PHYSICS WALLAH

CBSE MATHS PROJECT 45

Class 10th

Quick Revision Notes

CONTENTS

REAL NUMBERS

Prime no.(s) :- No.(s) having 2 factors only (1 and itself).

Composite no(s) :- No.(s) having more than 2 factors.

✡ Every Composite no. can be expressed as a product of primes and this factorization is unique.

H.C.F (a, b) → sabse bada common factor.

L.C.M (a, b) → sabse chotta no. jo dono se divide ho jaaye.

✡ H.C.F (a, b) × L.C.M (a, b) = a × b

✡ Rational no. = $\frac{p}{q}$ > Co-prime no.(s) and $q \neq 0$

- Co-prime no.(s) are no.(s) having only '1' as common factor i.e H.C.F of co-prime no.(s) = 1
- let x be a prime no.
  if x divides y^2 then x divides y.
  Where y is a positive integer.

POLYNOMIALS

POLYNOMIALS (Many terms) :- Algebraic expression where power of variable is non-negative integer. (whole no.)

- Exponent of highest degree term in polynomial is called **Degree.**
- if $P(x)$ is a polynomial,
  - value of $P(x)$ at $x=\alpha$ is obtained by replacing x with 'α' in whole expression.
  - 'α' is said to be zero of polynomial if $P(\alpha)=0$
- Graphically, zeros of polynomial $P(x)$ are the x- coordinate of the point where graph intersects x- axis.
- If α, β are the zeros of Quadratic polynomial.

$$P(x) = ax^2+bx+c$$

$$\alpha+\beta = \frac{-b}{a} = -\frac{\text{Cofficient of } x}{\text{Cofficient of } x^2}$$

$$\alpha\times\beta = \frac{c}{a} = \frac{\text{Constant term}}{\text{Cofficient of } x^2}$$

- let zeros are α, β
  Quadratic polynomial is given by

$$k(x^2-(\alpha+\beta)x+\alpha\beta)$$

- General formula

$$k(x^2-(\text{sum of zeros})x+\text{product of zeros})$$

Pair of Linear Equations in 2 Variables

✡ Pair of linear equation in two variables x & y can be represented by

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

Pair of linear equation can be solved by

Graphical method

✡ if pair of linear eqⁿ intersect at a point, then pair of linear eqⁿ is having unique solution.

✡ if pair of linear eqⁿ are parallel then pair has no solution, i.e inconsistent.

✡ if pair of linear equation is coincident, then it has infinity many solution.

Algebraic method

✓ substitution method
✓ elimination method

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

✡ $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ ⟶ unique solution

✡ $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ ⟶ no solution, inconsistent

✡ $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ ⟶ Infinety many solution

Quadratic Equations

✡ If $P(x) = ax^2+bx+c$ is a quadratic polynomial then $P(x)=0$ i.e $ax^2+bx+c=0$ $a\neq0$ is called Quadratic Equation.

✡ A real number 'α' is said to be root of equation $ax^2+bx+c=0$ if

- $a\alpha^2+b\alpha+c=0$
- 'α' is the zero of polynomial $P(x)=ax^2+bx+c$

✡ Solution (roots) of Quad. equation.

$$ax^2+bx+c=0,\ a\neq0$$

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}=\frac{-b\pm\sqrt{D}}{2a}$$

Discriminant $= D = b^2-4ac$

✡
- ✓ $D>0$ (+ve) → Real and Distinct roots
- ✓ $D=0$ → Real and equal roots
- ✓ $D<0$ (-ve) → Non-real roots

Arithmetic Progressions

Sequence: Arrangement of numbers in a definite order according to some rule.

Arithmetic Sequence: Sequence $a_1, a_2, a_3 \ldots a_n$ is called A.P if $a_2 - a_1 = a_3 - a_2 = a_4 - a_3 = \ldots = a_{n+1} - a_n = d$

$a_{n+1} - a_n$ is independent of n.

a_1 = first term (a)

d = common difference

Type of Arithmetic Progression

Finite A.P

A.P containing a finite no. of terms → finite A.P

e.g 3, 5, 7, 9, 11, 13 . . . 37.

Infinite A.P

A.P which does not have a finite no. of terms.

e.g 10, 20, 30, 40, 50 . . .

General/n^{th} term: $T_n = a + (n-1)d$ → common difference

first term

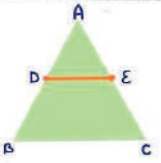
sum of n terms of an A.P:

$$S_n = \frac{n}{2}[2a + (n-1)d]$$

$$= \frac{n}{2}[a + T_n]$$

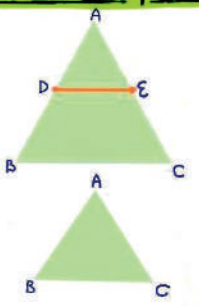
TRIANGLES

B.P.T / Thales Theorem :-



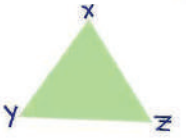
If DE // BC
then $\frac{AD}{DB} = \frac{AE}{EC}$

Converse of B.P.T :-



If $\frac{AD}{DB} = \frac{AE}{EC}$
then DE // BC

If AB = AC
then ∠C = ∠B



if ∠Y = ∠Z
then XY = XZ

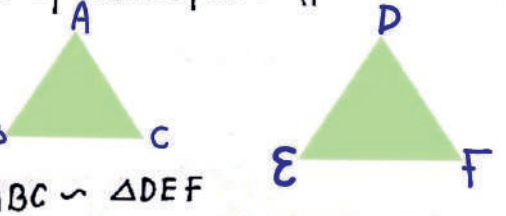
- Angles opposite to equal sides are equal.
- sides opposite to equal angles are equal.

congruent → shape (same), size (same)

similar → shape same, size may or may not be same.

similar polygons :-

- ✓ corresponding angles are equal.
- ✓ length of corresponding sides are proportional.



$\triangle ABC \sim \triangle DEF$

$\angle A = \angle D$
$\angle B = \angle E$
$\angle C = \angle F$

$\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$

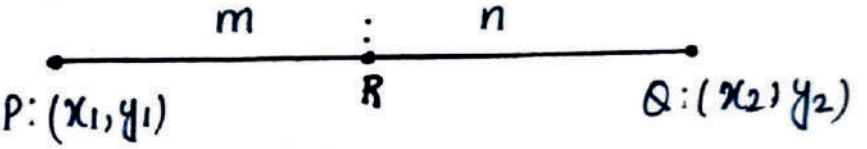
Coordinate Geometry

Distance formula

Distance b/w points $P:(x_1,y_1)$ & $Q:(x_2;y_2)$ is

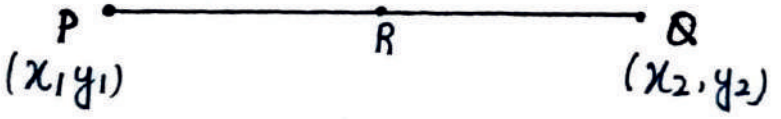
$$PQ = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$$

Section formula



$$PR : QR = m : n$$

$$R = \left(\frac{mx_2+nx_1}{m+n}, \frac{my_2+ny_1}{m+n}\right)$$



if R is midpoint of PQ

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

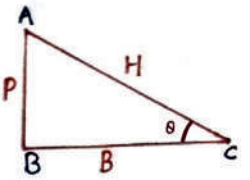
Introduction to Trigonometry

TRIGONOMETRY :-

$\sin\theta = P/H$ $\quad$ $\operatorname{cosec}\theta = H/P$

$\cos\theta = B/H$ $\quad$ $\sec\theta = H/B$

$\tan\theta = P/B$ $\quad$ $\cot\theta = B/P$



IDENTITIES :-

✓ $\sin^2\theta + \cos^2\theta = 1$ $\quad \left\{ \frac{P^2}{H^2} + \frac{B^2}{H^2} = \frac{P^2+B^2}{H^2} = \frac{H^2}{H^2} \right\}$

✓ $1 + \cot^2\theta = \operatorname{cosec}^2\theta$ $\quad \left\{ 1 + \frac{B^2}{P^2} = \frac{P^2+B^2}{P^2} = \frac{H^2}{P^2} \right\}$

✓ $1 + \tan^2\theta = \sec^2\theta$ $\quad \left\{ 1 + \frac{P^2}{B^2} = \frac{B^2+P^2}{B^2} = \frac{H^2}{B^2} \right\}$

✡ $\operatorname{cosec}\theta = \frac{1}{\sin\theta}$, $\sec\theta = \frac{1}{\cos\theta}$

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

✡ $\tan\theta = \frac{\sin\theta}{\cos\theta}$, $\cot\theta = \frac{\cos\theta}{\sin\theta}$

TRIGONOMETRIC RATIO OF SOME SPECIFIC ANGLES

θ / T-ratios	0°	30°	45°	60°	90°	
sinθ	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1	
cosθ	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0	
tanθ	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	Not defined	
cotθ	Not defined	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0	
secθ	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	Not defined	
cosecθ	Not defined	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1	

Some Applications of Trigonometry

Height and distance:-

With the help of trigonometric ratios. we can determine the height of an object or distance between two objects. some terms used to determine these are as follows.

Line of sight

The line of sight is a straight line along which an observer an object i.e, the line joinining the eye of the observer and the point on the object is *the line of sight.*

Angle of depression

If the object is below the horizontal level, the angle between the line of sight and the horizontal is called the angle of depression.

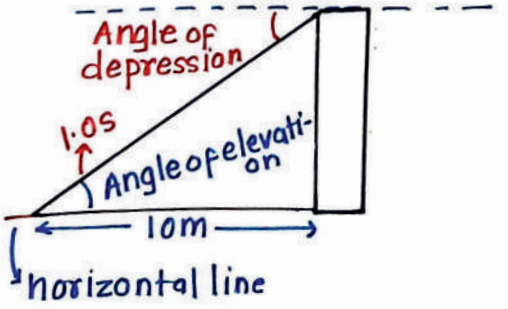
Angle of elevation

if the object is above the horizontal level, the angle between the line of sight and the horizontal is called the angle of elevation.

points

1. Question main kho jao
2. diagram banao
3. Trigonometry
4. Solve

distance Naapneki ek unit miles bhi hoti hai



50 Most Important Questions

MATHEMATICS

1. The prime factorization of 1728 is
   (A) $2^5 \times 3^4$
   (B) $2^6 \times 3^2$
   (C) $2^5 \times 3^3$
   (D) $2^6 \times 3^3$

Ans. (Hint): (D)

2. Two vertices of ΔBAC are A(−1, 4) and B(5, 2) and its centroid is G(0, −3). Then, the coordinates of C are
   (A) (4, 15)
   (B) (−4, −15)
   (C) (−15, −4)
   (D) (4, 3)

Ans. (Hint): (B)

3. What is the largest number that divides both 1152 and 1664 exactly?
   (A) 64
   (B) 128
   (C) 32
   (D) 2256

Ans. (Hint): (B)

4. The roots of a quadratic equation are 5 and −2. Then, the equation is
   (A) $x^2 + 3x - 10 = 0$
   (B) $x^2 - 3x - 10 = 0$
   (C) $x^2 + 3x + 10 = 0$
   (D) $x^2 - 3x + 10 = 0$

Ans. (Hint): (B)

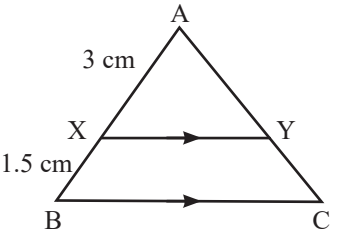
5. In an AP, if d = −4, n = 7 and $a_n = 4$, then the value of a is
   (A) 28
   (B) 6
   (C) 20
   (D) 7

Ans. (Hint): (A)

6. The discriminant of the equation $(2a + b)x = x^2 + 2ab$ is ____.
   (A) $(2a + b)^2$
   (B) $(2a - b)^2$
   (C) $(2a + b^2)$
   (D) $(2a - b^2)$

Ans. (Hint): (B)

7. In the given figure XY||BC. If AX = 3cm, XB = 1.5cm and BC = 6cm, then XY is equal to:



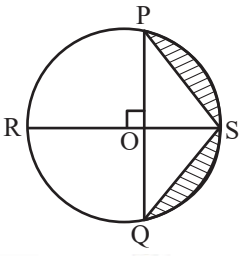
   (A) 6 cm
   (B) 4.5 cm
   (C) 3 cm
   (D) 4 cm

Ans. (Hint): (D)

8. The string of a kite in air is 50 m long and it makes an angle of 60° with the horizontal. Assuming the string to be straight, the height of the kite from the ground is:
   (A) $50\sqrt{3}$m.
   (B) $25\sqrt{3}$m
   (C) $\frac{100}{\sqrt{3}}$ m
   (D) $\frac{50}{\sqrt{3}}$ m

Ans. (Hint): (B)

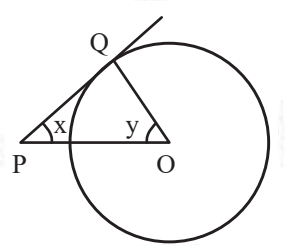
9. In the given figure PQ and RS are the perpendicular diameters of the circle whose centre is O and radius = 14 cm. the area of the shaded region is



(A) 28 cm^2
(B) 35 cm^2
(C) 60 cm^2
(D) 112 cm^2

Ans. (Hint): (D)

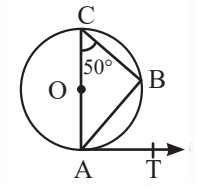
10. In the given figure, PQ is a tangent to the circle with centre O. If ∠OPQ = x, ∠POQ = y, then x + y is:



(A) 60°
(B) 90°
(C) 180°
(D) 45°

Ans. (Hint): (B)

11. If O is the centre of a circle, AOC is its diameter and B is a point on the circle such that ∠ACB = 50°. If AT is the tangent to the circle at the point A, then ∠BAT =



(A) 40°
(B) 60°
(C) 50°
(D) 65°

Ans. (Hint): (C)

12. The king, queen and jack of clubs are removed from a deck of 52 cards and the remaining cards are shuffled. A card is drawn from the remaining cards. The probability of getting a king is

(A) $\frac{3}{52}$
(B) $\frac{3}{49}$
(C) $\frac{4}{49}$
(D) $\frac{4}{52}$

Ans. (Hint): (B)

13. Consider the following frequency distribution:

Class	Frequency
65 – 85	4
85 – 105	5
105 – 125	13
125 – 145	20
145 – 165	14
165 – 185	7
185 – 205	4

The difference of the upper limit of the median class and the lower limit of the modal class is

(A) 0
(B) 19
(C) 20
(D) 38

Ans. (Hint): (C)

14. The distance between the points $P\left(-\frac{11}{3}, 5\right)$ and $Q\left(-\frac{2}{3}, 5\right)$ is:

(A) 3 units
(B) 4 units
(C) 2 units
(D) 6 units

Ans. (Hint): (A)

15. The height of a tower is 20 m. The length of its shadow made on the ground level when the Sun's altitude is 60°, is:

(A) 20 m
(B) $\frac{20}{3}$m
(C) $20\sqrt{3}$m
(D) $\frac{20}{\sqrt{3}}$m

Ans. (Hint): (D)

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