MATH-O-MANIA

Exercise 2.2 (Polynomials)

1. Find the zeroes of the following quadratic polynomials and verify the relationship between the zeroes 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

Solution

(i) x^2 – 2x – 8

= (x - 4) (x + 2)

The value of x^2 – 2x – 8 is zero when x - 4 = 0 or x + 2 = 0,
i.e., when x = 4 or x = -2

Therefore, the zeroes of x^2 – 2x – 8 are 4 and -2.

Sum of zeroes = 4 + (-2)
= 2 = -(-2)/1
= -(Coefficient of x)/Coefficient of x^2

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Product of zeroes = 4 × (-2)

= -8 = -8/1

= Constant term/Coefficient of x2

(ii) $4s^2$ – 4s + 1 = 0

= $(2s-2)^2$ =0

= (2s-1)(2s-1) =0

The value of $4s^2$ - 4s + 1 is zero when 2s - 1 = 0, i.e., s = 1/2

Therefore, the zeroes of $4s^2$ - 4s + 1 are 1/2 and 1/2.

Sum of zeroes = 1/2 + 1/2

= 1 = -(-4)/4

= -(Coefficient of s)/Coefficient of s^2

Product of zeroes = 1/2 × 1/2 = 1/4 = Constant term/Coefficient of s^2.

(iii) $6x^2$ – 3 – 7x

= $6x^2$ – 7x – 3

= (3x + 1) (2x - 3)

The value of $6x^2$ – 7x – 3 is zero when 3x + 1 = 0 or 2x - 3 = 0, i.e., x = -1/3 or x = 3/2

Therefore, the zeroes of $6x^2$ – 7x – 3 are -1/3 and 3/2.

Sum of zeroes = -1/3 + 3/2

= 7/6 = -(-7)/6

= -(Coefficient of x)/Coefficient of x^2

Product of zeroes = -1/3 × 3/2

= -1/2 = -3/6

= Constant term/Coefficient of x^2.

(iv) $4u^2$ + 8u

= $4u^2$ + 8u + 0

= 4u(u + 2)

The value of $4u^2$ + 8u is zero when 4u = 0 or u + 2 = 0, i.e., u = 0 or u = - 2

Therefore, the zeroes of $4u^2$ + 8u are 0 and - 2.

Sum of zeroes = 0 + (-2)
= -2 = -(8)/4
= -(Coefficient of u)/Coefficient of u^2

Product of zeroes = 0 × (-2)
= 0 = 0/4
= Constant term/Coefficient of u^2.

(v) t^2 – 15

= (t - √15) (t + √15)

The value of t^2 - 15 is zero when t - √15 = 0 or t + √15 = 0, i.e., when t = √15 or t = -√15

Sum of zeroes = √15 + -√15
= 0 = -0/1
= -(Coefficient of t)/Coefficient of t^2

Product of zeroes = (√15) (-√15)
= -15 = -15/1
= Constant term/Coefficient of t^2.

(vi) $3x^2$ – x – 4

= (3x - 4) (x + 1)

The value of $3x^2$ – x – 4 is zero when 3x - 4 = 0 and x + 1 = 0,i.e., when x = 4/3 or x = -1

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Therefore, the zeroes of $3x^2$ – x – 4 are 4/3 and -1.

Sum of zeroes = 4/3 + (-1)
= 1/3 = -(-1)/3
= -(Coefficient of x)/Coefficient of x^2

Product of zeroes = 4/3 × (-1)
= -4/3
= Constant term/Coefficient of x^2.

2. Find a quadratic polynomial each with the given numbers as the sum and product of its zeroes respectively.

(i) 1/4 , -1

Solution (i) 1/4 , -1

Let the polynomial be ax^2 + bx + c, and its zeroes be α and ß

α + ß = 1/4 = -b/a

αß = -1 = -4/4 = c/a

If a = 4, then b = -1, c = -4

Therefore, the quadratic polynomial is $4x^2$ - x -4.

(ii) √2 , 1/3

Solution (ii) √2 , 1/3

Let the polynomial be ax^2 + bx + c, and its zeroes be α and ß

α + ß = √2 = 3√2/3 = -b/a

αß = 1/3 = c/a

If a = 3, then b = -3√2, c = 1

Therefore, the quadratic polynomial is $3x^2$ -3√2x +1.

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(iii) 0, √5

Solution :- Let the polynomial be ax^2 + bx + c, and its zeroes be α and ß

α + ß = 0 = 0/1 = -b/a

αß = √5 = √5/1 = c/a

If a = 1, then b = 0, c = √5

Therefore, the quadratic polynomial is x^2 + √5.

(iv) 1, 1

Solution :- Let the polynomial be ax^2 + bx + c, and its zeroes be α and ß

α + ß = 1 = 1/1 = -b/a

αß = 1 = 1/1 = c/a

If a = 1, then b = -1, c = 1

Therefore, the quadratic polynomial is x^2 – x +1.

(v) -1/4 ,1/4

Solution :- Let the polynomial be ax^2 + bx + c, and its zeroes be α and ß

α + ß = -1/4 = -b/a

αß = ¼ = c/a

If a = 4, then b = 1, c = 1

Therefore, the quadratic polynomial is 4x^2 + x +1.

(vi) 4,1

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Solution :- Let the polynomial be ax^2 + bx + c, and its zeroes be α and ß

α + ß = 4 = 4/1 = -b/a

αß = 1 = 1/1 = c/a

If a = 1, then b = -4, c = 1

Therefore, the quadratic polynomial is x^2 - 4x +1.

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