

EXERCISE 19(B)

Question 1.

Find the sum of :

(i) $3a + 4b + 7c, -5a + 3b - 6c$
and $4a - 2b - 4c.$

(ii) $2x^2 + xy - y^2, -x^2 + 2xy + 3y^2$
and $3x^2 - 10xy + 4y^2.$

(iii) $x^2 - x + 1, -5x^2 + 2x - 2$
and $3x^2 - 3x + 1$

(iv) $a^2 - ab + bc, 2ab + bc - 2a^2$
and $-3bc + 3a^2 + ab.$

(v) $4x^2 + 7 - 3x, 4x - x^2 + 8$
and $-10 + 5x - 2x^2.$

(vi) $3x + 4xy - y^2, xy - 4x + 2y^2$
and $3y^2 - xy + 6x.$

Solution:

mc24

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$$\begin{aligned}
 & (i) (3a + 4b + 7c) + (-5a + 3b - 6c) \\
 & \quad + (4a - 2b - 4c) \\
 & = 3a + 4b + 7c - 5a + 3b - 6c \\
 & \quad + 4a - 2b - 4c \\
 & = 3a + 4a - 5a + 4b + 3b - 2b \\
 & \quad + 7c - 6c - 4c \\
 & = 7a - 5a + 7b - 2b + 7c - 10c \\
 & = 2a + 5b - 3c
 \end{aligned}$$

$$\begin{aligned}
 & (ii) (2x^2 + xy - y^2) + (-x^2 + 2xy + 3y^2) \\
 & \quad + (3x^2 - 10xy + 4y^2) \\
 & = 2x^2 + xy - y^2 - x^2 + 2xy + 3y^2 \\
 & \quad + 3x^2 - 10xy + 4y^2 \\
 & = 2x^2 + 3x^2 - x^2 + xy + 2xy - 10xy \\
 & \quad + 3y^2 + 4y^2 - y^2
 \end{aligned}$$

$$\begin{aligned}
 & = 5x^2 - x^2 + 3xy - 10xy + 7y^2 - y^2 \\
 & = 4x^2 - 7xy + 6y^2
 \end{aligned}$$

$$\begin{aligned}
 & (iii) (x^2 - x + 1) + (-5x^2 + 2x - 2) \\
 & \quad + (3x^2 - 3x + 1) \\
 & = x^2 - x + 1 - 5x^2 + 2x - 2 + 3x^2 \\
 & \quad - 3x + 1 \\
 & = x^2 + 3x^2 - 5x^2 + 2x - x - 3x + 1 + 1 - 2 \\
 & = 4x^2 - 5x^2 + 2x - 4x + 2 - 2 = -x^2 - 2x
 \end{aligned}$$

$$\begin{aligned}
 & (iv) (a^2 - ab + bc) + (2ab + bc - 2a^2) \\
 & \quad + (-3bc + 3a^2 + ab) \\
 & = a^2 - ab + bc + 2ab + bc - 2a^2 - 3bc \\
 & \quad + 3a^2 + ab \\
 & = a^2 + 3a^2 - 2a^2 + 2ab + ab - ab + bc \\
 & \quad + bc - 3bc \\
 & = 4a^2 - 2a^2 + 3ab - ab + 2bc - 3bc \\
 & = 2a^2 + 2ab - bc
 \end{aligned}$$

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$$\begin{aligned}
 \text{(v)} \quad & (4x^2 + 7 - 3x) + (4x - x^2 + 8) \\
 & \quad \quad \quad + (-10 + 5x - 2x^2) \\
 & = 4x^2 + 7 - 3x + 4x - x^2 + 8 \\
 & \quad \quad \quad - 10 + 5x - 2x^2 \\
 & = 4x^2 - x^2 - 2x^2 + 7 + 8 - 10 \\
 & \quad \quad \quad + 4x + 5x - 3x \\
 & = 4x^2 - 3x^2 + 15 - 10 + 9x - 3x \\
 & = x^2 + 5 + 6x
 \end{aligned}$$

$$\begin{aligned}
 \text{(vi)} \quad & (3x + 4xy - y^2) + (xy - 4x + 2y^2) \\
 & \quad \quad \quad + (3y^2 - xy + 6x) \\
 & = 3x + 4xy - y^2 + xy - 4x + 2y^2 \\
 & \quad \quad \quad + 3y^2 - xy + 6x \\
 & = 3x + 6x - 4x + 4xy + xy - xy \\
 & \quad \quad \quad + 2y^2 + 3y^2 - y^2 \\
 & = 9x - 4x + 5xy - xy + 5y^2 - y^2 \\
 & = 5x + 4xy + 4y^2
 \end{aligned}$$

Question 2.

Add the following expressions :

(i) $-17x^2 - 2xy + 23y^2$, $-9y^2 + 15x^2 + 7xy$

and $13x^2 + 3y^2 - 4xy$

(ii) $-x^2 - 3xy + 3y^2 + 8$, $3x^2 - 5y^2 - 3 + 4xy$

and $-6xy + 2x^2 - 2 + y^2$

(iii) $a^3 - 2b^3 + a$, $b^3 - 2a^3 + b$

and $-2b + 2b^3 - 5a + 4a^3$

Solution:

$$\begin{aligned} \text{(i)} \quad & (-17x^2 - 2xy + 23y^2) + (-9y^2 + 15x^2 + 7xy) \\ & \quad \quad \quad + (13x^2 + 3y^2 - 4xy) \\ & = -17x^2 - 2xy + 23y^2 - 9y^2 + 15x^2 \\ & \quad \quad \quad + 7xy + 13x^2 + 3y^2 - 4xy \\ & = -17x^2 + 15x^2 + 13x^2 - 2xy - 4xy \\ & \quad \quad \quad + 7xy + 23y^2 + 3y^2 - 9y^2 \\ & = 11x^2 + xy + 17y^2 \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & (-x^2 - 3xy + 3y^2 + 8) + (3x^2 - 5y^2 - 3 \\ & \quad \quad \quad + 4xy) + (-6xy + 2x^2 - 2 + y^2) \\ & = -x^2 - 3xy + 3y^2 + 8 + 3x^2 - 5y^2 - 3 \\ & \quad \quad \quad + 4xy - 6xy + 2x^2 - 2 + y^2 \\ & = -x^2 + 3x^2 + 2x^2 - 3xy - 6xy + 4xy \\ & \quad \quad \quad + 3y^2 + y^2 - 5y^2 + 8 - 3 - 2 \\ & = 4x^2 - 5xy - y^2 + 3 \end{aligned}$$

$$\begin{aligned} \text{(iii)} \quad & (a^3 - 2b^3 + a) + (b^3 - 2a^3 + b) \\ & \quad \quad \quad + (-2b + 2b^3 - 5a + 4a^3) \\ & = a^3 - 2b^3 + a + b^3 - 2a^3 + b - 2b \\ & \quad \quad \quad + 2b^3 - 5a + 4a^3 \\ & = a^3 + 4a^3 - 2a^3 - 2b^3 + b^3 + 2b^3 \\ & \quad \quad \quad + a - 5a + b - 2b \\ & = 3a^3 + b^3 - 4a - b \end{aligned}$$

Question 3.

Evaluate :

(i) $3a - (a + 2b)$

(ii) $(5x - 3y) - (x + y)$

(iii) $(8a + 15b) - (3b - 7a)$

(iv) $(8x + 7y) - (4y - 3x)$

(v) $7 - (4a - 5)$

(vi) $(6y - 13) - (4 - 7y)$

Solution:

$$\begin{aligned} \text{(i)} \quad & 3a - (a + 2b) \\ & = 3a - a - 2b = 2a - 2b \\ & = 2(a - b) \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & (5x - 3y) - (x + y) \\ & = 5x - 3y - x - y \end{aligned}$$

$$= 5x - x - 3y - y$$

$$= 4x - 4y = 4(x - y)$$

$$(iii) (8a + 15b) - (3b - 7a)$$

$$= 8a + 15b - 3b + 7a$$

$$= 8a + 7a + 15b - 3b$$

$$= 15a + 12b$$

$$(iv) (8x + 7y) - (4y - 3x)$$

$$= 8x + 7y - 4y + 3x$$

$$= 8x + 3x + 7y - 4y$$

$$= 11x + 3y$$

$$(v) 7 - (4a - 5)$$

$$= 7 - 4a + 5 = 7 + 5 - 4a$$

$$= 12 - 4a$$

$$(vi) (6y - 13) - (4 - 7y)$$

$$= 6y - 13 - 4 + 7y$$

$$= 6y + 7y - 13 - 4$$

$$= 13y - 17$$

Question 4.

Subtract :

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

(ii) $4x - 6y + 3z$ from $12x + 7y - 21z$.

(iii) $5 - a - 4b + 4c$ from $5a - 7b + 2c$.

(iv) $-8x - 12y + 17z$ from $x - y - z$.

(v) $2ab + cd - ac - 2bd$ from $ab - 2cd$
 $+ 2ac + bd$.

Solution:

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$$\begin{aligned}
 (i) \quad & (a - 4b - 2c) - (5a - 3b + 2c) \\
 & = a - 4b - 2c - 5a + 3b - 2c \\
 & = a - 5a - 4b + 3b - 2c - 2c \\
 & = -4a - b - 4c.
 \end{aligned}$$

$$\begin{aligned}
 (ii) \quad & (12x + 7y - 21z) - (4x - 6y + 3z) \\
 & = 12x + 7y - 21z - 4x + 6y - 3z \\
 & = 12x - 4x + 7y + 6y - 21z - 3z \\
 & = 8x + 13y - 24z.
 \end{aligned}$$

$$\begin{aligned}
 (iii) \quad & (5a - 7b + 2c) - (5 - a - 4b + 4c) \\
 & = 5a - 7b + 2c - 5 + a + 4b - 4c \\
 & = 5a + a - 7b + 4b + 2c - 4c - 5 \\
 & = 6a - 3b - 2c - 5.
 \end{aligned}$$

$$\begin{aligned}
 (iv) \quad & (x - y - z) - (-8x - 12y + 17z) \\
 & = x - y - z + 8x + 12y - 17z \\
 & = x + 8x + 12y - y - z - 17z \\
 & = 9x + 11y - 18z.
 \end{aligned}$$

$$\begin{aligned}
 (v) \quad & (ab - 2cd + 2ac + bd) \\
 & \quad - (2ab + cd - ac - 2bd) \\
 & = ab - 2cd + 2ac + bd - 2ab - cd \\
 & \quad \quad \quad + ac + 2bd \\
 & = ab - 2ab - 2cd - cd + 2ac \\
 & \quad \quad \quad + ac + bd + 2bd \\
 & = -ab - 3cd + 3ac + 3bd
 \end{aligned}$$

Question 5.

(i) Take $-ab + bc - ca$ from $bc - ca + ab$.

(ii) Take $5x + 6y - 3z$ from $3x + 5y - 4z$.

(iii) Take $\frac{-3}{2}p + q - r$ from $\frac{1}{2}p - \frac{1}{3}q - \frac{3}{2}r$.

(iv) Take $1 - a + a^2$ from $a^2 + a + 1$.

Solution:

$$\begin{aligned} \text{(i)} \quad & (bc - ca + ab) - (-ab + bc - ca) \\ & = bc - ca + ab + ab - bc + ca \\ & = bc - bc - ca + ca + ab + ab \\ & = 2ab \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & (3x + 5y - 4z) - (5x + 6y - 3z) \\ & = 3x + 5y - 4z - 5x - 6y + 3z \\ & = 3x - 5x + 5y - 6y - 4z + 3z \\ & = -2x - y - z \end{aligned}$$

$$\begin{aligned} \text{(iii)} \quad & \left(\frac{1}{2}p - \frac{1}{3}q - \frac{3}{2}r\right) - \left(-\frac{3}{2}p + q - r\right) \\ & = \frac{1}{2}p - \frac{1}{3}q - \frac{3}{2}r + \frac{3}{2}p - q + r \\ & = \frac{1}{2}p + \frac{3}{2}p - \frac{1}{3}q - q - \frac{3}{2}r + r \\ & = \frac{3p + 9p - 2q - 6q - 9r + 6r}{6} \\ & \quad \text{[Since L.C.M. = 6]} \\ & = \frac{12p}{6} - \frac{8q}{6} - \frac{3r}{6} \\ & = 2p - \frac{4}{3}q - \frac{1}{2}r \end{aligned}$$

$$\begin{aligned} \text{(iv)} \quad & (a^2 + a + 1) - (1 - a + a^2) \\ & = a^2 + a + 1 - 1 + a - a^2 \\ & = a^2 - a^2 + a + a + 1 - 1 = 2a \end{aligned}$$

Question 6.

From the sum of $x + y - 2z$ and $2x - y + z$ subtract $x + y + z$.

Solution:

$$\begin{aligned} & (x + y - 2z) + (2x - y + z) - (x + y + z) \\ & = x + y - 2z + 2x - y + z - x - y - z \\ & = x + 2x - x + y - y - y - 2z - z + z \\ & = 2x - y - 2z \end{aligned}$$

Question 7.

From the sum of $3a - 2b + 4c$ and $3b - 2c$ subtract $a - b - c$.

Solution:

$$\begin{aligned}(3a - 2b + 4c) + (3b - 2c) - (a - b - c) \\= 3a - 2b + 4c + 3b - 2c - a + b + c \\= 3a - a + 3b + b - 2b + 4c + c - 2c \\= 2a + 2b + 3c\end{aligned}$$

Question 8.

Subtract $x - 2y - z$ from the sum of $3x - y + z$ and $x + y - 3z$.

Solution:

$$\begin{aligned}(3x - y + z) + (x + y - 3z) - (x - 2y - z) \\= 3x - y + z + x + y - 3z - x + 2y + z \\= 3x + x - x - y + y + 2y + z + z - 3z \\= 3x + 2y - z\end{aligned}$$

Question 9.

Subtract the sum of $x + y$ and $x - z$ from the sum of $x - 2z$ and $x + y + z$

Solution:

$$\begin{aligned}(x - 2z) + (x + y + z) - \{(x + y) + (x - z)\} \\= x - 2z + x + y + z - \{x + y + x - z\} \\= x - 2z + x + y + z - x - y - x + z \\= x + x - x - x + y - y + z + z - 2z \\= 0\end{aligned}$$

Question 10.

By how much should $x + 2y - 3z$ be increased to get $3x$?

Solution:

$$\begin{aligned}3x - (x + 2y - 3z) \\= 3x - x - 2y + 3z \\= 2x - 2y + 3z\end{aligned}$$

Question 11.

The sum of two expressions is $5x^2 - 3y^2$. If one of them is $3x^2 + 4xy - y^2$, find the other.

Solution:

$$\begin{aligned}(5x^2 - 3y^2) - (3x^2 + 4xy - y^2) \\= 5x^2 - 3y^2 - 3x^2 - 4xy + y^2 \\= 5x^2 - 3x^2 - 4xy - 3y^2 + y^2 \\= 2x^2 - 4xy - 2y^2\end{aligned}$$

Question 12.

The sum of two expressions is $3a^2 + 2ab - b^2$. If one of them is $2a^2 + 3b^2$, find the other.

Solution:

$$\begin{aligned} & (3a^2 + 2ab - b^2) - (2a^2 + 3b^2) \\ &= 3a^2 + 2ab - b^2 - 2a^2 - 3b^2 \\ &= 3a^2 - 2a^2 + 2ab - b^2 - 3b^2 \\ &= a^2 + 2ab - 4b^2 \end{aligned}$$



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