

TRIANGLES

KEY POINTS

1. **Similar Triangles:-** Two triangles are said to be similar, if (a) their corresponding angles are equal and (b) their corresponding sides are in proportion (or are in the same ratio).
2. Basic proportionality Theorem [or Thales theorem].
3. Converse of Basic proportionality Theorem.
4. Criteria for similarity of Triangles.
 - (a) AA or AAA similarity criterion.
 - (b) SAS similarity criterion.
 - (c) SSS similarity criterion.
5. Areas of similar triangles.
6. Pythagoras theorem.
7. Converse of Pythagoras theorem.

(Level -1)

1. If in two triangles, corresponding angles are equal, then the two triangles are.....
Ans. Equiangular then similar
2. ΔABC is a right angled at B. BD is perpendicular upon AC. If $AD=a$, $CD=b$, then $AB^2=$
Ans. $a(a+b)$
3. The area of two similar triangles are 32cm^2 and 48cm^2 . If the square of a side of the first Δ is 24cm^2 , then the square of the corresponding side of 2nd triangle will be
Ans. 36cm^2
4. ABC is a triangle with $DE \parallel BC$. If $AD=2\text{cm}$, $BD=4\text{cm}$ then find the value $DE:BC$
Ans. 1:3
5. In ΔABC , $DE \parallel BC$, if $AD=4x-3$, $DB=3x-1$, $AE=8x-7$ and $BC=5x-3$, then find the values of x are:
Ans. $1, -\frac{1}{2}$
6. The perimeters of two similar triangles are 40cm and 50 cm respectively, find the ratio of the area of the first triangle to the area of the 2nd triangle:
Ans. 16:25
7. A man goes 150m due east and then 200m due north. How far is he from the starting point?
Ans. 250 m
8. A ladder reaches a window which is 12m above the ground on one side of the street. Keeping its foot at the same point, the ladder is turned to the other side of the street to reach a window 9m high. If the length of the ladder is 15m , find the width of the street.
Ans. 21m

9. BO and CO are respectively the bisector of $\angle B$ and $\angle C$ of $\triangle ABC$. AO produced meets BC at P, then find AB/AC

Ans. $\frac{BP}{PC}$

10. In $\triangle ABC$, the bisectors of $\angle B$ intersects the side AC at D. A line parallel to side AC intersects line segments AB, DB and CB at points P, R, Q respectively. Then, Find AB/XCQ

Ans. $BC \times AP$

11. If $\triangle ABC$ is an equilateral triangle such that $AD \perp BC$, then $AD^2 = \dots$

Ans. $3CD^2$

12. If $\triangle ABC$ and $\triangle DEF$ are similar triangles such that $\angle A = 47^\circ$, and $\angle E = 83^\circ$, then find $\angle C$

Ans. 50°

13. Two isosceles triangles have equal angles and their areas are in the ratio 16:25, then find the ratio of their corresponding heights

Ans. 4:5

14. Two poles of heights 6m and 11m stand vertically upright on a plane ground. If the distance between their feet is 12m, then find the distance between their tops.

Ans. 13m

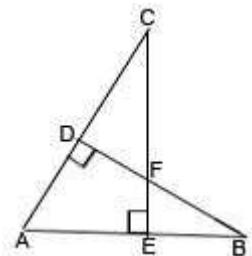
15. The lengths of the diagonals of a rhombus are 16cm and 12cm. Then, find the length of the side of the rhombus .

Ans. 10cm

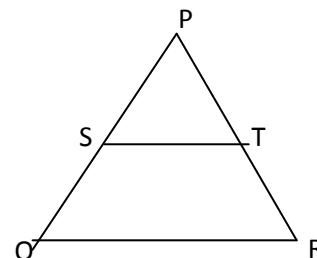
(Level - 2)

1. In given fig. $BD \perp AC$ and $CE \perp AB$ then prove that

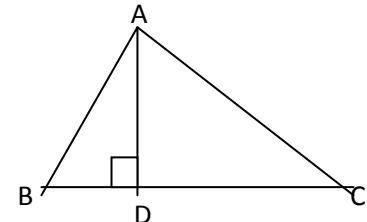
- (a) $\triangle AEC \sim \triangle ADB$
- (b) $CA/AB = CE/DB$



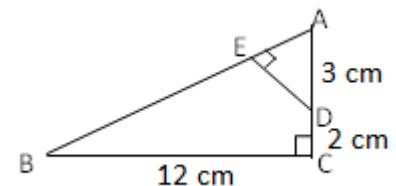
2. In the given figure fig. $\frac{PS}{SQ} = \frac{PT}{TR}$, and $\angle PST = \angle PQR$. Prove that $\triangle PQR$ is an isosceles triangle.



3. In given fig $AD \perp BC$ and $\angle B < 90^\circ$, prove that $AC^2 = AB^2 + BC^2 - 2BC \times BD$



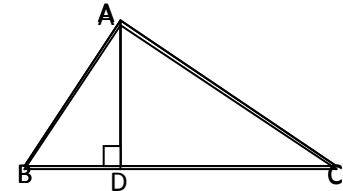
4. In given fig. $\triangle ABC$ is right angled at C and $DE \perp AB$. Prove that $\triangle ABC \sim \triangle ADE$ and hence find length of AE and DE.



Ans. $\frac{15}{17}, \frac{36}{17}$

5. In a $\triangle ABC$, if $DE \parallel AC$ and $DF \parallel AE$, prove that $\frac{EF}{BF} = \frac{EC}{BE}$

6. In given fig. $AD \perp BC$, if $\frac{BD}{AD} = \frac{DA}{DC}$, prove that $\triangle ABC$ is a right angled triangle.

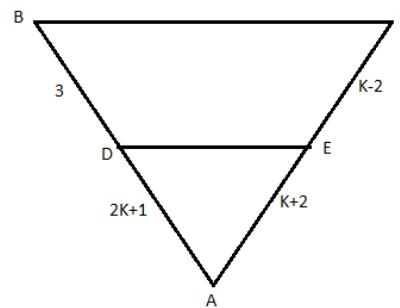


7. Two Δ s ABC and DEF are similar. If $\text{ar}(\Delta DEF) = 243 \text{ cm}^2$, $\text{ar}(\Delta ABC) = 108 \text{ cm}^2$ and $BC = 6 \text{ cm}$, find EF.

Ans. 9 cm

8. What is the value of K in given figure if $DE \parallel BC$.

Ans. $K=4, -1$



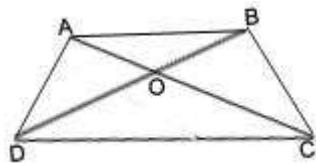
9. A pole of length 10m casts a shadow 2m long on the ground. At the same time a tower casts a shadow of length 60m on the ground then find the height of the tower.

Ans. 300m

Level - 3

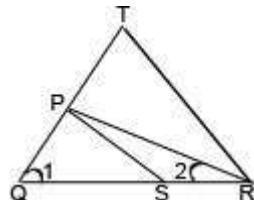
1. In given figure, $AB \parallel DC$ and $\frac{AO}{OC} = \frac{BO}{OD}$ then find the value of x, if .
 $OA = 2x + 7$, $OB = 4x$, $OD = 4x - 4$ and $OC = 2x + 4$

Ans. 7



2. PQR is a right angled triangle with $\angle P=90^\circ$. If $PM \perp QR$, then show that $PM^2 = QM \times MR$

3. In given fig. $\frac{QR}{QS} = \frac{QT}{PR}$ and $\angle 1 = \angle 2$. Show that $\Delta PQS \sim \Delta TQR$.



4. Find the length of altitude of an equilateral triangle of side 2cm.

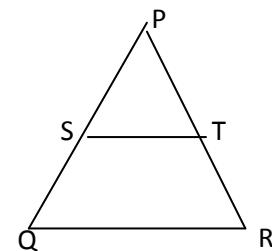
Ans. $\sqrt{3}$ cm

5. In a trapezium ABCD, O is the point of intersection of AC and BD, AB || CD and AB=2CD. If the area of $\Delta AOB=84\text{cm}^2$ then find area of ΔCOD .

Ans. 21 cm^2

6. In given fig. $\frac{PS}{SQ} = \frac{PT}{TR} = 3$. If area of ΔPQR is 32cm^2 , then find the area of the quad. STQR

Ans. 14 cm^2



7. M is the mid-point of the side CD of a ||gm ABCD. The line BM is drawn intersecting AC at L and AD produced at E. Prove that $EL=2BL$.

8. Prove that the ratio of the area of two similar Δ s is equal to the square of the ratio of their corresponding medians.

9. D and E are points on the sides CA and CB respectively of ΔABC , right angled at C. Prove that $AE^2 + BD^2 = AB^2 + DE^2$.

10. ABC and DBC are two Δ s on the same base BC and on the same side of BC with $\angle A = \angle D = 90^\circ$. If CA and BD meet each other at E, show that $AE \times EC = BE \times ED$.

1. Prove that in a right angled triangle the square of hypotenuse is equal to the sum of the squares of the other two sides.

2. If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, prove that the other two sides are divided into the same ratio.

3. ΔABC is right angled at B and D is midpoint of side BC . Prove that $AC^2 = 4AD^2 - 3 AB^2$

4. Prove that the ratio of the areas of two similar triangles is equal to the ratio of square of their corresponding sides.

5. In a Δ , if the square of one side is equal to sum of the squares of the other two sides, prove that the angle opposite to the first side is a right angle.

6. In an equilateral ΔABC , D is a point on the side BC , such that $BD = \frac{1}{3}BC$. Prove that $9 AD^2 = 7 AB^2$

7. P and Q are the mid points of side CA and CB respectively of ΔABC right angled at C . Prove that $4(AQ^2 + BP^2) = 5 AB^2$.

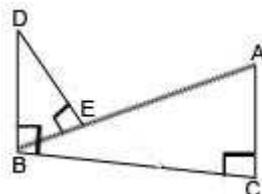
8. CM and RN are respectively the medians of ΔABC and ΔPQR . If $\Delta ABC \sim \Delta PQR$, prove that

(i) $\Delta AMC \sim \Delta PNR$ (ii) $CM/RN = AB/PQ$ (iii) $\Delta CMB \sim \Delta RNQ$

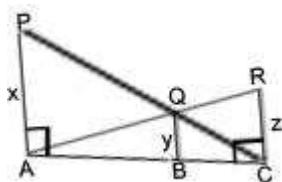
SELF EVALUATION

1. The diagonal BD of a ||gm $ABCD$ intersects the line segment AE at the point F , where E is any point on the side BC . Prove that $DF \times EF = FB \times FA$.

2. In fig. $DB \perp BC$, $DE \perp AB$ and $AC \perp BC$. Prove that $BE/DE = AC/BC$.



3. In given fig. PA , QB , RC are each perpendicular to AC . Prove that $\frac{1}{x} + \frac{1}{z} = \frac{1}{y}$



4. Prove that three times the sum of the squares of the sides of a triangle is equal to four times the sum of the squares of the medians of the triangle.

5. ABC is a right triangle with $\angle A = 90^\circ$, A circle is inscribed in it. The lengths of the two sides containing the right angle are 6 cm and 8 cm. find the radius of the incircle. Ans. 4cm

6. ABC is a right triangle, right angled at C. If p is the length of the perpendicular from C to AB and a, b, c have the usual meaning, then prove that

$$(i) cp=ab \quad (ii) \frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$$

7. In a trapezium ABCD, $AB \parallel DC$ and $DC=2AB$. $EF \parallel AB$, where E and F lie on the side BC and AD respectively such that $BE/EC=4/3$. Diagonal DB intersects EF at G. Prove that $EF=11AB$.

8. Sides AB, AC and median AD of a triangle ABC are respectively proportional to sides PQ, PR and median PM of another triangle PQR. Show that $\Delta ABC \sim \Delta PQR$.