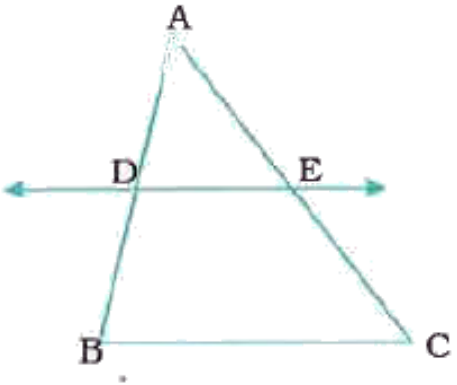
MATHS

BOOKS - KUMAR PRAKASHAN

TRIANGLES

Textual Examples

1. If a line intersects sides AB and AC of a $\triangle ABC$ at D and E respectively and is parallel to BC, prove that $\frac{AD}{AB} = \frac{AE}{AC}$ (see the given figure).



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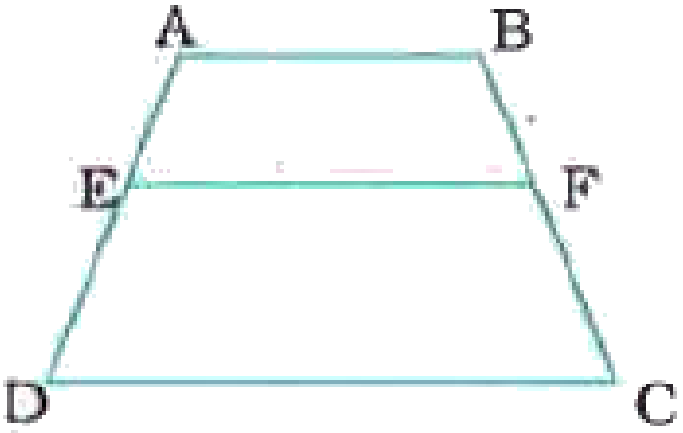
2. ABCD is a trapezium with $AB \mid\mid DC$. E and F are points on non-parallel sides Ad and BC respectively such that EF is parallel to AB (see the given figure). Show that $\frac{AE}{ED} = \frac{BF}{FC}$.



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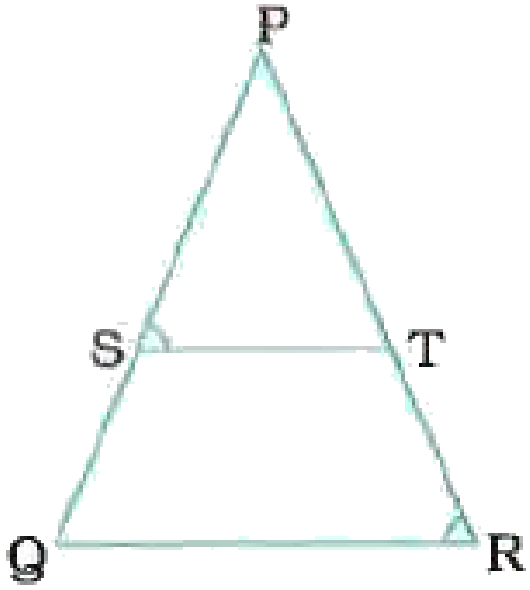
3. In the given figures $\frac{PS}{SQ} = \frac{PT}{TR}$ and $\angle PST = \angle PRQ$. Prove that $\triangle PQR$ is an isosceles triangles.



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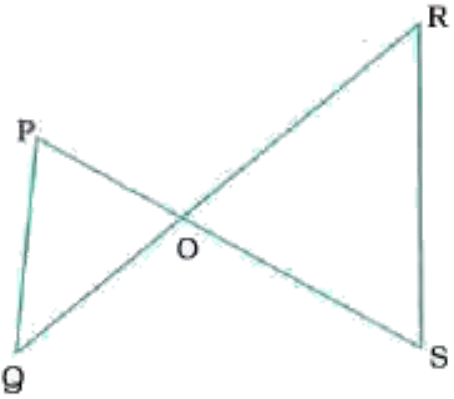
4. In the given figure, if $PQ \mid\mid RS$, prove that $\Delta POQ \sim \Delta SOR$.



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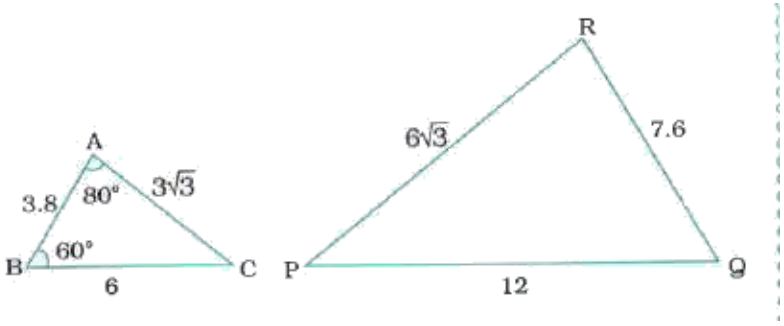
5. Observe the given figure and then find $\angle P$.



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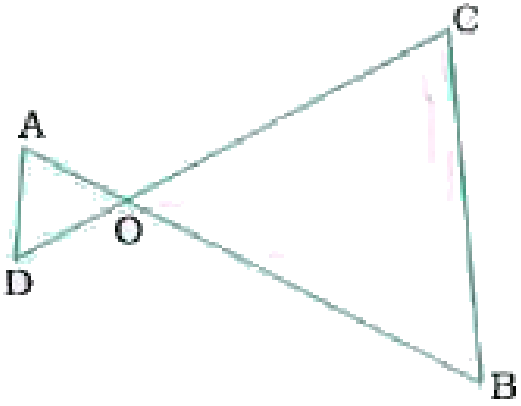
6. In the given figure $OA \cdot OB = OC \cdot OD$. Show that $\angle A = \angle C$ and $\angle B = \angle D$.



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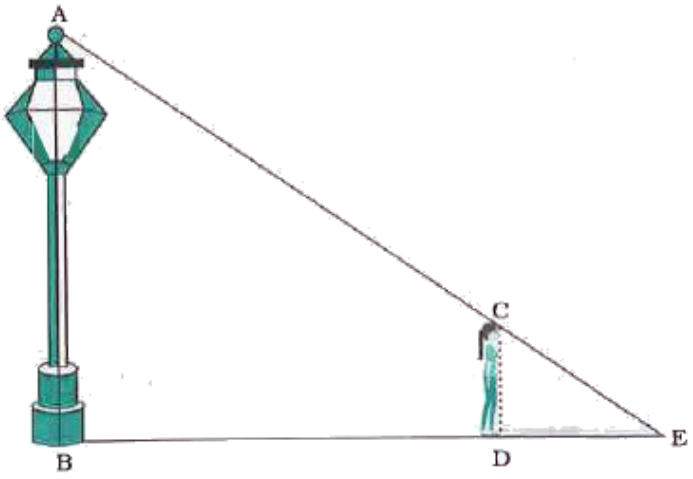
7. A girl of height 90 cm is walking away from the base of a lamp-post at a speed of $1.2m/s$. If the lamp is $3.6m$ above the ground, find the length of her shadow after 4 seconds.



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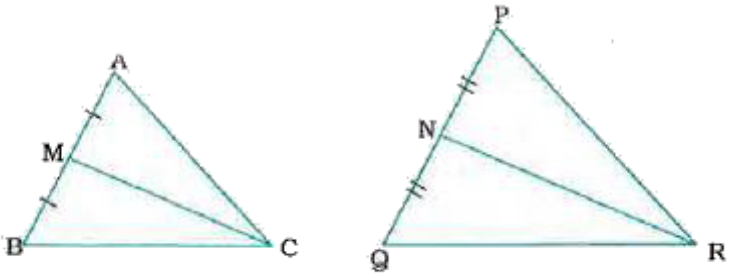
8. In the given figure, CM and RN are respectively the medians of ΔABC and ΔPQR. If $\Delta ABC \sim \Delta PQR$, prove that,

$\Delta AMC \sim \Delta PNR$



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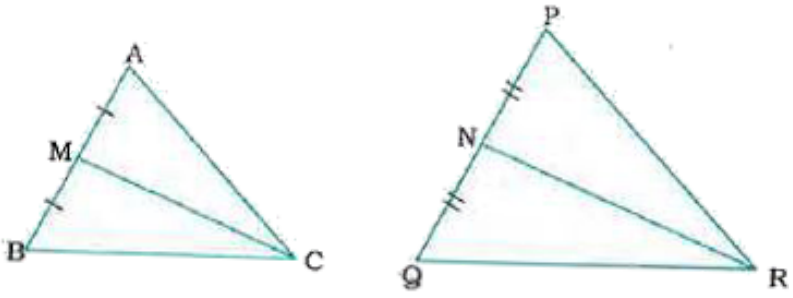
9. In the given figure, CM and RN are respectively the medians of ΔABC and ΔPQR. If $\Delta ABC \sim \Delta PQR$, prove that,

$$\frac{CM}{RN} = \frac{AB}{PQ}$$



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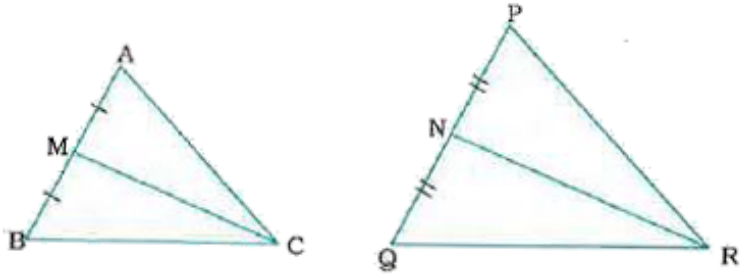
10. In the given figure, CM and RN are respectively the medians of ΔABC and ΔPQR. If $\Delta ABC \sim \Delta PQR$, prove that,

$\Delta CMB \sim \Delta RNQ$



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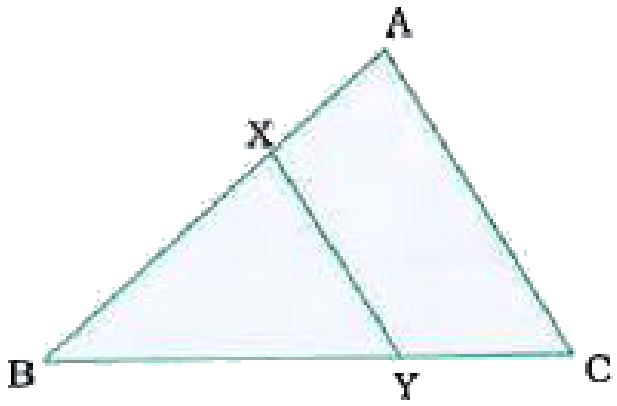
11. In the given figure, the line segment XY is parallel to side AC of ΔABC and it divides the Deltainto two parts of equal areas. Find the

ratio $\frac{AX}{AB}$.



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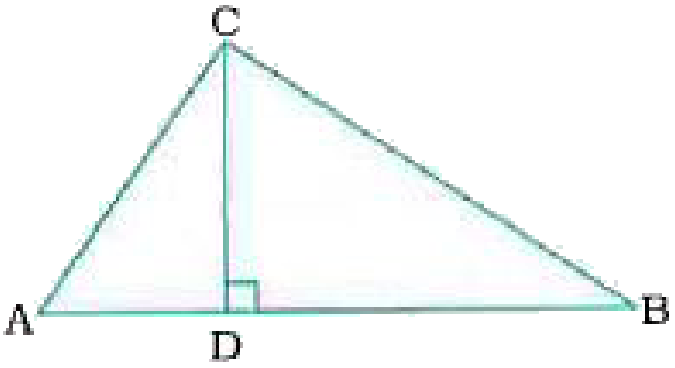
12. In the given figure, $\angle ACB = 90^\circ$ and $CD \perp AB$. Prove that $\frac{BC^2}{AC^2} = \frac{BD}{AD}$.



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13. A ladder is placed against a wall such that its foot is at a distance of $2.5cm$ from the wall and its top reaches a window 6 m above the ground. Find the length of the ladder.

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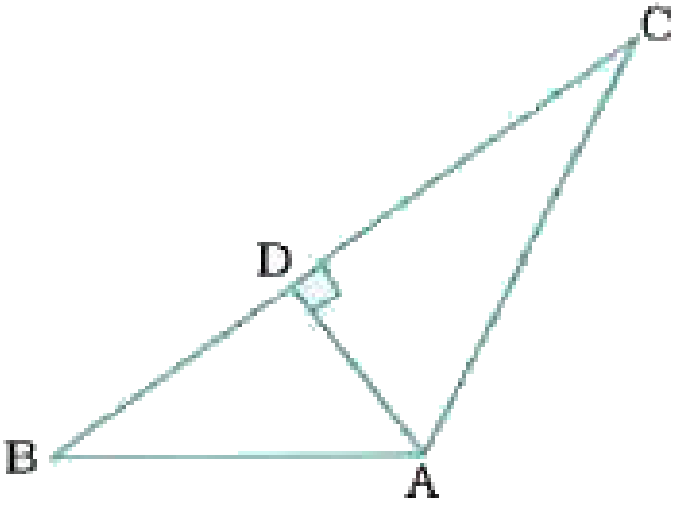
14. In the given figure, if $AD \perp BC$, prove that $AB^2 + CD^2 = BD^2 + AC^2$



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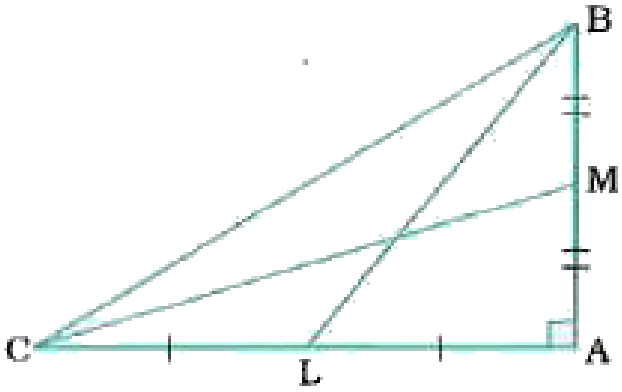
15. BL and CM are medians of a DeltaABC right angled at A. Prove that $4\left(BL^2 + CM^2\right) = 5BC^2$.



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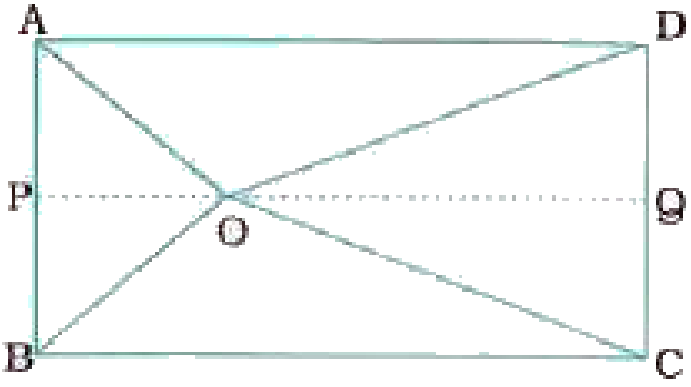
16. O is any point inside a rectangle ABCD (see the given figure). Prove that $OB^2 + OD^2 = OA^2 + OC^2$.



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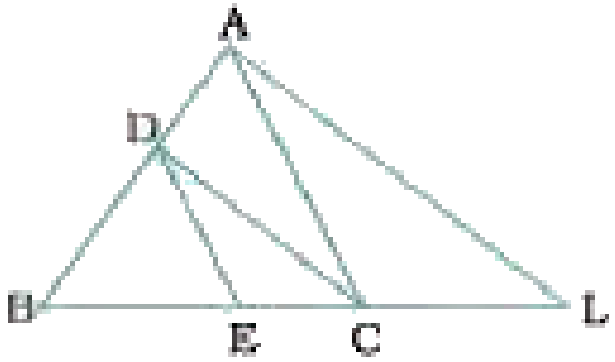
Other Important Examples

1. In the given figure, $CD||LA$ and $DE||AC$. Find the length of CL if BE= 4 cm and EC= 2 cm.



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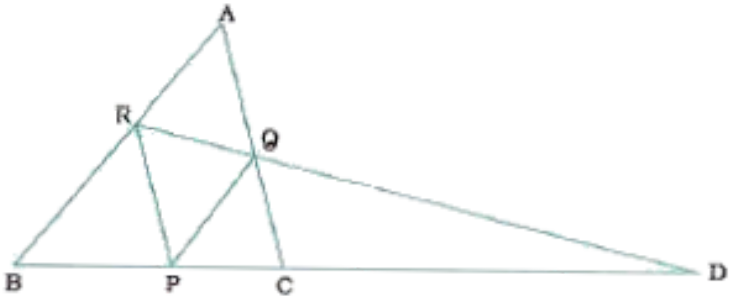
2. In the given figure, $PQ||BA$ and $PR||CA$. If PD= 12 cm, find $BD \times CD$.



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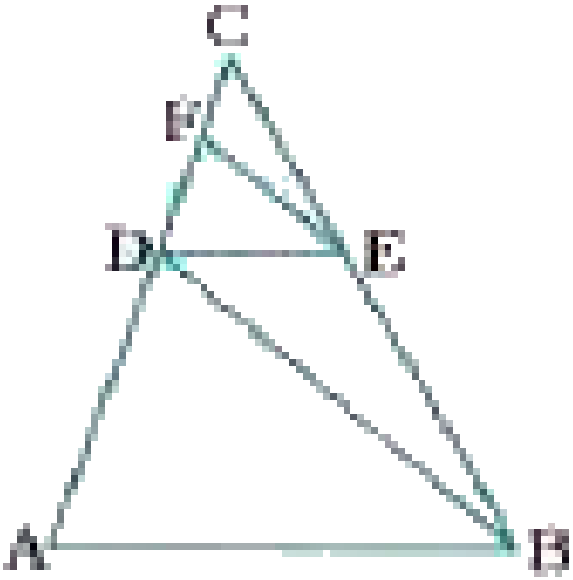
3. In the given figure, $AB||DE$ and $BD||EF$. Prove that $DC^2 = CF \times AC$.



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4. ABC is a triangle with AB= AC and D is a point on AC such that $BC^2 = AC \times CD$. Prove that BD= BC.

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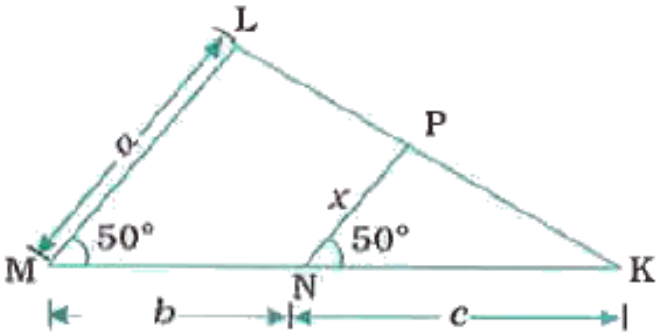
5. In the given figure, find the value of x in terms of a, b and c.



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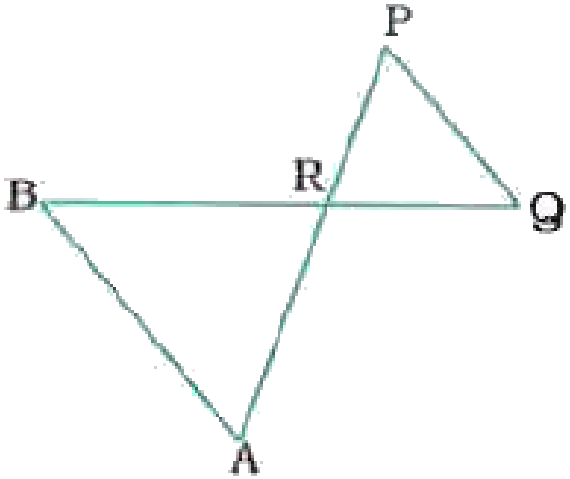
6. In the given figure, $\Delta ABR \sim \Delta PQR$. If PQ= 30 cm, AB= 45 cm, AP= 72 cm and QR= 42 cm, find PR, AR and BR.



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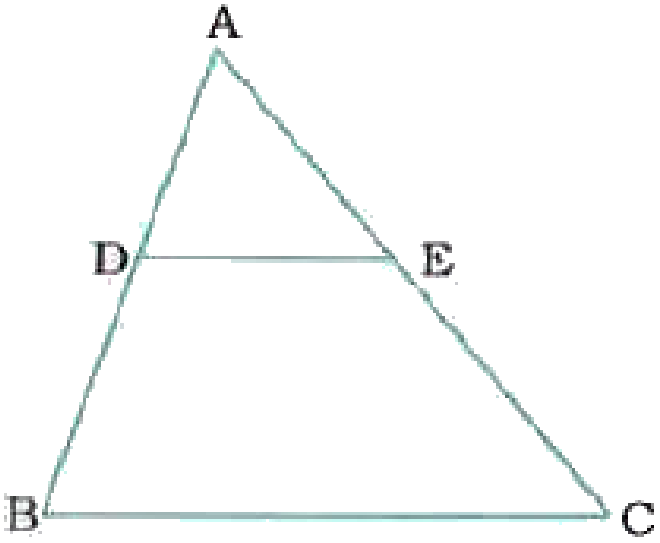
7. In the given figure, $DE \| BC$. If $DE : BC = 3 : 5$, find $\frac{ar(ADE)}{ar(BCED)}$.



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8. The areas of two similar triangles are $121cm^2$ and $64cm^2$ respectively. If the median of the first triangle is$12.1cm$, find the

corresponding median of the second triangle.

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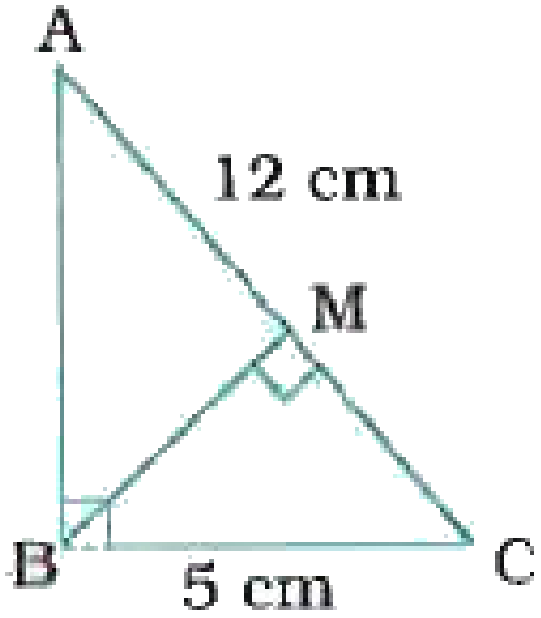
9. In ΔABC, $\angle B = 90^\circ$, $BM \perp AC$, BC= 5 cm and AC = 12 cm. Find the ratio of areas of ΔBMC and ΔABC.



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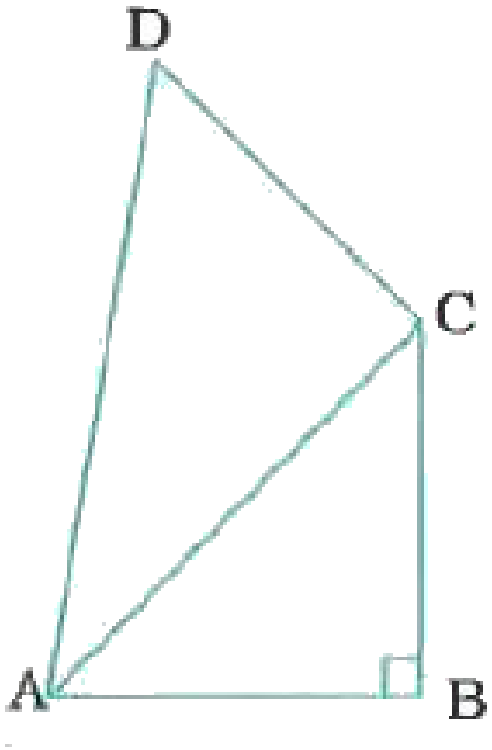
10. In a quadrilateral ABCD, $\angle B = 90^\circ$ and $AD^2 = AB^2 + BC^2 + CD^2$. Prove that $\angle ACD = 90^\circ$.



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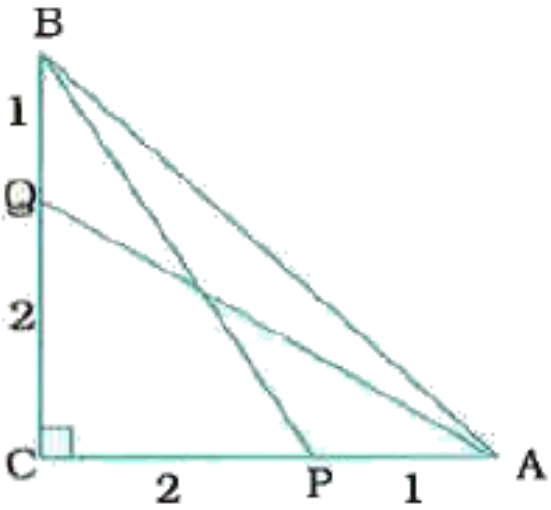
11. In a right trianlge ABC right angled at C, P and Q are the points on the sides CA and CB respectively which divide these sides in the ratio 2

: 1. Prove that $9\left(AQ^2+BP^2\right)=13AB^2$.



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12. In $\triangle ABC$, AD, BE, CF are the medians. Prove that, $4\left(AD^2+BE^2+CF^2\right)=3\left(AB^2+BC^2+AC^2\right)$.

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Exercise 6 1

1. Fill in the blanks using the correct word given in brackets :

All circles are.....(congruent, similar)

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2. Fill in the blanks using the correct word given in brackets :

All squares are.....(similar, congruent)

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3. Fill in the blanks using the correct word given in brackets :

All.....triangles are similar. (isosceles, equilateral)

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4. Fill in the blanks using the correct word given in brackets :

Two polygons of the same number of sides are similar, if (a) their

corrosponding angles are.....and (b) their corresponding sides are.....(equal, proportional)

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5. Give two different of pair of similar figures.

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6. Give two different of pair of non-similar figures.

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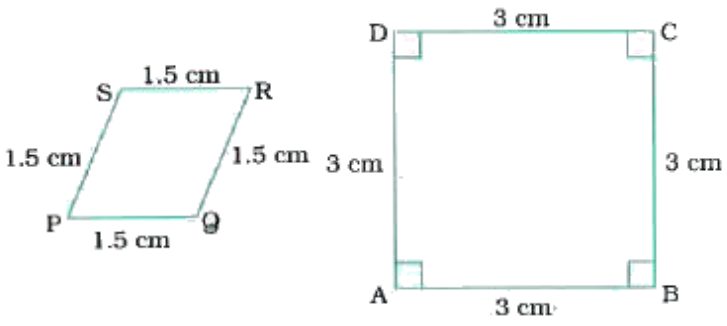
7. State whether the following quadrilaterals are similar or not :



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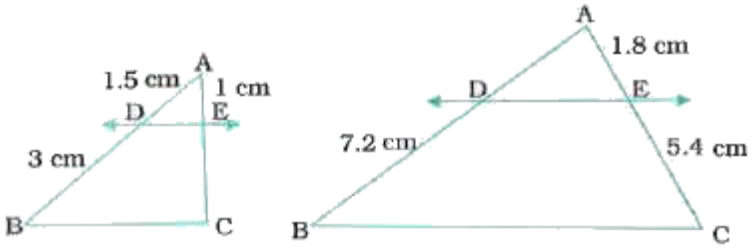
Exercise 6 2

1. In the given figures 1 and 2, $DE \| BC$. Find the EC in 1 and AD in 2.



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2. E and F are points on the sides PQ and PR respectively of a $\triangle PQR$.

For each of the following cases, state whether $EF \mid\mid QR$

$PE = 3.9cm, EQ = 3cm, PF = 3.6cm$ and $RF = 2.4cm$

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3. E and F are points on the sides PQ and PR respectively of a $\triangle PQR$.

For each of the following cases, state whether $EF \mid\mid QR$

$PE = 4cm, EQ = 4.5cm, PF = 8cm$ and $RF = 9cm$

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4. E and F are points on the sides PQ and PR respectively of a $\triangle PQR$

. For each of the following cases, state whether $EF \mid\mid QR$

$PQ = 1.28cm, PR = 2.56cm, PE = 0.18cm$ and $PF = 0.36cm$

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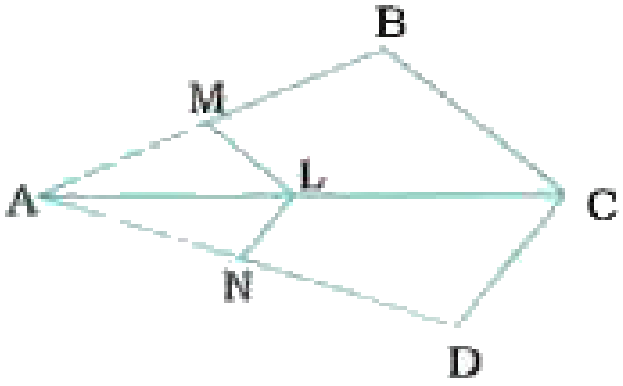
5. In the given figure, if $LM||CB$ and $LN||CD$, prove that $\frac{AM}{AB} = \frac{AN}{AD}$



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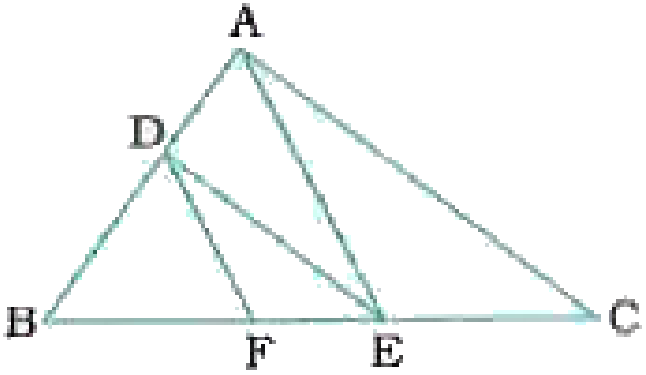
6. In the given figure, $DE||AC$ and $DF||AE$. Prove that $\frac{BF}{FE} = \frac{BE}{EC}$



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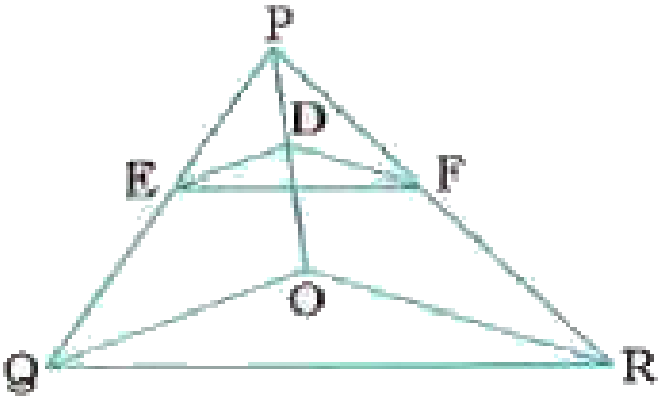
7. In the given figure, $DE||OQ$ and $DF||OR$. Show that $EF \mid \mid QR$



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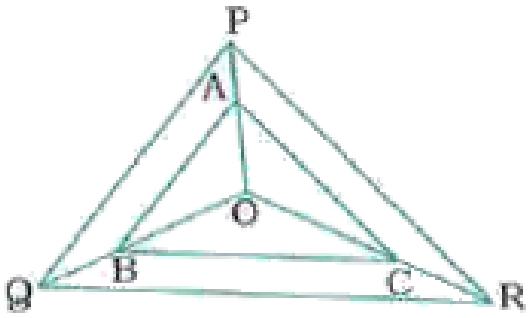
8. In the given figure, A, B and C are points on OP, OQ and OR respectively such that $AB||PQ$ and $AC||PR$. Show that

$BC \| \| QR.$



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9. Using therem 6.1, prove that a line drawn through the mid-point of one side of a triangle parallel to another side bisects the third side. (Recall that you have proved it in class IX).

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10. Using therem 6.2, prove that the line joining the mid-point of any two sides of a triangle is parallel to third side. (Recall that you have done it in class IX).

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11. ABCD is a trapezium in which $AB \| DC$ and its diagonals intersects each other at the point O. Show that $\frac{AO}{BO} = \frac{CO}{DO}$.

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12. The diagonals of a quadrilateral ABCD intersects each other at the point O such that $\frac{AO}{BO} = \frac{CO}{DO}$. Show that ABCD is a trapezium.

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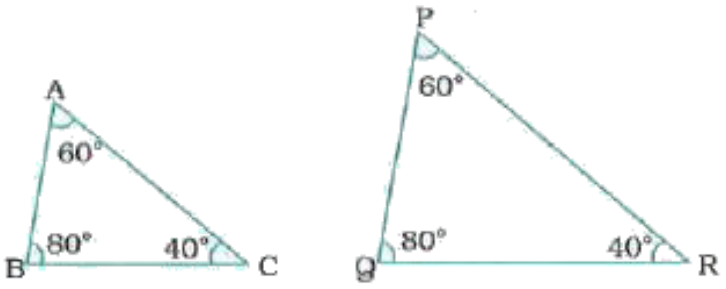
Exercise 6 3

1. State which pairs of triangles in the given figure are similar. Write the similarity criterion used by you for answering the question and

also write the pairs of similar triangles in the symbolic form :



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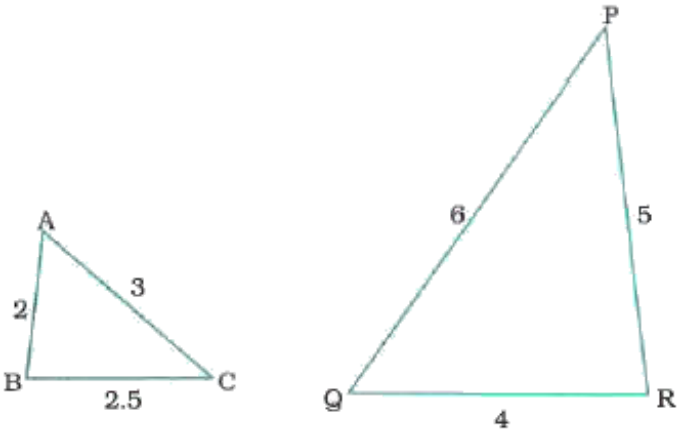
2. State which pairs of triangles in the given figure are similar. Write the similarity criterion used by you for answering the question and also write the pairs of similar triangles in the symbolic form :



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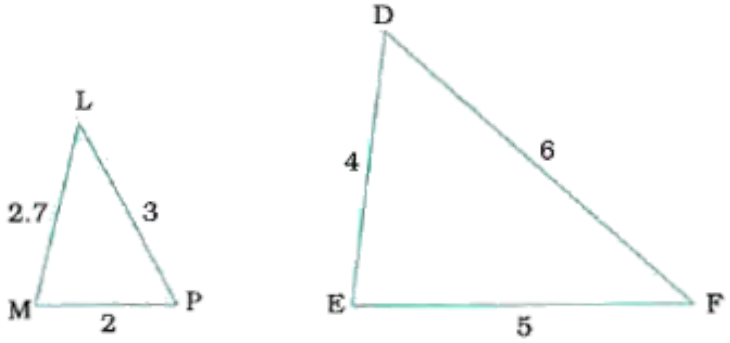
3. State which pairs of triangles in the given figure are similar. Write the similarity criterion used by you for answering the question and also write the pairs of similar triangles in the symbolic form :



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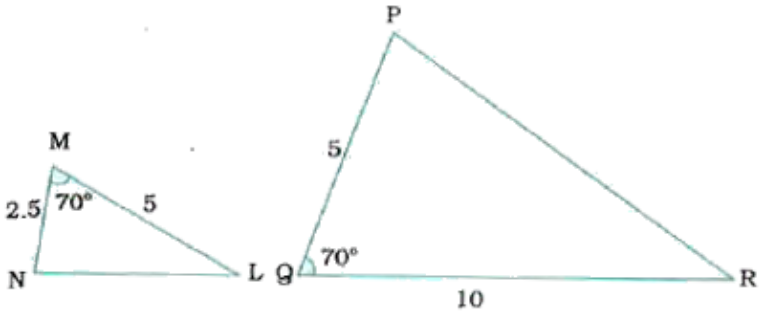
4. State which pairs of triangles in the given figure are similar. Write the similarity criterion used by you for answering the question and

also write the pairs of similar triangles in the symbolic form :



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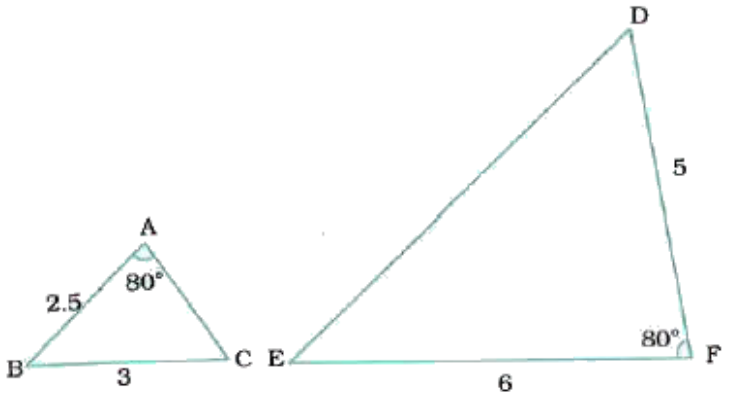
5. State which pairs of triangles in the given figure are similar. Write the similarity criterion used by you for answering the question and also write the pairs of similar triangles in the symbolic form :



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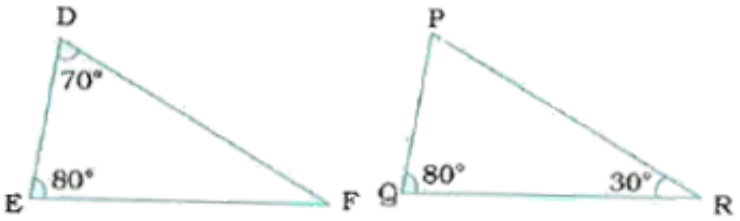
6. State which pairs of triangles in the given figure are similar. Write the similarity criterion used by you for answering the question and also write the pairs of similar triangles in the symbolic form :



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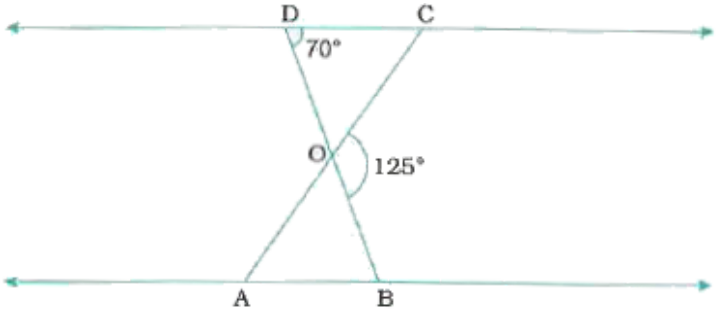
7. In the given figure $\Delta ODC \sim \Delta OBA, \angle BOC = 125^\circ$ and $\angle CDO = 70^\circ$. Find

$\angle DOC, \angle DCO$ and $\angle OAB$.



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8. Digonal AC and BD of a trapezium ABCD with $AB \mid\mid DC$ intersects each other at the point O. Using a similarity criterion for two triangles, show that $\frac{OA}{OC} = \frac{OB}{OD}$.

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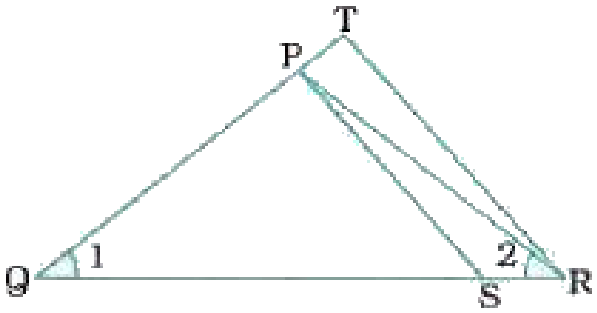
9. In the given figure $\frac{QR}{QS} = \frac{QT}{PR}$ and $\angle 1 = \angle 2$. Show that $\Delta PQS \sim \Delta TQR$.



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10. S and T are points on sides PR and QR of ΔPQR such that $\angle P = \angle RTS$. Show that $\Delta RPQ \sim \Delta RTS$.

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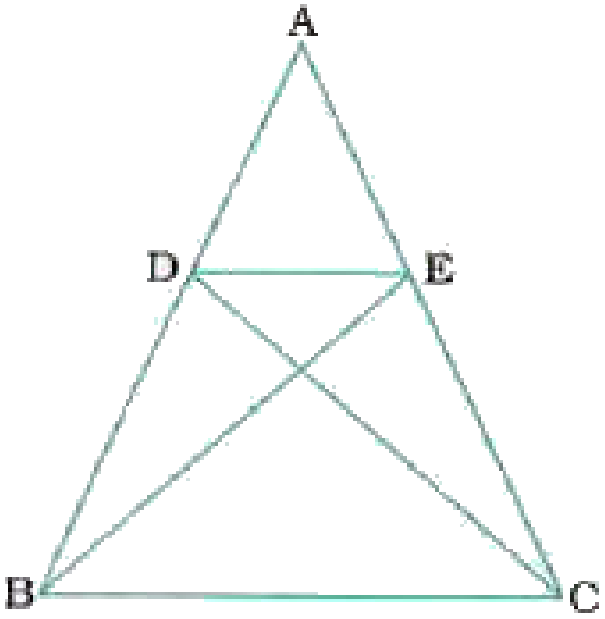
11. In the given figure, if $\Delta ABE \cong \Delta ACD$, show that $\Delta ADE \sim \Delta ABC$



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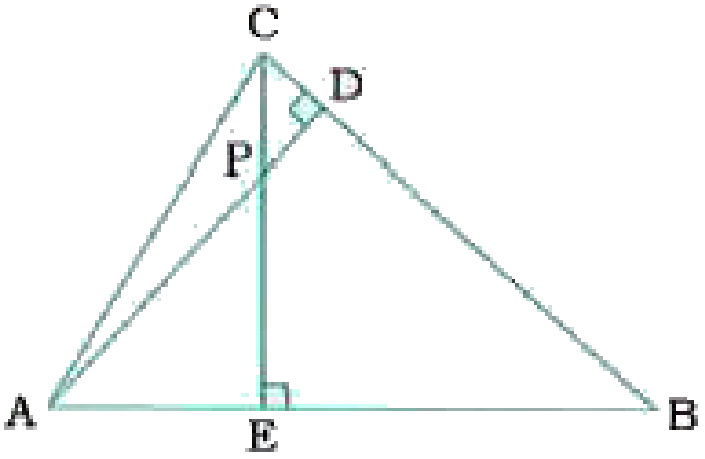
12. In the given figure, altitudes AD and CE of ΔABC intersect each other at the point P. Show that :

$\Delta AEP \sim \Delta CDP$



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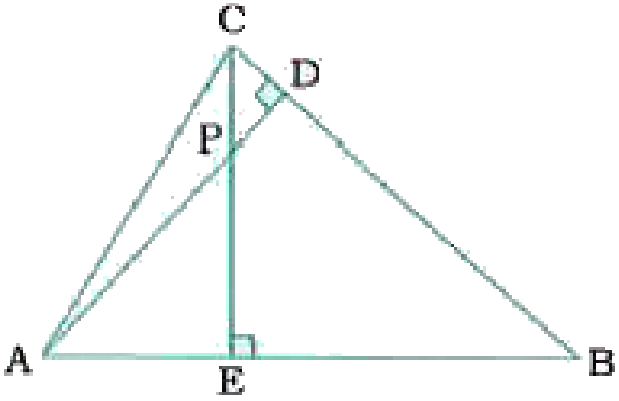
13. In the given figure, altitudes AD and CE of ΔABC intersect each other at the point P. Show that :

$\Delta ABD \sim \Delta CBE$



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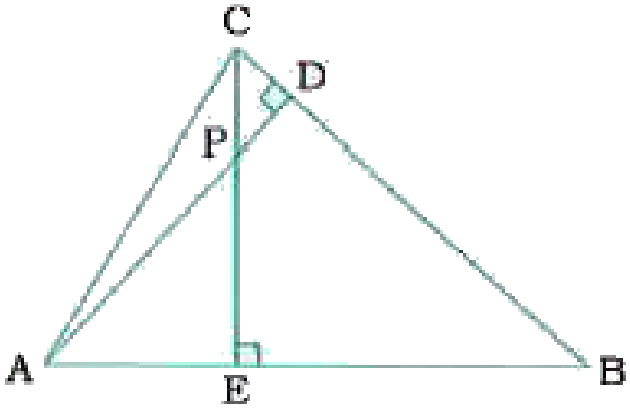
14. In the given figure, altitudes AD and CE of ΔABC intersect each other at the point P. Show that :

$\Delta AEP \sim \Delta ADB$



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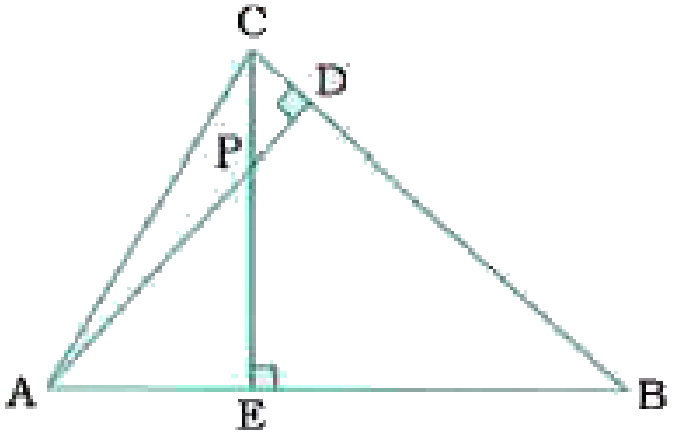
15. In the given figure, altitudes AD and CE of ΔABC intersect each other at the point P. Show that :

$\Delta PDC \sim \Delta BEC$



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16. E is a point on the side AD produced of a parallelogram ABCD and BE intersects CD at F. Show that $\Delta ABE \sim \Delta CFB$.

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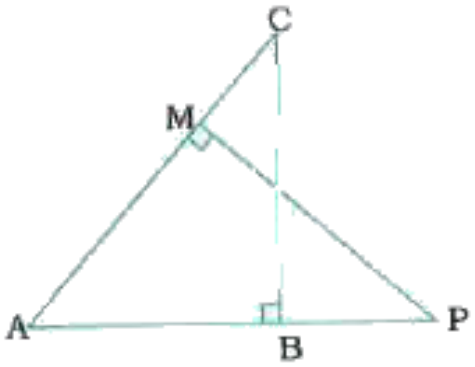
17. In the given figure, ABC and AMP are two right triangles, right angled at B and M respectively. Prove that :

$\Delta ABC \sim \Delta AMP$



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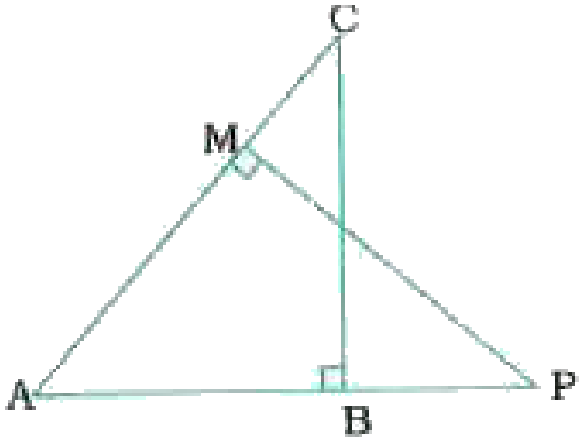
18. In the given figure, ABC and AMP are two right triangles, right angled at B and M respectively. Prove that :

$$\frac{CA}{PA} = \frac{BC}{MP}$$



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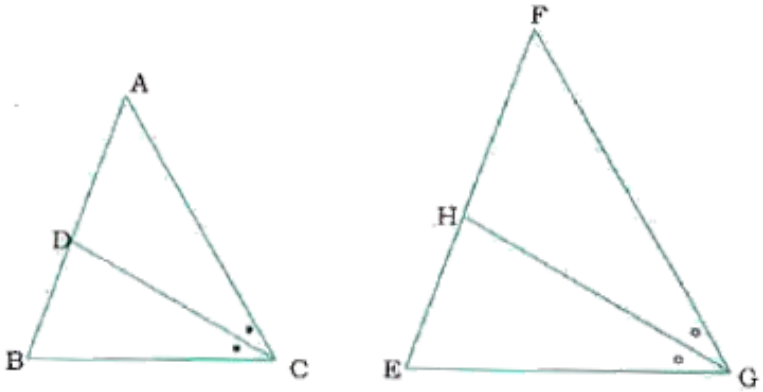
19. CD and GH are respectively the bisectors of $\angle ACB$ and $\angle EGF$ such that D and H lie on sides AB and FE of ΔABC and ΔEFG respectively. If $\Delta ABC \sim \Delta FEG$, show that :

$$\frac{CD}{GH} = \frac{AC}{FG}$$



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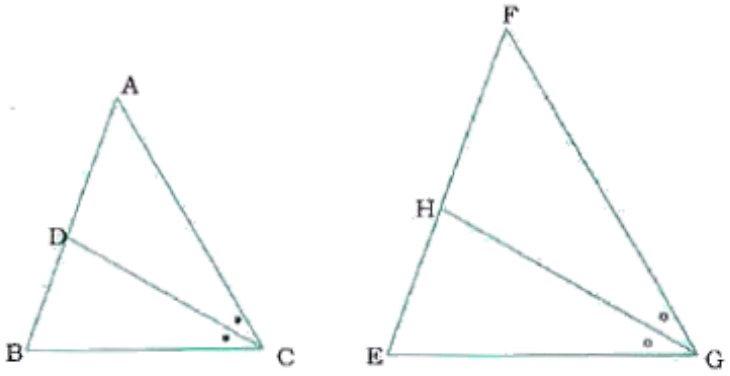
20. CD and GH are respectively the bisectors of $\angle ACB$ and $\angle EGF$ such that D and H lie on sides AB and FE of ΔABC and ΔEFG respectively. If $\Delta ABC \sim \Delta FEG$, show that :

$\Delta DCB \sim \Delta GHE$



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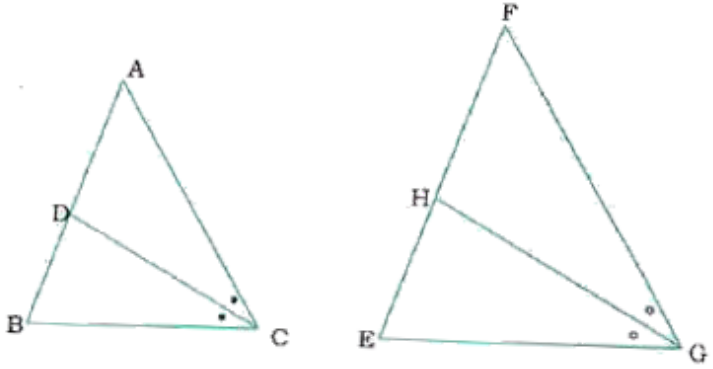
21. CD and GH are respectively the bisectors of $\angle ACB$ and $\angle EGF$ such that D and H lie on sides AB and FE of ΔABC and ΔEFG respectively. If $\Delta ABC \sim \Delta FEG$, show that :

$\Delta DCA \sim \Delta HGF$



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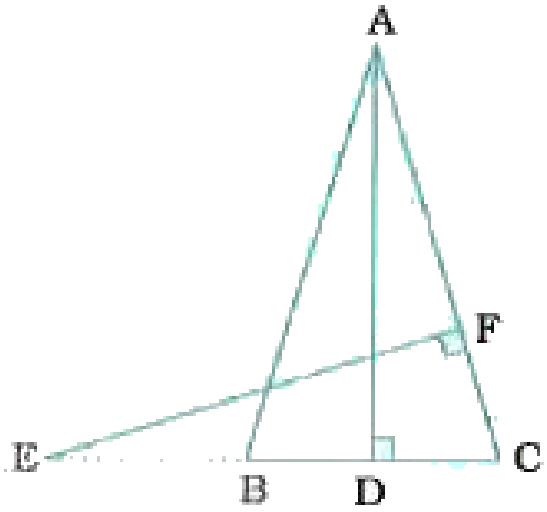
22. In the given figure, E is a point on side CB produced of an isosceles triangle ABC with AB=AC. If $AD \perp BC$ and $EF \perp AC$, prove that $\Delta ABD \sim \Delta ECF$



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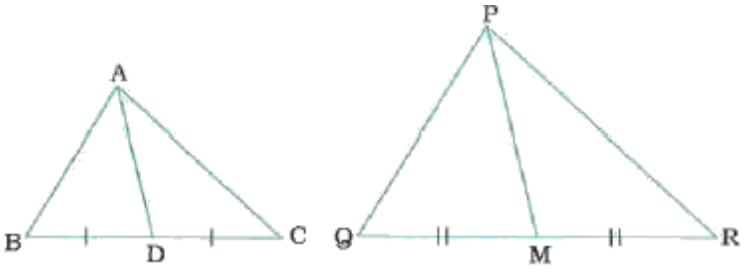
23. Sides AB and BC and median AD of a DeltaABC are respectively proportional to sides PQ and QR and median PM of ΔPQR (see the

given figure). Show that $\Delta ABC \sim \Delta PQR$.



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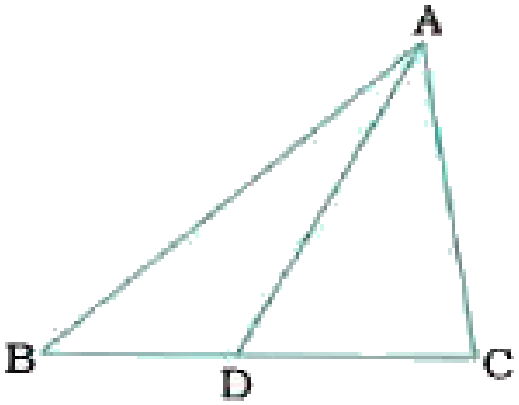
24. D is a point on the side BC of a triangle ABC such that $\angle ADC = \angle BAC$. Show that $CA^2 = CB \cdot CD$.



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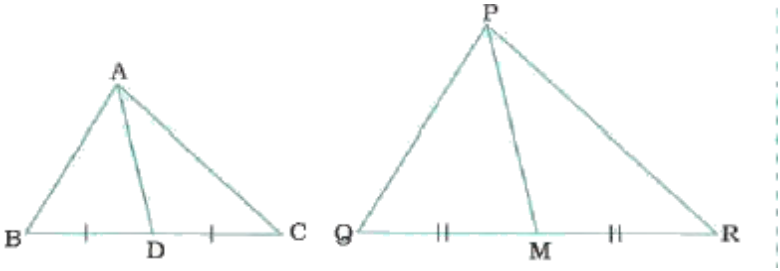
25. Sides AB and BC and median AD of a DeltaABC are respectively proportional to sides PQ and QR and median PM of ΔPQR (see the given figure). Show that $\Delta ABC \sim \Delta PQR$.



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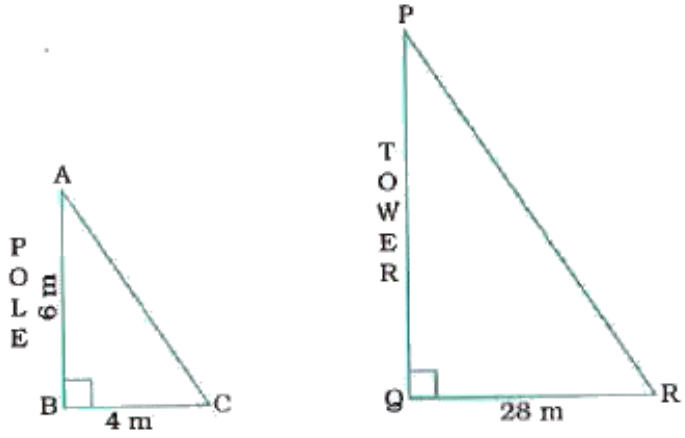
26. A vertical pole of length 6 m casts a shadow 4 m long on the ground and at the same time a tower casts a shadow 28 m long. Find

the height of the tower.



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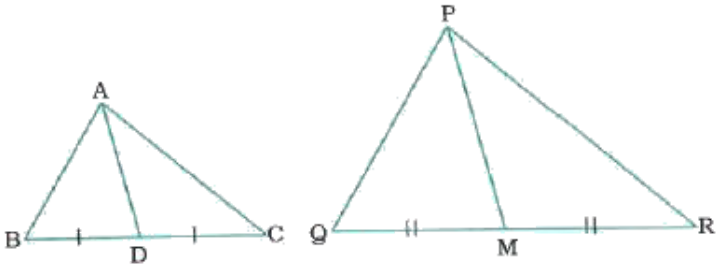
27. If AD and PM are medians of triangles ABC and PQR respectively , where $\Delta ABC \sim \Delta PQR$, prove that $\frac{AB}{PQ} = \frac{AD}{PM}$.



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Exercise 6 4

1. Let $\Delta ABC \sim \Delta DEF$ and their areas be, respectively, $64cm^2$ and $121cm^2$. If $EF = 15.4cm$, find BC.

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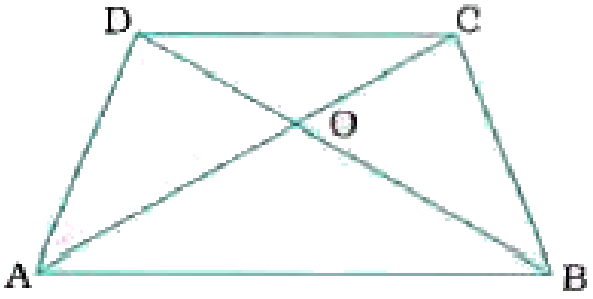
2. Digonals of a trapezium ABCD with $AB \mid\mid DC$ intersect each other at the point O. If AB= 2 CD, find the ratio of the areas of triangles AOB and COD.



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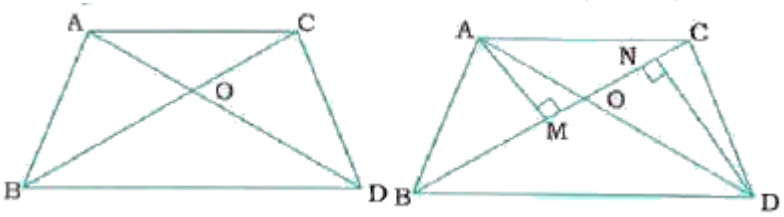
3. In the given figure, ABC and DBC are two triangles on the same base BC. If AD intersects BC at O, show that $\frac{ar(ABC)}{ar(DBC)} = \frac{AO}{DO}$.



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4. If the areas of two similar triangles are equal, prove that they are congruent.

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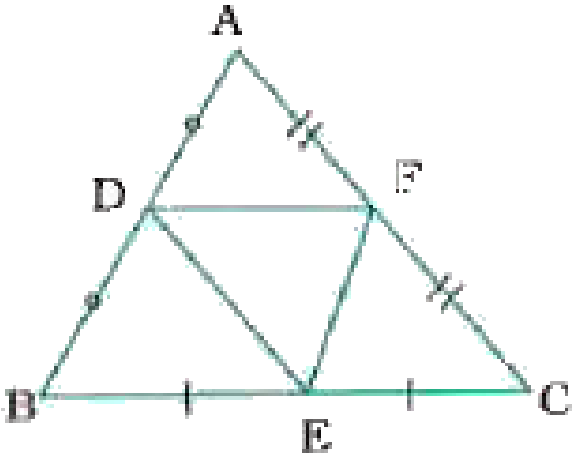
5. D, E and F are respectively the mid-points of sides AB, BC and CA of ΔABC. Find the ratio of the areas of ΔDEF and ΔABC.



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

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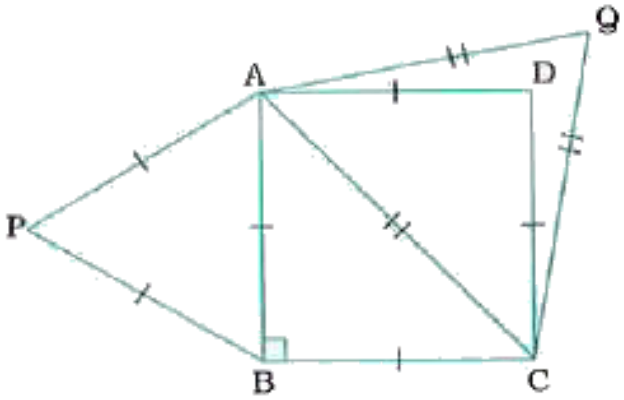
7. Prove that the area of an equilateral triangle described on one side of a square is equal to half the area of the equilateral triangle

described on one of its diagonals.



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8. ABC and BDE are two equilateral triangles such that D is the mid-point of BC. Ratio of the areas of triangles ABC and BDE is

A. $2:1$

B. $1:2$

C. $4:1$

D. $1:4$

Answer: C

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9. Sides of two similar triangles are in the ratio 4 : 9. Areas of these triangles are in the ratio

A. $2:3$

B. $4:9$

C. $81:16$

D. $16:81$

Answer: D

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Exercise 6 5

1. Sides of triangles are given below, Determine which of them are right triangles. In case of a right triangle, write the length of its hypotenuse :

7 cm, 24 cm, 25 cm

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2. Sides of triangles are given below, Determine which of them are right triangles. In case of a right triangle, write the length of its hypotenuse :

3 cm, 8 cm, 6 cm

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3. Sides of triangles are given below, Determine which of them are right triangles. In case of a right triangle, write the length of its

hypotenuse :

50 cm, 80 cm, 100 cm

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4. Sides of triangles are given below, Determine which of them are right triangles. In case of a right triangle, write the length of its hypotenuse :

13 cm, 12 cm, 5 cm

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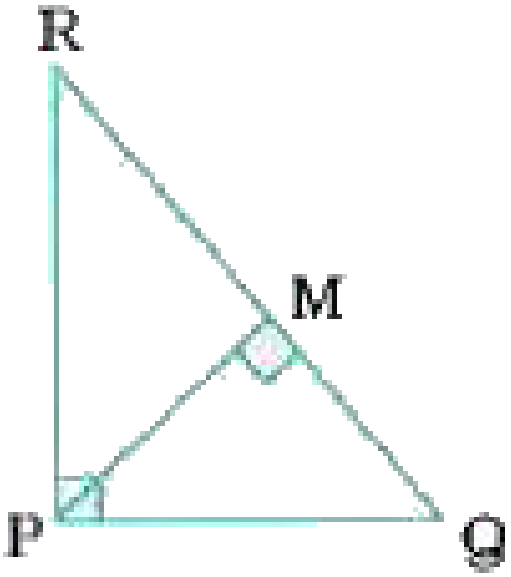
5. PQR is a Deltaright angled at P and M is a point on QR such that $PM \perp QR$. Show that $PM^2 = QM \cdot MR$.



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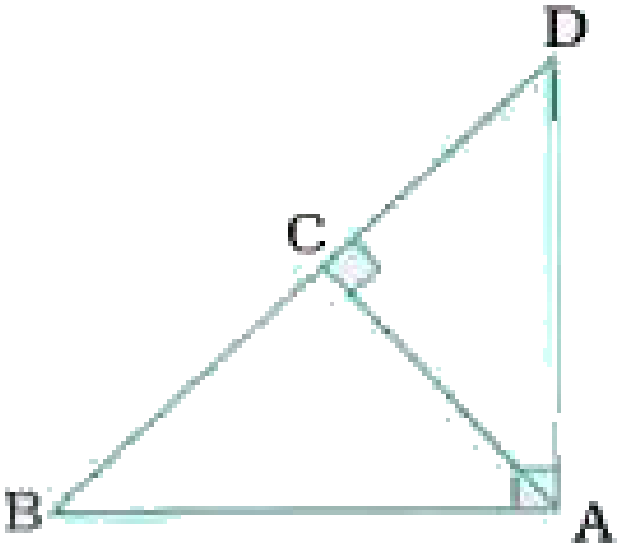
6. In the given figure, ABD is a Deltaright angled at A and $AC \perp BD$.

Show that

$AB^2 = BC \cdot BD$



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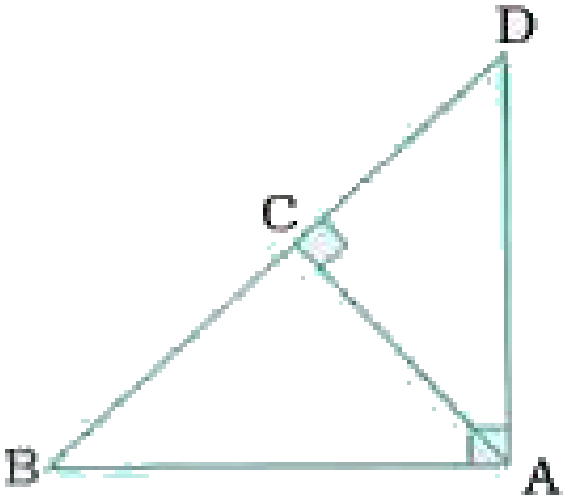
7. In the given figure, ABD is a triangle right angled at A and $AC \perp BD$. Show that

$AC^2 = BC \cdot DC$



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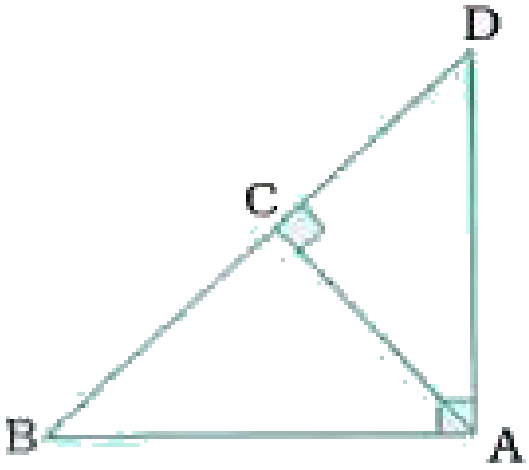
8. In the given figure, ABD is a triangle right angled at A and $AC \perp BD$. Show that

$AD^2 = BD \cdot CD$



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9. ABC is an isosceles triangle, right angled at C. Prove that $AB^2 = 2AC^2$.

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10. ABC is an isosceles triangle, with AC= BC. If $AB^2 = 2AC^2$, prove that ABC is a right triangle.

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11. ABC is an equilateral triangle of side 2a. Find each of its altitude.

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12. 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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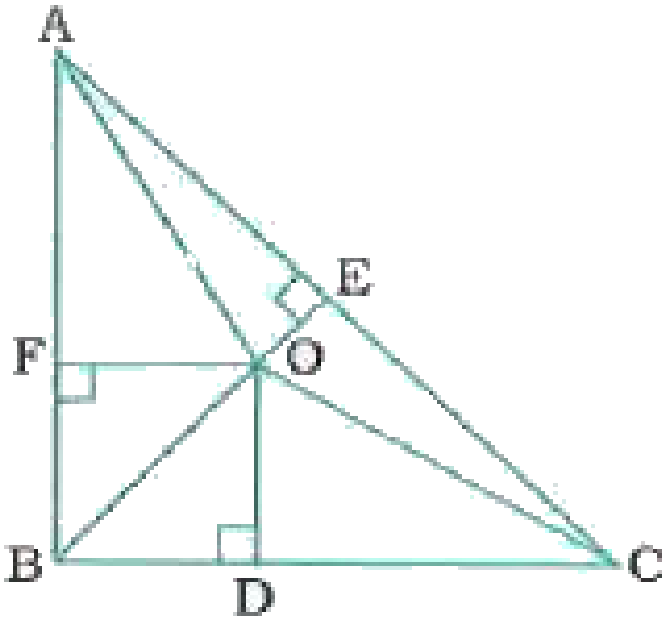
13. In the given figure, O is a point in the interior of a DeltaABC, $OD \perp BC, OE \perp AC$ and $OF \perp AB$. Show that :

$OA^2 + OB^2 + OC^2 - OD^2 - OE^2 - OF^2 = AF^2 + BD^2 + CE^2.$



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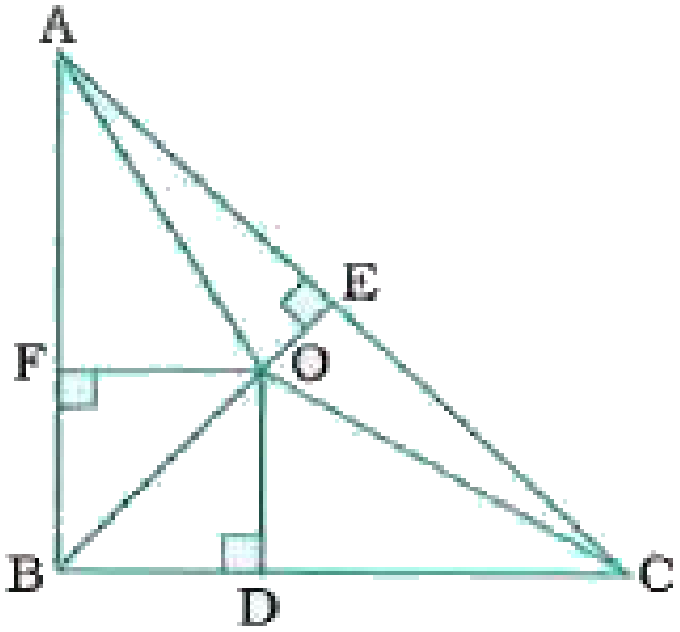
14. In the given figure, O is a point in the interior of a DeltaABC, $OD \perp BC, OE \perp AC$ and $OF \perp AB$. Show that :

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



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15. 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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16. 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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17. An aeroplane leaves an airport and flies due north at a speed of 1000 km per hour. At the same time, another aeroplane leaves the same airport and flies due west at a speed of 1200 km per hour. How far apart will be the two planes after $1\frac{1}{2}$ hours?

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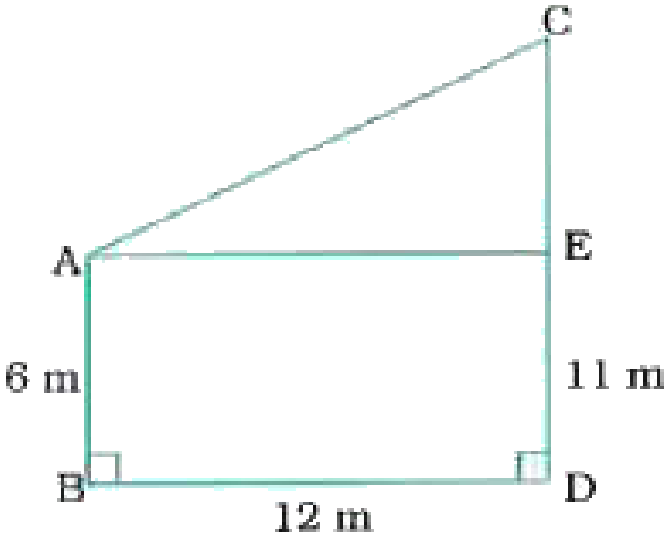
18. Two poles of heights 6 m and 11m stand on a plane ground. If the distance between the feet of the poles is 12 m, find the distance

between their tops.



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

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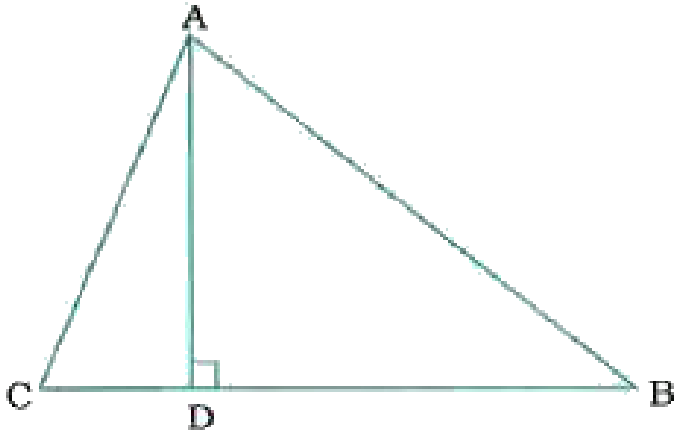
20. The perpendicular from A on side BC of a ΔABC intersects BC at D such that $DB = 3CD$ (see the given figure). Prove that

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



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

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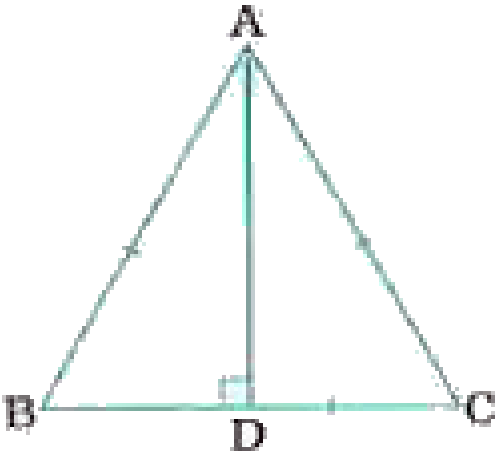
22. In an equilateral triangle, prove that three times the square of one side is equal to four times the square of one of its altitude.



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23. Tick the correct answer and justify : In ΔABC, $AB = 6\sqrt{3}$, $AC = 12cm$ and BC= 6 cm. The angle B is :

A. 120°

B. 60°

C. 90°

D. 45°

Answer: C

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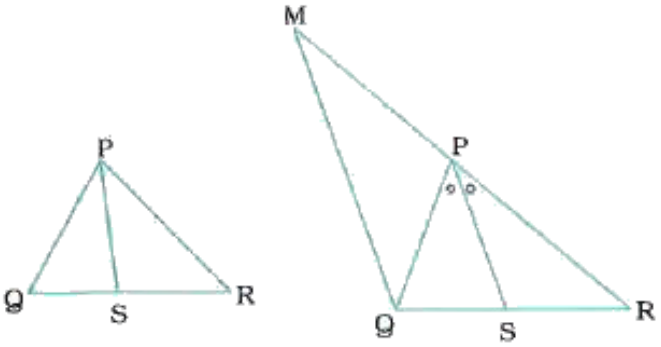
Exercise 6 6

1. In the given figure, PS in the bisector of $\angle QPR$ of ΔPQR. Prove that $\frac{QS}{SR} = \frac{PQ}{PR}$.



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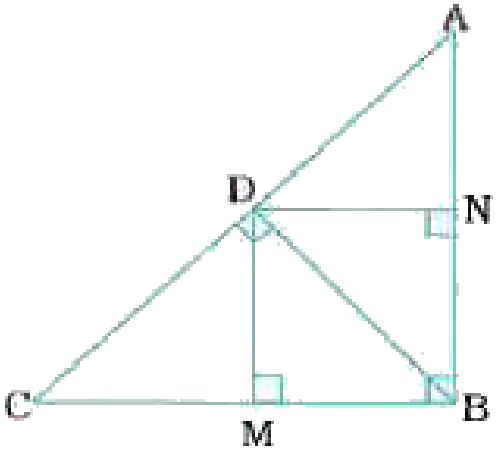
2. In the given figure, D is a point on hypotenuse AC of $\triangle ABC$, such that $BD \perp AC, DM \perp BC$ and $DN \perp AB$. Prove that :

$DM^2 = DN \cdot MC$



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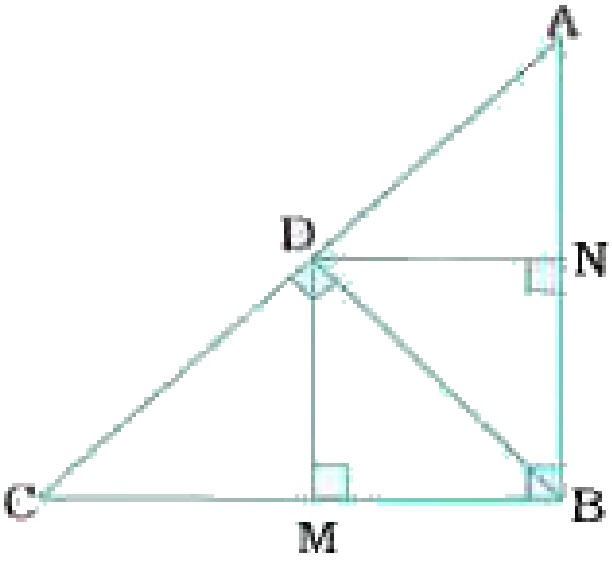
3. In the given figure, D is a point on hypotenuse AC of $\triangle ABC$, such that $BD \perp AC, DM \perp BC$ and $DN \perp AB$. Prove that :

$DN^2 = DM \cdot AN$



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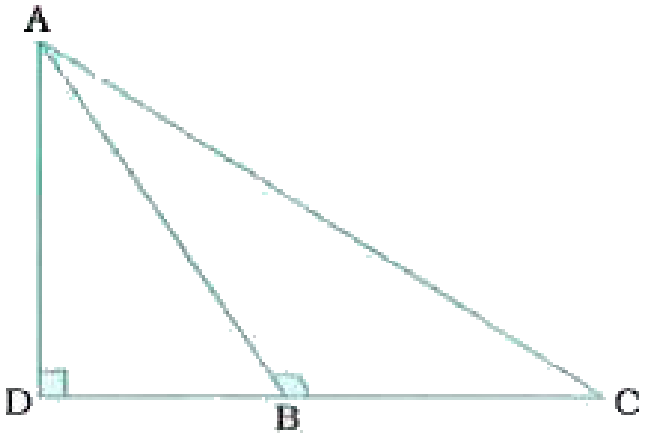
4. In the given figure, ABC is a Deltain which $\angle ABC > 90^\circ$ and $AD \perp CB$ produced. Prove that

$AC^2 = AB^2 + BC^2 + 2BC \cdot BD$



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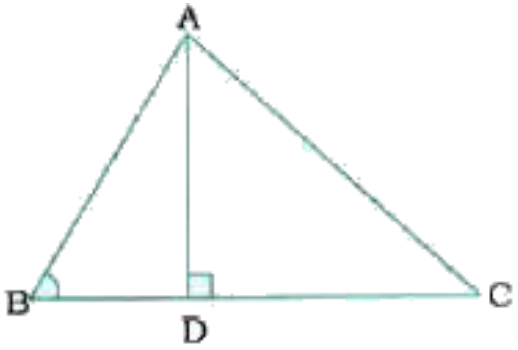
5. In the given figure, ABC is a Deltain which $\angle ABC < 90^\circ$ and $AD \perp BC$. Prove that $AC^2 = AB^2 + BC^2 - 2BC \cdot BD$



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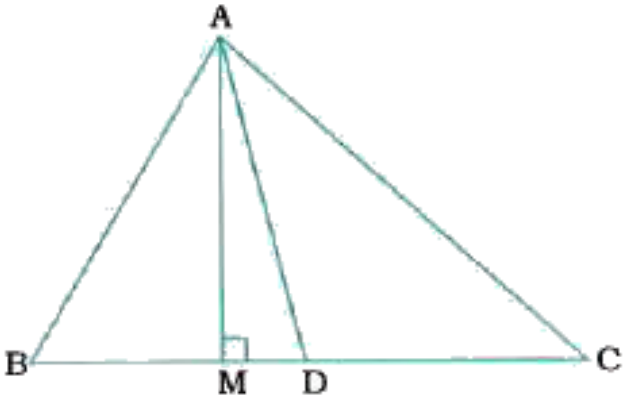
6. In the given figure, AD is a median of a DeltaABC and $AM \perp BC$.

Prove that :

$$AC^2 = AD^2 + BC \cdot DM + \left(\frac{BC}{2}\right)^2$$



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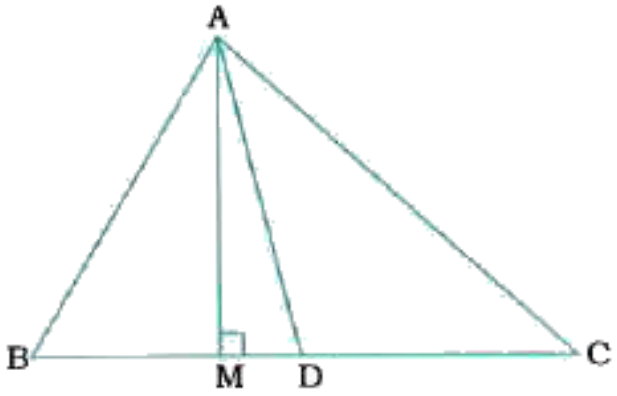
7. In the given figure, AD is a median of a DeltaABC and $AM \perp BC$.

Prove that :

$$AB^2 = AD^2 - BC \cdot DM + \left(\frac{BC}{2}\right)^2$$



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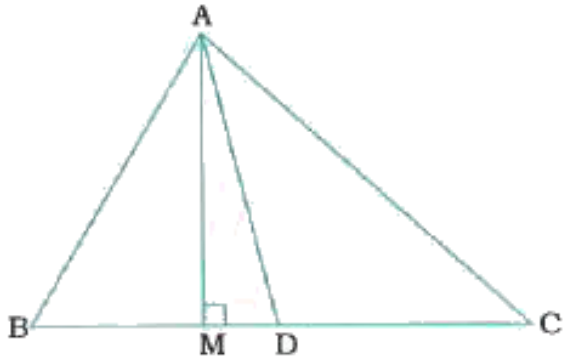
8. In the given figure, AD is a median of a DeltaABC and $AM \perp BC$.

Prove that :

$$AC^2 + AB^2 = 2AD^2 + \frac{1}{2}BC^2$$



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

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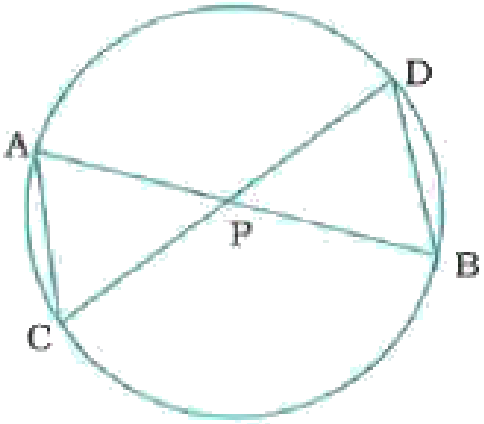
10. In the given figure, two chords AB and CD intersect each other at the point P. Prove that

$\Delta APC \sim \Delta DPB$



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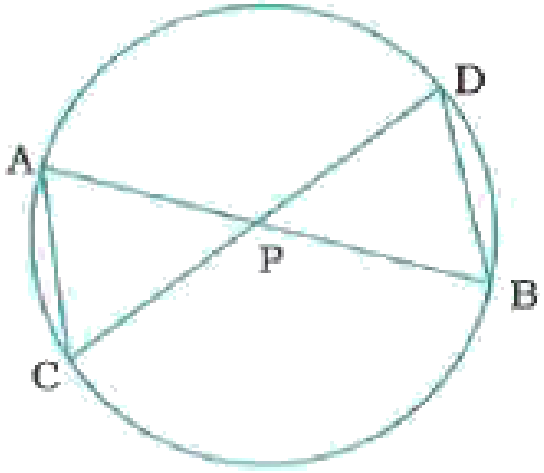
11. In the given figure, two chords AB and CD intersect each other at the point P. Prove that

$AP \cdot PB = CP \cdot DP$



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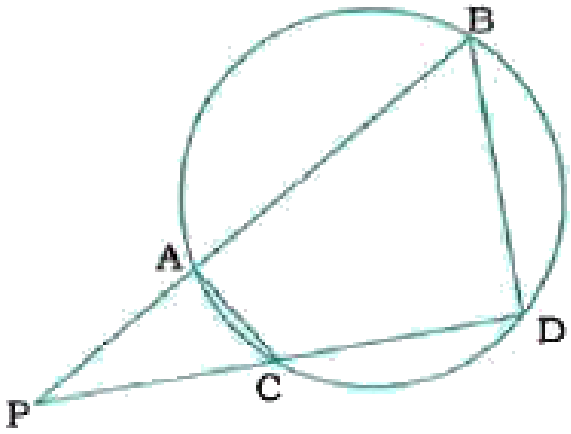
12. In the given figure, two chords AB and CD of a circle intersect each other at the point P (when produced) outside the circle. Prove that

$\Delta PAC \sim \Delta PDB$



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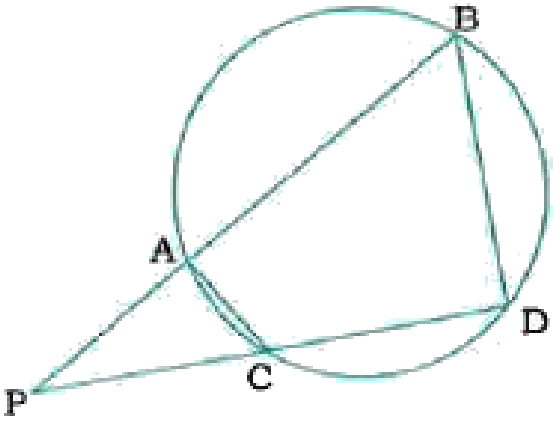
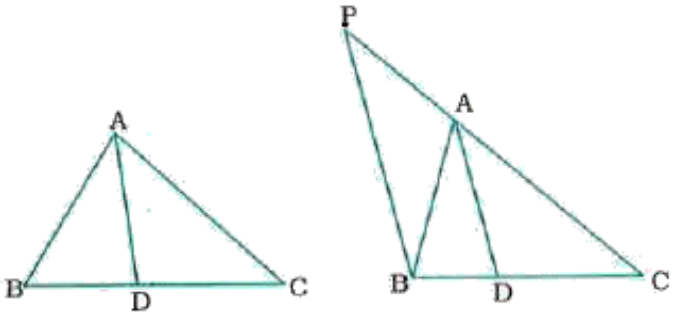
13. In the given figure, two chords AB and CD of a circle intersect each other at the point P (when produced) outside the circle. Prove that

$PA \cdot PB = PC \cdot PD$



Watch Video Solution

14. In the given figure, D is a point on side BC of ΔABC such that $\frac{BD}{CD} = \frac{AB}{AC}$. Prove that AD is the bisector of $\angle BAC$.



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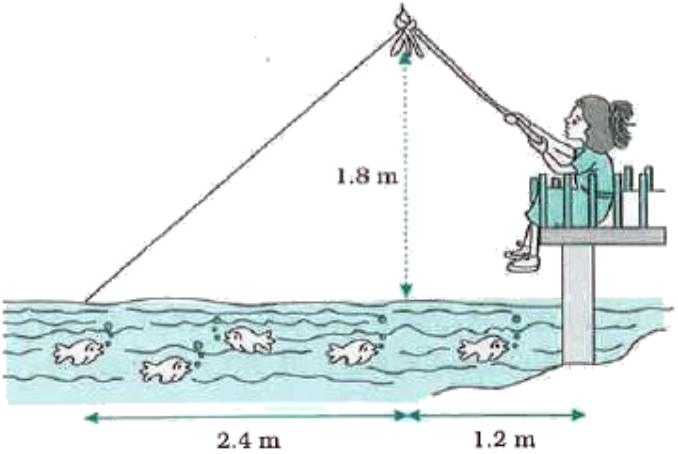
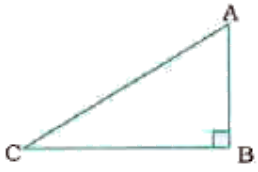
15. Nazima is fly fishing in a stream. The tip of her fishing rod is $1.8m$ above the surface of the water and the fly at the end of the string rests on the water $3.6m$ away from her and $2.4m$ from a point directly under the tip of the rod. Assuming that her string (from the tip of her rod to the fly) is taut, how much string does she have out (see the given figure)? If she pulls in the string at the rate of 5 cm per second, what will be the horizontal distance of the fly from her after 12 seconds?





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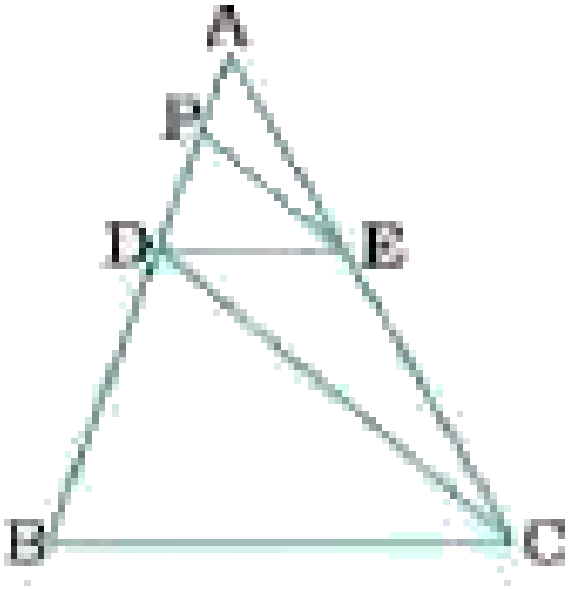
Test Your Skills

1. In the given figure, $DE||BC$ and $PE||DC$. If AP= 4 cm and PB= 12 cm, find AD.



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2. In ΔABC, P and Q are points on sides AB and AC respectively. For each of the following cases, state whether $PQ \mid\mid BC$ or not :

$AP = 8cm, PB = 6cm, AQ = 12cm, AC = 21cm$

Watch Video Solution

3. In ΔABC, P and Q are points on sides AB and AC respectively. For each of the following cases, state whether $PQ \| BC$ or not :

$PB = 5cm, AB = 12cm, CQ = 7.5cm, QA = 10.5cm$

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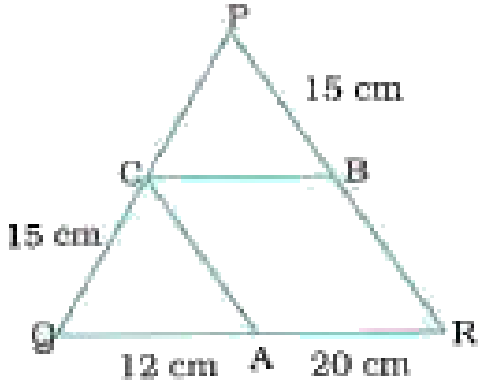
4. In ΔABC, P and Q are points on sides AB and AC respectively. For each of the following cases, state whether $PQ \| BC$ or not :

$AP = 8cm, PB = 8cm, AQ = 7cm, AC = 15cm$

Watch Video Solution

5. In the given figure $CB||QR$ and $CA||PR$. If AQ= 12 cm, AR= 20 cm and PB= CQ= 15 cm, find PC and BR.



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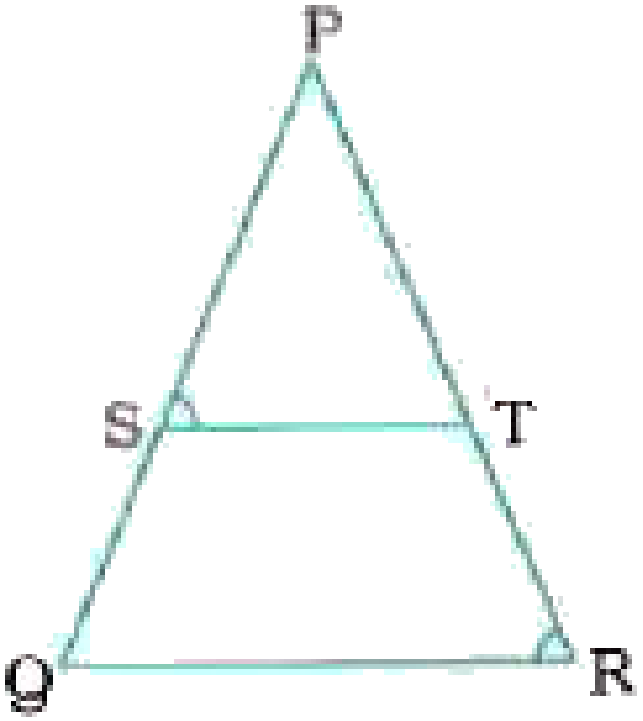
6. In the given figure, $\frac{PS}{SQ} = \frac{PT}{TR}$ and $\angle PST = \angle PRQ$. Prove that PQR is an isosceles triangle.



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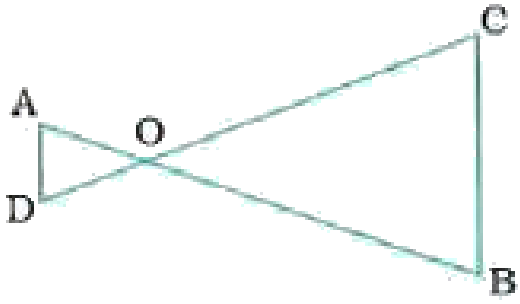
7. ABCD is a trapezium with $AB \| DC$. E and F are points on non-parallel sides AD and BC respectively such that EF is parallel to AB (see

the figure). Show that $\frac{AE}{ED} = \frac{BF}{FC}$

Watch Video Solution

8. In the given figure, $OA \cdot OB = OC \cdot OD$. Prove that $\angle A = \angle C$ and $\angle B = \angle D$.



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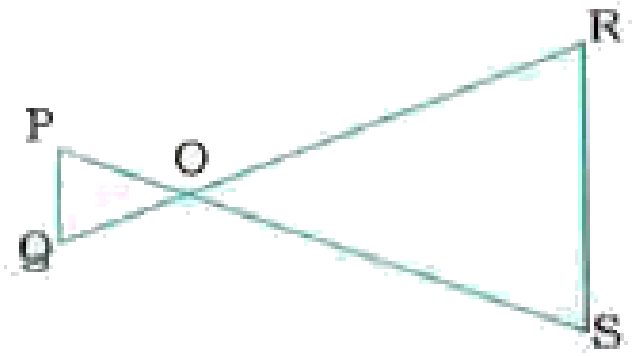
9. In the given figure, if $PQ \mid\mid RS$, prove that $\Delta POQ \sim \Delta SOR$



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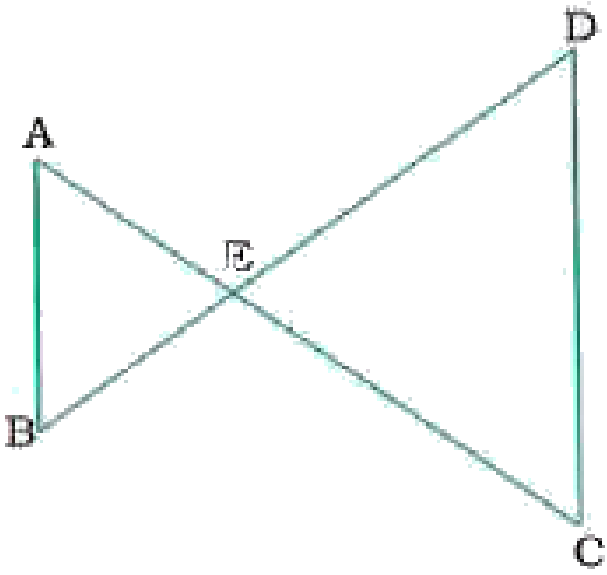
10. In the given figure, if $\frac{EA}{EC} = \frac{EB}{ED}$ prove that

$\Delta EAB \sim \Delta ECD$



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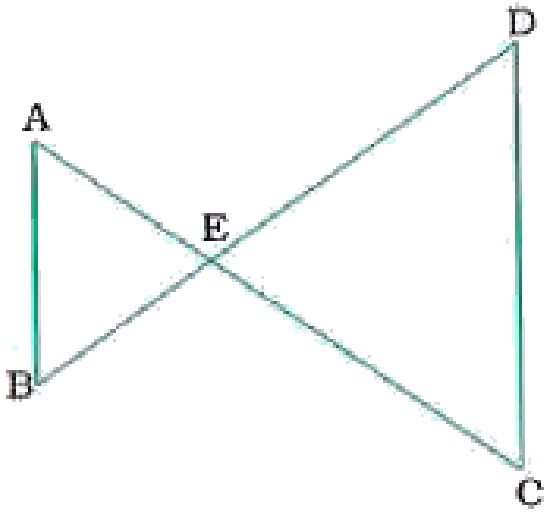
11. In the given figure, if $\frac{EA}{EC} = \frac{EB}{ED}$ prove that

$AB \| CD$



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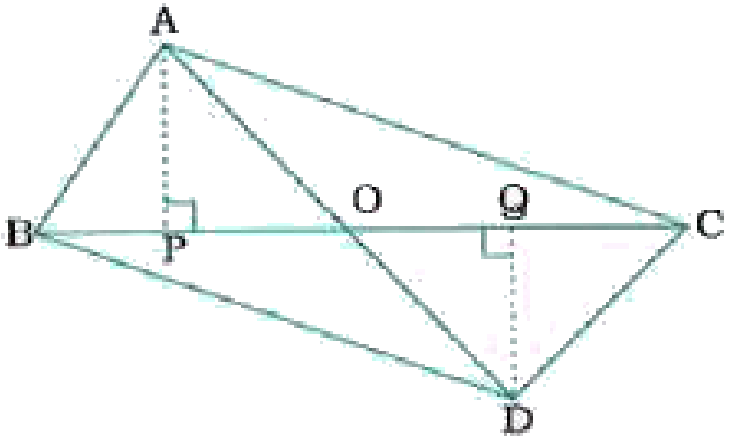
12. In the given figure, ABC and DBC are two triangles on the same base BC. Prove that $\frac{ar(ABC)}{ar(DBC)} = \frac{AO}{DO}$.



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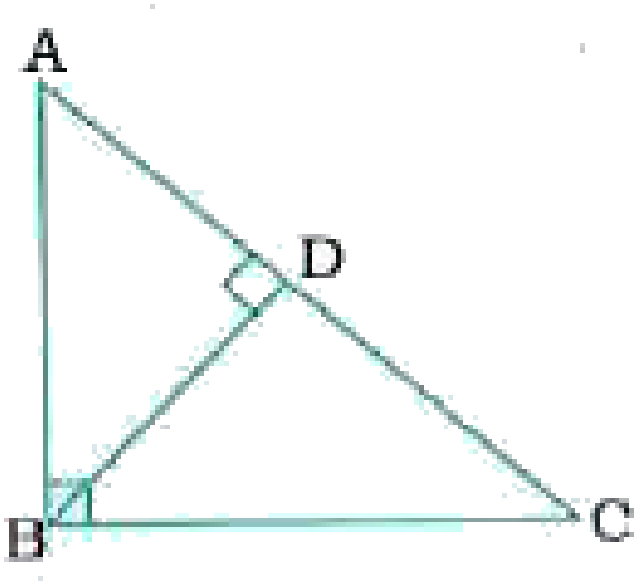
13. In the given figure, ΔABC is a right angled Deltawith $\angle B = 90^\circ$ and BD is perpendicular to AC. Prove that $\Delta ADB \sim \Delta ABC$



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14. The areas of two similar triangles are $100cm^2$ and $49cm^2$ respectively. If the altitude of the bigger triangle 5 cm, find the

corresponding altitude of the smaller triangle.

Watch Video Solution

15. The areas of two similar triangles are $169cm^2$ and $121cm^2$ respectively. If the longest side of the bigger Deltais 26 cm, find the longest side of the smaller triangle.

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16. ABC is a Deltaand PQ is a line intersecting AB at P and AC at Q. If $AP = 1cm, PB = 3cm, AQ = 1.5cm$ and $QC = 4.5$, prove that ar(ABC)= 16 ar(APQ).

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17. In $\Delta PQR, \angle Q = 90^\circ$. Equilateral triangles APQ, BQR and CPR are described on sides PQ, QR and PR respectively. Prove that $ar(APQ) + ar(BQR) = ar(CPR)$.

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18. Two isosceles triangles have equal vertical angles and their areas are in the ratio 36 : 25. Find the ratio of their corresponding altitudes.

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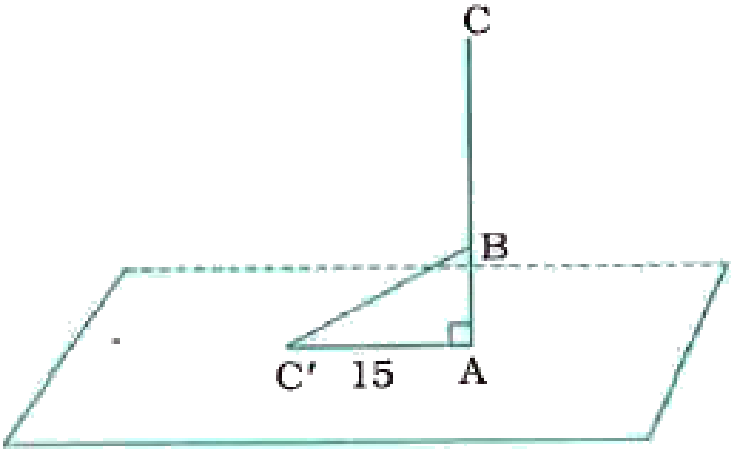
19. In $\Delta ABC, AD \perp BC$, point D lies on BC. If $AC^2 = CD \cdot BD$, prove that $\angle BAC$ is a right angle.

Watch Video Solution

20. In the figure, AC is the length of a pole standing vertical on the ground. The pole is bent at point B, so that the top of the pole touches the ground at a point 15 m away from the base of the pole. If the length of the pole is 25m, find the length of the upper part of the pole.



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21. In $\Delta ABC, \angle A = 90^\circ$ and $AD \perp BC$. Prove that $\frac{1}{AD^2} = \frac{1}{AB^2} + \frac{1}{AC^2}$.

Watch Video Solution

22. In an equilateral triangle with side a, prove that,

the altitude is of length $\frac{\sqrt{3}}{2}a$.

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23. In an equilateral triangle with side a, prove that,

the area of the triangle $\frac{\sqrt{3}}{4}a^2$.

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24. BL and CM are medians of a DeltaABC right angled at A. Prove that

$4\left(BL^2 + CM^2\right) = 5BC^2$.

Watch Video Solution

25. ABC is a Deltain which $\angle B > 90^\circ$ and $AD \perp CB$ produced. Prove that $AC^2 = AB^2 + BC^2 + 2BC \cdot BD$.

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26. ABC is a Deltain which $\angle B < 90^\circ$ and $AD \perp CB$. Prove that $AC^2 = AB^2 + BC^2 - 2BC \cdot BD$.

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27. A ladder 15 m long reaches a window which is 9 m above the ground on one side of a street. Keeping its foot at the same point, the ladder is turned to the other side of the street to reach a window 12 m above the ground. Find the width of the street.

Watch Video Solution

28. Find the length of the longest stick that can be placed in a cuboidal box measuring $28cm \times 21cm \times 12cm$.

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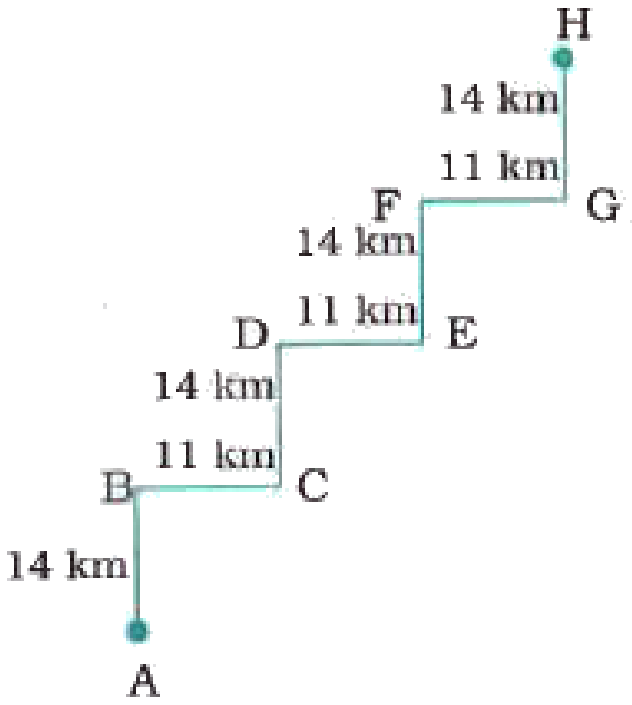
29. The given figure shows the distances covered by Ariv from place a to place H. His direction of movement from A to B, C to D, E to F and G to H is due north and that from B to C, D to E and F to G is due east.

Find the aerial distance between A and H.



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Practice Thoroughly

1. In ΔABC, D and E are points on the sides AB and AC respectively such that $DE \| BC$. If

$AB = 6.75cm$, $AC = 8.50cm$ and $EC = 6.80cm$. Then find BD.

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2. $\Delta ABC \sim \Delta PQR$. If $AB = 6.5cm$, $PQ = 10.4cm$ and the perimeter of ΔABC is 60 cm, then find the perimeter of ΔPQR.

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3. In ΔABC, D and E are points of sides AB and AC such that $DE \| BC$. If $AD = x$, $DB = 2x - 1$, $AE = x + 3$ and EC= 2x, then find the value of x.

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4. An aeroplane leaves an airport and flies due west at a speed of 2100 km per hour. At the same time, another aeroplane leaves the same

airport and flies due south at a speed of 2000 km per hour. How far apart will be the two planes after 1 hours?

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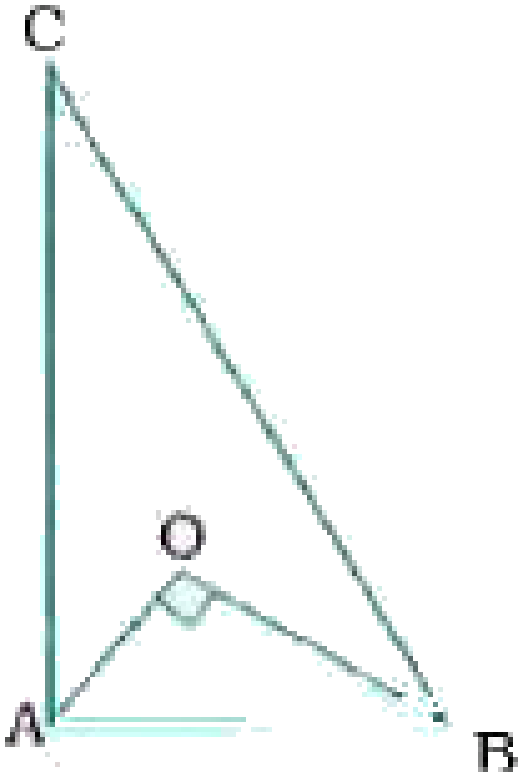
5. In the given figure, $OA = 3cm, OB = 4cm, \angle AOB = 90^\circ, AC = 12cm$ and $BC = 13cm$

. Prove that $\angle CAB = 90^\circ$.



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6. In trapezium ABCD, $AB \mid\mid CD$ and $AB = \frac{1}{3}CD$. The diagonals AC and BD interset at O. If $ar(AOB) = 21cm^2$, then find ar (COD).

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7. ΔABC and ΔDEF are two equilateral triangles of sides 4 cm and 2 cm respectively. Find the ratio of ar(ABC) and ar(DEF).

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8. A girl of height 100 cm is walking away from the base of a lamp-post at a speed of $1.9m/s$. If the lamp is 5m above the ground, find the length of her shadow after 4 seconds.

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9. In $\triangle ABC, \angle C = 90^\circ$ and P and Q are the midpoints of BC and AC respectively. Prove that $AP^2 + BQ^2 = 5PQ^2$.

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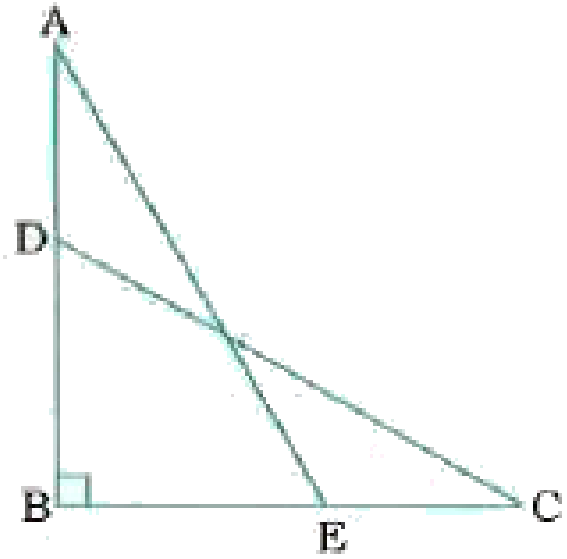
10. In the given figure, $\angle B = 90^\circ$. If AE= CD= 13 cm and BE= AD= 5 cm, then find BC.



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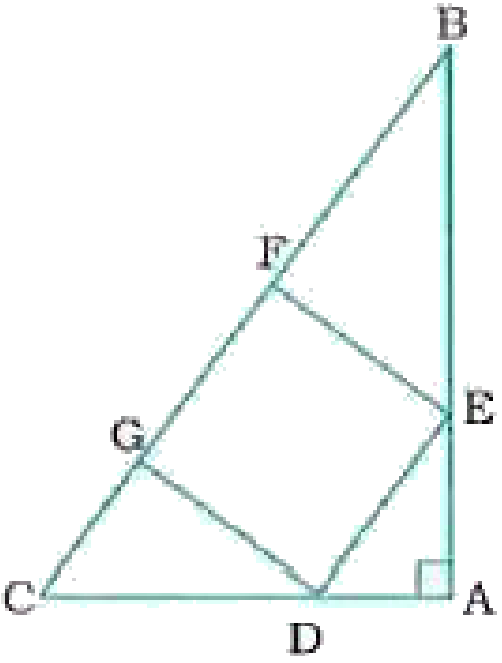
11. In the given figure, EFGD is a square and $\angle BAC = 90^\circ$. Prove that $BF \times CG = GF^2$.



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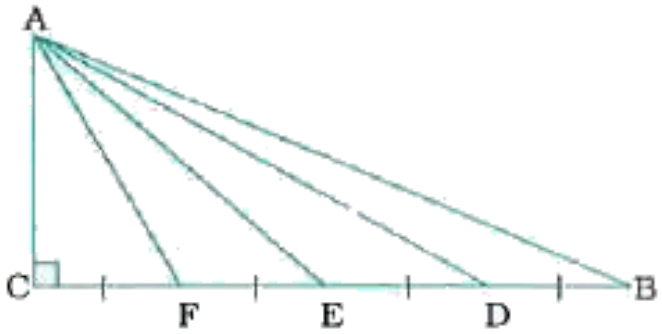
12. In right angled DeltaABC, $\angle C = 90^\circ$ and D, E, F are three points on BC such that they divide BC in eaual parts (see the given figure). Prove

that $8\left(AF^2 + AD^2\right) = 11AC^2 + 5AB^2$.



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13. In an equilateral ABC, E is a point on BC such that $BE = \frac{1}{4}BC$. Prove that $16AE^2 = 13AB^2$.

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14. A rhombus has each side of length 20 cm and one pair of opposite angles 60° each. Find the length of its diagonals.

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15. In $\Delta ABC, \angle B = 90^\circ$. D and E are any points on sides AB and BC respectively. Prove that $AE^2 + CD^2 = AC^2 + DE^2$.

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16. In $\Delta ABC, \angle B = 90^\circ$ and BM is an altitude. Prove that $\frac{1}{BM^2} = \frac{1}{AB^2} + \frac{1}{BC^2}$.

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17. ABCD is a rhombus. Prove that $AB^2 + BC^2 + CD^2 + DA^2 = AC^2 + BD^2$.

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

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19. If A be the area of a right Deltaand b be one of the sides containing the right angle, prove that the length of the altitude on the hypotenuse is $\frac{2Ab}{\sqrt{b^4+4A^2}}$.

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20. The perimeter of a right triangle 60 cm. If its hypotenuse is 25 cm, find the area of the triangle.

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Objective Questions

1. Fill in the blanks so as to make each of the following statements true :

$\Delta ABC \sim \Delta DEF$ and $2AB = DE$. If BC= 8 cm, then $EF = \ldots\ldots\ldots cm$.

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2. Fill in the blanks so as to make each of the following statements true :

In ΔABC, AD is the bisector of $\angle A$ and D lies on BC. If AB= 6 cm, AC= 5 cm and BD= 3 cm, then $BC = \ldots\ldots\ldots\ldots cm.$

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3. Fill in the blanks so as to make each of the following statements true :

The areas of two similar triangles ABC and DEF are

$144cm^2$ and $81cm^2$ respectively. If the longest side of ΔABC measures 36 cm, then the longest side of ΔDEF measures.....cm.

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4. Fill in the blanks so as to make each of the following statements true :

In ΔABC, points P and Q lie on sides AB and AC respectively such that $PQ \| BC$. If AP= 5cm, PB= 12 cm and AQ= 8 cm, then $AC = \ldots\ldots\ldots cm.$

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5. Fill in the blanks so as to make each of the following statements true :

In $\triangle ABC, \angle B = 90^\circ$. If AC= 73 cm and BC= 55 cm, then $AB = \ldots\ldots\ldots cm.$

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6. Answer each question by selecting the proper alternative from those given below each question so as to make each statement true :

A man goes 24 cm due west and then 7 m due north. Then, he is .....m away from the starting point.

A. 31

B. 17

C. 25

D. 26

Answer: C

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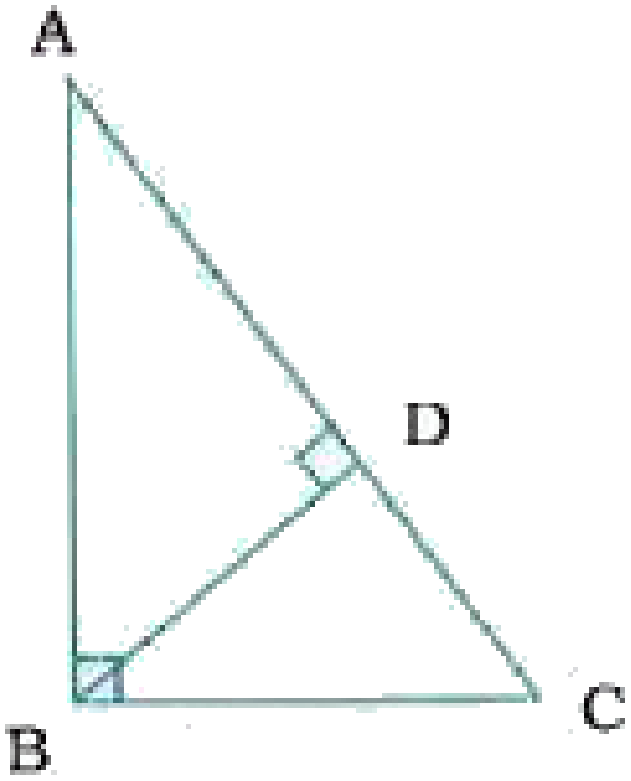
7. Answer each question by selecting the proper alternative from those given below each question so as to make each statement true :

In the given figure of $\triangle ABC, \angle B = 90^\circ$ and BD is an altitude. Then

$\Delta ADB \sim \Delta$.....



A. BAC

B. BCA

C. BCD

D. BDC

Answer: D

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8. Answer each question by selecting the proper alternative from those given below each question so as to make each statement true :

In ΔABC and /_E= 70^(@) and $\angle F = 50^\circ$ "DeltaDEF, /_A=50^(@), /_B= 70^(@), /_C= 60^(@), /_D= 60^(@),

. Then, ΔABC~Δ. . . . . .

A. DEF

B. FED

C. DFE

D. FDE

Answer: B

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9. Answer each question by selecting the proper alternative from those given below each question so as to make each statement true :

If in triangles ABC and DEF $\frac{AB}{DE} = \frac{BC}{FD}$, then they will be similar if.....

A. $\angle B = \angle E$

B. $\angle A = \angle D$

C. $\angle B = \angle D$

D. $\angle A = \angle F$

Answer: C

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10. Answer each question by selecting the proper alternative from those given below each question so as to make each statement true :

$\Delta ABC \sim \Delta DEF$. If $\angle A = 45^\circ$ and $\angle E = 56^\circ$ then, $\angle C = \ldots\ldots\ldots\ldots$

A. 45°

B. 56°

C. 101°

D. 79°

Answer: D

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11. Answer each question by selecting the proper alternative from those given below each question so as to make each statement true : $\Delta ABC \sim \Delta PQR$. The perimeter of ΔABC is 60 cm. If PQ= 9 cm, then $AB = \ldots\ldots\ldots cm$. If $\angle A = 45^\circ$ and $\angle Q = 56^\circ$ then, $\angle C = \ldots\ldots\ldots\ldots$

A. 6

B. 10

C. 15

D. 24

Answer: C

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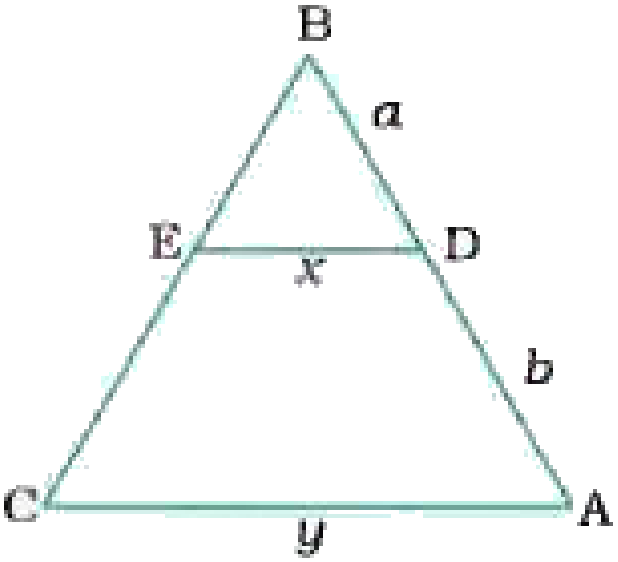
12. Answer each question by selecting the proper alternative from those given below each question so as to make each statement true :

In the given figure, $ED \mid\mid AC$. Then, ...holds good.



A. $x = \frac{a+b}{ay}$

B. $y = \frac{ax}{a+b}$

C. $x = \frac{ay}{a+b}$

D. $\frac{x}{y} = \frac{a}{b}$

Answer: C

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13. Answer each question by selecting the proper alternative from those given below each question so as to make each statement true :

In $\Delta ABC, \angle B = 90^\circ, AC = 25cm$ and BC= 24 cm. Then, the area of ΔABC is $\ldots\ldots\ldots\ldots cm^2$.

A. 600

B. 300

C. 84

D. 168

Answer: C

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14. Answer each question by selecting the proper alternative from those given below each question so as to make each statement true :

The lengths of the diagonals of a rhombus are 16 cm and 30 cm. Then, the perimeter of the rhombus is.....cm.

A. 136

B. 68

C. 34

D. 92

Answer: B

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15. Answer each question by selecting the proper alternative from those given below each question so as to make each statement true : The ratio of the perimeters of two similar triangles is 4 : 25, then the ratio of their areas is.....

A. 16 : 625

B. $2:5$

C. $5:2$

D. $625:16$

Answer: A

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16. Answer the following by a number or a word or a sentence :

The length of the shadow of a 12 m long vertical rod is 8 m. At the same time, the length of the shadow of a tower a 40 m. Find the height of the tower.

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17. Answer the following by a number or a word or a sentence :

The length of the diagonal of a square is $7\sqrt{2}$ cm. Find the area of the

square.

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18. Answer the following by a number or a word or a sentence :

How much is the area of an equilateral triangle with side 8 cm?

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19. Answer the following by a number or a word or a sentence :

In ΔABC, $AB = 11cm$, $BC = 60cm$ and CA = 61 cm. State the type of ΔABC.

Watch Video Solution

20. Answer the following by a number or a word or a sentence :

In $\triangle$ ABC , AD ia a median. If AB= 6 cm, AC= 8 cm and AD= 5 cm, find BC.

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21. State whether each of the following statements is true or false :

In ΔABC, AB= 5 cm, BC= 12 cm and AC= 15 cm. Then, ΔABC is an obtuse angled triangle.

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22. State whether each of the following statements is true or false :

Two chords AB and CD of a circle interset each other at O in the interior of the circle. Then, $\frac{OA}{OD} = \frac{OC}{OB}$.

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23. State whether each of the following statements is true or false :

In ΔABC, $\angle B = 90^\circ$, AB= 8 cm and BC= 15 cm. Then, its perimeter is 40 cm.

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24. State whether each of the following statements is true or false :

The areas of two similar triangels are propotional to their correspoonding sides.

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25. State whether each of the following statements is true or false :

The side of a square is 10 cm, then its diagonal is $10\sqrt{3}$ cm.

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26. Define :

Similar polygons

Watch Video Solution

27. Define :

Similar triangles

Watch Video Solution

28. Define :

Equiangular triangles

Watch Video Solution

29. State :

Basic proportionality theorem.

Watch Video Solution

30. State :

Converse of Thales theorem.

Watch Video Solution

31. State :

AAA criterion of similarity

Watch Video Solution

32. State :

AA criterion of similarity.

Watch Video Solution

33. State :

SSS criterion of similarity.

Watch Video Solution

34. State :

SAS criterion of similarity.

Watch Video Solution

35. State :

RHS criterion of similarity.

Watch Video Solution

36. State :

Pythagoras theorem.

Watch Video Solution

37. State :

Converse of Pythagoras theorem.

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