# Unit 10(Algebraic Expressions)

## Multiple Choice Questions (MCQs)

**Question 1:**

**An algebraic expression containing three terms is called a**

**(a)** monomial

**(b)** binomial

**(c)** trinomial

**(d)** All of these

**Solution:**

**(c)** An algebraic expression containing one term is called monomial, two terms is called binomial and three terms is called trinomial.

**Question 2:**

**Number of terms in the expression 3x y -2y z-z x+ 5 is**

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

**Solution:**

**(c)** The terms in the expression are $3x^2y$, $-2y^2z$, $-z^2x$ and 5. Hence, total number of terms are 4.

**Question 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 2 2 2

**Solution:**

**(a)** Terms in the expression $4x^2$ -3xy are $4x^2$ and -3xy.

**Question 4:**

**Factors of $-5x^2y^2z$ are**

**(a)** -5 x x x y x z

**(b)** -5 x $x^2$ x y x z

**(c)** -5 x x x x x y x y x z

**(d)** -5 x x x y x $z^2$

**Solution:**

**(c)** $-5x^2y^2z$ can be written as -5 x x x x x y x y x z.

**Question 5:**

**Coefficient of x in -9xy2z is**

**(a)** 9 yz

**(b)** -9 yz

**(c)** 9 $y^2z$

**(d)** -9 $y^2z$

**Solution:**

**(d)** Coefficient of x in$-9x^2yz$ = – $9y^2z$

**Question 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)** Like terms are those terms, having same algebraic factor.

Hence, $-10ayz^2$ and $3ayz^2$ are like terms as they contain $xyz^2$ same factor.

**Question 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)** We know that, an algebraic expression containing two terms is called binomial. So, taking option **(d)**, $3xy^2 + 5y-xy^2 = 2x^2y + 5y$ As it contains only two terms, hence it is known as binomial.

**Question 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)** Required sum = $(x^4-xy+2y^2)+ (-x^4 + xy+2y^2)$

$= x^4-xy+2y^2-x^4+ xy+2y^2$ = [(x4 + $(-x^4)$] + (-xy+xy)+$(2y^2 + 2y^2)$

$= 0+ 0+ 4y^2 = 4y^2$

$4y^2$ is a monomial and polynomial in y.

**Question 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)** 5 times of y = 5y

Now, subtraction of 5 times of y from x is written as x-5y.

**Question 10:**

**-b- 0 is equal to**

**(a)** -1 x b **(b)** 1-b-0 **(c)** 0-(-1) x b **(d)** -b—0 —1

**Solution:**

**(a)** We have, -b-0=-b

**(a)**-1 x b=-b

**(b)** 1-b-0=1-b

**(c)** 0-(-1) x b=0+b=b

**(d)** -b-0-1=-b-1

Hence, option **(a)** is correct.

**Question 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)** Given, side length of a square table = x

∴Perimeter of a square = 4x

Side = 4 x x =4x.

**Question 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)** We have,

Length of 1 scarf =½ m

So, number of scarfs which can be made from y metres =y/(½)=2 y.

**Question 13:**

**$123x^2y-138x^2y$ is a like term of**

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

**Solution:**

**(d)** We have, $123x^2y-138x^2y=-15x^2y$

Hence, it is like term of $10x^2y$ as both contain $x^2y$.

**Question 14:**

**The value of $3x^2 – 5x + 3$, when x=1 is**

**(a)** 1 **(b)** 0 **(c)**-1 **(d)**11

**Solution:**

**(a)** Putting x=1 in given equation we get $3x^2-5x + 3= 3(1)^2-5(1)+3 =3-5+3 =1$

**Question 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)** Since, vertex is formed by joining two sides. Diagonal is line segment joining the two opposite vertex. So, number of diagonal formed by one vertex =n-3.

**Question 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)** Given, side of the square = $(2x + 3)$

∴ Perimeter of square = 4 x (Side)

= 4 x $(2x + 3)$

= $8x + 12$

## Fill in the Blanks

**In questions 17 to 32, fill in the blanks to make the statements true.**

**Question 17:**

Sum or difference of two like terms is ………………..

**Solution:**

Sum or difference of two like terms is a like term, e.g. $138x^2y-125x^2y = 13x^2y$

**Question 18:**

In the formula, area of circle $=\pi r^2$, the numerical constant of the expression $\pi r^2$ is …………….

**Solution:**

In $\pi r^2$, the numerical constant is $\pi$ as $r^2$ is variable.

**Question 19:**

$3a^2b$ and $-7ba^2$ are ………………… terms.

**Solution:**

$3a^2b$ and $-7ba^2$ are like terms as both have same algebraic factor $a^2b$.

**Question 20:**

$-5a^2b$ and $-5b^2a$ are ……………. terms.

**Solution:**

$-5a^2b$ and $-5b^2a$ are unlike terms as they do not have same algebraic factor.

**Question 21:**

In the expression $2\pi r$, the algebraic variable is …………….

**Solution:**

In the expression $2\pi r, 2\pi$ is constant while r is an algebraic variable.

**Question 22:**

Number of terms in a monomial is …………….

**Solution:**

Number of terms in a monomial is one.

**Question 23:**

Like terms in the expression $n(n+1)+6(n-1)$ are ……………. and ………………

**Solution:**

We have, $n(n+1)+ 6(n – 1)=n^2 + n+6n-6$

Hence, like terms in the expression $n(n+1)+6(n-1)$are n and 6n.

**Question 24:**

The expression 13+90 is a ………………

**Solution:**

∴ 13+ 90=103

∴ 103 is a constant term.

**Question 25:**

The speed of car is 55 km/h. The distance covered in y hours is ………………

**Solution:**

Given, speed of car = 55 km/h.

∴ Distance = Speed x Time

∴Distance covered in y hours = 55xy = 55y km

**Question 26:**

x+y+z is an expression which is neither monomial nor …………..

**Solution:**

Since, x+ y+z has three terms, so it is trinomial.

Hence, x + y+z is an expression which is neither monomial nor binomial.

**Question 27:**

If $(x^2y+y^2 + 3)$ is subtracted from $(3x^2y+2y^2 + 5)$, then coefficient of y in the result is ……………….

**Solution:**

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

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

Coefficient of $y = 2x^2$

**Question 28:**

-a-b-c is same as -a- (……………).

**Solution:**

We have, -a-b-c=-a-(b+c)     [by taking common (-) minus sign]

So,-a-b-c is same as -a-(b+ c).

**Question 29:**

The unlike terms in perimeters of following figures are …………….. and ……………….

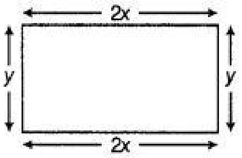


Fig. (i)

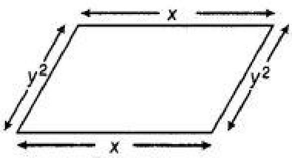


Fig. (ii)

**Solution:**

In Fig. **(i)**,

Perimeter = Sum of all sides

= 2x + y+2x + y = 4x + 2y

In Fig. **(ii)**,

Perimeter = Sum of all sides

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

Unlike terms in perimeters are 2y and $2y^2$.

**Question 30:**

On adding a monomial ……………… to $-2x+4y^2+z$, the resulting expression becomes a binomial.

**Solution:**

We can add 2x, $-4y^2$ and -z to the expression to make it binomial.

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

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

=> -z + (-2x + 4y2 + z) = $-2x + 4y^2$

Hence, on adding a monomial 2x or $-4y^2$ or -z to $-2x + 4y^2 + z$, the resulting expression becomes a binomial.

**Question 31:**

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

**Solution:**

Let$(3x+23x^2 + 6y^2+2x+y^2)$+ M = $5x + 7y^2$

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

=> M = $5x + 7y^2-3x- 23x^2– 6y^2 -2x – y^2$

[with -ve sign, +ve sign in the bracket will change on opening it]

=> M = $5x-3x-2x + 7y^2-6y^2$-y2-$23x^2$

M = 0 + 0 – $23x^2 =-23x^2$

**Question 32:**

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

**Solution:**

We have, Rohit has toffees =5xy

Shantanu has toffees =20yx

Difference = 20xy -5xy=15xy

Hence, Shantanu had 15xy more toffees.

## True/False

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

**Question 33:**

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

**Solution:**

**True**

Expression with one or more than one term is called a polynomial.

**Question 34:**

(3a-b+3)-(a+b) is a binomial.

**Solution:**

**False**

We have , (3a-b+3)-(a + b)= 3a-b+3-a-b

= 3a-a-b-b + 3 = 2a-2b+ 3

The expression has three terms, it is a trinomial.

**Question 35:**

A trinomial can be a polynomial.

**Solution:**

**True**

Trinomial is a polynomial, because it has three terms.

**Question 36:**

A polynomial with more than two terms is a trinomial.

**Solution:**

**False**

A polynomial with more than two terms can be trinomial or more. While a trinomial have exact three terms.

**Question 37:**

Sum of x andy is x+y.

**Solution:**

**True**

Sum of x and y is x+y.

**Question 38:**

Sum of 2 and p is 2p.

**Solution:**

**False**

Sum of 2 and p is 2 + p.

**Question 39:**

A binomial has more than two terms.

**Solution:**

**False**

Binomial has exactly two unlike terms.

**Question 40:**

A trinomial has exactly three terms.

**Solution:**

**True**

A trinomial has exactly three unlike terms.

**Question 41:**

In like terms, variables and their powers are the same.

**Solution:**

**True**

In like terms, algebraic factors are same.

**Question 42:**

The expression x+y+5x is a trinomial.

**Solution:**

**False**

∴ x+ y + 5x =6x+ y It is a binomial.

**Question 43:**

4p is the numerical coefficient of $q^2$ in $-4pq^2$.

**Solution:**

**False**

Numerical coefficient of $q^2$ in $-4pq^2$ =-4.

**Question 44:**

5a and 5b are unlike terms.

**Solution:**

**True**

Because both the terms have different algebraic factors.

**Question 45:**

Sum of $x^2 + x$ and $y+y^2$ is $2x^2 + 2y^2$.

**Solution:**

**False**

∴ Sum = $(x^2 + x) + (y + y^2) = x^2 + x + y + y^2 = x^2 + y^2 + x + y$

**Question 46:**

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

**Solution:**

**True**

Because additive inverse is the negation of a number or expression.

**Question 47:**

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

**Solution:**

**False**

As, Sun has infinite planets around it.

**Question 48:**

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

**Solution:**

**False**

**e.g**. $-3x^2y$ and $4x^2y$ are like terms as they have same algebraic factor $x^2y$ but have different numerical coefficients.

**Question 49:**

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

**Solution:**

**False**

If we add a monomial and a binomial, then answer can be a monomial, e.g. Add $x^2$ and $-x^2 + y^2$

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

$= x^2 – x^2 + y^2 = y^2$

Hence, the answer is monomial.

**Question 50:**

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

**Solution:**

**False**

If we subtract a monomial from a binomial, then answer is atleast a monomial, e.g. Subtract x and x-y= x-(x-y) = x-x + y = y, i.e. monomial.

Hence, the answer is monomial.

**Question 51:**

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

**Solution:**

**True**

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

**e.g.** Subtract $y^2$ from $y^2 -x^2 -2xy$.

$= (y^2 -x^2 – 2xy)-y^3 = y^2 – y^2 -x^2 -2xy = -x^2 – 2xy$ Hence, answer is binomial.

**Question 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 it can be binomial or trinomial, e.g. Add xy and $x^3 + 2xy - y^3$

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

$= xy + 2xy + x^3 - y^3 = 3xy + x^3 - y^3$ Hence, answer is trinomial.

**Question 53:**

**Write the following statements in the form of algebraic expressions and write whether is monomial, binomial or trinomial.**

**(a)** x is multiplied by itself and then added to the product of x and y.

**(b)** Three times of p and two times of q are multiplied and then subtracted from r.

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

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

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

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

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

**(h)** Area of a square with side x.

**(i)** Cube of s subtracted from cube of t.

**(j)** Quotient of x and 15 multiplied by x.

**(k)**The sum of square of x and cube of z.

**(l)** Two times q subtracted from cube of q.

**Solution:**

(a) $x^2 + xy$ [binomial]

(b) $r - (3p \times 2q) = r - 6pq$ [binomial]

(c) $p \times 2q \times 3r = 6pq$ [monomial]

(d) $ab + bc + ca$ [trinomial]

(e) $3x$ [monomial] [$\because$ perimeter of an equilateral triangle] $= 3 \times$ side]

(f) $2(p+q) = 2p + 2q$ [binomial] [$\because$ perimeter of a rectangle with length $l$ and breadth $b = 2(l+b)$]

(g) $\frac{1}{2}mn$ [monomial] [$\because$ area of a triangle $= \frac{1}{2} \times$ base $\times$ height]

(h) $x^2$ [monomial] [$\because$ area of a square $=$ (side)$^2$]

(i) $t^3 - s^3$ [binomial]

(j) $(x+15)x$ or $\frac{x^2}{15}$ [monomial]

(k) $x^2 + z^3$ [binomial]

(l) $q^3 - 2q$ [binomial]

**Question 54:**

**Write the coefficient of x2 in the following:**

(i) $x^2 - x + 4$ (ii) $x^3 - 2x^2 + 3x + 1$

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

**Solution:**

(i) Coefficient of $x^2$ in $x^2 - x + 4 = 1$

(ii) Coefficient of $x^2$ in $x^3 - 2x^2 + 3x + 1 = -2$

(iii) Coefficient of $x^2$ in $1 + 2x + 3x^2 + 4x^3 = 3$

(iv) Coefficient of $x^2$ in $y + y^2x + y^3x^2 + y^4x^3 = y^3$

**Question 55:**

**Find the numerical coefficient of each of the terms**

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

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

**Solution:**

(i) 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) Numerical coefficient of, $10xyz = 10$

$-7xy^2z = -7$

$-9xyz = -9$

$2xy^2z = 2$

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

**Question 56:**

**Simplify the following by combining the like terms and then write whether the expression is a monomial, a binomial or a trinomial.**

(a) $3x^2yz^2 - 3xy^2z + x^2yz^2 + 7xy^2z$

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

(c) $p^3q^2r + pq^2r^3 + 3p^2qr^2 - 9p^2qr^2$

(d) $2a + 2b + 2c - 2a - 2b - 2c - 2b + 2c + 2a$

(e) $50x^3 - 21x + 107 + 41x^3 - x + 1 - 93 + 71x - 31x^3$

**Solution:**

We have,

(a) $3x^2yz^2 - 3xy^2z + x^2yz^2 + 7xy^2z$

By combining the like terms,

$= 3x^2yz^2 + x^2yz^2 - 3xy^2z + 7xy^2z$

$= 4x^2yz^2 + 4xy^2z$

The expression contains two terms. So, it is binomial.

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

By combining the like terms,

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

$= x^4 + 0 + 0 - 3x^3y + y^4 = x^4 + y^4 - 3x^3y$

The expression contains three terms. So, it is trinomial.

(c) $p^3q^2r + pq^2r^3 + 3p^2qr^2 - 9p^2qr^2$

By combining the like terms,

$= p^3q^2r + pq^2r^3 + 3p^2qr^2 - 9p^2qr^2$

$= p^3q^2r + pq^2r^3 - 6p^2qr^2$

The expression contains three terms. So, it is trinomial.

(d) $2a + 2b + 2c - 2a - 2b - 2c - 2b + 2c + 2a$

By combining the like terms,

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

$= 2a - 2b + 2c$

The expression contains three terms. So, it is trinomial.

(e) $50x^3 - 21x + 107 + 41x^3 - x + 1 - 93 + 71x - 31x^3$

By combining the like terms,

$= 50x^3 + 41x^3 - 31x^3 - 21x - x + 71x + 107 + 1 - 93$

$= 60x^3 + 49x + 15$

The expression contains three terms. So, it is trinomial.

**Note** *We can add and subtract only like terms.*

**Question 57:**

**Add the following expressions**

**(a)** $p^2-7pq-q^2$ and $-3p^2-2pq+7q^2$

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

**(c)** ab + bc+ca and -bc-ca-ab

**(d)** $p^2 - q + r$ ,$q^2 - r + p$ and $r^2 - p + q$

**(e)** $x^3y^2 + x^2y^3 + 3y^4$ and $x^4 + 3x^2y^3 + 4y^4$

**(f)** $p^2qr + pq^2r + pqr^2$ and $-3pq^2r - 2pqr^2$

**(g)** uv-vw, vw-wu and wu-uv

**(h)** a2 +3ab-bc, bz +3bc-ca and $c^2 + 3ca - ab$

(i) $\frac{5}{8}p^4 + 2p^2 + \frac{5}{8}, \frac{1}{8} - 17p + \frac{9}{8}p^2$ and $p^5 - p^3 + 7$

(j) $t - t^2 - t^3 - 14$, $15t^3 + 13 + 9t - 8t^2$;

$12t^2 - 19 - 24t$ and $4t - 9t^2 + 19t^3$

**Solution:**

(a) We have, $p^2 - 7pq - q^2 + (-3p^2 - 2pq + 7q^2)$

$= p^2 - 7pq - q^2 - 3p^2 - 2pq + 7q^2$

On combining the like terms,

$= p^2 - 3p^2 - 7pq - 2pq - q^2 + 7q^2 = -2p^2 - 9pq + 6q^2$

(b) We have, $x^3 - x^2y - xy^2 - y^3 + x^3 - 2x^2y + 3xy^2 + 4y$

On combining the like terms,

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

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

(c) We have,

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

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

On combining the like terms,

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

$= 0 + 0 + 0$

$= 0$

(d) We have,

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

$= p^2 - q + r + q^2 - r + p + r^2 - p + q$

On combining the like terms,

$= p^2 + q^2 + r^2 - q + q + r - r + p - p$

$= p^2 + q^2 + r^2 + 0 + 0 + 0 = p^2 + q^2 + r^2$

(e) We have,

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

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

On combining the like terms,

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

$= x^4 + 7y^4 + x^3y^2 + 4x^2y^3$

(f) We have,

$p^2qr + pq^2r + pqr^2 + (-3pq^2r - 2pqr^2)$

$= p^2qr + pq^2r + pqr^2 - 3pq^2r - 2pqr^2$

On combining the like terms,

$$= p^2qr + pq^2r - 3pq^2r + pqr^2 - 2pqr^2$$

$$= p^2qr - 2pq^2r - pqr^2$$

(g) We have,

$$uv - vw + (vw - wu) + (wu - uv)$$

$$= uv - vw + vw - wu + wu - uv$$

On combining like terms,

$$= uv - uv - vw + vw - wu + wu$$

$$= 0 + 0 + 0 = 0$$

(h) We have,

$$(a^2 + 3ab - bc) + (b^2 + 3bc - ca) + (c^2 + 3ca - ab)$$

On combining the like terms,

$$= a^2 + 3ab - bc + b^2 + 3bc - ca + c^2 + 3ca - ab$$

$$= a^2 + b^2 + c^2 + 3ab - ab - bc + 3bc - ca + 3ca$$

$$= a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$$

(i) We have,

$$\left(\frac{5}{8}p^4 + 2p^2 + \frac{5}{8}\right) + \left(\frac{1}{8} - 17p + \frac{9}{8}p^2\right) + (p^5 - p^3 + 7)$$

$$= \frac{5}{8}p^4 + 2p^2 + \frac{5}{8} + \frac{1}{8} - 17p + \frac{9}{8}p^2 + p^5 - p^3 + 7$$

On combining the like terms,

$$= p^5 + \frac{5}{8}p^4 - p^3 + \left(2 + \frac{9}{8}\right)p^2 - 17p + \left(\frac{5}{8} + \frac{1}{8} + 7\right)$$

$$= p^5 + \frac{5}{8}p^4 - p^3 + \left(\frac{16+9}{8}\right)p^2 - 17p + \left(\frac{5+1+56}{8}\right)$$

$$= p^5 + \frac{5}{8}p^4 - p^3 + \frac{25}{8}p^2 - 17p + \frac{62}{8}$$

$$= p^5 + \frac{5}{8}p^4 - p^3 + \frac{25}{8}p^2 - 17p + \frac{31}{4}$$

(j) We have,

$$(t - t^2 - t^3 - 14) + (15t^3 + 13 + 9t - 8t^2) + (12t^2 - 19 - 24t) + (4t - 9t^2 + 19t^3)$$

$$= t - t^2 - t^3 - 14 + 15t^3 + 13 + 9t - 8t^2 + 12t^2 - 19 - 24t + 4t - 9t^2 + 19t^3$$

On combining the like terms,

$$= t + 9t - 24t + 4t - t^2 - 8t^2 + 12t^2 - 9t^2 - t^3 + 15t^3 + 19t^3 - 14 + 13 - 19$$

$$= -10t - 6t^2 + 33t^3 - 20$$

$$= 33t^3 - 6t^2 - 10t - 20$$

**Question 58:**

**Subtract**

**(a)** $-7p^2qr$ from $-3p^2qr$.

**(b)** $-a^2 - ab$ from $b^2 + ab$.

**(c)** $-4x^2y - y^3$ from $x^3 + 3xy^2 - x^2y$.

**(d)** $x^4 + 3x^3y^3 + 5y^4$ from $2x^4 - x^3y^3 + 7y^4$.

**(e)** $ab - bc - ca$ from $-ab + bc + ca$.

**(f)** $-2a^2 - 2b^2$ from $-a^2 - b^2 + 2ab$.

**(g)** $x^3y^3 + 3x^2y^2 - 7xy^3$ from $x^4 + y^4 + 3x^2y^2 - xy^3$.

**(h)** $2(ab + bc + ca)$ from $-ab - bc - ca$.

**(i)** $4.5x^5 - 3.4x^2 + 5.7$ from $5x^4 - 3.2x^2 - 7.3x$.

**(j)** $11 - 15y^2$ from $y^3 - 15y^2 - y - 11$.

**Solution:**

(a) We have,

$-3p^2qr-(-7p^2qr)=-3p^2qr+7p^2qr=p^2qr(-3+7)=4p^2qr$

[∵ with –ve sign, +ve sign will be change]

(b) We have, $b^2+ab-(-a^2-ab)=b^2+ab+a^2+ab$

On combining the like terms,

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

(c) We have,

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

(d) We have,

$2x^4-x^3y^3+7y^4-(x^4+3x^3y^3+5y^4)=2x^4-x^3y^3+7y^4-x^4-3x^3y^3-5y^4$

On combining the like terms,

$=2x^4-x^4-x^3y^3-3x^3y^3+7y^4-5y^4=x^4-4x^3y^3+2y^4$

(e) We have,

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

On combining the like terms,

$=-ab-ab+bc+bc+ca+ca=-2ab+2bc+2ca$

(f) We have,

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

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

On combining the like terms,

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

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

(g) We have,

$x^4+y^4+3x^2y^2-xy^3-(x^3y^3+3x^2y^2-7xy^3)$

$=x^4+y^4+3x^2y^2-xy^3-x^3y^3-3x^2y^2+7xy^3$

On combining the like terms,

$=x^4+y^4+3x^2y^2-3x^2y^2-xy^3+7xy^3-x^3y^3$

$=x^4+y^4+6xy^3-x^3y^3$

(h) We have,

$-ab-bc-ca-2(ab+bc+ca)$

$=-ab-bc-ca-2ab-2bc-2ca$

On combining the like terms,

$=-ab-2ab-bc-2bc-ca-2ca$

$=-3ab-3bc-3ca$

(i) We have,

$5x^4-3.2x^2-7.3x-(4.5x^5-3.4x^2+5.7)$

$=5x^4-3.2x^2-7.3x-4.5x^5+3.4x^2-5.7$

On combining the like terms,

$=-4.5x^5+5x^4-3.2x^2+3.4x^2-7.3x-5.7$

$=-4.5x^5+5x^4+0.2x^2-7.3x-5.7$

(j) We have,

$y^3-15y^2-y-11-(11-15y^2)$

$=y^3-15y^2-y-11-11+15y^2$

On combining the like terms,

$=y^3-15y^2+15y^2-y-11-11$

$=y^3-y-22$

**Question 59:**

**(a)** What should be added to $x^3+3x^2y+3xy^2+y^3$ to get $x^3+y^3$?

**(b)** What should be added to $3pq+5p^2q^2+p3$ to get $p^3+2p^2q^2+4pq$ ?

**Solution:**

(a) In order to find the solution subtract $x^3 + 3x^2y + 3xy^2 + y^3$ from $x^3 + y^3$.

Required expression is

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

On combining the like terms,

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

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

So, if we add $-3x^2y - 3xy^2$ in $x^3 + 3x^2y + 3xy^2 + y^3$, we get $x^3 + y^3$.

(b) In order to find the solution, subtract $3pq + 5p^2q^2 + p^3$ from $p^3 + 2p^2q^2 + 4pq$.

Required expression is

$p^3 + 2p^2q^2 + 4pq - (3pq + 5p^2q^2 + p^3)$

$= p^3 + 2p^2q^2 + 4pq - 3pq - 5p^2q^2 - p^3$

On combining the like terms,

$= p^3 - p^3 + 2p^2q^2 - 5p^2q^2 + 4pq - 3pq$

$= -3p^2q^2 + pq$

So, if we add $-3p^2q^2 + pq$ in $3pq^2 + 5p^2q^2 + p^3$, we get $p^3 + 2p^2q^2 + 4pq$

**Question 60:**

**(a)** What should be subtracted from $2x^3 - 3x^2y + 2xyz + 3y^3$ to get $x^3 - 2x^2y + 3xy^2 + 4y^3$?

**(b)** What should be subtracted from $-7mn + 2m^2 + 3n^2$ to get $m^2 + 2mn + n^2$?

**Solution:**

(a) In order to get the solution, we will subtract $x^3 - 2x^2y + 3xy^2 + 4y^3$ from $2x^3 - 3x^2y + 2xy^2 + 3y^3$.

Required expression is

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

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

On combining the like terms,

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

So, if we subtract $x^3 - x^2y - xy^2 - y^3$ from $2x^3 - 3x^2y + 2xy^2 + 3y^3$, then we get $x^3 - 2x^2y + 3xy^2 + 4y^3$.

(b) In order to get solution, we will subtract $m^2 + 2mn + n^2$ from $-7mn + 2m^2 + 3n^2$.

Required expression is

$-7mn + 2m^2 + 3n^2 - (m^2 + 2mn + n^2)$

$= -7mn + 2m^2 + 3n^2 - m^2 - 2mn - n^2$

On combining the like terms,

$= -7mn - 2mn + 2m^2 - m^2 + 3n^2 - n^2$

$= -9mn + m^2 + 2n^2$

So, if we subtract $m^2 + 2n^2 - 9mn$ from $-7mn + 2m^2 + 3n^2$, then we get $m^2 + 2mn + n^2$.

**Question 61:**

How much is $21a^3 - 17a^2$ less than $89a^3 - 64a^2 + 6a + 16$ ?

**Solution:**

Required expression is

$89a^3 - 64a^2 + 6a + 16 - (21a^3 - 17a^2)$

$= 89a^3 - 64a^2 + 6a + 16 - 21a^3 + 17a^2$ On combining the like terms,

$= 89a^3 - 21a^3 - 64a^2 + 17a^2 + 6a + 16 = 68a^3 - 47a^2 + 6a + 16$

So, $21a^3 - 17a^2$ is $68a^3 - 47a^2 + 6a + 16$ less than $89a^3 - 64a^2 + 6a + 16$.

**Question 62:**

How much is $y^4 - 12y^2 + y + 14$ greater than $17y^3 + 34y^2 - 51y + 68$?

**Solution:**

Required expression is

$y^4 - 12y^2 + y + 14 - (17y^3 + 34y^2 - 51y + 68)$

$=y^4 -12y^2 +y+14-17y^3-34y^2 +51y-68$ On combining the like terms,

$=y^4-12y^2-34y^2 + y+51y+14-68-17y^3 = y^4-46y^2 + 52y-17y^3 -54 =y4 -17y^3 -46y^2 + 52y-54$

So, $y^4 -12y^2 +y+14$ is $y^4-17y^3-46y^2 + 52y-54$ greater than $17y^3+34y^2 -51y+68$.

### Question 63:

How much does $93p^2 -55p+4$ exceed $13p^3 -5p^2 + 17p-90$?

**Solution:**

Required expression is

$93p^2 -55p+4 — (13p^3 -5p^2 + 17p-90)$

$= 93p^2 -55p+4 -13p^3+5p^2 – 17p + 90$

On combining the like terms,

$= 93p^2 + 5p^2-55p-17p+4+90-13p^3 = 98p^2-72p+94-13p^3 =-13p^3 + 98p^2-72p+ 94$

So, $93p^2 -55p+4$ is $-13p^3 + 9p^2 -72p+ 94$ exceed from $13p^3 -5p^2 + 17p-90$.

### Question 64:

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

**Solution:**

In order to find the solution, we will subtract $99x^3 -33x^2 -13x-41$ from 0.

Required expression is

$0- (99x^3 -33x^2 -13x-41) = 0- 99x^3 +33x^2 +13x+41$

$= – 99x^3 +33x^2 +13x+41$

So, If we add $-99x^3 +33x^2 +13x+41$ to $99x^3 -33x^2 -13x-41$, then the sum is zero.

### Question 65:

**Subtract $9a^2$ – 15a +3 from unity.**

**(a)** $a^2 +2ab+b^2$

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

**(c)** $a^3 +3a^2b+3ab^2 + b^3$

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

**(e)** $(a^2+b^2)/3$

**(f)** $(a^2 – b^2)/3$

**(g)** (a/b) + (b/a)

**(h)** $a^2 +b^2 -ab-b^2 -a^2$

**Solution:**

In order to find solution, we will subtract $9a^2 -15a + 3$ from unity, i.e. 1. Required’expression is

$1- (9a^2-15a+3)=1- 9a2 + 15a – 3$

$=-9a^2+15a-2$

### Question 66:

**Find the values of the following polynomials at a = -2 and b=3.**

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

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

(e) $\frac{a^2+b^2}{3}$ (f) $\frac{a^2-b^2}{3}$

(g) $\frac{a}{b}+\frac{b}{a}$ (h) $a^2+b^2-ab-b^2-a^2$

**Solution:**

Given, $a=-2$ and $b=3$

So, putting $a=-2$ and $b=3$ in the given expressions, we get

(a) $a^2+2ab+b^2=(-2)^2+2(-2)(3)+(3)^2=4-12+9=1$

(b) $a^2-2ab+b^2=(-2)^2-2(-2)(3)+(3)^2=4+12+9=25$

(c) $a^3+3a^2b+3ab^2+b^3=(-2)^3+3(-2)^2(3)+3(-2)(3)^2+(3)^3=-8+36-54+27=1$

(d) $a^3-3a^2b+3ab^2-b^3=(-2)^3-3(-2)^2(3)+3(-2)(3)^2-(3)^3=-8-36-54-27=-125$

(e) $\frac{a^2+b^2}{3}=\frac{(-2)^2+(3)^2}{3}=\frac{4+9}{3}=\frac{13}{3}$

(f) $\frac{a^2-b^2}{3}=\frac{(-2)^2-(3)^2}{3}=\frac{4-9}{3}=\frac{-5}{3}$

(g) $\frac{a}{b}+\frac{b}{a}=\frac{(-2)}{3}+\frac{3}{(-2)}=\frac{-2}{3}-\frac{3}{2}=\frac{-4-9}{6}=\frac{-13}{6}$ [∵ LCM of 2 and 3 is 6]

(h) $a^2+b^2-ab-b^2-a^2=(-2)^2+(3)^2-(-2)(3)-(3)^2-(-2)^2=4+9+6-9-4=6$

**Question 67:**

**Find the values of following polynomials at m = 1, n = -1 and p=2**

**(a)** m+n+p

**(b)** $m^2+n^2+P^2$

**(c)** $m^3+ n^3+p^3$

**(d)** mn+np + pm

**(e)** $m^3 +n^3 + p^3 -3mnp$

**(f)** $m^2n^2 +n^2p^2 +p^2m^2$

**Solution:**

Given, m=1, n=-1 and p=2

So, putting m = 1, n = -1 and p = 2 in the given expressions, we get

**(a)** m+n+p=1-1+2=2

**(b)** $m^2+n^2+P^2 =(1)^2 + (-1)^2 + (2)^2 =1+1+ 4=6$

**(c)** $m^3+ n^3+p^3 =(1)^3 + (-1)^3 + (2)^3 =1 -1 + 8 = 8$

**(d)** mn+np+ pm=(1)(-1)+(-1)(2)+(2)(1)=-1-2 + 2 =-1

**(e)** $m^3 +n^3 + p^3 -3mnp =(1)^3 + (-1)^3 + (2)^3 -3(1)(-1)(2) =1-1+8+6=14$

**(f)** $m^2n^2 +n^2p^2 +p^2m^2 =(1)^2 (-1)^2 + (-1)^2 (2)^2 + (2)^2 (1)^2 =1+ 4+ 4=9$

**Question 68:**

**If $A=3x^2 -4x+1$, $B=5x^2+3x-8$ and $C=4x^2 -7x+3$, then find**

1. (A + B)-C
2. B+C-A
3. A-B+C

**Solution:**

Given, $A = 3x^2 – 4x +1$, $B = 5x^2 + 3x – 8$ and $C = 4x^2 – 7x + 3$

1. $(A + B)-C =(3x^2 -4x +1 + 5x^2 + 3x-8) -(4x^2 -1x + 3)$
   On combining the like terms,
   $= (3x^2 + 5x^2 – 4x + 3x + 1 – 8) – (4x^2 – 1x + 3) =(8x^2-x-7)-(4x^2-7x + 3)$
   $= 8x^2-x-7-4x^2 + 7x-3 = 8x^2-4x^2 -x + 7x-7-3 =4x^2 + 6x-10$
2. B+C-A
   $= 5x^2 + 3x-8+4x^2-7x + 3-(3x^2-4x + 1))$
   On combining the like terms,
   $= (5x^2 + 4x^2 + 3x-7x-8+ 3)-(3x^2 – 4x + 1)$
   $= (9x^2 -4x-5)- (3x^2 – 4x +1)$
   $= 9x^2 -4x-5-3x^2 + 4x-1 = 9x^2 – 3x^2 – 4x + 4x – 5 -1 = 6x^2-6$
3. A+B+C

$= 3x^2 - 4x + 1 + 5x^2 + 3x - 8 + 4x^2 - 7x + 3$ On combining the like terms,
$= 3x^2 + 5x^2 + 4x^2 - 4x + 3x - 7x + 1 - 8 + 3 = 12x^2 - 8x - 4$

**Question 69:**

If P = -(x-2), Q = -2(y+1) and R=- x+2y, find a,when P+Q+ R=ax.

**Solution:**

Given, P = -(x-2),Q = -2(y+ 1)and R = -x + 2y Also given, P+Q + R=ax

On putting the values of P,Q and R on LHS, we get -(x-2)+[-2(y+1)]+(-x+2y) = ax => -x+2 + (-2y-2)-x + 2y = ax

=> -x + 2 – 2y – 2 – x+ 2y = ax

On combining the like terms,

-x – x – 2y + 2y + 2 – 2=ax => -2x = ax

By comparing LHS and RHS, we get a = -2

**Question 70:**

From the sum of $x^2 - y^2 - 1$, $y^2 - x^2 - 1$ and $1 - x^2 - y^2$, subtract $-(1 + y^2)$.

**Solution:**

Sum of $x^2 - y^2 - 1$, $y^2 - x^2 - 1$ and $1 - x^2 - y^2 = x^2 - y^2 - 1 + y^2 - x^2 - 1 + 1 - x^2 - y^2$ On combining the like terms,

$= x^2 - x^2 - x^2 - y^2 + y^2 - y^2 - 1 - 1 + 1 = -x^2 - y^2 - 1$

Now, subtract $-(1 + y^2)$ from $-x^2 - y^2 - 1$

$= -x^2 - y^2 - 1 - [-(1 + y^2)]$

$= - x^2 - y^2 - 1 + 1 + y^2 = -x^2 - y^2 + y^2 - 1 + 1 = -x^2$

**Question 71:**

Subtract the sum of $12ab - 10b^2 - 18a^2$ and $9ob + 12b^2 + 14a^2$ from the sum of $ab + 2b^2$ and $3b^2 - a^2$.

**Solution:**

Sum of 12ab-10b2 -18a2 and $9ab + 12b^2 + 14a^2 = 12ab - 10b^2 - 18a^2 + 9ab + 12b^2 + 14a^2$

On combining the like terms,

$= 12ab + 9ab - 10b^2 + 12b^2 - 18a^2 + 14a^2 = 21\ ab + 2b^2 - 4a^2$

Sum of $ab + 2b^2$ and $3b^2 - a^2 = ab + 2b^2 + 3b^2 - a^2 = ab + 5b^2 - a^2$

Now, subtracting $21ab + 2b^2 - 4a^2$ from $ab + 5b^2 - a^2$, we get $= (ab + 5b^2 - a^2) - (21ab + 2b^2 - 4a^2)$

$= ab + 5b^2 - a^2 - 21ab - 2b^2 + 4a^2$ On combining the like terms,

$= ab - 21ab + 5b^2 - 2b^2 - a^2 + 4a^2 = - 20ab + 3b^2 + 3a^2 = 3a^2 + 3b^2 - 20ab$

**Question 72:**

**Each symbol given below represents an algebraic expression.**

△ $= 2x^2 + 3y$, ○ $= 5x^2 + 3x$, □ $= 8y^2 - 3x^2 + 2x + 3y$

The symbols are then represented in the expression

△ + ○ − □

Find the expression which is represented by the above symbols.

**Solution:**

Given, $\triangle = 2x^2 + 3y$, $\bigcirc = 5x^2 + 3x$

and $\square = 8y^2 - 3x^2 + 2x + 3y$

$\therefore \quad \triangle + \bigcirc - \square$

$= (2x^2 + 3y) + (5x^2 + 3x) - (8y^2 - 3x^2 + 2x + 3y)$

$= 2x^2 + 3y + 5x^2 + 3x - 8y^2 + 3x^2 - 2x - 3y$

On combining the like terms,

$= 2x^2 + 5x^2 + 3x^2 + 3y - 3y + 3x - 2x - 8y^2$

$= 10x^2 - 8y^2 + x$

**Question 73:**

**Observe the following nutritional chart carefully**

| **Food Item** (per unit = 100 g) | **Carbohydrates** |
|---|---|
| Rajma | 60 g |
| Cabbage | 5 g |
| Potato | 22 g |
| Carrot | 11 g |
| Tomato | 4 g |
| Apples | 14 g |

Write an algebraic expression for the amount of carbohydrates (in grams) for

**(a)** y units of potatoes and 2 units of rajma.

**(b)** 2x units tomatoes and y units apples.

**Solution:**

**(a)** By unitary method,

∴ 1 unit of potatoes contain carbohydrates = 22 g

y units of potatoes contain carbohydrates =22 x y = 22y g

Similarly,

∴ 1 unit of rajma contain carbohydrates = 60 g

∴ 2 units of rajma contain carbohydrates =(60 x 2) = 120 g

Hence, the required expression is 22 y +120.

**(b)** By unitary method,

∴ 1 unit of tomatoes contain carbohydrates = 4 g

∴ 2x units of tomatoes contain carbohydrates = 2x x 4= 8x g

Similarly,

∴ 1 unit apples contain carbohydrates = 14 g y units apples contain carbohydrates = 14 x y = 14y g Hence, the required expression is 8x +14y.

**Question 74:**

Arjun bought a rectangular plot with length x and breadth y and then sold a triangular part of it whose base is y and height is z. Find the area of the remaining part of the plot.

**Solution:**

Given,

Arjun bought a rectangular plot with length $x$ and breadth $y$.

∴ Area of rectangular plot = Length × Breadth $= x \times y = xy$

Also, given triangular part with base $y$ and height $z$ is sold.

So, area of triangular part $= \frac{1}{2} \times y \times z = \frac{1}{2} yz$ $\quad \left[\because \text{area of triangle} = \frac{1}{2} \times \text{height} \times \text{base}\right]$

∴ Area of remaining part of the plot

$= \text{Area of rectangular plot} - \text{Area of triangular plot} = xy - \frac{1}{2} yz = y\left(x - \frac{1}{2} z\right)$

**Question 75:**

Amisha has a square plot of side m and another triangular plot with base and height each to

m. What is the total area of both plots?

**Solution:**

Given, side of square plot = $m$ and height and base of triangular plot = $m$

$\because$ Area of square plot = $m^2$ [$\because$ area of square = (side)$^2$]

$\therefore$ Area of triangular plot = $\frac{1}{2} \times m \times m = \frac{m^2}{2}$ $\left[\because \text{area of triangle} = \frac{1}{2} \times \text{height} \times \text{base}\right]$

$\therefore$ Total of both plots = Area of square plot + Area of triangular plot

$$= m^2 + \frac{m^2}{2} = \frac{2m^2 + m^2}{2} = \frac{3m^2}{2}$$ [taking LCM of 1 and 2 is 2]

## Question 76:

A taxi Service charges Rs. 8 per km levies a fixed charge of Rs. 50. Write an algebraic expression for the above situation, if the taxi is hired for x km.

**Solution:**

As per the given information, taxi service charges Rs. 8 per km and fixed charge of ? 50.

If taxi is hired for x km.

Then, algebraic expression for the situation = 8 x x + 50 = 8x + 50 Hence, the required expression is 8x + 50.

## Question 77:

Shiv works in a mall and gets paid Rs. 50 per hour. Last week he worked for 7 h and this week he will work for x hours. Write an algebraic expression for the money paid to him for both the weeks.

Solution:

Given, money paid to shiv = Rs. 50 per h.

∴ Money paid last week =Rs. 50 x 7 = Rs. 350

So, money paid this week = Rs. 50 x x = Rs. 50x

Total money paid to shiv =Rs. (350 + 50x) =Rs. 50(x + 7)

## Question 78:

Sonu and Raj have to collect different kinds of leaves for science project. They go to a park where Sonu collects 12 leaves and Raj collects x leaves. After some time Sonu loses 3 leaves and Raj collects 2x leaves. Write an algebraic expression to find the total number of leaves collected by both of them.

**Solution:**

According to the question,

Sonu collected leaves = 12-3=9

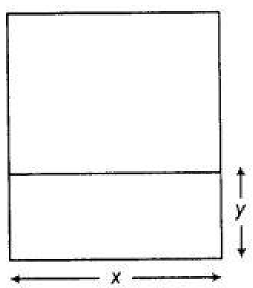
Raj collected leaves =x + 2x=3x

∴ Total leaves collected =9 + 3x

Hence, the required expression is 9+ 3x.

## Question 79:

**A school has a rectangular playground with Length x and breadth y and a square lawn with side x as shown in the figure given below. What is the total perimeter of both of them combined together?**



**Solution:**

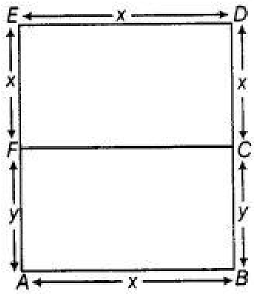
Given,

Length of rectangular playground, $AB = x$

and breadth of rectangular playground, $BC = y$

$\because$ $FCDE$ is a square, i.e. $FC = CD = EF = DE = x$ [$\because$ all sides of a square are equal]

$\because$ $ABCF$ is a rectangle, i.e. $AB = FC = x$ and $BC = AF = y$




Now, perimeter of combined (playground + lawn) = Sum of all sides

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

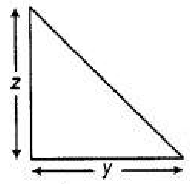
$= x + y + x + x + x + y = 4x + 2y$

**Question 80:**

The rate of planting the grass is Rs. x per square metre. Find the cost of planting the grass on a triangular lawn whose base is y metres and height is z metres.

**Solution:**

Given, base of triangular lawn is $y$ metres and height $z$ metres.

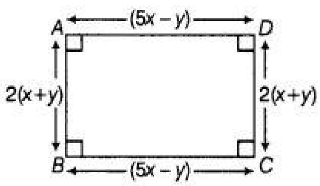



$\therefore$ Area of triangular lawn $= \frac{1}{2} \times y \times z = \frac{1}{2} yz \ m^2$ $\left[\because \text{area of triangle} = \frac{1}{2} \times \text{height} \times \text{base}\right]$

$\therefore$ Cost of planting the grass on lawn $= \frac{1}{2} yz \times x = ₹ \ \frac{1}{2} xyz$

**Question 81:**

**Find the perimeter of the figure given below.**




**Solution:**

We know that, perimeter is the sum of all sides.

Perimeter of the given figure = AB + BC + CD + DA

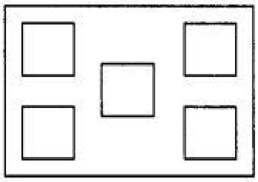
=(5x – y)+2 (x + y)+ (5x – y)+2(x + y) = 5x – y + 2x + 2y + 5x – y + 2x + 2y

On combining the like terms,

= 5x + 2x+ 5x + 2x – y + 2y – y + 2y =14x + 2y

**Question 82:**

**In a rectangular plot, 5 square flower beds of side (x+2) metres each have been laid (see the figure). Find the total cost of fencing the flower beds at the cost of Rs. 50 per 100 metres.**



**Solution:**

Given, side of one square flower bed = $(x+2)$ m

$\therefore$ Perimeter of one square flower bed = 4 (Side) = $4(x+2)$ m

Now, total perimeter of 5 such square flower beds = 5 × Perimeter of one square

$= 5 \times 4(x+2)$

$= 20(x+2)$ m

$\because$ Cost of fencing of 100 m = ₹50

$\therefore$ Cost of 1 m = ₹$\frac{50}{100}$

$\therefore$ Cost of $20(x+2)$ m $= \frac{50}{100} \times 20(x+2) = 10(x+2)$

$=$ ₹$(10x+20)$

**Question 83:**

**A wire is (7x-3) metres long. A length of (3x—4) metres is cut for use, answer the following questions**

**(a)** How much wire is left?

**(b)** If this left out wire is used for making an equilateral triangle. What is the length of each side of the triangle so formed?

**Solution:**

Given, length of wire = (7x – 3)m

and wire cut for use has length = (3x – 4) m

**(a)** Left wire=(7x – 3) – (3x – 4)=7x – 3 – 3x + 4=7x – 3x – 3 + 4 =(4x + 1)m

**(b)** ∴ Left wire = (4x +1)m

∴ Perimeter of equilateral triangle = Length of wire left

=> 3 x (side) = 4x + 1

=> side = (4x +1)/3 = 1/3 (4x + 1)m.

**Question 84:**

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

**Solution:**

Given, amount given to Rohan by his mother =Rs. $3xy^2$ and amount given to Rohan by his father =Rs. $5(xy^2 + 2)$

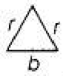
∴ Total amount Rohan have = $[(3xy^2)+(5xy^2 + 10)]$ =Rs. $[3xy^2 + 5xy^2 + 10]$

= Rs. $(8xy^2 + 10)$

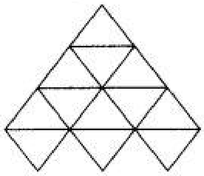
Total amount spent by Rohan =Rs. $(10 – 3xy^2)$

∴After spending, Rohan have left money

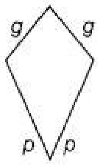
**Question 85:**

(i) A triangle is made up of 2 red sticks and 1 blue sticks. 

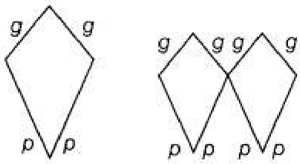

The length of a red stick is given by $r$ and that of a blue stick is given by $b$. Using this information, write an expression for the total length of sticks in the pattern given below



(ii) In the given figure, the length of a green side is given by $g$ and that of the red side is given by $p$.




Write an expression for the following pattern. Also, write an expression if 100 such shapes are joined together.



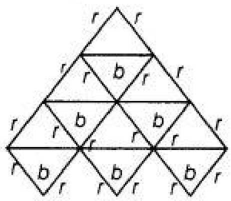

**Solution:**

(i) Given, length of a red stick = $2r$ and length of a blue stick = $b$

From the given figure,

The total number of red sticks = 18

and the total number of blue sticks = 6



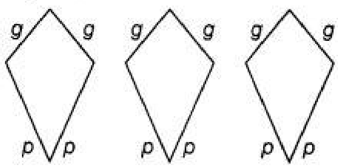

So, the total length of sticks = $18r + 6b = 6(3r + b)$

Hence, the required expression is $6(3r + b)$.

(ii) From the given figure,

Given, length of green side = $g$ and length of red side = $p$

When we take three figures,




Total length of three figures $= 3(2g + 2p) = 6g + 6p$

If 100 such shapes are joined together, then the expression becomes

$= 100(2g + 2p)$

$= 200g + 200p$

$= 200(g + p)$

Hence, the required expression is $200(g + p)$.

## Question 86:

**The sum of first natural numbers is given by $\frac{1}{2}n^2 + \frac{1}{2}n$.**

**(i)** The sum of first 5 natural numbers.

**(ii)** The sum of first 11 natural numbers.

**(iii)** The sum of natural numbers from 11 to 30.

**Solution:**

Given, sum of first $n$ natural numbers $= \frac{1}{2}n^2 + \frac{1}{2}n$

(i) Sum of first 5 natural numbers $= \frac{1}{2}(5)^2 + \frac{1}{2}(5)$ [put $n = 5$]

$$= \frac{25}{2} + \frac{5}{2} = \frac{30}{2} = 15$$

(ii) Sum of first 11 natural numbers

$$= \frac{1}{2}(11)^2 + \frac{1}{2}(11) = \frac{1}{2} \times 121 + \frac{11}{2}$$ [put $n = 11$]

$$= \frac{121}{2} + \frac{11}{2} = \frac{132}{2} = 66$$

(iii) Sum of natural numbers from 11 to 30

= Sum of first 30 natural numbers − Sum of first 10 natural numbers

$$= \left[\frac{1}{2}(30)^2 + \frac{1}{2}(30)\right] - \left[\frac{1}{2}(10)^2 + \frac{1}{2}(10)\right]$$

$$= \frac{900}{2} + \frac{30}{2} - \frac{100}{2} - \frac{10}{2}$$ [divide each term by 2]

$$= 450 + 15 - 50 - 5 = 410$$

**Question 87:**

The sum of squares of first n natural numbers is given by 1/6(n+1)(2n+1) or 1/6(2n$^3$ + 3n$^2$ + n). Find the sum of squares of the first 10 natural numbers.

**Solution:**

Given, the sum of squares of first n natural numbers = 1/6(n +1)(2n + 1)

∴ The sum of squares of first 10 natural numbers [∴ put n=10]

= 1/6 (10)(10+1)(2 x 10+1) =1/6 x 10 x 11 x 21

= 385

**Question 88:**

**The sum of the multiplication table of natural number n is given by 55 x n. Find the sum of**

**(a)** Table of 7 **(b)** Table of 10 **(c)** Table of 19

**Solution:**

Given, the sum of multiplication table of n natural numbers = 55 x n

**(a)** Sum of table of 7 = 55 x 7 =385 [put n = 7]

**(b)** Sum of table of 10=55 x 10=550 [put n = 10]

**(c)** Sum of table of 19 = 55 x 19=1045 [put n = 19]

**Question 89:**

If $\triangle x = 2x + 3$, $\boxed{x} = \frac{3}{2}x + 7$ and $\textcircled{x} = x - 3$

Then, find the value of

(i) $2\ \triangle 6 + \boxed{3} - \textcircled{1}$ (ii) $\frac{1}{2}\ \boxed{2} + \textcircled{8} - 3\ \triangle 0$

**Solution:**

Given,

$\triangle x = 2x + 3$, $\boxed{x} = \frac{3}{2}x + 7$ and $\textcircled{x} = x - 3$

(i) $2\ \triangle 6 + \boxed{3} - \textcircled{1}$

$$= 2 \times (2 \times 6 + 3) + \left(\frac{3}{2} \times 3 + 7\right) - (1 - 3) = 2 \times (12 + 3) + \left(\frac{9}{2} + 7\right) - (-2)$$

$$= 2 \times 15 + \left(\frac{23}{2}\right) + 2 = 30 + 2 + \frac{23}{2}$$

$$= 32 + \frac{23}{2} = \frac{32 \times 2 + 23}{2} = \frac{64 + 23}{2}$$

$$= \frac{87}{2}$$

(ii) $\frac{1}{2}\boxed{2} + \textcircled{8} - 3\ \triangle\!\!\!\!\!\;0$

$= \frac{1}{2}\left(\frac{3}{2}\times 2+7\right)+(8-3)-3(2\times 0+3)$

$= \frac{1}{2}(10)+5-3(3)$

$= 5+5-9=1$

**Question 90:**

If $\triangle x = \frac{3}{4}x - 2$ and $\Diamond x = x+6$, then find the value of

(i) $\triangle 10 - \Diamond 4$ (ii) $2\ \Diamond 12 - \frac{3}{2}\ \triangle 1$

**Solution:**

Given, $\triangle x = \frac{3}{4}x - 2$ and $\Diamond x = x+6$

(i) $\triangle 10 - \Diamond 4$

$= \frac{3}{4}\times 10-2-4-6$

$= \frac{30}{4}-\frac{12}{1}$ [∵ LCM of 4 and 1 is 4]

$= \frac{30-48}{4}$

$= \frac{-18}{4}$

$= \frac{-9}{2}$

(ii) $2\ \Diamond 12 - \frac{3}{2}\ \triangle 1$

$= 2\times(12+6)-\frac{3}{2}\left(\frac{3}{4}\times 1-2\right) = 36-\frac{3}{2}\left(\frac{3-2\times 4}{4}\right)$

$= 36-\frac{3}{2}\left(\frac{3-8}{4}\right) = 36-\frac{3}{2}\left(\frac{-5}{4}\right)$

$= 36+\frac{15}{8} = \frac{36\times 8+15}{8}$

$= \frac{288+15}{8} = \frac{303}{8}$

**Question 91:**

4b – 3

**Solution:**

Three subtracted from four times b.

**Question 92:**

8(m+5)

**Solution:**

Eight times the sum of m and 5.

**Question 93:**

7/(8-x)

**Solution:**

Quotient on dividing seven by the difference of eight and x(x<8).

**Question 94:**

17(16/w)

**Solution:**

Seventeen times quotient of sixteen divided by w.

**Question 95:**

1. Critical Thinking Write two different algebraic expressions for the word phrase (¼) of the sum of x and 7.
2. What's the Error? A student wrote an algebraic expression for "5 less than a number n divided by 3" as (n/3 )- 5. What error did the student make?
3. Write About It Shashi used addition to solve a word problem about the weekly cost of commuting by toll tax for Rs. 15 each day. Ravi solved the same problem by multiplying. They both got correct answer. How is this possible?

**Solution:**

1. First expression = ¼(x+7)
   As we know, the addition is commutative.
   So, it can also be written as = ¼ (7 + x)
2. Since, the expression of 5 less than a number n =n-5
   So, 5 less than a number n divided by 3 will be written = (n-5)/3.
   So, student make an error of quotient.
3. By addition method,
   Total weekly cost = (15+15+15+15+15+15+15)
   = Rs. 105
   By multiplication method,
   Total weekly cost = Cost of one day x Seven days =15 x 7 = Rs. 105

**Question 96:**
Challenge
Write an expression for the sum of 1 and twice a number n, if you let n be any odd number, will the result always be an odd number?
**Solution:**
Let the number be n.
So, according to the statement, the expression can be written as = 2n+1.
Yes, the result is always an odd number, because when a number becomes multiplied by 2, it becomes even and addition of 1 in that even number makes it an odd number.

**Question 97:**
Critical Thinking
Will the value of 11x for x – 5 be greater than 11 or less than 11? Explain.
**Solution:**
Expression given is
11x = 11 x (-5)= -55 [put x = —5]
Clearly, -55 <11.
Hence, the value is grater than 11.

**Question 98:**
**Matching the column I and Column II by the following**

| | Column I | | Column II |
|---|---|---|---|
| 1. | The difference of 3 and a number squared | (a) | $4-2x$ |
| 2. | 5 less than twice a number squared | (b) | $n^2-3$ |
| 3. | Five minus twice the square of a number | (c) | $2n^2-5$ |
| 4. | Four minus a number multiplied by 2 | (d) | $5-2n^2$ |
| 5. | Seven times the sum of a number and 1 | (e) | $3-n^2$ |
| 6. | A number squared plus 6 | (f) | $2(n+6)$ |
| 7. | 2 times the sum of a number and 6 | (g) | $7(n+1)$ |
| 8. | Three less than the square of a number | (h) | $n^2+6$ |

**Solution:**

1 → (e) Let the number be $n$.

So, according to the statements, we can write the equation = $3-n^2$

2 → (c) Let the number be $n$.

So, the equation is $2n^2-5$.

3 → (d) Let the number be $n$.

So, the equation is $5-2n^2$.

4 → (a) Let the number be $x$.

So, the equation is $4-2x$.

5 → (g) Let the number be $n$.

So, the equation is $7(n+1)$.

6 → (h) Let the number be $n$.

So, the equation is $n^2+6$.

7 → (f) Let the number be $n$.

So, the equation is $2(n+6)$.

8 → (b) Let the number be $n$.

So, the equation is $n^2-3$.

**Question 99:**

At age of 2 years, a cat or a dog is considered 24 "human" years old. Each year, after age 2 is equivalent to 4 "human" years. Fill in the expression [24+[] (a – 2)], so that it represents the age of a cat or dog in human years. Also, you need to determine for what 'a' stands for. Copy the chart and use your expression to complete it.

| Age | $[24+[\,](a-2)]$ | Age (human years) |
|---|---|---|
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |

**Solution:**

The expression is $[24+4(a-2)]$.

Here, 'a' represents the present age of dog or cat.

| Age | $[24+4(a-2)]$ | Age (human years) |
|---|---|---|
| 2 | $[24+4(2-2)]$ | 24 |
| 3 | $[24+4(3-2)]$ | 28 |
| 4 | $[24+4(4-2)]$ | 32 |
| 5 | $[24+4(5-2)]$ | 36 |
| 6 | $[24+4(6-2)]$ | 40 |

**Question 100:**

**Express the following properties with variables x, y and z.**

1. Commutative property of addition
2. Commutative property of multiplication
3. Associative property of addition
4. Associative property of multiplication
5. Distributive property of multiplication over addition

**Solution:**

1. We know that,
   Commutative property of addition, $a + b = b + c$
   ∴ Required expression is $x + y = y + x$
2. We know that,
   Commutative property of multiplication, $a \times b = b \times a$
   ∴ Required expression is $x \times y = y \times x$
3. We know that,
   Associative property of addition, $a + (b + c) = (a + b) + c$
   ∴ Required expression is $x + (y + z) = (x + y) + z$
4. We know that,
   Associative property of multiplication, $a \times (b \times c) = (a \times b) \times c$
   ∴ Required expression is $x \times (y \times z) = (x \times y) \times z$
5. We know that,
   Distributive property of multiplication over addition, $a \times (b + c) = a \times b + a \times c$
   ∴ Required expression is $x \times (y + z) = x \times y + x \times z$