Fundamental Operations

EXERCISE 19(A)

Question 1.

Fill in the blanks :

(i) 5 + 4 = ... and 5x + 4x = ...

(ii) 12 + 18 = ... and $12x^2y + 18x^2y$ = ...

(iii) 7 + 16 = ... and 7a + 16b = ...

(iv) 1 + 3 = ... and $x^2y + 3xy^2$ = ...

(v) 7 – 4 = ... and 7ab – 4ab = ...

(vi) 12 – 5 = ... and 12x – 5y = ...

(vii) 35 – 16 = ... and 35ab – 16ba = ...

(viii) 28 – 13 = ... and $28ax^2 – 13a^2x$ = ...

Solution:

(i) 5 + 4 = **9** and 5x + 4x = **9x**

(ii) 12 + 18 = **30** and $12x^2y + 18x^2y$ = **$30x^2y$**

(iii) 7 + 16 = **23** and 7a + 16 b = **7a + 16b**

(iv) 1 + 3 = **4** and $x^2y + 3xy^2$ = **$x^2y + 3xy^2$**

(v) 7 – 4 = **3** and 7ab – 4ab = **3ab**

(vi) 12 – 5 = **7** and 12x – 5y = **12x – 5y**

(vii) 35 – 16 = **19** and 35ab – 16ba = **19ab**

(viii) 28 – 13 = **15** and $28ax^2 – 13a^2x$ = **$28ax^2 – 13a^2x$**

Question 2.

Fill in the blanks :

(i) The sum of – 2 and – 5 = ……. and the sum of – 2x and – 5x = …….
(ii) The sum of 8 and – 3 = …….. and the sum of 8ab and – 3ab = …….
(iii) The sum of – 15 and – 4 =..... and the sum of – 15x and -4y = ……
(iv) 15 + 8 + 3 = …….. and 15x + 8y + 3x = …….
(v) 12 – 9 + 15 = ……. and 12ab – 9ab + 15ba = ……..
(vi) 25 – 7 – 9 = and 25xy – 7xy – 9yx = ……
(vii) – 4 – 6 – 5 = ……. and – 4ax – 6ax – 5ay = …….

Solution:

(i) The sum of – 2 and – 5 = **– 7** and the sum of – 2x and – 5x = **-7x**
(ii) The sum of 8 and -3 = **5** and the sum of 8ab and – 3ab = **5ab**
(iii) The sum of – 15 and – 4 = **– 19** and the sum of – 15x and – 4y = **– 15x – 4y**
(iv) 15 + 8 + 3 = **26** and 15x + 8y + 3x = **18x + 8y**
(v) 12 – 9 + 15 = **18** and 12ab – 9ab + 15ba = **18ab**
(vi) 25 – 7 – 9 = **9** and 25xy – 7xy – 9yx = **9xy**
(vii) – 4 – 6 – 5 = **– 15** and – 4ax – 6ax – 5ay = **– 10ax – 5ay**

Question 3.

Add:
(i) 8xy and 3xy
(ii) 2xyz, xyz and 6xyz
(iii) 2a, 3a and 4b
(iv) 3x and 2y
(v) 5m, 3n and 4p
(vi) 6a, 3a and 9ab
(vii) 3p, 4q and 9q
(viii) 5ab, 4ba and 6b
(ix) 50pq, 30pq and 10pr
(x) – 2y, – y and – 3y
(xi) – 3b and – b
(xii) 5b, – 4b and – 10b
(xiii) – 2c, – c and – 5c

Solution:

(i) 8xy + 3xy = 11xy
(ii) 2xyz + xyz + 6xyz = (2 + 1 + 6) xyz = 9xyz

(*iii*) $2a + 3a + 4b$

$= (2 + 3)\ a + 4b$

$= \mathbf{5a + 4b}$

(*iv*) $3x + 2y = \mathbf{3x + 2y}$

(*v*) $5m + 3n + 4p = \mathbf{5m + 3n + 4p}$

(*vi*) $6a + 3a + 9ab$

$=(6 + 3)\ a + 9ab$

$= \mathbf{9a + 9ab}$

(*vii*) $3p + 4q + 9q$

$= 3p + (4 + 9)q$

$= \mathbf{3p + 13q}$

(*viii*) $5ab + 4ba + 6b$

$= (5 + 4)\ ab + 6b$

$= \mathbf{9ab + 6b}$

(*ix*) $50pq + 30pq + 10pr$

$= (50 + 30).pq + 10\ pr$

$= \mathbf{80pq + 10pr}$

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

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

$= -6y$

(*xi*) $(-3b) + (-b)$

$= -(3 + 1)b$

$= \mathbf{-4b}$

(*xii*) $5b + (-4b) + (-10b)$

$= 5b - (4 + 10)b$

$= 5b - 14b = \mathbf{-9b}$

(*xiii*) $(-2c) + (-c) + (-5c)$

$= -(2 + 1 + 5)c = \mathbf{-8c}$

Question 4.

Evaluate :

(*i*) $6a - a - 5a - 2a$

(*ii*) $2b - 3b - b + 4b$

(*iii*) $3x - 2x - 4x + 7x$

(*iv*) $5ab + 2ab - 6ab + ab$

(*v*) $8x - 5y - 3x + 10y$

Solution:

(i) $6a - a - 5a - 2a = 6a - (1 + 5 + 2).a$

$= 6a - 8a = \mathbf{-2a}$

(ii) $2b - 3b - b + 4b$

$= 2b + 4b - (3 + 1).b$

$= 6b - 4b = \mathbf{2b}$

(iii) $3x - 2x - 4x + 7x$

$= 3x + 7x - 2x - 4x$

$= (3 + 7).x - (2 + 4).x$

$= 10x - 6x = \mathbf{4x}$

(iv) $5ab + 2ab - 6ab + ab$

$= 5ab + 2ab + ab - 6ab$

$= 8ab - 6ab = 2ab$

(v) $8x - 5y - 3x + 10y$

$= 8x - 3x + 10y - 5y$

$= \mathbf{5x + 5y}$

Question 5.

Evaluate :

(i) $-7x + 9x + 2x - 2x$

(ii) $5ab - 2ab - 8ab + 6ab$

(iii) $\mathbf{-8a - 3a + 12a + 13a - 6a}$

(iv) $19abc - 11abc - 12abc + 14abc$

Solution:

(i) $-7x + 9x + 2x - 2x$

$= 9x + 2x - 7x - 2x$

$= 11x - 9x = \mathbf{2x}$

(ii) $5ab - 2ab - 8ab + 6ab$

$= 5ab + 6ab - 2ab - 8ab$

$= 11ab - 10ab = \mathbf{ab}$

(iii) $\mathbf{-8a - 3a + 12a + 13a - 6a}$

$\mathbf{= 12a + 13a - (8a + 3a + 6a)}$

$\mathbf{= 25a - 17a = 8a}$

(iv) $19abc - 11abc - 12abc + 14abc$

$= abc\,(19 - 11 - 12 + 14)$

$= abc\,(33 - 23) = 10abc$

Question 6.

Subtract the first term from the second :

(*i*) $4ab, 6ba$

(*ii*) $4 \cdot 8b, 6 \cdot 8b$

(*iii*) $3 \cdot 5abc, 10 \cdot 5abc$

(*iv*) $3\frac{1}{2}mn, 8\frac{1}{2}nm$

Solution:

(*i*) $6ba - 4ab = \mathbf{2ab}$

(*ii*) $6 \cdot 8b - 4 \cdot 8b = \mathbf{2b}$

(*iii*) $10 \cdot 5abc - 3 \cdot 5abc = \mathbf{7abc}$

(*iv*) $8\frac{1}{2}nm - 3\frac{1}{2}nm$

$$= \frac{17}{2}nm - \frac{7}{2}mn$$

$$= \frac{17mn - 7mn}{2} = \frac{10mn}{2} = \mathbf{5mn}$$

Question 7.

Simplify :

(*i*) $2a^2b^2 + 5ab^2 + 8a^2b^2 - 3ab^2$

(*ii*) $4a + 3b - 2a - b$

(*iii*) $2xy + 4yz + 5xy + 3yz - 6xy$

(*iv*) $ab + 15ab - 11ab - 2ab$

(*v*) $6a^2 - 3b^2 + 2a^2 + 5b^2 - 4a^2$

(*vi*) $8abc + 2ab - 4abc + ab$

(*vii*) $9xyz + 15yxz - 10zyx - 2zxy$

(viii) $13pqr + 2p + 4q - 6pqr + 5pqr$

(ix) $4ab + 0 - 2ba$

(x) $6x^2y - 2xy^2 + 5x^2y - xy^2$

(xi) $6 \cdot 4a + 5 \cdot 3b - 2 \cdot 4a - 2 \cdot 2b$

(xii) $2 \cdot 5a + 4 \cdot 6b + 1 \cdot 2a - 3 \cdot 6b$

(xiii) $22m - 12\frac{1}{2}n - 15p + 16n$

(xiv) $6p + \frac{2}{3}q - 1\frac{1}{2}p + \frac{1}{3}q + 2q$

(xv) $2\frac{2}{3}xy - 3\frac{1}{2}xy + 3\frac{1}{3}xy - 2\frac{1}{2}xy$

Solution:

(i) $2a^2b^2 + 5ab^2 + 8a^2b^2 - 3ab^2$

$= 2a^2b^2 + 8a^2b^2 + 5ab^2 - 3ab^2$

$= \mathbf{10a^2b^2 + 2\ ab^2}$

(ii) $4a + 3b - 2a - b$

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

$= \mathbf{2a + 2b}$

(iii) $2xy + 4yz + 5xy + 3yz - 6xy$

$= 2xy + 5xy - 6xy + 4yz + 3yz$

$= 7xy - 6xy + 7yz$

$= \mathbf{x + 7yz}$

(iv) $ab + 15ab - 11ab - 2ab$

$= 16ab - 13ab = \mathbf{3ab}$

(v) $6a^2 - 3b^2 + 2a^2 + 5b^2 - 4a^2$

$= 6a^2 + 2a^2 - 4a^2 + 5b^2 - 3b^2$

$= \mathbf{4a^2 + 2b^2}$

(vi) $8abc + 2ab - 4abc + ab$

$= 8abc - 4abc + 2ab + ab$

$= \mathbf{4abc + 3ab}$

(vii) $9xyz + 15yxz - 10zyx - 2zxy$

$= 9xyz + 15xyz - 10xyz - 2xyz$

$= 24xyz - 12xyz = \mathbf{12xyz}$

(viii) $13pqr + 2p + 4q - 6pqr + 5pqr$

$= 13pqr + 5pqr - 6pqr + 2p + 4q$

$= \mathbf{12pqr + 2p + 4q}$

(*ix*) $4ab + 0 - 2ba$

$= 4ab - 2ab + 0 = \mathbf{2ab}$

(*xii*) $6x^2y - 2xy^2 + 5x^2y - xy^2$

$= 6x^2y + 5x^2y - 2xy^2 - xy^2$

$= \mathbf{11x^2y - 3xy^2}$

(*xi*) $6 \cdot 4a + 5 \cdot 3b - 2 \cdot 4a - 2 \cdot 2b$

$= 6 \cdot 4a - 2 \cdot 4a + 5 \cdot 3b - 2 \cdot 2b$

$= \mathbf{4a + 3 \cdot 1b}$

(*xii*) $2 \cdot 5a + 4 \cdot 6b + 1 \cdot 2a - 3 \cdot 6b$

$= 2 \cdot 5a + 1 \cdot 2a + 4 \cdot 6b - 3 \cdot 6b$

$= \mathbf{3 \cdot 7a + b}$

(*xiii*) $22m - 12\frac{1}{2}n - 15p + 16n$

$= 22m - \frac{25}{2}n - 15p + 16n$

$= 22m + 16n - \frac{25}{2}n - 15p$

$= 22m + \frac{32n - 25n}{2} - 15p$

$= 22m + \frac{7n}{2} - 15p$

$= \mathbf{22m + 3\frac{1}{2}n - 15p}$

(*xiv*) $6p + \frac{2}{3}q - 1\frac{1}{2}p + \frac{1}{3}q + 2q$

$= 6p - \frac{3}{2}p + \frac{2}{3}q + \frac{1}{3}q + 2q$

$= \left(\frac{12p - 3p}{2}\right) + \left(\frac{2q + q + 6q}{3}\right)$

$= \frac{9}{2}p + 3q = \mathbf{4\frac{1}{2}p + 3q}$

(*xv*) $2\frac{2}{3}xy - 3\frac{1}{2}xy + 3\frac{1}{3}xy - 2\frac{1}{2}xy$

$$= xy\left(2\frac{2}{3}-3\frac{1}{2}+3\frac{1}{3}-2\frac{1}{2}\right)$$

$$= xy\left(\frac{8}{3}-\frac{7}{2}+\frac{10}{3}-\frac{5}{2}\right)$$

$$= xy\left(\frac{16-21+20-15}{6}\right)$$

$$= xy\left(\frac{36-36}{6}\right) = 0 \times xy = 0$$