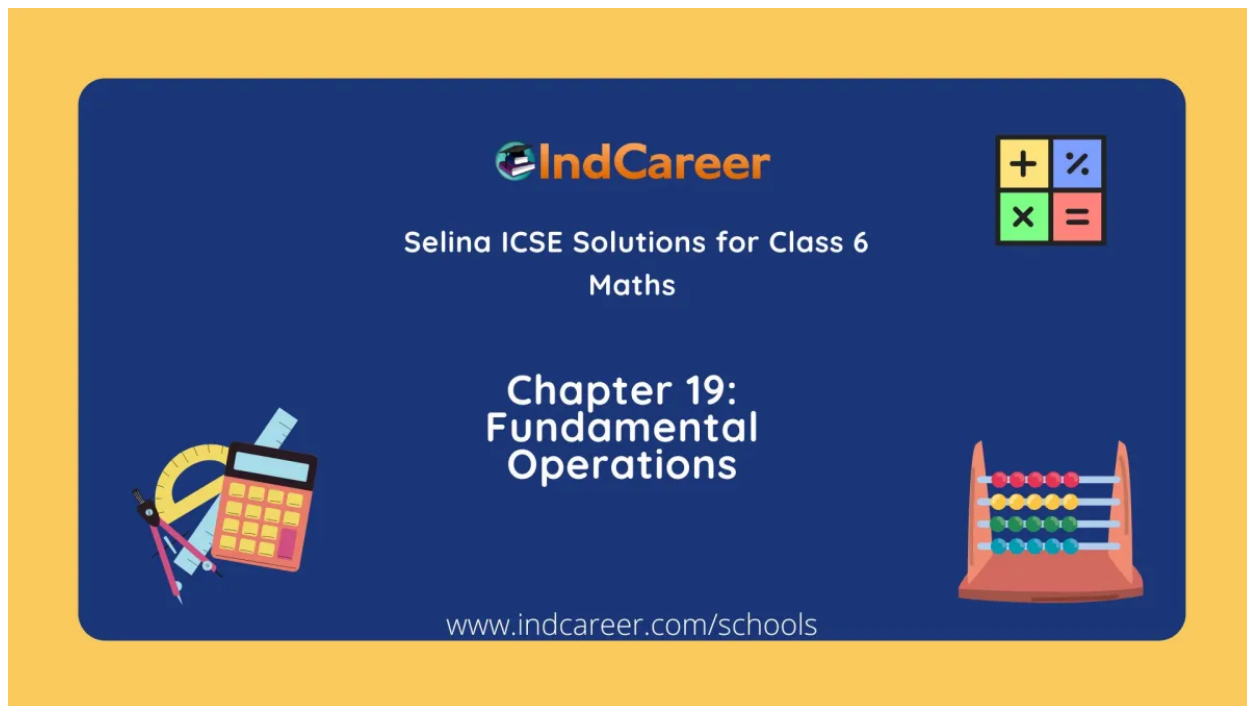


Selina Class 6 ICSE Solutions Mathematics : Chapter 19- Fundamental Operations



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Chapter 19- Fundamental Operations

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Selina Class 6 ICSE Solutions Mathematics : Chapter 19- Fundamental Operations

Selina 6th Maths Chapter 19, Class 6 Maths Chapter 19 solutions

Exercise 19(A)

1. Fill in the blanks:

(i) $5 + 4 = \dots\dots\dots$ and $5x + 4x = \dots\dots\dots$

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

(iii) $7 + 16 = \dots\dots\dots$ and $7a + 16b = \dots\dots\dots$

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

(v) $7 - 4 = \dots\dots\dots$ and $7ab - 4ab = \dots\dots\dots$

Solution:

(i) $5 + 4 = \mathbf{9}$ and $5x + 4x = \mathbf{9x}$

(ii) $12 + 18 = \mathbf{30}$ and $12x^2y + 18x^2y = \mathbf{30x^2y}$

(iii) $7 + 16 = \mathbf{23}$ and $7a + 16b = \mathbf{7a + 16b}$

(iv) $1 + 3 = \mathbf{4}$ and $x^2y + 3xy^2 = \mathbf{x^2y + 3xy^2}$

(v) $7 - 4 = \mathbf{3}$ and $7ab - 4ab = \mathbf{3ab}$

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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) $15 + 8 + 3 = \dots\dots\dots$ and $15x + 8y + 3x = \dots\dots\dots$
- (v) $12 - 9 + 15 = \dots\dots\dots$ and $12ab - 9ab + 15ba = \dots\dots\dots$

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) $15 + 8 + 3 = \mathbf{26}$ and $15x + 8y + 3x = \mathbf{18x + 8y}$
- (v) $12 - 9 + 15 = \mathbf{18}$ and $12ab - 9ab + 15ba = \mathbf{18ab}$

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

Solution:

- (i) 8xy and 3xy

The addition of 8xy and 3xy is calculated as follows

$$8xy + 3xy = 11xy$$

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(ii) $2xyz$, xyz and $6xyz$

The addition of $2xyz$, xyz and $6xyz$ is calculated as follows

$$2xyz + xyz + 6xyz = 9xyz$$

(iii) $2a$, $3a$ and $4b$

The addition of $2a$, $3a$ and $4b$ is calculated as follows

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

(iv) $3x$ and $2y$

The addition of $3x$ and $2y$ is calculated as follows

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

(v) $5m$, $3n$ and $4p$

The addition of $5m$, $3n$ and $4p$ is calculated as follows

$$5m + 3n + 4p = 5m + 3n + 4p$$

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) $6a - a - 5a - 2a$

The value of given expression is calculated as below

$$6a - a - 5a - 2a = (6 - 1 - 5 - 2) a$$

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We get,

$$= (5 - 5 - 2) a$$

$$= - 2a$$

Therefore, $6a - a - 5a - 2a = - 2a$

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

The value of given expression is calculated as below

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

We get,

$$= 6b - 4b$$

$$= 2b$$

Therefore, $2b - 3b - b + 4b = 2b$

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

The given expression is calculated as below

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

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

$$= 10x - 6x$$

$$= 4x$$

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

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

The given expression is calculated as below

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

We get,

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$$= 8ab - 6ab$$

$$= 2ab$$

$$\text{Therefore, } 5ab + 2ab - 6ab + ab = 2ab$$

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

The given expression is calculated as below

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

$$= 5x + 5y$$

$$\text{Therefore, } 8x - 5y - 3x + 10y = 5x + 5y$$

5. Evaluate:

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

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

$$(iii) -8a - 3a + 12a + 13a - 6a$$

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

Solution:

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

The value of given expression is calculated as follows

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

$$= 11x - 9x$$

We get,

$$= 2x$$

$$\text{Hence, } -7x + 9x + 2x - 2x = 2x$$

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

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The value of given expression is calculated as follows

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

We get,

$$= 11ab - 10ab$$

$$= ab$$

$$\text{Hence, } 5ab - 2ab - 8ab + 6ab = ab$$

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

The value of given expression is calculated as follows

$$-8a - 3a + 12a + 13a - 6a = 12a + 13a - (8a + 3a + 6a)$$

$$= 25a - 17a$$

$$= 8a$$

$$\text{Hence, } -8a - 3a + 12a + 13a - 6a = 8a$$

$$\text{(iv) } 19abc - 11abc - 12abc + 14abc$$

The value of given expression is calculated as follows

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

$$= abc (33 - 23)$$

$$= 10abc$$

$$\text{Hence, } 19abc - 11abc - 12abc + 14abc = 10abc$$

6. Subtract the first term from the second:

$$\text{(i) } 4ab, 6ba$$

$$\text{(ii) } 4.8b, 6.8b$$

$$\text{(iii) } 3.5abc, 10.5abc$$

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(iv) $3(1/2)mn$, $8(1/2)nm$

Solution:

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

The subtraction of first term from the second term is calculated as below

$$6ba - 4ab = 2ab$$

(ii) $4.8b$, $6.8b$

The subtraction of first term from the second term is calculated as below

$$6.8b - 4.8b = 2b$$

(iii) $3.5abc$, $10.5abc$

The subtraction of first term from the second term is calculated as below

$$10.5abc - 3.5abc = 7abc$$

(iv) $3(1/2)mn$, $8(1/2)nm$

The subtraction of first term from the second term is calculated as below

$$8(1/2)nm - 3(1/2)mn = (17/2)nm - (7/2)mn$$

We get,

$$= [(17mn - 7mn) / 2]$$

$$= (10/2)mn$$

$$= 5mn$$

7. Simplify:

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

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

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

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

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

Solution:

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

The simplified form of the given expression is calculated as follows

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

We get,

$$= 10a^2b^2 + 2ab^2$$

$$\text{Therefore, } 2a^2b^2 + 5ab^2 + 8a^2b^2 - 3ab^2 = 10a^2b^2 + 2ab^2$$

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

The simplified form of the given expression is calculated as follows

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

$$= 2a + 2b$$

$$\text{Therefore, } 4a + 3b - 2a - b = 2a + 2b$$

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

The simplified form of the given expression is calculated as follows

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

$$= xy + 7yz$$

$$\text{Therefore, } 2xy + 4yz + 5xy + 3yz - 6xy = xy + 7yz$$

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

The simplified form of the given expression is calculated as follows

$$ab + 15ab - 11ab - 2ab = 16ab - 13ab$$

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$$= 3ab$$

$$\text{Therefore, } ab + 15ab - 11ab - 2ab = 3ab$$

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

The simplified form of the given expression is calculated as follows

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

We get,

$$= 4a^2 + 2b^2$$

$$\text{Therefore, } 6a^2 - 3b^2 + 2a^2 + 5b^2 - 4a^2 = 4a^2 + 2b^2$$

Exercise 19(B)

1. Find the sum of:

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

$$\text{and } 4a - 2b - 4c$$

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

$$\text{and } 3x^2 - 10xy + 4y^2$$

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

$$\text{and } 3x^2 - 3x + 1$$

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

$$\text{and } -3bc + 3a^2 + ab$$

$$(v) 4x^2 + 7 - 3x, 4x - x^2 + 8$$

$$\text{and } -10 + 5x - 2x^2$$

Solution:

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

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and $4a - 2b - 4c$

The sum of $3a + 4b + 7c$, $-5a + 3b - 6c$ and $4a - 2b - 4c$ is calculated as shown below

$$(3a + 4b + 7c) + (-5a + 3b - 6c) + (4a - 2b - 4c)$$

$$= 3a + 4a - 5a + 4b + 3b - 2b + 7c - 6c - 4c$$

We get,

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

Hence, the sum of $3a + 4b + 7c$, $-5a + 3b - 6c$ and $4a - 2b - 4c$ is $3c$

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

and $3x^2 - 10xy + 4y^2$

The sum of $2x^2 + xy - y^2$, $-x^2 + 2xy + 3y^2$ and $3x^2 - 10xy + 4y^2$ is calculated as shown below

$$(2x^2 + xy - y^2) + (-x^2 + 2xy + 3y^2) + (3x^2 - 10xy + 4y^2)$$

$$= 2x^2 - x^2 + 3x^2 + xy + 2xy - 10xy + 3y^2 + 4y^2 - y^2$$

We get,

$$= 4x^2 - 7xy + 6y^2$$

Hence, the sum of $2x^2 + xy - y^2$, $-x^2 + 2xy + 3y^2$ and $3x^2 - 10xy + 4y^2$ is $4x^2 - 7xy + 6y^2$

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

The sum of $(x^2 - x + 1)$, $(-5x^2 + 2x - 2)$ and $(3x^2 - 3x + 1)$ is calculated as shown below

$$(x^2 - x + 1) + (-5x^2 + 2x - 2) + (3x^2 - 3x + 1)$$

$$= x^2 - 5x^2 + 3x^2 + 2x - x - 3x + 1 + 1 - 2$$

$$= -x^2 - 2x$$

Hence, the sum of $(x^2 - x + 1)$, $(-5x^2 + 2x - 2)$ and $(3x^2 - 3x + 1)$ is $-x^2 - 2x$

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

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The sum of $(a^2 - ab + bc)$, $(2ab + bc - 2a^2)$ and $(-3bc + 3a^2 + ab)$ is calculated as shown below

$$(a^2 - ab + bc) + (2ab + bc - 2a^2) + (-3bc + 3a^2 + ab)$$

$$= a^2 - 2a^2 + 3a^2 + 2ab + ab - ab + bc + bc - 3bc$$

We get,

$$= 2a^2 + 2ab - bc$$

Hence, the sum of $(a^2 - ab + bc)$, $(2ab + bc - 2a^2)$ and $(-3bc + 3a^2 + ab)$ is $2a^2 + 2ab - bc$

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

The sum of $(4x^2 + 7 - 3x)$, $(4x - x^2 + 8)$ and $(-10 + 5x - 2x^2)$ is calculated as shown below

$$(4x^2 + 7 - 3x) + (4x - x^2 + 8) + (-10 + 5x - 2x^2)$$

$$= 4x^2 - x^2 - 2x^2 + 7 + 8 - 10 + 4x + 5x - 3x$$

We get,

$$= x^2 + 5 + 6x$$

Hence, the sum of $(4x^2 + 7 - 3x)$, $(4x - x^2 + 8)$ and $(-10 + 5x - 2x^2)$ is $x^2 + 5 + 6x$

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:

(i) The sum of $(-17x^2 - 2xy + 23y^2)$, $(-9y^2 + 15x^2 + 7xy)$ and $(13x^2 + 3y^2 - 4xy)$ is calculated as follows

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

We get,

$$= 11x^2 + xy + 17y^2$$

Therefore, the sum of $(-17x^2 - 2xy + 23y^2)$, $(-9y^2 + 15x^2 + 7xy)$ and $(13x^2 + 3y^2 - 4xy)$ is $11x^2 + xy + 17y^2$

$$(ii) -x^2 - 3xy + 3y^2 + 8, 3x^2 - 5y^2 - 3 + 4xy \text{ and } -6xy + 2x^2 - 2 + y^2$$

The sum of $(-x^2 - 3xy + 3y^2 + 8)$, $(3x^2 - 5y^2 - 3 + 4xy)$ and $(-6xy + 2x^2 - 2 + y^2)$ is calculated as follows

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

We get,

$$= 4x^2 - 5xy - y^2 + 3$$

Therefore, the sum of $(-x^2 - 3xy + 3y^2 + 8)$, $(3x^2 - 5y^2 - 3 + 4xy)$ and $(-6xy + 2x^2 - 2 + y^2)$ is $4x^2 - 5xy - y^2 + 3$

$$(iii) a^3 - 2b^3 + a, b^3 - 2a^3 + b \text{ and } -2b + 2b^3 - 5a + 4a^3$$

The sum of $(a^3 - 2b^3 + a)$, $(b^3 - 2a^3 + b)$ and $(-2b + 2b^3 - 5a + 4a^3)$ is calculated as follows

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

We get,

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

Therefore, the sum of $(a^3 - 2b^3 + a)$, $(b^3 - 2a^3 + b)$ and $(-2b + 2b^3 - 5a + 4a^3)$ is $3a^3 + b^3 - 4a - b$

3. Evaluate:

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

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

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

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

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

Solution:

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

The value of the given expression is calculated as below

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

$$= 3a - a - 2b$$

$$= 2a - 2b$$

Taking 2 as common, we get

$$= 2(a - b)$$

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

The value of the given expression is calculated as below

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

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

$$= 4x - 4y$$

Taking 4 as common, we get

$$= 4(x - y)$$

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

The value of the given expression is calculated as below

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

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

On calculation, we get

$$= 15a + 12b$$

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

The value of the given expression is calculated as below

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

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

On further calculation, we get

$$= 11x + 3y$$

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

The value of the given expression is calculated as below

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

$$= 7 - 4a + 5$$

We get,

$$= 12 - 4a$$

4. Subtract:

$$(i) 5a - 3b + 2c \text{ from } a - 4b - 2c$$

$$(ii) 4x - 6y + 3z \text{ from } 12x + 7y - 21z$$

$$(iii) 5 - a - 4b + 4c \text{ from } 5a - 7b + 2c$$

$$(iv) -8x - 12y + 17z \text{ from } x - y - z$$

$$(v) 2ab + cd - ac - 2bd \text{ from } ab - 2cd + 2ac + bd$$

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Solution:

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

The value of the subtraction is calculated as follows

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

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

We get,

$$= -4a - b - 4c$$

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

The value of the subtraction is calculated as follows

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

$$= 12x - 4x + 7y + 6y - 21z - 3z$$

On further calculation, we get

$$= 8x + 13y - 24z$$

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

The value of the subtraction is calculated as follows

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

$$= 5a + a - 7b + 4b + 2c - 4c - 5$$

We get,

$$= 6a - 3b - 2c - 5$$

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

The value of the subtraction is calculated as follows

$$(x - y - z) - (-8x - 12y + 17z)$$

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$$= x + 8x + 12y - y - z - 17z$$

We get,

$$= 9x + 11y - 18z$$

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

The value of the subtraction is calculated as follows

$$(ab - 2cd + 2ac + bd) - (2ab + cd - ac - 2bd)$$

$$= ab - 2ab - 2cd - cd + 2ac + ac + bd + 2bd$$

On calculating further, we get

$$= -ab - 3cd + 3ac + 3bd$$

5.

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

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

(iii) Take $(-3/2)p + q - r$ from $(1/2)p - (1/3)q - (3/2)r$

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

Solution:

(i) The value of the subtraction is calculated as,

$$(bc - ca + ab) - (-ab + bc - ca)$$

$$= bc - bc - ca + ca + ab + ab$$

We get,

$$= 2ab$$

Hence, $(bc - ca + ab) - (-ab + bc - ca) = 2ab$

(ii) The value of the subtraction is calculated as,

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$$(3x + 5y - 4z) - (5x + 6y - 3z)$$

$$= 3x - 5x + 5y - 6y - 4z + 3z$$

On simplification, we get

$$= -2x - y - z$$

$$\text{Hence, } (3x + 5y - 4z) - (5x + 6y - 3z) = -2x - y - z$$

(iii) The value of the subtraction is calculated as, $[(1/2)p - (1/3)q - (3/2)r] - [(-3/2)p + q - r]$

$$= (1/2)p + (3/2)p - (1/3)q - q - (3/2)r + r$$

On further calculation, we get

$$= 2p - (4/3)q - (1/2)r$$

$$\text{Hence, } [(1/2)p - (1/3)q - (3/2)r] - [(-3/2)p + q - r] = 2p - (4/3)q - (1/2)r$$

(iv) The value of the subtraction is calculated as,

$$(a^2 + a + 1) - (1 - a + a^2)$$

$$= a^2 - a^2 + a + a + 1 - 1$$

We get,

$$= a + a$$

$$= 2a$$

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

Solution:

The value of terms as per the question is calculated as follows

$$(x + y - 2z) + (2x - y + z) - (x + y + z)$$

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

We get,

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$$= 2x - y - 2z$$

$$\text{Therefore, } (x + y - 2z) + (2x - y + z) - (x + y + z) = 2x - y - 2z$$

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

Solution:

The value of terms as per the question is calculated as shown below

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

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

On further calculation, we get

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

$$= 2a + 2b + 3c$$

$$\text{Hence, } (3a - 2b + 4c) + (3b - 2c) - (a - b - c) = 2a + 2b + 3c$$

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

Solution:

The value of terms as per the question is calculated as follows

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

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

We get,

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

$$\text{Therefore, } (3x - y + z) + (x + y - 3z) - (x - 2y - z) = 3x + 2y - z$$

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

Solution:

The value of terms as per the question is calculated as follows

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$$(x - 2z) + (x + y + z) - \{(x + y) + (x - z)\}$$

On further calculation, we get

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

We get,

$$= 0$$

$$\text{Therefore, } (x - 2z) + (x + y + z) - \{(x + y) + (x - z)\} = 0$$

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

Solution:

The terms calculated as per the question is as follows

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

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

We get,

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

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:

The other expression is calculated as follows

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

$$= 5x^2 - 3x^2 - 4xy - 3y^2 + y^2$$

We get,

$$= 2x^2 - 4xy - 2y^2$$

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:

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The other expression is calculated as follows

$$(3a^2 + 2ab - b^2) - (2a^2 + 3b^2)$$

On simplification, we get

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

$$= a^2 - 4b^2 + 2ab$$

Exercise 19(C)

1. Fill in the blanks:

(i) $6 \times 3 = \dots\dots\dots$ and $6x \times 3x = \dots\dots\dots$

(ii) $6 \times 3 = \dots\dots\dots$ and $6x^2 \times 3x^3 = \dots\dots\dots$

(iii) $5 \times 4 = \dots\dots\dots$ and $5x \times 4y = \dots\dots\dots$

(iv) $4 \times 7 = \dots\dots\dots$ and $4ax \times 7x = \dots\dots\dots$

(v) $6 \times 2 = \dots\dots\dots$ and $6xy \times 2xy = \dots\dots\dots$

Solution:

(i) $6 \times 3 = 18$

Hence,

$$6x \times 3x = 6 \times 3 \times x \times x$$

We get,

$$= 18 \times x^2$$

$$= 18x^2$$

Therefore, $6 \times 3 = 18$ and $6x \times 3x = 18x^2$

(ii) $6 \times 3 = 18$

Hence,

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$$6x^2 \times 3x^3 = 6 \times 3 \times x^{2+3}$$

$$= 18 \times x^5$$

$$= 18x^5$$

Therefore, $6 \times 3 = 18$ and $6x^2 \times 3x^3 = 18x^5$

(iii) $5 \times 4 = 20$ and $5x \times 4y = 5 \times 4 \times x \times y$

$$= 20xy$$

Therefore, $5 \times 4 = 20$ and $5x \times 4y = 20xy$

(iv) $4 \times 7 = 28$

Hence,

$$4ax \times 7x = 4 \times 7 \times a \times x \times x$$

$$= 28 \times a \times x^2$$

$$= 28ax^2$$

Therefore, $4 \times 7 = 28$ and $4ax \times 7x = 28ax^2$

(v) $6 \times 2 = 12$

Hence,

$$6xy \times 2xy = 6 \times 2 \times x^{1+1} \times y^{1+1}$$

$$= 12 \times x^2 \times y^2$$

$$= 12x^2y^2$$

Therefore, $6 \times 2 = 12$ and $6xy \times 2xy = 12x^2y^2$

2. Fill in the blanks:

(i) $4x \times 6x \times 2 = \dots\dots\dots$

(ii) $3ab \times 6ax = \dots\dots\dots$

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(iii) $x \times 2x^2 \times 3x^3 = \dots\dots\dots$

(iv) $5 \times 5a^3 = \dots\dots\dots$

(v) $6 \times 6x^2 \times 6x^2y^2 = \dots\dots\dots$

Solution:

(i) $4x \times 6x \times 2 = 4 \times 6 \times 2 \times x \times x$

$$= 48 \times x^2$$

We get,

$$= 48x^2$$

Hence, $4x \times 6x \times 2 = 48x^2$

(ii) $3ab \times 6ax = 3 \times 6 \times a \times a \times b \times x$

$$= 18 \times a^2 \times b \times x$$

We get,

$$= 18a^2bx$$

Hence, $3ab \times 6ax = 18a^2bx$

(iii) $x \times 2x^2 \times 3x^3 = 2 \times 3 \times x \times x^2 \times x^3$

$$= 6 \times x^{1+2+3}$$

$$= 6 \times x^6$$

$$= 6x^6$$

Hence, $x \times 2x^2 \times 3x^3 = 6x^6$

(iv) $5 \times 5a^3 = 5 \times 5 \times a^3$

$$= 25 \times a^3$$

We get,

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$$= 25a^3$$

$$\text{Hence, } 5 \times 5a^3 = 25a^3$$

$$(v) 6 \times 6x^2 \times 6x^2y^2 = 6 \times 6 \times 6 \times x^2 \times x^2 \times y^2$$

$$= 216 \times x^{2+2} \times y^2$$

$$= 216 \times x^4 \times y^2$$

We get,

$$= 216x^4y^2$$

$$\text{Hence, } 6 \times 6x^2 \times 6x^2y^2 = 216x^4y^2$$

3. Find the value of:

(i) $3x^3 \times 5x^4$

(ii) $5a^2 \times 7a^7$

(iii) $3abc \times 6ac^3$

(iv) $a^2b^2 \times 5a^3b^4$

(v) $2x^2y^3 \times 5x^3y^4$

Solution:

(i) $3x^3 \times 5x^4$

$$3x^3 \times 5x^4 = 3 \times 5 \times x^3 \times x^4$$

$$= 15 \times x^{3+4}$$

We get,

$$= 15 \times x^7$$

$$= 15x^7$$

Hence, the value of $3x^3 \times 5x^4$ is $15x^7$

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(ii) $5a^2 \times 7a^7$

$$5a^2 \times 7a^7 = 5 \times 7 \times a^2 \times a^7$$

$$= 35 \times a^{2+7}$$

$$= 35 \times a^9$$

We get,

$$= 35a^9$$

Hence, the value of $5a^2 \times 7a^7$ is $35a^9$

(iii) $3abc \times 6ac^3$

$$3abc \times 6ac^3 = 3 \times 6 \times a \times a \times b \times c \times c^3$$

$$= 18 \times a^{1+1} \times b \times c^{1+3}$$

$$= 18 \times a^2 \times b \times c^4$$

We get,

$$= 18a^2bc^4$$

Hence, the value of $3abc \times 6ac^3$ is $18a^2bc^4$

(iv) $a^2b^2 \times 5a^3b^4$

$$a^2b^2 \times 5a^3b^4 = 5 \times a^2 \times a^3 \times b^2 \times b^4$$

$$= 5 \times a^{2+3} \times b^{2+4}$$

$$= 5 \times a^5 \times b^6$$

We get,

$$= 5a^5b^6$$

Hence, the value of $a^2b^2 \times 5a^3b^4$ is $5a^5b^6$

(v) $2x^2y^3 \times 5x^3y^4$

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$$2x^2y^3 \times 5x^3y^4 = 2 \times 5 \times x^2 \times x^3 \times y^3 \times y^4$$

$$= 10 \times x^{2+3} \times y^{3+4}$$

We get,

$$= 10 \times x^5 \times y^7$$

$$= 10x^5y^7$$

Hence, the value of $2x^2y^3 \times 5x^3y^4$ is $10x^5y^7$

4. Multiply:

(i) $a + b$ by ab

(ii) $3ab - 4b$ by $3ab$

(iii) $2xy - 5by$ by $4bx$

(iv) $4x + 2y$ by $3xy$

(v) $1 + 4x$ by x

Solution:

(i) $a + b$ by ab

The multiplication of $a + b$ by ab is calculated as,

$$(a + b) \times ab = a \times ab + b \times ab$$

$$= a^{1+1}b + ab^{1+1}$$

We get,

$$= a^2b + ab^2$$

Hence, $(a + b)$ by $ab = a^2b + ab^2$

(ii) $3ab - 4b$ by $3ab$

The multiplication of $3ab - 4b$ by $3ab$ is calculated as,

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$$(3ab - 4b) \times 3ab = 3ab \times 3ab - 4b \times 3ab$$

$$= 9a^{1+1}b^{1+1} - 12ab^{1+1}$$

We get,

$$= 9a^2b^2 - 12ab^2$$

$$\text{Therefore, } (3ab - 4b) \text{ by } 3ab = 9a^2b^2 - 12ab^2$$

(iii) $2xy - 5by$ by $4bx$

The multiplication of $2xy - 5by$ by $4bx$ is calculated as,

$$(2xy - 5by) \times 4bx = 2xy \times 4bx - 5by \times 4bx$$

$$= 8bx^{1+1}y - 20b^{1+1}xy$$

We get,

$$= 8bx^2y - 20b^2xy$$

$$\text{Therefore, } (2xy - 5by) \text{ by } 4bx = 8bx^2y - 20b^2xy$$

(iv) $4x + 2y$ by $3xy$

The multiplication of $4x + 2y$ by $3xy$ is calculated as,

$$(4x + 2y) \times 3xy = 4x \times 3xy + 2y \times 3xy$$

On simplification, we get

$$= 12x^{1+1}y + 6xy^{1+1}$$

$$= 12x^2y + 6xy^2$$

$$\text{Therefore, } (4x + 2y) \text{ by } 3xy = 12x^2y + 6xy^2$$

(v) $1 + 4x$ by x

The multiplication of $(1 + 4x)$ by x is calculated as,

$$(1 + 4x) \times x = 1 \times x + 4x \times x$$

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On simplification, we get

$$= x + 4x^{1+1}$$

$$= x + 4x^2$$

Therefore, $(1 + 4x)$ by $x = x + 4x^2$

5. Multiply:

(i) $-x + y - z$ and $-2x$

(ii) $xy - yz$ and x^2yz^2

(iii) $2xyz + 3xy$ and $-2y^2z$

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

(v) $4xy$ and $-x^2y - 3x^2y^2$

Solution:

(i) $-x + y - z$ and $-2x$

The multiplication of the given expression is calculated as,

$$(-x + y - z) \times -2x = -x \times -2x + y \times -2x - z \times -2x$$

On further calculation, we get

$$= 2x^{1+1} - 2xy + 2xz$$

$$= 2x^2 - 2xy + 2xz$$

Hence, the multiplication of $(-x + y - z)$ and $-2x$ is $2x^2 - 2xy + 2xz$

(ii) $xy - yz$ and x^2yz^2

The multiplication of the given expression is calculated as,

$$(xy - yz) \times (x^2yz^2) = xy \times x^2yz^2 - yz \times x^2yz^2$$

We get,

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$$= x^{1+2}y^{1+1}z^2 - x^2y^{1+1}z^{1+2}$$

$$= x^3y^2z^2 - x^2y^2z^3$$

Hence, the multiplication of $(xy - yz)$ and $x^2yz^2 = x^3y^2z^2 - x^2y^2z^3$

(iii) $2xyz + 3xy$ and $-2y^2z$

The multiplication of the given expression is calculated as,

$$(2xyz + 3xy) \times -2y^2z = 2xyz \times -2y^2z + 3xy \times -2y^2z$$

On further calculation, we get

$$= -4xy^{1+2}z^{1+1} - 6xy^{1+2}z$$

$$= -4xy^3z^2 - 6xy^3z$$

Hence, the multiplication of $2xyz + 3xy$ and $-2y^2z = -4xy^3z^2 - 6xy^3z$

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

The multiplication of the given expression is calculated as,

$$(-3xy^2 + 4x^2y) \times -xy = 3x^{1+1}y^{2+1} - 4x^{2+1}y^{1+1}$$

On calculation, we get

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

Hence, the multiplication of $-3xy^2 + 4x^2y$ and $-xy = 3x^2y^3 - 4x^3y^2$

(v) $4xy$ and $-x^2y - 3x^2y^2$

The multiplication of the given expression is calculated as,

$$(-x^2y - 3x^2y^2) \times 4xy = -x^2y \times 4xy - 3x^2y^2 \times 4xy$$

On further calculation, we get

$$= -4x^{2+1}y^{1+1} - 12x^{2+1}y^{2+1}$$

$$= -4x^3y^2 - 12x^3y^3$$

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Hence, the multiplication of $4xy$ and $-x^2y - 3x^2y^2 = -4x^3y^2 - 12x^3y^3$

6. Multiply:

(i) $3a + 4b - 5c$ and $3a$

(ii) $-5xy$ and $-xy^2 - 6x^2y$

Solution:

(i) $3a + 4b - 5c$ and $3a$

The multiplication of the given expression is calculated as,

$$(3a + 4b - 5c) \times 3a = 3a \times 3a + 4b \times 3a - 5c \times 3a$$

On further calculation, we get

$$= 9a^{1+1} + 12ab - 15ac$$

$$= 9a^2 + 12ab - 15ac$$

Therefore, the multiplication of $3a + 4b - 5c$ and $3a = 9a^2 + 12ab - 15ac$

(ii) $-5xy$ and $-xy^2 - 6x^2y$

The multiplication of the given expression is calculated as,

$$-5xy \times (-xy^2 - 6x^2y) = -5xy \times -xy^2 - 5xy \times -6x^2y$$

On further calculation, we get

$$= 5x^{1+1}y^{1+2} + 30x^{1+2}y^{1+1}$$

$$= 5x^2y^3 + 30x^3y^2$$

Therefore, the multiplication of $-5xy$ and $-xy^2 - 6x^2y = 5x^2y^3 + 30x^3y^2$

7. Multiply:

(i) $x + 2$ and $x + 10$

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

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(iii) $x - 5$ and $x + 3$

(iv) $x - 5$ and $x - 3$

(v) $2x + y$ and $x + 3y$

Solution:

(i) $x + 2$ and $x + 10$

The given expression is calculated as follows

$$(x + 2) \times (x + 10) = x \times (x + 10) + 2 \times (x + 10)$$

We get,

$$= x^2 + 10x + 2x + 20$$

$$= x^2 + 12x + 20$$

Hence, the multiplication of $(x + 2)$ and $(x + 10) = x^2 + 12x + 20$

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

The given expression is calculated as follows

$$(x + 5) \times (x - 3) = x \times (x - 3) + 5 \times (x - 3)$$

On simplification, we get

$$= x^2 - 3x + 5x - 15$$

$$= x^2 + 2x - 15$$

Hence, the multiplication of $(x + 5)$ and $(x - 3) = x^2 + 2x - 15$

(iii) $x - 5$ and $x + 3$

The given expression is calculated as follows

$$(x - 5) \times (x + 3) = x \times (x + 3) - 5 \times (x + 3)$$

On further calculation, we get

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$$= x^2 + 3x - 5x - 15$$

$$= x^2 - 2x - 15$$

Hence, the multiplication of $(x - 5)$ and $(x + 3) = x^2 - 2x - 15$

(iv) $x - 5$ and $x - 3$

The given expression is calculated as,

$$(x - 5) \times (x - 3) = x \times (x - 3) - 5 \times (x - 3)$$

On further calculation, we get

$$= x^2 - 3x - 5x + 15$$

$$= x^2 - 8x + 15$$

Hence, the multiplication of $(x - 5)$ and $(x - 3) = x^2 - 8x + 15$

(v) $2x + y$ and $x + 3y$

The given expression is calculated as,

$$(2x + y) \times (x + 3y) = 2x \times (x + 3y) + y \times (x + 3y)$$

On simplification, we get

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

$$= 2x^2 + 7xy + 3y^2$$

Hence, the multiplication of $(2x + y)$ and $(x + 3y) = 2x^2 + 7xy + 3y^2$

8. Multiply:

(i) $3abc$ and $-5a^2b^2c$

(ii) $x - y + z$ and $-2x$

(iii) $2x - 3y - 5z$ and $-2y$

(iv) $-8xyz + 10x^2yz^3$ and xyz

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(v) xyz and $-13xy^2z + 15x^2yz - 6xyz^2$

Solution:

(i) $3abc$ and $-5a^2b^2c$

The given expression is calculated as follows,

$$3abc \times -5a^2b^2c = 3 \times -5 \times a \times a^2 \times b \times b^2 \times c \times c$$

On further calculation, we get

$$= -15 \times a^{1+2} \times b^{1+2} \times c^{1+1}$$

$$= -15 \times a^3 \times b^3 \times c^2$$

$$= -15a^3b^3c^2$$

Therefore, the multiplication of $3abc$ and $-5a^2b^2c = -15a^3b^3c^2$

(ii) $x - y + z$ and $-2x$

The given expression is calculated as follows,

$$(x - y + z) \times -2x = x \times -2x - y \times -2x + z \times -2x$$

On simplification, we get

$$= -2x^{1+1} + 2xy - 2xz$$

$$= -2x^2 + 2xy - 2xz$$

Therefore, the multiplication of $x - y + z$ and $-2x = -2x^2 + 2xy - 2xz$

(iii) $2x - 3y - 5z$ and $-2y$

The given expression is calculated as follows,

$$(2x - 3y - 5z) \times -2y = 2x \times -2y - 3y \times -2y - 5z \times -2y$$

On further calculation, we get

$$= -4xy + 6y^{1+1} + 10yz$$

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$$= -4xy + 6y^2 + 10yz$$

Therefore, the multiplication of $2x - 3y - 5z$ and $-2y = -4xy + 6y^2 + 10yz$

(iv) $-8xyz + 10x^2yz^3$ and xyz

The given expression is calculated as follows,

$$(-8xyz + 10x^2yz^3) \times xyz = -8xyz \times xyz + 10x^2yz^3 \times xyz$$

On further calculation, we get

$$= -8x^{1+1}y^{1+1}z^{1+1} + 10x^{2+1}y^{1+1}z^{3+1}$$

$$= -8x^2y^2z^2 + 10x^3y^2z^4$$

Therefore, the multiplication of $-8xyz + 10x^2yz^3$ and $xyz = -8x^2y^2z^2 + 10x^3y^2z^4$

(v) xyz and $-13xy^2z + 15x^2yz - 6xyz^2$

The given expression is calculated as follows,

$$xyz \times (-13xy^2z + 15x^2yz - 6xyz^2) = xyz \times -13xy^2z + xyz \times 15x^2yz - xyz \times 6xyz^2$$

On simplification, we get

$$= -13x^{1+1}y^{1+2}z^{1+1} + 15x^{1+2}y^{1+1}z^{1+1} - 6x^{1+1}y^{1+1}z^{1+2}$$

We get,

$$= -13x^2y^3z^2 + 15x^3y^2z^2 - 6x^2y^2z^3$$

Therefore, the multiplication of xyz and $-13xy^2z + 15x^2yz - 6xyz^2 = -13x^2y^3z^2 + 15x^3y^2z^2 - 6x^2y^2z^3$

9. Find the product of:

(i) $xy - ab$ and $xy + ab$

(ii) $2abc - 3xy$ and $2abc + 3xy$

(iii) $a + b - c$ and $2a - 3b$

(iv) $5x - 6y - 7z$ and $2x + 3y$

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(v) $5x - 6y - 7z$ and $2x + 3y + z$

Solution:

(i) $xy - ab$ and $xy + ab$

The product of the given expression is calculated as,

$$(xy - ab) \times (xy + ab) = xy \times (xy + ab) - ab \times (xy + ab)$$

On simplification, we get

$$= xy \times xy + xy \times ab - ab \times xy - ab \times ab$$

$$= x^2y^2 + abxy - abxy - a^2b^2$$

$$= x^2y^2 - a^2b^2$$

Hence, the product of $(xy - ab)$ and $(xy + ab) = x^2y^2 - a^2b^2$

(ii) $2abc - 3xy$ and $2abc + 3xy$

The product of the given expression is calculated as,

$$(2abc - 3xy) \times (2abc + 3xy)$$

$$= 2abc \times (2abc + 3xy) - 3xy \times (2abc + 3xy)$$

We get,

$$= 2abc \times 2abc + 2abc \times 3xy - 3xy \times 2abc - 3xy \times 3xy$$

$$= 4a^2b^2c^2 + 6abcxy - 6abcxy - 9x^2y^2$$

$$= 4a^2b^2c^2 - 9x^2y^2$$

Hence, the product of $2abc - 3xy$ and $2abc + 3xy = 4a^2b^2c^2 - 9x^2y^2$

(iii) $a + b - c$ and $2a - 3b$

The product of the given expression is calculated as,

$$(a + b - c) \times (2a - 3b)$$

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$$\begin{aligned} &= a \times (2a - 3b) + b \times (2a - 3b) - c \times (2a - 3b) \\ &= a \times 2a - a \times 3b + b \times 2a - b \times 3b - c \times 2a + c \times 3b \\ &= 2a^{1+1} - 3ab + 2ab - 3b^{1+1} - 2ac + 3bc \end{aligned}$$

We get,

$$= 2a^2 - ab - 3b^2 - 2ac + 3bc$$

Hence, the product of $a + b - c$ and $2a - 3b = 2a^2 - ab - 3b^2 - 2ac + 3bc$

(iv) $5x - 6y - 7z$ and $2x + 3y$

The product of the given expression is calculated as,

$$\begin{aligned} &(5x - 6y - 7z) \times (2x + 3y) \\ &= (5x - 6y - 7z) \times 2x + (5x - 6y - 7z) \times 3y \\ &= 5x \times 2x - 6y \times 2x - 7z \times 2x + 5x \times 3y - 6y \times 3y - 7z \times 3y \end{aligned}$$

We get,

$$\begin{aligned} &= 10x^2 - 12xy - 14xz + 15xy - 18y^2 - 21yz \\ &= 10x^2 + 3xy - 14xz - 18y^2 - 21yz \end{aligned}$$

Hence, the product of $5x - 6y - 7z$ and $2x + 3y = 10x^2 + 3xy - 14xz - 18y^2 - 21yz$

(v) $5x - 6y - 7z$ and $2x + 3y + z$

The product of the given expression is calculated as,

$$\begin{aligned} &(5x - 6y - 7z) \times (2x + 3y + z) \\ &= (5x - 6y - 7z) \times 2x + (5x - 6y - 7z) \times 3y + (5x - 6y - 7z) \times z \\ &= 5x \times 2x - 6y \times 2x - 7z \times 2x + 5x \times 3y - 6y \times 3y - 7z \times 3y + 5x \times z - 6y \times z - 7z \times z \end{aligned}$$

We get,

$$= 10x^2 - 12xy - 14xz + 15xy - 18y^2 - 21yz + 5xz - 6yz - 7z^2$$

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$$= 10x^2 - 12xy + 15xy - 14xz + 5xz - 18y^2 - 21yz - 6yz - 7z^2$$

$$= 10x^2 + 3xy - 9xz - 18y^2 - 27yz - 7z^2$$

Hence, the product of $5x - 6y - 7z$ and $2x + 3y + z = 10x^2 + 3xy - 9xz - 18y^2 - 27yz - 7z^2$

Exercise 19(D)

1. Divide:

(i) $3a$ by a

(ii) $15x$ by $3x$

(iii) $16m$ by 4

(iv) $20x^2$ by $5x$

(v) $30p^2$ by $10p^2$

Solution:

(i) $3a$ by a

$$3a \div a$$

This can be written as,

$$3a / a = (3 \times a) / a$$

$$= 3$$

Hence, $3a \div a = 3$

(ii) $15x$ by $3x$

$$15x \div 3x$$

$$15x / 3x = (15 \times x) / (3 \times x)$$

This can be written as,

$$= (3 \times 5 \times x) / (3 \times x)$$

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We get,

$$= 5$$

Hence, $15x \div 3x = 5$

(iii) $16m$ by 4

$$16m \div 4$$

$$16m / 4 = (16 \times m) / 4$$

This can be written as,

$$= (4 \times 4 \times m) / 4$$

We get,

$$= 4m$$

Hence, $16m \div 4 = 4m$

(iv) $20x^2$ by $5x$

$$20x^2 \div 5x$$

$$20x^2 / 5x = (20 \times x^2) / (5 \times x)$$

This can be written as,

$$= (4 \times 5 \times x^{2-1}) / 5$$

$$= 4 \times x$$

$$= 4x$$

Hence, $20x^2 \div 5x = 4x$

(v) $30p^2$ by $10p^2$

$$30p^2 \div 10p^2 = (30 \times p^2) / (10 \times p^2)$$

This can be written as,

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$$= (3 \times 10 \times p^{2-2}) / 10$$

$$= 3 \times p^0$$

$$= 3 \times 1$$

$$= 3$$

Hence, $30p^2 \div 10p^2 = 3$

2. Simplify:

(i) $2x^5 \div x^2$

(ii) $6a^8 \div 3a^3$

(iii) $20xy \div -5xy$

(iv) $-24a^2b^2c^2 \div 6ab$

(v) $-5x^2y \div xy^2$

Solution:

(i) $2x^5 \div x^2$

$$= (2 \times x^5) / x^2$$

$$= 2 \times x^{5-2}$$

$$= 2 \times x^3$$

We get,

$$= 2x^3$$

Hence, $2x^5 \div x^2 = 2x^3$

(ii) $6a^8 \div 3a^3$

$$= (6 \times a^8) / (3 \times a^3)$$

This can be written as,

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$$= (2 \times 3 \times a^{8-3}) / 3$$

We get,

$$= 2 \times a^5$$

$$= 2a^5$$

$$\text{Hence, } 6a^8 \div 3a^3 = 2a^5$$

$$\text{(iii) } 20xy \div -5xy$$

$$= (20 \times x \times y) / (-5 \times x \times y)$$

This can be written as,

$$= (4 \times 5) / -5$$

We get,

$$= -4$$

$$\text{Hence, } 20xy \div -5xy = -4$$

$$\text{(iv) } -24a^2b^2c^2 \div 6ab$$

$$= (-24 \times a^2 \times b^2 \times c^2) / (6 \times a \times b)$$

This can be written as,

$$= (-4 \times 6 \times a^{2-1} \times b^{2-1} \times c^2) / 6$$

We get,

$$= -4 \times a \times b \times c^2$$

$$= -4abc^2$$

$$\text{Hence, } -24a^2b^2c^2 \div 6ab = -4abc^2$$

$$\text{(v) } -5x^2y \div xy^2$$

$$= (-5 \times x^2 \times y) / (x \times y^2)$$

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This can be written as,

$$= (-5 \times x^{2-1}) / y^{2-1}$$

We get,

$$= (-5 \times x) / y$$

$$= -5x / y$$

$$\text{Hence, } -5x^2y \div xy^2 = -5x / y$$

3. Divide:

(i) $(-3m / 4)$ by $2m$

(ii) $-15p^6q^8$ by $-5p^6q^7$

(iii) $-21m^5n^7$ by $14m^2n^2$

(iv) $36a^4x^5y^6$ by $4x^2a^3y^2$

(v) $20x^3a^6$ by $5xy$

Solution:

(i) $(-3m / 4)$ by $2m$

$$= -3m / 4 \div 2m = -3m / 4 \times 1 / 2m$$

$$= -(3 \times m) / (4 \times 2 \times m)$$

We get,

$$= -3 / 8$$

$$\text{Hence, } (-3m / 4) \div 2m = -3 / 8$$

(ii) $-15p^6q^8$ by $-5p^6q^7$

$$-15p^6q^8 \div -5p^6q^7 = (-15 \times p^6 \times q^8) / (-5 \times p^6 \times q^7)$$

This can be written as,

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$$= (3 \times 5 \times q^{8-7}) / 5$$

We get,

$$= 3 \times q$$

$$= 3q$$

$$\text{Hence, } -15p^6q^8 \div -5p^6q^7 = 3q$$

$$\text{(iii) } -21m^5n^7 \text{ by } 14m^2n^2$$

$$-21m^5n^7 \div 14m^2n^2 = (-21 \times m^5 \times n^7) / (14 \times m^2 \times n^2)$$

This can be written as,

$$= (-3 \times 7 \times m^{5-2} \times n^{7-2}) / (2 \times 7)$$

$$= (-3 \times m^3 \times n^5) / 2$$

We get,

$$= -3m^3n^5 / 2$$

$$\text{Hence, } -21m^5n^7 \div 14m^2n^2 = -3m^3n^5 / 2$$

$$\text{(iv) } 36a^4x^5y^6 \text{ by } 4x^2a^3y^2$$

$$36a^4x^5y^6 \div 4x^2a^3y^2 = (36 \times a^4 \times x^5 \times y^6) / (4 \times x^2 \times a^3 \times y^2)$$

This can be written as,

$$= (4 \times 9 \times a^{4-3} \times x^{5-2} \times y^{6-2}) / 4$$

$$= 9 \times a^1 \times x^3 \times y^4$$

We get,

$$= 9ax^3y^4$$

$$\text{Hence, } 36a^4x^5y^6 \div 4x^2a^3y^2 = 9ax^3y^4$$

$$\text{(v) } 20x^3a^6 \text{ by } 5xy$$

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$$20x^3a^6 \div 5xy = (20 \times x^3 \times a^6) / (5 \times x \times y)$$

This can be written as,

$$= (4 \times 5 \times x^{3-1} \times a^6) / (5 \times y)$$

We get,

$$= (4 \times x^2 \times a^6) / y$$

$$= 4x^2a^6 / y$$

$$\text{Hence, } 20x^3a^6 \div 5xy = 4x^2a^6 / y$$

4. Simplify:

(i) $(-15m^5n^2) / (-3m^5)$

(ii) $35x^4y^2 / -15x^2y^2$

(iii) $(-24x^6y^2) / (6x^6y)$

Solution:

$$(i) (-15m^5n^2) / (-3m^5) = (-15 \times m^5 \times n^2) / (-3 \times m^5)$$

This can be written as,

$$= (3 \times 5 \times m^{5-5} \times n^2) / 3$$

$$= 5 \times m^0 \times n^2$$

$$= 5 \times 1 \times n^2$$

$$= 5n^2$$

$$\text{Hence, } (-15m^5n^2) / (-3m^5) = 5n^2$$

(ii) $35x^4y^2 / -15x^2y^2$

$$35x^4y^2 / -15x^2y^2 = (35 \times x^4 \times y^2) / (-15 \times x^2 \times y^2)$$

This can be written as,

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$$= - (5 \times 7 \times x^{4-2} \times y^{2-2}) / (3 \times 5)$$

$$= - (7 \times x^2 \times y^0) / 3$$

We get,

$$= - 7x^2y / 3$$

$$\text{Hence, } 35x^4y^2 / - 15x^2y^2 = - 7x^2y / 3$$

$$\text{(iii) } (- 24x^6y^2) / (6x^6y)$$

$$(- 24x^6y^2) / (6x^6y) = (- 24 \times x^6 \times y^2) / (6 \times x^6 \times y)$$

This can be written as,

$$= (- 4 \times 6 \times x^{6-6} \times y^{2-1}) / 6$$

$$= - 4 \times x^0 \times y^1$$

$$= - 4y$$

$$\text{Hence, } (- 24x^6y^2) / (6x^6y) = - 4y$$

5. Divide:

$$\text{(i) } 9x^3 - 6x^2 \text{ by } 3x$$

$$\text{(ii) } 6m^2 - 16m^3 + 10m^4 \text{ by } - 2m$$

$$\text{(iii) } 15x^3y^2 + 25x^2y^3 - 36x^4y^4 \text{ by } 5x^2y^2$$

$$\text{(iv) } 36a^3x^5 - 24a^4x^4 + 18a^5x^3 \text{ by } - 6a^3x^3$$

Solution:

$$\text{(i) } 9x^3 - 6x^2 \text{ by } 3x$$

$$9x^3 - 6x^2 \div 3x = (9 \times x^3 - 6 \times x^2) / (3 \times x)$$

Separating the terms, we get

$$= (9 \times x^3) / (3 \times x) - (6 \times x^2) / (3 \times x)$$

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We get,

$$= 3 \times x^{3-1} - 2 \times x^{2-1}$$

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

$$\text{Hence, } 9x^3 - 6x^2 \div 3x = 3x^2 - 2x$$

(ii) $6m^2 - 16m^3 + 10m^4$ by $-2m$

$$6m^2 - 16m^3 + 10m^4 \div -2m = (6 \times m^2 - 16 \times m^3 + 10 \times m^4) / -2 \times m$$

Separating the terms, we get

$$= (6 \times m^2 / -2 \times m) - (16 \times m^3) / (-2 \times m) + (10 \times m^4) / (-2 \times m)$$

$$= -3 \times m^{2-1} + 8 \times m^{3-1} - 5 \times m^{4-1}$$

$$= -3 \times m + 8 \times m^2 - 5 \times m^3$$

We get,

$$= -3m + 8m^2 - 5m^3$$

$$\text{Hence, } 6m^2 - 16m^3 + 10m^4 \div -2m = -3m + 8m^2 - 5m^3$$

(iii) $15x^3y^2 + 25x^2y^3 - 36x^4y^4$ by $5x^2y^2$

$$15x^3y^2 + 25x^2y^3 - 36x^4y^4 \div 5x^2y^2 = (15x^3y^2 + 25x^2y^3 - 36x^4y^4) / (5x^2y^2)$$

$$= (15 \times x^3 \times y^2) / (5 \times x^2 \times y^2) + (25 \times x^2 \times y^3) / (5 \times x^2 \times y^2) - (36 \times x^4 \times y^4) / (5 \times x^2 \times y^2)$$

On further calculation, we get

$$= 3 \times x^{3-2} \times y^{2-2} + 5 \times x^{2-2} \times y^{3-2} - (36 \times x^{4-2} \times y^{4-2}) / 5$$

We get,

$$= 3 \times x^1 \times y^0 + 5 \times x^0 \times y^1 - (36 \times x^2 \times y^2) / 5$$

$$= 3x + 5y - (36x^2y^2) / 5$$

$$\text{Hence, } 15x^3y^2 + 25x^2y^3 - 36x^4y^4 \div 5x^2y^2 = 3x + 5y - (36x^2y^2) / 5$$

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(iv) $36a^3x^5 - 24a^4x^4 + 18a^5x^3$ by $-6a^3x^3$

$$36a^3x^5 - 24a^4x^4 + 18a^5x^3 \div (-6a^3x^3) = (36a^3x^5 - 24a^4x^4 + 18a^5x^3) / -6a^3x^3$$

$$= (36.a^3.x^5) / (-6.a^3.x^3) - (24.a^4.x^4) / (-6.a^3.x^3) + (18.a^5.x^3) / (-6.a^3.x^3)$$

We get,

$$= -6.x^{5-3} + 4.a^{4-3}.x^{4-3} - 3.a^{5-3}$$

$$= -6x^2 + 4ax - 3a^2$$

$$\text{Hence, } 36a^3x^5 - 24a^4x^4 + 18a^5x^3 \div (-6a^3x^3) = -6x^2 + 4ax - 3a^2$$



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