MATHEMATICS

Chapter 12: Algebraic Expressions

Important Questions

Multiple Choice Questions-

Question 1. How many terms are there in the expression $2x^2y$?

(a) 1

(b) 2

(c) 3

(d) 4

Question 2. How many terms are there in the expression $2y + 5$?

(a) 1

(b) 2

(c) 3

(d) 4

Question 3. How many terms are there in the expression $1.2ab - 2.4b + 3.6a$?

(a) 1

(b) 2

(c) 3

(d) 4

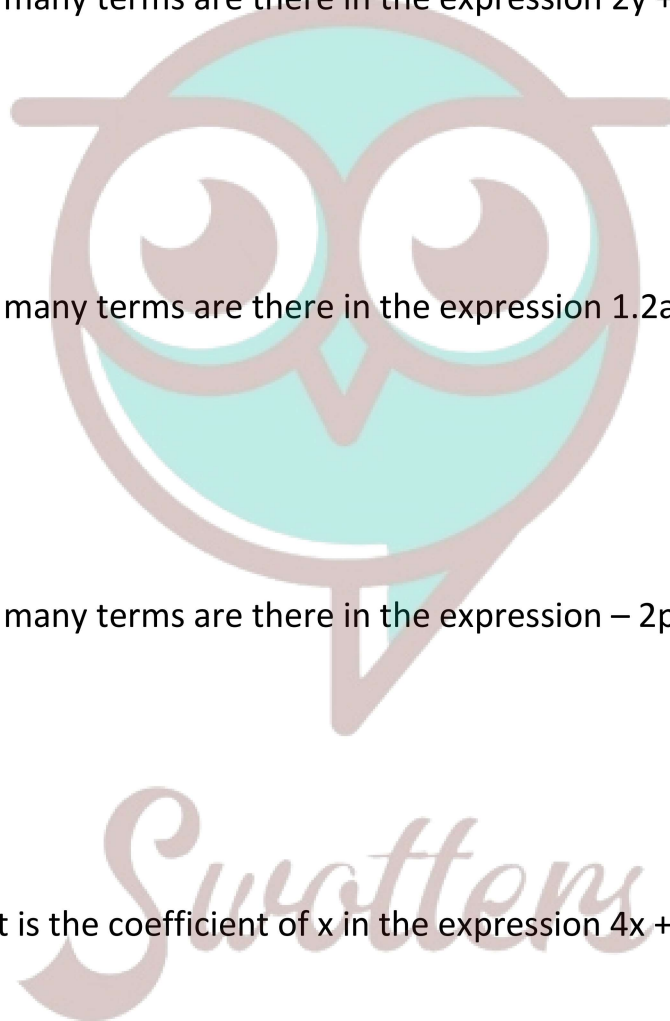Question 4. How many terms are there in the expression $-2p^3 - 3p^2 + 4p + 7$?

(a) 1

(b) 2

(c) 3

(d) 4

Question 5. What is the coefficient of x in the expression $4x + 3y$?

(a) 1

(b) 2

(c) 3

(d) 4

Question 6. What is the coefficient of x in the expression $2 - x + y$?

(a) 2

(b) 1

(c) -1

(d) None of these

Question 7. What is the coefficient of x in the expression $y^2x + y$?

(a) y^2

(b) y

(c) 1

(d) 0

Question 8. What is the coefficient of x in the expression $2z - 3xz$?

(a) 3

(b) z

(c) 3z

(d) -3z

Question 9. What is the coefficient of x in the expression $1 + x + xz$?

(a) z

(b) 1 + z

(c) 1

(d) 1 + x

Question 10. What is the coefficient of x in the expression $2x + xy^2$?

(a) $2 + y^2$

(b) 2

(c) y^2

(d) None of these

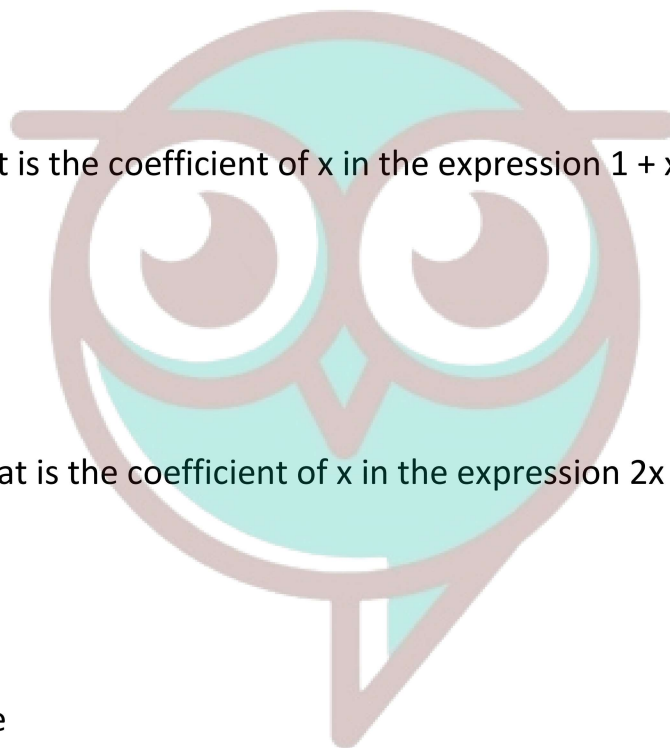Question 11. What is the coefficient of y^2 in the expression $4 - xy^2$?

(a) 4

(b) x

(c) -x

(d) None of these

Question 12. What is the coefficient of y^2 in the expression $3y^2 + 4x$?

(a) 1

(b) 2

(c) 3

(d) 4

Question 13. What is the coefficient of y^2 in the expression $2x^2y - 10xy^2 + 5y^2$?

(a) 5 – 10x

(b) 5

(c) -10 x

(d) None of these

Question 14. What is the coefficient of x in the expression $ax^3 + bx^2 + d$?

(a) a

(b) b

(c) d

(d) 0

Question 15. What is the coefficient of x^2 in the expression $ax + b$?

(a) a

(b) b

(c) a + b

(d) 0

Very Short Questions:

1. Identify in the given expressions, terms which are not constants. Give their numerical coefficients.

(i) $5x - 3$

(ii) $11 - 2y^2$

(iii) $2x - 1$

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

2. Group the like terms together from the following expressions:

$-8x^2y$, $3x$, $4y$, $\frac{-3}{2}x$, $2x^2y$, $-y$

3. Identify the pairs of like and unlike terms:

(i) $\frac{-3}{2}x$, y

(ii) -x, 3x

(iii) $\frac{-1}{2}y2x$, $\frac{3}{2}xy^2$

(iv) 1000, -2

4. Classify the following into monomials, binomial and trinomials.

(i) -6

(ii) -5 + x

(iii) $\frac{3}{2}x - y$

(iv) $6x^2 + 5x - 3$

(v) $z^2 + 2$

5. Draw the tree diagram for the given expressions:

(i) $-3xy + 10$

(ii) $x^2 + y^2$

6. Identify the constant terms in the following expressions:

(i) $-3 + \frac{3}{2}x$

(ii) $\frac{3}{2} - 5y + y^2$

(iii) $3x^2 + 2y - 1$

7. Add:

(i) $3x^2y, -5x^2y, -x^2y$

(ii) $a + b - 3, b + 2a - 1$

8. Subtract $3x^2 - x$ from $5x - x^2$.

9. Simplify combining the like terms:

(i) $a - (a - b) - b - (b - a)$

(ii) $x^2 - 3x + y^2 - x - 2y^2$
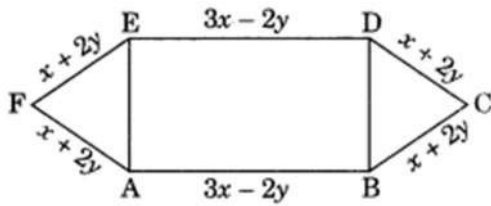
Short Questions :

1. Subtract $24xy - 10y - 18x$ from $30xy + 12y - 14x$.

2. From the sum of $2x^2 + 3xy - 5$ and $7 + 2xy - x^2$ subtract $3xy + x^2 - 2$.

3. Subtract $3x^2 - 5y - 2$ from $5y - 3x^2 + xy$ and find the value of the result if $x = 2$, $y = -1$.

4. Simplify the following expressions and then find the numerical values for $x = -2$.

(i) $3(2x - 4) + x^2 + 5$

(ii) $-2(-3x + 5) - 2(x + 4)$

5. Find the value of t if the value of $3x^2 + 5x - 2t$ equals to 8, when $x = -1$.

Long Questions :

1. Subtract the sum of $-3x^3y^2 + 2x^2y^3$ and $-3x^2y^3 - 5y^4$ from $x^4 + x^3y^2 + x^2y^3 + y^4$.

2. What should be subtracted from $2x^3 - 3x^2y + 2xy^2 + 3y^2$ to get $x^3 - 2x^2y + 3xy^2 + 4y^2$?

3. To what expression must $99x^3 - 33x^2 - 13x - 41$ be added to make the sum zero?

4. If $P = 2x^2 - 5x + 2$, $Q = 5x^2 + 6x - 3$ and $R = 3x^2 - x - 1$. Find the value of

2P – Q + 3R.

5. If A = -(2x + 3), B = -3(x – 2) and C = -2x + 7. Find the value of k if (A + B + C) = kx.

6. Find the perimeter of the given figure ABCDEF.

7. Rohan's mother gave him ₹ $3xy^2$ and his father gave him ₹ $5(xy^2 + 2)$. Out of this total money he spent ₹ $(10 – 3xy^2)$ on his birthday party. How much money is left with him?

Answer Key-

Multiple Choice questions-

1. (a) 1
2. (b) 2
3. (c) 3
4. (d) 4
5. (d) 4
6. (c) -1
7. (a) y^2
8. (d) -3z
9. (b) 1 + z
10. (a) $2 + y^2$
11. (c) -x
12. (c) 3
13. (a) 5 – 10x
14. (d) 0
15. (d) 0

Very Short Answer :

1.

Expression	Term which is not a constant	Numerical coefficient
(i) $5x - 3$	$5x$	5
(ii) $11 - 2y^2$	$-2y^2$	-2
(iii) $2x - 1$	$2x$	2
(iv) $4x^2y + 3xy^2 - 5$	$4x^2y$	4
	$3xy^2$	3

2. Group of like terms are:

(i) $-8x^2y$, $2x^2y$

(ii) $3x$, $\dfrac{-3}{2}x$

(iii) $4y$, $-y$

3. (i) $\dfrac{-3}{2}x$, y → Unlike Terms

(ii) $-x$, $3x$ → Like Terms

(iii) $\dfrac{-1}{2}y2x$, $\dfrac{3}{2}xy^2$ → Like Terms

(iv) 1000, -2 → Like Terms
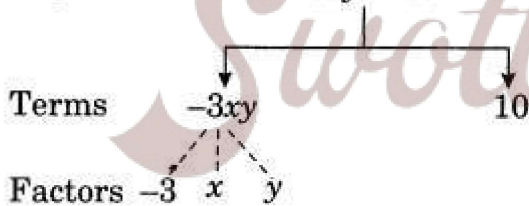
4. (i) -6 is monomial

(ii) $-5 + x$ is binomial

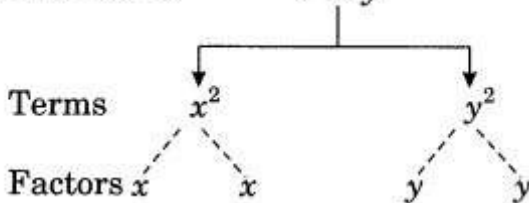(iii) $\dfrac{3}{2}x - y$ is binomial

(iv) $6x^2 + 5x - 3$ is trinomial

(v) $z^2 + z$ is binomial

5.

6. (i) Constant term = -3

(ii) Constant term = $\dfrac{3}{2}$

(iii) Constant term = -1

7. (i) $3x^2y$, $-5x^2y$, $-x^2y$

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

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

   $= (3 - 5 - 1)x^2y$

   $= -3x^2y$

   (ii) $a + b - 3$, $b + 2a - 1$

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

   $= a + b - 3 + b + 2a - 1$

   $= a + 2a + b + b - 3 - 1$

   $= 3a + 2b - 4$

8. $(5x - x^2) - (3x^2 - x)$

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

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

   $= 6x - 4x^2$

9. (i) $a - (a - b) - b - (b - a)$

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

   $= (a - a + a) + (b - b - b)$

   $= a - b$

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

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

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

Short Answer :

1. $(30xy + 12y - 14x) - (24xy - 10y - 18x)$

   $= 30xy + 12y - 14x - 24xy + 10y + 18x$

   $= 30xy - 24xy + 12y + 10y - 14x + 18x$

   $= 6xy + 22y + 4x$

2. Sum of the given term is $(2x^2 + 3xy - 5) + (7 + 2xy - x^2)$

   $= 2x^2 + 3xy - 5 + 7 + 2xy - x^2$

   $= 2x^2 - x^2 + 3xy + 2xy - 5 + 7$

   $= x^2 + 5xy + 2$

   Now $(x^2 + 5xy + 2) - (3xy + x^2 - 2)$

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

$= x^2 − x^2 + 5xy − 3xy + 2 + 2$

$= 0 + 2xy + 4$

$= 2xy + 4$

3. $(5y − 3x^2 + xy) − (3x^2 − 5y − 2)$

$= 5y − 3x^2 + xy − 3x^2 + 5y + 2$

$= -3x^2 − 3x^2 + 5y + 5y + xy + 2$

$= -6x^2 + 10y + xy + 2$

Putting x = 2 and y = -1, we get

$-6(2)^2 + 10(-1) + (2)(-1) + 2$

$= -6 × 4 − 10 − 2 + 2$

$= -24 − 10 − 2 + 2$

$= -34$

4. (i) $3(2x − 4) + x^2 + 5$

$= 6x − 12 + x^2 + 5$

$= x^2 + 6x − 7$

Putting x = -2, we get

$= (-2)^2 + 6(-2) − 7$

$= 4 − 12 − 7$

$= 4 − 19$

$= -15$

(ii) $-2(-3x + 5) − 2(x + 4)$

$= 6x − 10 − 2x − 8$

$= 6x − 2x − 10 − 8$

$= 4x − 18$

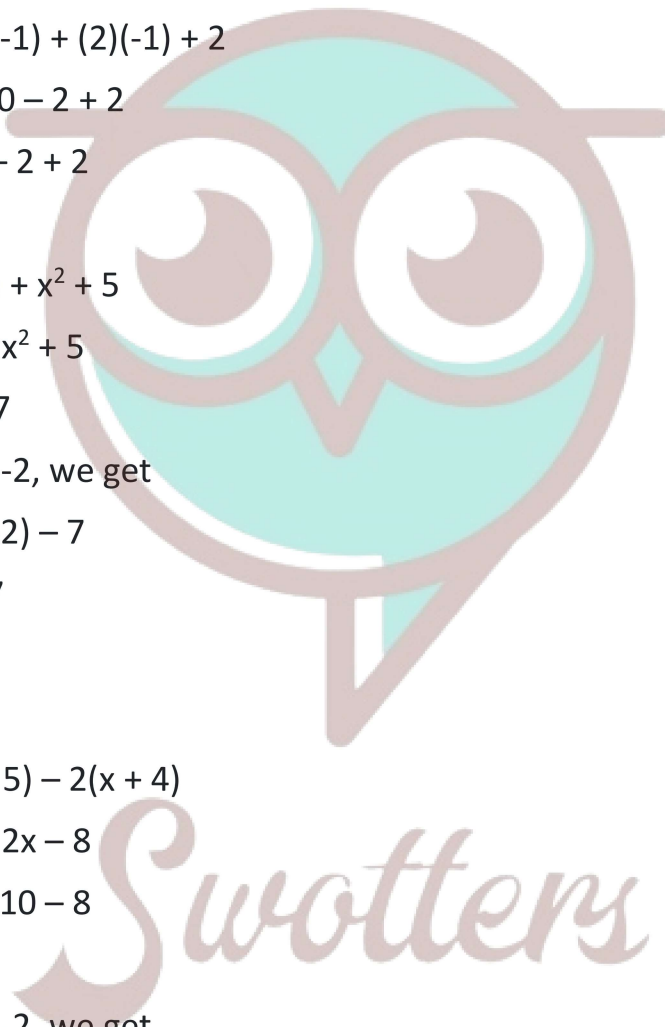Putting x = -2, we get

$= 4(-2) − 18$

$= -8 − 18$

$= -26$

5. $3x^2 + 5x − 2t = 8$ at x = -1

$⇒ 3(-1)^2 + 5(-1) − 2t = 8$

$⇒ 3(1) − 5 − 2t = 8$

$⇒ 3 − 5 − 2t = 8$

$⇒ -2 − 2t = 8$

$\Rightarrow 2t = 8 + 2$

$\Rightarrow -2t = 10$

$\Rightarrow t = -5$

Hence, the required value of t = -5.

Long Answer :

1. Sum of the given terms:

$$-3x^3y^2 + 2x^2y^3$$
$$+ \qquad \cdot - 3x^2y^3 - 5y^4$$
$$\overline{-3x^3y^2 - x^2y^3 - 5y^4}$$

Now

$$x^4 + x^3y^2 + x^2y^3 + y^4$$
$$- 3x^3y^2 - x^2y^3 - 5y^4$$
$$(+) \qquad (+) \qquad (+)$$
$$\overline{x^4 + 4x^3y^2 + 2x^2y^3 + 6y^4}$$

Required expression

2. We have

$$2x^3 - 3x^2y + 2xy^2 + 3y^2$$
$$x^3 - 2x^2y + 3xy^2 + 4y^2$$
$$(-) \quad (+) \quad \cdot \quad (-) \qquad (-)$$
$$\overline{x^3 - x^2y - xy^2 - y^2}$$

Required expression

3. Given expression:

$99x^3 - 33x^2 - 13x - 41$

Negative of the above expression is

$-99x^3 + 33x^2 + 13x + 41$

$(99x^3 - 33x^2 - 13x - 41) + (-99x^3 + 33x^2 + 13x + 41)$

$= 99x^3 - 33x^2 - 13x - 41 - 99x^3 + 33x^2 + 13x + 41$

$= 0$

Hence, the required expression is $-99x^3 + 33x^2 + 13x + 41$

4. $2P - Q + 3R = 2(2x^2 - 5x + 2) - (5x^2 + 6x - 3) + 3(3x^2 - x - 1)$

$= 4x^2 - 10x + 4 - 5x^2 - 6x + 3 + 9x^2 - 3x - 3$

$= 4x^2 - 5x^2 + 9x^2 - 10x - 6x - 3x + 4 + 3 - 3$

$= 8x^2 - 19x + 4$

Required expression.

5. A + B + C = -(2x + 13) − 3(x − 2) + (-2x + 7)

= -2x − 13 − 3x + 6 − 2x + 7

= -2x − 3x − 2x − 13 + 6 + 7

= -7x

Since A + B + C = kx

-7x = kx

Thus, k = -7

6. Required perimeter of the figure

ABCDEF = AB + BC + CD + DE + EF + FA

= (3x − 2y) + (x + 2y) + (x + 2y) + (3x − 2y) + (x + 2y) + (x + 2y)

= 2(3x − 2y) + 4(x + 2y)

= 6x − 4y + 4x + 8y

= 6x + 4x-4y + 8y

= 10x + 4y

Required expression.

7. Money give by Rohan's mother = ₹ $3xy^2$

Money given by his father = ₹ $5(xy^2 + 2)$

Total money given to him = ₹ $3xy^2$ + ₹ $5 (xy^2 + 2)$

= ₹ $[3xy^2 + 5(xy^2 + 2)]$

= ₹ $(3xy^2 + 5xy^2 + 10)$

= ₹ $(8xy^2 + 10)$.

Money spent by him = ₹ $(10 − 3xy)^2$

Money left with him = ₹ $(8xy^2 + 10) − ₹ (10 − 3xy^2)$

= ₹ $(8xy^2 + 10 − 10 + 3x^2y)$

= ₹ $(11xy^2)$

Hence, the required money = ₹ $11xy^2$