केन्द्रीय विद्यालय संगठन

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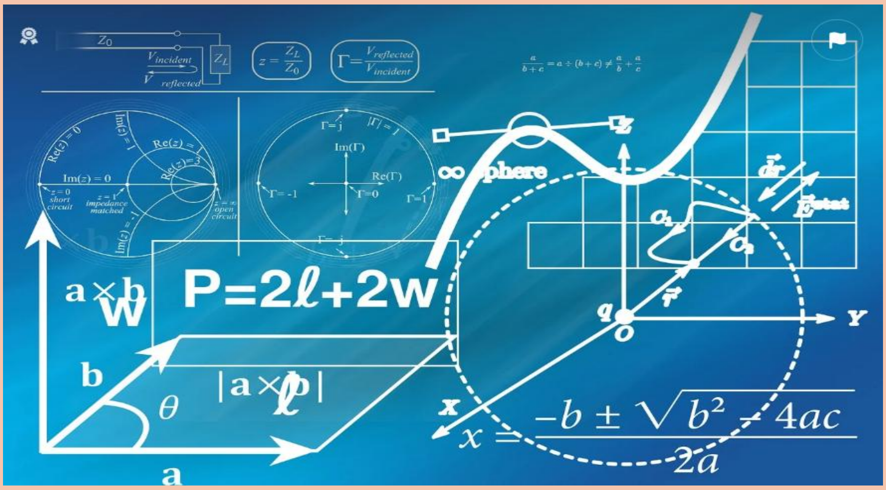
आंचलिक शिक्षा एवं प्रशिक्षण संस्थान, चंडीगढ़

ZONAL INSTITUTE OF EDUCATION AND TRAINING, CHANDIGARH

REVISION NOTES FOR MATHEMATICS: CLASS X

(BASED ON CBSE CURRICULUM)



संरक्षक

श्रीमती प्राची पांडे, आई.ए.एवं ए.एस.

आयुक्त

केन्द्रीय विद्यालय संगठन,नई दिल्ली

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श्रीमती श्रुति भार्गव

उपायुक्त एवं निदेशक,

केन्द्रीय विद्यालय संगठन

आंचलिक शिक्षा एवं प्रशिक्षण संस्थान

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REVISION NOTES FOR MATHEMATICS: CLASS X

REAL NUMBERS

If LCM of a &b =L
HCF of a &b=H
Then L×H=a×b

HCF (p, q, r) × LCM (p, q, r) ≠ p × q × r

$$LCM(p,q,r) = \frac{p \times q \times r \times \ HCF(p,q,r)}{HCF(p,q) \times HCF(q,r) \times HCF(r,p)}$$

$$HCF(p,q,r) = \frac{p \times q \times r \times \ LCM(p,q,r)}{LCM(p,q) \times LCM(q,r) \times LCM(r,p)}$$

Fundamental theorem of Arithmetic:
(Prime Factorisation)
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. For example:
216=2.2.2.3.3.3=$2^3.3^3$

Prove that √3 is irrational number.
Let √3 is rational number

$$\rightarrow \sqrt{3} = \frac{p}{q}, where\ q \neq 0, p\&q\ are\ co-prime$$

p=√3q → $p^2 = 3q^2$
→p^2 is multiple of 3 → p is multiple of 3
→p=3m
and $p^2 = 3q^2 \rightarrow (3m)^2 = 3q^2 \rightarrow 9m^2 = 3q^2$
$q^2 = 3m^2$
→q^2 is multiple of 3
→q is multiple of 3
Hence 3 is the common factor of p & q but p & q are co-prime. it is a contradiction. It means our assumption is wrong. Hence √3 is an irrational number

Prove that 5-2√3 is an irrational number

Let 5-2√3 is a rational number

$$5-2\sqrt{3}=\frac{p}{q}, q\neq 0 \rightarrow -2\sqrt{3}=\frac{p}{q}-5 \rightarrow -2\sqrt{3}=\frac{p-5q}{q}$$

$$-\sqrt{3}=\frac{p-5q}{2q} \rightarrow irrational = rational$$

It is a contradiction hence 5-2√3 is an irrational number

POLYNOMIALS Polynomial is an algebraic expression in which powers of variable are only whole numbers.

Degree of polynomial is the highest power of variable.

Degree=0 (Constant polynomial)

Degree=1 (Linear polynomial)

Degree=2 (Quadratic polynomial)

Degree=3 (Cubic polynomial)

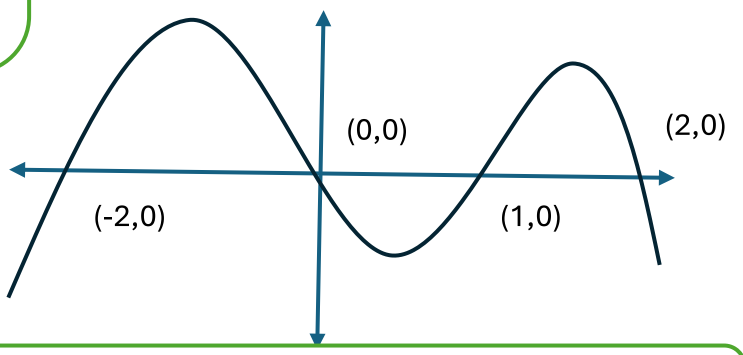
Degree=4 (Biquadratic polynomial)

Zero of polynomial

Value of variable for which value of polynomial becomes zero

i.e if at x=a, p(x)=0 then x=a is zero of p(x)

Geometrically, we can say that where the curve of y=p(x) cuts the x-axis that value of x is zero of p(x)



In the above graph y=p(x) intersects the x-axis at (-2,0),(0,0),(1,0) and (2,0) it means p(x) has four zeros i.e x= -2,0,1,2

Maximum number of distinct zeros of a polynomial= degree of polynomial

For Linear polynomial (Maximum number of possible zeros=1)

For Quadratic polynomial (Maximum number of possible distinct zeros=2)

For cubic polynomial (Maximum number of possible distinct zeros=3)

Relationship between zeros and coefficients of polynomial

$$if\ f(x) = ax^2 + bx + c$$
$$is\ a\ quadratic\ polynomial\ and \alpha, \beta\ are\ zeros\ of\ f(x) then$$
$$\alpha + \beta = -\frac{b}{a}, \quad \alpha\beta = \frac{c}{a}$$
$$and\ f(x) = x^2 - (\alpha + \beta)x + \alpha\beta$$

$$if\ f(x) = ax^3 + bx^2 + cx + d$$
$$is\ a\ cubic\ polynomial\ and\ \alpha, \beta, \gamma\ are\ zeros\ of\ f(x) then$$
$$\alpha + \beta + \gamma = -\frac{b}{a}, \quad \alpha\beta + \beta\gamma + \gamma\alpha = \frac{c}{a}, \quad \alpha\beta\gamma = -\frac{d}{a}$$
$$and\ f(x) = x^3 - (\alpha + \beta + \gamma)x^2 + (\alpha\beta + \beta\gamma + \gamma\alpha)x + \alpha\beta\gamma$$

LINEAR EQUATION IN TWO VARIABLES

ax+ by+ c=0

represent the linear equation of two variables (Power of x &y should be either 0 OR 1 and at least one of them should have power 1

Solution of system of linear equation of Two Variables

Algebraic Method

Graphical Method

Substitution Method

Elimination Method

Cross multiplication Method

$a_1x + b_1y + c_1 = 0$..........(1)

$a_2x + b_2y + c_2 = 0$.........(2)

Find the value of x (or y) from any one of the equation in terms of other variable and substitute in other equation and then on solving that we can find the value of that other variable and then the 1st variable

$3x - 4y + 2 = 0$..........(1)

$5x + 2y - 5 = 0$.........(2)

From equation (1) $y = \frac{3x+2}{4}$

Substitute in equation (2)

$$5x + 2\left(\frac{3x+2}{4}\right) = 5$$

$$\frac{20x + 6x + 4}{4} = 5$$

$$26x = 16 \rightarrow x = \frac{8}{13} \rightarrow y = \frac{3x+2}{4}$$

$$\rightarrow y = \frac{25}{26}$$

Elimination Method

$$a_1x + b_1y + c_1 = 0 \ldots\ldots\ldots(1)$$

$$a_2x + b_2y + c_2 = 0 \ldots\ldots\ldots(2)$$

Making any one of x (OR y) equal in both the equation by multiplying by a number in any one equation (Or both the equations) the eliminate that by adding (if sign of that x (OR y) has the opposite sign in both equation) or subtracting (if sign of that x (OR Y) has the same sign in both equation) both modified equations.

Then we will get the value of one variable. substitute that value in any one of the equation and find the value of second variable.

$$3x - 4y = -2 \ldots\ldots\ldots(1)$$

$$5x + 2y = 5 \ldots\ldots\ldots(2)$$

For making y equal in both equation, multiplying equation (2) by 2 the equation (2) becomes

$10x + 4y = 10 \ldots\ldots\ldots(2)\times 2$

$3x - 4y = -2 \ldots\ldots\ldots(1)$

By adding above two equations (because y has opposite sign in both) we have

13x=8 $\rightarrow x = \frac{8}{13}$ substituting this value of x we have $y = \frac{25}{26}$

If in a two digit number:
Ten's digit = x One's digit=y
Then number= 10x+y
Number (Reversing the digits) =10y+x

Speed of a man(boat) in still water=x
Speed of stream (water) =y
Then Final speed of man
in downstream =x+y, in upstream =x-y

If two objects are moving in the same direction with speeds x & y then their relative speed = x-y

If two objects are moving in the opposite direction with speeds x & y then their relative speed = x+y

Cross multiplication Method

$$a_1x + b_1y + c_1 = 0 \text{..........(1)}$$

$$a_2x + b_2y + c_2 = 0 \text{.........(2)}$$

$$\frac{x}{\begin{matrix} b_1 & c_1 \\ b_2 & c_2 \end{matrix}} = \frac{y}{\begin{matrix} c_1 & a_1 \\ c_2 & a_2 \end{matrix}} = \frac{1}{\begin{matrix} a_1 & b_1 \\ a_2 & b_2 \end{matrix}}$$

$$\frac{x}{b_1c_2 - b_2c_1} = \frac{y}{c_1a_2 - c_2a_1} = \frac{1}{a_1b_2 - a_2b_1}$$

$$3x - 4y + 2 = 0 \text{..........(1)}$$

$$5x + 2y - 5 = 0 \text{.........(2)}$$

$$\frac{x}{\begin{matrix} -4 & 2 \\ 2 & -5 \end{matrix}} = \frac{y}{\begin{matrix} 2 & 3 \\ -5 & 5 \end{matrix}} = \frac{1}{\begin{matrix} 3 & -4 \\ 5 & 2 \end{matrix}}$$

$$\frac{x}{20 - 4} = \frac{y}{10 + 15} = \frac{1}{6 + 20}$$

$$\frac{x}{16} = \frac{y}{25} = \frac{1}{26}$$

$$\frac{x}{16} = \frac{1}{26} \rightarrow x = \frac{16}{26} = \frac{8}{13}$$

$$\frac{y}{25} = \frac{1}{26} \rightarrow y = \frac{25}{26}$$

Nature of solution of system of linear equations in two variables

$$a_1x + b_1y + c_1 = 0 \text{..........(1)}$$

$$a_2x + b_2y + c_2 = 0 \text{.........(2)}$$

$$\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$$ → Unique Solution (Intersecting Lines)

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$$ → Infinitely many Solutions (Coincident Lines)

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$$ → No Solution (Parallel Lines)

QUADRATIC EQUATION

QUADRATIC EQUATION means

quadratic polynomial=0

$$ax^2 + bx + c = 0 \qquad (a \neq 0)$$

Zeros of quadratic equation

$$ax^2 + bx + c = 0$$

$$(a \neq 0)$$

Factorisation method

(Factorisation by splitting the middle term)

By using Formula

(Quadratic formula OR Sri Dharacharya Formula)

By Completing the perfect square

Factorisation method (Factorisation by splitting the middle term)

$$2x^2 - 11x + 9 = 0$$

2 × 9 =18 (result is positive it means we have to find two factors of 18 whose sum is 11(coefficient of x)

9×2=18 and 9+2=11 Hence

$2x^2 - (9+2)x + 9 = 0$

$2x^2 - 9x - 2x + 9 = 0$

$x(2x-9) - 1(2x-9) = 0$

$(2x-9)(x-1) = 0 \rightarrow x = 1, \quad \frac{9}{2}$

$$2x^2 - 3x - 9 = 0$$

2 × (-9) =-18 (result is negative it means we have to find two factors of 18 whose difference is 3(coefficient of x)

6×3=18 and 6-3=3 Hence

$2x^2 - (6-3)x - 9 = 0$

$2x^2 - 6x + 3x - 9 = 0$

$2x(x-3) - 3(x-3) = 0$

$(x-3)(2x-3) = 0$

$x = 3, \quad \frac{3}{2}$

By using Formula

(Quadratic formula OR Sri Dharacharya Formula)

$$\boldsymbol{ax^2 + bx + c = 0}$$

Discriminant

$$\boldsymbol{D = b^2 - 4ac}$$

Sri Dharacharya Formula

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

OR

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

Nature of roots

$$\boldsymbol{D = b^2 - 4ac}$$

$D \geq 0 \rightarrow real\ roots\ (consistent\ equation)$

i) D > 0 (Real and distinct (unequal) roots)

ii) D = 0 (Real and equal roots)

D < 0 → No real roots (Inconsistent equation)

By Completing the perfect square

$$ax^2 \pm bx \pm c = 0$$
$$ax^2 \pm bx = \mp c$$
$$x^2 \pm \frac{b}{a}x = \mp \frac{c}{a}$$
$$\left(x \pm \frac{b}{2a}\right)^2 - \left(\frac{b}{2a}\right)^2 = \mp \frac{c}{a}$$
$$\left(x \pm \frac{b}{2a}\right)^2 = \left(\frac{b}{2a}\right)^2 \mp \frac{c}{a}$$
$$x \pm \frac{b}{2a} = \pm \sqrt{\left(\frac{b}{2a}\right)^2 \mp \frac{c}{a}}$$
$$x = \mp \frac{b}{2a} \pm \sqrt{\left(\frac{b}{2a}\right)^2 \mp \frac{c}{a}}$$

$$2x^2 - 11x + 9 = 0$$
$$2x^2 - 11x = -9$$
$$x^2 - \frac{11}{2}x = -\frac{9}{2}$$
$$\left(x - \frac{11}{4}\right)^2 - \left(\frac{11}{4}\right)^2 = -\frac{9}{2}$$
$$\left(x - \frac{11}{4}\right)^2 = \left(\frac{11}{4}\right)^2 - \frac{9}{2}$$
$$\left(x - \frac{11}{4}\right)^2 = \frac{121}{16} - \frac{9}{2} = \frac{49}{16}$$
$$x - \frac{11}{4} = \pm \frac{7}{4}$$
$$x = \frac{11}{4} \pm \frac{7}{4} \rightarrow x = \frac{11 \pm 7}{4} = \frac{9}{2}, 1$$

ARITHMATIC PROGRESSION

Arithmetic Progression (A.P.) is a sequence in which terms increase or decrease regularly by the same constant d (common difference d can be positive or negative or zero). If a is the first tem and d is the common difference the A.P. a, a + d, a + 2d, ... $\mathbf{a_n}$**....** $\boldsymbol{l}$

nth term from beginning =$\mathbf{a_n}$=a + (n – 1) d.
nth term from end = $\boldsymbol{l}$**- (n – 1) d**

$$\text{Sum to } n \text{ terms of } AP = S_n = \frac{n}{2}[2a+(n-1)d] = \frac{n}{2}[a+a_n]$$

$$a_n = S_n - S_{n-1}$$

If a and b are two number then $\frac{a+b}{2}$ ***is the arithmatic mean of a & b***

Three consecutive terms in A.P. are a – d , a, a + d.
Five consecutive terms in A.P. are a – 2d , a – d , a, a + d, a + 2d.

Comon diff.=d

Four consecutive terms in A.P. are a – 3d , a – d , a + d, a + 3d.
Six consecutive terms in A.P. are a-5d, a – 3d , a – d , a + d, a + 3d, a+5d

Comon diff.=2d

TRIANGLES

SIMILAR FIGURES

Figures which are same in shape but may be different in size.

All squares are similar

All circles are similar

All equilateral triangles are similar

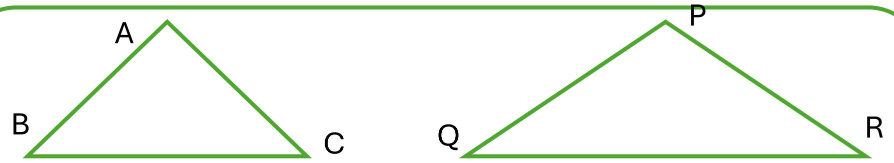
All congruent triangles are similar but similar triangles may not be congruent

Similar Polygons

If two polygons are similar then their corresponding angles are equal and their corresponding sides are proportional.

Similar Triangles

Two triangles are similiar, if
i)their corresponding angles are equal and
ii)their corresponding sides are in the same ratio (or proportion).



$If\ \angle A = \angle P, \angle B = \angle Q, \angle C = \angle R$ then $\Delta ABC \sim \Delta PQR$

$$\rightarrow \frac{BC}{QR} = \frac{AC}{PR} = \frac{AB}{PQ}$$

Criteria for Similarity of Triangles

AAA
(Angle–Angle–Angle)
OR
AA(Angle–Angle)
If all three angles (or two angles) of two triangles are equal then triangles are similar

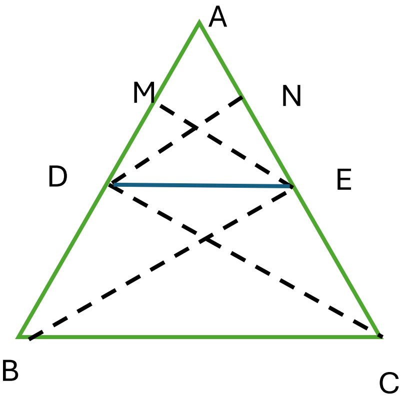
SSS
(Side-Side-Side)
If all three corresponding sides are proportional then triangles are similar

SAS
(Side–Angle–Side)
If any two corresponding sides are proportional and including angles are equal then triangles are similar

RHS
(Right angle-hypotenuse-side)
If in two right triangles, hypotenuse and one side of one triangle are proportional to the hypotenuse and one side of the other triangle, then the two triangles are similar.

BASIC PROPORTIONALITY THEOREM

If a line drawn parallel to a side of a triangle (intersects the other two sides) then it divides the other two sides in the same ratio.



Let ABC is a triangle , DE is parallel to AB.
Draw DN and EM perpendiculars to AC and AB respectively and join BE and CD.

Now area of $\Delta ADE = \frac{1}{2} base \times height$

area of $\Delta ADE = \frac{1}{2} AE \times DN = \frac{1}{2} AD \times EM$

Hence $\frac{AE}{AD} = \frac{EM}{DN}$ ....(1)

Now area of ΔBDE=area of ΔCDE

(Triangles on the same base DE and between same parallels BC and DE)

$\frac{1}{2} BD \times EM = \frac{1}{2} CE \times DN \rightarrow \frac{CE}{BD} = \frac{EM}{DN}$ ....(2)

From (1) and (2) $\frac{AE}{AD} = \frac{CE}{BD} \rightarrow \frac{AD}{BD} = \frac{AE}{CE}$ HENCE PROVED

If two triangles are similar then

- Their corresponding angles are equal
- Their corresponding sides are proportional
- Their corresponding medians are proportional
- Their corresponding angle bisectors are proportional
- Their corresponding altitudes are proportional

If two triangles are similar then ratio of their corresponding sides is equal

Ratio of Their corresponding medians

Ratio of Their corresponding altitudes

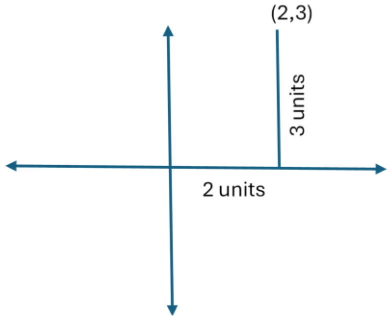
Ratio of Their corresponding angle bisectors

Ratio of their areas=ratio of squares their corresponding sides (or medians or altitudes or angle bisectors)

COORDINATE GEOMETRY

Axes: x-axis and y-axis are two mutually perpendicular number lines

If (x,y) is the coordinate of a point it means that point is at a distance of x units along x- axis (horizontal) and at distance of y units along y-axis (vertical)



COORDINATE GEOMETRY

Distance between two points A(x_1 , y_1) & B(x_2, y_2) is AB $=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

Section formula

i)Coordinates of a point dividing the line joining A (x_1, y_1) & B (x_2, y_2) internally in the ratio m:n is $\left(\frac{mx_2+nx_1}{m+n}, \frac{my_2+ny_1}{m+n}\right)$.

ii)Coordinates of a point dividing the line joining A (x_1, y_1) & B (x_2, y_2) externally in the ratio m: n is $\left(\frac{mx_2-nx_1}{m-n}, \frac{my_2-ny_1}{m-n}\right)$

iii)Mid-point of the line joining A (x_1, y_1) & B (x_2, y_2) is $\left(\frac{x_1+y_1}{2}, \frac{x_2+y_2}{2}\right)$

Centroid of a ΔABC with vertices A(x_1 , y_1), B (x_2 , y_2) & C(x_3, y_3) $\left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}\right)$

Area of ΔABC with vértices A(x_1, y_1), B(x_2, y_2) & C (x_3, y_3) $=\frac{1}{2}\left| x_1(y_2-y_3)+x_2(y_3-y_1)+x_3(y_1-y_2)\right|$

INTRODUCTION OF TRIGONOMETRY

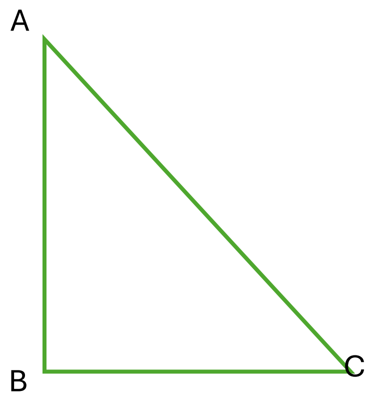
TRIGONOMETRIC RATIOS

$$sin\theta = \frac{side\ opposite\ to\ angle\ (perpendicular)}{hypotenuse}$$

$$cos\theta = \frac{side\ adjacent\ to\ angle\ (base)}{hypotenuse}$$

$$tan\theta = \frac{side\ opposite\ to\ angle\ (perpendicular)}{side\ adjacent\ to\ angle\ (base)}$$

$$cot\theta = \frac{1}{tan\theta},\quad sec\theta = \frac{1}{cos\theta},\quad cosec\theta = \frac{1}{sin\theta}$$



$$sinA = \frac{BC}{AC}, \quad sinC = \frac{AB}{AC}$$

$$cosA = \frac{AB}{AC}, \quad cosC = \frac{BC}{AC}$$

$$tanA = \frac{BC}{AB}, \quad tanC = \frac{AB}{BC}$$

$$cotA = \frac{AB}{BC}, \quad sinC = \frac{BC}{AB}$$

$$secA = \frac{AC}{AB}, \quad secC = \frac{AC}{BC}$$

$$cosecA = \frac{AC}{BC}, \quad sinC = \frac{AC}{AB}$$

TRIGONOMETRICAL IDENTITIES

$$sin^2\theta + cos^2\theta = 1$$

$$sin^2\theta = 1 - cos^2\theta$$

$$cos^2\theta = 1 - sin^2\theta$$

$$1 + tan^2\theta = sec^2\theta$$

$$sec^2\theta - tan^2\theta = 1$$

$$sec^2\theta - 1 = tan^2\theta$$

$$1 + cot^2\theta = cosec^2\theta$$

$$cosec^2\theta - cot^2\theta = 1$$

$$cosec^2\theta - 1 = cot^2\theta$$

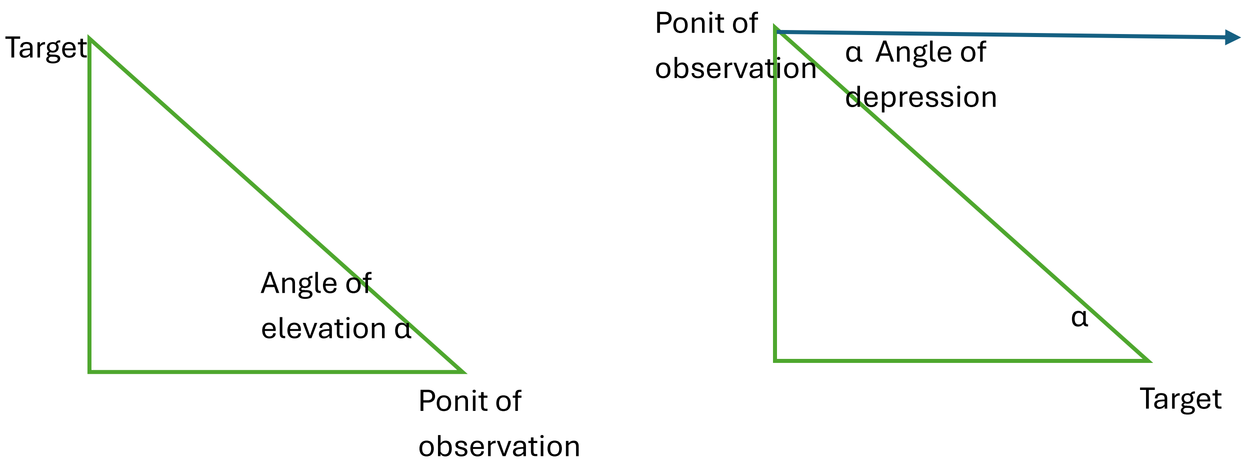
Pythgoras Theorem

$$perpendicular^2 + base^2 = Hypotenuse^2$$

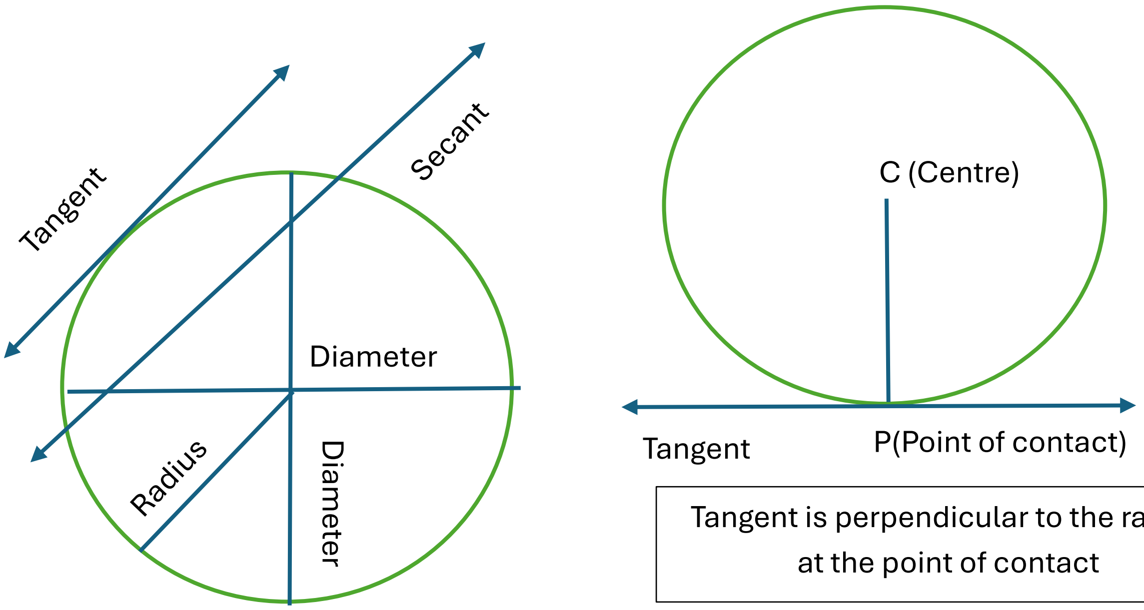
$$AB^2 + BC^2 = AC^2$$

Ɵ	0^0	30^0	45^0	60^0	90^0
sin Ɵ	0	1/2	$1/\sqrt{2}$	$\sqrt{3}/2$	1
cos Ɵ	1	$\sqrt{3}/2$	$1/\sqrt{2}$	1/2	0
sin Ɵ/ cos Ɵ = tan Ɵ	0	$1/\sqrt{3}$	1	$\sqrt{3}$	∞
cos Ɵ/ sin Ɵ OR 1/ tan Ɵ = cot Ɵ	∞	$\sqrt{3}$	1	$1/\sqrt{3}$	0
1/cos Ɵ = sec Ɵ	1	$2/\sqrt{3}$	$\sqrt{2}$	2	∞
1/sin Ɵ = cosec Ɵ	∞	2	$\sqrt{2}$	$2/\sqrt{3}$	1

Application of Trigonometry



CIRCLES

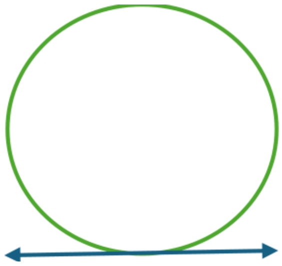


Tangent is perpendicular to the radius at the point of contact

Number of tangents to a circle from a point

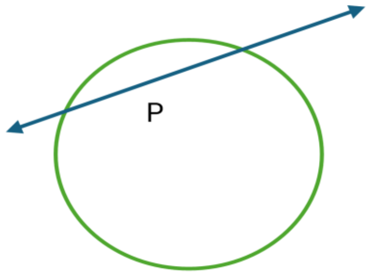
From (at)a point P on the circle

Number of tangent =1



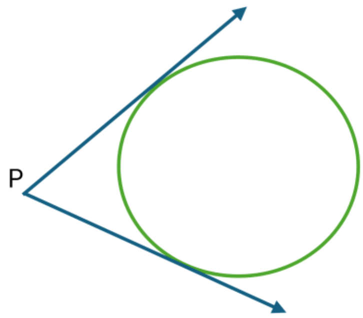
From a point P inside the circle

Number of tangent =0

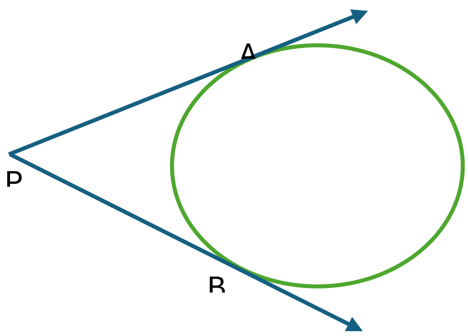


From a point P outside the circle

Number of tangent =2



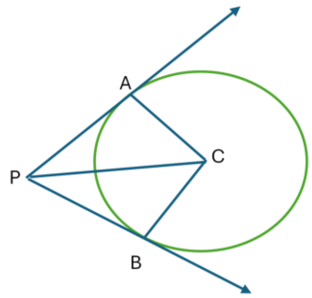
Lenths of tangents to a circle from external point P are equal.



PA=PB

Prove that the length of tangents (PA & PB) to a circle from an external points are equal, i.e PA=PB

Let C is the centre of the circle and PA and PB are the tangents to the circle from an external point P



Then in ΔPAC and ΔPBC

$\angle PAC = \angle PBC = 90^0$

$(angle\ between\ radius\ and\ tangents)$

AC=BC (radii)

PC=PC (Common)

By RHS

$\Delta PAC \equiv \Delta PBC$

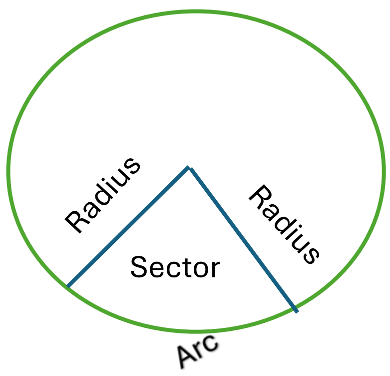
By CPCT

PA=PB (Hence Proved)

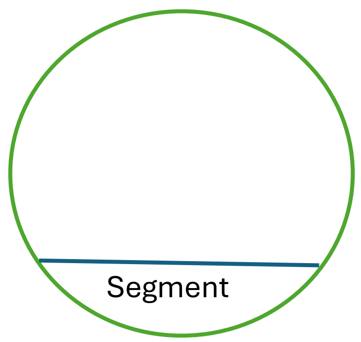
Also: $\angle APC = \angle BPC$

It means PC is the angle bisector of $\angle APB$ $(Angle\ between\ tangents)$

Area Related to Circle



Sector is the region bounded by two radii and arc of the circle



Segment is the region bounded by a chord and arc of the circle

$$Length\ of\ arc = \frac{\theta}{360} 2\pi r$$

Where θ= angle between radii

Area Related to Circle

Area of Circle=πr^2

Where r= radius of circle

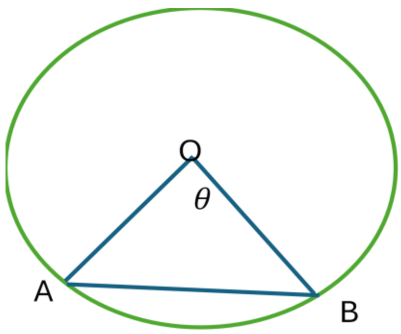
$$Area\ of\ semi-circle = \frac{1}{2}\pi r^2$$

$$Area\ of\ sector = \frac{\theta}{360}\pi r^2$$

Where θ= angle between radii

$$Area\ of\ segment = area\ of\ sector - area\ of\ \Delta OAB$$

$$= \left(\frac{\pi\theta}{360} - \frac{sin\theta}{2}\right)r^2$$



Where θ= angle between radii
O is the centre, A&B are the ends of Arc
r= radius

SURFACE AREA AND VOLUME

CUBOID

Length=l
Breadth=b
Height=h

Total Surface Area =2(lb+bh+hl)

Lateral Surface Area

(Area of four walls) =2(l+b)h

Total Surface Area of open cuboid

(Open at the top) =2(l+b)h+lb

Volume= lbh

$$Length\ of\ diagonal = \sqrt{l^2 + b^2 + h^2}$$

CUBE

Length=Breadth=Height=a

- Total Surface Area $=6a^2$
- Lateral Surface Area (Area of four walls) $=4a^2$
- Total Surface Area of open cube (Open at the top) $=5a^2$
- Volume$= a^3$
- $Length\ of\ diagonal = a\sqrt{3}$

CYLINDER

Radius=r

Length(Height)=h

- Curved Surface Area $=2\pi rh$
- Total Surface Area
  = CSA+area of base(circle)+area of top(circle)
  $=2\pi rh+\pi r^2+\pi r^2=2\pi rh+2\pi r^2$
  $=2\pi r(h+r)$
- Total Surface Area of open cylinder
  (Open at the top) = CSA+area of base(circle)
  $=2\pi rh+\pi r^2=2\pi rh+\pi r^2$
- Volume$= \pi r^2h$

CONE

Radius=r

Height=h

- Curved Surface Area $=\pi rl$
- Total Surface Area
  = CSA+area of base(circle)
  $= \pi rl +\pi r^2+\pi r^2=\pi r(l+r)$
- Volume$=\frac{1}{3}\pi r^2h$

Sphere and Hemishere

Radius=r

Surface Area of sphere=$4\pi r^2$

Volume of sphere=$\frac{4}{3}\pi r^3$

Curved Surface Area of hemisphere=$2\pi r^2$

Total Surface Area of hemisphere=$3\pi r^2$

Volume of hemisphere=$\frac{2}{3}\pi r^2 h$

Cylinder with Conical Cap

Volume=

Volume of cylinder +Volume of cone

Cylinder with Conical Cavity

Volume=

Volume of cylinder-Volume of cone

Total surface area= CSA of Cylinder +CSA of cone- area of base of cone

Cylinder with Cap of any shape

Volume=

Volume of cylinder +Volume of shape

Cylinder with Cavity of any shape

Volume=

Volume of cylinder-Volume of shape

Total surface area= CSA of Cylinder +CSA of shape- area of base of shape

STATISTICS

Mean	$\frac{\sum x_i}{n}$	$\frac{\sum f_i x_i}{\sum f_i}$	$A+\frac{\sum f_i d_i}{\sum f_i}$ Where A=Assumed mean, $d_i = x_i - A$	$A+\left(\frac{\sum f_i u_i}{\sum f_i}\right)h$ Where A=Assumed mean, $u_i=\frac{x_i - A}{h}$
Median	If n is total number of observations and the observations are arranged in ascending order i)n is odd: then median=$\frac{n+1}{2}\,th\ term$ (ii) n is even: then median=$\frac{\frac{n}{2}th\ term+\left(\frac{n}{2}+1\right)the\ term}{2}$		$Median = l+\left(\frac{\frac{n}{2}-c}{f}\right)h$ *l=lower limit of median class* *n=total number of observations=*$\sum f_i$ *c= cumulative frequency of class proceeding of median class* *f= frequency of median class* *h=length of class interval (class size)*	
Mode	Value of observation (x) which has the highest frequency	$Mode = l+\left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right)h$ *l= lower limit of modal class* $f_1 = frequency\ of\ modal\ class$ $f_0 = Frequency\ of\ preceeding\ class$ $f_2 = frequency\ of\ suceeding\ class$ *h= class size*		

PROBABILITY

It will be assumed that all the experiments have equally likely outcomes.

the experimental or empirical probability P(E) of an event E as

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

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

$$P(E)=\frac{Number\ of\ outcomes\ favourable\ to\ E}{total\ number\ of\ possible\ outcomes}$$

Probability of sure event=1

Probability of impossible event=0

Probability of not E= $P(\bar{E}) - 1 - P(E)$