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 ration).
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 2^{nd} *triangle* will be

Ans. $36cm^2$

4. ABC is a triangle with DE|| BC. If AD=2cm, BD=4cm then find the value DE:BC

Ans. 1:3

5. In ΔABC,DE ||BC, if AD=4x-3,DB=3x-1,AE=8x-7and 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 2^{nd} 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 ∠B and ∠C of ΔABC.AO produced meets BC at P,then find AB/AC

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

10.In ▲ABC,the bisectors of ∠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 X AP

11.If ΔABC is an equilateral triangle such that AD⊥BC,then AD^2=..........

Ans. $3CD^2$

12.If ΔABC and ΔDEF are similar triangles such that ∠A=47^0,and∠E=83^0 ,then find ∠C

Ans. 50^0

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.

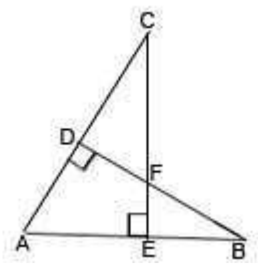
Ans.13m

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

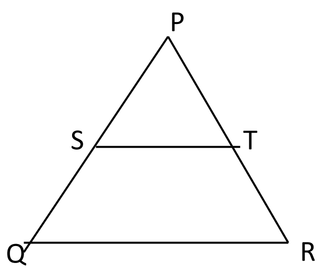
Ans. 10cm

(Level - 2)

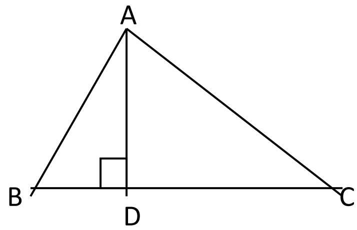
1.In given fig. BD⊥AC and CE⊥AB then prove that
(a)ΔAEC~ΔADB
(b)CA/AB=CE/DB



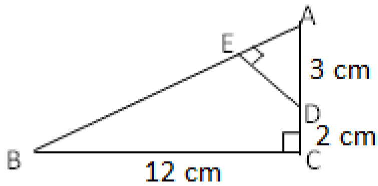
2. In the given figure fig .$\frac{PS}{SQ} = \frac{PT}{TR}$, and ∠PST=∠PQR. Prove that ΔPQR is an isosceles triangle.



3.In given fig $AD \perp BC$ and $\angle B<90^0$,prove that $AC^2=AB^2 + BC^2 - 2BC \times BD$



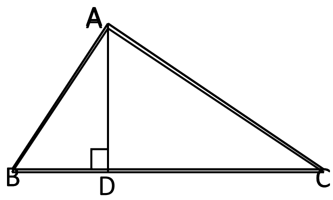
4.In given fig. ΔABC is right angled at C and $DE \perp AB$. Prove that ΔABC~ΔADE and hence find length of AE and DE.



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

5. In a ΔABC ,if DE||AC and DF||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 ABC is a right angled triangle.

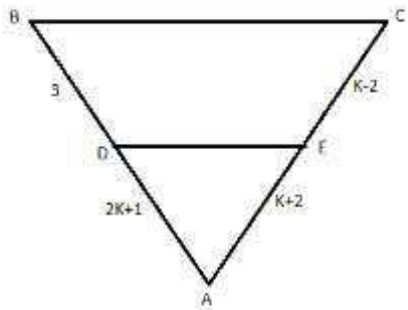


7.Two Δs ABC and DEF are similar. If ar(ΔDEF)=243cm²,ar(ΔABC)=108cm² and BC=6cm,find EF.

Ans. 9 cm

8.What is the value of K in given figure if DE||BC.

Ans. K=4, -1



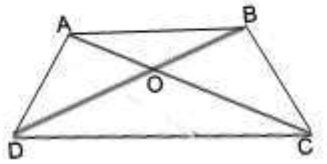
9. A pole of length 10m casts a shadow 2m long on the ground. At the same time a tower casts a shadow of length 60m on the ground then find the height of the tower.

Ans. 300m

Level - 3

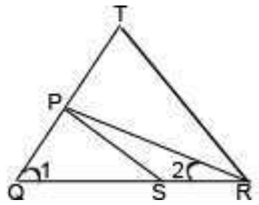
1.In given figure,AB||DCand $\frac{AO}{OC} = \frac{BO}{OD}$ then find the value of x, if .
$OA = 2x + 7, OB = 4x, OD = 4x - 4 \text{ and } OC = 2x + 4$

Ans. 7



2.PQR is a right angled triangle with ∠P=90^0. If PM ⊥QR, then show that $PM^2 = QM\ X\ \ MR$

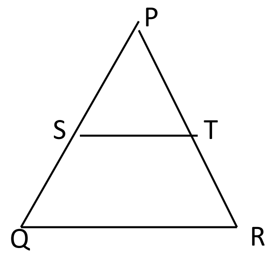
3. In given fig. $\frac{QR}{QS}=\frac{QT}{PR}$ and ∠1=∠2.Show that ΔPQS~ΔTQR.



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 ΔAOB=84cm² 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 32cm², 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 Δs 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 Δs on the same base BC and on the same side of BC with ∠A=∠D=90^0.If CA and BD meet each other at E, show that AE x EC=BE x ED.

Level - 4

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

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

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

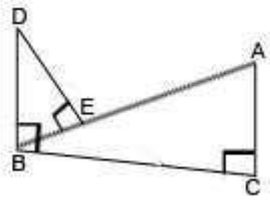
8. CM and RN are respectively the medians of ΔABC and ΔPQR. If ΔABC~ΔPQR, prove that

(i) ΔAMC~ΔPNR (ii)CM/RN=AB/PQ (iii)ΔCMB~ΔRNQ

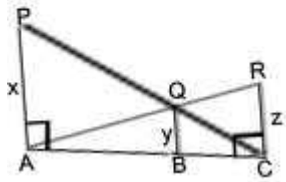
SELF EVALUATION

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 x EF=FB x FA.

2. In fig.DB⊥BC,DE⊥AB and AC⊥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 $\angle A = 90^0$,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 (ii) $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$

7. In a trapezium ABCD, AB||DC and DC=2AB.EF||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 ΔABC~ΔPQR.