# MATHS

# BOOKS - NCERT EXEMPLAR

# ALGEBRAIC EXPRESSIONS

**Solved Examples**

**1.** The like terms in $3x(3 - 2y)$ and $2(xy + x^2)$ are

A. $9x$ and $2x^2$

B. $-6xy$ and $2xy$

C. $9x$ and $2xy$

D. $-6xy$ and $2x^2$

**Answer: B**

**2.** The coefficient of xy in $3x^2zy + 7xyz - 2z^2x$ is

A. 3z

B. $-2$

C. 7xy

D. 7z

**Answer: D**

**3.** The factors of the term $-xy^2$ are

A. $x \times y \times y$

B. $-1 \times y \times y$

C. $-1 \times x \times y$

D. $-1 \times x \times y \times y$

**Answer: D**

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**4.** An algebraic expression having one or more terms with non-negative integral exponents of the variables is called ____ .

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**5.** Numerical factor in any term of a polynomial is called _____ of the term.

    A. variable

    B. term

    C. coefficient

    D. constant

**Answer: C**

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**6.** The terms with different algebraic factors are called _____ .

    A. Like terms

    B. Unlike terms

    C. Binomial

    D. Polynomial

**Answer: A**

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**7.** The terms with same algebraic factors are called_____ .

**8.** State true or False : An expression with two terms is called a binomial.

**9.** Every polynomial is a monomial.

**10.** The value of a variable is fixed.

**11.** Twice the sum of length x and breadth y of a rectangle is the perimeter of a rectangle. Write the expression for perimeter.

**12.** Identify the term containing $u^2$ in the expression $u^3 + 3u^2v + 3uv^2 + v^3$ and write its coefficient.

**13.** Simplify the expression by combining the like terms:

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

**14.** Subtract the sum of -

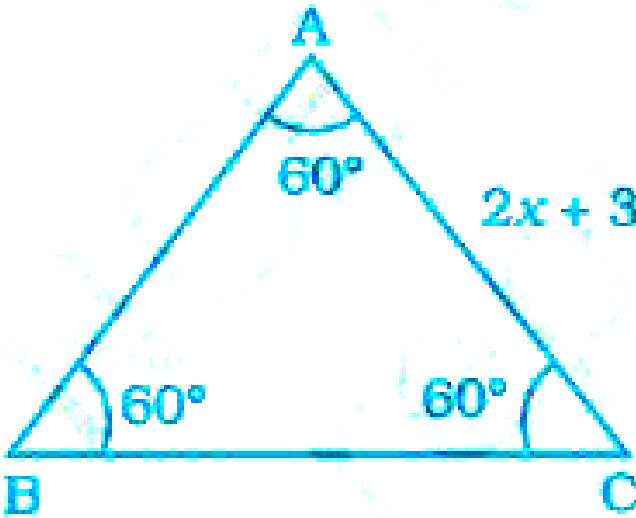$3x^3y^2 + 2x^2y^3$ and $-3x^2y^3 - 5y^4$ from $x^4 + x^3y^2 + x^2y^3 + y^4$

**15.** Find the value of the following expressions at a=1 b = -2 :

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

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

**16.** Find each side of an equilateral triangle given below, if it's perimeter is 240 cm.

**Exercise Write The Correct Answer**

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

A. monomial

B. binomial

C. trinomial

D. All of these

**Answer: C**

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

A. 2

B. 3

C. 4

D. 5

**Answer: D**

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

A. $4x^2$ and $-3xy$

B. $4x^2$ and $-3xy$

C. $4x^2$ and $-xy$

D. $x^2$ and $xy$

**Answer:**

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**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. $-5 \times x \times y \times z^2$

**Answer: C**

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

A. 9yz

B. $-9yz$

C. $9y^2z$

D. $-9y^2z$

**Answer: D**

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**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. $4xyz^2, \; 4x^2yz$

**Answer: B**

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**7.** Identify the binomial out of the following:

A. $3xy^2 + 5y - x^2y$

B. $x^2 + y - 5y - x^2y$

C. $xy + yz + zx$

D. $3xy^2 + 5y - Xy^2$

**Answer:**

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**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

**Answer: A**

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

    A. $5x - y$

B. $y - 5x$

C. $x - 5y$

D. $5y - x$

**Answer: C**

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**10.** $-b - 0$ is equal to

A. $-1 \times b$

B. $1 - b - 0$

C. $0 - (-1) \times b$

D. $-b - 0 - 1$

**Answer: A**

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**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. $4x^2$

**Answer: C**

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

A. $2y$

B. $\dfrac{y}{2}$

C. $y + 2$

D. $y + \dfrac{1}{2}$

**Answer:**

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

A. $10xy$

B. $-15xy$

C. $-15x^2y$

D. $10x^2y$

**Answer: C**

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

A. 1

B. 0

C. -1

D. 11

**Answer: A**

**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. $n - 3$

**Answer: D**

**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. $8x + 12$

**Answer: D**

## Exercise Fill In The Blanks

**1.** Sum or difference of two like terms is _____ .

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

**3.** $3a^2 b$ and $-7ba^2$ are___ terms.

**4.** $-5a^2 b$ and $-5ba^2$ are___ terms.

**5.** In the expression $2\pi r$, the algebraic variable is _____ .

**6.** Number of terms in a monomial is _____ .

A. Zero

B. One

C. Two

D. Three

**Answer: B**

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**7.** Like terms in the expression $n(n + 1) + 6(n - 1)$ are _____ and ____

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**8.** The expression 13 + 90 is a _____ .

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**9.** The speed of car is 55 km/hrs. The distance covered in y hours is _____ .

**10.** $x + y + z$ is an expression which is neither monomial nor _____ .

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

**12.** $-a - b - c$ is same as -a-(_____ ) .

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

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**14.** Evaluate: $3x + 23x^2 + 6y^2 + 2x + y^2 + $ _____ $= 5x + 7y^2$.

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

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**Exercise True Or False**

**1.** State True or False: $1 + \dfrac{x}{2} + x^3$ is a polynomial.

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**2.** State True or False: $(3a - b + 3) - (a + b)$ is a binomial.

**3.** A trinomial can be a polynomial.

**4.** A polynomial with more than two terms is a trinomial.

**5.** State True or False: Sum of x and y is $x + y$.

**6.** Sum of 2 and p is 2p. True or false.

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**7.** State True or False :A binomial has more than two terms.

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**8.** State True or False : A trinomial has exactly three terms.

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**9.** State True or False: In like terms, variables and their powers are the same.

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**10.** State True or False: The expression $x + y + 5x$ is a trinomial.

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**11.** State True or False: 4p is the numerical coefficient of $q^2$ in $-4pq^2$.

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**12.** State True or False: 5a and 5b are unlike terms.

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**13.** State True or False: Sum of $x^2 + x$ and $y + y^2 is 2x^2 + 2y^2$.

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

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

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

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**17.** State True or False :If we add a monomial and binomial, then answer can never be a monomial.

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**18.** State True or False :If we subtract a monomial from a binomial, then answer is atleast a binomial.

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

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**20.** When we add a monomial and a trinomial, then answer can be a monomial.

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Exercise

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

x is multiplied by itself and then added to the product of x and y.

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

Three times of p and two times of q are multiplied and then subtracted from r.

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

Product of p, twice of q and thrice of r.

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

Sum of the products of a and b, band c and c and a.

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

Perimeter of an equilateral triangle of side x.

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**6.** The algebraic expression,

Perimeter of a rectangle with length p and breadth q.

Is a monomial, binomial or trinomial?

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**7.** The algebraic expression,

Area of a triangle with base m and height n.

Is a monomial, binomial or trinomial?

**8.** The algebraic expression,

Area of a square with side x.

Is a monomial, binomial or trinomial?

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

Cube of s subtracted from cube of t.

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

Quotient of x and 15 multiplied by x.

**11.** The algebraic expression,

The sum of square of x and cube of z is

    A. monomial

    B. binomial

    C. trinomial

    D. coefficient

**Answer: B**

**12.** The algebraic expression,

Two times q subtracted from cube of q.

Is a monomial, binomial or trinomial?

**13.** Write the coefficient of $x^2$ in the following:

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

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

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

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

**14.** Find the numerical coefficient of each of the terms:

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

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

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

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

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

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

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

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

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

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

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

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

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**20.** Add the following expressions:

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

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**21.** Add the following expressions:

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

**22.** Add the following expressions:

$ab + bc + ca$ and $-bc - ca - ab$

**23.** Add the following expressions:

$p^2 - q + r, q^2 - r + p$ and $r^2 - p + q$

**24.** Add the following expressions:

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

**25.** Add the following expressions:

$$p^2qr + pq^2r + pqr^2 \text{ and } -3pq^2r - 2pqr^2$$

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**26.** Add the following expressions:

$$uv - vw, vw - wu \text{ and } wu - uv$$

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**27.** Add the following expressions:

$$a^2 + 3ab - bc, b^2 + 3bc - ca \text{ and } c^2 + 3ca - ab$$

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**28.** Add the following expressions:

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

**29.** Add the following expressions:

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

**30.** Subtract

$$-7p^2qr \text{ from } -3p^2qr$$

**31.** Subtract

$$-a^2 - ab \text{ from } b^2 + ab.$$

**32.** Subtract

$-4x^2y - y^3$ from $x^3 + 3xy^2 - x^2y.$

**33.** Subtract

$x^4 + 3x^3y^3 + 5y^4$ from $2x^4 - x^3y^3 + 7y^4.$

**34.** Subtract

$ab - bc - ca$ from $-ab + bc + ca.$

**35.** Subtract

$-2a^2 - 2b^2$ from $\ -a^2 - b^2 + 2ab.$

   A. $a^2 - b^2 - 2ab$

   B. $a^2 - b^2 + 2ab$

   C. $a^2 + b^2 + 2ab$

   D. $a^2 - b^2$

**Answer: C**

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**36.** Subtract

$x^3y^2 + 3x^2y^3 - 7xy^3$ from $\ x^4 + y^4 + 3x^2y^2 - xy^3.$

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**37.** Subtract

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

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**38.** Subtract

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

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**39.** Subtract

$11 - 15y^2$ from $y^3 - 15y^2 - y - 11$.

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**40.** What should be added to $x^3 + 3x^2y + 3xy^2 + y^3$ to get $x^3 + y^3$ ?

A. $-3x^2y - 3xy^2$

B. $-3x^2y + 3xy^2$

C. $3x^2y - 3xy^2$

D. $-2x^3 - 2y^3 + 3x^2y + 3xy^2$

**Answer: A**

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**41.** What should be added to $3pq + 5p^2q^2 + p^3$ to get $p^3 + 2p^2q^2 + 4pq$ ?

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

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**43.** What should be subtracted from $-7mn + 2m^2 + 3n^2$ to get $m^2 + 2mn + n^2$ ?

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$\dfrac{a^2 + b^2}{3}$

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

$\dfrac{a^2 - b^2}{3}$

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

$$\frac{a}{b} + \frac{b}{a}$$

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

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

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

$$m + n + p$$

**58.** Find the values of following polynomials at

$m = 1, n = -1$ and $p = 2$ :

$m^2 + n^2 + p^2$

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**59.** Find the values of following polynomials at

$m = 1, n = -1$ and $p = 2$ :

$m^3 + n^3 + p^3$

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**60.** Find the values of following polynomials at

$m = 1, n = -1$ and $p = 2$ :

$mn + np + mp$

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

$m^3 + n^3 + p^3 - 3mnp$

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

$m^2n^2 + n^2p^2 + p^2m^2$

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

(i) $(A + B) - C$

(ii) $B + C - A$

(iii) $A + B + C$

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**64.** If $P = -(x-2), Q = -2(y+1)$ and $R = -x + 2y$, find a,

when $P + Q + R = ax$

**65.**             From             the             sum             of

$x^2 - y^2 - 1, y^2 - x^2 - 1$ and $1 - x^2 - y^2$ subtract $-(1 + y^2)$.

**66.**             Subtract             the             sum             of

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

.

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

$\triangle$ = $2x^2 + 3y$, $\bigcirc$ = $5x^2 + 3x$, $\square$ = $8y^2 - 3x^2 + 2x + 3y$

The symbols are then represented in the expression:

$\triangle$ + $\bigcirc$ - $\square$

Find the expression which is represented by the above symbols

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**68.** 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.

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**69.** Amisha has a square plot of side m and another triangular plot with base and height each equal to mI What is the total area of both plots?

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

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

**72.** 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.

**73.** A school has a rectangular play ground with length x and breadth y and a square lawn with side x as shown in the figure given below. What is
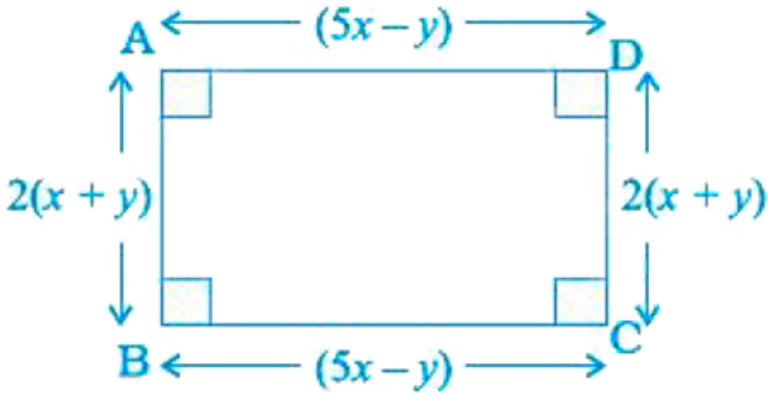
the total perimeter of both of them combined together?
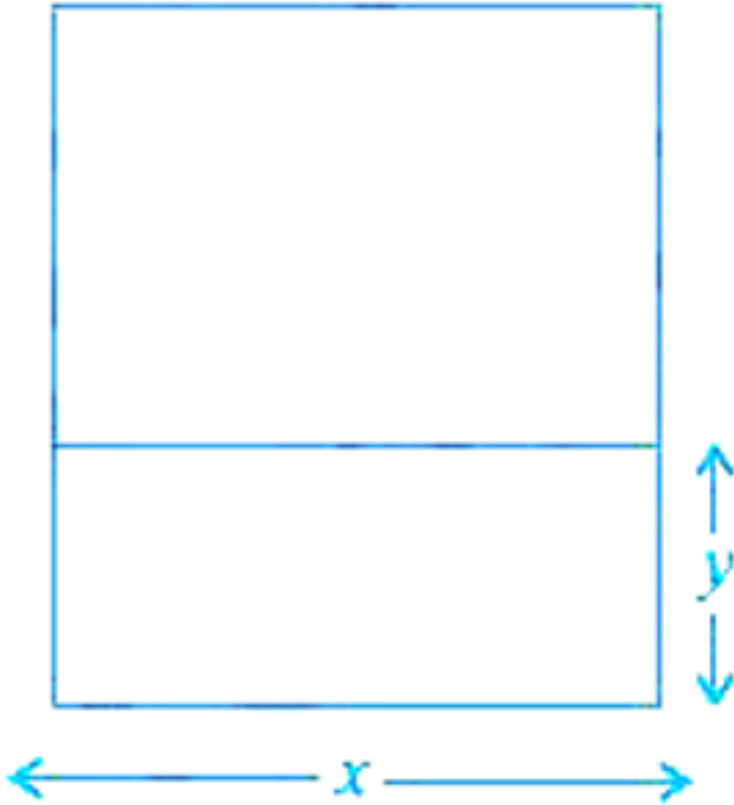
**74.** The rate of planting the grass is x per square metre. Find the cost of planting the grass on a triangular lawn whose base is y metres and height is z metres.
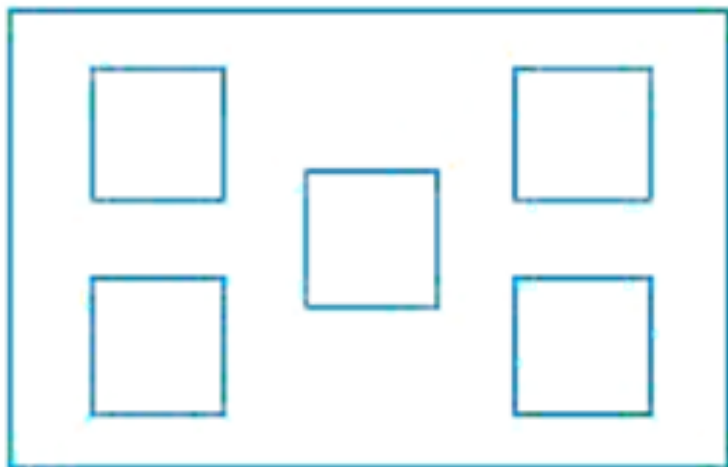
**75.** Find the perimeter of the figure given below:

**76.** In a rectangular plot, 5 square flower beds of side (x+2) metres each have been laid (see figure given below). Find the total cost of fencing the

flower beds at the cost of 50 per 100 metres:

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

How much wire is left?

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

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

**79.** 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?
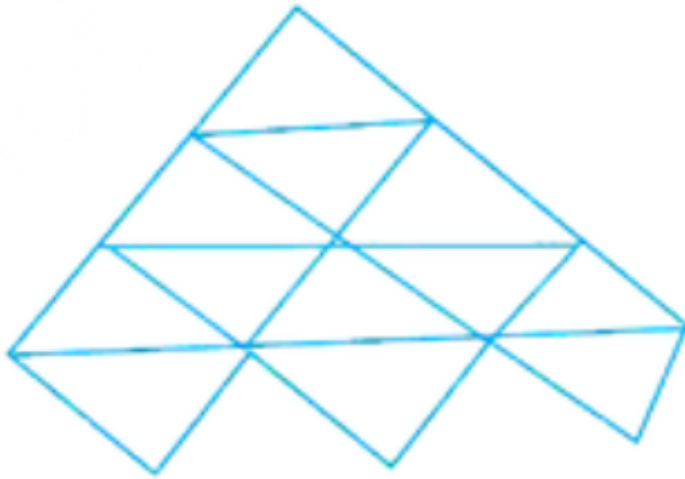
**80.** A triangle is made up of 2 red sticks and 1 blue sticks



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:

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

(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.

**82.** The sum of squares of first n natural numbers is given by $\frac{1}{6}n(n+1)(2n+1)$ or $\frac{1}{6}(2n^3 + 3n^2 + n)$. Find the sum of squares of the first 10 natural numbers.

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**83.** The sum of the multiplication table of natural number 'n' is given by $55 \times n$. Find the sum of

(a) Table of 7

(b) Table of 10

(c) Table of 19

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**84.** Translate each of the following algebraic expressions into words

$4b - 3$

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**85.** $8(m + 5)$

**86.** Solve the equation, $\dfrac{7}{8 - x} = \dfrac{2}{3}$

**87.** Solve the equation, $\dfrac{17}{w + 3} = \dfrac{16}{w + 1}$

**88.** Write the algebraic expression for the word phrase " $\dfrac{1}{4}$ of the sum of x and 7."

**89.** What's the Error? A student wrote an algebraic expression for "5 less than a number n divided by 3" as $\dfrac{n}{3} - 5$. What error did the student make?

**90.** Write About it Shashi used addition to solve a word problem about the weekly cost of commuting by toll tax for 15 each day. Ravi solved the same problem by multiplying. They both got the correct answer. How is this possible?

**91.** 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?

**92.** Will the value of $11x$ for $x = -5$ be greater than 11 or less than 11? Explain.

**93.** Match Column I with Column II in 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) $n^2 + 6$ |

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

(i) Commutative property of addition

(ii) Commutative property of multiplication

(iii) Associative property of addition

(iv) Associative property of multiplication

(v) Distributive property of multiplication over addition

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**1.** Describe two different number patterns that begin with 3,6 ...

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**1.** Identify the following terms as like or unlike.

(a) 3x, 3y (b) 7k, 3k (c) 2p, 2pt

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