ODM EDUCATIONAL GROUP
Changing your Tomorrow

TRIANGLES
PPT-11

SUBJECT : MATHEMATICS
CHAPTER NUMBER: 06
CHAPTER NAME :TRIANGLES

CHANGING YOUR TOMORROW

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PREVIOUS KNOWLEDGE TEST

1 . If a perpendicular is drawn from the vertex of the right angle of a right triangle to the hypotenuse then triangles on both sides of the perpendicular are similar to the whole triangle and to each other

2. Pythagoras Theorem ; : In a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

3.The ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.

Ratio of areas of two similar triangles is equal to:

1.Ratio of the squares of their corresponding sides.

2. Ratio of the squares of their corresponding altitudes.

3. Ratio of the squares of their corresponding medians.

4. Ratio of the squares of their corresponding angle-bisector segments.

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LEARNING OUTCOME

1. 1.Students will be able to prove In a triangle, if square of one side is equal to the sum of the squares of the other two sides, then the angle opposite the first side is a right angle.

2. Students will be able to solve problems based on Converse Pythagoras Theorem.

3.. Students will be able to solve problems based on Pythagoras theorem and apply in solving real life problems.

Theorem 6.9 : In a triangle, if square of one side is equal to the sum of the squares of the other two sides, then the angle opposite the first side is a right angle.

https://youtu.be/nuRg3EVv7Ec (8.05)

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Converse of Pythagoras Theorem 6.9 : In a triangle, if square of one side is equal to the sum of the squares of the other two sides, then the angle opposite the first side is a right angle.

Given. A ΔABC in which $AC^2 = AB^2 + BC^2$.

To Prove. $\angle ABC = 90°$.

Construction. Draw a ΔPQR such that $PQ = AB$, $QR = BC$ and $\angle Q = 90°$.

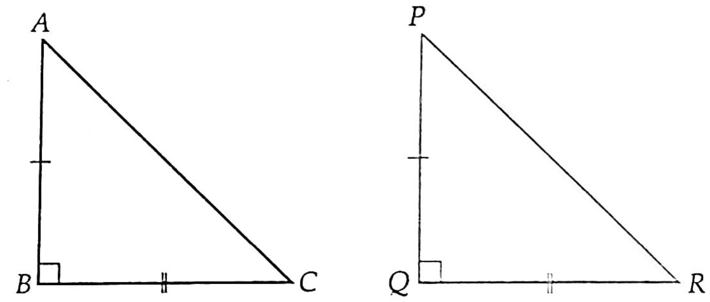

FIGURE 6.149

Proof. In ΔPQR, $\angle Q = 90°$.

$\therefore \quad PR^2 = PQ^2 + QR^2$ [By Pythagoras Theorem]

$\Rightarrow \quad PR^2 = AB^2 + BC^2$ ...(1) [By construction]

But, $\quad AC^2 = AB^2 + BC^2$ ...(2) [Given]

From (1) and (2), we get $AC^2 = PR^2 \Rightarrow AC = PR$

Now, in ΔABC and ΔPQR, we have

$AB = PQ$, $BC = QR$ and $AC = PR$

$\therefore \quad \Delta ABC \cong \Delta PQR$ [SSS congruency]

Hence, $\quad \angle ABC = \angle PQR = 90°$.

1 . A ladder 10 m long reaches a window 8 m above the ground. Find the distance of the foot of the ladder from base of the wall

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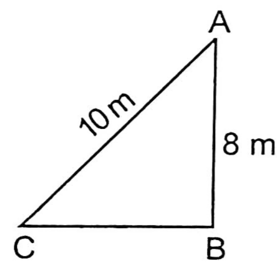
Sol. Let AC be the ladder of length 10 m and AB = 8 m

In ΔABC,



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

$$\Rightarrow \quad BC^2 = AC^2 - AB^2$$

$$= (10)^2 - (8)^2$$

$$BC^2 = 100 - 64 = 36$$

$$BC = \sqrt{36} = 6 \text{ m}$$

Hence distance of foot of the ladder from base of the wall is 6 m.

2.Prove that the sum of the squares of the sides of a rhombus is equal to the sum of the squares of its diagonals.

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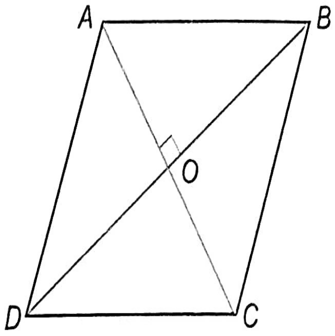
Given. $ABCD$ is a rhombus and its diagonals AC and BD intersect at O.



To Prove. $AB^2 + BC^2 + CD^2 + DA^2 = AC^2 + BD^2$.

Proof. Since the diagonals of a rhombus bisect each other at right angles.

$\therefore \quad AB^2 = OA^2 + OB^2$ [By Pythagoras Theorem]

$AB^2 = \left(\frac{1}{2}AC\right)^2 + \left(\frac{1}{2}BD\right)^2$ $\left[\because OA = \frac{1}{2}AC \text{ and } OB = \frac{1}{2}BD\right]$

or $4AB^2 = AC^2 + BD^2$

or $AB^2 + AB^2 + AB^2 + AB^2 = AC^2 + BD^2$

Hence, $AB^2 + BC^2 + CD^2 + DA^2 = AC^2 + BD^2$ $[\because AB = BC = CD = DA]$

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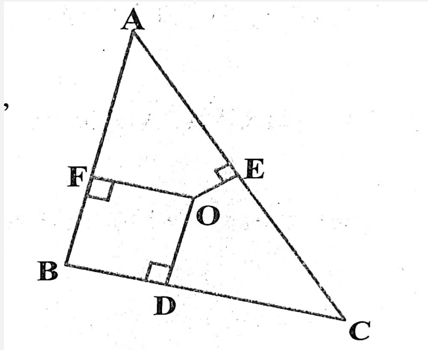
3. In Fig. O is a point in the interior of a triangle ABC, OD ⊥ BC, OE ⊥AC and OF ⊥AB. Show that (i) $OA^2 + OB^2 + OC - OD^2 \ - OE^2 \ - OF^2 = AF^2 + BD^2 + CE^2$, (ii) $AF^2 + BD^2 + CE^2 = AE^2 + CD^2 + BF^2$.



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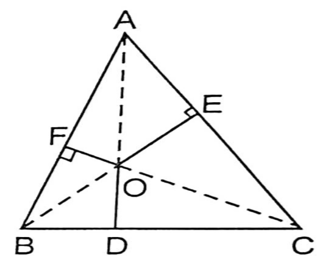
Construction: Join OA, OB and OC

Proof: (*i*) In ΔAOF,

$$OA^2 = OF^2 + AF^2 \quad \text{[Pythagoras theorem]}$$

$$AF^2 = OA^2 - OF^2$$



In ΔBDO, $OB^2 = BD^2 + OD^2$

$$BD^2 = OB^2 - OD^2$$

In ΔCEO, $OC^2 = CE^2 + OE^2$

$$CE^2 = OC^2 - OE^2$$

$$\therefore AF^2 + BD^2 + CE^2 = OA^2 + OB^2 + OC^2 - OD^2 - OE^2 - OF^2 \quad \ldots(i)$$

(*ii*) $OA^2 - OF^2 + OB^2 - OD^2 + OC^2 - OE^2 = AF^2 + BD^2 + CE^2$

$$(OA^2 - OE^2) + (OC^2 - OD^2) + (OB^2 - OF^2) = AE^2 + CD^2 + BF^2 \quad \ldots(ii)$$

Equating (*i*) and (*ii*)

$$AF^2 + BD^2 + CE^2 = AE^2 + CD^2 + BF^2$$

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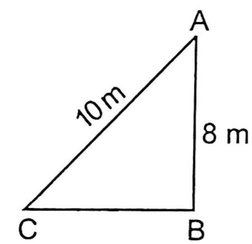
In ΔABC,



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Hence distance of foot of the ladder from base of the wall is 6 m.

5. A guy wire attached to a vertical pole of height 18 m is 24 m long and has a stake attached to the other end. How far from the base of the pole should the stake be driven so that the wire will be taut?

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5. A guy wire attached to a vertical pole of height 18 m is 24 m long and has a stake attached to the other end. How far from the base of the pole should the stake be driven so that the wire will be taut?

Sol. In ΔABC, $AC^2 = AB^2 + BC^2$

$\Rightarrow \quad (24)^2 = (18)^2 + BC^2$

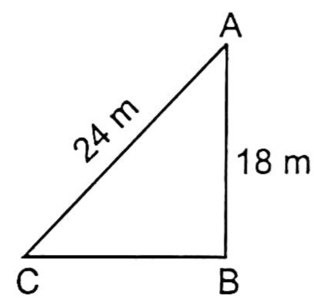
$\Rightarrow \quad 576 = 324 + BC^2$

$\Rightarrow \quad 576 - 324 = BC^2$

$BC^2 = 252$

$BC = \sqrt{252} = 6\sqrt{7}$ m

$\therefore \quad$ Distance $= 6\sqrt{7}$ m



HOME ASSIGNMENT Ex. 6.5 Q. No 5 to Q10

AHA

1. : ABC is a triangle in which ∠ABC > 90° and AD ⊥ CB produced. Prove that $AC^2 = AB^2 + BC^2 + 2\ BC.BD$

THANKING YOU

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