EXERCISE 2.3

Find the zeroes of the following polynomials by factorisation method.

1. $4x^2 - 3x - 1$

Solution:

$4x^2 - 3x - 1$

Splitting the middle term, we get,

$4x^2-4x+1x-1$

Taking the common factors out, we get,

$4x(x-1) +1(x-1)$

On grouping, we get,

$(4x+1)(x-1)$

So, the zeroes are,

$4x+1= 0 \Rightarrow 4x=-1 \Rightarrow x= (-1/4)$

$(x-1) = 0 \Rightarrow x=1$

Therefore, zeroes are (-1/4) and 1

Verification:

Sum of the zeroes = - (coefficient of x) ÷ coefficient of x^2

$\alpha + \beta = - b/a$

$1 - 1/4 = - (- 3)/4 = 3/4$

Product of the zeroes = constant term ÷ coefficient of x^2

$\alpha \beta = c/a$

$1(- 1/4) = - 1/4$

$- 1/4 = - 1/4$

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

Solution:

$3x^2 + 4x - 4$

Splitting the middle term, we get,

$3x^2 + 6x - 2x - 4$

Taking the common factors out, we get,

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

On grouping, we get,

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

So, the zeroes are,

$x+2=0 \Rightarrow x= -2$

$3x-2=0\Rightarrow 3x=2\Rightarrow x=2/3$

Therefore, zeroes are (2/3) and -2

Verification:

Sum of the zeroes = - (coefficient of x) ÷ coefficient of x^2

$\alpha + \beta = - b/a$

$- 2 + (2/3) = - (4)/3$

$= - 4/3 = - 4/3$

Product of the zeroes = constant term ÷ coefficient of x^2

$\alpha \beta = c/a$
Product of the zeroes = (- 2) (2/3) = - 4/3

3. $5t^2 + 12t + 7$
Solution:

$5t^2 + 12t + 7$
Splitting the middle term, we get,
$5t^2 + 5t + 7t + 7$
Taking the common factors out, we get,
5t (t+1) +7(t+1)
On grouping, we get,
(t+1)(5t+7)
So, the zeroes are,
t+1=0 ⇒ y= -1
5t+7=0 ⇒ 5t=-7⇒t=-7/5
Therefore, zeroes are (-7/5) and -1
Verification:
Sum of the zeroes = - (coefficient of x) ÷ coefficient of x^2
$\alpha + \beta = - b/a$
(- 1) + (- 7/5) = - (12)/5
= - 12/5 = - 12/5
Product of the zeroes = constant term ÷ coefficient of x^2
$\alpha \beta = c/a$
(- 1)(- 7/5) = - 7/5
- 7/5 = - 7/5

4. $t^3 – 2t^2 – 15t$
Solution:

$t^3 – 2t^2 – 15t$
Taking t common, we get,
t (t^2 -2t -15)
Splitting the middle term of the equation t^2 -2t -15, we get,
t(t^2 -5t + 3t -15)
Taking the common factors out, we get,
t (t (t-5) +3(t-5)
On grouping, we get,
t (t+3)(t-5)
So, the zeroes are,
t=0
t+3=0 ⇒ t= -3
t -5=0 ⇒ t=5
Therefore, zeroes are 0, 5 and -3
Verification:
Sum of the zeroes = - (coefficient of x^2) ÷ coefficient of x^3
$\alpha + \beta + \gamma = - b/a$

(0) + (- 3) + (5) = - (- 2)/1
= 2 = 2
Sum of the products of two zeroes at a time = coefficient of x ÷ coefficient of x^3
αβ + βγ + αγ = c/a
(0)(- 3) + (- 3) (5) + (0) (5) = - 15/1
= - 15 = - 15
Product of all the zeroes = - (constant term) ÷ coefficient of x^3
αβγ = - d/a
(0)(- 3)(5) = 0
0 = 0

5. $2x^2 + (7/2)x + 3/4$
Solution:

$2x^2 + (7/2)x + 3/4$
The equation can also be written as,
$8x^2+14x+3$
Splitting the middle term, we get,
$8x^2+12x+2x+3$
Taking the common factors out, we get,
4x (2x+3) +1(2x+3)
On grouping, we get,
(4x+1)(2x+3)
So, the zeroes are,
4x+1=0 ⇒ x = -1/4
2x+3=0 ⇒ x = -3/2
Therefore, zeroes are -1/4 and -3/2
Verification:
Sum of the zeroes = - (coefficient of x) ÷ coefficient of x^2
α + β = - b/a
(- 3/2) + (- 1/4) = - (7)/4
= - 7/4 = - 7/4
Product of the zeroes = constant term ÷ coefficient of x^2
α β = c/a
(- 3/2)(- 1/4) = (3/4)/2
3/8 = 3/8