॥ॐ॥

OM TUTORIALS

.....redefining education

GEOMETRY FORMULA SET

FOR SSC STUDENTS

School Section

Nursery to 10^{th}

(State / CBSE / ICSE Board)

College Section

XI^{th} / XII^{th}

(Commerce)

Chapter 1- Similarity

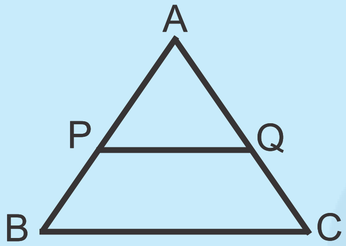
1. Ratio of areas of two triangles having different bases and heights is equal to the ratio of product of their bases and corresponding heights.

2. Ratio of areas of two triangles having equal height is equal to the ratio of their bases.

3. Ratio of areas of two triangles having equal base is equal to the ratio of their heights.

4. Ratio of areas of two triangles having equal base and equal height is equal to one.

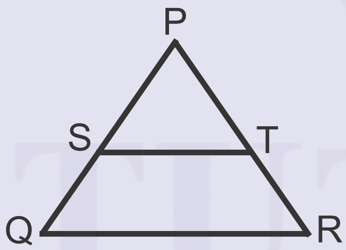
5. **Basic proportionality theorem**



In Δ ABC, If Seg PQ II Side BC

then $\frac{AP}{PB} = \frac{AQ}{QC}$

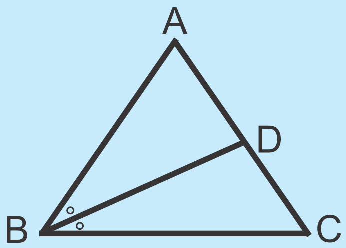
6. **Converse of basic proportionality theorem**,



In Δ PQR if $\frac{PS}{SQ} = \frac{PT}{TR}$

then seg ST II seg QR

7. **Angle bisector theorem**

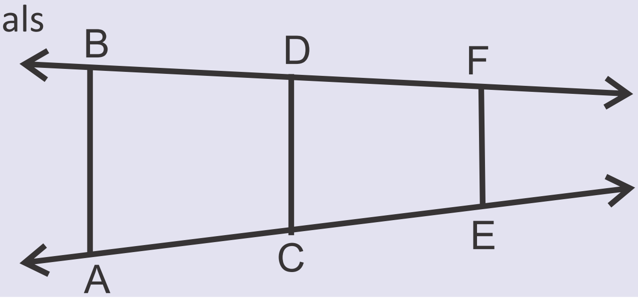


If in Δ ABC, BD is Bisector of $\angle$ABC

then $\frac{AB}{BC} = \frac{AD}{DC}$

8. If AB II CD II EF . BF and AE are transversals

then $\frac{BD}{DF} = \frac{AC}{CE}$

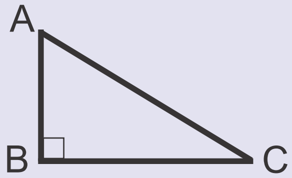


9. If Δ ABC ~ Δ PQR then $\frac{A(\Delta ABC)}{A(\Delta PQR)} = \frac{AB^2}{PQ^2} = \frac{BC^2}{QR^2} = \frac{AC^2}{PR^2}$

(Ratio of areas of two similar triangles is equal to the ratio of square of their corresponding sides)

Chapter 2- Pythagoras Theorem

1. **Pythagoras theorem**



In Δ ABC, If $\angle$ ABC = 90°
then $AC^2 = AB^2 + BC^2$
(Pythagoras theorem)

2. **Pythagorean Triplet** :-

In a triplet of natural numbers , if the square of largest number is equal to the sum of the squares of the remaining two numbers then the triplet is called Pythagorean triplet.

Ex. In the triplet (11,60,61)
$11^2 = 121$, $60^2 = 3600$, $61^2 = 3721$
And 3721 = 121 + 3600

$\because$ The square of the largest number is equal to the sum of the squares of the other two numbers .
$\therefore$ (11,60,61) is Pythagorean triplet.

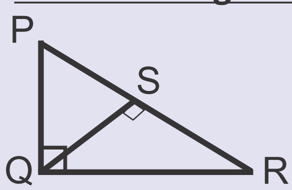
3. **Property of 30°-60°-90° triangle**

If triangle is 30°-60°-90° kind of triangle then side opposite to 30° is half of hypotenuse and side opposite to 60° is $\frac{\sqrt{3}}{2}$ times the hypotenuse.

4. **Property of 45°-45°-90° triangle**

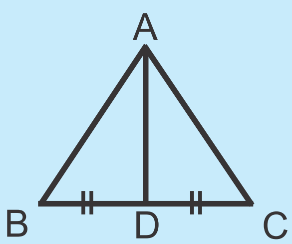
If triangle is 45°-45°-90° kind of triangle then side opposite to 45° is $\frac{1}{\sqrt{2}}$ times the hypotenuse .

5. **Theorem of geometric mean**



In Δ PQR , $\angle$Q = 90° , Seg QS $\perp$ Seg PR ,
$\therefore QS^2 = PS \times SR$
[Theorem of geometric mean]

6. **Apollonius theorem**



In Δ ABC if AD is Median of Δ ABC
Then , $AB^2 + AC^2 = 2 \times AD^2 + 2 \times BD^2$

Chapter 3- Circle

1. Diameter is double of radius.

2. Radius is half of diameter.

3. Diameter is the biggest chord of any circle.

4. Infinite circles pass through one point.

5. Infinite circles pass through two distinct points.

6. There is a unique circle passing through three non-collinear points.

7. No circle can pass through 3 collinear points.

8. **Tangent Theorem** : A tangent at any point of a circle is perpendicular to the radius at the point of contact.

9. **Converse of tangent theorem** : A line perpendicular to a radius at its point on the circle , is **Tangent** to the circle.

10. Tangent segments drawn from same exterior point to a circle are congruent.

11. If the circles touch each other externally then distance between their centres is equal to the sum of their radii.

12. If the circles touch each other internally then distance between their centres is equal to the different of their radii.

13. An angle whose vertex is the centre of a circle is called a central angle .

14. M(Minor Arc) = measure of central angle

15. M (Major Arc) = 360° - measure of minor Arc

16. When only one point C is common to are ABC and Arc CDE of the same circle, M(Arc ABC) + M(Arc CDE) = M(Arc ACE)

17. Chords of the same or Congruent circle are equal if the related Arcs are congruent.

18. Arcs of the same or congruent circles are equal if the related chords are congruent.

19. The measure of an inscribed angel is half the measure of the arc intercepted by it.

20. Angles inscribed in the same arc are congruent .

21. Angle inscribed in a semicircle is a right angle.

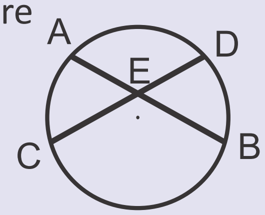
22. If all vertices of a quadrilateral lie on the same circle then quadrilateral is called a cyclic quadrilateral.

Chapter 3- Circle

23. Opposite angles of a cyclic quadrilateral are supplementary.

24. If two points on a given line subtend equal angles at two different points which lie on the same side of the line, then those four points are concyclic.

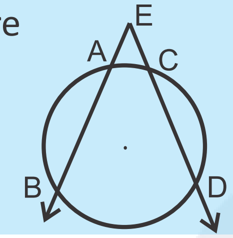
25. In figure



(i) $\angle AEC = \frac{1}{2}$ [m (arc AC) + m (arc DB)]

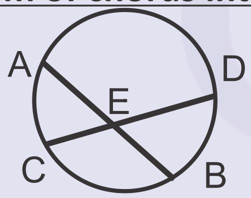
(ii) $\angle CEB = \frac{1}{2}$ [m (arc AD) + m (arc CB)]

26. In figure



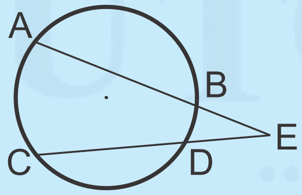
$\angle BED = \frac{1}{2}$ [m (arc BD) - m (arc AC)]

27. **<u>Theorem of chords intersecting inside the circle</u>**



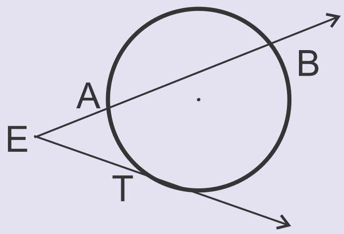
AE X EB = CE X ED

28. **<u>Theorem of chords intersecting outside the circle</u>**



AE X EB = CE X ED

29. **<u>Tangent secant segments theorem</u>**



ET^2 = EA X EB

30. Measure of Semi – Circle =180°

31. Measure of Circle =360°

32. Any perpendicular drawn from the centre of circle to the chord , bisect the chord.

Chapter 5 - Co-Ordinate Geometry

1. Co-ordinates of origin are (0,0)

2. If points P (x_1,y_1), Q (x_2,y_2)

   Then d (P,Q) = $\sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$

3. **Section Formula** :

   The co-ordinates of a point, which divides the line segment joined the two distinct points (x_1,y_1) and (x_2,y_2) in the ratio m:n are $\left(\frac{mx_2+nx_1}{m+n}, \frac{my_2+ny_1}{m+n}\right)$

4. **Mid – point formula**

   The co-ordinates of mid-point of a line segment joining two distinct points (x_1,y_2) and (x_2,y_2) are $\left(\frac{x_1+x_2}{2} \quad \frac{y_1+y_2}{2},\right)$

5. **Centroid Formula**

   If (x_1 ,y_1) ; (x_2,y_2) and (x_3,y_3) are the vertices of a triangle then co ordinates of centroid are: $\left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}\right)$

6. **Slope Formula**

   If $A(x_1, y_1)$; $B(x_2, y_2)$ then slope of AB = $\frac{y_2 - y_1}{x_2 - x_1}$

Chapter 6 - Trigonometry

1. Sequence of trigonometric ratio are as below :

$\sin\theta$ $\cos\theta$ $\tan\theta$ $\cot\theta$ $\sec\theta$ $\mathrm{cosec}\,\theta$

2. A) $\sin\theta = \dfrac{1}{\mathrm{cosec}\,\theta}$

B) $\mathrm{cosec}\,\theta = \dfrac{1}{\sin\theta}$

C) $\cos\theta = \dfrac{1}{\sec\theta}$

D) $\sec\theta = \dfrac{1}{\cos\theta}$

E) $\tan\theta = \dfrac{1}{\cot\theta}$

F) $\cot\theta = \dfrac{1}{\tan\theta}$

3. A) $\sin\theta = \dfrac{\text{Opposite side}}{\text{Hypotenuse}}$

B) $\cos\theta = \dfrac{\text{Adjacent Side}}{\text{Hypotenuse}}$

C) $\tan\theta = \dfrac{\text{Opposite side}}{\text{Adjacent side}}$

D) $\cot\theta = \dfrac{\text{Adjacent side}}{\text{Opposite side}}$

E) $\sec\theta = \dfrac{\text{Hypotenuse}}{\text{Adjacent side}}$

F) $\mathrm{cosec}\,\theta = \dfrac{\text{Hypotenuse}}{\text{Opposite side}}$

4. A) $\sin\theta = \cos(90^\circ - \theta)$

B) $\cos\theta = \sin(90^\circ - \theta)$

C) $\tan\theta = \cot(90^\circ - \theta)$

D) $\cot\theta = \tan(90^\circ - \theta)$

E) $\sec\theta = \mathrm{cosec}(90^\circ - \theta)$

F) $\mathrm{cosec}\,\theta = \sec(90^\circ - \theta)$

5. A) $\sin\theta \times \mathrm{cosec}\,\theta = 1$

B) $\cos\theta \times \sec\theta = 1$

C) $\tan\theta \times \cot\theta = 1$

6. A) $\sin^2\theta + \cos^2\theta = 1$

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

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

7. A) $1 + \tan^2\theta = \sec^2\theta$

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

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

8. A) $1 + \cot^2\theta = \mathrm{cosec}^2\theta$

B) $\cot^2\theta = \mathrm{cosec}^2\theta - 1$

C) $\mathrm{cosec}^2\theta - \cot^2\theta = 1$

Chapter 6 - Trigonometry

9. The table of the values of trigonometric ratios of angles 0°,30°,45°,60° and 90°.

Angle (θ)					
Trigonometric Ratio	0^0	30^0	45^0	60^0	90^0
$\sin\theta$	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
$\cos\theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
$\tan\theta$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	N.D.
$\cot\theta$	N.D.	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0
$\sec\theta$	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	N.D.
$\operatorname{cosec}\theta$	N.D.	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1

Chapter 7 - Mensuration

1. **Cuboid**
   A) Lateral surface area of cuboid = $2h(\ell + b)$
   B) Total surface area of cuboid = $2(\ell b + bh + h\ell)$
   C) Volume of cuboid = ℓbh

2. **Cube**
   A) Lateral surface area of cube = $4\ell^2$
   B) Total surface area of cube = $6\ell^2$
   C) Volume of cube = ℓ^3

3. **Cylinder**
   A) Curved surface area of cylinder = $2\pi rh$
   B) Total surface area of cylinder = $2\pi r(r + h)$
   C) Volume of cylinder = $\pi r^2 h$

4. **Cone**
   A) Slant Height of cone (ℓ) = $\sqrt{(r^2+h^2)}$
   B) Curved surface area of cone = $\pi r\ell$
   C) Volume of cone = $\frac{1}{3}$ X $\pi r^2 h$
   D) Total surface area of cone = $\pi r(\ell + r)$

5. **Sphere**
   A) Volume of Sphere = $\frac{4}{3}\pi r^3$
   B) surface area of Sphere = $4\pi r^2$

6. **Hemisphere**
   A) Curved surface area of Hemisphere = $2\pi r^2$
   B) Total surface area of Hemisphere = $3\pi r^2$
   C) Volume of Hemisphere = $\frac{2}{3}\pi r^3$

7. **Frustum of a cone**
   A) Slant Height of Frustum (ℓ) = $\sqrt{h^2 + (r_1 - r_2)^2}$
   B) Curved surface area of Frustum = $\pi\ell(r_1 + r_2)$
   C) Total surface area of Frustum = $\pi\ell(r_1+r_2) + \pi r_1^2 + \pi r_2^2$
   D) Volume of Frustum = $\frac{1}{3}\pi h(r_1^2 + r_2^2 + r_1 \times r_2)$

Chapter 7 - Mensuration

8. Area of sectors (A) = $\frac{\theta}{360} \times \pi r^2$

9. Length of arc (ℓ) = $\frac{\theta}{360} \times 2\pi r$

10. Area of minor segment = $r^2 \left(\frac{\pi\theta}{360} - \frac{\sin\theta}{2} \right)$

11. Area of circle = πr^2

12. Area of major segment = Area of circle – A (minor segment)

13. Area of Hexagon **= 6 X $\frac{\sqrt{3}}{4}$ X (side)²**

14. Area of sector **(A) =** $\frac{\text{length of arc} \times \text{radius}}{2} = \frac{\ell \times r}{2}$

15. Area of major sector **= 360° – Area of minor sector**

The End

Branch 1 :

Shop No 13 , 15 ,16 & 21,
Anand View, Near DGS Group,
Nallasopara (W)

Branch 2 :

Shop No 08, Shanti nagar,
Near Yashwant gaurav Com.,
Nallasopara (W)

For More Details Contact

7798553996
9665110074
9765399180