

EXERCISE 7.4

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Simplify each of the following algebraic expressions by removing grouping symbols.

1. $2x + (5x - 3y)$

Solution:

Given $2x + (5x - 3y)$

Since the '+' sign precedes the parentheses, we have to retain the sign of each term in the parentheses when we remove them.

$$= 2x + 5x - 3y$$

On simplifying, we get

$$= 7x - 3y$$

2. $3x - (y - 2x)$

Solution:

Given $3x - (y - 2x)$

Since the '-' sign precedes the parentheses, we have to change the sign of each term in the parentheses when we remove them. Therefore, we have

$$= 3x - y + 2x$$

On simplifying, we get

$$= 5x - y$$

3. $5a - (3b - 2a + 4c)$

Solution:

Given $5a - (3b - 2a + 4c)$

Since the '-' sign precedes the parentheses, we have to change the sign of each term in the parentheses when we remove them.

$$= 5a - 3b + 2a - 4c$$

On simplifying, we get

$$= 7a - 3b - 4c$$

4. $-2(x^2 - y^2 + xy) - 3(x^2 + y^2 - xy)$

Solution:

$$\text{Given } -2(x^2 - y^2 + xy) - 3(x^2 + y^2 - xy)$$

Since the ‘-’ sign precedes the parentheses, we have to change the sign of each term in the parentheses when we remove them. Therefore, we have

$$= -2x^2 + 2y^2 - 2xy - 3x^2 - 3y^2 + 3xy$$

On rearranging,

$$= -2x^2 - 3x^2 + 2y^2 - 3y^2 - 2xy + 3xy$$

On simplifying, we get

$$= -5x^2 - y^2 + xy$$

5. $3x + 2y - \{x - (2y - 3)\}$

Solution:

$$\text{Given } 3x + 2y - \{x - (2y - 3)\}$$

First, we have to remove the parentheses. Then, we have to remove the braces.

Then we get,

$$= 3x + 2y - \{x - 2y + 3\}$$

$$= 3x + 2y - x + 2y - 3$$

On simplifying, we get

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

6. $5a - \{3a - (2 - a) + 4\}$

Solution:

$$\text{Given } 5a - \{3a - (2 - a) + 4\}$$

First, we have to remove the parentheses. Then, we have to remove the braces.

Then we get,

$$= 5a - \{3a - 2 + a + 4\}$$

$$= 5a - 3a + 2 - a - 4$$

On simplifying, we get

$$= 5a - 4a - 2$$

$$= a - 2$$

7. $a - [b - \{a - (b - 1) + 3a\}]$

Solution:

$$\text{Given } a - [b - \{a - (b - 1) + 3a\}]$$

First we have to remove the parentheses, then the curly brackets, and then the square

brackets.

Then we get,

$$= a - [b - \{a - (b - 1) + 3a\}]$$

$$= a - [b - \{a - b + 1 + 3a\}]$$

$$= a - [b - \{4a - b + 1\}]$$

$$= a - [b - 4a + b - 1]$$

$$= a - [2b - 4a - 1]$$

On simplifying, we get

$$= a - 2b + 4a + 1$$

$$= 5a - 2b + 1$$

8. $a - [2b - \{3a - (2b - 3c)\}]$

Solution:

Given $a - [2b - \{3a - (2b - 3c)\}]$

First we have to remove the parentheses, then the braces, and then the square brackets.

Then we get,

$$= a - [2b - \{3a - (2b - 3c)\}]$$

$$= a - [2b - \{3a - 2b + 3c\}]$$

$$= a - [2b - 3a + 2b - 3c]$$

$$= a - [4b - 3a - 3c]$$

On simplifying we get,

$$= a - 4b + 3a + 3c$$

$$= 4a - 4b + 3c$$

9. $-x + [5y - \{2x - (3y - 5x)\}]$

Solution:

Given $-x + [5y - \{2x - (3y - 5x)\}]$

First we have to remove the parentheses, then remove braces, and then the square brackets.

Then we get,

$$= -x + [5y - \{2x - (3y - 5x)\}]$$

$$= -x + [5y - \{2x - 3y + 5x\}]$$

$$= -x + [5y - \{7x - 3y\}]$$

$$= -x + [5y - 7x + 3y]$$

$$= -x + [8y - 7x]$$

On simplifying we get

$$= -x + 8y - 7x$$

$$= -8x + 8y$$

10. $2a - [4b - \{4a - 3(2a - b)\}]$

Solution:

Given $2a - [4b - \{4a - 3(2a - b)\}]$

First we have to remove the parentheses, then remove braces, and then the square brackets.

Then we get,

$$= 2a - [4b - \{4a - 3(2a - b)\}]$$

$$= 2a - [4b - \{4a - 6a + 3b\}]$$

$$= 2a - [4b - \{-2a + 3b\}]$$

$$= 2a - [4b + 2a - 3b]$$

$$= 2a - [b + 2a]$$

On simplifying, we get

$$= 2a - b - 2a$$

$$= -b$$

11. $-a - [a + \{a + b - 2a - (a - 2b)\}] - b$

Solution:

Given $-a - [a + \{a + b - 2a - (a - 2b)\}] - b$

First we have to remove the parentheses, then remove braces, and then the square brackets.

Then we get,

$$= -a - [a + \{a + b - 2a - (a - 2b)\}] - b$$

$$= -a - [a + \{a + b - 2a - a + 2b\}] - b$$

$$= -a - [a + \{-2a + 3b\}] - b$$

$$= -a - [a - 2a + 3b] - b$$

$$= -a - [-a + 3b] - b$$

On simplifying, we get

$$= -a + a - 3b - b$$

$$= -4b$$

12. $2x - 3y - [3x - 2y - \{x - z - (x - 2y)\}]$

Solution:

Given $2x - 3y - [3x - 2y - \{x - z - (x - 2y)\}]$

First we have to remove the parentheses, then remove braces, and then the square brackets.

Then we get,

$$= 2x - 3y - [3x - 2y - \{x - z - (x - 2y)\}]$$

$$= 2x - 3y - [3x - 2y - \{x - z - x + 2y\}]$$

$$= 2x - 3y - [3x - 2y - \{-z + 2y\}]$$

$$= 2x - 3y - [3x - 2y + z - 2y]$$

$$= 2x - 3y - [3x - 4y + z]$$

On simplifying, we get

$$= 2x - 3y - 3x + 4y - z$$

$$= -x + y - z$$

13. $5 + [x - \{2y - (6x + y - 4) + 2x\} - \{x - (y - 2)\}]$

Solution:

Given $5 + [x - \{2y - (6x + y - 4) + 2x\} - \{x - (y - 2)\}]$

First we have to remove the parentheses, then remove braces, and then the square brackets.

Then we get,

$$= 5 + [x - \{2y - (6x + y - 4) + 2x\} - \{x - (y - 2)\}]$$

$$= 5 + [x - \{2y - 6x - y + 4 + 2x\} - \{x - y + 2\}]$$

$$= 5 + [x - \{y - 4x + 4\} - \{x - y + 2\}]$$

$$= 5 + [x - y + 4x - 4 - x + y - 2]$$

$$= 5 + [4x - 6]$$

$$= 5 + 4x - 6$$

$$= 4x - 1$$

14. $x^2 - [3x + [2x - (x^2 - 1)] + 2]$

Solution:

Given $x^2 - [3x + [2x - (x^2 - 1)] + 2]$

First we have to remove the parentheses, then remove braces, and then the square brackets.

Then we get,

$$= x^2 - [3x + [2x - (x^2 - 1)] + 2]$$

$$= x^2 - [3x + [2x - x^2 + 1] + 2]$$

$$= x^2 - [3x + 2x - x^2 + 1 + 2]$$

$$= x^2 - [5x - x^2 + 3]$$

On simplifying we get

$$= x^2 - 5x + x^2 - 3$$

$$= 2x^2 - 5x - 3$$

15. $20 - [5xy + 3[x^2 - (xy - y) - (x - y)]]$

Solution:

Given $20 - [5xy + 3[x^2 - (xy - y) - (x - y)]]$

First we have to remove the parentheses, then remove braces, and then the square brackets.

Then we get,

$$= 20 - [5xy + 3[x^2 - (xy - y) - (x - y)]]$$

$$= 20 - [5xy + 3[x^2 - xy + y - x + y]]$$

$$= 20 - [5xy + 3[x^2 - xy + 2y - x]]$$

$$= 20 - [5xy + 3x^2 - 3xy + 6y - 3x]$$

$$= 20 - [2xy + 3x^2 + 6y - 3x]$$

On simplifying we get

$$= 20 - 2xy - 3x^2 - 6y + 3x$$

$$= -3x^2 - 2xy - 6y + 3x + 20$$

16. $85 - [12x - 7(8x - 3) - 2\{10x - 5(2 - 4x)\}]$

Solution:

Given $85 - [12x - 7(8x - 3) - 2\{10x - 5(2 - 4x)\}]$

First we have to remove the parentheses, then remove braces, and then the square brackets.

Then we get,

$$= 85 - [12x - 7(8x - 3) - 2\{10x - 5(2 - 4x)\}]$$

$$= 85 - [12x - 56x + 21 - 2\{10x - 10 + 20x\}]$$

$$= 85 - [12x - 56x + 21 - 2\{30x - 10\}]$$

$$= 85 - [12x - 56x + 21 - 60x + 20]$$

$$= 85 - [12x - 116x + 41]$$

$$= 85 - [-104x + 41]$$

On simplifying, we get

$$= 85 + 104x - 41$$

$$= 44 + 104x$$

17. $xy [yz - zx - \{yx - (3y - xz) - (xy - zy)\}]$

Solution:

Given $xy [yz - zx - \{yx - (3y - xz) - (xy - zy)\}]$

First we have to remove the parentheses, then remove braces, and then the square brackets.

Then we get,

$$= xy - [yz - zx - \{yx - (3y - xz) - (xy - zy)\}]$$

$$= xy - [yz - zx - \{yx - 3y + xz - xy + zy\}]$$

$$= xy - [yz - zx - \{-3y + xz + zy\}]$$

$$= xy - [yz - zx + 3y - xz - zy]$$

$$= xy - [-zx + 3y - xz]$$

On simplifying, we get

$$= xy - [-2zx + 3y]$$

$$= xy + 2xz - 3y$$

