TRIANGLES

IMPORTANT CONCEPTS
TAKE A LOOK

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 for solution refer NCERT Text Book].

3. Converse of Basic proportionality Theorem.

4. Criteria for similarity of Triangles.

   (a) AA or AAA similarity criterion.
   (b) S.A.S similarity criterion.
   (c) S.S.S similarity criterion.

5. Areas of similar triangles.

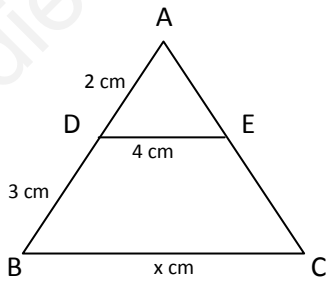
6. Pythagoras theorem.

7. Converse of Pythagoras theorem.

Level I

1. If Δ ABC is similar to Δ DEF $\angle B=60^0$ and $\angle c=50^0$, then degree measure of $\angle D$.
   Ans-70^0

2. In Fig-(1) if DE||BC find the value of x.



Fig(i)

Ans-10cm

3. In the given fig-(ii) PQ 24 cm, QR=26 cm , $\angle PAR=90^0$, PA=6cm and AR=8cm find the value of $\angle QPR$.

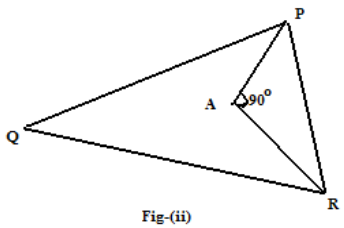


Fig-(ii)

Ans-$\angle QPR=90^0$

4. In given fig-(iii) Δ ABC and Δ DEF are similar, BC=3cm, EF=4cm, and area of triangle ABC=54cm^2 find the area of Δ DEF.

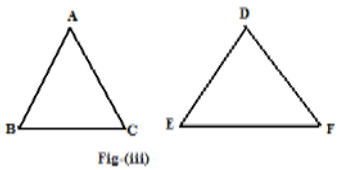


Fig-(iii)

Ans-96 sq.cm

5. If the area of two similar triangles are in the ratio 16:25 then the ratio of their corresponding sides is.

Ans-4:5

6. If ar(ΔABC):ar(ΔDEF)= 25:81 then AB:DE is.

Ans-5:9

7. A right triangle has hypotenuse P cm and one side q cm. If p-q=1, Find the length of the third sides.

Ans-$\sqrt{2p-1}$

LEVEL- II

1. In given figure(i), PQ||SR and PO:RO=QO:SO find the value of x.

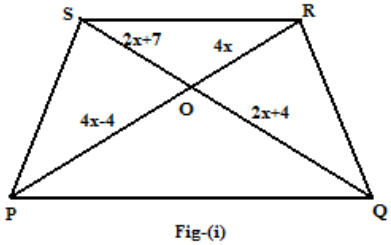


Fig-(i)

Ans : 7

2. In the given fig-(ii) express x in terms of a, b and c.

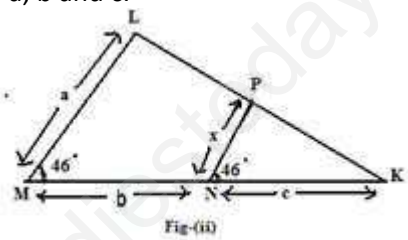


Fig-(ii)

Ans : x = $\frac{ac}{b+c}$

3. In fig(iii) ΔPQR is a triangle right angled at P and M is point on QR such that PM ⊥ QR. Show that PM^2= QM x MR.

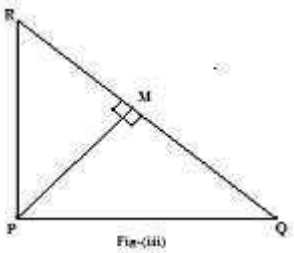


Fig-(iii)

4. The diagonals of a quadrilaterals intersect each other at the point 0 such that AO/OC=BO/DO show that ABCD is a trapezium.

5. A Man goes 10 m due east and then 30m due north. Find the distance from the starting points.

Ans-31.62m

6. Two poles of height 6m and 11m stand on a plane ground. If the distance between their feet is 12m find the distance between their tops. Ans-13cm

7. Prove that the line joining the mid points of any two sides of a triangle is parallel to the third sides.

8. ABC is an isosceles triangle angled at B. Two equilateral triangles are constructed on side BC and AC in Fig-(iv), prove that area of ΔBCD=1/2 area of ACE.

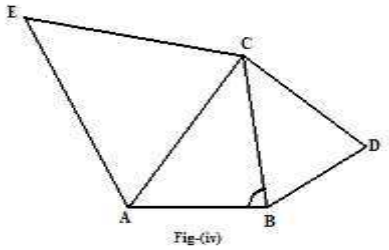


Fig-(iv)

LEVEL-III

1. In fig-(i) BD ⊥ BC, DE ⊥ AB and AC⊥ BC, prove that $\frac{BE}{DE} = \frac{AC}{BC}$.

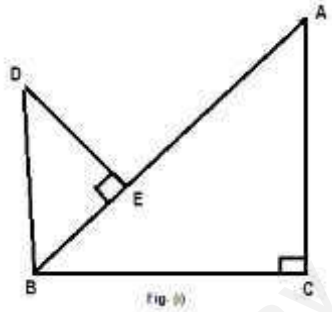


Fig-(i)

2. D is a point on the side of Δ ABC such that ∠ADC =∠ BAC prove that $\frac{CA}{CD} = \frac{CB}{CA}$ or CA^2 =BC.CD.

3. If the areas of two similar triangles are equal then the triangles are congruent.

4. The areas of two similar triangles ΔABC and ΔPQR are 25 cm^2 and 49 cm^2 respectively. If QR=9.8 cm find BC.
Ans-7cm

5. Prove that the area of an equilateral triangle described on one side of a square is equal to half the area of an equilateral triangle described on one of it diagonals.

6. BL and CM are medians of a ΔABC, right angled at A. Prove that $4(BL^2+CM^2)=5BC^2$

7. In an equilateral triangle prove that three times the square of one side is equal to four times the square of one of its altitudes.

8. In fig(ii) A triangle ABC is right angled at B side BC is trisected at point D and E prove that $8AE^2=3AC^2+5AD^2$

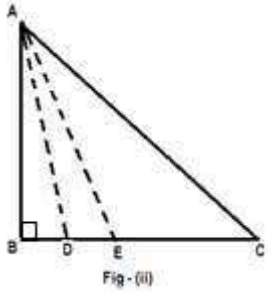


Fig-(ii)

LEVEL-IV

1. Prove that if a line is drawn parallel to one side of a triangle the other two sides are divided in the same ratio. Ans-[For solution refer NCERT Text Book]

2. ABC is a triangle, PQ is a line segment intersecting AB in P and AC in Q such that PQ||BC and divides ΔABC into two parts equal in area find BD/AB. Ans-BD/AB=√2-1/√2

3. In the Fig(i) PA,QB and RC are perpendicular to AC prove that 1/x+1/y=1/z.

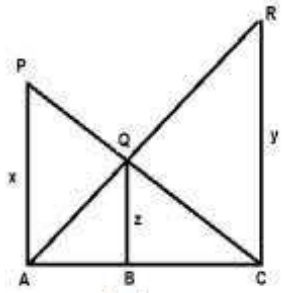


Fig- (i)

4. State and prove converse of Basic proportionality theorems[Refer to your text Book for solution]

5. In Fig-(ii) DE|| BC and AD/BD=3/5 if AC=4.8cm find the length of AE.

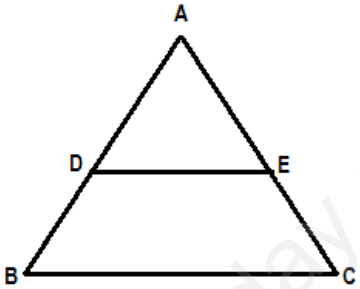


Fig- (ii)

Ans-AE=1.8 cm

6. Prove that the ratio of the areas of two similar triangles is equal to the ratio of the squares of theirs corresponding sides [Refer to your text book for proof].

7. The areas of two similar triangles are 81cm^2 and 49 cm^2 respectively. If the altitude of the bigger triangle is 4. 5 cm find the corresponding altitude of the similar triangle. Ans-3.5 c m

8. State and prove Pythagoras theorem [Refer text book for proof and statement].

9. In an equilateral triangle ABC, D is a point on side BC, such that BD=1/3 BC. Prove that 9 AD^2=7AB^2.

10. State and prove Pythagoras and its converse theorems. [Refer text book for proof and statement].

11. Δ ABC is an isosceles triangle in which AC=BC. If AB^2 =2AC^2 then prove that Δ ABC is a right triangle.

SELF EVALUATION QUESTIONS

1. D is a point on the side BC of a triangle ABC such that ∠ADC=∠BAC show that CA^2=BC.CD.

2. In Fig-(i) if LM|| BC and LN || CD prove that $\frac{AM}{AB} = \frac{AN}{AD}$

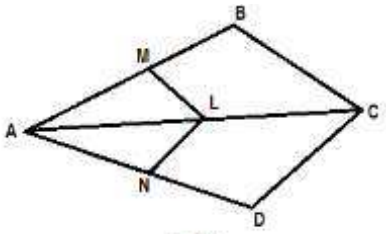


Fig-(i)

3. S and T are points on sides PR and QR of ΔPQR such that ∠p=∠RTS show that ΔRPQ=ΔRTS.
4. D and E are points on the sides CA and CB respectively of a triangle ABC right angles at C. Prove that $AE^2 + BD^2 = AB^2+DE^2$.

5. Prove that the sum of the squares of the diagonals of parallelogram is equal to the sum of the squares of its sides.

6. Two poles of height a meters and b meters are p meters apart. Prove that the height of the point of intersection of the lines joining the top of each pole to the foot of the opposite pole is given by $\frac{ab}{a+b}$ meters.

7. The perpendicular from A on side BC of a Δ ABC intersects BC at D. Such that BD=3CD prove that $2AB^2=2AC^2+BC^2$.