Polynomial Exercise 2

Question 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) $3x^2 - x - 4$

Answer

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

$= x^2 - 4x + 2x - 8$

$= (x - 4)(x + 2)$

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

(ii) $4s^2 - 4s + 1$

From $(a-b)^2 = a^2 - 2ab + b^2$

$= (2s-1)^2$

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

(iii) $6x^2 - 3 - 7x$

$= 6x^2 - 7x - 3$

$= 6x^2 - 9x + 2x - 3$

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

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

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

$= 4u^2 + 8u$

$= 4u(u + 2)$

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

(v) $t^2 - 15$

From $(a^2 - b^2) = (a-b)(a+b)$

$= (t - \sqrt{15})(t + \sqrt{15})$

Therefore, the zeroes of $t^2 - 15$ are $\sqrt{15}$ and $-\sqrt{15}$.

(vi) $3x^2 - x - 4$

$= 3x^2 - 4x + 3x - 4$

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

Verification of the relationship between the zeroes

S. No	Sum of zeroes=-(Coefficient of x)/Coefficient of x^2	Product of zeroes= Constant term/Coefficient of x^2.
i)	4 + (-2) = 2 = -(-2)/1	4 × (-2) = -8 = -8/1
ii)	1/2 + 1/2 = 1 = -(-4)/4	1/2 × 1/2 = 1/4
iii)	-1/3 + 3/2 = 7/6 = -(-7)/6	-1/3 × 3/2 = -1/2 = -3/6
iv)	0 + (-2) = -2 = -(8)/4	0 × (-2) = 0 = 0/4
v)	√15 + -√15 = 0 = -0/1	(√15) (-√15) = -15 = -15/1
vi)	4/3 + (-1) = 1/3 = -(-1)/3	4/3 × (-1) = -4/3

Question 2

Find a quadratic polynomial each with the given numbers as the sum and product of its zeroes respectively.
(i) 1/4, -1
(ii) √2, 1/3
(iii) 0, √5
(iv) 1,1
(v) -1/4 ,1/4
(vi) 4,1

Answer

(i) 1/4 , -1
Let the polynomial be $ax^2 + bx + c$, and its zeroes be p and q
p + q = 1/4 = -b/a
pq = -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
Let the polynomial be $ax^2 + bx + c$, and its zeroes be p and q

p + q = √2 = 3√2/3 = -b/a
pq = 1/3 = c/a
If a = 3, then b = -3√2, c = 1
Therefore, the quadratic polynomial is $3x^2 - 3\sqrt{2}x + 1$.

(iii) 0, √5
Let the polynomial be $ax^2 + bx + c$, and its zeroes be p and q
p + q = 0 = 0/1 = -b/a
pq = √5 = √5/1 = c/a
If a = 1, then b = 0, c = √5
Therefore, the quadratic polynomial is $x^2 + \sqrt{5}$.

(iv) 1, 1
Let the polynomial be $ax^2 + bx + c$, and its zeroes be p and q
p + q = 1 = 1/1 = -b/a
pq = 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
Let the polynomial be $ax^2 + bx + c$, and its zeroes be p and q
p + q = -1/4 = -b/a
pq = 1/4 = c/a
If a = 4, then b = 1, c = 1
Therefore, the quadratic polynomial is $4x^2 + x + 1$.

(vi) 4,1
Let the polynomial be $ax^2 + bx + c$, and its zeroes be p and q
p + q = 4 = 4/1 = -b/a
pq = 1 = 1/1 = c/a
If a = 1, then b = -4, c = 1
Therefore, the quadratic polynomial is $x^2 - 4x + 1$.