# KENDRIYA VIDYALAYA SANGATHAN

# AHMEDABAD REGION

# SUBJECT: MATHEMATICS

# CLASS: X

# TERM-1

# STUDENT SUPPORT MATERIAL

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# CLASS X : CHAPTER - 1
# REAL NUMBERS

## IMPORTANT FORMULAS & CONCEPTS

**EUCLID'S DIVISION LEMMA**
*Given positive integers a and b, there exist unique integers q and r satisfying a = bq + r, where* $0 \le r < b$.
Here we call 'a' as dividend, 'b' as divisor, 'q' as quotient and 'r' as remainder.
$\therefore$ Dividend = (Divisor x Quotient) + Remainder
If in Euclid's lemma r = 0 then b would be HCF of 'a' and 'b'.

**NATURAL NUMBERS**
Counting numbers are called natural numbers i.e. 1, 2, 3, 4, 5,...................... are natural numbers.

**WHOLE NUMBERS**
All counting numbers/natural numbers along with 0 are called whole numbers i.e. 0, 1, 2, 3, 4, 5 ……………. are whole numbers.

**INTEGERS**
All natural numbers, negative of natural numbers and 0, together are called integers. i.e. ………. – 3, – 2, – 1, 0, 1, 2, 3, 4,....................are integers.

**ALGORITHM**
An **algorithm** is a series of well defined steps which gives a procedure for solving a type of problem.

**LEMMA**
A **lemma** is a proven statement used for proving another statement.

**EUCLID'S DIVISION ALGORITHM**
Euclid's division algorithm is a technique to compute the Highest Common Factor (HCF) of two given positive integers. Recall that the HCF of two positive integers *a* and *b* is the largest positive integer *d* that divides both *a* and *b*.

**To obtain the HCF of two positive integers, say a and b, with a > b, follow the steps below:**
**Step 1 :** Apply Euclid's division lemma, to *a* and *b*. So, we find whole numbers, *q* and *r* such that $a = bq + r$, $0 \le r < b$.
**Step 2 :** If *r* = 0, *b* is the HCF of *a* and *b*. If $r \neq 0$ apply the division lemma to *b* and *r*.
**Step 3 :** Continue the process till the remainder is zero. The divisor at this stage will be the required HCF.
This algorithm works because HCF (*a*, *b*) = HCF (*b*, *r*) where the symbol HCF (*a*, *b*) denotes the HCF of *a* and *b*, etc.

**The Fundamental Theorem of Arithmetic**
*Every composite number can be expressed ( factorised) as a product of primes, and this factorisation is unique, apart from the order in which the prime factors occur.*

*The prime factorisation of a natural number is unique, except for the order of its factors.*

- HCF is the highest common factor also known as GCD i.e. greatest common divisor.
- LCM of two numbers is their least common multiple.
- Property of HCF and LCM of two positive integers 'a' and 'b':
  - $HCF(a,b) \times LCM(a,b) = a \times b$

- $LCM(a,b) = \frac{a \times b}{HCF(a,b)}$
- $HCF(a,b) = \frac{a \times b}{LCM(a,b)}$

**PRIME FACTORISATION METHOD TO FIND HCF AND LCM**

HCF(a, b) = Product of the smallest power of each common prime factor in the numbers.
LCM(a, b) = Product of the greatest power of each prime factor, involved in the numbers.

**RATIONAL NUMBERS**

**The number in the form of $\frac{p}{q}$ where 'p' and 'q' are integers and $q \neq 0$ , e.g $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}$**

Every rational number can be expressed in decimal form and the decimal form will be either terminating or non-terminating repeating. e.g. $\frac{5}{2} = 2.5$ (Terminating), $\frac{2}{3} = 0.66666.....$ *or* $0.\bar{6}$ (Non-terminating repeating).

**IRRATIONAL NUMBERS**

The numbers which are not rational are called irrational numbers. e.g. $\sqrt{2}, \sqrt{3}, \sqrt{5}, etc$ .

- *Let p be a prime number. If p divides $a^2$, then p divides a, where a is a positive integer.*
- If p is a positive integer which is not a perfect square, then $\sqrt{m}$ is an irrational, e.g. $\sqrt{2}, \sqrt{5}, \sqrt{6}, \sqrt{8}, ...etc$ .
- If p is prime, then $\sqrt{p}$ is also an irrational.

**RATIONAL NUMBERS AND THEIR DECIMAL EXPANSIONS**

- *Let x be a rational number whose decimal expansion terminates. Then x can be expressed in the form $\frac{p}{q}$ where p and q are coprime, and the prime factorisation of q is of the form $2^n5^m$, where n, m are non-negative integers.*

- *Let x = $\frac{p}{q}$ be a rational number, such that the prime factorisation of q is of the form $2^n5^m$, where n, m are non-negative integers. Then x has a decimal expansion which terminates.*
- *Let x = $\frac{p}{q}$ be a rational number, such that the prime factorisation of q is not of the form $2^n5^m$, where n, m are non-negative integers. Then, x has a decimal expansion which is non-terminating repeating (recurring).*

- *The decimal form of irrational numbers is non-terminating and non-repeating.*
- *Those decimals which are non-terminating and non-repeating will be irrational numbers. e.g. 0.20200200020002……. is a non-terminating and non-repeating decimal, so it irrational.*

# CLASS X : CHAPTER - 1
# REAL NUMBERS

**1.** A rational number between $\frac{1}{2}$ and $\frac{3}{4}$ is:

(a) $\frac{2}{5}$ (b) $\frac{5}{8}$ (c) $\frac{4}{3}$ (d) $\frac{1}{4}$

**2.** For some integer m, every even integer is of the form

(a) m (b)m+1 (c)2m (d)2m+1

**3.** Decimal representation of rational number $\frac{8}{27}$ is:

(a) $0.\overline{296}$ (b) $0.29\overline{6}$ (c) $0.2\overline{96}$ (d) 0.296

**4.** Let x = $\frac{7}{20x25}$ be a rational number. Then x has decimal expansion, which terminates:

(a) after four places of decimal (b) after three places of decimal
(c) after two places of decimal (d) after five places of decimal

**5.** The decimal expansion of $\frac{63}{72 \times 175}$ is

(a) terminating (b) non-terminating
(c) non termination and repeating (d) an irrational number

**6.** If HCF and LCM of two numbers are 4 and 9696, then the product of the two numbers is:

(a) 9696 (b) 24242 (c) 38784 (d) 4848

**7.** The number .211 2111 21111….. is a

(a) terminating decimal (b) non-terminating decimal
(c) non terminating and non-repeating decimal (d) none of these

8. If $(m)^n$ =32 where m and n are positive integers, then the value of $(n)^{mn}$ is:

(a) 32 (b) 25 (c) $5^{10}$ (d) $5^{25}$

9. If LCM(x,18)=36 and HCF(x,18)=2 then x=

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

10. If p is a prime number and p divides $k^2$, then p divides:

a. $2k^2$ (b) k (c) 3k (d) none of these

11. Prime factors of the denominator of a rational number with the decimal expansion 44.123 are
(a)2,3 (b)2,3,5 (c)2,5 (d)3,5

12. Which of the following is not a rational number?
(a) $\sqrt{6}$ (b) $\sqrt{9}$ (c) $\sqrt{25}$ (d) $\sqrt{36}$

13. If a and b are positive integers, then HCF (a, b) x LCM (a, b) =
(a) a x b (b) a + b (c) a – b (d) a/b

14. If the HCF of two numbers is 1, then the two numbers are called
a. composite (b) relatively prime or co-prime
(c) perfect (d) irrational numbers

15. The HCF and LCM of 12,21,15 are
(a) 3,140 (b) 12,420 (c) 3,420 (d) 420,3

16. The HCF of smallest composite number and the smallest prime number is
(a) 0 (b) 1 (c) 2 (d) 3

17. The ratio of LCM and HCF of the least composite and the least prime number is
(a) 1:2 (b) 2:1 (c) 1:1 (d) 1:3

18.The HCF of two numbers is 23 and their LCM is 1449. If one of the numbers is 161, then the other number is
(a) 23 (b) 207 (c) 1449 (d) none of these

19. Which one of the following rational number is a non-terminating decimal expansion:
a. $\frac{33}{50}$ b. $\frac{6}{180}$ c. $\frac{6}{15}$ d. $\frac{1}{1000}$

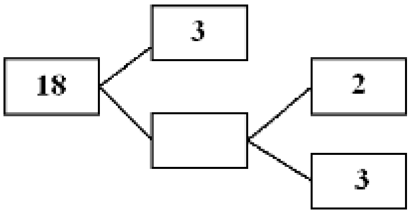
20. The product of L.C.M and H.C.F. of two numbers is equal to
a. Sum of numbers (b) Difference of numbers
(c) Product of numbers (d) Quotients of numbers

21. L.C.M. of two co-prime numbers is always
a. product of numbers (b) sum of numbers
(c) difference of numbers (d)none

22. Three bells ring at intervals 0f 4,7,and14 minutes .All three rang at 6am.when will they ring together again (a) 6:07am (b) 6:14am (c) 6:28am (d) 6:25am

23. The missing number in the following factor tree is

(a) 2 (b) 6 (c) 3 (d) 9




24. If the sum of two numbers is 1215 and their HCF is 81,then the possible number of pairs of such numbers are (a) 2 (b) 3 (c) 4 (d) 5

25. If two positive integers *a* and *b* are written as $a = x^3y^2$ and $b = xy^3$ ; *x*, *y* are prime numbers, then HCF (*a*, *b*) is

 a. $xy$ (b) $xy^2$ (c) $x^3y^3$ (d) $x^2y^2$

26. If two positive integers *p* and *q* can be expressed as $p = ab^2$ and $q = a^3b$; *a*, *b* being prime numbers, then LCM (*p*, *q*) is

 a. $ab$ (b) $a^2b^2$ (c) $a^3b^2$ (d) $a^3b^3$

27. The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is

 (a) 10 (b) 100 (c) 504 (d) 2520

28. The decimal expansion of the rational number $\frac{14587}{1250}$ will terminate after:

 a. one decimal place (b) two decimal places
 (c) three decimal places (d) four decimal places

29. The LCM of two prime numbers p and q (p>q) is 221.Find the value of 3p - q

 a. 4 (b) 28 (c)38 (d) 48

30. The smallest number by which 1/13 should be multiplied so that its decimal expansion terminates after two decimal places is

 a. 13/100 (b) 13/10 (c) 10/13 (d) none of these

**CASE STUDY 1.**

To enhance the reading skills of grade X students, the school nominates you and two of your friends to set up a class library. There are two sections- section A and section B of grade X. There are 32 students in section A and 36 students in section B.

1. What is the minimum number of books you will acquire for the class library, so that they can be distributed equally among students of Section A or Section B?
   a) 144
   b) 128
   c) 288
   d) 272
2. If the product of two positive integers is equal to the product of their HCF and LCM is true then, the HCF (32 , 36) is
   a) 2
   b) 4
   c) 6
   d) 8
3. 36 can be expressed as a product of its primes as
   a) $2^2 \times 3^2$
   b) $2^1 \times 3^3$
   c) $2^3 \times 3^1$
   d) $2^0 \times 3^0$
4. $7\times 11 \times 13 \times 15 + 15$ is a
   a) Prime number
   b) Composite number
   c) Neither prime nor composite
   d) None of the above
5. If p and q are positive integers such that p = $ab^2$ and q= $a^2$b, where a , b are prime numbers, then the LCM (p, q) is
   a) ab
   b) $a^2b^2$
   c) $a^3b^2$
   d) $a^3b^3$

**CASE STUDY 2:**

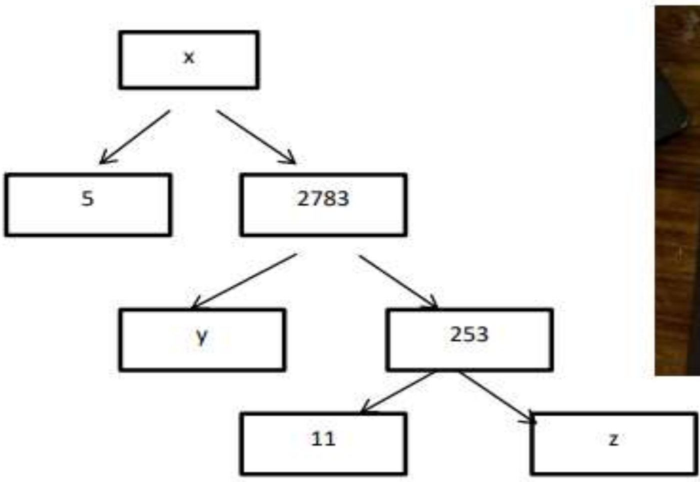
A seminar is being conducted by an Educational Organisation, where the participants will be educators of different subjects. The number of participants in Hindi, English and Mathematics are 60, 84 and 108 respectively.

1. In each room the same number of participants are to be seated and all of them being in the same subject, hence maximum number participants that can accommodated in each room are
   a) 14
   b) 12
   c) 16
   d) 18
2. What is the minimum number of rooms required during the event?
   a) 11
   b) 31
   c) 41
   d) 21
3. The LCM of 60, 84 and 108 is
   a) 3780
   b) 3680
   c) 4780
   d) 4680
4. The product of HCF and LCM of 60,84 and 108 is
   a) 55360
   b) 35360
   c) 45500
   d) 45360
5. 108 can be expressed as a product of its primes as
   a) $2^3 \times 3^2$
   b) $2^3 \times 3^3$
   c) $2^2 \times 3^2$
   d) $2^2 \times 3^3$

**CASE STUDY 3:**

A Mathematics Exhibition is being conducted in your School and one of your friends is making a model of a factor tree. He has some difficulty and asks for your help in completing a quiz for the audience.

Observe the following factor tree and answer the following:





**1.** What will be the value of x?

a) 15005

b) 13915

c) 56920

d) 17429

**2.** What will be the value of y?

a) 23

b) 22

c) 11

d) 19

**3.** What will be the value of z?

a) 22

b) 23

c) 17

d) 19

**4.** According to Fundamental Theorem of Arithmetic 13915 is a

a) Composite number

b) Prime number

c) Neither prime nor composite

d) Even number

**5.** The prime factorisation of 13915 is

a) $5 \times 11^3 \times 13^2$

b) $5 \times 11^3 \times 23^2$

c) $5 \times 11^2 \times 23$

d) $5 \times 11^2 \times 13^2$

# CLASS X : CHAPTER - 2
# POLYNOMIALS

## IMPORTANT FORMULAS & CONCEPTS

An algebraic expression of the form $p(x) = a_0 + a_1x + a_2x^2 + a_3x^3 + \ldots\ldots\ldots a_nx^n$, where $a \neq 0$, is called a polynomial in variable x of degree n.
Here, $a_0, a_1, a_2, a_3, \ldots\ldots, a_n$ are real numbers and each power of x is a non-negative integer.
e.g. $3x^2 - 5x + 2$ is a polynomial of degree 2.
$3\sqrt{x} + 2$ is not a polynomial.

- If $p(x)$ is a polynomial in $x$, the highest power of $x$ in $p(x)$ is called **the degree of the polynomial** $p(x)$. For example, $4x + 2$ is a polynomial in the variable $x$ of degree 1, $2y^2 - 3y + 4$ is a polynomial in the variable $y$ of degree 2,

  - A polynomial of degree 0 is called a constant polynomial.
  - A polynomial $p(x) = ax + b$ of degree 1 is called a linear polynomial.
  - A polynomial $p(x) = ax^2 + bx + c$ of degree 2 is called a quadratic polynomial.
  - A polynomial $p(x) = ax^3 + bx^2 + cx + d$ of degree 3 is called a cubic polynomial.
  - A polynomial $p(x) = ax^4 + bx^3 + cx^2 + dx + e$ of degree 4 is called a bi-quadratic polynomial.

### VALUE OF A POLYNOMIAL AT A GIVEN POINT x = k

If $p(x)$ is a polynomial in $x$, and if $k$ is any real number, then the value obtained by replacing $x$ by $k$ in $p(x)$, is called **the value of $p(x)$ at $x = k$**, and is denoted by $p(k)$.

### ZERO OF A POLYNOMIAL

A real number $k$ is said to be a **zero of a polynomial $p(x)$**, if $p(k) = 0$.

- Geometrically, the zeroes of a polynomial $p(x)$ are precisely the $x$-coordinates of the points, where the graph of $y = p(x)$ intersects the $x$ -axis.
- A quadratic polynomial can have at most 2 zeroes and a cubic polynomial can have at most 3 zeroes.
- In general, a polynomial of degree 'n' has at the most 'n' zeroes.

### RELATIONSHIP BETWEEN ZEROES & COEFFICIENTS OF POLYNOMIALS

| Type of Polynomial | General form | No. of zeroes | Relationship between zeroes and coefficients |
|---|---|---|---|
| Linear | $ax + b, a \neq 0$ | 1 | $k = -\frac{b}{a}$, i.e. $k = -\frac{\text{Constant term}}{\text{Coefficient of x}}$ |
| Quadratic | $ax^2 + bx + c, a \neq 0$ | 2 | Sum of zeroes $(\alpha + \beta) = -\frac{\text{Coefficient of x}}{\text{Coefficient of } x^2} = -\frac{b}{a}$<br>Product of zeroes $(\alpha\beta) = \frac{\text{Constant term}}{\text{Coefficient of } x^2} = \frac{c}{a}$ |
| Cubic | $ax^3 + bx^2 + cx + d$ , $a \neq 0$ | 3 | Sum of zeroes $(\alpha + \beta + \chi) = -\frac{\text{Coefficient of } x^2}{\text{Coefficient of } x^3} = -\frac{b}{a}$<br>Product of sum of zeroes taken two at a time<br>$(\alpha\beta + \alpha\chi + \beta\chi) = \frac{\text{Coefficient of x}}{\text{Coefficient of } x^3} = \frac{c}{a}$<br>Product of zeroes $(\alpha\beta\chi) = -\frac{\text{Constant term}}{\text{Coefficient of } x^3} = -\frac{d}{a}$ |

- A quadratic polynomial whose zeroes are $\alpha$ and $\beta$ is given by $p(x) = x^2 - (\alpha + \beta)x + \alpha\beta$
  i.e. $x^2$ – (Sum of zeroes)x + (Product of zeroes)

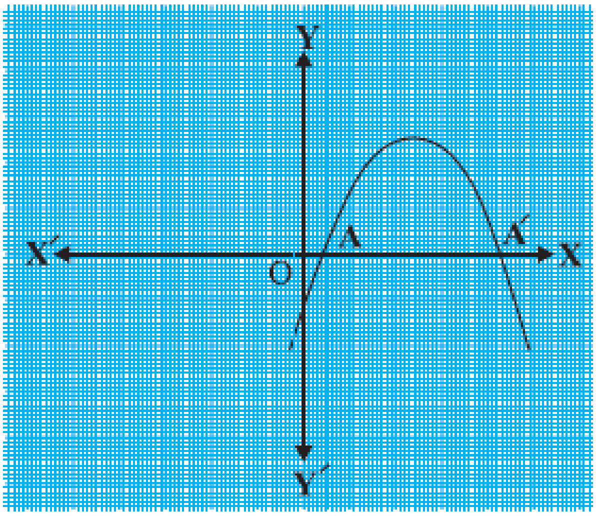
- A cubic polynomial whose zeroes are $\alpha, \beta$ *and* $\chi$ is given by
  $p(x) = x^3 - (\alpha + \beta + \chi)x^2 + (\alpha\beta + \beta\chi + \alpha\chi)x - \alpha\beta\chi$

The zeroes of a quadratic polynomial $ax^2 + bx + c$, $a \neq 0$, are precisely the $x$-coordinates of the points where the parabola representing $y = ax^2 + bx + c$ intersects the $x$-axis.

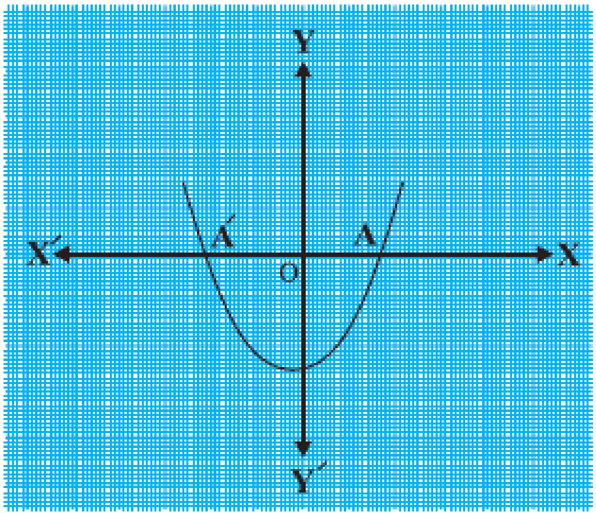
In fact, for any quadratic polynomial $ax^2 + bx + c$, $a \neq 0$, the graph of the corresponding equation $y = ax^2 + bx + c$ has one of the two shapes either open upwards like (ii) or open downwards like (i) depending on whether $a > 0$ or $a < 0$. (These curves are called **parabolas**.)

The following three cases can be happen about the graph of quadratic polynomial $ax^2 + bx + c$ :

**Case (i) :** Here, the graph cuts $x$-axis at two distinct points A and A'. The $x$-coordinates of A and A' are the **two zeroes** of the quadratic polynomial $ax^2 + bx + c$ in this case

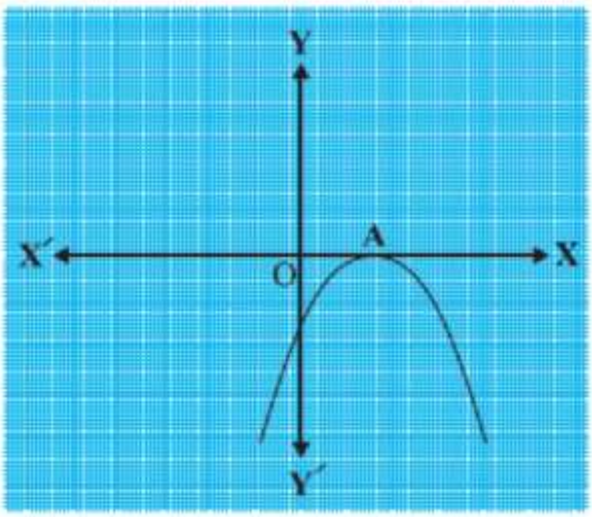


(i)
$a > 0$

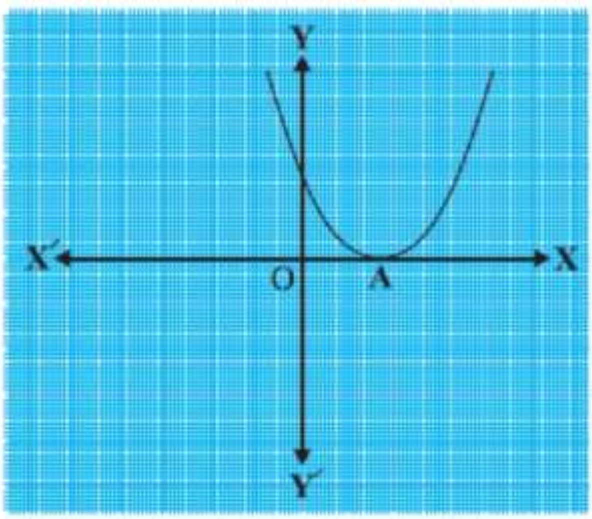


(ii)
$a < 0$

**Case (ii) :** Here, the graph cuts the $x$-axis at exactly one point, i.e., at two coincident points. So, the two points A and A′ of Case (i) coincide here to become one point A. The $x$-coordinate of A is the **only zero** for the quadratic polynomial $ax^2 + bx + c$ in this case.



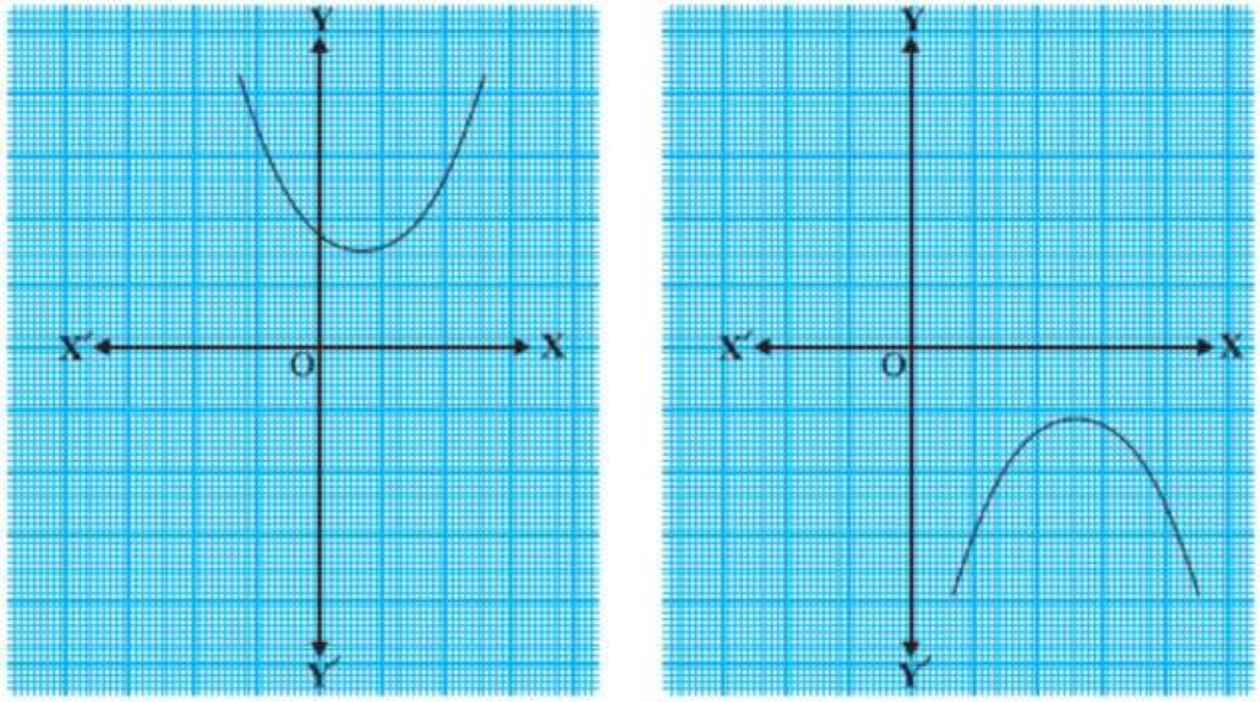
(i)



(ii)

a > 0 a < 0

**Case (iii) :** Here, the graph is either completely above the *x*-axis or completely below the *x*-axis. So, it does not cut the *x*-axis at any point. So, the quadratic polynomial $ax^2 + bx + c$ has **no zero** in this case.




(i) a > 0 (ii) a < 0

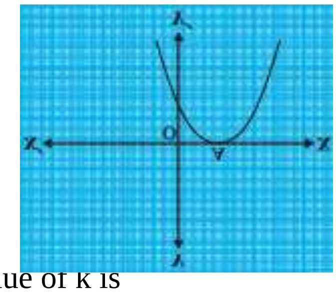
**DIVISION ALGORITHM FOR POLYNOMIALS**

If $p(x)$ and $g(x)$ are any two polynomials with $g(x) \neq$ □0, then we can find polynomials $q(x)$ and $r(x)$ such that $p(x) = g(x) \times q(x) + r(x)$,
where $r(x) = 0$ or degree of $r(x) <$ degree of $g(x)$.

- If r(x) = 0, then g(x) is a factor of p(x).
- Dividend = Divisor × Quotient + Remainder

# CLASS X : CHAPTER - 2
# POLYNOMIALS

**1.** The value of k for which (–4) is a zero of the polynomial $x^2 - x - (2k+2)$ is
(a) 3 (b) 9 (c) 6 (d) –1



**2.** The number of zeroes of the polynomial from the graph is
(a) 0 (b) 1 (c) 2 (d) 3

**3.** If one of the zero of the quadratic polynomial $x^2 + 3x + k$ is 2, then the value of k is
(a) 10 (b) –10 (c) 5 (d) –5

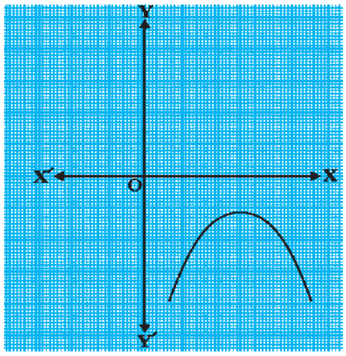
**4.** A quadratic polynomial whose zeroes are –3 and 4 is
(a) $x^2 - x + 12$ (b) $x^2 + x + 12$ (c) $2x^2 + 2x - 24$. (d) none of these

**5.** The relationship between the zeroes and coefficients of the quadratic polynomial $ax^2 + bx + c$ is (a) $\alpha + \beta = \frac{c}{a}$ (b) $\alpha + \beta = \frac{-b}{a}$ (c) $\alpha + \beta = \frac{-c}{a}$ (d) $\alpha + \beta = \frac{b}{a}$

**6.** The zeroes of the polynomial $x^2 + 7x + 10$ are
(a) 2 and 5 (b) –2 and 5 (c) –2 and –5 (d) 2 and –5

**7.** The relationship between the zeroes and coefficients of the quadratic polynomial $ax^2 + bx + c$ is (a) $\alpha.\beta = \frac{c}{a}$ (b) $\alpha.\beta = \frac{-b}{a}$ (c) $\alpha.\beta = \frac{-c}{a}$ (d) $\alpha.\beta = \frac{b}{a}$

**8.** Graph of a quadratic polynomial is a
(a) straight line (b) circle (c) parabola (d) ellipse




**9.** The number of zeroes of the polynomial from the graph is
(a) 0 (b) 1 (c) 2 (d) 3

**10.** A quadratic polynomial whose sum and product of zeroes are –3 and 2 is
(a) $x^2 - 3x + 2$ (b) $x^2 + 3x + 2$ (c) $x^2 + 2x - 3$. (d) $x^2 + 2x + 3$.

**11.** If $\alpha$, $\beta$ are the zeroes of the polynomials $f(x) = x^2 + x + 1$, then $\frac{1}{\alpha} + \frac{1}{\beta}$
(a) 0 (b) 1 (c) –1 (d) none of these

**12.** If one of the zero of the polynomial $f(x) = (k^2 + 4)x^2 + 13x + 4k$ is reciprocal of the other, then k =
(a) 2 (b) 1 (c) –1 (d) – 2

**13.** If $\alpha$ , $\beta$ are the zeroes of the polynomials f(x) = $4x^2 + 3x + 7$, then $\frac{1}{\alpha} + \frac{1}{\beta}$

(a) $\frac{7}{3}$ (b) $\frac{-7}{3}$ (c) $\frac{3}{7}$ (d) $\frac{-3}{7}$

**14.** If 2 and ½ are the zeroes of $px^2 + 5x + r$ then, then value of p and r is

(a)p = r= 2 (b) p = r = -2 (c) p=2, r= –2 (d) p= – 2, r= 2

**15.** The zeroes of a polynomial $p(x)$ are precisely the $x$-coordinates of the points, where the graph of $y = p(x)$ intersects the

(a) x – axis (b) y – axis (c) origin (d) none of the above

**16.** A quadratic polynomial can have at most.............. zeroes

(a) 0 (b) 1 (c) 2 (d) 3

**17.** A cubic polynomial can have at most.............. zeroes.

(a) 0 (b) 1 (c) 2 (d) 3

**18.** Which are the zeroes of p(x) = $x^2 - 1$:

(a) 1, –1 (b) – 1, 2 (c) –2, 2 (d) –3, 3

***19.*** If $\alpha, \beta$ are the zeroes of the polynomials f(x) = $x^2 + 5x + 8$, then $\alpha + \beta$

(a) 5 (b) –5 (c) 8 (d) none of these

***20.*** If $\alpha, \beta$ are the zeroes of the polynomials f(x) = $x^2 + 5x + 8$, then $\alpha.\beta$

(a) 0 (b) 1 (c) –1 (d) 8

**21.** On dividing $x^3 + 3x^2 + 3x + 1$ by 5 + 2x we get remainder:

(a) $\frac{8}{27}$ (b) $\frac{-8}{27}$ (c) $\frac{-27}{8}$ (d) $\frac{27}{8}$

**22.** A quadratic polynomial whose zeroes are $\frac{3}{5}$ and $\frac{-1}{2}$ is

(a) $10x^2 - x - 3$ (b) $10x^2 + x - 3$ (c) $10x^2 - x + 3$ (d) none of the above.

**23.** The number of polynomials having zeroes as -2 and 5 is

(a) 1 (b) 2 (c) 3 (d) more than 3

**24.** The zeroes of the quadratic polynomial $x^2 + 99x + 127$ are

(a) both positive (b) both negative (c) one positive and one negative (d) both

**25.** A real numbers a is called a zero of the polynomial f(x), then

(a) f(a) = –1 (b) f(a) = 1 (c) f(a) = 0 (d) f(a) = –2

**26.** Which of the following is a polynomial:

(a) $x^2 + \frac{1}{x}$ (b) $2x^2 - 3\sqrt{x} + 1$ (c) $x^2 + x^{-2} + 7$ (d) $3x^2 - 3x + 1$

27. The product and sum of zeroes of the quadratic polynomial $ax^2 + bx + c$ respectively are:

(a) $\frac{b}{a}, \frac{c}{a}$ (b) $\frac{c}{a}, \frac{b}{a}$ (c) $\frac{c}{b}, 1$ (d) $\frac{c}{a}, \frac{-b}{a}$

28.If α, β are the zeros of the polynomial $f(x) = x^2 - 5x + k$ such that $\alpha - \beta = 1$, find the value of k.

(a) 5 (b) 6 (c) 3 (d) none of these

29 If α, β are the zeroes of $kx^2 - 2x + 3k$ such that $\alpha + \beta = \alpha\beta$, then k = ?

(a) 1/3 (b) −1/3 (c) 2/3 (d) −2/3

30 If α, β be the zero of the polynomial $2x^2 + 5x + k$ such that $\alpha^2 + \beta^2 + \alpha\beta = 21/4$, then k = ?

(a) 3 (b) −3 (c) −2 (d) 2

**CASE STUDY 1:**

The below picture are few natural examples of parabolic shape which is represented by a quadratic polynomial. A parabolic arch is an arch in the shape of a parabola. In structures, their curve represents an efficient method of load, and so can be found in bridges and in architecture in a variety of forms.

1. In the standard form of quadratic polynomial, $ax^2 + bx + c$, a, b and c are
   a) All are real numbers.
   b) All are rational numbers.
   c) 'a' is a non zero real number and b and c are any real numbers.
   d) All are integers.
2. If the roots of the quadratic polynomial are equal, where the discriminant D = $b^2 - 4ac$, then
   a) $D > 0$
   b) $D < 0$
   c) $D \geq 0$
   d) $D = 0$
3. If $\alpha$ *and* $\frac{1}{\alpha}$ are the zeroes of the qudratic polynomial $2x^2 - x + 8k$, then k is
   a) 4
   b) $\frac{1}{4}$
   c) $\frac{-1}{4}$
   d) 2
4. The graph of $x^2+1=0$
   a) Intersects x-axis at two distinct points.
   b) Touches x-axis at a point.
   c) Neither touches nor intersects x-axis.
   d) Either touches or intersects x- axis.

5. If the sum of the roots is –p and product of the roots is $-\frac{1}{p}$, then the quadratic polynomial is

a) k $(-px^2 + \frac{x}{p} + 1)$

b) k $(px^2 - \frac{x}{p} - 1)$

c) k $(x^2 + px - \frac{1}{p})$

d) k $(x^2 - px + \frac{1}{p})$

**CASE STUDY 2:**

An asana is a body posture, originally and still a general term for a sitting meditation pose, and later extended in hatha yoga and modern yoga as exercise, to any type of pose or position, adding reclining, standing, inverted, twisting, and balancing poses. In the figure, one can observe that poses can be related to representation of quadratic polynomial.



1. The shape of the poses shown is
   a) Spiral
   b) Ellipse
   c) Linear
   d) Parabola
2. The graph of parabola opens downwards, if _______

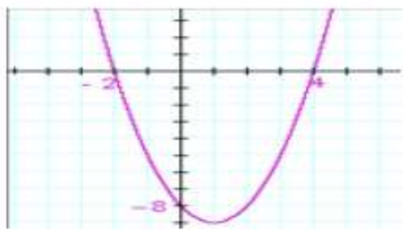
a) a ≥ 0

b) a = 0

c) a < 0

d) a > 0

**3.** In the graph, how many zeroes are there for the polynomial?




a) 0

b) 1

c) 2

d) 3

**4.** The two zeroes in the above shown graph are

a) 2, 4

b) -2, 4

c) -8, 4

d) 2,-8

**5.** The zeroes of the quadratic polynomial $4\sqrt{3}x^2 + 5x - 2\sqrt{3}$ are

a) $\frac{2}{\sqrt{3}}, \frac{\sqrt{3}}{4}$

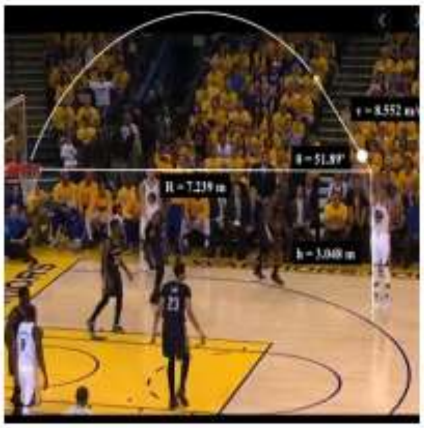
b) $-\frac{2}{\sqrt{3}}, \frac{\sqrt{3}}{4}$

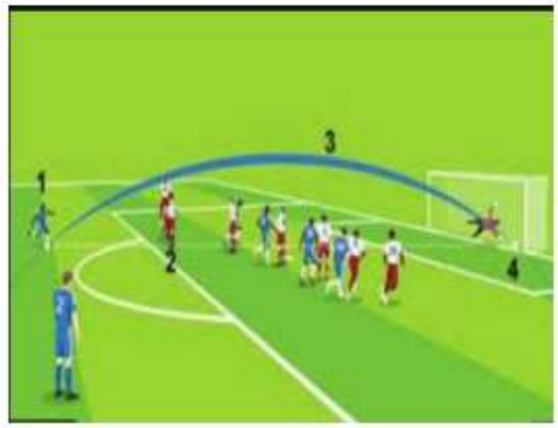
c) $\frac{2}{\sqrt{3}}, -\frac{\sqrt{3}}{4}$

d) $-\frac{2}{\sqrt{3}}, -\frac{\sqrt{3}}{4}$

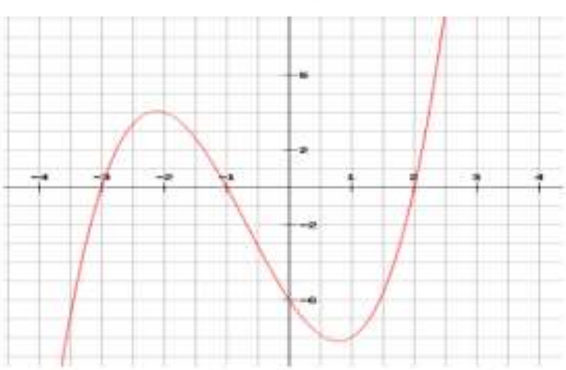
## CASE STUDY 3:

Basketball and soccer are played with a spherical ball. Even though an athlete dribbles the ball in both sports, a basketball player uses his hands and a soccer player uses his feet. Usually, soccer is played outdoors on a large field and basketball is played indoor on a court made out of wood. The projectile (path traced) of soccer ball and basketball are in the form of parabola representing quadratic polynomial.





1. The shape of the path traced shown is
   a) Spiral
   b) Ellipse
   c) Linear
   d) Parabola
2. The graph of parabola opens upwards, if _______
   a) a = 0
   b) a < 0
   c) a > 0
   d) a $\geq$ 0
3. Observe the following graph and answer



In the above graph, how many zeroes are there for the polynomial?

a) 0

b) 1

c) 2

d) 3

**4.** The three zeroes in the above shown graph are

b) 2, 3,-1

c) -2, 3, 1

d) -3, -1, 2

e) -2, -3, -1

**5.** What will be the expression of the polynomial?

a) $x^3 + 2x^2 - 5x - 6$

b) $x^3 + 2x^2 - 5x + 6$

c) $x^3 + 2x^2 + 5x - 6$

d) $x^3 + 2x^2 + 5x + 6$

**Answers of X Maths Study Materials**

**Chapter -1 Real Numbers**

Q1. (b) $\frac{5}{8}$

Q2. (c ) 2 m

Q3. (a) $\overline{296}$

Q4. $\frac{7}{2^2 \ x \ 5^3}$ = 3 places
(b) after three places of decimal

Q5. (a) Terminating

Q6. (c ) 4 x9696 = 38784

Q7. ( c) non terminating and non repeating decimal

Q.8 (c ) $5^{10}$ where m=2 ,n=5

Q.9. ( c) x = $\frac{36 \ x \ 2}{18}$ = 4

Q10. (b) K

Q11. ( c) 2 , 5

Q.12. (a) $\sqrt{6}$

Q.13 (a) a x b

Q14. (b) relatively prime or coprime

Q15. (c ) 3 , 420

Q.16. (c ) 2

Q17. (b) 4: 2 = 2 : 1

Q18. $\frac{23 \ x \ 1449}{161}$ = 207

Q19. (b) $\frac{6}{180}$ = $\frac{1}{3}$

Q20. (c ) product of numbers

Q21. ( a ) product of numbers

Q22. (c *) 6 : 28 am where LCM of 4, 7,14 = 28*

Q23. (b ) 6

Q24. (c ) 4

Q25. (b) $xy^2$

Q26. (c ) $a^3 b^2$

Q27. (d) 2520

Q28. (d ) 1250 = $5^4$ x 2

Q29. (c ) 221 = 13x17 ; p= 17 and q=13

3p - q = 3x 17 -13 = 38

Q30. (a) $\frac{13}{100}$

Answers Case Study 1 – Ch 1 Real numbers

1 (c ) 288
2 (b) 4
3 (a) $2^2$ x $3^2$
4 (b) composite number
5 (b) $a^2$ x $b^2$

**Case study 2**

1 (b) 12
2 (d) 21
3 (a) 3780
4 (d) 45360
5 (d) $2^2$ x $3^3$

**Case study 3**

1. (b) 13915
2. ( c) 11
3. 23
4. (a) composite number
5. (c ) 5 x $11^2$ x 23

# CHAPTER 2 POLYNOMIALS

(1) (b) 16 + 4 - 2 k - 2 = 0
k = 9

2) (b) 1

3) (b) -10

4 ) (d) none of these

5) (b) α + β = $\frac{-b}{a}$

6) ( c) -2 , and -5

7) (a) α β = $\frac{c}{a}$

8) ( c) parabola

9 ) (a ) 0

10. (b) $x^2$ + 3 x + 2

11) (c ) -1

12) α β = $\frac{4k}{k2+4}$
$K^2$ - 4k + 4 =0 ; ( k -2 $)^2$ =0 ; k= 2

13 ) (d) $\frac{-3}{7}$

14) (b) 2+ ½ = -5 /p ; 2x ½ =r/p ; p= r= -2

15) (a) x axis

16) (c ) 2

17) (d) 3

18) (a) 1 , -1

19) (b) -5

20) (c ) 8

21) © ( -5/2 $)^3$ +3 (-5/2$)^2$ +3 (-5/2) +1 = -27/8

22) (a) ) α + β = 1/10 ; α β =-3/10 ; 10 $x^2$ - x- 3

23) (d)more than 3

24) (b) both negative

25) (c) f(a)=0

26) (d) $3x^2$-3x +1 =0

27) (d) $\frac{c}{a}$ x - $\frac{b}{a}$

28) (b) 6

29) (c ) α + β = 2/k , α β = 3 ,
2/k = 3 ,
k = 2/3

30 ) (d) ( α + β$)^2$ - 2 α β + α β = ( -5/2) 2 - 2 x k /2 +k/2 = 21/4

$25/4 - k + k/2 = 21/4$

$k/2 = 1$ ; $k=2$

**Case study Q1 – Polynomials**

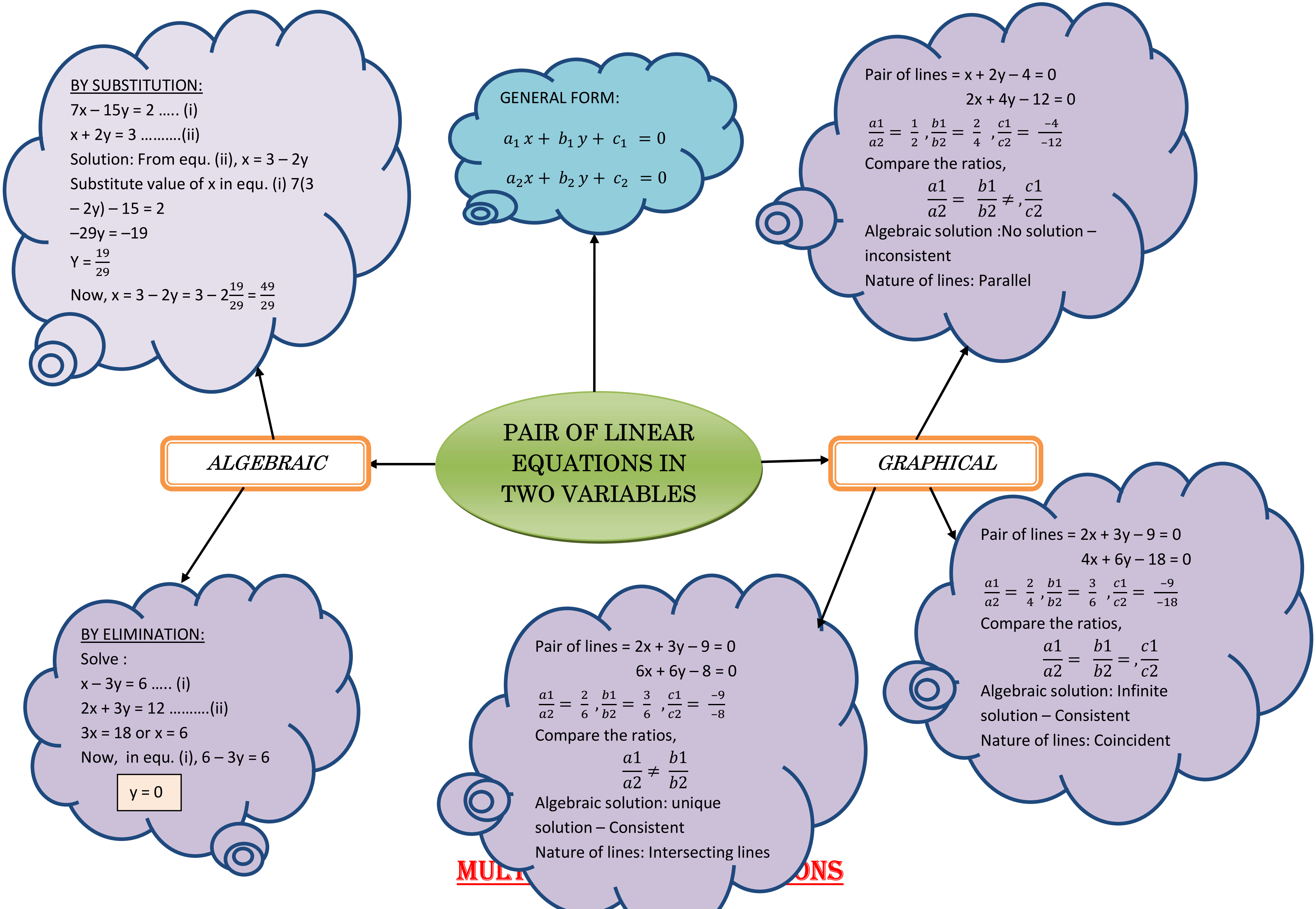
1) (c ) a is a non zero real number and b and c are any real numbers.
2) (d) D = 0
3) (b) ¼
4) (c ) neither touches nor intersects the x-axis .
5) (c ) $k ( x^2 + px – 1/p )$

**Case study -2**

(1) (d )Parabola
(2) (c ) $a< 0$
(3) (c ) 2
(4) (b) -2 , 4
(5) (b) $-2/\sqrt{3}$ , $\sqrt{3}/4$

**Case study -3**

1) (d) parabola
2) (c ) $a > 0$
3) ( d ) 3
4) (d ) -3, -1 , 2
5) $x^3 + 2x^2 - 5x - 6$




**MULT… …ONS**

Q.1) If a pair of linear equations is consistent , … the lines will be:

a) Parallel
b) Always coincident
c) Intersecting or coincident
d) Always intersecting

Q.2) The value of k for which the system of linear equations x + 2y = 3, 5x + ky +7 =0 is inconsistent, is:

a) $-\{\frac{14}{3}\}$
b) $\frac{2}{5}$
c) 5
d) 10

Q.3) The value of k for which the system of equations x + y – 4 = 0 and 2x + ky = 3, has no solution, is:

a) -2
b) $\neq 2$
c) 3
d) 2

Q.4) The pair of equations y = 0 and y = -7 has:

a) One solution
b) Two solutions

c) Infinitely many solutions
d) No solution

Q.5) The pair of equations x = a and y = b graphically represents lines which are:

a) Parallel
b) Intersecting at (b,a)
c) Coincident
d) Intersecting at (a,b)

Q.6) For which values of p, will the lines represented by the following pair of linear equations be parallel:

$$3x - y - 5 = 0$$

$$6x - 2y - p = 0$$

a) All real values except 10
b) 10
c) $\frac{5}{2}$
d) $\frac{1}{2}$

Q.7) If the lines given by $3x + 2ky = 2$ and $2x + 5y + 1 = 0$ are parallel, then the value of k is:

a) $-\frac{5}{4}$
b) $\frac{5}{2}$

c) $\frac{15}{4}$

d) $\frac{3}{2}$

Q.8) The pair of equations, x = 0 and x = - 4 has:

a) A unique solution
b) No solution
c) Infinitely many solution
d) Only solution (0, 0)

Q.9) One equation of a pair of dependent linear equations is -5x + 7y = 2. The second equation can be:

a) 10x + 14y + 4 = 0
b) -10x – 14y + 4 = 0
c) -10x + 14y + 4 = 0
d) 10x - 14y + 4 = 0

Q.10) A pair of linear equations which has a unique solution x= 2, y = -3 is:

a) x + y = -1 and 2x - 3y = -5
b) 2x + 5y = -11 and 4x + 10y = -22
c) 2x - y = 1 and 3x + 2y = 0
d) x - 4y = 14 and 5x - y = 13

Q.11)If x = a,y = b is the solution of the equations x – y = 2 and x + y = 4, then the values of a and b respectively are:

a) 3 & 5
b) 5 & 3
c) 3 & 1
d) -1 & -3

Q.12) The value of k , for which the pair of linear equations $kx + y = k^2$ and $x + ky = 1$ have infinitely many solutions is:

a) $\pm$ 1
b) 1
c) - 1
d) 2

Q.13) If $ax + by = a^2 - b^2$ and $bx + ay = 0$, then the value of $(x + y)$ is:

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

Q.14)The value of k for which the pair of linear equations $3x + 2y = -5$ and $x - ky = 2$ has a unique solution is:

a) $k = -\frac{2}{3}$
b) $k \neq -\frac{2}{3}$
c) $k = -\frac{3}{2}$
d) $k \neq -\frac{3}{2}$

## CH-3

Q.15) The value of a so that the point (3,a) lies on the line represented by $2x - 3y = 5$, is:

a) $\frac{1}{3}$
b) $-\frac{1}{3}$
c) $\frac{2}{3}$
d) $-\frac{2}{3}$

Q.16) The point where the line $x - y = 8$ will intersect y-axis is:

a) X = 0 Y=-8
b) X = -1 Y=-8
c) Y = 8 X=-8
d) Y = 0 X=-8

Q.17) the graphical representation of the pair of linear equations $x + 2y - 4 = 0$ and $2x + 4y = 12$ represents:

a) Coincident lines
b) Parallel lines
c) No solution
d) Intersecting lines

Q.18)If x-y = 2 and $\frac{1}{x+y} = \frac{2}{5}$ then x =________:

a) $\frac{9}{2}$
b) $\frac{9}{4}$

c) $\frac{5}{2}$
d) $\frac{5}{4}$

Q.19)The value of p for which the pair of linear equations $(p-3)x + 3y = p$ ; $px + py = 12$ have infinitely many solutions, is:

a) P= 6
b) P = -6
c) P =± 6
d) None of these

Q.20)What type of straight lines will be represented by the system of equations $2x + 3y = 5$ and $4x + 6y = 7$?

a) Parallel lines
b) Intersecting lines
c) Coincident lines
d) Transversal

Q21) 2 women and 5 men can together finish an embroidery work in 4 days, while 3 women and 6 men can finish it in 3 days. Find the time taken by 1 woman alone to finish the work, and also that taken by 1 man alone.

a) W-18, M-18
b) W-12, M-24
c) W-18, M-36
d) W-12, M-20

# CH-3

Q.22) Roohi travels 300 km to her home partly by train and partly by bus. She takes 4 hours if she travels 100 km by train and the remaining by bus, she takes 10 minutes longer.find the speed of the train and the bus separately.

a) 60km/hr, 80km/hr
b) 80km/hr, 60km/hr
c) 40km/hr, 50km/hr
d) 50km/hr, 40km/hr

Q.23)Ritu can row downstream 20 km in 2 hours, upstream 4km in 2 hours. Find her speed of rowing in still water.

a) 4km/hr
b) 6km/hr
c) 8km/hr
d) 10km/hr

Q.24) A man when asked how many hens and buffaloes he has. He told that his animalshave 120 eyes and 180 legs. How many buffaloes he has?

a) 10
b) 20
c) 30
d) 40

Q.25) A part of monthly charges in a college is fixed and the remaining depends on the number of days one has taken food in the mess. When a student X takes food for 25 days, he has to pay Rs.1750 as hostel charges, whereas a student Y, who takes food for 28 days, he has to pay Rs. 1900 as hostel charges. Find the fixed charges.

a) Rs. 35
b) Rs. 40
c) Rs.45
d) Rs.50

## ❖ CASE STUDY QUESTIONS

CSQ.1)Mr. Jose decided to go to a amusement park with his family. The cost of an entry ticket is Rs. 25 for children and Rs. 50 for adults. On that particular day , attendance at the circus is 2000 and the total gate revenue is Rs. 70,000.

1. If we let the number of children as x and number of adults as y who bought ticket on that day, the pair of linear equations describing the above situation are given as:
   a) $50x + 25y = 2000$
   b) $25x + 50y = 2000$

c) $50x + 25y = 70000$
d) $25x + 50y = 70000$

2. Find the number of children and adults who bought tickets on that particular day,are:
   a) 800 children
   b) 1200 children
   c) 400 children
   d) 1600 children

3. Find the number of adults who bought tickets on that particular day,are:
   a) 1200 adults
   b) 800 adults
   c) 1600 adults
   d) 400 adults
4. The graph drawn for the equations formed by given equation is-
   a) Parallel
   b) Coincident
   c) Intersecting
   d) Can't say

5. The pair of linear equations has ____________ solution(s) algebraically as well as graphically-
   a) Only one
   b) Infinitely many
   c) Two

d) No

CSQ.2)In the autumn break Mr. sharma's family planned to go on a vacation and their kids noticed and noted the different boats and their specific speed in the water. A boat goes 30 km upstream and 44 km downstream in 10 hours. In 13 hours, it can go 40 km upstream and 55 km down-stream.(x km/hr is the speed of boat in still water and y km/hr is the speed of the stream).

1. The algebraic representation of the first condition is____________(assuming u = $\frac{1}{x-y}$ And v= $\frac{1}{x+y}$)
   a) 30u + 44v +10 = 0
   b) 30u + 44v - 10 = 0
   c) 33u + 44v +10 = 0
   d) 33u + 44v - 10 = 0

# CH-3

2. The algebraic representation of the second condition is___________(assuming $u = \frac{1}{x-y}$ and $v = \frac{1}{x+y}$)
   a) 40u + 55v - 13 = 0
   b) 40u + 55v + 13 = 0
   c) 43u + 55v +10 = 0
   d) 43u + 55v - 10 = 0
3. The speed of the boat in still water is:
   a) 8km/hr
   b) 6km/hr
   c) 3km/hr
   d) 5km/hr
4. The speed of the stream is:
   a) 8km/hr
   b) 6km/hr
   c) 3km/hr
   d) 5km/hr
5. If there are two boats ,will they take the same time to reach if they have the same speed:
   a) Yes
   b) No
   c) Can't say
   d) Cannot be determined

<u>**CH-3**</u>

CSQ.3) Gulab went to a 'sale' to purchase some pants and shirts. When her friends asked her how many of each she had bought , she answered, "the number of shirts is two less than twice the number of pants purchased. Also, the number of shirts is four less than four times the number of pants purchased".

1. The algebraic representation of the first condition is:
   a) $Y = 2x + 2$
   b) $Y = 2x - 2$
   c) $Y = -2x - 2$
   d) $Y = -2x + 2$

2. The algebraic representation of the second condition is:
   a) $Y = 4x - 4$
   b) $Y = 4x + 4$
   c) $Y = -4x - 4$
   d) $Y = -4x + 4$

3. The number of pants she purchased is:
   a) 0
   b) 1
   c) 2
   d) 3

4. The number of shirts she purchased is:
   a) 0
   b) 1
   c) 2
   d) 3

5. When the lines are plotted on graph paper they meet on:
   a) X-axis
   b) Y-axis
   c) Origin
   d) None of these

## ANSWER KEY

## MULTIPLE CHOICE QUESTIONS:

**1.** **C**
**2.** **D**
**3.** **D**
**4.** **D**
**5.** **D**

## CH-3

6. A
7. C
8. B
9. D
10. D
11. C
12. B
13. C
14. B
15. A
16. A
17. B
18. B
19. A
20. A
21. C
22. B
23. A
24. A
25. C

## CASE STUDY QUESTIONS:

**CSQ.1:**

1. D
2. B

## CH-3

3. B
4. C
5. A

**CSQ.2:**

1. B
2. A
3. A
4. C
5. A

**CSQ.3:**

1. B
2. A
3. B
4. A
5. A

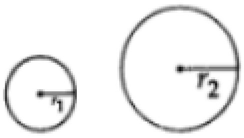
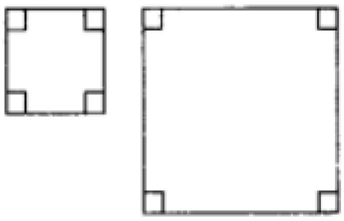
## Chapter 6 Triangles

**IMPORTANT FORMULAS & CONCEPTS**

*All those objects which have the same shape but different sizes are called similar objects.

* All congruent figures are similar but all similar figures need not to be congruent.

Example:

| | | |
|---|---|---|
| All line segments are similar since their lengths are proportional. | All the circles are similar since their radii are proportional. | All squares are similar since corresponding angles are equal and lengths are proportional. |
|  |  |  |

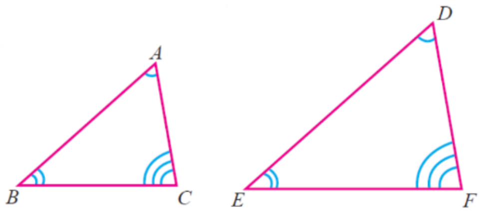
Two triangles are similar if

(i) their corresponding angles are equal (or)
(ii) their corresponding sides have lengths in the same ratio (or proportional)

Two triangles $\Delta ABC$ *and* $\Delta DEF$ are similar if

i) $\angle A = \angle D, \angle B = \angle E, \angle C = \angle F$

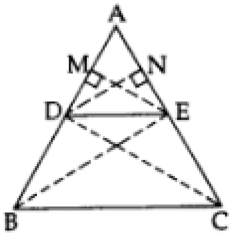
ii) $\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD}$




**Basic Proportionality theorem or Thales Theorem**

If a straight line is drawn parallel to one side of a triangle intersecting the other two sides, then it divides the two sides in the same ratio. If in a $\Delta$

ABC, a straight line DE parallel to BC, intersects AB at D and AC at E, then




$$i)\ \frac{AB}{AD} = \frac{AC}{AE} \qquad ii)\ \frac{AB}{DB} = \frac{AC}{EC}$$

**Converse of Basic Proportionality Theorem (Converse of Thales Theorem)**

If a straight line divides any two sides of a triangle in the same ratio, then the line must be parallel to the third side.

**Angle Bisector Theorem**

The internal (external) bisector of an angle of a triangle divides the opposite side internally (externally) in the ratio of the corresponding sides containing the angle.

**Converse of Angle Bisector Theorem**

If a straight line through one vertex of a triangle divides the opposite side internally (externally) in the ratio of the other two sides, then the line bisects the angle internally (externally) at the vertex. **Criteria for similarity of triangles**

The following three criteria are sufficient to prove that two triangles are similar.

**(i) AAA (Angle-Angle-Angle) similarity criterion**
If in two triangles, corresponding angles are equal, then their corresponding sides are in the same ratio (or proportion) and hence the two triangles are similar.
**Remark**: If two angles of one triangle are respectively equal to two angles of another triangle, then the two triangles are similar. ( AA similarity)

**(ii) SSS (Side-Side-Side) similarity criterion for Two Triangles:**
In two triangles, if the sides of one triangle are proportional (in the same ratio) to the sides of the other triangle, then their corresponding angles are equal and hence the two triangles are similar.

**(iii) SAS (Side-Angle-Side) similarity criterion for Two Triangles:**

If one angle of a triangle is equal to one angle of the other triangle and if the corresponding sides including these angles are proportional, then the two triangles are similar.

**Areas of Similar Triangles:**

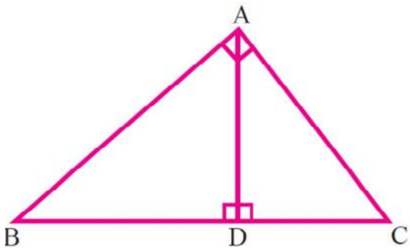
The ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides.

If a perpendicular is drawn from the vertex of a right angled triangle to its hypotenuse, then the triangles on each side of the perpendicular are similar to the whole triangle.

Here,(a) $\Delta DBA \sim \Delta\, ABC$

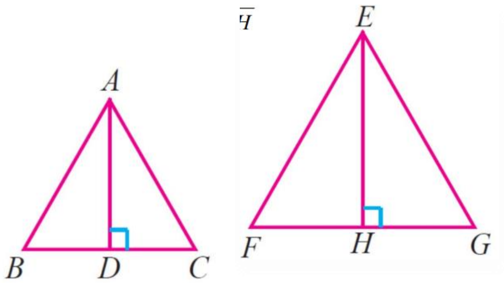
(b) $\Delta DAC \sim \Delta\, ABC$

(c) $\Delta\, DBA \sim \Delta DAC$




If two triangles are similar, then th s equal to the ratio of their correspo

i.e., if $\Delta ABC \sim \Delta EFG, then\ \frac{AB}{DE} = \frac{BC}{FG} = \frac{CA}{GE} = \frac{AD}{EH}$




If two triangles are similar, then the ratio of the corresponding sides is equal to the ratio of the corresponding perimeters.

$$If\ \Delta ABC \sim \Delta EF, then\ \frac{AB}{DE} = \frac{BC}{FG} = \frac{CA}{GE} = \frac{AB + BC + CA}{DE + FG + GE}$$

**Pythagoras theorem (Baudhayan theorem)**:

In a right angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

**Converse of Pythagoras theorem**:

In a triangle, if the square of one side is equal to the sum of the squares of the other two sides, then the angle opposite to the first side is a right angle.

**MCQs**

1. If in $\Delta ABC$ and $\Delta DEF$, $\frac{AB}{DE} = \frac{BC}{FD}$, then they will be similar when

   (a) $\angle B = \angle E$ (b) $\angle A = \angle D$ (c) $\angle B = \angle D$ (d) $\angle A = \angle F$

2. It is given that $\Delta ABC \sim \Delta PQR$ with $\frac{BC}{QR} = \frac{1}{3}$, then $\frac{ar(\Delta ABC)}{ar(\Delta PQR)}$ is equal to

   (a) 9 (b) 3 (c) $\frac{1}{3}$ (d) $\frac{1}{9}$

3. In ΔABC, DE || BC and AD = 4cm, AB = 9cm. AC = 13.5 cm then the value of EC is

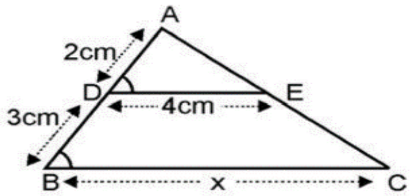
   (a) 6 cm (b) 7.5 cm (c) 9 cm (d) none of these

4. A ladder is placed against a wall such that its foot is at distance of 2.5 m from the wall and its top reaches a window 6 m above the ground. The length of the ladder is

   (a) 6.5 m (b) 7.5 m (c) 8.5 m (d) 9.5 m

5. In the given figure, if DE || BC, then x equals

   (a) 6 cm (b) 10 cm (c) 8 cm (d) 12.5 cm



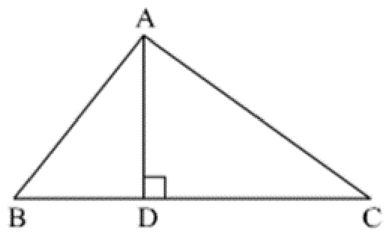

6. A girl of height 90 cm is walking away from the ba at a speed of 1.2 m/s. If the lamp is 3.6 m above the g length of her shadow after 4 seconds.

(a) 1.2 m (b) 1.6 m (c) 2 m (d) none of these.

7. In the Figure, ∠BAC = 90° and AD ⊥ BC. then,

(a) $BD \cdot CD = BC^2$ (b) $AB \cdot AC = BC^2$

(c) $BD \cdot CD = AD^2$ (d) $AB \cdot AC = AD^2$

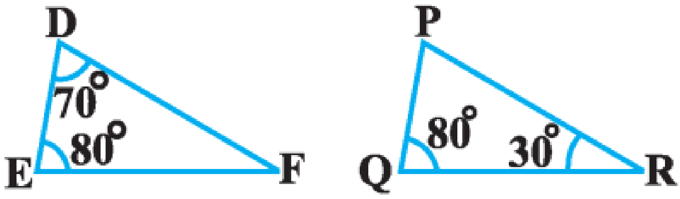



8. The lengths of the diagonals of a rhombus are 16 cm and 12 cm. Then, the length of the side of the rhombus is

(a) 9 cm (b) 10 cm (c) 8cm (d) 20 cm.

9. The similarity criterion used for the similarity of the given triangles shown in figure is

(a) AAA (b) SSS (c) SAS (d) AA




10. If ΔA B C ~ ΔDEF, such that 2AB = DE and BC = 8 cm, then EF =

(a) 16 cm (b) 112 cm (c) 8 cm (d) 4 cm

11. Two poles of height 6 m and 11 m stand vertically upright on a plane ground. If the distance between their foot is 12 m, the distance between their tops is

(a) 14 cm (b) 12 cm (c) 13 cm (d) 11 cm

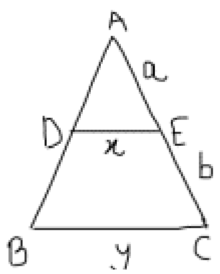
12. . If D, E, F are midpoints of sides BC, CA and AB respectively of ΔA B C , then the ratio of the areas of triangles DEF and ABC is

(a) 2 : 3 (b) 1 : 4 (c) 1 : 2 (d) 4 : 5.

13. In the given figure, DE II BC. Which of the following is true?

(a) $x = \frac{a+b}{ay}$ (b) $y = \frac{ax}{a+y}$

( c) $x = \frac{ay}{a+b}$ (d) $\frac{x}{y} = \frac{a}{b}$




14. In an isosceles triangle ABC, if AC=BC and $AB^2 = 2AC^2$, then the measure of angle C will be

(a) 30° (b) 45° (c) 60° (d) 90.

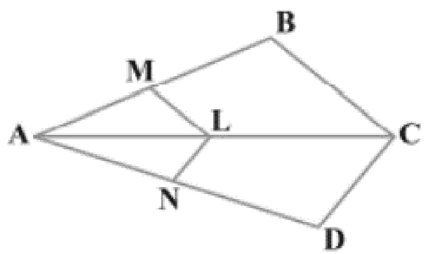
15. In ΔABC, ∠B=90° and BD ⊥ AC. If AC = 9cm and AD = 3 cm then BD is equal to

(a) 2√2 cm (b) 3√2 cm (c) 2√3 cm (d) 3√3 cm.

16. In the following figure LM is parallel to BC and LN is parallel to CD then which of the following relation is true:

(a)$\frac{AM}{AB} = \frac{AN}{AD}$ (b) $\frac{ML}{BC} = \frac{NL}{CD}$

(c) Both of (i) &(ii (d) Neither c

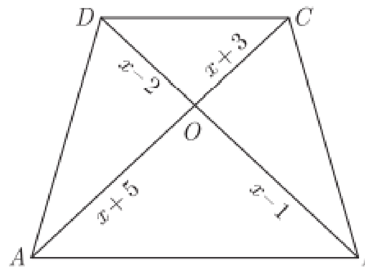


17. The sides AB and AC and the perimeter $P_1$ of $\Delta ABC$ are respectively three times the corresponding sides DE and DF and the perimeter $P_2$ of $\Delta DEF$. What is the value of $\frac{ar(\Delta ABC)}{ar(\Delta DEF)}$?

(a) 4 (b) 8 (c) 9 (d) 16

18. In the given figure, if AB∥DC , the value of $x$ will be

(a) 3 (b) 6 (c) 7 (d) 8




19. In ΔABC, the mid-points of sides BC, CA and AB are D, E and F respectively. The ratio of $\frac{ar(\Delta DEF)}{ar(\Delta ABC)}$ is

(a) $\frac{2}{3}$ (b) $\frac{1}{3}$ (c) $\frac{1}{4}$ (d) $\frac{1}{2}$

20. Which of the following statement is false?

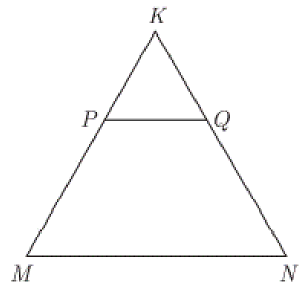
(a) All isosceles triangles are similar. (b) All squares are similar.

(c) All circles are similar. (d) None of the above.

21. In the figure, $PQ$ is parallel to $MN$. If $\frac{KP}{PM} = \frac{4}{13}$ = and $KN$ = 20 4. cm then $KQ$ will be

(a) 4.1 cm (b) 5.2 cm

(c) 4.8 cm (d) 5.4 cm




22. $\Delta ABC$ is isosceles with $AC = BC$ . If $AB^2 = 2AC^2$ , then the measure of $\angle C$ will be

(a) 30° (b) 60° (c) 45° (d) 90°

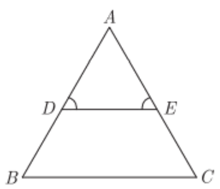
23. In figure $\angle D = \angle E$ and $\frac{AD}{DB} = \frac{AE}{EC}$, then Δ $BAC$ is

(a) isosceles triangle

(b) scalene triangle

(c) equilateral triangle

(d) right angle triangle



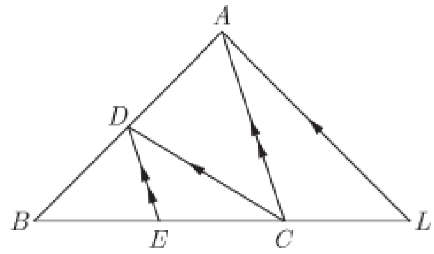
24. In the given figure, $CD \parallel LA$ $and$ $DE \parallel AC$. If BE = 4 cm and EC = 2 cm, the length of C$CL$ will be

(a) 3 cm

(b) 6 cm

(c) 8 cm

(d) 12 cm

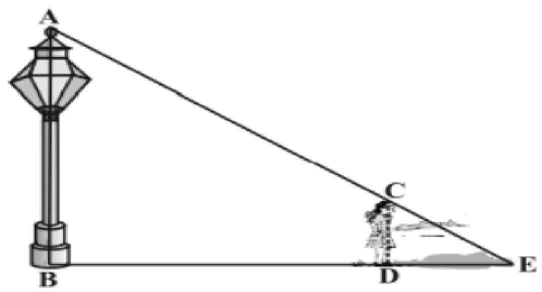



25. In the given figure, $ABC$ is a right angled triangle, $\angle B = 90°$. If $D$ is the mid-point of $BC$ , then $AC^2$ equal to

(a) $3AD^2 + CD^2$ (b) $AD^2 + 3CD^2$ (c) $3AD^2 + \frac{1}{2}CD^2$(d) $\frac{1}{3}AD^2 + 3CD^2$

**CASE STUDY BASED**

1. Geetansha was standing in the ground in front of ATC tower in air force station Gandhinagar. The officer on duty Flight Lieutenant Aman focused the search light of the ATC tower on Geetansha and her shadow was formed on the ground. Look into the figure given below where AB is the ATC tower, CD is Geetansha and DE is her shadow and answer the following questions:




If the height of Geetansha is 1.5 m and the length of her shadow is 6 m point E is 36 m away from the tower then what the height of the ATC tower is

(a) 6 m (b) 9 m (c) 12 m (d) 15 m

(ii) If Geetansha moves 2 m towards the tower then the length of shadow will:

(a) Increase (b) Decrease

(c) Remain same (d) Mathematically cannot calculated.

(iii) Using the data in part (i) of this question find the value of AC: CE

(a) 1: 4 (b) 1: 5 (c) 4:1 (d) 5 : 1

(iv) Which of the following relations is true?

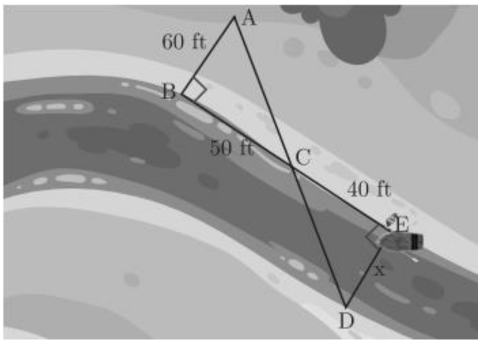
(a) AB: CD = AC: CE (b) AB:CD = AE: CE

(c) AB: CD = AE:AC (d) AB: CD = BE: DE

(v) If Geetansha moves away from the tower at a speed of 1.2 m/s then what will be length of her shadow after 5 seconds.

(a)7.2 m (b) 6.0 m (c) 8.4 m (d) 9.6 m

2. Tania is very intelligent in maths. She always try to relate the concept of maths in daily life. One day she plans to cross a river and want to know how far it is to the other side.




She takes measurements on her side of the river and make the drawing as shown above

i)Which similarity criterion is used in solving the above problem?

(a) SAS similarity criterion (b) AA similarity criterion

(c) SSS similarity criterion (d) None of these

(ii) Consider the following statement :

S1 : $\angle ACB = \angle DCE$

S2 : $\angle BAC = CDE$

Which of the above statement is/are correct

(a) S1 and S2 both (b) S1 (c) S2 (d) None

(iii) Consider the following statement :

S3 : $\frac{AB}{DE} = \frac{CA}{CD}$ S4: $\frac{BC}{CE} = \frac{AB}{DE}$ S5: $\frac{CA}{CD} = \frac{DE}{AB}$

Which of the above statements are correct ?

(a) S3 and S5 (b) S4 and S5 (c) S3 and S4 (d) All three

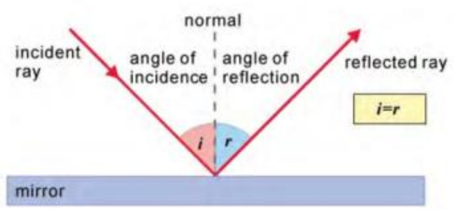
(iv) What is the distance $x$ across the river?

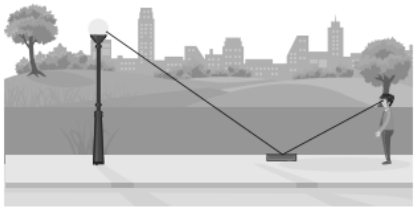
(a) 96 ft (b) 48 ft (c) 24 ft (d) 16 ft

(v) What is the approximate length of AD shown in the figure?

(a) 120 ft (b) 160 ft (c) 140 ft (d) 100 ft.

3. The law of reflection states that when a ray of light reflects off a surface, the angle of incidence is equal to the angle of reflection.



Ramesh places a mirror on level ground to determine the height of a pole (with traffic light fired on it). He stands at a certain distance so that he can see the top of the pole reflected from the mirror. Ramesh's eye level is 1.5 m above the ground. The distance of Ramesh and the pole from the mirror are 1.8 m and 6 m respectively.

(i) Which criterion of similarity is applicable to similar triangles?
(a) SSA (b) ASA (c) SSS (d) AA

(ii) What is the height of the pole?

(a) 6 metres (b) 8 metres (c) 5 metres (d) 4 metres.

(iii) If angle of incidence is $i$ , find $\tan i$ .

(a) $\tan i = \frac{5}{6}$ (b) $\tan i = \frac{6}{5}$ (c) $\tan i = \frac{3}{5}$ (d) $\tan i = \frac{5}{3}$

(iv) Now Ramesh move behind such that distance between pole and Ramesh is 13 meters. He place mirror between him and pole to see the reflection of light in right position. What is the distance between mirror and Ramesh ?

(a) 7 metres (b) 3 metres (c) 5 metres (d) 4 metres.

(v) What is the distance between mirror and pole?

(a) 9 metres (b) 8 metres (c) 12 metres (d) 10 metres.

## CLASS X : CHAPTER - 7

## COORDINATE GEOMETRY

# IMPORTANT FORMULAS & CONCEPTS

## Points to remember

*The distance of a point from the y-axis is called its **x-coordinate**, or **abscissa**.

*The distance of a point from the x-axis is called its **y-coordinate**, or **ordinate**.

*The coordinates of a point on the x-axis are of the form (x, 0).

* The coordinates of a point on the y-axis are of the form (0, y).

## Distance Formula

The distance between any two points $A(x_1, y_1)$ and $B(x_2, y_2)$ is given by

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$or \quad AB = \sqrt{(\text{difference of abscissae})^2 + (\text{difference of ordinates})^2}$$

**Distance of a point from origin**

The distance of a point P(x, y) from origin O is given by OP = $\sqrt{x^2 + y^2}$

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Problems based on geometrical figure

To show that a given figure is a

* Parallelogram – prove that the opposite sides are equal

*Rectangle – prove that the opposite sides are equal and the diagonals are equal.

*Parallelogram but not rectangle – prove that the opposite sides are equal and the diagonals are

not equal.

* Rhombus – prove that the four sides are equal

*Square – prove that the four sides are equal and the diagonals are equal.

* Rhombus but not square – prove that the four sides are equal and the diagonals are not equal.

* Isosceles triangle – prove any two sides are equal.

* Equilateral triangle – prove that all three sides are equal.

* Right triangle – prove that sides of triangle satisfies Pythagoras theorem.

The coordinates of the point P(x, y) which divides the line segment joining the points A($x_1, y_1$) and

$B(x_2, y_2)$, internally, in the ratio $m_1 : m_2$ are

$$\left(\frac{m_1x_2 + m_2x_1}{m_1 + m_2}, \frac{m_1y_2 + m_2y_1}{m_1 + m_2}\right)$$

This is known as **section formula.**

**Mid-point formula**

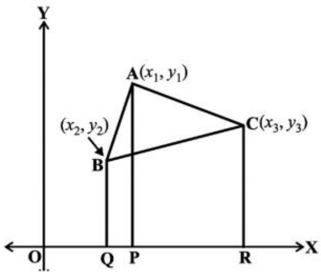
The coordinates of the point P(x, y) which is the midpoint of the line segment joining the points $A(x_1, y_1)$ and $B(x_2, y_2)$ are

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

**Area of a Triangle**

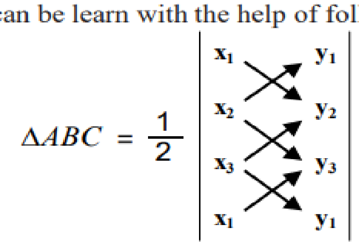
If A($x_1$, $y_1$), B($x_2$, $y_2$) and C($x_3$, $y_3$) are the vertices of a Δ ABC, then the area of Δ ABC is given by

$$Area\ \ of\ \ \Delta ABC = \frac{1}{2}[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$$




**Trick to remember the formula**

The formula of area of a triangle can be learn with the help of following arrow diagram:




Find the sum of products of numbers at the ends of the lines pointing downwards and then subtract the sum of products of numbers at the ends of the line pointing upwards, multiply the difference by $\frac{1}{2}$. .e. $Area\ \ of\ \ \Delta ABC = \frac{1}{2}[(x_1y_2 + x_2y_3 + x_3y_1) - (x_1y_3 + x_3y_2 + x_2y_1)]$

**MCQs**

1. The point P on x -axis equidistant from the points A(- 1, 0) and B( 5, 0) is
   (a) (2, 0) (b) (0, 2) (c) (3, 0) (d) (-3 ,5)

2. If the point P (6, 2) divides the line segment joining A(6, 5) and B (4,y) in the ratio 3:1 then the value of y is

(a) 4 (b) 3 (c) 2 (d) 1

3. What is the ratio is which the line segment joining the points A(3,-3) and B(-2, 7) is divided by x-axis.

(a) 3 : 7 (b) 4 : 7 (c) 5 : 6 (d) 4 : 6

4. The co-ordinates of the point which is reflection of point (- 3, 5) in x - axis are

(a) (3, 5) (b) (3, -5) (c) (-3,-5) (d) (-3,5 )

5 If the point P(k,0) divides the line segment joining the points A(2,- 2) and B(- 7,4) in the ratio 1 : 2, then the value of k is

(a) 1 (b) 2 (c) -2 (d) -1

6. The coordinates of a point A on y -axis, at a distance of 4 units from x - axis and below it are

(a) (4, 0) (b) (0, 4) (c) (-4 0, ) (d) (0, -4)

7. The distance of the point (- 12, 5) from the origin is

(a) 12 (b) 5 (c) 13 (d) 169

8. What are the co-ordinate of a point P on the line segment joining

A(1, 2) and B(6 ,7) such that $AP = \frac{2}{3}$AB?

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

9. What is the ratio in which the point p (m, 6) divides the line segment joining the points A(-4 3), and B(2 8) .

(a) 2 : 3 (b) 3 : 2 (c) 3 : 1 (d) 1 : 3

10. What is the ratio in which the straight line $x - y - 2 = 0$ divides the line segment joining (3,-1) and (8, 9) ?

(a) 5 : 6 (b) 4 : 5 (c) 3 : 4 (d) 2 : 3

**11.** Which of the following point on y-axis is equidistant from the points (5, - 2)and (-3, 2)?

(a) (0,3) (b) (0,2 ) (c) (0,-3) (d) (0,-2)

12. If (a, b) is the mid-point of the segment joining the points A(10,-6) and B (k,4) and $a - 2b = 18,$, the value of k will be

(a) 28 (b) 20 (c) 24 (d) 22

13. What are the co-ordinates of the points of trisection of the line segment joining the points

A(1,-2) and B(-3, 4)

(a) (2, $\frac{-5}{2}$) (b) $(\frac{-5}{2}, 2)$ (c) $(2, \frac{5}{2})$ (d) $(\frac{5}{2}, 2)$

14. What is the ratio in which the line joining points $(a+b, b+a)$ and $(a-b, b-a)$ is divided by the point $(a, b)$ ?

(a) 1 : 1 (b) 2 : 1 (c) 2 : 3 (d) 1 : 3

15. If two adjacent vertices of a parallelogram are (3, 2), and (-1, 0) and the diagonals intersect at (2,-5) then find the co-ordinates of the other two vertex

(a) ( -14, 4) and D(-10,5) (b) (4, -14) and D(5, -10)
(c) (1, -12) and D(5, -10) (d) (- 12, 1) and D(-10,5)

16. If the distance of $P(x, y)$ from $A(6,2)$ and $B(-2,6)$are equal, then

(a) $x = 2y$ (b) $y = 2x$ (c) $y = 3x$ (d) $x = 3y$

17. What is the value of $a$ so that ( $3, a$) lies on the line represented by $2x - 3y - 5 = 0$?

(a) $\frac{5}{2}$ (b) $\frac{1}{3}$ ( c) $\frac{3}{2}$ (d) $\frac{1}{2}$

18. If the vertices of $\Delta ABC\ are\ A(5,-1), B(-3,-2), C(-1,8)$ , the length of median through A will be

(a)$\sqrt{65}$ (b) $\sqrt{55}$ (c) $\sqrt{45}$ (d) $\sqrt{35}$

19. If the point $C(k, 4)$ divides the line segment joining two points $A(2,6)$ and $B(5,1)$ in ratio 2 : 3, the value of k is ......... .

(a) $\frac{5}{16}$ (b) $\frac{16}{5}$ (c) $\frac{9}{5}$ (d) $\frac{5}{9}$

20. The points $(3,0), (6,4)\ and\ (-1,3)$ are the vertices of a

(a) equilateral triangle (b) scalene triangle

(c) isosceles triangle (d) right angled isosceles triangle

21. If $(3,2) and\ (-3,2)$ are two vertices of an equilateral triangle which contains the origin, the third vertex will be

(a) $(1, 2-\sqrt{3})$ (b) $(2, 1-3\sqrt{3})$ (c) $(0, 2-3\sqrt{3})$ (d) $(1, 2+\sqrt{3})$

22. The distance of a point $P(x, y)$ from the origin is

$(\boldsymbol{a})\sqrt{\boldsymbol{x^2 - xy + y^2}}$ (b) $\sqrt{x^2 + xy + y^2}$

(c ) $\sqrt{x^2+y^2}$ (d) $\sqrt{x^2+3xy+y^2}$

23. If $A(-1,0), B(3,1), C(2,2)$ $and$ $D(-2,1)$ to be four point in plane then ABCD is a ______

(a) rhombus (b) square

(c) parallelogram (d) rectangle.

24. If the mid-point of the line segment joining $A\left(\frac{x}{2},\frac{y+1}{2}\right)$and $\mathrm{B}(\mathrm{x}+1,\mathrm{y}-3)$ is $\mathrm{C}(5,-2)$ , value of y is

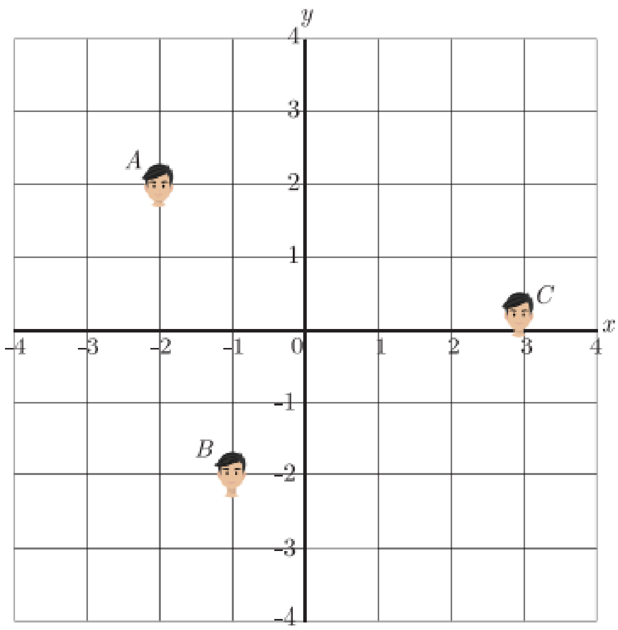
(a) (- 7, 0) (b) (7, 0) (c) (0, 7) (d) (7,0)

25. If points A( -3,12), B(7,6) and C(x,9) are collinear, then the value of x is .........

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

**COMPETENCEY BASED QUESTION**

**1.** Ajay, Bhigu and Colin are fast friend since childhood. They always want to sit in a row in the classroom. But teacher doesn't allow them and rotate the seats row-wise every day. Bhigu is very good in maths and he does distance calculation every day. He considers the centre of class as origin and marks their position on a paper in a co-ordinate system. One day Bhigu make the following diagram of their seating position.




i) . What are the coordinates of point A?

(a) (2, 2) (b) (2,- 2)
(c) (- 2 ,2) (d) (-2,-2)

ii) What is the distance of point A from origin?

(a) 8 (b) $2\sqrt{2}$ (c) 4 (d) $4\sqrt{2}$

iii) What is the distance between A and B ?

(a) $3\sqrt{19}$ (b) $3\sqrt{5}$ (c) $\sqrt{17}$ (d) $2\sqrt{5}$

iv) What is the distance between B and C ?

(a) $3\sqrt{19}$ (b) $3\sqrt{5}$ (c) $\sqrt{17}$ (d) $2\sqrt{5}$

v) . A point D lies on the line segment between points A and B such that AD: DB = 4 :3 . What are the the coordinates of point D ?

(a) $\left(\frac{10}{7},\frac{2}{7}\right)$ (b) $\left(\frac{2}{7},\frac{7}{7}\right)$ (c) $\left(-\frac{10}{7}\cdot\frac{-2}{7}\right)$ (d) $\left(\frac{-2}{7},\frac{-7}{7}\right)$

2. Satellite Images : Satellite images are images of Earth collected by imaging satellites operated by governments and businesses around the world. Satellite imaging companies sell images by licensing them to governments and businesses such as Apple Maps and Google Maps. It should not be confused for astronomy images collected by space telescope.

Barun lives in Jaipur in Vaishali. Satellite image of his colony is shown in given figure. In this view, his house is pointed out by a flag, which is situated at the point of intersection of $x$ and $y$- axes. If he goes 2 cm east and 3 cm north from the house, then he reaches to a grocery store, If he goes 4 cm west and 6 cm south from the house, then he reaches to his office. If he goes 6 cm east and 8 cm south from the house, then he reaches to a food court. If he goes 6 cm west and 8 cm north from the house, he reaches to his kid’s school. Based on the above information, answer the following questions.

i) What is the distance between grocery store and food court?

(a) $\sqrt{137}$ cm (b) $\sqrt{129}$ cm (c) $8\sqrt{15}$ cm (d) $16\sqrt{3}$ cm

ii) What is the distance of the school from the house?

(a) 10 cm (b) 15 cm (c) 20 cm (d) 25 cm

iii) . If the grocery store and office lie on a line, what is the ratio of distance of house from grocery store to that from office?

(a) 2 :1 (b) 3 : 1 (c) 4 : 1 (d) 5 : 1

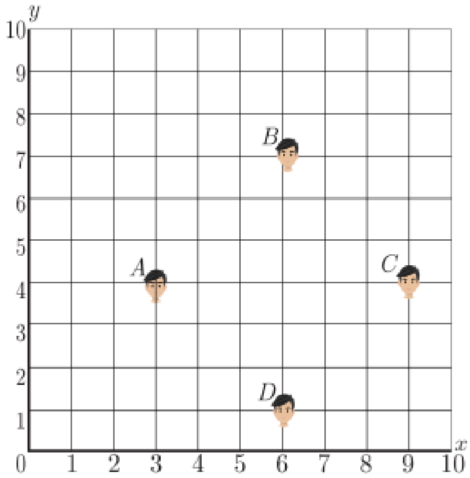
iv) What is the ratio of distances of house from school to food court.

(a) 1 :1 (b) 2 : 1 (c) 3 : 1 (d) 4 : 1

v) What shape is formed by the coordinates of positions of school, grocery store, food court and office?

(a) square (b) rectangle (c) rhombus (d) quadrilateral

1. Morning assembly is an integral part of the school's schedule. Almost all the schools conduct morning assemblies which include prayers, information of latest happenings, inspiring thoughts, speech, national anthem, etc. A good school is always particular about their morning assembly schedule. Morning assembly is




important for a child's development. It is essential to understand that morning assembly is not just about standing in long queues and singing prayers or national anthem, but it's something beyond just prayers. All the activities carried out in morning assembly by the school staff and students have a great influence in every point of life. The positive effects of attending school assemblies can be felt throughout life.

Have you noticed that in school assembly you always stand in row and column and this make a coordinate system. Suppose a school have 100 students and they all assemble in prayer in 10 rows as given above, Here A,B,C and D are four friend Amar, Bharat, Colin and Dravid.

i) What is the distance between A and B ?
(a) 8 (b) 6 (c) $3\sqrt{3}$ (d) $2\sqrt{3}$

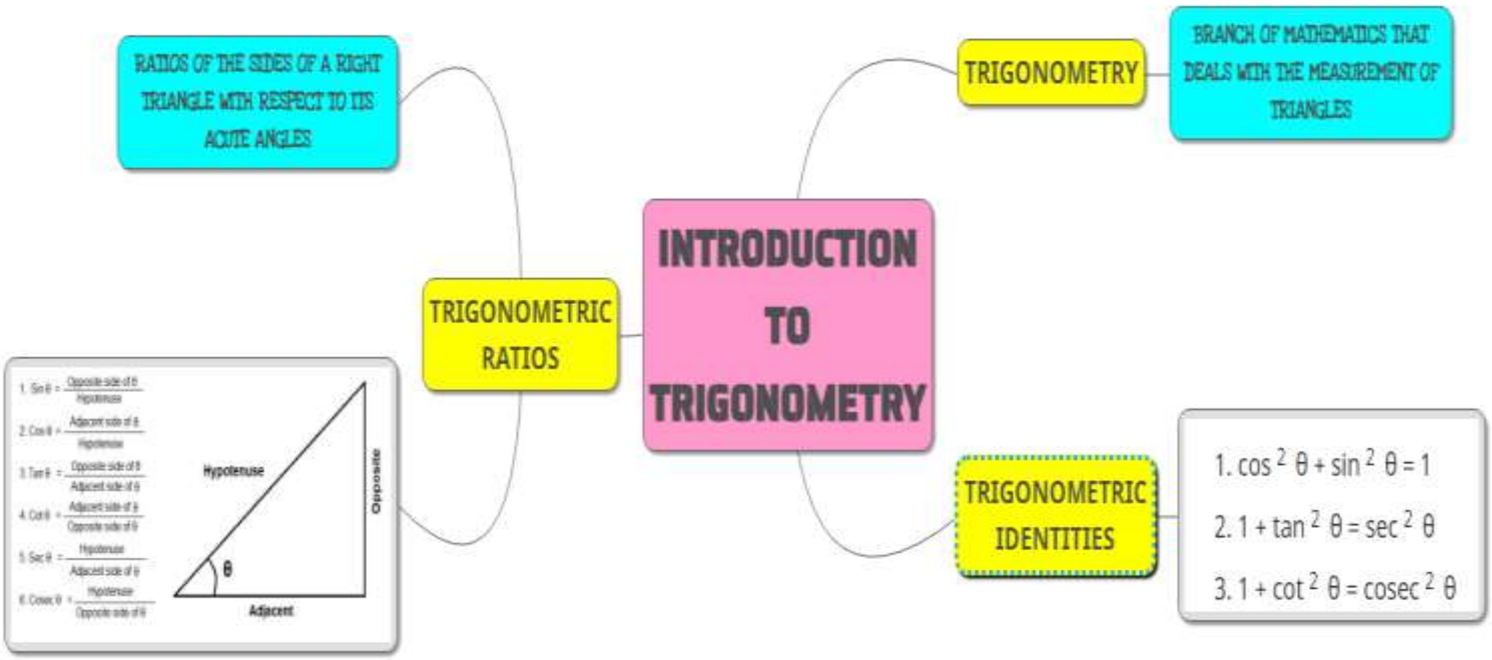
ii) What is the distance between C and D ?
(a) 8 (b) 6 (c) $3\sqrt{3}$ (d) $2\sqrt{3}$

iii) What is the distance between A and C ?
(a) 8 (b) 6 (c) $3\sqrt{3}$ (d) $2\sqrt{3}$

iv) What is the distance between D and B ?
(a) 8 (b) 6 (c) $3\sqrt{3}$ (d) $2\sqrt{3}$

# CHAPTER-10

# INTRODUCTION TO TRIGONOMETRY




## TRIGONOMETRIC RATIOS OF SOME SPECIFIC ANGLES

| Angles(A) | SinA | Cos A | TanA | Cosec A | Sec A | Cot A |
|---|---|---|---|---|---|---|
| $0^0$ | 0 | 1 | 0 | Not defined | 1 | Not defined |
| $30^0$ | 1/2 | $\frac{\sqrt{3}}{2}$ | $\frac{1}{\sqrt{3}}$ | 2 | $\frac{2}{\sqrt{3}}$ | $\sqrt{3}$ |
| $45^0$ | $\frac{1}{\sqrt{2}}$ | $\frac{1}{\sqrt{2}}$ | 1 | $\sqrt{2}$ | $\sqrt{2}$ | 1 |
| $60^0$ | $\frac{\sqrt{3}}{2}$ | 1/2 | $\sqrt{3}$ | $\frac{2}{\sqrt{3}}$ | 2 | $\frac{1}{\sqrt{3}}$ |
| $90^0$ | 1 | 0 | Not defined | 1 | Not defined | 0 |

## A. MULTIPLE CHOICE QUESTIONS

1. If $\sin A = \frac{3}{5}$, then $\cos A$ and $\operatorname{cosec} A$ respectively are

(a) $\frac{4}{5}, \frac{3}{4}$ (b) $\frac{4}{5}, \frac{5}{3}$ (c) $\frac{5}{4}, \frac{3}{4}$ (d) $\frac{5}{4}, \frac{5}{3}$

2. If $8 \tan A = 15$, then the value of $\operatorname{cosec} A$ is

(a) $\frac{15}{12}$ (b) $\frac{13}{15}$ (c) $\frac{4}{15}$ (d) $\frac{17}{15}$

3. If $5 \tan \theta = 3$, then the value of $\left(\frac{5\sin\theta - 3\cos\theta}{4\sin\theta + 3\cos\theta}\right)$ is

(a) 0 (b) 1 (c) 2 (d) 3

4. If $\sin(A + B) = 1$ and $\tan(A - B) = \frac{1}{\sqrt{3}}$ then value of tan A + cot B is

(a) $\frac{1}{\sqrt{3}}$ (b) $\sqrt{3}$ (c) $\frac{1}{2\sqrt{3}}$ (d) $2\sqrt{3}$

5. If $\sin\theta = x$ and $\sec\theta = y$ then the value of $\cot\theta$ is

(a) $xy$ (b) $2xy$ (c) $\frac{1}{xy}$ (d) $\frac{1}{2xy}$

6. The value of $3\cot^2 60° + \sec^2 45°$ is

(a) 3 (b) 5 (c) 7 (d) 13

7. If $\sin(A - B) = \frac{\sqrt{3}}{2}$ and $\cos(A + B) = \frac{\sqrt{3}}{2}$ then the value of A and B respectively are

(a) $30°, 45°$ (b) $45°, 15°$ (c) $60°, 45°$ (d) None of these

8. $\sin 2A = 2\sin A$ is true for when A equals to

(a) $0°$ (b) $30°$ (c) $45°$ (d) $60°$

9. If $\cos A + \cos^2 A = 1$, then $\sin^2 A + \sin^4 A$ equals to

(a) $-1$ (b) 0 (c) 1 (d) 2

10. The value of $\sin 45° + \cos 45°$

(a) $\sqrt{2}$ (b) $\frac{1}{\sqrt{2}}$ (c) 1 (d) None of these

11. The value of $\frac{5\cos^2 60° + 4\sec^2 30° - \tan^2 45°}{\sin^2 30° + \cos^2 30°}$ is

(a) $\frac{32}{35}$ (b) $\frac{14}{55}$ (c) $\frac{67}{12}$ (d) $\frac{19}{33}$

12. The value of $3\tan^2 45° + \cos^2 30° - \sin^2 60°$ is

(a) 1 (b) 3 (c) 6 (d) None of these

13. The value of $\frac{2\cos 30° + 2\sin 60°}{1 + \cos 60° + \sin 30°}$ is

(a) $\sqrt{3}$ (b) $\frac{1}{\sqrt{3}}$ (c) $\frac{\sqrt{3}}{2}$ (d) $\frac{2}{\sqrt{3}}$

14. If $x = 2\cos^2\theta$ and $y = 2\sin^2\theta + 1$, then the value of $(x + y)$ is

(a) 1 (b) 2 (c) 3 (d) 12

15. If $7\sin^2 A + 3\cos^2 A = 4$, then $\tan A$ equals to

(a) $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) $\frac{1}{\sqrt{2}}$ (d) $\frac{1}{\sqrt{3}}$

16. The value of $\frac{\cos A}{1 + \sin A} + \frac{1 + \sin A}{\cos A}$ is

(a) cos A (b) 2 cosA (c) secA (d) 2 secA

17. The value of $\frac{\tan^2 60° + 4\sin^2 45° + 3\sec^2 30° + 5\cos^2 90°}{\operatorname{cosec} 30° + \sec 60° - \cot^2 30°}$ is

(a) 7 (b) 9 (c) 14 (d) None of these

18. The value of $\sqrt{\frac{1 + \sin A}{1 - \sin A}} + \sqrt{\frac{1 - \sin A}{1 + \sin A}}$ is

(a) $\cos A$ (b) $2\cos A$ (c) $\sec A$ (d) $2\sec A$

19. If $\sqrt{3}\sin\theta - \cos\theta = 0$ and $0° < \theta < 90°$, *then the value of* $\theta$ *is*

(a) 30° (b) 45° (c) 60° (d) 90°

20. ΔRP1Q is a right angled at Q. If PQ=5cm and RQ=10cm, then value of $\sin P \times \cos P$

(a) $\frac{1}{5}$ (b) $\frac{2}{5}$ (c) $\frac{3}{5}$ (d) $\frac{4}{5}$

**B. Assertion- Reason Type Questions**

In the following questions a statement of assertion (A) is followed by a statement Reason(R). Choose the correct choice as:

**(a)** Both Assertion (A) and reason (R) are true and reason (R) is the correct explanation of Assertion (A).

**(b)** Both Assertion (A) and reason (R) are true and reason (R) is not the correct explanation of Assertion (A).

**(c)** Assertion (A) is true but reason (R) is false.

**(d)** Assertion (A) is false but reason (R) is true.

**1. Assertion (A):** $sin^2 15° + cos^2 15° = 1$

**Reason (R):** For any value of $\theta$, $sin^2\theta + cos^2\theta = 1$

**2. Assertion (A):** If ΔABC is right angled at C such that AC=$\sqrt{3}$ BC, then ABC equals to 30°.

**Reason (R):** $\tan B = \frac{AC}{BC}$

**3. Assertion (A):** $\sin\theta = \frac{4}{3}$ for some angle θ.

**Reason (R):** The value of sinθ can never exceed 1 for any angle θ.

**4. Assertion (A):** If ΔABC is right angled at C, then the value of cos(A+B) is 0.

**Reason (R):** $\sin 90°\ equals\ to\ 1$.

**5. Assertion (A):** Cot A is the product of cot and A.

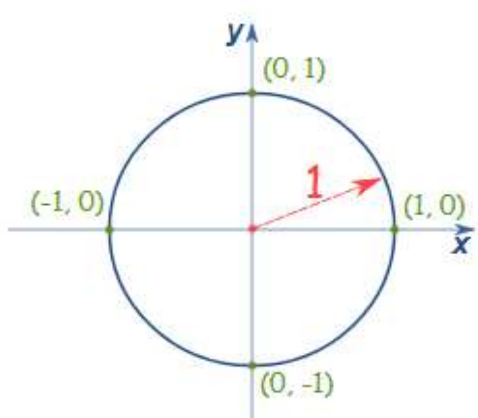
**Reason (R):** Cot A is the abbreviation used for cotangent A.

## C. Case study questions

<u>Converting Cartesian coordinates into Polar coordinates:-</u>

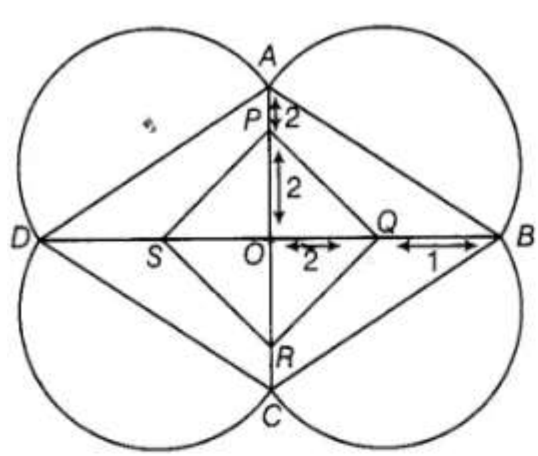
We can convert polar coordinates into Cartesian coordinates (x,y) by using the trigonometric functions sin and cos. The following diagram illustrates the relationship between polar and Cartesian coordinates. So, to convert from polar coordinates (r,θ) to Cartesian coordinates (x,y) the formula is

**x= rcos θ and y=rsin θ, where r is the distance of given point from origin.**



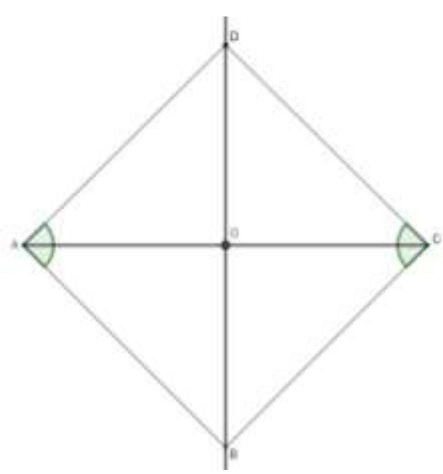
1. Find the polar coordinates of point whose Cartesian coordinates are (1, 0).
   (a) $(\sin 90°, \cos 0°)$
   (b) $(\sin 0°, \cos 90°)$
   (c) $(\sin 0°, \cos 0°)$
   (d) $(\sin 90°, \cos 90°)$
2. Find the polar coordinates of point whose Cartesian coordinates are (1, 0).
   (a) $(\sin 90°, \cos 0°)$
   (b) $(\sin 0°, \cos 90°)$
   (c) $(\sin 0°, \cos 0°)$
   (d) $(\sin 90°, \cos 90°)$
3. For x= cos θ and y= sin θ, the value of $x^2+y^2$ is
   (a) 0
   (b) 1
   (c) -1
   (d) None of the above
4. The Cartesian coordinates of point P $(\cos 60°, \sin 60°)$ are
   (a) $(\frac{1}{2}, 0)$
   (b) $(\frac{1}{2}, \frac{1}{2})$
   (c) $(\frac{1}{2}, \frac{\sqrt{3}}{2})$
   (d) $(\frac{\sqrt{3}}{2}, \frac{1}{2})$
5. Find the distance between point A $(\sin 90°, \cos 90°)$ and point B $(\sin 0°, \cos 0°)$
   (a) 1
   (b) 2
   (c) $\sqrt{2}$
   (d) $2\sqrt{2}$

RANGOLI DESIGNS- A rangoli has been designed on the floor of a house. ABCD and PQRS are both in shape of rhombus.



1. The measure of angle PQO is
   (a) $30°$
   (b) $45°$
   (c) $60°$
   (d) None of the above
2. The value of tanB is
   (a) $\frac{2}{3}$
   (b) $\frac{3}{2}$
   (c) $\frac{4}{3}$
   (d) $\frac{3}{4}$
3. The length of PQ is
   (a) $\sqrt{2}$
   (b) $2\sqrt{2}$
   (c) 4
   (d) None of these
4. The length of AB is
   (a) 3
   (b) 4
   (c) 5
   (d) 6
5. The value of $cosec^2 B$ is
   (a) $\frac{25}{16}$
   (b) $\frac{25}{4}$
   (c) $\frac{25}{9}$
   (d) $\frac{25}{3}$

RHOMBUS- ABCD is a Rhombus of side 10 cm which has two angles BAD and BCD of measure $60°$ each.



1. ΔAOB is an
   (a) Acute angled triangle
   (b) Right angled triangle
   (c) Obtuse angled triangle
   (d) Can’t be determined
2. The length of diagonal AC is
   (a) 5
   (b) $5\sqrt{3}$
   (c) 10
   (d) $10\sqrt{3}$
3. The length of diagonal BD is
   (a) 5
   (b) $5\sqrt{3}$
   (c) 10
   (d) $10\sqrt{3}$
4. The value of $\frac{AO}{OB}$ is
   (a) 1
   (b) $\sqrt{3}$
   (c) $\frac{1}{\sqrt{3}}$
   (d) Cannot be determined
5. The value of OB is
   (a) 5
   (b) $5\sqrt{3}$
   (c) 10
   (d) $10\sqrt{3}$

# ANSWER KEY-CLASS X TRIANGLES, COORDINATE GEOMETRY

1( c) 2(d) 3( b) 4(a) 5(b) 6(b) 7(c ) 8( b) 9( a) 10(a) 11.(c ) 12. (b)
13.( c) 14 (d) 15.( b) 16( c)

17 (C) 9 AB+AC+BC=3(DE+DF+EF), $\frac{ar(\Delta ABC)}{ar(\Delta DEF)}=\frac{AB^2}{DE^2}$=9

18 ( c) 7, diagonals of a trapezium divides each other proportionally ∴

$$\frac{x+5}{x+3}=\frac{x-1}{x-2}$$

$$\begin{aligned}(x+5)(x-2) &= (x-1)(x+3)\\ x^2-2x+5x-10 &= x^2+3x-x-3\\ x^2+3x-10 &= x^2+2x-3\\ 3x-10 &= 2x-3\\ 3x-2x &= 10-3 \Rightarrow x=7\end{aligned}$$

19( c) $\frac{1}{4}$ 20(a)

21 ( c) 4.8 cm

$$\begin{aligned}\frac{KP}{PM} &= \frac{KQ}{QN}\\ \frac{KP}{PM} &= \frac{KQ}{KN-KQ}\\ \frac{4}{13} &= \frac{KQ}{20.4-KQ}\\ 4\times 20.4-4KQ &= 13KQ\\ 17KQ &= 4\times 20.4\\ KQ &= \frac{20.4\times 4}{17}=4.8 \text{ cm}\end{aligned}$$

22(d) $90^0$ 23( a) isosceles triangle.

24 (a) 3 cm

In $\Delta ABC$, $DE \parallel AC$, $BE=4$ cm and $EC=2$c

By BPT $\frac{BD}{DA}=\frac{BE}{EC}$

In $\Delta ABL$, $DC \parallel AL$

By BPT $\frac{BD}{DA}=\frac{BC}{CL}$

From equations (1) and (2),

$$\frac{BE}{EC}=\frac{BC}{CL}$$

$$\frac{4}{2}=\frac{6}{CL}\Rightarrow CL=3 \text{ cm}$$

25 ( c) (c) $3AD^2+\frac{1}{2}CD^2$

CASE STUDY BASED

1
. (i) (b) 9 m {Explanation: AB: CD = BE: DE by B.P.T}
(ii) (b) Decrease {When Geetansha moves 2 m towards the tower BD = 34 m, AB = 9 m, CD = 1.5 m, DE = ?. AB: CD = BE:DE , Solving we get DE = 5.6m. Which is a decrease}

(iii) (d) 5 : 1 {Explanation: AC:CE = BD:DE = 36-6: 6 = 30: 6 = 5: 1}

(iv) (b) AB:CD = AE: CE (iv) AB: CD = BE: DE

(v) (a) 7.2 m {Explanation: When Geetansha moves away from the tower at the speed of 1.2 m/s and time taken is 5 secs. The new position of point D is shifted by = 1.2X 5 = 6 m. Now BD = 30+6 = 36 m. Let the length of new shadow be x m. BE : DE = AB: CD 36+x : x = 9 :1.5 . Solving this relation we can get the value of x}

2.i)(b) AA ii)(a) S1 and S2 both iii)( c) S3 and S4 iv b) 48 ft v) (c ) 140 ft

3.i) (d) AA ii) c) 5 m iii) b) $\tan i = \frac{6}{5}$ iv)b) 3 mts v)( d) 10 mts

## CO-ORDINATE GEOMETRY

1(a) (2,0) 2.(d) 1 3. (a) 3:7 4. c(-3,-5) 5. (d) -1 6. (d) (0,-4)

7. (c) 13 8. (a) (3, 4) 9. (b) 3:2

10. (d) 2:3

Let co-ordinates of $P$ be $(x_1, y_1)$ and it divides line $AB$ in the ratio $k:1$.

Now
$$x_1 = \frac{8k+3}{k+1}$$
$$y_1 = \frac{9k-1}{k+1}$$

Since point $P(x_1, y_1)$ lies on line $x - y - 2 = 0$, so co-ordinates of $P$ must satisfy the equation of line.

Thus
$$\frac{8k+3}{k+1} - \frac{9k-1}{k+1} - 2 = 0$$
$$8k + 3 - 9k + 1 - 2k - 2 = 0$$
$$-3k + 2 = 0 \Rightarrow k = \frac{2}{3}$$

11. (d) (0,-2)

12. (d)

We have $A(10,-6)$ and $B(k,4)$.
If $P(a,b)$ is mid-point of $AB$, then we have

$$(a,b) = \left(\frac{k+10}{2}, \frac{-6+4}{2}\right)$$

$$a = \frac{k+10}{2} \text{ and } b = -1$$

From given condition we have

$$a - 2b = 18$$

Substituting value $b = -1$ we obtain

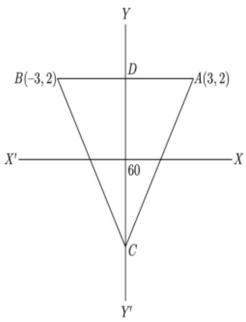
$$a + 2 = 18 \Rightarrow a = 16$$

$$a = \frac{k+10}{2} = 16 \Rightarrow k = 22$$

13. (b) $(\frac{-5}{2}, 2)$ 14. (a) 1:1 15. (c ) (1,-12) and D(5,-10) 16. (b) y=2x

17. (b) 1/3 18. (a) $\sqrt{65}$ 19.(b) $\frac{16}{5}$ 20. (d) right angled isosceles triangle

21. $(0, 2-3\sqrt{3})$




Let $C(x,y)$ be the coordinate of $3^{rd}$ vertex of $\Delta ABC$.

Now $AB^2 = (3+3)^2 + (2-2)^2 = 36$

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

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

Since $AB^2 = AC^2 = BC^2$

$$(x+3)^2 + (y-2)^2 = 36 \quad (1)$$

$$(x-3)^2 + (y-2)^2 = 36 \quad (2)$$

Since $P(x,y)$ lie on $y$-axis, substituting $x=0$ in (1) we have

$$3^2 + (y-2)^2 = 36 - 9 = 27$$

$$(y-2)^2 = 36 - 9 = 27$$

Taking square root both side

$$y - 2 = \pm 3\sqrt{3}$$

$$y = 2 \pm 3\sqrt{3}$$

Since origin is inside the given triangle, coordinate of $C$ below the origin,

$$y = 2 - 3\sqrt{3}$$

Hence Coordinate of $C$ is $(0, \ 2-3\sqrt{3})$
Thus (c) is correct option.

22. ( c) $\sqrt{x^2 + y^2}$ 23. (c) parallelogram 24. (a) (- 7, 0) 25. (a) 2

COMPETENCEY BASED QUESTIONS

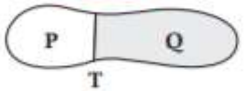
1. i) c ii) b iii) c iv) d v) c
2. i) a ii) a iii) a iv) a v) d
3. i) d ii) d iii) b iv) b

MIND MAPS
LEARNING MADE SIMPLE

# Areas Related to Circles

## Area - Combination of figures

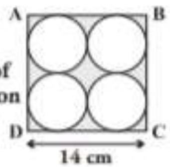
### Meaning




Area of T = Area of P + Area of Q

### Example

Find Area of shaded region




Area of square ABCD = $14 \times 14$ cm$^2$
$= 196$ cm$^2$

Diameter of each circle, $D = \frac{14}{2} = 7$ cm

For each circle, radius $(r) = \frac{7}{2}$ cm

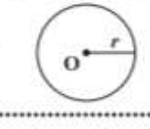
Area of 1 circle $= \pi r^2$

Area of 4 circles $= 4 \times \frac{22}{7} \times \left(\frac{7}{2}\right)^2$ cm$^2$
$= \frac{154}{4} \times 4$ cm$^2$
$= 154$ cm$^2$

Area of shaded region = Area of ABCD– Area of 4 circles
$= (196 - 154) = 42$ cm$^2$

## Circle

- Circumference $= \pi \times$ diameter $= 2\pi r$
- Area $= \pi r^2$




## Sector

### Meaning

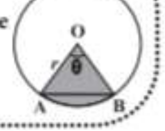
Portion of the circular region enclosed by two radius and the corresponding arc


### Formula

#### Area

$A = \frac{\theta}{360°} \times$ area of circle

$A = \frac{\theta}{360°} \times \pi r^2$




#### Length of arc

$L = \frac{\theta}{360°} \times$ circumference

$L = \frac{\theta}{360°} \times 2\pi r$

## Segment

### Formula

Area = Area of the corresponding sector– Area of the corresponding triangle

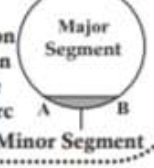
$= \frac{\theta}{360°} \times \pi r^2 -$ area of $\Delta OAB$

$= \frac{\pi r^2 \theta}{360°} - \frac{1}{2} r^2 \sin\theta$


Area of Sector $= \frac{1}{2} \times L \times r$

### Meaning

Portion of the circular region enclosed between a chord and the corresponding arc



**CLASS X CHAPTER 12 AREAS RELATED TO CIRCLES MCQ : 25**

QUE.1 The area of a circle that can be inscribed in a square of side 10 cm is
(a) $40\pi$ $cm^2$
(b) $30\pi$ $cm^2$
(c) $100\pi$ $cm^2$
(d) $25\pi$ $cm^2$

QUE.2 If the sum of the circumferences of two circles with radii $R_1$ and $R_2$ is equal to circumference of a circle of radius R, then
(a) $R_1 + R_2 = R$
(b) $R_1 + R_2 > R$
(c) $R_1 + R_2 < R$
(d) Can't say;

QUE.3 The radius of sphere is r cm. It is divided into . two equal parts. The whole surface area of two parts will be
(a) $8\pi r^2$ $cm^2$
(b) $6\pi r^2$ $cm^2$
(c) $4\pi r^2$ $cm^2$
(d) $3\pi r^2$ $cm^2$

QUE.4 A race track is in the form of a circular ring whose outer and inner circumferences are 396 m and 352 m respectively. The width of the track is
(a) 63 m
(b) 56 m
(c) 7 m

(d) 3.5 m

QUE.5 The area of the largest triangle that can be inscribed in a semicircle of radius r is
(a) $r^2$
(b) $2r^2$
(c) $r^3$
(d) $2r^3$

QUE.6 If the perimeter of a circle is equal to that of a square, then the ratio of their areas is
(a) 22 : 7
(b) 14 : 11
(c) 7 : 22
(d) 11 : 14

QUE.7 A steel wire when bent in the form of a square encloses an area of 121 $cm^2$. If the same wire is bent in the form of a circle, then the circumference of the circle is
(a) 88 cm
(b) 44 cm
(c) 22 cm
(d) 11 cm

QUE.8 In a circle of radius 21 cm, an arc subtends an angle of 60° at the centre. The area of the sector formed by the arc is**:**

(a) 200 $cm^2$

(b) 220 $cm^2$

(c) 231 $cm^2$

(d) 250 $cm^2$

QUE.9 Area of a sector of angle p (in degrees) of a circle with radius R is

(a) p/180 × 2πR

(b) p/180 × π $R^2$

(c) p/360 × 2Πr

(d) p/720 × 2π$R^2$

QUE.10 The wheel of a motorcycle is of radius 35 cm. The number of revolutions per minute must the wheel make so as to keep a speed of 66 km/hr will be

(a) 50

(b) 100

(c) 500

(d) 1000

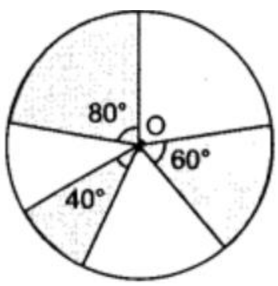
QUE.11 A horse is tied to a peg at one corner of a square shaped grass field of side 15 m by means of a 7 m long rope. The area of that part of the field in which the horse can graze, is
(a) 77 cmÂ²
(b) 77/2 cmÂ²
(c) 15/4 cmÂ²
(d) 77/4 cmÂ²

QUE.12 The length of the minute hand of a clock is 14 cm. The area swept by the minute hand in 5 minutes is
(a) 153.9 cmÂ²
(b) 102.6 cmÂ²
(c) 51.3 cmÂ²
(d) 205.2 cmÂ²

QUE.13 If the area of a circle is numerically equal to twice its circumference, then the diameter of the circle is
(a) 4 units
(b) n units
(c) 8 units
(d) 2 units

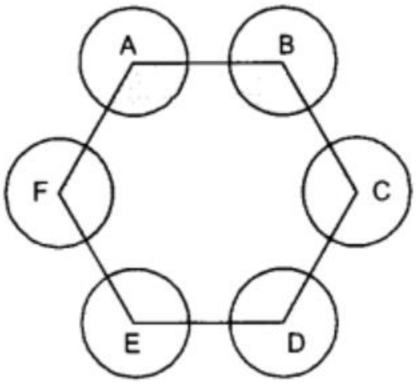
QUE.14 If the circumference of a circle and the perimeter of a square are equal, then [NCERT Exemplar Problems]
(a) area of the circle=area of the square
(b) area of the circle > area of the square
(c) area of the circle < area of the square
(d) nothing definite can be said about the relation between the areas of the circle and square.

QUE.15 In the given figure, three sectors of a circle of radius 7 cm, making angles of 60Â°, 80Â° and 40Â° at the centre are shaded. The area of the shaded region (in cm2) is [Using π=22/7]



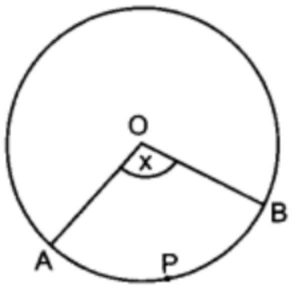
(a) 77
(b) 154
(c) 44
(d) 22

QUE.16 ABCDEF is any hexagon with different vertices A, B, C, D, E and F as the centres of circles with same radius r are drawn. The area of the shaded portion is




(a) πrÂ$^{2}$
(b) 2πrÂ$^{2}$
(c) 3πrÂ$^{2}$
(d) 4πrÂ$^{2}$

QUE.17 In the fig., O is the centre of a circle. The area of sector OAPB is 5/18 of the area of the circle. Find x.




(a)120

(b)80

(c)75

(d)100

QUE.18 The area of the sector of a circle with radius 6 cm and of angle 60° is
(a) 9.42 cm$^2$
(b) 37.68 cm$^2$
(c) 18.84 cm$^2$
(d) 19.84 cm$^2$

QUE.19 If the radius of the circle is increased by 100%, then the area is increased by

(a)200%

(b)400%

(c)80%

(d)300%

QUE.20 If the circumference of a circle is 352 metres, then its area (approx)in **m 2** is

(a)9859

(b)9769

(c)7869

(d)5467

QUE.21 if diameter of a circle is increased by 40 then its area will be increased by

(a)80%

(b)96%

(c)150%

(d)200%

QUE.22 The diameter of a circle whose area is equal to the sum of the areas of the two circles of radii **24 cm** and **7 cm** is

(a)89 cm

(B)100 cm

(c)50 cm

(d) 90 cm

QUE.23 If the circumferences of two concentric circles forming a ring are 88 cm and 66 cm respectively. Find the width of the ring

(a)14

(b)7/2

(c)22

(d)3/2

QUE. 24 The area of the largest square that can be inscribed in a circle of radius **12cm** is

(a)249

(b)288

(c)267

(d)232

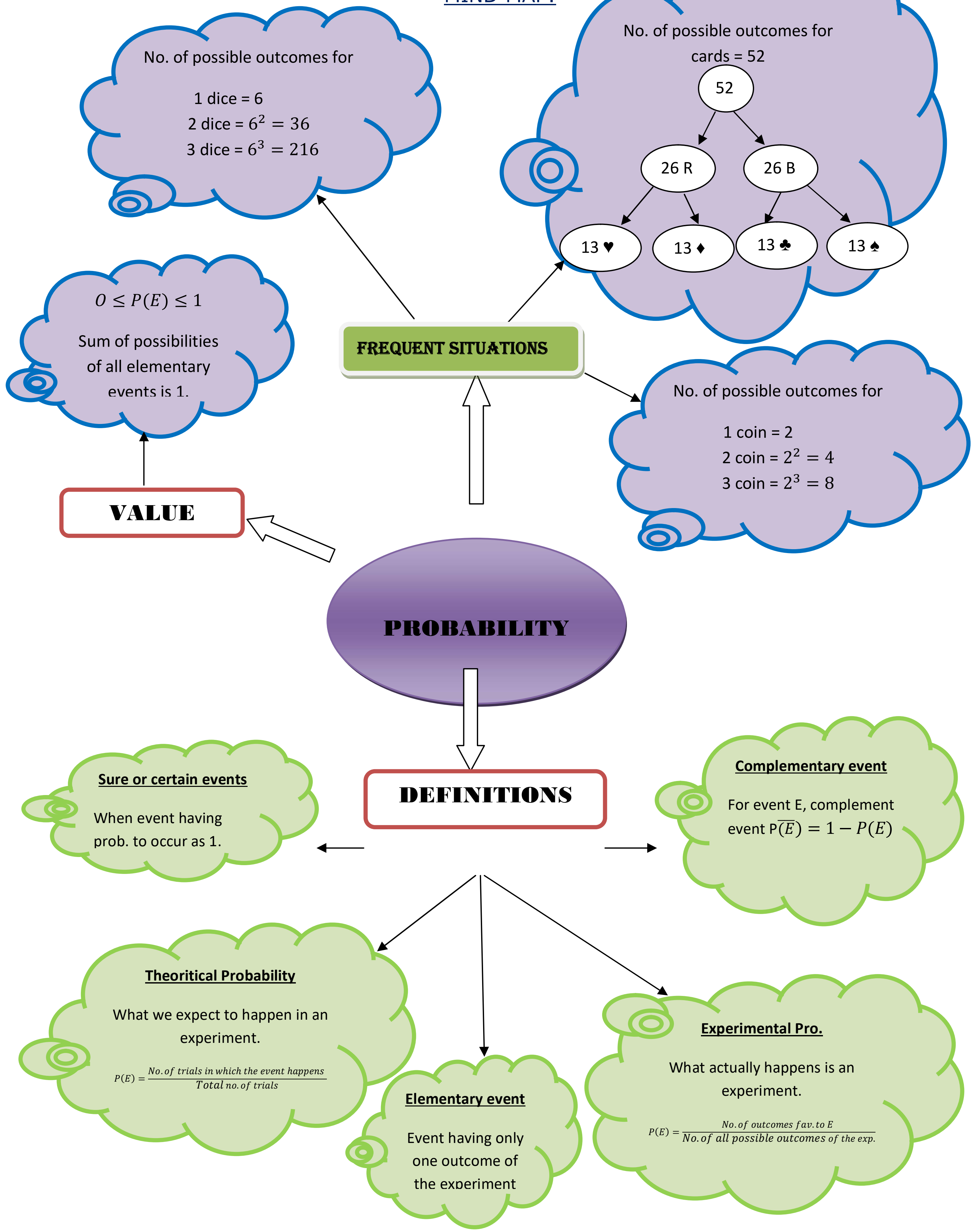
QUE. 25 The ratio of the areas of the incircle and circumcircle of a square is
(a) 1 : 2
(b) 1 : 3
(c) 1 : 4
(d) 1 : √2

ANSWERS :

| QUE.NO | ANSWER |
|---|---|
| 1 | D |
| 2 | A |
| 3 | B |
| 4 | C |
| 5 | A |
| 6 | B |
| 7 | B |
| 8 | C |
| 9 | D |
| 10 | C |
| 11 | B |
| 12 | C |
| 13 | C |
| 14 | B |
| 15 | A |
| 16 | B |
| 17 | D |
| 18 | C |
| 19 | D |
| 20 | A |
| 21 | B |
| 22 | C |
| 23 | B |
| 24 | B |
| 25 | A |

# CHAPTER 15: PROBABILITY

## MIND MAP:



## MULTIPLE CHOICE QUESTIONS

Q.1) If Ē denotes the complement of a negation of an event E, what is the value of P€ +P(Ē)?

a) 1
b) 0
c) $\frac{1}{2}$
d) $\frac{10}{13}$

Q.2) Tickets numbered 1 to 20 are mixed up and then a ticket is drawn at random. What is the probability that the ticket drawn bears a number which is a multiple of 3?

a) $\frac{3}{4}$
b) $\frac{1}{13}$
c) $\frac{1}{2}$
d) $\frac{3}{10}$

Q.3) A bag contains 3 red balls and 5 black balls. A black ball is drawn at random from the bag. What is the probability that the ball drawn is not red?

a) $\frac{2}{7}$
b) $\frac{21}{26}$
c) $\frac{5}{8}$
d) $\frac{3}{7}$

Q.4) A letter of English alphabet is chosen at random. Determine the probability that the chosen letter is a consonant.

a) $\frac{3}{8}$
b) $\frac{5}{8}$
c) $\frac{2}{26}$
d) $\frac{21}{26}$

Q.5) What is the probability that a leap year has 52 Mondays?

a) $\frac{2}{7}$
b) $\frac{3}{7}$
c) $\frac{4}{7}$
d) $\frac{5}{7}$

Q.6) Two dice are rolled simultaneously. The probability that they show different faces is?

a) $\frac{2}{3}$
b) $\frac{5}{6}$
c) $\frac{1}{6}$
d) $\frac{1}{3}$

Q.7) A card is drawn at random from a pack of 52 cards. The probability that the drawn card is not an ace is?

a) $\frac{1}{13}$
b) $\frac{9}{13}$
c) $\frac{4}{13}$
d) $\frac{12}{13}$

Q.8) If two different dice are rolled together, the probability of getting an even number on both dice, is?

a) $\frac{1}{36}$
b) $\frac{1}{2}$
c) $\frac{1}{4}$
d) $\frac{1}{6}$

Q.9) Two different coins are tossed together. The probability of getting atleast one head is?

a) $\frac{1}{4}$
b) $\frac{1}{8}$
c) $\frac{3}{4}$
d) $\frac{7}{8}$

Q.10) A box contains 90 discs, numbered from 1 to 90. If one disc is drawn at random from the box, find the probability that it bears a prime numberless then 23?

a) $\frac{7}{90}$
b) $\frac{10}{90}$
c) $\frac{4}{45}$
d) $\frac{9}{89}$

Q.11) The probability of an impossible event is

a) 0
b) 1
c) $\frac{1}{2}$
d) Does not exist

Q.12) Arushi sold 100 lottery tickets in which 5 tickets carry prizes. If Priya purchased a ticket, what is the probability of Priya winning a prize?

a) $\frac{19}{20}$
b) $\frac{1}{25}$
c) $\frac{1}{20}$
d) $\frac{17}{20}$

Q.13) A school has 5 houses A, B, C, D and E. A class has 23 students, 4 from house A, 8 from house B, 5 from house C, 2 from house D and the rest from house E. A single student is selected at randomto be the class monitor. The probability that the selected student is not from A, B and C is:

a) $\frac{4}{23}$
b) $\frac{6}{23}$
c) $\frac{8}{23}$
d) $\frac{17}{23}$

Q.14) which of the following cannot be the probability of an event?

a) $\frac{1}{3}$
b) 0.1
c) 3%
d) $\frac{17}{16}$

Q.15) A card is selected from  a deck of 52 cards. The probability of its being red face card is:

a) $\frac{3}{13}$
b) $\frac{3}{26}$
c) $\frac{12}{13}$
d) $\frac{1}{13}$

Q.16) In a family of 3 children, Find the probability of having at least one boy?

a) $\frac{7}{8}$
b) $\frac{1}{8}$
c) $\frac{5}{8}$
d) $\frac{1}{4}$

Q.17)The probability of guessing the correct answer to a certain test questions is $\frac{x}{12}$ . if the probability of not guessing the correct answer to this question is $\frac{2}{3}$ then x= ?

a) 2
b) 3
c) 4
d) 6

Q.18) If three coins are tossed simultaneously, then the probability of getting at least two heads, is?

a) $\frac{1}{4}$
b) $\frac{3}{8}$
c) $\frac{1}{2}$
d) $\frac{2}{3}$

Q.19) Two dice are rolled simultaneously. Find the probability that the sum of numbers appearing is10.

a) $\frac{1}{12}$
b) $\frac{3}{100}$
c) $\frac{22}{25}$
d) $\frac{122}{125}$

Q.20) From a deck of 52 playing cards, Jacks and Kings of red colour and queen and aces of black colour are removed. The remaining cards are mixed and a card is drawn at random. Find the probability that the card drawn is a card of red colour?

a) $0$
b) $\frac{1}{2}$
c) $\frac{1}{22}$
d) $\frac{3}{22}$

Q.21)In tossing a die what is the probability of getting an odd number or a number less then 4?

a) $\frac{3}{4}$
b) $\frac{1}{2}$
c) $\frac{2}{3}$
d) $\frac{3}{10}$

Q.22)A dice is rolled twice. Find the probability that 5 will not come up either time?

a) $\frac{5}{18}$
b) $\frac{25}{36}$
c) $\frac{8}{113}$
d) $\frac{16}{113}$

Q.23) An event is very unlikely to happen. Its probability is closest to

(a) 0.0001

(b) 0.001

(c) 0.01

(d) 0.1

Q.24) Two players, Sangeeta and Reshma, play a tennis match. It is known that the probability of Sangeeta winning the match is 0.62. The probability of Reshma winning the match is

a) 0.62

b) 0.38

c) 0.58

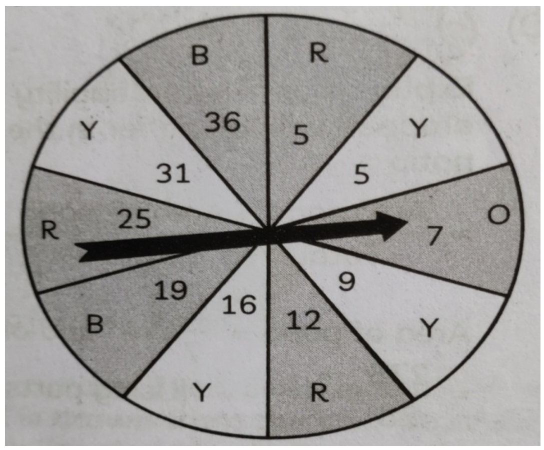
d) 0.42

Q.25) What is the probability of getting a sum 9 from two throws of a dice?

a) $\frac{1}{6}$
b) $\frac{1}{8}$
c) $\frac{1}{12}$
d) $\frac{1}{9}$

## ***CASE STUDY QUESTIONS:***

CSQ.1)An unbiased game of chance as shown below consists of spinning the wheel on which different areas have been marked with different colors such as red, yellow,blue, and orange denoted by the alphabetsR, Y, B and O on the wheel respectively. Numbers have been marked on different parts and each of these is equally likely. The prize depends on the number at which the arrow points once the wheel come to a rest.




1. The probability that the arrow will point at a prime number is:
   a) 0
   b) $\frac{3}{10}$
   c) $\frac{1}{2}$
   d) $\frac{2}{5}$
2. If the arrow points at a perfect square number, the person gets a double chance to spin the wheel. Then probabilityof a double chance of spinning wheel is:

   a) $\frac{2}{5}$
   b) $\frac{3}{10}$
   c) $\frac{1}{2}$
   d) $\frac{3}{5}$
3. The probability that the arrow will point towards yellow colour 'Y' is:

   a) $\frac{1}{2}$
   b) $\frac{3}{5}$
   c) $\frac{3}{10}$
   d) $\frac{2}{5}$

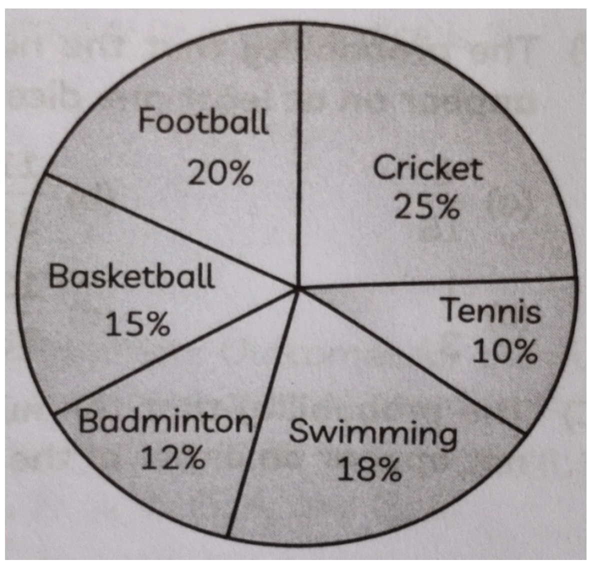
4. The probability of arrow pointing towards a number divisible by 3 is:

    a) 0
    b) $\frac{3}{10}$
    c) $\frac{3}{5}$
    d) $\frac{1}{2}$

5. The probability of arrow pointing towards an odd number or a prime number is:

    a) $\frac{1}{2}$
    b) $\frac{3}{5}$
    c) $\frac{7}{10}$
    d) $\frac{6}{5}$

CSQ.2) A school offers several sports to its students such as cricket, basketball, tennis, badminton and swimming. Based on past records the sports teacher prepared a pie charts shown below showing preference of students towards a particular sport.




1. The probability of favourite sport being cricket is:
    a) $\frac{1}{10}$
    b) $\frac{9}{50}$
    c) $\frac{1}{4}$
    d) $\frac{3}{10}$
2. The probability of favourite sport being either swimming or badminton is:

    a) $\frac{33}{100}$
    b) $\frac{1}{10}$
    c) $\frac{1}{4}$
    d) $\frac{3}{10}$

3. The probability of favourite sport being neither football nor cricket is:

   a) $\frac{3}{10}$
   b) $\frac{11}{20}$
   c) $\frac{7}{10}$
   d) $\frac{33}{100}$

4. The probability of favourite sport not being basketball is:

   a) $\frac{17}{20}$
   b) $\frac{1}{10}$
   c) $\frac{3}{10}$
   d) $\frac{19}{20}$

5. A student wants to select a sport in the school.The probability that the student will choose tennis as his/her preferred sport is:

   a) 0
   b) $\frac{3}{10}$
   c) $\frac{11}{20}$
   d) $\frac{1}{10}$

CSQ.3) On a weekend Rani was playing cards with her family. The deck has 52 cards. If her brother drew one card.

1. Find the probability of getting a king of red color:
   a) $\frac{1}{26}$
   b) $\frac{1}{13}$
   c) $\frac{1}{52}$
   d) $\frac{1}{4}$

2. Find the probability of getting a face card:

   a) $\frac{1}{26}$
   b) $\frac{1}{13}$
   c) $\frac{2}{13}$
   d) $\frac{3}{13}$

3. Find the probability of getting a jack of hearts:

a) $\frac{1}{26}$
b) $\frac{1}{52}$
c) $\frac{3}{26}$
d) $\frac{3}{52}$

4. Find the probability of getting a red face card:

a) $\frac{3}{26}$
b) $\frac{1}{13}$
c) $\frac{1}{4}$
d) $\frac{1}{52}$

5. Find the probability of getting a spade:

a) $\frac{1}{26}$
b) $\frac{1}{13}$
c) $\frac{1}{4}$
d) $\frac{1}{52}$

# ANSWER KEY

## MULTIPLE CHOICE QUESTION:

**1. A**
**2. D**
**3. C**
**4. D**
**5. D**
**6. B**
**7. D**
**8. C**
**9. C**
**10. C**
**11. A**
**12. C**
**13. B**
**14. D**
**15. B**

16. A
17. C
18. C
19. A
20. B
21. C
22. B
23. A
24. B
25. D

## CASE STUDY QUESTION:

**CSQ.1:**

1. C
2. B
3. D
4. B
5. C

**CSQ.2:**

1. C
2. D
3. B
4. A
5. D

**CSQ.3:**

1. A
2. D
3. B
4. A
5. C