EXERCISE PAGE: 312

In each of the questions 1 to 16, out of the four options, only one is correct. Write the correct answer.

1. An algebraic expression containing three terms is called a

(a) monomial (b) binomial (c) trinomial (d) All of these

Solution:-

(c) trinomial

Expression with three unlike terms is called a 'Trinomial'.

2. Number of terms in the expression $3x^2y - 2y^2z - z^2x + 5$ is

(a) 2 (b) 3 (c) 4 (d) 5

Solution:-

(c) 4

In the given expression there are 4 terms.

3. The terms of expression $4x^2 - 3xy$ are:

(a) $4x^2$ and $-3xy$ (b) $4x^2$ and $3xy$

(c) $4x^2$ and $-xy$ (d) x^2 and xy

Solution:-

(a) $4x^2$ and $-3xy$

A term is the product of factors.

4. Factors of $-5x^2y^2z$ are

(a) $-5 \times x \times y \times z$ (b) $-5 \times x^2 \times y \times z$

(c) $-5 \times x \times x \times y \times y \times z$ (d) $-5 \times x \times y \times z^2$

Solution:-

(c) $-5 \times x \times x \times y \times y \times z$

Factors may be numerical as well as algebraic (literal).

5. Coefficient of x in $-9xy^2z$ is

(a) 9yz (b) $-9yz$ (c) $9y^2z$ (d) $-9y^2z$

Solution:-

(d) $-9y^2z$

Coefficient is the numerical factor in a term. Sometimes, any factor in a term is called the coefficient of the remaining part of the term.

6. Which of the following is a pair of like terms?

(a) $-7xy^2z, -7x^2yz$ **(b) $-10xyz^2, 3xyz^2$**

(c) $3xyz, 3x^2y^2z^2$ **(d) $4xyz^2, 4x^2yz$**

Solution:-

(b) $-10xyz^2, 3xyz^2$

The terms having the same algebraic factors are called like terms.

7. Identify the binomial out of the following:

(a) $3xy^2 + 5y - x^2y$ **(b) $x^2y - 5y - x^2y$**

(c) $xy + yz + zx$ **(d) $3xy^2 + 5y - xy^2$**

Solution:-

(d) $3xy^2 + 5y - xy^2$

Expression with two unlike terms is called a 'Binomial'.

The expression $3xy^2 + 5y - xy^2$ is further simplified as,

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

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

$= 2xy^2 + 5y$

8. The sum of $x^4 - xy + 2y^2$ and $-x^4 + xy + 2y^2$ is

(a) Monomial and polynomial in y **(b) Binomial and Polynomial**

(c) Trinomial and polynomial **(d) Monomial and polynomial in x**

Solution:-

(a) Monomial and polynomial in y

Consider the given equation, $x^4 - xy + 2y^2$ and $-x^4 + xy + 2y^2$

Sum of two expressions $= (x^4 - xy + 2y^2) + (-x^4 + xy + 2y^2)$

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

$= (x^4 - x^4) + (-xy + xy) + (2y^2 + 2y^2)$

$= 0 + 0 + 4y^2$

$= 4y^2$

9. The subtraction of 5 times of y from x is

(a) $5x - y$ **(b) $y - 5x$** **(c) $x - 5y$** **(d) $5y - x$**

Solution:-

(c) $x - 5y$

10. $-b - 0$ is equal to

(a) $-1 \times b$ **(b) $1 - b - 0$** **(c) $0 - (-1) \times b$** **(d) $-b - 0 - 1$**

Solution:-

(a) –1 × b

– b – 0 is equal to = -b

11. The side length of the top of square table is x. The expression for perimeter is:

(a) 4 + x **(b) 2x** **(c) 4x** **(d) 8x**

Solution:-

(c) 4x

We know that, perimeter of the square = 4 × side

From the question it is given that, side length of the top of square table is x.

Then, perimeter = 4 × x

= 4x

12. The number of scarfs of length half metre that can be made from y metres of cloth is:

(a) 2y **(b) y/2** **(c) y + 2** **(d) y + ½**

Solution:-

(a) 2y

From the question it is given that, length of scarf is half metre = ½ m

Then, the number of scarfs can be made from y metres of cloth = y/(½)

= 2y

13. $123x^2y – 138x^2y$ is a like term of :

(a) 10xy **(b) –15xy** **(c) $–15xy^2$** **(d) $10x^2y$**

Solution:-

(d) $10x^2y$

$123x^2y – 138x^2y = (123 - 138)\ x^2y$

$= -15\ x^2y$

Therefore, $-15x^2y$ is a like term of $10x^2y$, because both contain x^2y.

14. The value of $3x^2 – 5x + 3$ when x = 1 is

(a) 1 **(b) 0** **(c) –1** **(d) 11**

Solution:-

(a) 1

From the question it is given that, value of x = 1

Substitute the value of x in the expression $3x^2 – 5x + 3$

$= (3 \times (1)^2) – (5 \times 1) + 3$

= 3 – 5 + 3
= 6 – 5
= 1

15. The expression for the number of diagonals that we can make from one vertex of a n sided polygon is:
(a) 2n + 1 (b) n – 2 (c) 5n + 2 (d) n – 3
Solution:-
(d) n – 3
There are n vertices, and from each vertex you can draw n-3 diagonals, so the total number of diagonals that can be drawn is (n-3).

16. The length of a side of square is given as 2x + 3. Which expression represents the perimeter of the square?
(a) 2x + 16 (b) 6x + 9 (c) 8x + 3 (d) 8x + 12
Solution:-
(d) 8x + 12
We know that, perimeter of the square = 4 × side
From the question it is given that, side length of the top of square table is 2x + 3.
Then, perimeter = 4 × (2x + 3)
= (4 × 2x) + (4 × 3)
= 8x + 12

In questions 17 to 32, fill in the blanks to make the statements true.
17. Sum or difference of two like terms is _____.
Solution:-
Sum or difference of two like terms is a like term.
Let us consider the two like terms = 2y and 3y
Sum of two like terms = 2y + 3y
= 5 y
Difference of two like terms = 2y – 3y
= -y

18. In the formula, area of circle = πr^2, the numerical constant of the expression πr^2 is _____.
Solution:-
In the formula, area of circle = πr^2, the numerical constant of the expression πr^2 is π.

19. $3a^2b$ and $-7ba^2$ are _____ terms.
Solution:-
$3a^2b$ and $-7ba^2$ are like terms.
The terms having the same algebraic factors are called like terms.

20. $-5a^2b$ and $-5b^2a$ are _____ terms.
Solution:-
$-5a^2b$ and $-5b^2a$ are unlike terms.
The terms having different algebraic factors are called unlike terms.

21. In the expression $2\pi r$, the algebraic variable is _____.
Solution:-
In the expression $2\pi r$, the algebraic variable is r.

22. Number of terms in a monomial is _____.
Solution:-
Number of terms in a monomial is 1.
Expression with one term is called a 'Monomial'.

23. Like terms in the expression n(n + 1) + 6 (n – 1) are _____and _____.
Solution:-
Like terms in the expression n(n + 1) + 6 (n – 1) are n and 6n.
Consider the given expression, n(n + 1) + 6 (n – 1)

$= n^2 + n + 6n - 6$

$= n^2 + 7n - 6$

Therefore, like terms are n and 6n

24. The expression 13 + 90 is a _____.
Solution:-
The expression 13 + 90 is a constant.
13 + 90 = 103

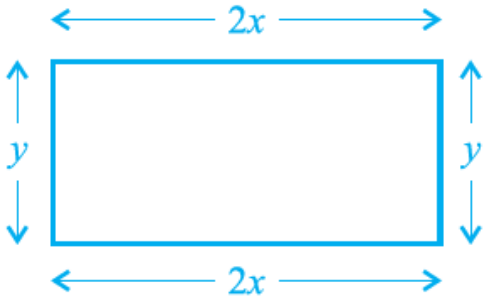
25. The speed of car is 55 km/hrs. The distance covered in y hours is _____.
Solution:-
The speed of car is 55 km/hrs. The distance covered in y hours is 55y.
Because, distance = speed × time

26. x + y + z is an expression which is neither monomial nor _____.
Solution:-
x + y + z is an expression which is neither monomial nor binomial.
The given expression contains 3 terms so; it is a trinomial.

27. If $(x^2y + y^2 + 3)$ is subtracted from $(3x^2y + 2y^2 + 5)$, then coefficient of y in the result is _____.
Solution:-
If $(x^2y + y^2 + 3)$ is subtracted from $(3x^2y + 2y^2 + 5)$, then coefficient of y in the result is $2x^2$.
$(x^2y + y^2 + 3)$ is subtracted from $(3x^2y + 2y^2 + 5)$
$= (3x^2y + 2y^2 + 5) – (x^2y + y^2 + 3)$
$= 3x^2y + 2y^2 + 5 – x^2y – y^2 – 3$
$= (3x^2y – x^2y) + (2y^2 – y^2) + (5 - 3)$
$= 2x^2y + y^2 + 2$

28. – a – b – c is same as – a – (_____).
Solution:-
– a – b – c is same as – a – (b + c).

29. The unlike terms in perimeters of following figures are_____ and _____.
Solution:-
The unlike terms in perimeters of following figures are 2y and $2y^2$.



We know that perimeter of rectangle = 2 (length + breadth)
$= 2 (2x + y)$
$= 4x + 2y$
Perimeter of parallelogram $= x + x + y^2 + y^2$
$= 2x + 2y^2$

30. On adding a monomial _____ to – 2x + 4y² + z, the resulting expression becomes a binomial.

Solution:-

On adding a monomial 2x or -4y² or -z to – 2x + 4y² + z, the resulting expression becomes a binomial.

$2x + (-2x + 4y^2 + z) = 2x - 2x + 4y^2 + z$

$= 4y^2 + z$

$-4y^2 + (-2x + 4y^2 + z) = -4y^2 - 2x + 4y^2 + z$

$= -2x + z$

$-z + (-2x + 4y^2 + z) = -z - 2x + 4y^2 + z$

$= -2x + 4y^2$

31. $3x + 23x^2 + 6y^2 + 2x + y^2 +$ _____ $= 5x + 7y^2$.

Solution:-

$3x + 23x^2 + 6y^2 + 2x + y^2 + (-23x^2) = 5x + 7y^2$.

Let us consider the missing letter be p.

Then,

$3x + 23x^2 + 6y^2 + 2x + y^2 + p = 5x + 7y^2$

By transposing 3x, $23x^2$, $6y^2$, 2x and y^2 to RHS

$5x - 3x - 23x^2 + 7y^2 - 6y^2 - 2x - y^2 = p$

$2x - 2x - 23x^2 + y^2 - y^2 = p$

$p = 0 - 23x^2 - 0$

$p = -23x^2$

32. If Rohit has 5xy toffees and Shantanu has 20yx toffees, then Shantanu has _____ more toffees.

Solution:-

If Rohit has 5xy toffees and Shantanu has 20yx toffees, then Shantanu has 15xy more toffees.

From the question,

Rohit has 5xy toffees

Shantanu has 20yx toffees

Then, difference between the toffees of both Rohit and Shantanu = 20yx – 5xy = 15 xy

Then Shantanu has 15 xy more toffees.

In questions 33 to 52, state whether the statements given are True or False.

33. $1 + (x/2) + x^3$ is a polynomial

Solution:-
True.
In general, an expression with one or more than one term (with nonnegative integral exponents of the variables) is called a ‘Polynomial’.

34. (3a – b + 3) – (a + b) is a binomial.
Solution:-
False.
Consider the given expression,
(3a – b + 3) – (a + b)
3a – b + 3 – a – b
2a – 2b + 3
Therefore, the given expression contains 3 terms.
So, it is a trinomial.

35. A trinomial can be a polynomial.
Solution:-
True.
In general, an expression with one or more than one term (with nonnegative integral exponents of the variables) is called a ‘Polynomial’.

36. A polynomial with more than two terms is a trinomial.
Solution:-
False.
Expression with three unlike terms is called a 'Trinomial’.

37. Sum of x and y is x + y.
Solution:-
True.

38. Sum of 2 and p is 2p.
Solution:-
False.
Sum of 2 and p is 2 + p.

39. A binomial has more than two terms.
Solution:-

False
Expression with two unlike terms is called a 'Binomial'

40. A trinomial has exactly three terms.
Solution:-
True.
Expression with three unlike terms is called a 'Trinomial'.

41. In like terms, variables and their powers are the same.
Solution:-
True.
The terms having the same algebraic factors are called like terms.

42. The expression x + y + 5x is a trinomial.
Solution:-
False.
Consider the given expression, x + y + 5x
The expression contains like terms, x + 5x = 6x
Then, the given expression becomes y + 6x which is a binomial.

43. 4p is the numerical coefficient of q^2 in $-4pq^2$.
Solution:-
False.
-4 is the numerical coefficient of q^2 in $-4pq^2$.

44. 5a and 5b are unlike terms.
Solution:-
True.
The terms having different algebraic factors are called unlike terms.

45. Sum of $x^2 + x$ and $y + y^2$ is $2x^2 + 2y^2$.
Solution:-
False.
Sum of $x^2 + x$ and $y + y^2$
$= (x^2 + x) + (y + y^2)$
$= x^2 + y^2 + x + y$

46. Subtracting a term from a given expression is the same as adding its additive inverse to the given expression.

Solution:-

True.

Additive inverse of the expression is same as the subtracting term.

47. The total number of planets of Sun can be denoted by the variable n.

Solution:-

False.

We know that, total number of planets is constant. Hence, we cannot denote planets in variables.

48. In like terms, the numerical coefficients should also be the same.

Solution:-

False.

The terms having the same algebraic factors are called like terms. Numerical of the coefficient can be vary.

49. If we add a monomial and binomial, then answer can never be a monomial.

Solution:-

False.

If we add a monomial and binomial, then answer can be a monomial.

For example: sum of y^2 and $-y^2 + x^2$

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

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

$= x^2$

50. If we subtract a monomial from a binomial, then answer is at least a binomial.

Solution:-

False.

If we subtract a monomial from a binomial, then answer is at least a monomial.

For example: difference of y^2 and $y^2 + x^2$

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

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

$= - x^2$

51. When we subtract a monomial from a trinomial, then answer can be a polynomial.

Solution:-

True.
When we subtract a monomial from a trinomial, then answer can be binomial or polynomial.
For example: subtract p^2 from $p^2 + q^2 – r^2$

$= (p^2 + q^2 – r^2) – p^2$
$= p^2 + q^2 - r^2 – p^2$
$= q^2 - r^2$

52. When we add a monomial and a trinomial, then answer can be a monomial.
Solution:-
False.
When we add a monomial and a trinomial, then answer can be binomial or trinomial.
For example: add p^2 and $p^2 + q^2 – r^2$

$= p^2 + (p^2 + q^2 – r^2)$
$= p^2 + p^2 + q^2 – r^2$
$= 2p^2 + q^2 – r^2$

53. Write the following statements in the form of algebraic expressions and write whether it is monomial, binomial or trinomial.
(a) x is multiplied by itself and then added to the product of x and y.
Solution:-
From the question it is given that,
x is multiplied by itself = $x \times x = x^2$
the product of x and y = $x \times y = xy$
Then, As per the condition in the question = $x^2 + xy$
Therefore, the obtained expression is binomial.

(b) Three times of p and two times of q are multiplied and then subtracted from r.
Solution:-
From the question it is given that,
Three times of p = 3p
Two times of q = 2q
Three times of p and two times of q are multiplied = $3p \times 2q = 3p2q$
Then, As per the condition in the question = r - 3p2q
Therefore, the obtained expression is binomial.

(c) Product of p, twice of q and thrice of r.

Solution:-

As per the condition given in the question,

$p \times 2q \times 3r = 6pqr$

Therefore, the obtained expression is a monomial.

(d) Sum of the products of a and b, b and c and c and a.

Solution:-

The products of a and b, b and c and c and a = $(a \times b)$ and $(b \times c)$ and $(c \times a)$

Then, sum of the products of a and b, b and c and c and a = $ab + bc + ca$

Therefore, the obtained expression is trinomial.

(e) Perimeter of an equilateral triangle of side x.

Solution:-

We know that, perimeter of triangle = sum of all sides

$= x + x + x$

$= 3x$

Therefore, the obtained expression is monomial.

(f) Perimeter of a rectangle with length p and breadth q.

Solution:-

We know that, perimeter of rectangle = 2 (length + breadth)

$= 2 (p + q)$

$= 2p + 2q$

Therefore, the obtained expression is binomial.

(g) Area of a triangle with base m and height n.

Solution:-

We know that, area of triangle = ½ × base × height

$= ½ \times m \times n$

$= ½mn$

Therefore, the obtained expression is monomial.

(h) Area of a square with side x.

Solution:-

We know that, area of square = side × side

$= x \times x$

$= x^2$

Therefore, the obtained expression is monomial.

(i) Cube of s subtracted from cube of t.
Solution:-
As per the condition given in the question, $t^3 – s^3$
Therefore, the obtained expression is binomial.

(j) Quotient of x and 15 multiplied by x.
Solution:-
Quotient of x and 15 = x ÷ 15
As per the condition given in the question, Quotient of x and 15 multiplied by x = (x ÷ 15)x
$= x^2/15$
Therefore, the obtained expression is monomial.

(k) The sum of square of x and cube of z.
Solution:-
As per the condition given in the question = $x^2 + z^3$
Therefore, the obtained expression is binomial.

(l) Two times q subtracted from cube of q.
Solution:-
As per the condition given in the question = $q^3 – 2q$
Therefore, the obtained expression is binomial.

54. Write the coefficient of x^2 in the following:
(i) $x^2 – x + 4$
Solution:-
The coefficient of x^2 in the given expression is 1.
Coefficient is the numerical factor in a term. Sometimes, any factor in a term is called the coefficient of the remaining part of the term.

(ii) $x^3 – 2x^2 + 3x + 1$
Solution:-
The coefficient of x^2 in the given expression is -2.
Coefficient is the numerical factor in a term. Sometimes, any factor in a term is called the coefficient of the remaining part of the term.

(iii) $1 + 2x + 3x^2 + 4x^3$

Solution:-

The coefficient of x^2 in the given expression is 3.

Coefficient is the numerical factor in a term. Sometimes, any factor in a term is called the coefficient of the remaining part of the term.

(iv) $y + y^2x + y^3x^2 + y^4x^3$

Solution:-

The coefficient of x^2 in the given expression is y^3.

Coefficient is the numerical factor in a term. Sometimes, any factor in a term is called the coefficient of the remaining part of the term.

55. Find the numerical coefficient of each of the terms :

(i) $x^3y^2z, xy^2z^3, –3xy^2z^3, 5x^3y^2z, –7x^2y^2z^2$

Solution:-

Numerical coefficient of,

$x^3y^2z = 1$

$xy^2z^3 = 1$

$–3xy^2z^3 = -3$

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

$–7x^2y^2z^2 = -7$

(ii) $10xyz, –7xy^2z, –9xyz, 2xy^2z, 2x^2y^2z$

Solution:-

Numerical coefficient of,

$10xyz = 10$

$–7xy^2z = -7$

$–9xyz = -9$

$2xy^2z = 2$

$2x^2y^2z = 2$