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.
∴ 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 c and d, with c > d, follow the steps below:
Step 1 : Apply Euclid's division lemma, to *c* and *d*. So, we find whole numbers, *q* and *r* such that $c = dq + r$, $0 \le r < d$.
Step 2 : If *r* = 0, *d* is the HCF of *c* and *d*. If $r \neq 0$ apply the division lemma to *d* 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 (*c*, *d*) = HCF (*d*, *r*) where the symbol HCF (*c*, *d*) denotes the HCF of *c* and *d*, 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':
  - $HCF(a,b) \times LCM(a,b) = a \times b$

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

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 $\dfrac{p}{q}$ where ‘p’ and ‘q’ are integers and $q \neq 0$, e.g. $\dfrac{2}{3}, \dfrac{3}{5}, \dfrac{5}{7}, \ldots\ldots.$

Every rational number can be expressed in decimal form and the decimal form will be either terminating or non-terminating repeating. e.g. $\dfrac{5}{2} = 2.5$ (Terminating), $\dfrac{2}{3} = 0.66666....$ *or* $0.\overline{6}$ (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 a2, 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 $\dfrac{p}{q}$ 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 $x = \dfrac{p}{q}$ 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 $x = \dfrac{p}{q}$ 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 $\frac{3}{5}$ and $\frac{4}{5}$ is:

(a) $\frac{7}{5}$ (b) $\frac{7}{10}$ (c) $\frac{3}{10}$ (d) $\frac{4}{10}$

2. 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) $\frac{1}{4}$

3. Which one of the following is not a rational number:

(a) $\sqrt{2}$ (b) 0 (c) $\sqrt{4}$ (d) $\sqrt{-16}$

4. Which one of the following is an irrational number:

(a) $\sqrt{4}$ (b) $3\sqrt{8}$ (c) $\sqrt{100}$ (d) $-\sqrt{0.64}$

5. $3\frac{3}{8}$ in decimal form is:

(a) 3.35 (b) 3.375 (c) 33.75 (d) 337.5

6. $\frac{5}{6}$ in the decimal form is:

(a) $0.8\overline{3}$ (b) $0.8\overline{33}$ (c) $0.6\overline{3}$ (d) $0.6\overline{33}$

7. 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

8. 0.6666…….. in $\frac{p}{q}$ form is:

(a) $\frac{6}{99}$ (b) $\frac{2}{3}$ (c) $\frac{3}{5}$ (d) $\frac{1}{66}$

9. The value of $\left(\sqrt{5}+\sqrt{2}\right)\left(\sqrt{5}-\sqrt{2}\right)$ is:

(a) 10 (b) 7 (c) 3 (d) $\sqrt{3}$

10. $0.\overline{36}$ in $\frac{p}{q}$ form is:

(a) $\frac{6}{99}$ (b) $\frac{2}{3}$ (c) $\frac{3}{5}$ (d) none of these

11. $\sqrt{5}-3-2$ is

(a) a rational number (b) a natural number (c) equal to zero (d) an irrational number

12. Let x = $\frac{7}{20\times 25}$ 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

13. The decimal expansion of $\frac{63}{72 \times 175}$ is
(a) terminating (b) non-terminating
(c) non termination and repeating (d) an irrational number

14. 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

15. $\left(2+\sqrt{3}+\sqrt{5}\right)$ is :
(a) a rational number (b) a natural number (c) a integer number (d) an irrational number

16. If $\left(\frac{9}{7}\right)^3 \times \left(\frac{49}{81}\right)^{2x-6} = \left(\frac{7}{9}\right)^9$, the value of x is:
(a) 12 (b) 9 (c) 8 (d) 6

17. The number .211 2111 21111….. is a
(a) terminating decimal (b) non-terminating decimal
(c) non termination and non-repeating decimal (d) none of these

18. 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}

19. The number $0.\overline{57}$ in the $\frac{p}{q}$ form $q \neq 0$ is
(a) $\frac{19}{35}$ (b) $\frac{57}{99}$ (c) $\frac{57}{95}$ (d) $\frac{19}{30}$

20. The number $0.5\overline{7}$ in the $\frac{p}{q}$ form $q \neq 0$ is
(a) $\frac{26}{45}$ (b) $\frac{13}{27}$ (c) $\frac{57}{99}$ (d) $\frac{13}{29}$

21. Any one of the numbers a, a + 2 and a + 4 is a multiple of:
(a) 2 (b) 3 (c) 5 (d) 7

22. 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

23. π is
(a) a natural number (b) not a real number
(c) a rational number (d) an irrational number

24. The decimal expansion of π
(a) is terminating (b) is non terminating and recurring
(c) is non terminating and non recurring (d) does not exist.

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

26. Which of the following is a rational number?
(a) $\sqrt{36}$ (b) $\sqrt{12}$ (c) $\sqrt{14}$ (d) $\sqrt{21}$

27. 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

28. 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

29. The decimal expansion of $\frac{93}{1500}$ will be
(a) terminating (b) non-terminating (c) non-terminating repeating
(d) non-terminating non-repeating.

30. $\sqrt{3}$ is
(a) a natural number (b) not a real number
(c) a rational number (d) an irrational number

31. The HCF of 52 and 130 is
(a) 52 (b) 130 (c) 26 (d) 13

32. The product of non-zero rational ad an irrational number is
(a) always rational (b) always irrational (c) rational or irrational (d) one

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

34. Given that HCF(1152, 1664) = 128 the LCM(1152, 1664) is
(a) 14976 (b) 1664 (c) 1152 (d) none of these

35. 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

36. Which one of the following rational number is a non-terminating decimal expansion:
(a) $\frac{33}{50}$ (b) $\frac{66}{180}$ (c) $\frac{6}{15}$ (d) $\frac{41}{1000}$

37. 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

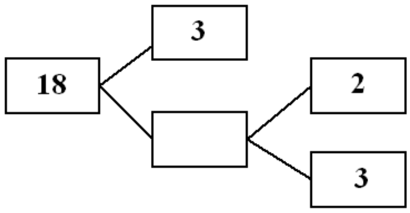
38. L.C.M. of two co-prime numbers is always
(a) product of numbers (b) sum of numbers
(c) difference of numbers (d)none

39. What is the H.C.F. of two consecutive even numbers
(a) 1 (b)2 (c) 4 (d) 8

40. What is the H.C.F. of two consecutive odd numbers
(a) 1 (b) 2 (c) 4 (d) 8

41. The missing number in the following factor tree is

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



42. The largest number which divides 70 and 125, leaving remainders 5 and 8, respectively, is
(a) 13 (b) 65 (c) 875 (d) 1750

43. 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

44. 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

45. The product of a non-zero rational and an irrational number is
(a) always irrational (b) always rational
(c) rational or irrational (d) one

46. 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

47. 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

48. Find the HCF and LCM of 12, 15, 18, 27.
(a) 180 (b) 360 (c) 540 (d) none of these

49. The HCF of two numbers is 27 and their LCM is 162. If one of the number is 81, find the other.
(a) 36 (b) 54 (c) 72 (d) none of these

50. The decimal expansion of the rational number $\frac{33}{2^2.5}$ will terminate after
(a) one decimal place (b) two decimal places
(c) three decimal places (d) more than 3 decimal places

CLASS X : CHAPTER - 2
POLYNOMIALS

IMPORTANT FORMULAS & CONCEPTS

An algebraic expression of the form $p(x) = a_0 + a_1x + a_2x^2 + a_3x^3 + \ldots\ldots a_nx^n$, where $a \neq 0$, is called a polynomial in variable x of degree n.
Here, $a_0, a_1, a_2, a_3, \ldots, a_n$ 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 $(\alpha+\beta) = -\frac{\text{Coefficient of x}}{\text{Coefficient of x}^2} = -\frac{b}{a}$ 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 $(\alpha+\beta+\gamma) = -\frac{\text{Coefficient of x}^2}{\text{Coefficient of x}^3} = -\frac{b}{a}$ Product of sum of zeroes taken two at a time $(\alpha\beta+\beta\gamma+\gamma\alpha) = \frac{\text{Coefficient of x}}{\text{Coefficient of x}^3} = \frac{c}{a}$ Product of zeroes $(\alpha\beta\gamma) = -\frac{\text{Constant term}}{\text{Coefficient of x}^3} = -\frac{d}{a}$

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

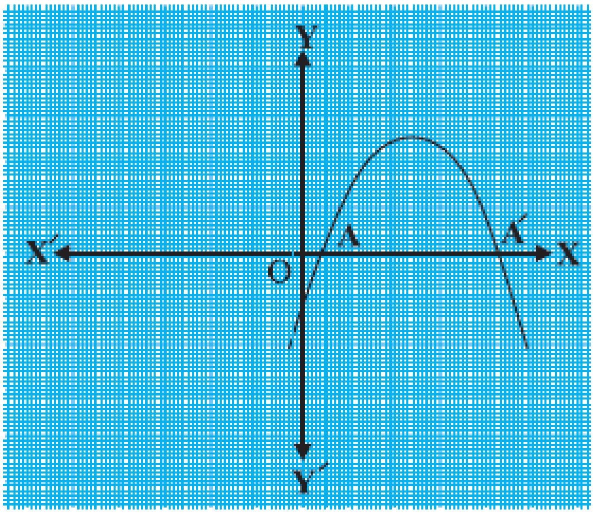
❖ A cubic polynomial whose zeroes are α, β *and* γ is given by
$$p(x)=x^3-(\alpha+\beta+\gamma)x^2+(\alpha\beta+\beta\gamma+\gamma\alpha)x-\alpha\beta\gamma$$

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.

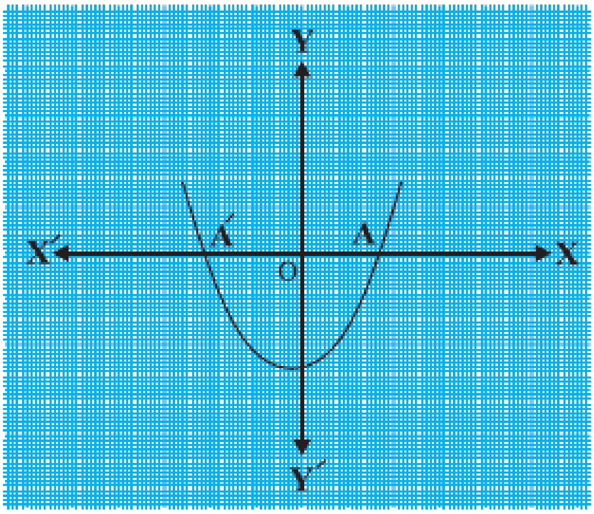
In fact, for any quadratic polynomial $ax^2 + bx + c$, $a \neq 0$, the graph of the corresponding equation $y = ax^2 + bx + c$ has one of the two shapes either open upwards like $\cup$ or open downwards like $\cap$ depending on whether $a > 0$ or $a < 0$. (These curves are called **parabolas**.)

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

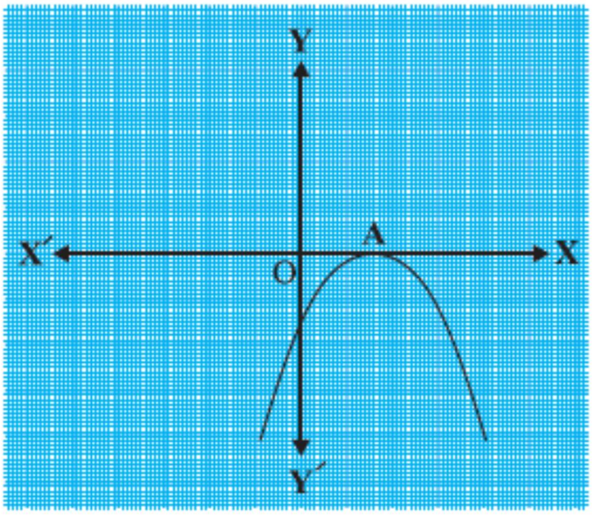


(i)
a > 0

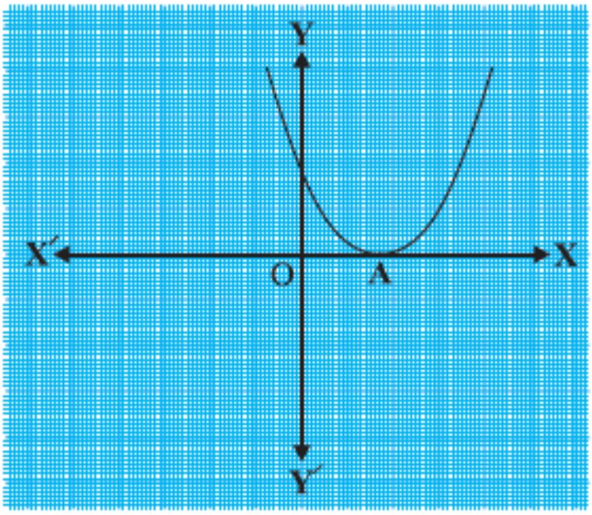


(ii)
a < 0

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.



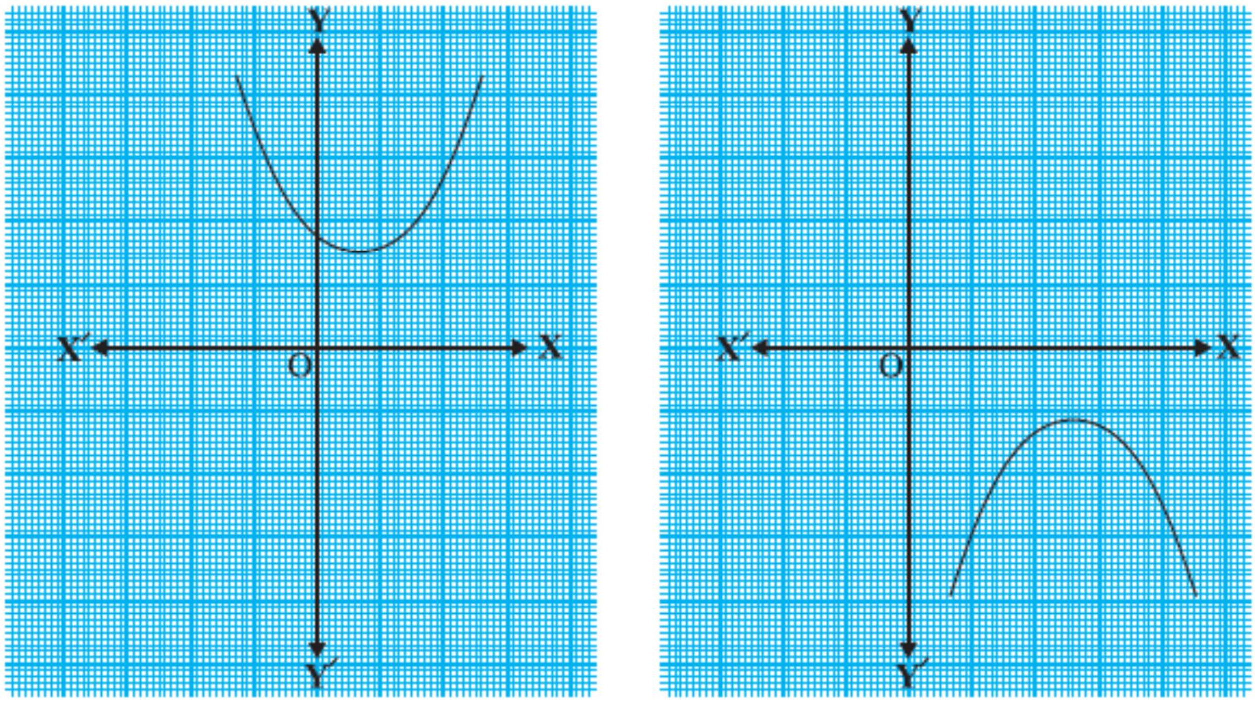
(i)



(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

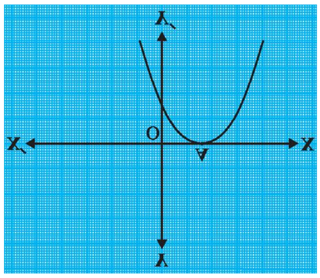
If $p(x)$ and $g(x)$ are any two polynomials with $g(x) \neq$ □0, then we can find polynomials $q(x)$ and $r(x)$ such that $p(x) = g(x) \times q(x) + r(x)$,
where $r(x) = 0$ or degree of $r(x)$ < degree of $g(x)$.

- 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. If the zeroes of the quadratic polynomial ax2 + bx + c, c $\neq$ 0 are equal, then
(a) c and a have opposite sign (b) c and b have opposite sign
(c) c and a have the same sign (d) c and b have the same sign



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

4. 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

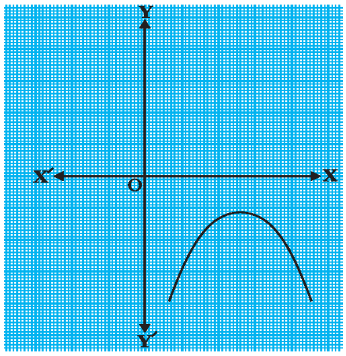
5. A quadratic polynomial whose zeroes are –3 and 4 is
(a) $x^2 - x + 12$ (b) $x^2 + x + 12$ (c) $2x^2 + 2x - 24$. (d) none of the above.

6. 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) $\alpha + \beta = \frac{b}{a}$

7. 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

8. 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) $\alpha.\beta = \frac{b}{a}$

9. The zeroes of the polynomial $x^2 - 3$ are
(a) 2 and 5 (b) –2 and 5 (c) –2 and –5 (d) none of the above



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

11. 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) $x^2 + 2x + 3$.

12. The zeroes of the quadratic polynomial $x^2 + kx + k$, $k \neq 0$,
(a) cannot both be positive (b) cannot both be negative
(c) are always unequal (d) are always equal

13. If α, β 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

14. 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

15. If α, β 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) $\frac{-3}{7}$

16. If the sum of the zeroes of the polynomial f(x) = $2x^3 - 3kx^2 + 4x - 5$ is 6, then value of k is

(a) 2 (b) 4 (c) –2 (d) – 4

17. 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

18. If α, β are the zeroes of the polynomials f(x) = $x^2 - p(x + 1) - c$, then $(\alpha+1)(\beta+1)$ =

(a) c – 1 (b) 1 – c (c) c (d) 1 + c

19. A quadratic polynomial can have at most …….. zeroes

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

20. A cubic polynomial can have at most …….. zeroes.

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

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

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

22. Which are the zeroes of p(x) = (x – 1)(x – 2):

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

23. Which of the following is a polynomial?

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

$(b) \sqrt{x} + \frac{1}{\sqrt{x}}$

$(c) x^{3/2} - x + x^{1/2}$

$(d) x^{1/2} + x + 10$

24. Which of the following is not a polynomial?

$(a) \sqrt{3}x^2 - 2\sqrt{3}x + 3$

$(b) \frac{3}{2}x^3 - 5x^2 - \frac{1}{\sqrt{2}}x - 1$

$(c) x + \frac{1}{x}$

$(d) 5x^2 - 3x + \sqrt{2}$

25. If α, β 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

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

(a) 0 (b) 1 (c) –1 (d) none of these

27. The zero of p(x) = 9x + 4 is:

(a) $\frac{4}{9}$ (b) $\frac{9}{4}$ (c) $\frac{-4}{9}$ (d) $\frac{-9}{4}$

28. 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) $\frac{27}{8}$

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

30. 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.

31. A quadratic polynomial whose sum and product of zeroes are 0 and 5 is
(a) $x^2 - 5$(b) $x^2 + 5$ (c) $x^2 + x - 5$. (d) none of the above.

32. A quadratic polynomial whose zeroes are 1 and –3 is
(a) $x^2 - 2x - 3$ (b) $x^2 + 2x - 3$ (c) $x^2 - 2x + 3$ (d) none of the above.

33. A quadratic polynomial whose sum and product of zeroes are –5 and 6 is
(a) $x^2 - 5x - 6$ (b) $x^2 + 5x - 6$ (c) $x^2 + 5x + 6$ (d) none of the above.

34. Which are the zeroes of $p(x) = x^2 + 3x - 10$:
(a) 5, –2 (b) –5, 2 (c) –5, –2 (d) none of these

35. Which are the zeroes of $p(x) = 6x^2 - 7x - 3$:
(a) 5, –2 (b) –5, 2 (c) –5, –2 (d) none of these

36. Which are the zeroes of $p(x) = x^2 + 7x + 12$:
(a) 4, –3 (b) –4, 3 (c) –4, –3 (d) none of these

37. The degree of the polynomial whose graph is given below:
(a) 1 (b) 2 (c) ≥ 3 (d) cannot be fixed

38. If the sum of the zeroes of the polynomial 3x2 – kx + 6 is 3, then the value of k is:
(a) 3 (b) –3 (c) 6 (d) 9

39. The quadratic polynomial, the sum and product of whose zeroes are –3 and 2 is:
(a) $x^2 - 3x + 2$ (b) $x^2 + 3x - 2$ (c) $x^2 + 3x + 2$ (d) none of the these.

40. The third zero of the polynomial, if the sum and product of whose zeroes are –3 and 2 is:
(a) 7 (b) –7 (c) 14 (d) –14

41. If a – b, a and a + b are zeroes of the polynomial $x^3 - 3x^2 + x + 1$ the value of (a + b) is
(a) $1 \pm \sqrt{2}$ (b) $-1 + \sqrt{2}$ (c) $-1 - \sqrt{2}$ (d) 3

42. 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

43. 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) $3x^2 - 3x + 1$

44. 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) $\frac{c}{a}, \frac{-b}{a}$

45. The quadratic polynomial, sum and product of whose zeroes are 1 and –12 respectively is
(a) $x^2 - x - 12$ (b) $x^2 + x - 12$ (c) $x^2 - 12x + 1$ (d) $x^2 - 12x - 1$.

46. 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

47. If α, β, γ are the zeros of the polynomial $x^3 - 6x^2 - x + 30$, then the value of $(\alpha\beta + \beta\gamma + \gamma\alpha)$ is
(a) −1 (b) 1 (c) −5 (d) 30

48. 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

49. 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

50. If the product of two of the zeroes of the polynomial $2x^3 - 9x^2 + 13x - 6$ is 2, the third zero of the polynomial is:
(a) –1 (b) –2 (c) $\frac{3}{2}$ (d) $-\frac{3}{2}$

CLASS X : CHAPTER - 3
PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

IMPORTANT FORMULAS & CONCEPTS

- An equation of the form ax + by + c = 0, where a, b and c are real numbers ($a \neq 0, b \neq 0$), is called a linear equation in two variables x and y.
- The numbers a and b are called the coefficients of the equation ax + by + c = 0 and the number c is called the constant of the equation ax + by + c = 0.

Two linear equations in the same two variables are called a pair of linear equations in two variables. The most general form of a pair of linear equations is

$$a_1x + b_1y + c_1 = 0$$
$$a_2x + b_2y + c_2 = 0$$

where a_1, a_2, b_1, b_2, c_1, c_2 are real numbers, such that $a_1^2 + b_1^2 \neq 0$, $a_2^2 + b_2^2 \neq 0$.

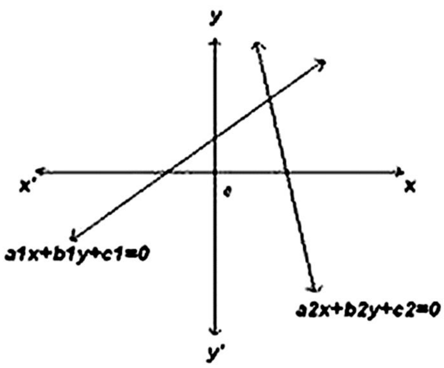
CONSISTENT SYSTEM
A system of simultaneous linear equations is said to be consistent, if it has at least one solution.

INCONSISTENT SYSTEM
A system of simultaneous linear equations is said to be inconsistent, if it has no solution.

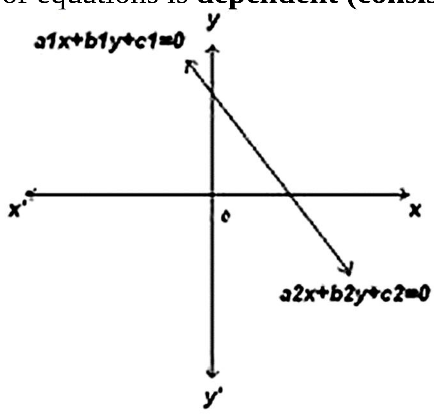
METHOD TO SOLVE A PAIR OF LINEAR EQUATION OF TWO VARIABLES
A pair of linear equations in two variables can be represented, and solved, by the:
(i) graphical method (ii) algebraic method

GRAPHICAL METHOD OF SOLUTION OF A PAIR OF LINEAR EQUATIONS
The graph of a pair of linear equations in two variables is represented by two lines.

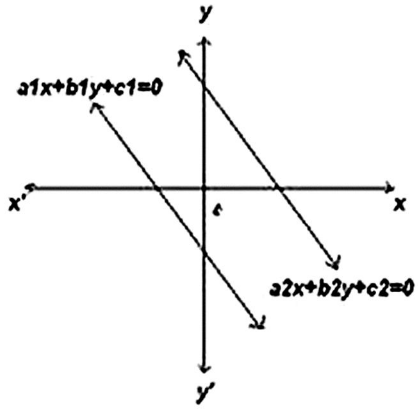
1. If the lines intersect at a point, then that point gives the unique solution of the two equations. In this case, the pair of equations is **consistent**.



2. If the lines coincide, then there are infinitely many solutions — each point on the line being a solution. In this case, the pair of equations is **dependent (consistent)**.



3. If the lines are parallel, then the pair of equations has no solution. In this case, the pair of equations is **inconsistent**.



Algebraic interpretation of pair of linear equations in two variables

The pair of linear equations represented by these lines $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$

1. If $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ then the pair of linear equations has exactly one solution.

2. If $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ then the pair of linear equations has infinitely many solutions.

3. If $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ then the pair of linear equations has no solution.

S. No.	Pair of lines	Compare the ratios	Graphical representation	Algebraic interpretation
1	$a_1x + b_1y + c_1 = 0$ $a_2x + b_2y + c_2 = 0$	$\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$	Intersecting lines	Unique solution (Exactly one solution)
2	$a_1x + b_1y + c_1 = 0$ $a_2x + b_2y + c_2 = 0$	$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$	Coincident lines	Infinitely many solutions
3	$a_1x + b_1y + c_1 = 0$ $a_2x + b_2y + c_2 = 0$	$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$	Parallel lines	No solution

ALGEBRAIC METHODS OF SOLVING A PAIR OF LINEAR EQUATIONS

Substitution Method

Following are the steps to solve the pair of linear equations by substitution method:

$a_1x + b_1y + c_1 = 0$ … (i) and

$a_2x + b_2y + c_2 = 0$ … (ii)

Step 1: We pick either of the equations and write one variable in terms of the other

$$y = -\frac{a_1}{b_1}x - \frac{c_1}{b_1} \ldots \text{(iii)}$$

Step 2: Substitute the value of x in equation (i) from equation (iii) obtained in step 1.

Step 3: Substituting this value of y in equation (iii) obtained in step 1, we get the values of x and y.

Elimination Method

Following are the steps to solve the pair of linear equations by elimination method:

Step 1: First multiply both the equations by some suitable non-zero constants to make the coefficients of one variable (either x or y) numerically equal.

Step 2: Then add or subtract one equation from the other so that one variable gets eliminated.

- If you get an equation in one variable, go to Step 3.

- If in Step 2, we obtain a true statement involving no variable, then the original pair of equations has infinitely many solutions.
- If in Step 2, we obtain a false statement involving no variable, then the original pair of equations has no solution, i.e., it is inconsistent.

Step 3: Solve the equation in one variable (x or y) so obtained to get its value.
Step 4: Substitute this value of x (or y) in either of the original equations to get the value of the other variable.

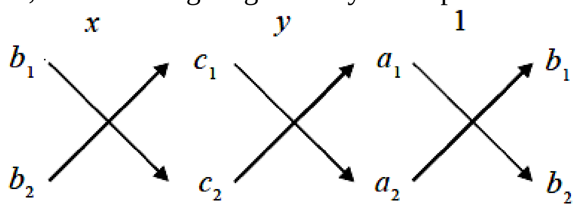
Cross - Multiplication Method
Let the pair of linear equations be:

$a_1x + b_1y + c_1 = 0$ … (1) and
$a_2x + b_2y + c_2 = 0$ … (2)

$$\frac{x}{b_1c_2 - b_2c_1} = \frac{y}{c_1a_2 - c_2a_1} = \frac{1}{a_1b_2 - a_2b_1} \quad \text{…………. (3)}$$

$$\Rightarrow x = \frac{b_1c_2 - b_2c_1}{a_1b_2 - a_2b_1} \quad \text{and} \quad y = \frac{c_1a_2 - c_2a_1}{a_1b_2 - a_2b_1}$$

In remembering the above result, the following diagram may be helpful :



The arrows between the two numbers indicate that they are to be multiplied and the second product is to be subtracted from the first.

For solving a pair of linear equations by this method, we will follow the following steps :
Step 1 : Write the given equations in the form (1) and (2).
Step 2 : Taking the help of the diagram above, write Equations as given in (3).
Step 3 : Find *x* and *y*, provided $a_1b_2 - a_2b_1 \neq 0$
Step 2 above gives you an indication of why this method is called the **cross-multiplication method**.

CLASS X : CHAPTER - 3
PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

1. The pair of equations y = 0 and y = –7 has
(a) one solution (b) two solution (c) infinitely many solutions (d) no solution

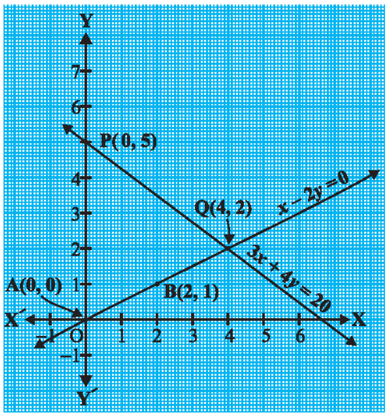
2. The pair of equations x = a and y = b graphically represents the lines which are
(a) parallel (b) intersecting at (a, b)
(c) coincident (d) intersecting at (b, a)

3. The value of c for which the pair of equations cx – y = 2 and 6x – 2y = 3 will have infinitely many solutions is
(a) 3 (b) – 3 (c) – 12 (d) no value

4. When lines l_1 and l_2 are coincident, then the graphical solution system of linear equation have
(a) infinite number of solutions (b) unique solution
(c) no solution (d) one solution

5. When lines l_1 and l_2 are parallel, then the graphical solution system of linear equation have
(a) infinite number of solutions (b) unique solution
(c) no solution (d) one solution

6. The coordinates of the vertices of triangle formed between the lines and y-axis from the graph is
(a) (0, 5), (0, 0) and (6.5,0) (b) (4,2), (0, 0) and (6.5,0)
(c) (4,2), (0, 0) and (0,5) (d) none of these



7. Five years ago Nuri was thrice old as Sonu. Ten years later, Nuri will be twice as old as Sonu. The present age, in years, of Nuri and Sonu are respectively
(a) 50 and 20 (b) 60 and 30 (c) 70 and 40 (d) 40 and 10

8. The pair of equations 5x – 15y = 8 and 3x – 9y = 24/5 has
(a) infinite number of solutions (b) unique solution
(c) no solution (d) one solution

9. The pair of equations x + 2y + 5 = 0 and –3x – 6y + 1 = 0 have
(a) infinite number of solutions (b) unique solution
(c) no solution (d) one solution

10. The sum of the digits of a two digit number is 9. If 27 is added to it, the digits of the numbers get reversed. The number is
(a) 36 (b) 72 (c) 63 (d) 25

11. If a pair of equation is consistent, then the lines will be
(a) parallel (b) always coincident
(c) always intersecting (d) intersecting or coincident

12. The solution of the equations x + y = 14 and x – y =4 is
(a) x = 9 and y = 5 (b) x = 5 and y = 9 (c) x = 7 and y = 7 (d) x = 10 and y = 4

13. The sum of the numerator and denominator of a fraction is 12. If the denominator is increased by b3, the fraction becomes ½ , then the fraction

(a) $\frac{4}{7}$ (b) $\frac{5}{7}$ (c) $\frac{6}{7}$ (d) $\frac{3}{7}$

14. The value of k for which the system of equations x – 2y = 3 and 3x + ky = 1 has a unique solution is

(a) k = – 6 (b) k ≠ – 6 (c) k = 0 (d) no value

15. If a pair of equation is inconsistent, then the lines will be

(a) parallel (b) always coincident
(c) always intersecting (d) intersecting or coincident

16. The value of k for which the system of equations 2x + 3y = 5 and 4x + ky = 10 has infinite many solution is

(a) k = – 3 (b) k ≠ – 3 (c) k = 0 (d) none of these

17. The value of k for which the system of equations kx – y = 2 and 6x – 2y = 3 has a unique solution is

(a) k = – 3 (b) k ≠ – 3 (c) k = 0 (d) k ≠ 0

18. Sum of two numbers is 35 and their difference is 13, then the numbers are

(a) 24 and 12 (b) 24 and 11 (c) 12 and 11 (d) none of these

19. The solution of the equations 0.4x + 0.3y = 1.7 and 0.7x – 0.2y = 0.8 is

(a) x = 1 and y = 2 (b) x = 2 and y = 3 (c) x = 3 and y = 4 (d) x = 5 and y = 4

20. The solution of the equations x + 2y = 1.5 and 2x + y = 1.5 is

(a) x = 1 and y = 1 (b) x = 1.5 and y = 1.5(c) x = 0.5 and y = 0.5(d) none of these

21. The value of k for which the system of equations x + 2y = 3 and 5x + ky + 7 = 0 has no solution is

(a) 10 (b) 6 (c) 3 (d) 1

22. The value of k for which the system of equations 3x + 5y = 0 and kx + 10y = 0 has a non-zero solution is

(a) 0 (b) 2 (c) 6 (d) 8

23. Sum of two numbers is 50 and their difference is 10, then the numbers are

(a) 30 and 20 (b) 24 and 14 (c) 12 and 2 (d) none of these

24. The sum of the digits of a two-digit number is 12. The number obtained by interchanging its digit exceeds the given number by 18, then the number is

(a) 72 (b) 75 (c) 57 (d) none of these

25. The sum of a two-digit number and the number obtained by interchanging its digit is 99. If the digits differ by 3, then the number is

(a) 36 (b) 33 (c) 66 (d) none of these

26. Seven times a two-digit number is equal to four times the number obtained by reversing the order of its digit. If the difference between the digits is 3, then the number is

(a) 36 (b) 33 (c) 66 (d) none of these

27. A two-digit number is 4 more than 6 times the sum of its digits. If 18 is subtracted from the number, the digits are reversed, then the number is
(a) 36 (b) 46 (c) 64 (d) none of these

28. The sum of two numbers is 1000 and the difference between their squares is 25600, then the numbers are
(a) 616 and 384 (b) 628 and 372 (c) 564 and 436 (d) none of these

29. Five years ago, A was thrice as old as B and ten years later A shall be twice as old as B, then the present age of A is
(a) 20 (b) 50 (c) 30 (d) none of these

30. The sum of thrice the first and the second is 142 and four times the first exceeds the second by 138, then the numbers are
(a) 40 and 20 (b) 40 and 22 (c) 12 and 22 (d) none of these

31. The sum of twice the first and thrice the second is 92 and four times the first exceeds seven times the second by 2, then the numbers are
(a) 25 and 20 (b) 25 and 14 (c) 14 and 22 (d) none of these

32. The difference between two numbers is 14 and the difference between their squares is 448, then the numbers are
(a) 25 and 9 (b) 22 and 9 (c) 23 and 9 (d) none of these

33. The solution of the system of linear equations $\frac{x}{a}+\frac{y}{b}=a+b; \frac{x}{a^2}+\frac{y}{b^2}=2$ are
(a) x = a and y = b (b) $x = a^2$ and $y = b^2$ (c) x = 1 and y = 1 (d) none of these

34. The solution of the system of linear equations $2(ax-by)+(a+4b)=0; 2(bx+ay)+(b-4a)=0$ are
(a) x = a and y = b (b) x = –1 and y = –1 (c) x = 1 and y = 1 (d) none of these

35. The pair of equations 3x + 4y = 18 and $4x + \frac{16}{3}y = 24$ has
(a) infinite number of solutions (b) unique solution
(c) no solution (d) cannot say anything

36. If the pair of equations 2x + 3y = 7 and $kx + \frac{9}{2}y = 12$ have no solution, then the value of k is:
(a) $\frac{2}{3}$ (b) – 3 (c) 3 (d) $\frac{3}{2}$

37. The equations x – y = 0.9 and $\frac{11}{x+y}=2$ have the solution:
(a) x = 5 and y = a (b) x = 3, 2 and y = 2, 3 (c) x = 3 and y = 2 (d) none of these

38. If $bx + ay = a^2 + b^2$ and ax – by = 0, then the value of x – y equals:
(a) a – b (b) b – a (c) $a^2 - b^2$ (d) $b^2 + a^2$.

39. If 2x + 3y = 0 and 4x – 3y = 0, then x + y equals:
(a) 0 (b) – 1 (c) 1 (d) 2

40. If $\sqrt{a}x-\sqrt{b}y=b-a$ and $\sqrt{b}x-\sqrt{a}y=0$, then the value of x, y is:
(a) a + b (b) a – b (c) $\sqrt{ab}$ (d) $-\sqrt{ab}$

41. If $\frac{2}{x}+\frac{3}{y}=13$ and $\frac{5}{x}-\frac{4}{y}=-2$, then x + y equals:
(a) $\frac{1}{6}$ (b) $-\frac{1}{6}$ (c) $\frac{5}{6}$ (d) $-\frac{5}{6}$

42. If 31x + 43y = 117 and 43 + 31y = 105, then value of x – y is:
(a) $\frac{1}{3}$ (b) – 3 (c) 3 (d) $-\frac{1}{3}$

43. If 19x – 17y = 55 and 17x – 19y = 53, then the value of x – y is:
(a) $\frac{1}{3}$ (b) – 3 (c) 3 (d) 5

44. If $\frac{x}{2}+y=0.8$ and $\frac{7}{\left(x+\frac{y}{2}\right)}=10$, then the value of x + y is:
(a) 1 (b) – 0.8 (c) 0.6 (d) 0.5

45. If (6, k) is a solution of the equation 3x + y – 22 = 0, then the value of k is:
(a) 4 (b) –4 (c) 3 (d) –3

46. If 3x –5y = 1, $\frac{2x}{x-y}=4$, then the value of x + y is
(a) $\frac{1}{3}$ (b) – 3 (c) 3 (d) $-\frac{1}{3}$

47. If 2x – 3y = 7 and (a + b)x – (a + b – 3)y = 4a + b have an infinite number of solutions, then
(a) a = 5, b = 1 (b) a = −5, b = 1
(c) a = 5, b = −1 (d) a = −5, b = −1

48. If 3x + 2y = 13 and 3x – 2y = 5, then the value of x + y is:
(a) 5 (b) 3 (c) 7 (d) none of these

49. If the pair of equations 2x + 3y = 5 and 5x + $\frac{15}{2}$y = k represent two coincident lines, then the value of k is:
(a) –5 (b) $\frac{-25}{2}$ (c) $\frac{25}{2}$ (d) $\frac{-5}{2}$

50. Rs. 4900 were divided among 150 children. If each girl gets Rs. 50 and a boy gets Rs. 25, then the number of boys is:
(a) 100 (b) 102 (c) 104 (d) 105

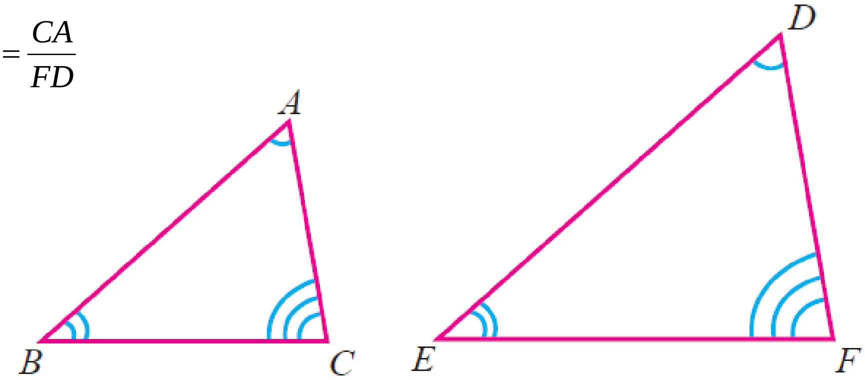
CLASS X : CHAPTER - 6
TRIANGLES

IMPORTANT FORMULAS & CONCEPTS

All those objects which have the same shape but different sizes are called similar objects.
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 ΔABC and ΔDEF 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 ΔABC, a straight line DE parallel to BC, intersects AB at D and AC at E, then
$(i) \frac{AB}{AD} = \frac{AC}{AE}$ $\quad (ii) \frac{AB}{DB} = \frac{AC}{EC}$

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.

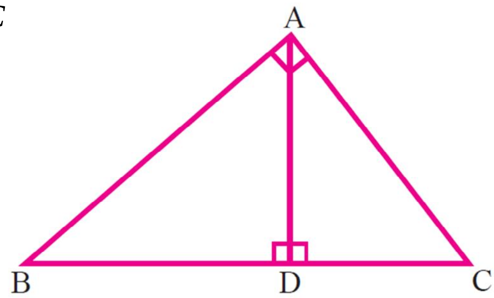
(i) AAA(Angle-Angle-Angle) similarity criterion
If in two triangles, corresponding angles are equal, then their corresponding sides are in the same ratio (or proportion) and hence the two triangles are similar.
Remark: If two angles of one triangle are respectively equal to two angles of another triangle,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

(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.

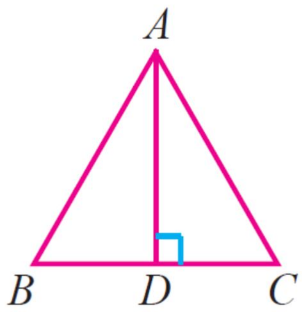
(iii) SAS (Side-Angle-Side) similarity criterion for Two Triangles
If one angle of a triangle is equal to one angle of the other triangle and if the corresponding sides including these angles are proportional, then the two triangles are similar.

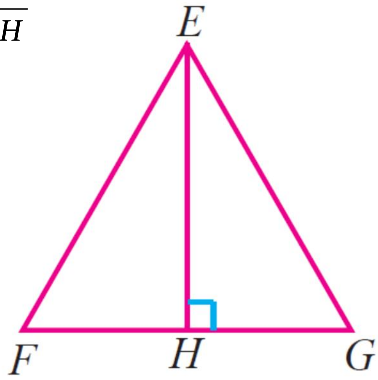
Areas of Similar Triangles
The ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides.

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) $\Delta\, DBA + \Delta\, ABC$
(b) $\Delta\, DAC + \Delta\, ABC$
(c) $\Delta\, DBA + \Delta\, DAC$



If two triangles are similar, then the ratio of the corresponding sides is equal to the ratio of their corresponding altitudes.
i.e., if $\Delta\, ABC + \Delta\, EFG$, 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 $\Delta\, ABC + \Delta\, EFG$, then $\frac{AB}{DE} = \frac{BC}{FG} = \frac{CA}{GE} = \frac{AB+BC+CA}{DE+FG+GE}$

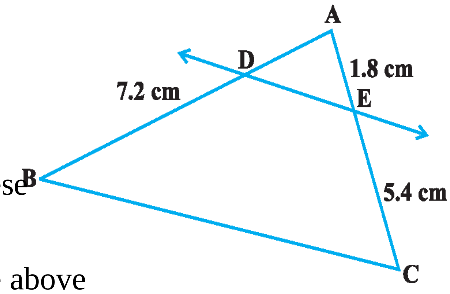
Pythagoras theorem (Baudhayan theorem)
In a right angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

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.

CLASS X : CHAPTER - 6
TRIANGLES

1. If in triangle ABC and 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. In figure DE || BC then the value of AD is
(a) 2 cm (b) 2.4 cm (c) 3 cm (d) none of the above

5. ABC and BDE are two equilateral triangles such that $BD = \frac{2}{3}BC$. The ratio of the areas of triangles ABC and BDE are
(a) 2 : 3 (b) 3 : 2 (c) 4 : 9 (d) 9 : 4

6. 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

7. If the corresponding sides of two similar triangles are in the ratio 4 : 9, then the areas of these triangles are in the ratio is
(a) 2 : 3 (b) 3 : 2 (c) 81 : 16 (d) 16 : 81

8. If $\Delta ABC \sim \Delta PQR$, BC = 8 cm and QR = 6 cm, the ratio of the areas of ΔABC and ΔPQR is
(a) 8 : 6 (b) 6 : 8 (c) 64 : 36 (d) 9 : 16

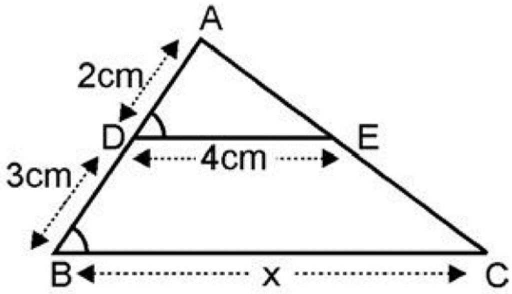
9. If $\Delta ABC \sim \Delta PQR$, area of ΔABC = 81cm^2, area of ΔPQR = 144cm^2 and QR = 6 cm, then length of BC is
(a) 4 cm (b) 4.5 cm (c) 9 cm (d) 12 cm

10. Sides of triangles are given below. Which of these is a right triangle?
(a) 7 cm, 5 cm, 24 cm (b) 34 cm, 30 cm, 16 cm
(c) 4 cm, 3 cm, 7 cm (d) 8 cm, 12 cm, 14 cm

11. If a ladder 10 m long reaches a window 8 m above the ground, then the distance of the foot of the ladder from the base of the wall is
(a) 18 m (b) 8 m (c) 6 m (d) 4 m

12. A girl walks 200 towards East and the she walks 150m towards North. The distance of the girl from the starting point is
(a) 350m (b) 250m (c) 300m (d) 225m

13. In the given figure, if DE || BC, then x equals
(a) 6 cm (b) 10 cm (c) 8 cm (d) 12.5 cm

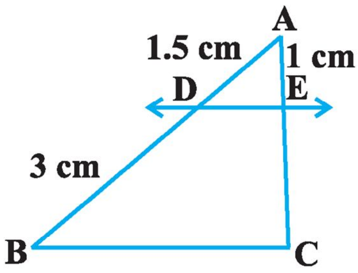


14. All _____________triangles are similar.
(a) isosceles (b) equilateral (c) scalene
(d) right angled

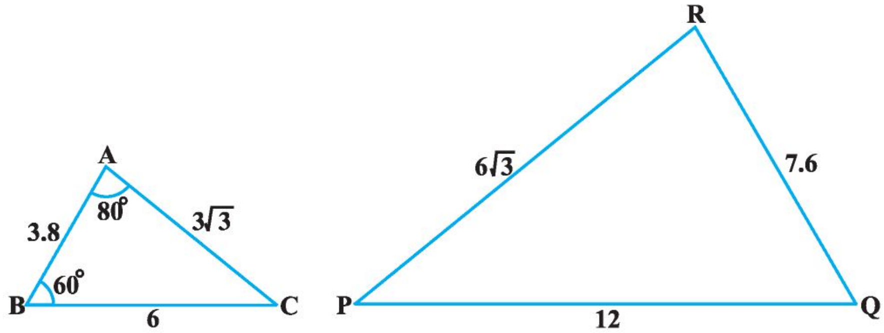
15. All circles are ___________
(a) congruent (b) similar (c) not similar
(d) none of these

16. All squares are ___________
(a) congruent (b) similar (c) not similar (d) none of these

17. In the given fig DE || BC then the value of EC is
(a) 1 cm (b) 2 cm (c) 3 cm (d) 4 cm



18. In the given below figure, the value of $\angle P$ is
(a) 60^0 (b) 80^0 (c) 40^0 (d) 100^0



19. A girl of height 90 cm is walking away from the base of a lamp-post at a speed of 1.2 m/s. If the lamp is 3.6 m above the ground, then the length of her shadow after 4 seconds.
(a) 1.2 m (b) 1.6 m (c) 2 m (d) none of these

20. A vertical pole of length 6 m casts a shadow 4 m long on the ground and at the same time a tower casts a shadow 28 m long. Find the height of the tower.
(a) 42 m (b) 48 m (c) 54 m (d) none of these

21. $\Delta ABC \sim \Delta DEF$ and their areas be, respectively, 64 cm^2 and 121 cm^2. If EF = 15.4 cm, the value of BC is.
(a) 11.2 cm (b) 15.4 cm (c) 6.4 cm (d) none of these

22. ABC and BDE are two equilateral triangles such that D is the midpoint of BC. Ratio of the areas of triangles ABC and BDE is
(a) 2 : 1 (b) 1 : 2 (c) 4 : 1 (d) 1 : 4

23. Areas of two similar triangles are in the ratio 4 : 9. Sides of these triangles are in the ratio
(a) 2 : 3 (b) 4 : 9 (c) 81 : 16 (d) 16 : 81

24. If ΔABC ~ ΔEDF and ΔABC is not similar to ΔDEF, then which of the following is not true?
(a) BC · EF = AC · FD (b) AB · EF = AC · DE
(c) BC · DE = AB · EF (d) BC · DE = AB · FD

25. In triangles ABC and DEF, ∠B = ∠E, ∠F = ∠C and AB = 3 DE. Then, the two triangles are
(a) congruent but not similar (b) similar but not congruent
(c) neither congruent nor similar (d) congruent as well as similar

26. In the below figure, two line segments AC and BD intersect each other at the point P such that PA = 6 cm, PB = 3 cm, PC = 2.5 cm, PD = 5 cm, ∠APB = 50° and ∠CDP = 30°. Then, ∠PBA is equal to

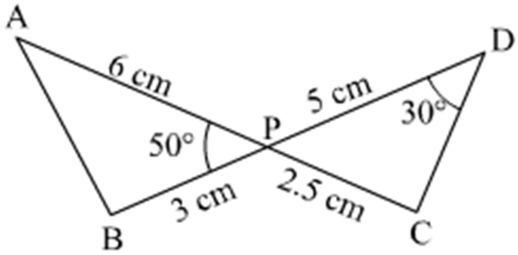
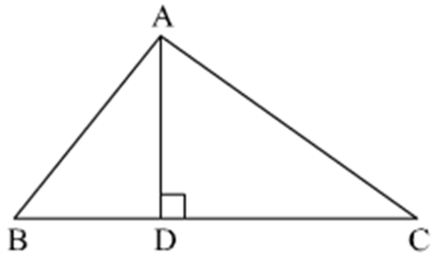


Fig. 6.3

(a) 50° (b) 30° (c) 60° (d) 100°

27. It is given that ΔABC ~ ΔDFE, ∠A = 30°, ∠C = 50°, AB = 5 cm, AC = 8 cm and DF = 7.5 cm. Then, the following is true:
(a) DE = 12 cm, ∠F = 50° (b) DE = 12cm, ∠F = 100°
(c) EF = 12cm, ∠D = 100° (d) EF = 12 cm, ∠D = 30°

28. In the Figure, ∠BAC = 90° and AD ⊥ BC. Then,



(a) BD · CD = BC^2 (b) AB · AC = BC^2
(c) BD · CD = AD^2 (d) AB · AC = AD^2

29. 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

30. If in triangles ABC and DEF, AB/DE=BC/FD, then they will be similar, when
(a) ∠B = ∠E (b) ∠A = ∠D (c) ∠B = ∠D (d) ∠A = ∠F

31. If ΔABC ~ ΔDEF, ar(ΔDEF) = 100cm^2 and AB/DE = 1/2 then ar(ΔABC) is
(a) 50 cm^2 (a) 25 cm^2 (a) 4 cm^2 (a) none of these

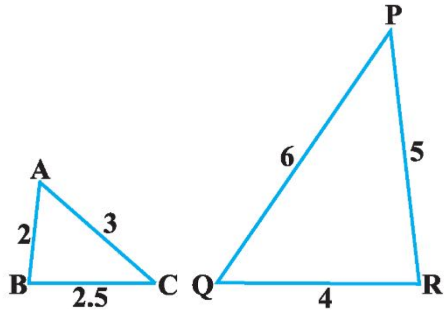
32. If the three sides of a triangle are a, √3 a, √2 a, then the measure of the angle opposite to the longest side is:
(a) 45^0 (b) 30^0 (c) 60^0 (d) 90^0

33. If ΔABC ~ ΔQRP, ar (ABC) : ar (PQR) = 9 : 4, AB = 18 cm and BC = 15 cm, then PR is equal to
(a) 10 cm (b) 12 cm (c) 20/3cm (d) 8 cm

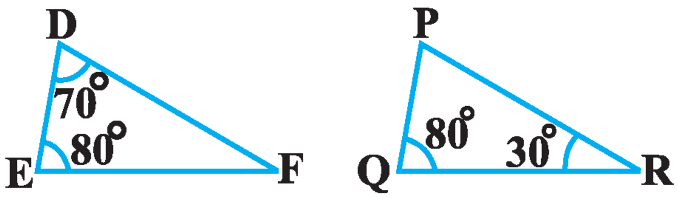
34. If S is a point on side PQ of a ΔPQR such that PS = QS = RS, then
(a) PR · QR = RS^2 (b) $QS^2 + RS^2 = QR^2$
(c) $PR^2 + QR^2 = PQ^2$ (d) $PS^2 + RS^2 = PR^2$

35. It is given that ΔABC ~ ΔPQR, with BC : QR = 1 : 3. Then, ar (PRQ) : ar (BCA) is equal to
(a) 9 (b) 3 (c) 13 (d) 19

36. The similarity criterion used for the similarity of the given triangles shown in fig (iii) is
(a) AAA (b) SSS (c) SAS (d) AA



37. The similarity criterion used for the similarity of the given triangles shown in fig (iv) is
(a) AAA (b) SSS (c) SAS (d) AA



38. A vertical pole of length 20 m casts a shadow 10 m long on the ground and at the same time a tower casts a shadow 50 m long, then the height of the tower.
(a) 100 m (b) 120 m (c) 25 m (d) none of these

39. The areas of two similar triangles are in the ratio 4 : 9. The corresponding sides of these triangles are in the ratio
(a) 2 : 3 (b) 4 : 9 (c) 81 : 16 (d) 16 : 81

40. The areas of two similar triangles ΔABC and ΔDEF are 144 cm^2 and 81 cm^2, respectively. If the longest side of larger ΔABC be 36 cm, then the longest side of the similar triangle ΔDEF is
(a) 20 cm (b) 26 cm (c) 27 cm (d) 30 cm

41. The areas of two similar triangles are in respectively 9 cm^2 and 16 cm^2. The ratio of their corresponding sides is
(a) 2 : 3 (b) 3 : 4 (c) 4 : 3 (d) 4 : 5

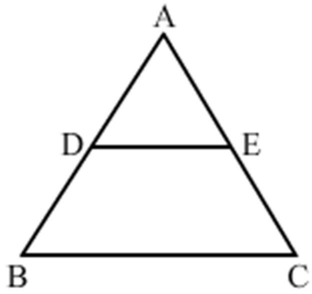
42. Two isosceles triangles have equal angles and their areas are in the ratio 16 : 25. The ratio of their corresponding heights is
(a) 3 : 2 (b) 5 : 4 (c) 5 : 7 (d) 4 : 5

43. If ΔABC and ΔDEF are similar such that 2AB = DE and BC = 8 cm, then EF =
(a) 16 cm (b) 112 cm (c) 8 cm (d) 4 cm

44. XY is drawn parallel to the base BC of a ΔABC cutting AB at X and AC at Y. If AB = 4BX and YC = 2 cm, then AY =
(a) 2 cm (b) 6 cm (c) 8 cm (d) 4 cm

45. 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

46. In the given figure, DE ∥ BC. If DE = 5 cm, BC = 8 cm and AD = 3.5 cm, then AB = ?



(a) 5.6 cm (b) 4.8 cm (c) 5.2 cm (d) 6.4 cm

47. If D, E, F are midpoints of sides BC, CA and AB respectively of ΔABC, then the ratio of the areas of triangles DEF and ABC is
(a) 2 : 3 (b) 1 : 4 (c) 1 : 2 (d) 4 : 5

48. If ΔABC and ΔDEF are two triangles such that $\frac{AB}{DE}=\frac{BC}{EF}=\frac{CA}{FD}=\frac{2}{5}$, then $\frac{ar(\Delta ABC)}{ar(\Delta DEF)}=$
(a) 2 : 5 (b) 4 : 25 (c) 4 : 15 (d) 8 : 125

49. In triangles ABC and DEF, $\angle A = \angle E = 40^0$, AB : ED = AC : EF and $\angle F = 65^0$, then $\angle B =$
(a) 35^0 (b) 65^0 (c) 75^0 (d) 85^0

50. If ABC and DEF are similar triangles such that $\angle A = 47^0$ and $\angle E = 83^0$, then $\angle C=$
(a) 50^0 (b) 60^0 (c) 70^0 (d) 80^0

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 = $\sqrt{x^2 + y^2}$

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.

Section formula

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 the **section formula**.

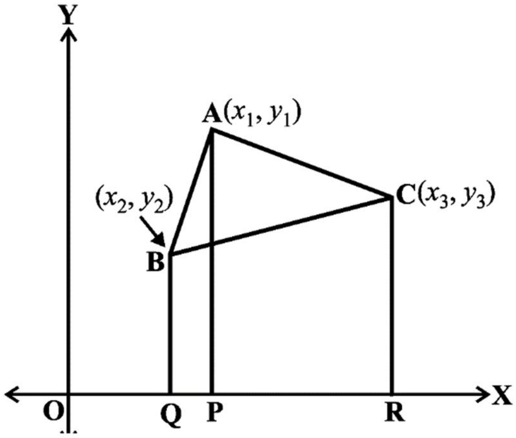
Mid-point formula

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:

$$\Delta ABC = \frac{1}{2}\begin{vmatrix} x_1 & y_1 \\ x_2 & y_2 \\ x_3 & y_3 \\ x_1 & y_1 \end{vmatrix}$$

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. $Area \;\; of \;\; \Delta ABC = \frac{1}{2}[(x_1y_2 + x_2y_3 + x_3y_1) - (x_1y_3 + x_3y_2 + x_2y_1)]$

CLASS X: CHAPTER – 7
COORDINATE GEOMETRY

1. The points A(0, –2), B(3, 1), C(0, 4) and D(–3, 1) are the vertices of a
(a) parallelogram (b) rectangle (c) square (d) rhombus

2. If A(3, 8), B(4, –2) and C(5, –1) are the vertices of ΔABC. Then, its area is
(a) $28\frac{1}{2}$ sq. units (b) $37\frac{1}{2}$ sq. units (c) 57 sq. units (d) 75 sq. units

3. The points A(0, 6), B(–5, 3) and C(3, 1) are the vertices of a triangle which is
(a) isosceles (b) equilateral (c) scalene (d) right angled

4. Two vertices of ΔABC are A(–1, 4) and B(5, 2) and its centroid is G(0, –3). The coordinate of C is
(a) (4, 3) (b) (4, 15) (c) (–4, –15) (d) (–15, –4)

5. The coordinates of the centroid of ΔABC with vertices A(–1, 0), B(5, –2) and C(8, 2) is
(a) (12, 0) (b) (6, 0) (c) (0, 6) (d) (4, 0)

6. If the points A(2, 3), B(5, k) and C(6, 7) are collinear, then the value of k is
(a) 4 (b) 6 (c) $\frac{-3}{2}$ (d) $\frac{11}{4}$

7. If P(–1, 1) is the middle point of the line segment joining A(–3, b) and B(1, b + 4) then the value of b is
(a) 1 (b) –1 (c) 2 (d) 0

8. y–axis divides the join of P(–4, 2) and Q(8, 3) in the ratio
(a) 3 : 1 (b) 1 : 3 (c) 2 : 1 (d) 1 : 2

9. x–axis divides the join of A(2, –3) and B(5, 6) in the ratio
(a) 3 : 5 (b) 2 : 3 (c) 2 : 1 (d) 1 : 2

10. The point P(1, 2) divides the join of A(–2, 1) and B(7, 4) are in the ratio of
(a) 3 : 2 (b) 2 : 3 (c) 2 : 1 (d) 1 : 2

11. A point P divides the join of A(5, –2) and B(9, 6) are in the ratio 3 : 1. The coordinates of P are
(a) (4, 7) (b) (8, 4) (c) $(\frac{11}{2}, 5)$ (d) (12, 8)

12. What point on x – axis is equidistant from the points A(7, 6) and B(–3, 4)?
(a) (0, 4) (b) (–4, 0) (c) (3, 0) (d) (0, 3)

13. The distance of the point P(4, –3) from the origin is
(a) 1 unit (b) 7 units (c) 5 units (d) 3 units

14. The distance between the points A(2, –3) and B(2, 2) is
(a) 2 units (b) 4 units (c) 5 units (d) 3 units

11. What is the midpoint of a line with endpoints (–3, 4) and (10, –5)?
(a) (–13, –9) (b) (–6.5, –4.5) (c) (3.5, –0.5) (d) none of these

12. A straight line is drawn joining the points (3, 4) and (5,6). If the line is extended, the ordinate of the point on the line, whose abscissa is –1 is

(a) 1 (b) –1 (c) 2 (d) 0

13. If the distance between the points (8, p) and (4, 3) is 5 then value of p is
(a) 6 (b) 0 (c) both (a) and (b) (d) none of these

14. The fourth vertex of the rectangle whose three vertices taken in order are (4,1), (7, 4), (13, –2) is
(a) (10, –5) (b) (10, 5) (c) (8, 3) (d) (8, –3)

15. If four vertices of a parallelogram taken in order are (–3, –1), (a, b), (3, 3) and (4, 3). Then a : b =
(a) 1 : 4 (b) 4 : 1 (c) 1 : 2 (d) 2 : 1

16. The points (2, 5), (4, - 1), (6, - 7) are vertices of an ___________ triangle
(a) isosceles (b) equilateral (c) scalene (d) right angled

17. If the origin is the mid-point of the line segment joined by the points (2,3) and (x,y), then the value of (x,y) is
(a) (2, –3) (b) (2, 3) (c) (–2, 3) (d) (–2, –3)

18. The distance of the point P(2, 3) from the x-axis is:
(a) 2 (b) 3 (c) 1 (d) 5

19. The distance between the points A(0, 6) and B(0, -2) is:
(a) 2 (b) 6 (c) 4 (d) 8

20. The distance of the point P(-6, 8) from the origin is:
(a) 8 (b) 27 (c) 10 (d) 6

21. The distance between the points (0, 5) and (-5, 0) is:
(a) 5 (b) 52 (c) 25 (d) 10

22. AOBC is a rectangle whose three vertices are A(0, 3), O(0, 0) and B(5, 0). The length of its diagonal is:
(a) 5 (b) 3 (c) 34 (d) 4

23. The perimeter of a triangle with vertices (0, 4), (0, 0) and (3, 0) is:
(a) 5 (b) 12 (c) 11 (d) 7 + 5

24. The points (–4, 0), (4, 0), (0, 3) are the vertices of a :
(a) Right triangle (b) Isosceles triangle (c) Equilateral triangle (d) Scalene triangle

25. Point on x – axis has coordinates:
(a) (a, 0) (b) (0, a) (c) (–a, a) (d) (a, –a)

26. Point on y – axis has coordinates:
(a) (–a, b) (b) (a, 0) (c) (0, b) (d) (–a, –b)

27. Line formed by joining (- 1,1) and (5, 7) is divided by a line x + y = 4 in the ratio of
(a) 1 : 4 (b) 1 : 3 (c) 1 : 2 (d) 3 : 4

28. Point A(–5, 6) is at a distance of:
(a) 61 units from the origin (b) 11 units from the origin
(c) $\sqrt{61}$ units from the origin (d) $\sqrt{11}$ units from the origin

29. If the points (1, x), (5, 2) and (9, 5) are collinear then the value of x is
(a) $\frac{5}{2}$ (b) $\frac{-5}{2}$ (c) –1 (d) 1

30. The end points of diameter of circle are (2, 4) and (–3, –1). The radius of the circle us
(a) $\frac{5\sqrt{2}}{2}$ (b) $5\sqrt{2}$ (c) $3\sqrt{2}$ (d) $\frac{\pm 5\sqrt{2}}{2}$

31. The ratio in which x – axis divides the line segment joining the points (5, 4) and (2, –3) is:
(a) 5 : 2 (b) 3 : 4 (c) 2 : 5 (d) 4 : 3

32. The point which divides the line segment joining the points (7, –6) and (3, 4) in ratio 1 : 2 internally lies in the
(a) I quadrant (b) II quadrant (c) III quadrant (d) IV quadrant

33. The point which lies on the perpendicular bisector of the line segment joining the points A(–2, –5) and B(2, 5) is:
(a) (0, 0) (b) (0, 2) (c) (2, 0) (d) (–2, 0)

34. The fourth vertex D of a parallelogram ABCD whose three vertices are A(-2, 3), B(6, 7) and C(8, 3) is:
(a) (0, 1) (b) (0, -1) (c) (-1, 0) (d) (1, 0)

35. If the point P(2, 1) lies on the line segment joining points A(4, 2) and B(8, 4), then
(a) AP = $\frac{1}{3}$ AB (b) AP = PB (c) PB = $\frac{1}{3}$ AB (d) AP = $\frac{1}{2}$ AB

36. Three vertices of a parallelogram taken in order are (- 1, - 6), (2, - 5) and (7, 2). The fourth vertex is
(a) (1, 4) (b) (1, 1) (c) (4, 4) (d) (4, 1)

37. If A and B are the points (- 3, 4) and (2,1) respectively, then the coordinates of the points on AB produced such that AC = 2BC are
(a) (2, 4) (b) (3, 7) (c) (7, –2) (d) none of these

38. Distance of the point (4, a) from x-axis is half its distance from y-axis then a =
(a) 2 (b) 8 (c) 4 (d) 6

39. A triangle is formed by the points 0(0, 0), A(5,0) and B(0,5). The number of points having integral coordinates (both x and y) and strictly inside the triangle is
(a) 10 (b) 17 (c) 16 (d) 6

40. If P(l, 2), Q(4,6), R(5,7) and S(a, b) are the vertices of a parallelogram PQRS then
(a) a = 2, b = 4 (b) a = 3, b = 4 (c) a = 2, b = 3 (d) a = 3, b = 5

41. The number of points on x-axis which are at a distance of 2 units from (2, 4) is
(a) 2 (b) 1 (c) 3 (d) 0

42. The distance of the point (h, k) from x-axis is
(a) h (b) k (c) | h | (d) | k |

43. The vertices of a triangle are (0, 0), (3, 0) and (0, 4). Its orthocentre is at
(a) (0, 3) (b) (4, 0) (c) (0, 0) (d) (3, 4)

44. If the segment joining the points (a, b) and (c, d) subtends a right angle at the origin, then
(a) ac – bd = 0 (b) ac + bd = 0 (c) ab – cd = 0 (d) ab + cd = 0

45. The distance of A(5, -12) from the origin is
(a) 12 (b) 11 (c) 13 (d) 10

46. If A(−1, 0), B(5, −2) and C(8, 2) are the vertices of a ΔABC, then its centroid is
(a) (12, 0) (b) (6, 0) (c) (0, 6) (d) (4, 0)

47. Two vertices of ΔABC are A(−1, 4) and B(5, 2) and its centroid is G(0, −3). Then, the coordinates of C are
(a) (4, 3) (b) (4, 15) (c) (−4, −15) (d) (−15, −4)

48. The line 2x + y −4 = 0 divides the line segment joining A(2, −2) and B(3, 7) in the ratio
(a) 2 : 5 (b) 2 : 9 (c) 2 : 7 (d) 2 : 3

49. If P(−1, 1) is the midpoint of the line segment joining A(−3, b) and B(1, b + 4), then b = ?
(a) 1 (b) −1 (c) 2 (d) 0

50. Find the ordinate of a point whose abscissa is 10 and which is at a distance of 10 units from the point P(2, -3).
(a) 3 (b) –9 (c) both (a) or (b) (d) none of these

CLASS X: CHAPTER - 8
INTRODUCTION TO TRIGONOMETRY

IMPORTANT FORMULAS & CONCEPTS

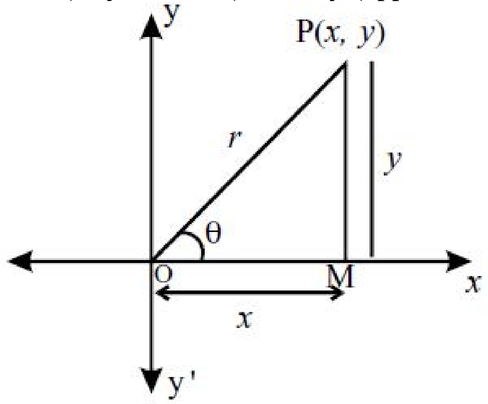
The word 'trigonometry' is derived from the Greek words 'tri' (meaning three), 'gon' (meaning sides) and 'metron' (meaning measure). In fact, **trigonometry** is the study of relationships between the sides and angles of a triangle.

Trigonometric Ratios (T - Ratios) of an acute angle of a right triangle

In XOY-plane, let a revolving line OP starting from OX, trace out $\angle XOP = \theta$.

From P (x, y)draw PM $\perp$ to OX.

In right angled triangle OMP. OM = x (Adjacent side); PM = y (opposite side); OP = r (hypotenuse).



$$\sin\theta = \frac{\text{Opposite side}}{\text{Hypotenuse}} = \frac{y}{r} \qquad \cos ec\theta = \frac{\text{Hypotenuse}}{\text{Opposite side}} = \frac{r}{y}$$

$$\cos\theta = \frac{\text{Adjacent Side}}{\text{Hypotenuse}} = \frac{x}{r} \qquad \sec\theta = \frac{\text{Hypotenuse}}{\text{Adjacent Side}} = \frac{r}{x}$$

$$\tan\theta = \frac{\text{Opposite side}}{\text{Adjacent Side}} = \frac{y}{x} \qquad \cot\theta = \frac{\text{Adjacent Side}}{\text{Opposite side}} = \frac{x}{y}$$

Reciprocal Relations

$$\sin\theta = \frac{1}{\cos ec\theta} \qquad \cos ec\theta = \frac{1}{\sin\theta}$$

$$\cos\theta = \frac{1}{\sec\theta} \qquad \sec\theta = \frac{1}{\cos\theta}$$

$$\tan\theta = \frac{1}{\cot\theta} \qquad \cot\theta = \frac{1}{\tan\theta}$$

Quotient Relations

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \quad and \quad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

- **Remark 1 :** sin q is read as the "sine of angle q" and it should never be interpreted as the product of 'sin' and 'q'
- **Remark 2 : Notation :** $(\sin\theta)^2$ is written as $\sin^2\theta$ (read "sin square q'') Similarly $(\sin\theta)^n$ is written as $\sin^n\theta$ (read ''sin nth power q''), n being a positive integer.
- **Note :** $(\sin\theta)^2$ should not be written as $\sin\theta^2$ or as $\sin^2\theta^2$
- **Remark 3 :** Trigonometric ratios depend only on the value of θ and are independent of the lengths of the sides of the right angled triangle.

Trigonometric ratios of Complementary angles.

$\sin(90-\theta) = \cos\theta$ $\quad$ $\cos(90-\theta) = \sin\theta$

$\tan(90-\theta) = \cot\theta$ $\quad$ $\cot(90-\theta) = \tan\theta$

$\sec(90-\theta) = \operatorname{cosec}\theta$ $\quad$ $\operatorname{cosec}(90-\theta) = \sec\theta$.

Trigonometric ratios for angle of measure.

0^0, 30^0, 45^0, 60^0 and 90^0 in tabular form.

$\angle$A	0^0	30^0	45^0	60^0	90^0
sinA	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
cosA	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
tanA	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	Not defined
cosecA	Not defined	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1
secA	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	Not defined
cotA	Not defined	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0

TRIGONOMETRIC IDENTITIES

An equation involving trigonometric ratios of an angle is said to be a trigonometric identity if it is satisfied for all values of θ for which the given trigonometric ratios are defined.

Identity (1) : $\sin^2\theta + \cos^2\theta = 1$

$\Rightarrow \sin^2\theta = 1 - \cos^2\theta$ and $\cos^2\theta = 1 - \sin^2\theta$.

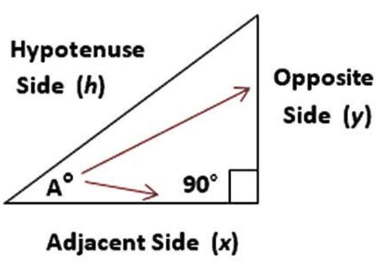
Identity (2) : $\sec^2\theta = 1 + \tan^2\theta$

$\Rightarrow \sec^2\theta - \tan^2\theta = 1$ and $\tan^2\theta = \sec^2\theta - 1$.

Identity (3) : $\operatorname{cosec}^2\theta = 1 + \cot^2\theta$

$\Rightarrow \operatorname{cosec}^2\theta - \cot^2\theta = 1$ and $\cot^2\theta = \operatorname{cosec}^2\theta - 1$.

SOME TIPS

Right Triangle	SOH-CAH-TOA Method	Coordinate System Method
	SOH: $\text{sine}(A) = \sin(A) = \frac{\text{Opposite}}{\text{Hypotenuse}}$ CAH: $\text{cosine}(A) = \cos(A) = \frac{\text{Adjacent}}{\text{Hypotenuse}}$ TOA: $\text{tangent}(A) = \tan(A) = \frac{\text{Opposite}}{\text{Adjacent}}$ $\text{cosecant}(A) = \csc(A) = \frac{1}{\sin(A)} = \frac{\text{Hypotenuse}}{\text{Opposite}}$ $\text{secant}(A) = \sec(A) = \frac{1}{\cos(A)} = \frac{\text{Hypotenuse}}{\text{Adjacent}}$ $\text{cotangent}(A) = \cot(A) = \frac{1}{\tan(A)} = \frac{\text{Adjacent}}{\text{Opposite}}$	$\sin(A) = \frac{y}{h}$ $\cos(A) = \frac{x}{h}$ $\tan(A) = \frac{y}{x}$ $\csc(A) = \frac{1}{\sin(A)} = \frac{h}{y}$ $\sec(A) = \frac{1}{\cos(A)} = \frac{h}{x}$ $\cot(A) = \frac{1}{\tan(A)} = \frac{x}{y}$

Each trigonometric function in terms of the other five.

in terms of	$\sin\theta$	$\cos\theta$	$\tan\theta$	$\csc\theta$	$\sec\theta$	$\cot\theta$
$\sin\theta =$	$\sin\theta$	$\pm\sqrt{1-\cos^2\theta}$	$\pm\frac{\tan\theta}{\sqrt{1+\tan^2\theta}}$	$\frac{1}{\csc\theta}$	$\pm\frac{\sqrt{\sec^2\theta-1}}{\sec\theta}$	$\pm\frac{1}{\sqrt{1+\cot^2\theta}}$
$\cos\theta =$	$\pm\sqrt{1-\sin^2\theta}$	$\cos\theta$	$\pm\frac{1}{\sqrt{1+\tan^2\theta}}$	$\pm\frac{\sqrt{\csc^2\theta-1}}{\csc\theta}$	$\frac{1}{\sec\theta}$	$\pm\frac{\cot\theta}{\sqrt{1+\cot^2\theta}}$
$\tan\theta =$	$\pm\frac{\sin\theta}{\sqrt{1-\sin^2\theta}}$	$\pm\frac{\sqrt{1-\cos^2\theta}}{\cos\theta}$	$\tan\theta$	$\pm\frac{1}{\sqrt{\csc^2\theta-1}}$	$\pm\sqrt{\sec^2\theta-1}$	$\frac{1}{\cot\theta}$
$\csc\theta =$	$\frac{1}{\sin\theta}$	$\pm\frac{1}{\sqrt{1-\cos^2\theta}}$	$\pm\frac{\sqrt{1+\tan^2\theta}}{\tan\theta}$	$\csc\theta$	$\pm\frac{\sec\theta}{\sqrt{\sec^2\theta-1}}$	$\pm\sqrt{1+\cot^2\theta}$
$\sec\theta =$	$\pm\frac{1}{\sqrt{1-\sin^2\theta}}$	$\frac{1}{\cos\theta}$	$\pm\sqrt{1+\tan^2\theta}$	$\pm\frac{\csc\theta}{\sqrt{\csc^2\theta-1}}$	$\sec\theta$	$\pm\frac{\sqrt{1+\cot^2\theta}}{\cot\theta}$
$\cot\theta =$	$\pm\frac{\sqrt{1-\sin^2\theta}}{\sin\theta}$	$\pm\frac{\cos\theta}{\sqrt{1-\cos^2\theta}}$	$\frac{1}{\tan\theta}$	$\pm\sqrt{\csc^2\theta-1}$	$\pm\frac{1}{\sqrt{\sec^2\theta-1}}$	$\cot\theta$

Note: $\csc\theta$ **is same as** $\operatorname{cosec}\theta$ **.**

CLASS X: CHAPTER - 8
INTRODUCTION TO TRIGONOMETRY

1. In ΔOPQ, right-angled at P, OP = 7 cm and OQ – PQ = 1 cm, then the values of sin Q.
(a) $\frac{7}{25}$ (b) $\frac{24}{25}$ (c) 1 (d) none of the these

2. If sin A = $\frac{24}{25}$, then the value of cosA is
(a) $\frac{7}{25}$ (b) $\frac{24}{25}$ (c) 1 (d) none of the these

3. In ΔABC, right-angled at B, AB = 5 cm and ∠ACB = 30° then the length of the side BC is
(a) $5\sqrt{3}$ (b) $2\sqrt{3}$ (c) 10 cm (d) none of these

4. In ΔABC, right-angled at B, AB = 5 cm and ∠ACB = 30° then the length of the side AC is
(a) $5\sqrt{3}$ (b) $2\sqrt{3}$ (c) 10 cm (d) none of these

5. The value of $\frac{2\tan 30^0}{1+\tan^2 30^0}$ is
(a) sin 60° (b) cos 60° (c) tan 60° (d) sin 30°

6. The value of $\frac{1-\tan^2 45^0}{1+\tan^2 45^0}$ is
(a) tan 90° (b) 1 (c) sin 45° (d) 0

7. sin 2A = 2 sin A is true when A =
(a) 0° (b) 30° (c) 45° (d) 60°

8. The value of $\frac{2\tan 30^0}{1-\tan^2 30^0}$ is
(a) sin 60° (b) cos 60° (c) tan 60° (d) sin 30°

9. 9 $\sec^2$ A – 9 $\tan^2$ A =
(a) 1 (b) 9 (c) 8 (d) 0

10. (1 + tanA + secA) (1 + cotA – cosecA) =
(a) 0 (b) 1 (c) 2 (d) –1

11. (sec A + tan A) (1 – sin A) =
(a) sec A (b) sin A (c) cosec A (d) cos A

12. $\frac{1+\tan^2 A}{1+\cot^2 A}=$
(a) $\sec^2$ A (b) –1 (c) $\cot^2$ A (d) $\tan^2$ A

13. If ΔABC is right angled at C, then the value of cos(A + B) is
(a) 0 (b) 1 (c) ½ (d) n.d.

14. If cos A = $\frac{24}{25}$, then the value of sinA is

(a) $\frac{7}{25}$ (b) $\frac{24}{25}$ (c) 1 (d) none of the these

15. If ΔABC is right angled at B, then the value of cos(A + C) is

(a) 0 (b) 1 (c) ½ (d) n.d.

16. If tanA = $\frac{4}{3}$, then the value of cosA is

(a) $\frac{3}{5}$ (b) $\frac{4}{3}$ (c) 1 (d) none of the these

17. If ΔABC is right angled at C, in which AB = 29 units, BC = 21 units and ∠ABC = α. Determine the values of $\cos^2\alpha + \sin^2\alpha$ is

(a) 0 (b) 1 (c) ½ (d) n.d.

18. In a right triangle ABC, right-angled at B, if tan A = 1, then the value of 2 sin A cos A =

(a) 0 (b) 1 (c) ½ (d) n.d.

19. Given 15 cot A = 8, then sin A =

(a) $\frac{3}{5}$ (b) $\frac{4}{3}$ (c) 1 (d) none of the these

20. In a triangle PQR, right-angled at Q, PR + QR = 25 cm and PQ = 5 cm, then the value of sin P is

(a) $\frac{7}{25}$ (b) $\frac{24}{25}$ (c) 1 (d) none of the these

21. In a triangle PQR, right-angled at Q, PQ = 3 cm and PR = 6 cm, then ∠QPR =

(a) 0° (b) 30° (c) 45° (d) 60°

22. If sin (A – B) = $\frac{1}{2}$ and cos(A + B) = $\frac{1}{2}$, then the value of A and B, respectively are

(a) 45° and 15° (b) 30° and 15° (c) 45° and 30° (d) none of these

23. If sin (A – B) = 1 and cos(A + B) = 1, then the value of A and B, respectively are

(a) 45° and 15° (b) 30° and 15° (c) 45° and 30° (d) none of these

24. If tan (A – B) = $\frac{1}{\sqrt{3}}$ and tan (A + B) = $\sqrt{3}$, then the value of A and B, respectively are

(a) 45° and 15° (b) 30° and 15° (c) 45° and 30° (d) none of these

25. If cos (A – B) = $\frac{\sqrt{3}}{2}$ and sin (A + B) = 1, then the value of A and B, respectively are

(a) 45° and 15° (b) 30° and 15° (c) 60° and 30° (d) none of these

26. The value of $2\cos^2 60^0 + 3\sin^2 45^0 - 3\sin^2 30^0 + 2\cos^2 90^0$ is

(a) 1 (b) 5 (c) $\frac{5}{4}$ (d) none of these

27. sin 2A = 2 sin AcosA is true when A =

(a) 0° (b) 30° (c) 45° (d) any angle

28. sin A = cosA is true when A =
(a) 0° (b) 30° (c) 45° (d) any angle

29. Value of θ , for $\sin 2\theta = 1$, $where\ 0^0 < \theta < 90^0$ is:
(a) 30° (b) 60° (c) 45° (d) 135^0.

30. Value of $\sec^2 26^0 - \cot^2 64^0$ is:
(a) 1 (b) –1 (c) 0 (d) 2

31. Product $\tan 1^0 . \tan 2^0 . \tan 3^0 \ldots\ldots \tan 89^0$ is:
(a) 1 (b) –1 (c) 0 (d) 90

32. $\sqrt{1+\tan^2\theta}$ is equal to:
(a) $\cot\theta$ (b) $\cos\theta$ (c) $\operatorname{cosec}\theta$ (d) $\sec\theta$

33. If A + B = 90^0, cot B = $\frac{3}{4}$ then tanA is equal to;
(a) $\frac{3}{4}$ (b) $\frac{4}{3}$ (c) $\frac{1}{4}$ (d) $\frac{1}{3}$

34. Maximum value of $\frac{1}{\operatorname{cosec}\theta}$, $0^0 < \theta < 90^0$ is:
(a) 1 (b) –1 (c) 2 (d) $\frac{1}{2}$

35. If $\cos\theta = \frac{1}{2}$, $\sin\phi = \frac{1}{2}$ then value of $\theta + \phi$ is
(a) 30° (b) 60° (c) 90° (d) 120^0.

36. If Sin (A + B) = 1 = cos(A – B) then
(a) A = B = 90^0 (b) A = B = 0^0 (c) A = B = 45^0 (d) A = 2B

37. If tan (3x + 30°) = 1 then x = ?
(a) 20 (b) 15° (c) 10° (d) 5°

38. If x tan 45° cos 60° = sin 60°cot 60° then x = ?
(a) 1 (b) 12 (c) 1/√2 (d) √3

39. If tan (3x + 30°) = 1 then x = ?
(a) 20 (b) 15° (c) 10° (d) 5°

40. If 2cos 3θ = 1 then θ = ?
(a) 10° (b) 15° (c) 20° (d) 30°

41. If 2sin 2θ = √3 then θ = ?
(a) 30° (b) 45° (c) 60° (d) 90°

42. If √3 tan 2θ – 3 = 0 then θ = ?
(a) 15° (b) 30° (c) 45° (d) 60°

43. If tan x = 3 cot x then x = ?
(a) 60° (b) 45° (c) 30° (d) 15°

44. The value of $\sin 60^0 \cos 30^0 - \cos 60^0 \sin 30^0$ is
(a) 1 (b) –1 (c) 0 (d) none of these

45. If sinA = 1/2, then the value of $3\cos A - 4\cos^3 A$ is
(a) 0 (b) 1 (c) (d) n.d.

46. If 3cotA = 4, then the value of cos2A – sin2A is
(a) $\frac{3}{4}$ (b) $\frac{7}{25}$ (c) (d) $\frac{24}{25}$

47. If 3tanA = 4, then the value of $\frac{3\sin A + 2\cos A}{3\sin A - 2\cos A}$ is
(a) 1 (b) $\frac{7}{25}$ (c) 3 (d) $\frac{24}{25}$

48. If $(\tan\theta + \cot\theta) = 5$, then $(\tan^2\theta + \cot^2\theta) = ?$
(a) 23 (b) 24 (c) 25 (d) 27

49. If $\sin A + \sin^2 A = 1$, then $(\cos^2 A + \cos^4 A) = ?$
(a) 1/2 (b) 1 (c) 2 (d) 3

50. The value of $2\sin^2 30^0 - 3\cos^2 45^0 + \tan^2 60^0 + 3\sin^2 90^0$ is
(a) 1 (b) 5 (c) 0 (d) none of these

CLASS X : CHAPTER - 12
AREAS RELATED TO CIRCLES

IMPORTANT FORMULAS & CONCEPTS

Perimeter and Area of a Circle

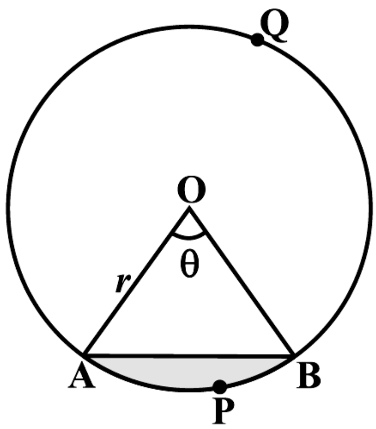
Perimeter/circumference of a circle $= \pi \times$ diameter
$= \pi \times 2r$ (where r is the radius of the circle)
$= 2\pi r$

Area of a circle $= \pi r^2$, where $\pi = \dfrac{22}{7}$

Areas of Sector and Segment of a Circle

Area of the sector of angle θ $= \dfrac{\theta}{360^0} \times \pi r^2$, where r is the radius of the circle and θ the angle of the sector in degrees

length of an arc of a sector of angle θ $= \dfrac{\theta}{360^0} \times 2\pi r$, where r is the radius of the circle and θ the angle of the sector in degrees



Area of the segment APB = Area of the sector OAPB – Area of Δ OAB

$$= \frac{\theta}{360^0} \times \pi r^2 - \text{area of } \Delta\text{ OAB}$$

☞ Area of the major sector OAQB $= \pi r^2$ – Area of the minor sector OAPB

☞ Area of major segment AQB $= \pi r^2$ – Area of the minor segment APB

☞ Area of segment of a circle = Area of the corresponding sector – Area of the corresponding triangle

CLASS X: CHAPTER – 12
AREAS RELATED TO CIRCLES

1. The area of a circle is 49π cm^2. Its circumference is
(a) 7π cm (b) 14π cm (c) 21π cm (d) 28π cm

2. The perimeter of circular field is 242cm. The area of the field is
(a) 9317 cm^2 (b) 18634 cm^2 (c) 4658.5 cm^2 (d) none of these

3. The area of a circle is 38.5 cm^2. Its circumference is
(a) 62 cm (b) 12.1 cm (c) 11 cm (d) 22 cm

4. The difference between the circumference and radius of a circle is 37 cm. The area of the circle is
(a) 111 cm^2 (b) 184 cm^2 (c) 154 cm^2 (d) 259 cm^2

5. The circumference of two circles are in the ratio 2 : 3. The ratio of their areas is
(a) 2 : 3 (b) 4 : 9 (c) 9 : 4 (d) none of these

6. On increasing the diameter of circle by 40%, its area will be increased by
(a) 40% (b) 80% (c) 96% (d) none of these

7. On decreasing the radius of the circle by 30%, its area is decreased by
(a) 30% (b) 60% (c) 45% (d) none of these

8. The area of the square is the same as the area of the circle. Their perimeter re in the ratio
(a) 1 : 1 (b) π : 2 (c) 2 : π (d) none of these

9. The areas of the two circle are in the ratio 4 : 9. The ratio of their circumference is
(a) 2 : 3 (b) 4 : 9 (c) 9 : 4 (d) 4 : 9

10. In making 1000 revolutions, a wheel covers 88 km. The diameter of the wheel is
(a) 14 m (b) 24 m (c) 28 m (d) 40 m

11. The diameter of a wheel is 40 cm. How many revolutions will it make an covering 176 m?
(a) 140 (b) 150 (c) 160 (d) 166

12. The radius of wheel is 0.25 m. How many revolutions will it make in covering 11 km?
(a) 2800 (b) 4000 (c) 5500 (d) 7000

13. Find the circumference of a circle of diameter 21 cm.
(a) 62 cm (b) 64 cm (c) 66 cm (d) 68 cm

14. Find the area of a circle whose circumference is 52.8 cm.
(a) 221.76 cm^2 (b) 220.76 cm^2 (c) 200.76 cm^2 (d) none of these.

15. A steel wire when bent in the form of a square, encloses an area of 121 sq. cm. The same wire is bent in the form of a circle. Find the area of the circle.
(a) 111 cm^2 (b) 184 cm^2 (c) 154 cm^2 (d) 259 cm^2

16. A wire is looped in the form of a circle of radius 28 cm. It is rebent into a square form. Determine the length of the side of the square.
(a) 42 cm (b) 44 cm (c) 46 cm (d) 48 cm

17. A circular part, 42 m in diameter has a path 3.5 m wide running round it on the outside. Find the cost of gravelling the path at Rs. 4 per m^2.
(a) Rs. 2800 (b) Rs. 2020 (c) Rs. 2002 (d) none of these

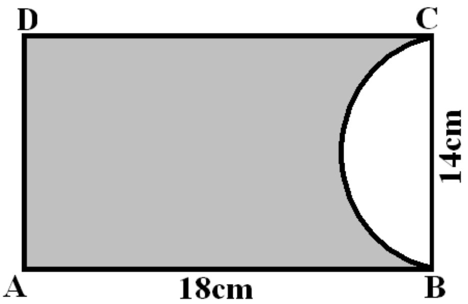
18. A road which is 7m wide surrounds a circular park whose circumference is 352 m. Find the area of the road.
(a) 2618 m^2 (b) 2518 m^2 (c) 1618 m^2 (d) none of these

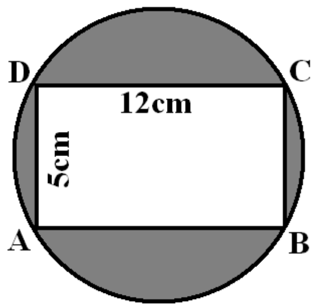
19. If the perimeter of a semicircular protractor is 36 cm, find the diameter.
(a) 14 cm (b) 16 cm (c) 18 cm (d) 12 cm

20. A bicycle wheel makes 5000 revolutions in moving 11 km. Find the diameter of the wheel.
(a) 60 cm (b) 70 cm (c) 66 cm (d) 68 cm

21. The diameter of the wheels of a bus is 140 cm. How many revolutions per minute must a wheel make in order to move a t a speed of 66km/hr?
(a) 240 (b) 250 (c) 260 (d) 270

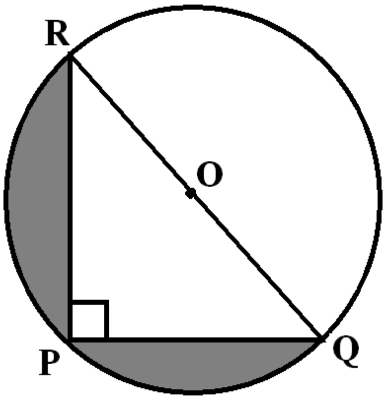
22. A paper is in the form of a rectangle ABCD in which AB = 18cm and BC = 14cm. A semicircular portion with BC as diameter is cut off. Find the area of the remaining paper (see in below figure).
(a) 175 cm^2 (b) 165 cm^2 (c) 145 cm^2 (d) none of these

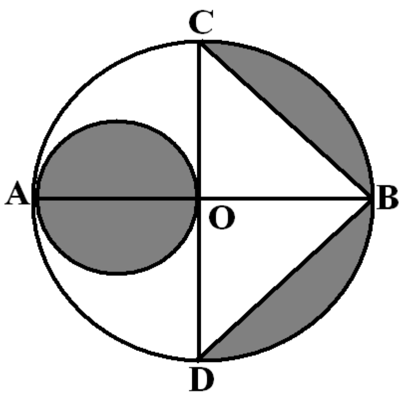




23. Find the area of the shaded region in the above sided figure. Take π = 3.14
(a) 75 cm^2 (b) 72 cm^2 (c) 70 cm^2 (d) none of these

24. Find the area of the shaded region in the given figure, if PR = 24 cm, PQ = 7 cm and O is the centre of the circle.
(a) 164.54 cm^2(b) 161.54 cm^2 (c) 162.54 cm^2 (d) none of these





25. In the above-sided figure, AB is a diameter of a circle with centre O and OA = 7 cm. Find the area of the shaded region.
(a) 64.5 cm^2 (b) 61.5 cm^2 (c) 66.5 cm^2 (d) none of these

26. A square ABCD is inscribed in a circle of radius 'r'. Find the area of the square in sq. units.
(a) $3r^2$ (b) $2r^2$ (c) $4r^2$ (d) none of these

27. Find the area of a right-angled triangle, if the radius of its circumcircle is 2.5 cm and the altitude drawn to the hypotenuse is 2 cm long.
(a) 5 cm^2 (b) 6 cm^2 (c) 7 cm^2 (d) none of these

28. The perimeter of a sector of a circle of radius 5.6 cm is 27.2 cm. Find the area of the sector.
(a) 44 cm^2 (b) 44.6 cm^2 (c) 44.8 cm^2 (d) none of these

29. The minute hand of a clock is 12 cm long. Find the area of the face of the clock described by the minute hand in 35 minutes.
(a) 265 cm^2 (b) 266 cm^2 (c) 264 cm^2 (d) none of these

30. A racetrack is in the form of a ring whose inner circumference is 352 m and outer circumference is 396 m. Find the width of the track.
(a) 4 m (b) 6 m (c) 8 m (d) 7 m

31. The difference between the circumference and the radius of a circle is 37 cm. Find the area of the circle.
(a) 111 cm^2 (b) 184 cm^2 (c) 154 cm^2 (d) 259 cm^2

32. The circumference of a circle exceeds its diameter by 16.8 cm. Find the circumference of the circle.
(a) 24.64 cm (b) 26.64 cm (c) 28.64 cm (d) 22 cm

33. A copper wire when bent in the form of square encloses an area of 484 cm^2. The same wire is now bent in the form of a circle. Find the area of the circle.
(a) 116 cm^2 (b) 166 cm^2 (c) 616 cm^2 (d) none of these

34. Find the area of the sector of a circle of radius 14 cm with central angle 45^0.
(a) 76 cm^2 (b) 77 cm^2 (c) 66 cm^2 (d) none of these

35. A sector is cut from a circle of radius 21 cm. The angle of the sector is 150^0. Find the length of the arc.
(a) 56 cm (b) 57 cm (c) 55 cm (d) 58 cm

36. The area of the sector of a circle of radius r and central angle 9, is
(a) ½ l.r cm (b) $2\pi r^2\theta/720^0$ (c) $2\pi r\theta/360^0$ (d) $\pi r\theta/360^0$

37. An arc of a circle is of length 51r cm and the sector it hounds has an area of 20 it cm2. The radius of circle is
(a) 1 cm (b) 5 cm (c) 8 cm (d) 10 cm

38. A sector is cut from a circle of circle of radius 21 cm. The angle of sector is 150°. The area of sector is
(a) 577.5 cm^2 (b) 288.2 cm^2 (c) 152 cm^2 (d) 155 cm^2

39. A chord AB of a circle of radius 10 cm makes a right angle at the centre of the circle. The area of major segment is
(a) 210 cm^2 (b) 235.7 cm^2 (c) 185.5 cm^2 (d) 258.1 cm^2

40. A horse is tied to a pole with 56 inch long siring. The area of the field where the horse can graze is
(a) 2560 $inch^2$ (b) 2464 m^2 (c) 9856 $inch^2$ (d) 25600 m^2

41. The circumferences of two circles are in the ratio 2 : 3. The ratio of their areas is
(a) 4 : 9 (b) 2 : 3 (c) 7 : 9 (d) 4 : 10

42. Area enclosed between two concentric circles is 770 cm^2. If the radius of outer circle is 21 cm, then the radius of inner circle is
(a) 12 cm (b) 13 cm (c) 14 cm (d) 15 cm

43. The perimeter of a semi-circular protector is 72 cm. Its diameter is
(a) 28 cm (b) 14 cm (c) 36 cm (d) 24 cm

44. The minute hand of a clock is 21 cm long. The area described by it on the face of clock in 5 minutes is
(a) 115.5 cm^2 (b) 112.5 cm^2 (c) 211.5 cm^2 (d) 123.5 cm^2

45. The area of a circle circumscribing a square of area 64 cm2 is
(a) 50.28 cm^2 (b) 25.5 cm^2 (c) 100.57 cm^2 (d) 75.48 cm2

46. A pendulum swings through an angle of 30^0 and describes an arc 8.8 cm in length. Find the length of the pendulum.
(a) 16 cm (b) 16.5 cm (c) 16.8 cm (d) 17 cm

47. The minute hand of a clock is 15 cm long. Calculate the area swept by it in 20 minutes. Take π=3.14
(a) 116 cm^2 (b) 166 cm^2 (c) 616 cm^2 (d) none of these

48. A sector of 56^0, cut out from a circle, contains 17.6 cm^2. Find the radius of the circle.
(a) 6 cm (b) 7 cm (c) 5 cm (d) 8 cm

49. A chord 10 cm long is drawn in a circle whose radius is $5\sqrt{2}$ cm. Find the areas of minor segment. Take π=3.14
(a) 16 cm^2 (b) 14.5 cm^2 (c) 14.25 cm^2 (d) none of these

50. The circumference of a circle is 88 cm. Find the area of the sector whose central angle is 72^0.
(a) 123 cm^2 (b) 123.5 cm^2 (c) 123.4 cm^2 (d) none of these

CLASS X : CHAPTER - 15
PROBABILITY

IMPORTANT FORMULAS & CONCEPTS

PROBABILITY

Experimental or empirical probability P(E) of an event E is

$$P(E) = \frac{\text{Number of trials in which the event happened}}{\text{Total number of trials}}$$

The theoretical probability (also called classical probability) of an event A, written as P(A), is defined as

$$P(A) = \frac{\text{Number of outcomes favourable to A}}{\text{Number of all possible outcomes of the experiment}}$$

Two or more events of an experiment, where occurrence of an event prevents occurrences of all other events, are called **Mutually Exclusive Events.**

COMPLIMENTARY EVENTS AND PROBABILITY

We denote the event 'not E' by $\overline{E}$. This is called the **complement** event of event E.

So, P(E) + P(not E) = 1

i.e., $P(E) + P(\overline{E}) = 1$, which gives us $P(\overline{E}) = 1 - P(E)$.

In general, it is true that for an event E, $P(\overline{E}) = 1 - P(E)$

- The probability of an event which is impossible to occur is 0. Such an event is called an **impossible event**.
- The probability of an event which is sure (or certain) to occur is 1. Such an event is called a **sure event** or a **certain event**.
- The probability of an event E is a number P(E) such that $0 \le P(E) \le 1$
- An event having only one outcome is called an elementary event. The sum of the probabilities of all the elementary events of an experiment is 1.

DECK OF CARDS AND PROBABILITY

A deck of playing cards consists of 52 cards which are divided into 4 suits of 13 cards each. They are black spades (♠) red hearts (♥), red diamonds (♦) and black clubs (♣).

The cards in each suit are Ace, King, Queen, Jack, 10, 9, 8, 7, 6, 5, 4, 3 and 2. Kings, Queens and Jacks are called face cards.

Example set of 52 poker playing cards

Suit	Ace	2	3	4	5	6	7	8	9	10	Jack	Queen	King
Clubs													
Diamonds													
Hearts													
Spades													

Equally likely events : Two or more events are said to be equally likely if each one of them has an equal chance of occurrence.

Mutually Exclusive events : Two or more events are mutually exclusive if the occurrence of each event prevents the every other event.

Complementary events : Consider an event has few outcomes. Event of all other outcomes in the sample survey which are not in the favourable event is called Complementary event.

Exhaustive events : All the events are exhaustive events if their union is the sample space.

Sure events : The sample space of a random experiment is called sure or certain event as any one of its elements will surely occur in any trail of the experiment.

Impossible event : An event which will occur on any account is called an impossible event.

CLASS X: CHAPTER - 15
PROBABILITY

1. There are 6 marbles in a box with number 1 to6 marked on each of them . What is the probability of drawing a marble with number 2 ?

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

2. A coin is flipped to decide which team starts the game . What is the probability of your team will start ?

(a) $\frac{1}{4}$ (b) $\frac{1}{2}$ (c) 1 (d) 0

3. A die is thrown once . What will be the probability of getting a prime number ?

(a) $\frac{1}{6}$ (b) $\frac{1}{2}$ (c) 1 (d) 0

Cards are marked with numbers 1 to 25 are placed in the box and mixed thoroughly. One card is drawn at random from the box. Answer the following questions (Q4-Q13)

4. What is the probability of getting a number 5?

(a) 1 (b) 0 (c) $\frac{1}{25}$ (d) $\frac{1}{5}$

5. What is the probability of getting a number less than 11?

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

6. What is the probability of getting a number greater than 25?

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

7. What is the probability of getting a multiple of 5?

(a) 1 (b) 0 (c) $\frac{1}{25}$ (d) $\frac{1}{5}$

8. What is the probability of getting an even number?

(a) 1 (b) 0 (c) $\frac{12}{25}$ (d) $\frac{13}{25}$

9. What is the probability of getting an odd number?

(a) 1 (b) 0 (c) $\frac{12}{25}$ (d) $\frac{13}{25}$

10. What is the probability of getting a prime number?

(a) $\frac{8}{25}$ (b) $\frac{9}{25}$ (c) $\frac{12}{25}$ (d) $\frac{13}{25}$

11. What is the probability of getting a number divisible by 3?

(a) $\frac{8}{25}$ (b) $\frac{9}{25}$ (c) $\frac{12}{25}$ (d) $\frac{13}{25}$

12. What is the probability of getting a number divisible by 4?

(a) $\frac{8}{25}$ (b) $\frac{9}{25}$ (c) $\frac{6}{25}$ (d) $\frac{3}{25}$

13. What is the probability of getting a number divisible by 7?

(a) $\frac{8}{25}$ (b) $\frac{9}{25}$ (c) $\frac{6}{25}$ (d) $\frac{3}{25}$

14. A bag has 4 red balls and 2 yellow balls. A ball is drawn from the bag without looking into the bag. What is probability of getting a red ball?

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

15. A bag has 4 red balls and 2 yellow balls. A ball is drawn from the bag without looking into the bag. What is probability of getting a yellow ball?

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

A box contains 3 blue, 2 white, and 5 red marbles. If a marble is drawn at *random* from the box, then answer the questions from 16 to 20.

16. What is the probability that the marble will be white?

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

17. What is the probability that the marble will be red?

(a) $\frac{1}{6}$ (b) $\frac{1}{2}$ (c) 1 (d) 0

18. What is the probability that the marble will be blue?

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

19. What is the probability that the marble will be any one colour?

(a) $\frac{1}{6}$ (b) $\frac{1}{2}$ (c) 1 (d) 0

20. What is the probability that the marble will be red or blue?

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

A die is thrown once, then answer the questions from 21 to 25.

21. Find the probability of getting a prime number

(a) $\frac{1}{6}$ (b) $\frac{1}{2}$ (c) 1 (d) 0

22. Find the probability of getting a number lying between 2 and 6

(a) $\frac{1}{6}$ (b) $\frac{1}{2}$ (c) 1 (d) 0

23. Find the probability of getting an odd number.

(a) $\frac{1}{6}$ (b) $\frac{1}{2}$ (c) 1 (d) 0

24. Find the probability of getting an even number.

(a) $\frac{1}{6}$ (b) $\frac{1}{2}$ (c) 1 (d) 0

25. Find the probability of getting a number greater than 4.

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

A box contains 5 red marbles, 6 white marbles and 4 green marbles. If a marble is drawn at *random* from the box, then answer the questions from 26 to 31.

26. What is the probability that the marble will be white?

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

27. What is the probability that the marble will be red?

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

28. What is the probability that the marble will be green?

(a) 0.3 (b) $\frac{1}{2}$ (c) 1 (d) none of these

29. What is the probability that the marble will be any one colour?

(a) $\frac{1}{6}$ (b) $\frac{1}{2}$ (c) 1 (d) 0

30. What is the probability that the marble will be red or green?

(a) $\frac{2}{5}$ (b) $\frac{3}{25}$ (c) $\frac{1}{5}$ (d) none of these

31. What is the probability that the marble will be blue?

(a) $\frac{1}{6}$ (b) $\frac{1}{2}$ (c) 1 (d) 0

Cards are marked with numbers 1 to 50 are placed in the box and mixed thoroughly. One card is drawn at random from the box. Answer the following questions from 32 to 41.

32. What is the probability of getting a number 5?

(a) 1 (b) 0 (c) $\frac{1}{25}$ (d) $\frac{1}{5}$

33. What is the probability of getting a number less than 11?

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

34. What is the probability of getting a number greater than 50?

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

35. What is the probability of getting a multiple of 5?

(a) 1 (b) 0 (c) $\frac{1}{25}$ (d) $\frac{1}{5}$

36. What is the probability of getting an even number?

(a) 1 (b) $\frac{1}{2}$ (c) $\frac{12}{25}$ (d) $\frac{13}{25}$

37. What is the probability of getting an odd number?

(a) 1 (b) $\frac{1}{2}$ (c) $\frac{12}{25}$ (d) $\frac{13}{25}$

38. What is the probability of getting a prime number?

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

39. What is the probability of getting a number divisible by 3?

(a) $\frac{8}{25}$ (b) $\frac{9}{25}$ (c) $\frac{12}{25}$ (d) $\frac{13}{25}$

40. What is the probability of getting a number divisible by 4?

(a) $\frac{8}{25}$ (b) $\frac{9}{25}$ (c) $\frac{6}{25}$ (d) $\frac{3}{25}$

41. What is the probability of getting a number divisible by 7?

(a) $\frac{8}{25}$ (b) $\frac{9}{25}$ (c) $\frac{6}{25}$ (d) $\frac{3}{25}$

One card is drawn from a well-shuffled deck of 52 cards. Answer the question from 42 to 51.

42. Find the probability of getting a king of red colour

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

43. Find the probability of getting a face card.

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

44. Find the probability of getting a black face card

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

45. Find the probability of getting an ace.

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

46. Find the probability of getting a face card or an ace.

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

47. Find the probability of getting face card or black card.

(a) $\frac{4}{13}$ (b) $\frac{8}{13}$ (c) $\frac{7}{13}$ (d) $\frac{3}{13}$

48. Find the probability of getting a king or red card.

(a) $\frac{4}{13}$ (b) $\frac{8}{13}$ (c) $\frac{7}{13}$ (d) $\frac{3}{13}$

49. Find the probability of getting a king and red card.

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

50. Find the probability of getting a king or queen card.

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