

Class 9th Math Exercise 4.1

Q. 1 Factorize by identifying common factors.

(i) $6x + 12$

Solution

$$\begin{aligned} 6x + 12 \\ &= 6x + 6 \times 2 \\ &= 6(x + 2) \text{ (6 is a common factor)} \end{aligned}$$

(ii) $15y^2 + 20y$

Solution:

$$\begin{aligned} 15y^2 + 20y \\ &= (5) \times 3 \times (y) \times y + (5) \times 4 \times (y) \\ &= 5y(3y + 4) \text{ (5y is a common factor)} \end{aligned}$$

(iii) $-12x^2 - 3x$

Solution:

$$\begin{aligned} -12x^2 - 3x \\ &= -3 \times 4 \times (x) \times x - (3)(x)(1) \\ &= -3x(4x + 1) \text{ (3x is a common factor)} \end{aligned}$$

(iv) $4a^2b + 8ab^2$

Solution:

$$\begin{aligned} 4a^2b + 8ab^2 \\ &= 4aa(b) + 2 \\ &= 4ab(a + 2b) \end{aligned}$$

(4ab is a common factor)

(v) $xy - 3x^2 + 2x$

Solution:

$$\begin{aligned} xy - 3x^2 + 2x \\ &= (x)y - 3x(x) + 2(x) \\ &= x(y - 3x + 2) \text{ (x is common factor)} \end{aligned}$$

(vi) $3a^2b - 9ab^2 + 15ab$

Solution:

$$\begin{aligned} 3a^2b - 9ab^2 + 15ab \\ &= 3 \times a \times a \times (b) - 3 \times 3a \times (b) \times b + (3) \times 5(a) \times (b) \\ &= 3ab(a - 3b + 5) \text{ (3ab is a common factor)} \end{aligned}$$

Q. 2 Factorize and represent pictorially:

(i) $5x + 15$

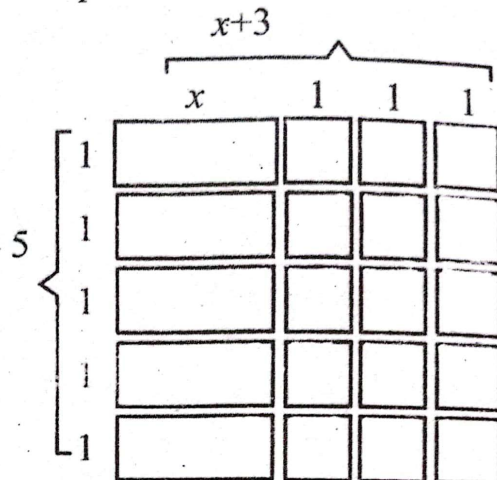
Solution:

$$5x + 15$$

$$= 5(x + 3)$$

Here, $(x + 3)$ is 5 times. Draw the picture of $(x + 3)$ and repeat it 5 times.

Pictorial represents



CS Scanned with CamScanner

(ii) $x^2 + 4x + 3$

Solution:

Factorization:

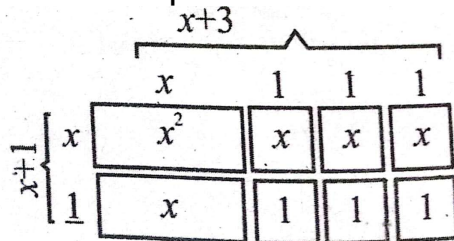
$$x^2 + 4x + 3$$

$$= x^2 + 3x + x + 3$$

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

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

Pictorial Representation:



CS Scanned with CamScanner

(iii) $x^2 + 6x + 8$

Solution:

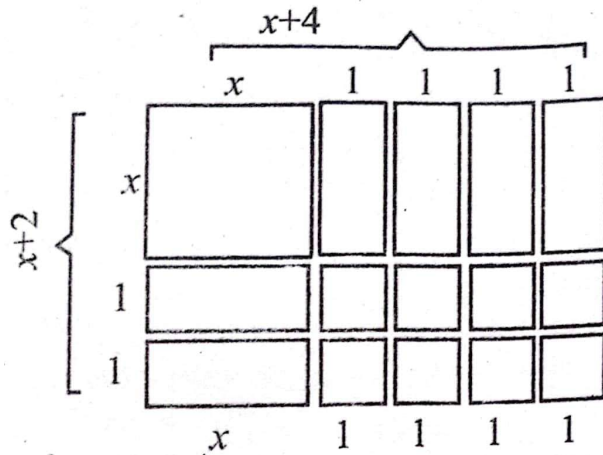
Factorization:

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$$\begin{aligned}
 & x^2 + 6x + 8 \\
 &= x^2 + 2x + 4x + 8 \\
 &= x(x + 2) + 4(x + 2) \\
 &= (x + 2)(x + 4)
 \end{aligned}$$

Pictorial representation:



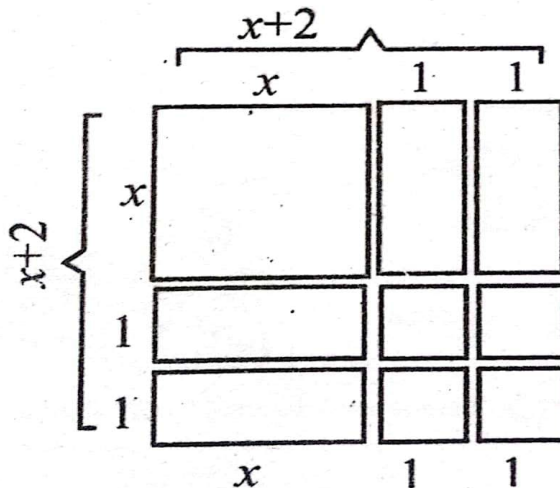
(iv) $x^2 + 4x + 4$

Solution:

Factorization: $x^2 + 4x + 4$

$$\begin{aligned}
 &= x^2 + 2x + 2x + 4 \\
 &= x(x + 2) + 2(x + 2) \\
 &= (x + 2)(x + 2)
 \end{aligned}$$

Pictorial representation:



Q. 3 Factorize:

(i) $x^2 + x - 12$

Solution:

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$$\begin{aligned}
 & x^2 + x - 12 \\
 & = x^2 - 3x + 4x - 12 \\
 & = x(x - 3) + 4(x - 3) \\
 & = (x - 3)(x + 4) \\
 & \text{(ii) } x^2 + 7x + 10
 \end{aligned}$$

Solution:

$$\begin{aligned}
 & x^2 + 7x + 10 \\
 & = x^2 + 5x + 2x + 10 \\
 & = x(x + 5) + 2(x + 5) \\
 & = (x + 2)(x + 5)
 \end{aligned}
 \left. \vphantom{\begin{aligned} x^2 + 7x + 10 \\ = x^2 + 5x + 2x + 10 \\ = x(x + 5) + 2(x + 5) \\ = (x + 2)(x + 5) \end{aligned}} \right\}$$

(iii) $x^2 - 6x + 8$

Solution:

$$\begin{aligned}
 & x^2 - 6x + 8 \\
 & = x^2 - 4x - 2x + 8 \\
 & = x(x - 4) - 2(x - 4) \\
 & = (x - 2)(x - 4)
 \end{aligned}$$

(iv) $x^2 - x - 56$

Solution:

$$\begin{aligned}
 & x^2 - x - 56 \\
 & = x^2 - 8x + 7x - 56 \\
 & = x(x - 8) + 7(x - 8)
 \end{aligned}
 \left. \vphantom{\begin{aligned} x^2 - x - 56 \\ = x^2 - 8x + 7x - 56 \\ = x(x - 8) + 7(x - 8) \end{aligned}} \right\}$$

(v) $x^2 - 10x - 24$

Solution:

$$\begin{aligned}
 & x^2 - 10x - 24 \\
 & = x^2 - 12x + 2x - 24 \\
 & = x(x - 12) + 2(x - 12) \\
 & = (x - 12)(x + 2)
 \end{aligned}$$

(vi) $y^2 + 4y - 12$

Solution:

$$\begin{aligned}
 & y^2 + 4y - 12 \\
 & = y^2 - 2y + 6y - 12 \\
 & = y(y - 2) + 6(y - 2) \\
 & = (y - 2)(y + 6)
 \end{aligned}$$

(vii) $y^2 + 13y + 36$

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Solution:

$$\begin{aligned} & y^2 + 13y + 36 \\ &= y^2 + 9y + 4y + 36 \\ &= y(y + 9) + 4(y + 9) \\ &= (y + 9)(y + 4) \end{aligned}$$

(iv) $x^2 - x - 56$

Solution:

$$\left. \begin{aligned} & x^2 - x - 56 \\ &= x^2 - 8x + 7x - 56 \\ &= x(x - 8) + 7(x - 8) \end{aligned} \right\}$$

Solution:

$$\begin{aligned} & x^2 - 10x - 24 \\ &= x^2 - 12x + 2x - 24 \\ &= x(x - 12) + 2(x - 12) \\ &= (x - 12)(x + 2) \end{aligned}$$

Solution:

$$\begin{aligned} & y^2 + 4y - 12 \\ &= y^2 - 2y + 6y - 12 \\ &= y(y - 2) + 6(y - 2) \\ &= (y - 2)(y + 6) \end{aligned}$$

(vii) $y^2 + 13y + 36$

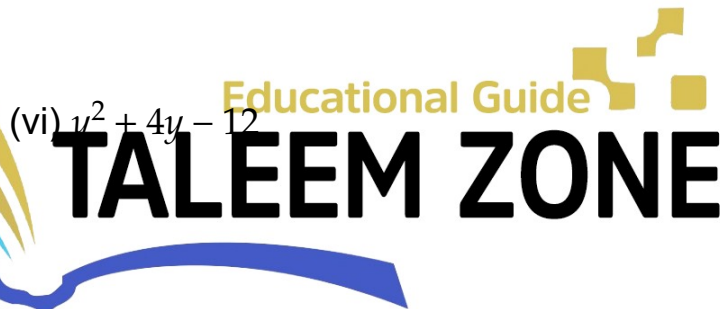
Solution:

$$\left. \begin{aligned} & y^2 + 13y + 36 \\ &= y^2 + 9y + 4y + 36 \\ &= y(y + 9) + 4(y + 9) \end{aligned} \right\}$$

(viii) $x^2 - x - 2$

Solution:

$$\begin{aligned} & x^2 - x - 2 \\ &= x^2 - 2x + x - 2 \\ &= x(x - 2) + 1(x - 2) \\ &= (x - 2)(x + 1) \end{aligned}$$



Q. 4 Factorize:

(i) $2x^2 + 7x + 3$

Solution:

$$\left. \begin{aligned} & 2x^2 + 7x + 3 \\ &= 2x^2 + 6x + x + 3 \\ &= 2x(x + 3) + 1(x + 3) \\ &= (x + 3)(2x + 1) \end{aligned} \right\}$$

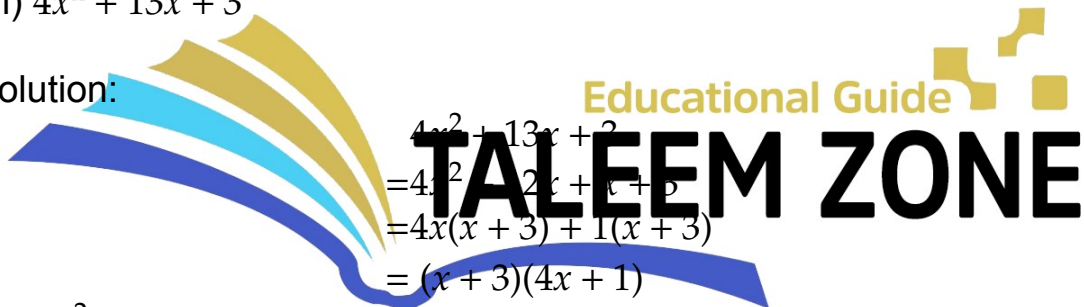
(ii) $2x^2 + 11x + 15$

Solution:

$$\left. \begin{aligned} & 2x^2 + 11x + 15 \\ &= 2x^2 + 6x + 5x + 15 \\ &= 2x(x + 3) + 5(x + 3) \\ &= (x + 3)(2x + 5) \end{aligned} \right\}$$

(iii) $4x^2 + 13x + 3$

Solution:


$$\left. \begin{aligned} & 4x^2 + 13x + 3 \\ &= 4x^2 + 12x + x + 3 \\ &= 4x(x + 3) + 1(x + 3) \\ &= (x + 3)(4x + 1) \end{aligned} \right\}$$

(iv) $3x^2 + 5x + 2$

Solution:

$$\left. \begin{aligned} & 3x^2 + 5x + 2 \\ &= 3x^2 + 3x + 2x + 2 \\ &= 3x(x + 1) + 2(x + 1) \\ &= (3x + 2)(x + 1) \end{aligned} \right\}$$

(v) $3y^2 - 11y + 6$

Solution:

$$\left. \begin{aligned} & 3y^2 - 11y + 6 \\ &= 3y^2 - 9y - 2y + 6 \\ &= 3y(y - 3) - 2(y - 3) \\ &= (y - 3)(3y - 2) \end{aligned} \right\}$$

(vi) $2y^2 - 5y + 2$

Solution:

$$\begin{aligned} &= 2y^2 - 4y - y + 2 \\ &= 2y(y - 2) - 1(y - 2) \\ &= (y - 2)(2y - 1) \end{aligned}$$

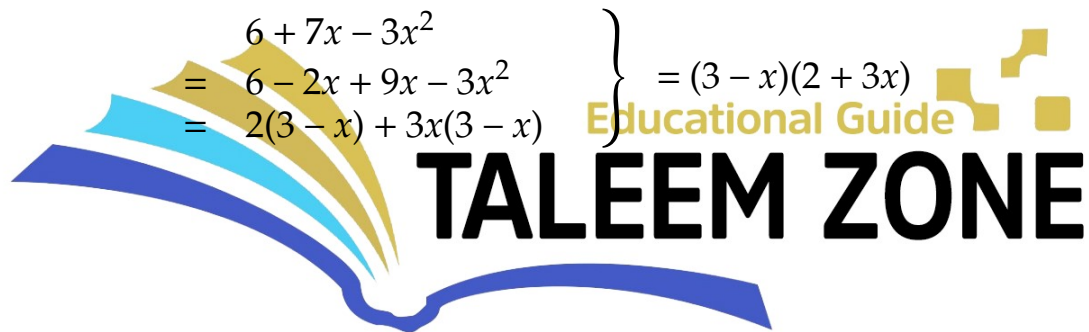
(vii) $4z^2 - 11z + 6$

Solution:

$$\left. \begin{aligned} &4z^2 - 11z + 6 \\ &= 4z^2 - 8z - 3z + 6 \\ &= 4z(z - 2) - 3(z - 2) \\ &= (z - 2)(4z - 3) \end{aligned} \right\}$$

(viii) $6 + 7x - 3x^2$

Solution:

$$\left. \begin{aligned} &6 + 7x - 3x^2 \\ &= 6 - 2x + 9x - 3x^2 \\ &= 2(3 - x) + 3x(3 - x) \end{aligned} \right\} = (3 - x)(2 + 3x)$$
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