

FUNDAMENTAL OPERATIONS

SUBJECT : MATHEMATICS

CHAPTER NUMBER:19

CHAPTER NAME :FUNDAMENTAL OPERATIONS

SUBTOPIC : Multiplication of Monomial and Polynomial.

PERIOD NO: 4

CHANGING YOUR TOMORROW

Learning outcomes

- Students will be able to multiply polynomial by polynomial.
- Students will develop application skill.

PREVIOUS KNOWLEDGE TEST

1. Multiply:

- (i) $a + b$ by ab
- (ii) $3ab - 4b$ by $3ab$
- (iii) $2xy - 5by$ by $4bx$

Negative numbers and Integers

- Students will Learn multiplication of binomials with the help of a video .
- [https://www.youtube.com/watch?v=fGThIRpWEE4\(9.4\)](https://www.youtube.com/watch?v=fGThIRpWEE4)

FUNDAMENTAL OPERATIONS

$$(x + 3)(x + 2) = x(x + 2) + 3(x + 2) \quad \text{Distribute.}$$

$$= x(x + 2) + 3(x + 2)$$

$$= x(x) + x(2) + 3(x) + 3(2) \quad \text{Distribute again.}$$

$$= x^2 + 2x + 3x + 6 \quad \text{Multiply.}$$

$$= x^2 + 5x + 6 \quad \text{Combine like terms.}$$

FUNDAMENTAL OPERATIONS

$$\begin{aligned}(x + 2)(x + 4) &= x \cdot (x + 4) + 2(x + 4) \\&= x \cdot x + x \cdot 4 + 2 \cdot x + 2 \cdot 4 \quad \text{distribute} \\&= x^2 + 4x + 2x + 8 \quad \text{combine like terms} \\&= x^2 + 6x + 8 \quad \text{Answer}\end{aligned}$$

Evaluation Question EX-19 C

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

Evaluation Question EX-19 C

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

The multiplication of the given expression is calculated as,

$$\begin{aligned}(xy - yz) \times (x^2yz^2) &= xy \times x^2yz^2 - yz \times x^2yz^2 \\ &= x^{1+2}y^{1+1}z^2 - x^2y^{1+1}z^{1+2} = x^3y^2z^2 - x^2y^2z^3\end{aligned}$$

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

Evaluation Question EX-19 C

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

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

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 $-x^2y - 3x^2y^2$

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

On further calculation, we get $-4x^{2+1}y^{1+1} - 12x^{2+1}y^{2+1}$

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

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

Evaluation Question EX-19 C

6. Multiply:

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

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

Solution:

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

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

On further calculation, we get $9a^{1+1} + 12ab - 15ac$

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

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

Evaluation Question EX-19 C

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

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

$$= 5x^{1+1}y^{1+2} + 30x^{1+2}y^{1+1} = 5x^2y^3 + 30x^3y^2$$

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 $x - 3$

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

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

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

Evaluation Question EX-19 C

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

The given expression is calculated as follows

$$\begin{aligned}(x + 2) \times (x + 10) &= x \times (x + 10) + 2 \times (x + 10) \\&= x^2 + 10x + 2x + 20 = x^2 + 12x + 20\end{aligned}$$

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 $(x - 3) = x^2 + 2x - 15$

Evaluation Question EX-19 C

Solution: (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 $x^2 + 3x - 5x - 15 = x^2 - 2x - 15$

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 $(x - 3) = x^2 - 8x + 15$

Evaluation Question EX-19 C

Solution: (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

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

Evaluation Question EX-19 C

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

The given expression is calculated as follows,

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

$$\text{On further calculation, we get } -15 \times a^{1+2} \times b^{1+2} \times c^{1+1}$$

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

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,

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

$$\text{On simplification, we get } = -2x^{1+1} + 2xy - 2xz = -2x^2 + 2xy - 2xz$$

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

Evaluation Question EX-19 C

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

The given expression is calculated as follows,

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

$$\text{On further calculation, we get } -4xy + 6y^{1+1} + 10yz = -4xy + 6y^2 + 10yz$$

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

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

The given expression is calculated as follows,

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

$$\text{On further calculation, we get } -8x^{1+1}y^{1+1}z^{1+1} + 10x^{2+1}y^{1+1}z^{3+1}$$

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

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

Evaluation Question EX-19 C

Solution: (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 $-13xy^2z + 15x^2yz - 6xyz^2 = -13x^2y^3z^2 + 15x^3y^2z^2 - 6x^2y^2z^3$

Evaluation Question EX-19 C

9. Find the product of:

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

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

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

$$\begin{aligned} &= xy \times xy + xy \times ab - ab \times xy - ab \times ab = x^2y^2 + abxy - abxy - a^2b^2 \\ &= x^2y^2 - a^2b^2 \end{aligned}$$

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

Additional Homework

1. $6a - (-5a - 8b) + (3a + b)$
2. $(p - 2q) - (3q - r)$

HW
Ex.19 C Q. NO 5 TO 9

**THANKING YOU
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