s(s - \sqrt{2}) -1(s - \sqrt{2}) = 0$

⇒ $(2s - 1)(s - \sqrt{2}) = 0$

This gives us 2 zeros, for

$x = \sqrt{2}$ and $x = 1/2$

Hence, the zeros of the quadratic equation are √3 and 1.

Now, for verification

Sum of zeros = – coefficient of s / coefficient of s^2

√2 + 1/2 = – (-(1 + 2√2)) / 2

(2√2 + 1)/2 = (2√2 +1)/2

Product of roots = constant / coefficient of s^2

1/2 x √2 = √2 / 2

√2 / 2 = √2 / 2

Therefore, the relationship between zeros and their coefficients is verified.

(x) f(v) = v^2 + 4√3v – 15

Solution:

Given,

f(v) = v^2 + 4√3v – 15

To find the zeros, we put f(v) = 0

⇒ v^2 + 4√3v – 15 = 0

⇒ v^2 + 5√3v – √3v – 15 = 0

⇒ v(v + 5√3) – √3 (v + 5√3) = 0

⇒ (v – √3)(v + 5√3) = 0

This gives us 2 zeros, for

v = √3 and v = -5√3

Hence, the zeros of the quadratic equation are √3 and -5√3.

Now, for verification

Sum of zeros = – coefficient of v / coefficient of v^2

√3 + (-5√3) = – (4√3) / 1

$-4\sqrt{3} = -4\sqrt{3}$

Product of roots = constant / coefficient of v^2

$\sqrt{3}$ x $(-5\sqrt{3}) = (-15) / 1$

-5 x $3 = -15$

$-15 = -15$

Therefore, the relationship between zeros and their coefficients is verified.

(xi) $p(y) = y^2 + (3\sqrt{5}/2)y – 5$

Solution:

Given,

$p(y) = y^2 + (3\sqrt{5}/2)y – 5$

To find the zeros, we put $f(v) = 0$

$\Rightarrow y^2 + (3\sqrt{5}/2)y – 5 = 0$

$\Rightarrow y^2 – \sqrt{5}/2\ y + 2\sqrt{5}y – 5 = 0$

$\Rightarrow y(y – \sqrt{5}/2) + 2\sqrt{5}\ (y – \sqrt{5}/2) = 0$

$\Rightarrow (y + 2\sqrt{5})(y – \sqrt{5}/2) = 0$

This gives us 2 zeros, for

$y = \sqrt{5}/2$ and $y = -2\sqrt{5}$

Hence, the zeros of the quadratic equation are $\sqrt{5}/2$ and $-2\sqrt{5}$.

Now, for verification

Sum of zeros = – coefficient of y / coefficient of y^2

$\sqrt{5}/2 + (-2\sqrt{5}) = – (3\sqrt{5}/2) / 1$

$-3\sqrt{5}/2 = -3\sqrt{5}/2$

Product of roots = constant / coefficient of y^2

$\sqrt{5}/2$ x $(-2\sqrt{5}) = (-5) / 1$

$-(\sqrt{5})^2 = -5$

$-5 = -5$

Therefore, the relationship between zeros and their coefficients is verified.

(xii) $q(y) = 7y^2 - (11/3)y - 2/3$

Solution:

Given,

$q(y) = 7y^2 - (11/3)y - 2/3$

To find the zeros, we put $q(y) = 0$

$\Rightarrow 7y^2 - (11/3)y - 2/3 = 0$

$\Rightarrow (21y^2 - 11y - 2)/3 = 0$

$\Rightarrow 21y^2 - 11y - 2 = 0$

$\Rightarrow 21y^2 - 14y + 3y - 2 = 0$

$\Rightarrow 7y(3y - 2) - 1(3y + 2) = 0$

$\Rightarrow (3y - 2)(7y + 1) = 0$

This gives us 2 zeros, for

$y = 2/3$ and $y = -1/7$

Hence, the zeros of the quadratic equation are 2/3 and -1/7.

Now, for verification

Sum of zeros = – coefficient of y / coefficient of y^2

$2/3 + (-1/7) = -(-11/3) / 7$

$-11/21 = -11/21$

Product of roots = constant / coefficient of y^2

$2/3 \times (-1/7) = (-2/3) / 7$

$-2/21 = -2/21$

Therefore, the relationship between zeros and their coefficients is verified.

2. For each of the following, find a quadratic polynomial whose sum and product respectively of the zeros are as given. Also, find the zeros of these polynomials by factorization.

(i) -8/3 , 4/3

Solution:

A quadratic polynomial formed for the given sum and product of zeros is given by:

f(x) = x^2 + -(sum of zeros) x + (product of roots)

Here, the sum of zeros is = -8/3 and product of zero= 4/3

Thus,

The required polynomial f(x) is,

⇒ $x^2 - (-8/3)x + (4/3)$

⇒ $x^2 + 8/3x + (4/3)$

So, to find the zeros, we put f(x) = 0

⇒ $x^2 + 8/3x + (4/3) = 0$

⇒ $3x^2 + 8x + 4 = 0$

⇒ $3x^2 + 6x + 2x + 4 = 0$

⇒ $3x(x + 2) + 2(x + 2) = 0$

⇒ $(x + 2)(3x + 2) = 0$

⇒ (x + 2) = 0 and, or (3x + 2) = 0

Therefore, the two zeros are -2 and -2/3.

(ii) 21/8 , 5/16

Solution:

A quadratic polynomial formed for the given sum and product of zeros is given by:

f(x) = x^2 + -(sum of zeros) x + (product of roots)

Here, the sum of zeros is = 21/8 and product of zero = 5/16

Thus,

The required polynomial f(x) is,

⇒ $x^2 - (21/8)x + (5/16)$

⇒ $x^2 - 21/8x + 5/16$

So, to find the zeros, we put f(x) = 0

⇒ $x^2 - 21/8x + 5/16 = 0$

⇒ $16x^2 - 42x + 5 = 0$

⇒ $16x^2 - 40x - 2x + 5 = 0$

⇒ $8x(2x - 5) - 1(2x - 5) = 0$

⇒ $(2x - 5)(8x - 1) = 0$

⇒ $(2x - 5) = 0$ and, or $(8x - 1) = 0$

Therefore, the two zeros are 5/2 and 1/8.

(iii) -2√3, -9

Solution:

A quadratic polynomial formed for the given sum and product of zeros is given by:

f(x) = x^2 + -(sum of zeros) x + (product of roots)

Here, the sum of zeros is = -2√3 and product of zero = -9

Thus,

The required polynomial f(x) is,

⇒ $x^2 - (-2\sqrt{3})x + (-9)$

⇒ $x^2 + 2\sqrt{3}x - 9$

So, to find the zeros we put f(x) = 0

⇒ $x^2 + 2\sqrt{3}x - 9 = 0$

⇒ $x^2 + 3\sqrt{3}x - \sqrt{3}x - 9 = 0$

⇒ $x(x + 3\sqrt{3}) - \sqrt{3}(x + 3\sqrt{3}) = 0$

⇒ $(x + 3\sqrt{3})(x - \sqrt{3}) = 0$

⇒ $(x + 3\sqrt{3}) = 0$ and, or $(x - \sqrt{3}) = 0$

Therefore, the two zeros are $-3\sqrt{3}$ and $\sqrt{3}$.

(iv) -3/2√5, -1/2

Solution:

A quadratic polynomial formed for the given sum and product of zeros is given by:

$f(x) = x^2 + -(\text{sum of zeros})\, x + (\text{product of roots})$

Here, the sum of zeros is = $-3/2\sqrt{5}$ and product of zero = $-1/2$

Thus,

The required polynomial f(x) is,

⇒ $x^2 - (-3/2\sqrt{5})x + (-1/2)$

⇒ $x^2 + 3/2\sqrt{5}x - 1/2$

So, to find the zeros, we put $f(x) = 0$

⇒ $x^2 + 3/2\sqrt{5}x - 1/2 = 0$

⇒ $2\sqrt{5}x^2 + 3x - \sqrt{5} = 0$

⇒ $2\sqrt{5}x^2 + 5x - 2x - \sqrt{5} = 0$

⇒ $\sqrt{5}x(2x + \sqrt{5}) - 1(2x + \sqrt{5}) = 0$

⇒ $(2x + \sqrt{5})(\sqrt{5}x - 1) = 0$

⇒ $(2x + \sqrt{5}) = 0$ and, or $(\sqrt{5}x - 1) = 0$

Therefore, the two zeros are $-\sqrt{5}/2$ and $1/\sqrt{5}$.

3. If α and β are the zeros of the quadratic polynomial $f(x) = x^2 - 5x + 4$, find the value of $1/\alpha + 1/\beta - 2\alpha\beta$.

Solution:

From the question, it's given that:

α and β are the roots of the quadratic polynomial f(x) where a = 1, b = -5 and c = 4

So, we can find

Sum of the roots = α+β = -b/a = – (-5)/1 = 5

Product of the roots = αβ = c/a = 4/1 = 4

To find, 1/α +1/β – 2αβ

⇒ [(α +β)/ αβ] – 2αβ

⇒ (5)/ 4 – 2(4) = 5/4 – 8 = -27/ 4

4. If α and β are the zeros of the quadratic polynomial p(y) = 5y^2 – 7y + 1, find the value of 1/α+1/β.

Solution:

From the question, it's given that:

α and β are the roots of the quadratic polynomial f(x) where a =5, b = -7 and c = 1

So, we can find

Sum of the roots = α+β = -b/a = – (-7)/5 = 7/5

Product of the roots = αβ = c/a = 1/5

To find, 1/α +1/β

⇒ (α +β)/ αβ

⇒ (7/5)/ (1/5) = 7

5. If α and β are the zeros of the quadratic polynomial f(x)=x^2 – x – 4, find the value of 1/α+1/β–αβ.

Solution:

From the question, it's given that:

α and β are the roots of the quadratic polynomial f(x) where a = 1, b = -1 and c = – 4

So, we can find

Sum of the roots = α+β = -b/a = – (-1)/1 = 1

Product of the roots = αβ = c/a = -4 /1 = – 4

To find, 1/α +1/β – αβ

⇒ [(α +β)/ αβ] – αβ

⇒ [(1)/ (-4)] – (-4) = -1/4 + 4 = 15/ 4

6. **If α and β are the zeroes of the quadratic polynomial f(x) = x^2 + x – 2, find the value of 1/α – 1/β.**

Solution:

From the question, it's given that:

α and β are the roots of the quadratic polynomial f(x) where a = 1, b = 1 and c = – 2

So, we can find

Sum of the roots = α+β = -b/a = – (1)/1 = -1

Product of the roots = αβ = c/a = -2 /1 = – 2

To find, 1/α – 1/β

⇒ [(β – α)/ αβ]

$$\frac{\beta-\alpha}{\alpha\beta} = \frac{\beta-\alpha}{\alpha\beta} \times \frac{(\alpha-\beta)}{\alpha\beta} = \frac{\sqrt{(\alpha+\beta)^2-4\alpha\beta}}{\alpha\beta} = \frac{\sqrt{1+8}}{2} = \frac{\sqrt{9}}{2} = \frac{3}{2}$$ ⇒

7. If one of the zero of the quadratic polynomial f(x) = $4x^2$ – 8kx – 9 is negative of the other, then find the value of k.

Solution:

From the question, it's given that:

The quadratic polynomial f(x) where a = 4, b = -8k and c = – 9

And, for roots to be negative of each other, let the roots be α and – α.

So, we can find

Sum of the roots = α – α = -b/a = – (-8k)/1 = 8k = 0 [∵ α – α = 0]

⇒ $k = 0$

8. If the sum of the zeroes of the quadratic polynomial $f(t)=kt^2 + 2t + 3k$ is equal to their product, then find the value of k.

Solution:

Given,

The quadratic polynomial $f(t)=kt^2 + 2t + 3k$, where a = k, b = 2 and c = 3k.

And,

Sum of the roots = Product of the roots

⇒ (-b/a) = (c/a)

⇒ (-2/k) = (3k/k)

⇒ (-2/k) = 3

∴ k = -2/3

9. If α and β are the zeros of the quadratic polynomial $p(x) = 4x^2 – 5x – 1$, find the value of $\alpha^2\beta+\alpha\beta^2$.

Solution:

From the question, it's given that:

α and β are the roots of the quadratic polynomial p(x) where a = 4, b = -5 and c = -1

So, we can find

Sum of the roots = α+β = -b/a = – (-5)/4 = 5/4

Product of the roots = αβ = c/a = -1/4

To find, $\alpha^2\beta+\alpha\beta^2$

⇒ αβ(α +β)

⇒ (-1/4)(5/4) = -5/16

10. If α and β are the zeros of the quadratic polynomial $f(t)=t^2– 4t + 3$, find the value of $\alpha^4\beta^3+\alpha^3\beta^4$.

Solution:

From the question, it’s given that:

α and β are the roots of the quadratic polynomial f(t) where a = 1, b = -4 and c = 3

So, we can find

Sum of the roots = $\alpha+\beta = -b/a = -(-4)/1 = 4$

Product of the roots = $\alpha\beta = c/a = 3/1 = 3$

To find, $\alpha^4\beta^3+\alpha^3\beta^4$

⇒ $\alpha^3\beta^3(\alpha+\beta)$

⇒ $(\alpha\beta)^3(\alpha+\beta)$

⇒ $(3)^3(4) = 27 \times 4 = 108$

Benefits of Solving RD Sharma Solutions Class 10 Maths Chapter 2 Exercise 2.1

Solving RD Sharma Solutions for Class 10 Maths Chapter 2, Exercise 2.1 on Polynomials provides numerous benefits:

Concept Clarity: RD Sharma Solutions Class 10 Maths Chapter 2 Exercise 2.1 offers clear explanations on polynomial definitions, degree, and classifications, solidifying foundational knowledge.

Step-by-Step Practice: Detailed RD Sharma Solutions Class 10 Maths Chapter 2 Exercise 2.1 guide students through each problem, enhancing problem-solving skills.

Exam Preparation: Practicing these solutions builds confidence and prepares students for various exam questions.

Logical Thinking: It develops analytical thinking as students learn to identify polynomial types and degrees.

Foundation for Advanced Topics: Mastery here supports future learning in algebra, calculus, and other math disciplines.