doubtnut
India's Number 1 Education App

MATHS

BOOKS - PSEB

TRIANGLES

Exercise

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 :- their corresponding angles are..... (equal , proportional).

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5. Give two different examples of pair of ,- similar figures.

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

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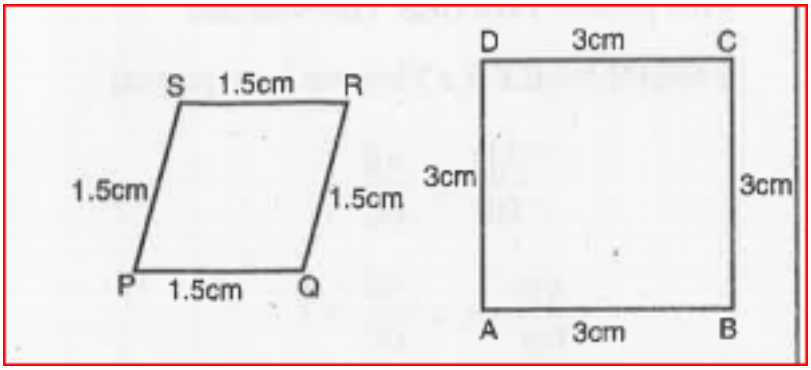
7. State whether the following quadrilaterals are similar or not :-



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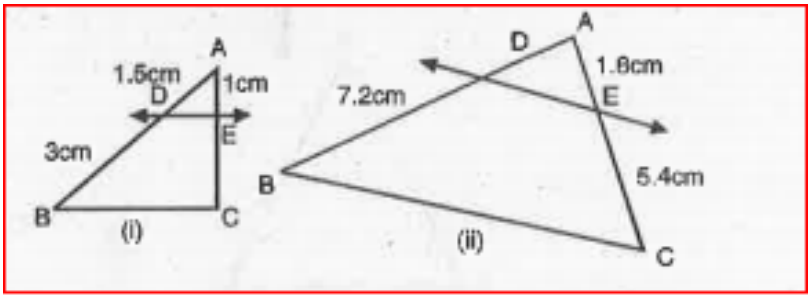
8. In fig. (i) and (ii), DE || BC. Find EC in (i) and AD in (ii).



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9. E and F are points on the sides PQ and PR respectively of a $\angle PQR$. For each of the following cases, state whether EF || OR :

PE = 3.9 cm, EQ = 3 cm, PF = 3.6 cm and FR = 2.4 cm.

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10. E and F are points on the sides PQ and PR respectively of a $\angle PQR$. For each of the following cases, state whether EF || OR : PE = 4 cm, QE = 4.5 cm, PF = 8 cm and RF = 9 cm.

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11. E and F are points on the sides PQ and PR respectively of a $\angle PQR$. For each of the following cases, state whether EF || QR : PQ = 1.28 cm, PR = 2.56 cm, PE = 0.18 cm and PF = 0.36 cm.

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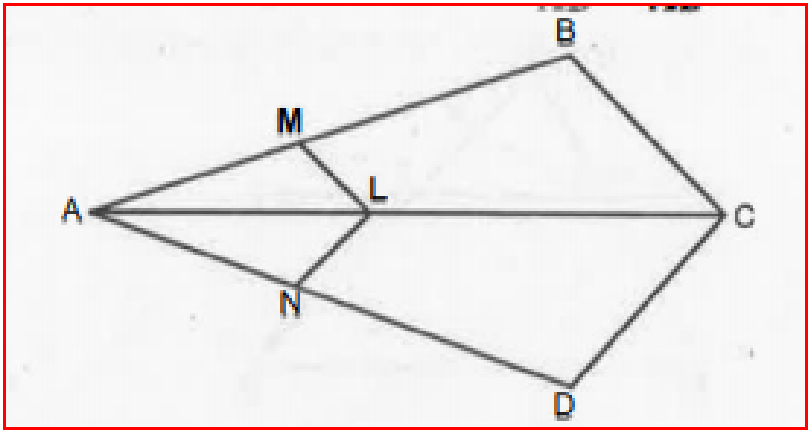
12. In fig., LM || CB , and LN||CD.Prove that $\frac{AM}{AB} = \frac{AN}{AD}$.



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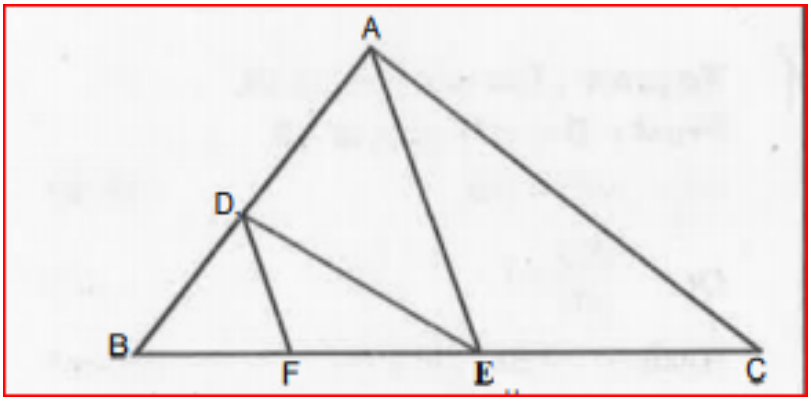
13. In fig. DE || AC, and DF || AE prove that $\frac{BF}{EF} = \frac{BE}{EC}$.



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14. In Fig. 6.20. DE||OQ anti DF||OR. Show that EF||QR.

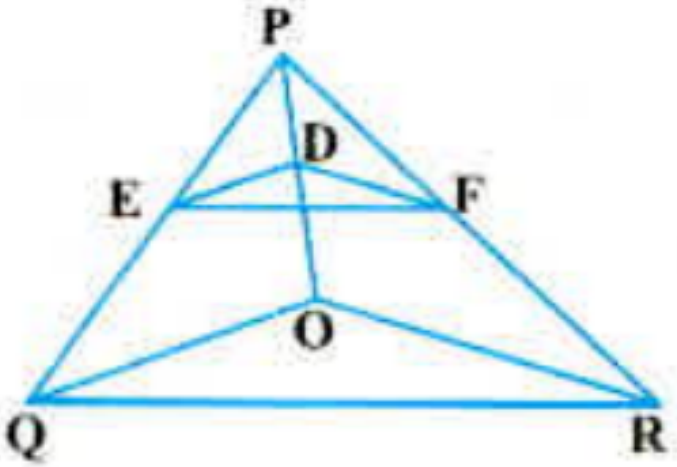

Fig. 6.20

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15. In Fig, 6.21 , A, B and C are points on OP, OQ and OR respectively such that AB||PQ and AC||PR. Show that BC||QR.

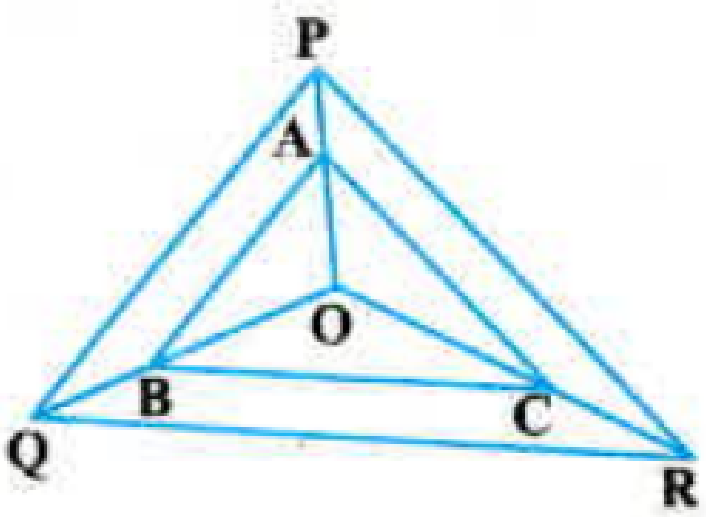

Fig. 6.21

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16. Using Basic Proportionality theorem, prove thata 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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17. Using converse of Basic Proportionality theorem prove that the line joining the mid-points of any two sides of a triangle is parallel to the third side. (Recall that you have done it in Class IX).

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18. ABCD is a trapezium in which AB II DC and its diagonals intersect each other at the point O. show that $\frac{AO}{BO} = \frac{CO}{DO}$.

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19. The diagonals of a quadrilateral ABCD intersect each other at the point o Such that $\frac{AO}{BO} = \frac{CO}{DO}$, show that ABCD is trapezium.

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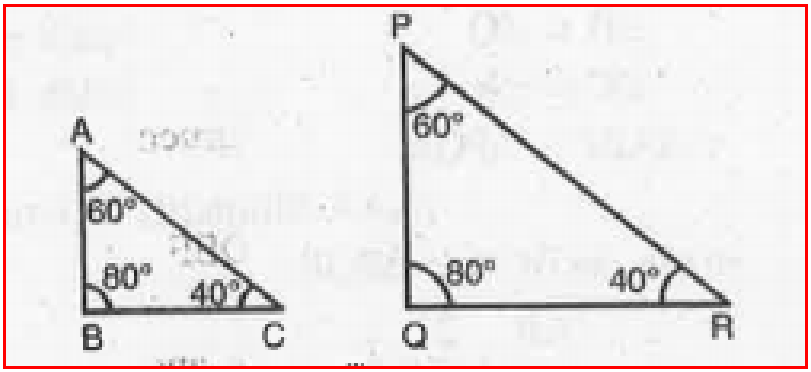
20. State which pairs of triangles in Fig. are similar. Write the similarity criterion used by you for answering the question and also write the pairs of similar triangles in the symbolic form :



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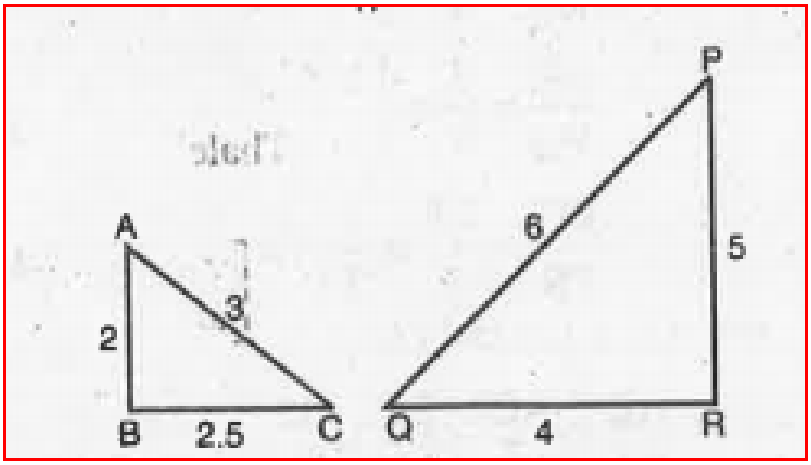
21. State which pairs of triangles in Fig. are similar. Write the similarity criterion used by you for answering the question and

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



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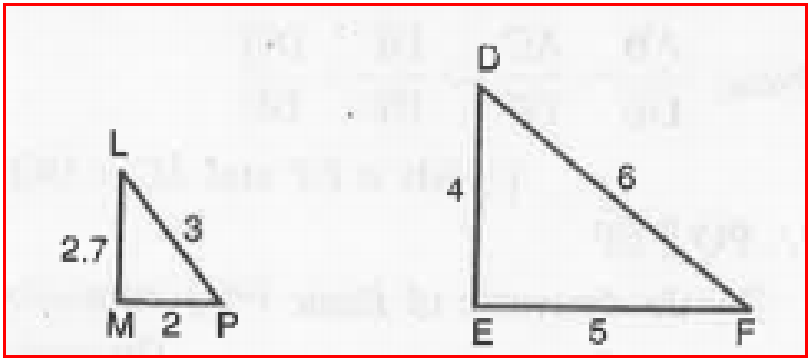
22. State which pairs of triangles in Fig. are similar. Write the similarity criterion used by you for answering the question and also write the pairs of similar triangles in the symbolic form :



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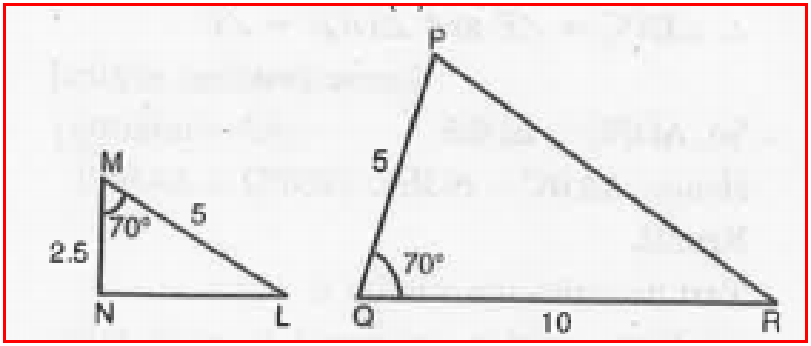
23. State which pairs of triangles in Fig. are similar. Write the similarity criterion used by you for answering the question and also write the pairs of similar triangles in the symbolic form :



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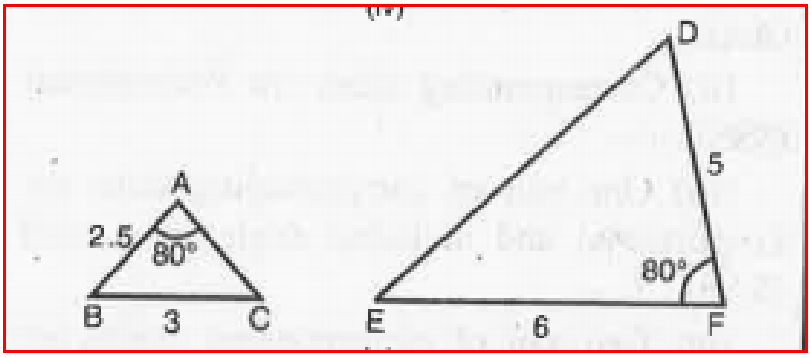
24. State which pairs of triangles in Fig. are similar. Write the similarity criterion used by you for answering the question and

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



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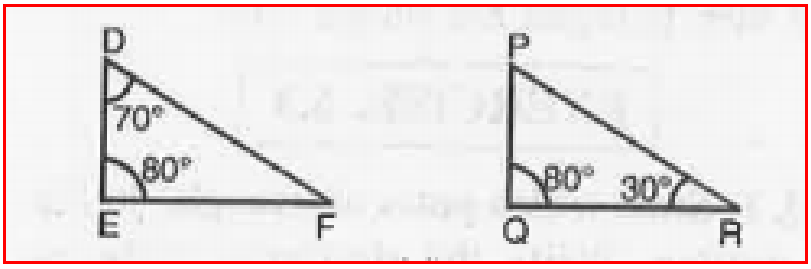
25. State which pairs of triangles in Fig. are similar. Write the similarity criterion used by you for answering the question and also write the pairs of similar triangles in the symbolic form :



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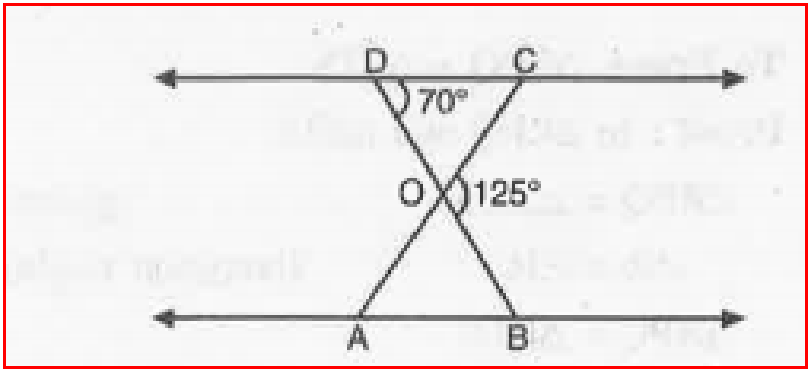
26. In fig., $\triangle ODC - \triangle OBA$, $\angle BOC = 125 \circ 0$ and $\angle CDO = 70 \circ 0$. Find $\angle DOC$, $\angle DCO$ and $\angle OAB$.



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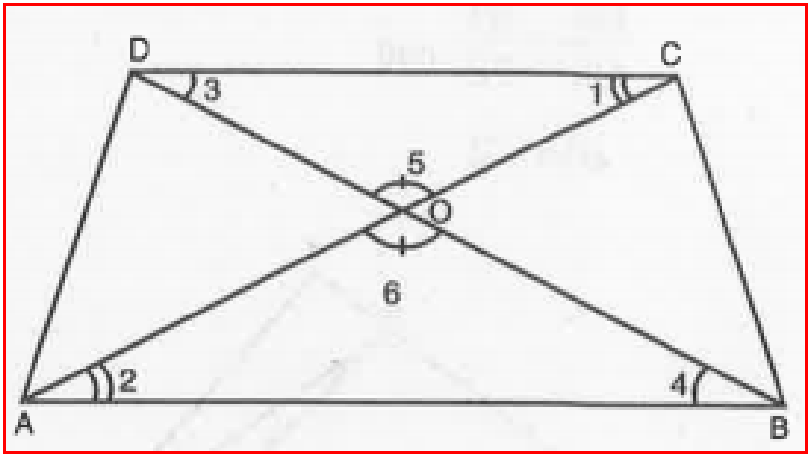
27. Diagonals AC and BD of a trapezium ABCD with AB || DC intersect each other at the point O. Using a similarity criterion for

two triangles , show that $\frac{OA}{OC} = \frac{OB}{OD}$.



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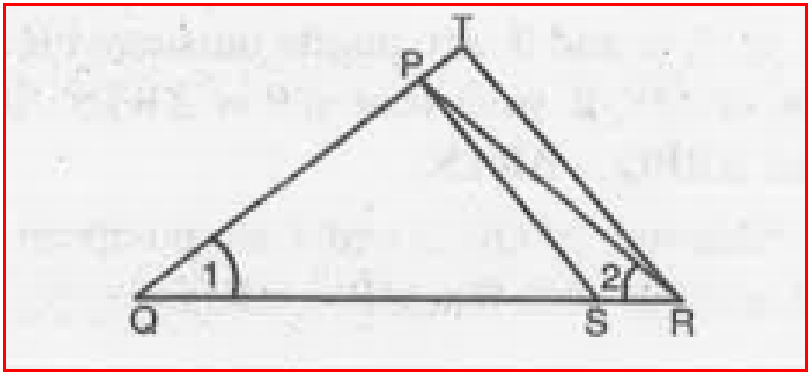
28. In fig., $\frac{QR}{QS} = \frac{QT}{PR}$ and $\angle 1 = \angle 2$. Show that $\triangle PQS \sim \triangle TQR$.



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29. S and T are points on sides PR and QR of $\triangle PQR$ such that $\angle P = \angle RTS$. Show that $\triangle RPQ \sim \triangle RTS$.

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30. In Fig. 6.37, if $\Delta ABE \cong \Delta ACD$, show that $\Delta ADE \sim \Delta ABC$.

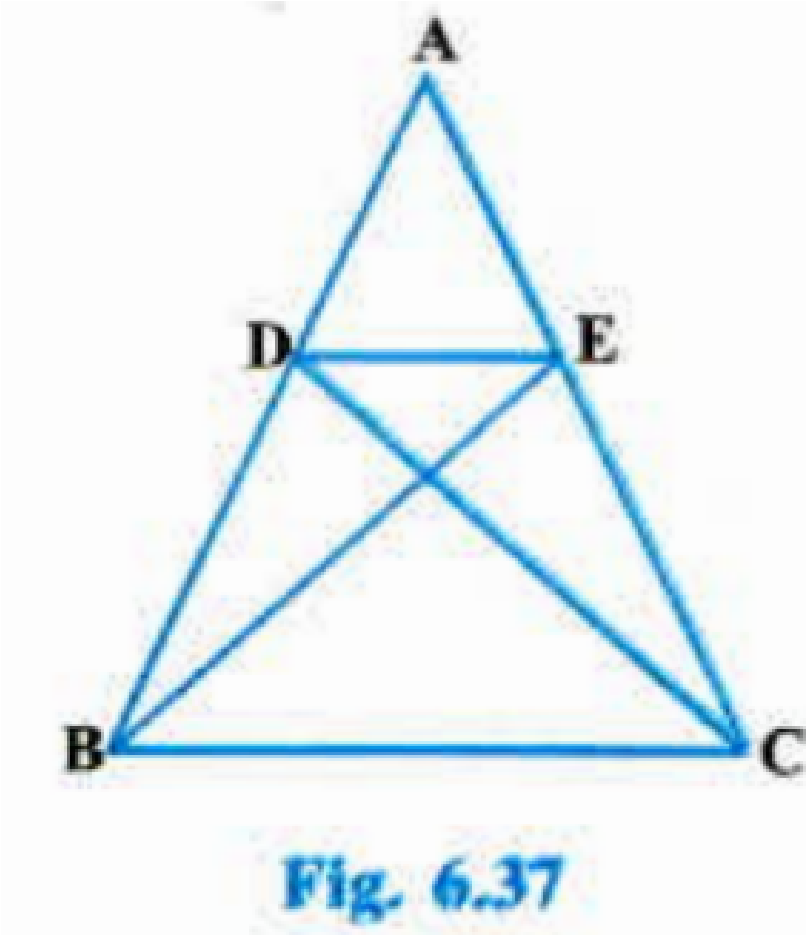

Fig. 6.37

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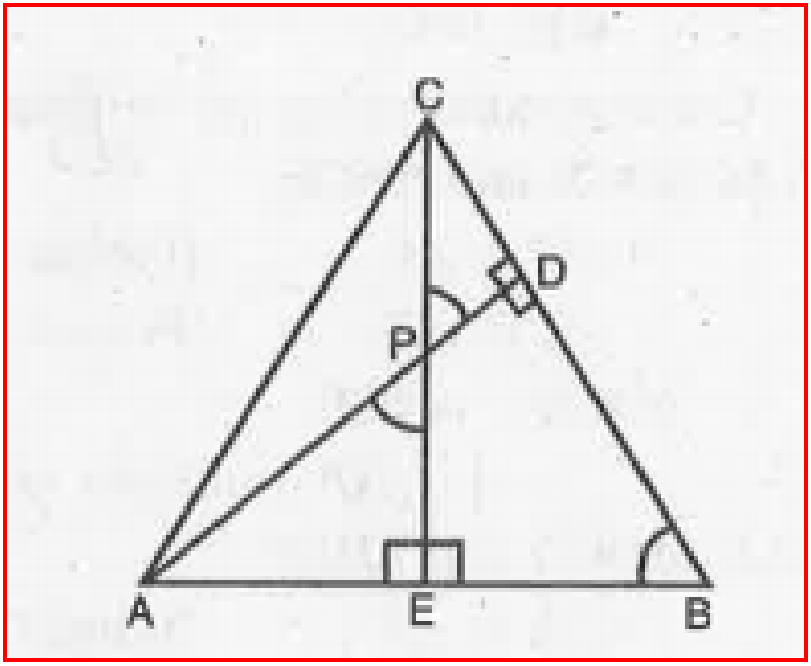
31. In Fig., altitudes AD and CE of $\triangle ABC$ intersect each other at the point P. Show that :- $\triangle AEP \sim \triangle CDP$.



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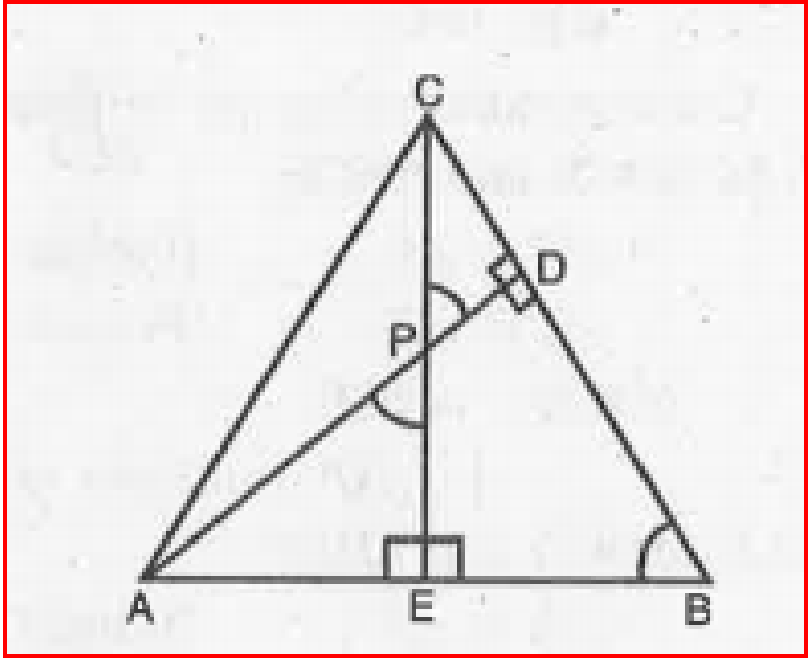
32. In Fig., altitudes AD and CE of $\triangle ABC$ intersect each other at the point P. Show that :- $\triangle ABD \sim \triangle CBE$.



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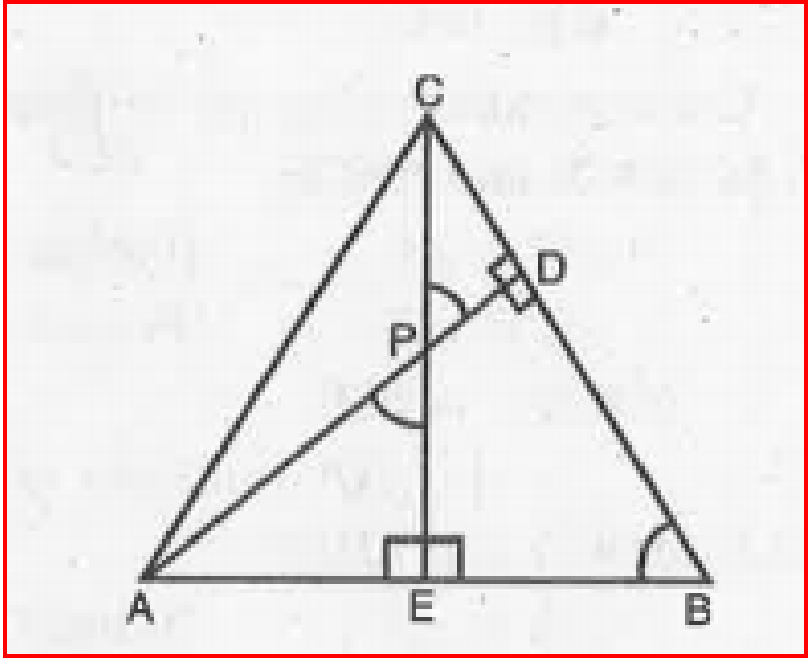
33. In Fig., altitudes AD and CE of $\triangle ABC$ intersect each other at the point P. Show that :- $\triangle AEP \sim \triangle ADB$.



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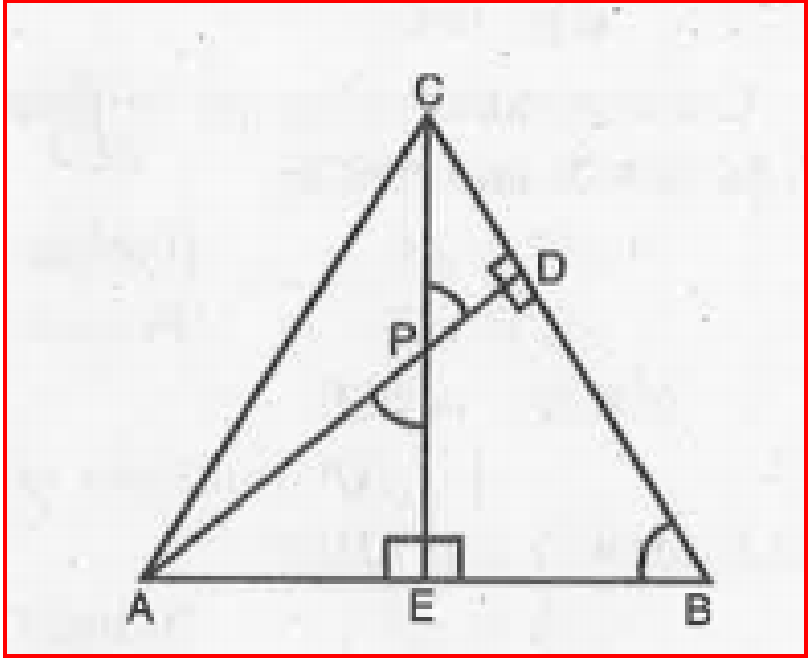
34. In Fig., altitudes AD and CE of $\triangle ABC$ intersect each other at the point P. Show that :- $\triangle PDC \sim \triangle BEC$.



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

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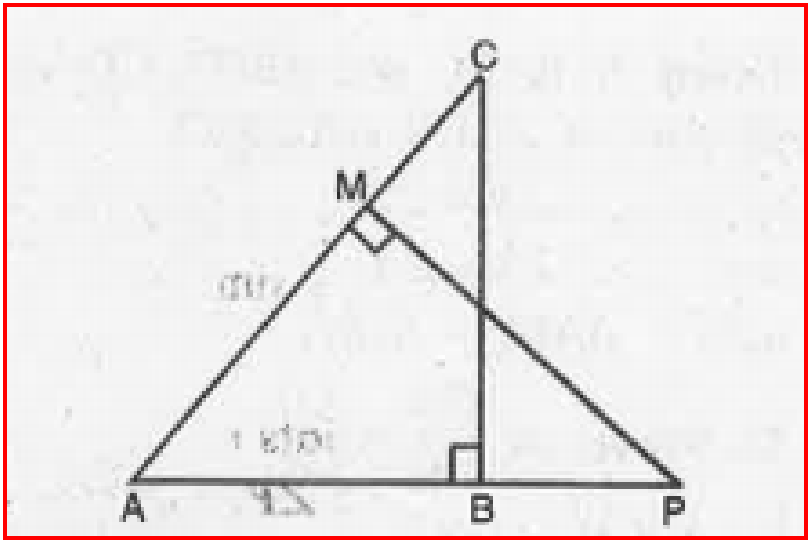
36. In Fig., ABC and AMP are two right triangles, right angled at B and M respectively. Prove that :- $\frac{CA}{PA} = \frac{BC}{MP}$.



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37. 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 $\triangle ABC$ and $\triangle EFG$ respectively. If $\triangle ABC \sim \triangle FEG$, show that :- $\frac{CD}{GH} = \frac{AC}{FG}$.

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38. 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 $\triangle ABC$ and $\triangle EFG$ respectively. If $\triangle ABC \sim \triangle FEG$, show that :- $\triangle DCB \sim \triangle HGE$.

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39. 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 $\triangle ABC$ and $\triangle EFG$ respectively. If $\triangle ABC \sim \triangle FEG$, show that :- $\triangle DCA \sim \triangle HGF$.

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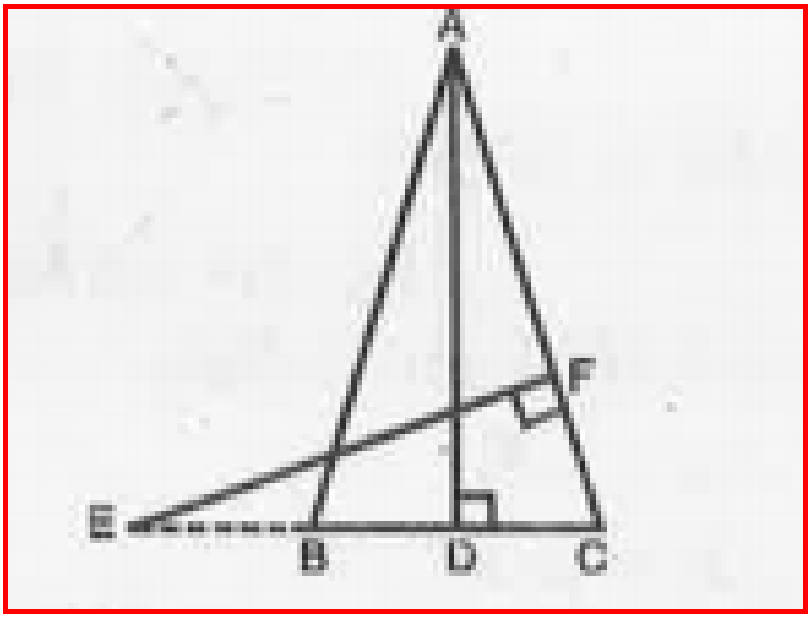
40. In Fig., E is a point on side CB produced of an isosceles triangle ABC with AB = AC. If AD $\perp$ BC and EF $\perp$ AC, prove that $\triangle ABD \sim \triangle ECF$.



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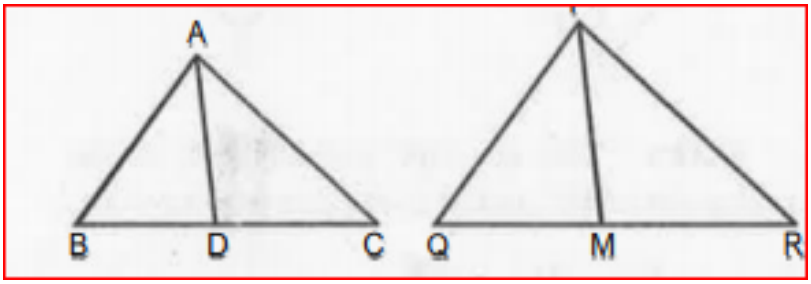
41. Sides AB and BC and median AD of a triangle ABC are respectively proportional to sides PQ and QR and median PM of

$\triangle PQR$ (see Fig.). Show that $\triangle ABC \sim \triangle PQR$.



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

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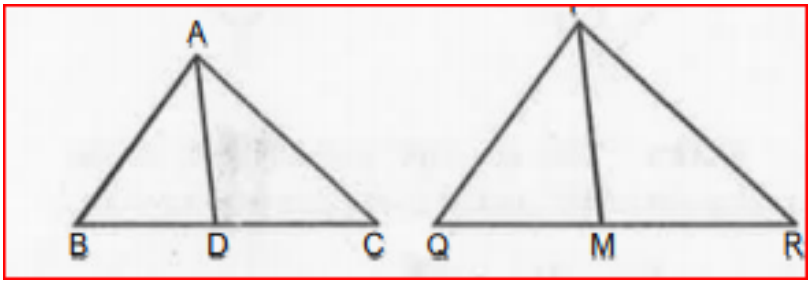
43. Sides AB and BC and median AD of a triangle ABC are respectively proportional to sides PQ and QR and median PM of

$\triangle PQR$ (see Fig.). Show that $\triangle ABC \sim \triangle PQR$.



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44. 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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45. If AD and PM are medians of triangles ABC and PQR, respectively where $\triangle ABC \sim \triangle PQR$, Prove that $\frac{AB}{PQ} = \frac{AD}{PM}$

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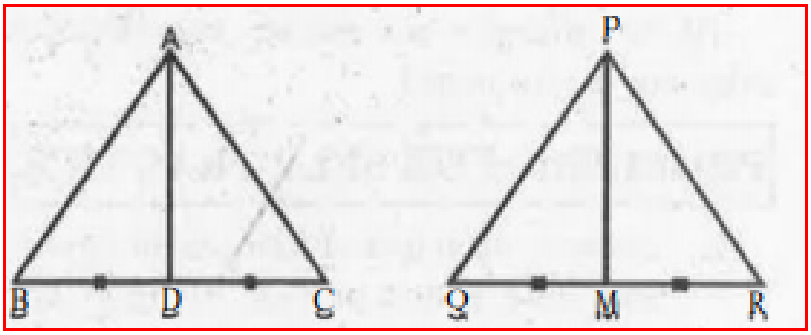

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46. Let $\Delta ABC \sim \Delta DEF$ and their areas be, respectively, 64 cm^2 and 121 cm^2. If EF = 15.4 cm, find BC.

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47. Diagonals of a trapezium ABCD with AB||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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48. In Fig, ABCand DBC are lwo triangles on the same base BC. If AD intersects BC at O,show that $\frac{ar(ABC)}{ar(DBC)} = \frac{AO}{DO}$.

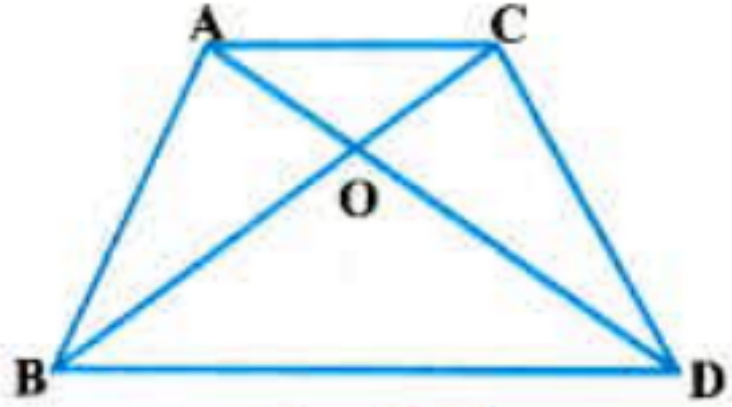

Fig. 6.44

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

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50. D, E and F are respectively the mid points of the sides BC, CA and AB of $\triangle ABC$. Determine the ratio of the areas of triangles DEF and ABC.

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51. 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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52. Prove that the areas of the equilateral triangle described on the side of a square is equal to half the area of the equilateral triangle described on one of its diagonal.

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53. Tick the correct answer and justify : 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:

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54. Tick the correct answer and justify : 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:

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55. 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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56. 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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57. 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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58. 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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59. PQR is a triangle right angled at P and M is a point on QR such that PM $\perp$ QR. Show that PM^2 = QM.MR.

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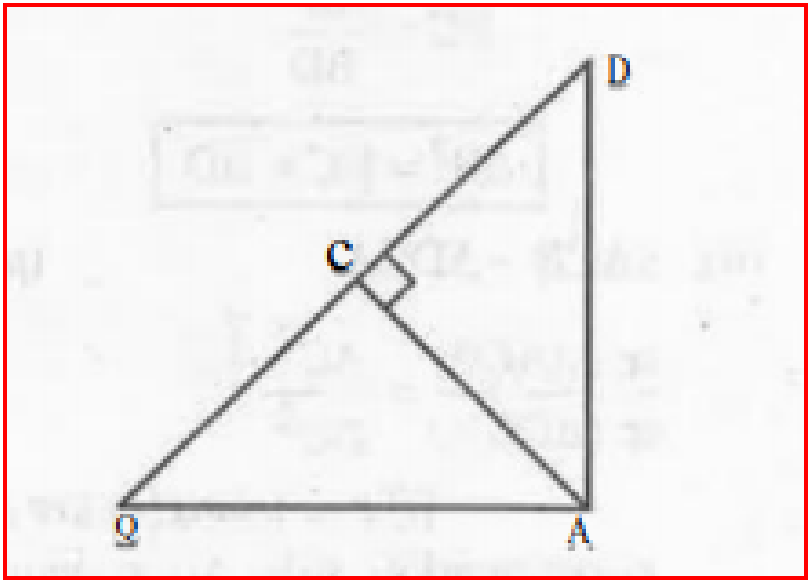
60. In fig., ABD is a triangle right angled at A and AC $\perp$ BD. Show that:- AB^2=BC.BD .



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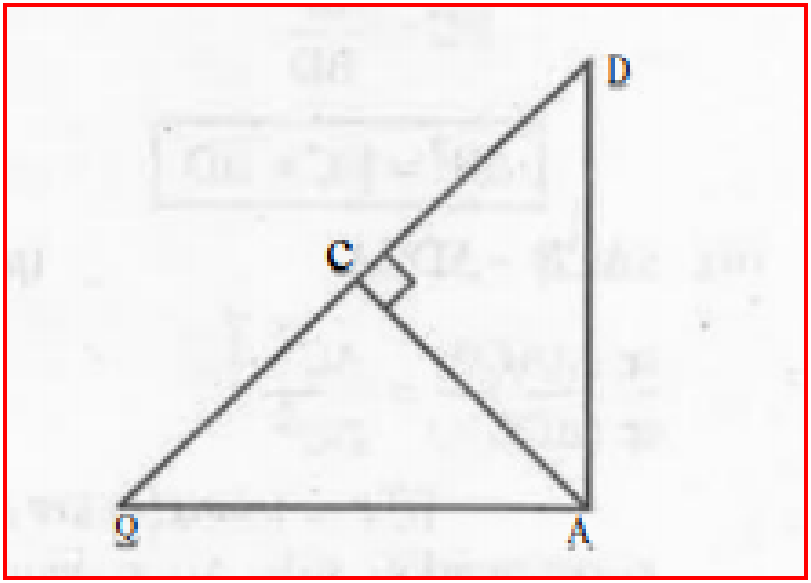
61. In fig., ABD is a triangle right angled at A and AC $\perp$ BD. Show that:- AC^2= BC.DC .



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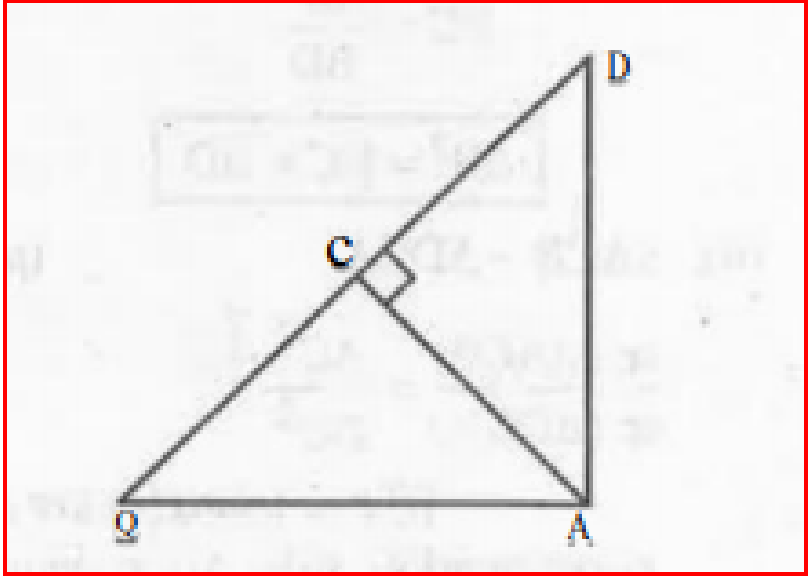
62. In fig., ABD is a triangle right angled at A and AC $\perp$ BD. Show that:- AD^2=BD.CD .



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

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

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65. ABC is an equilateral triangle ofside 2a. Find each of its altitudes.

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66. 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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67. In fig., O is a point in the interior of a triangle ABC, 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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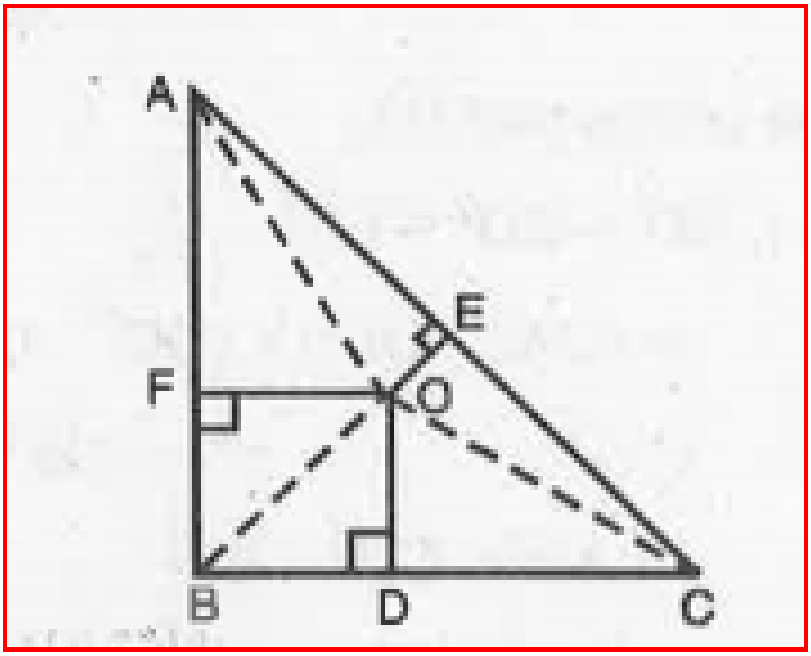

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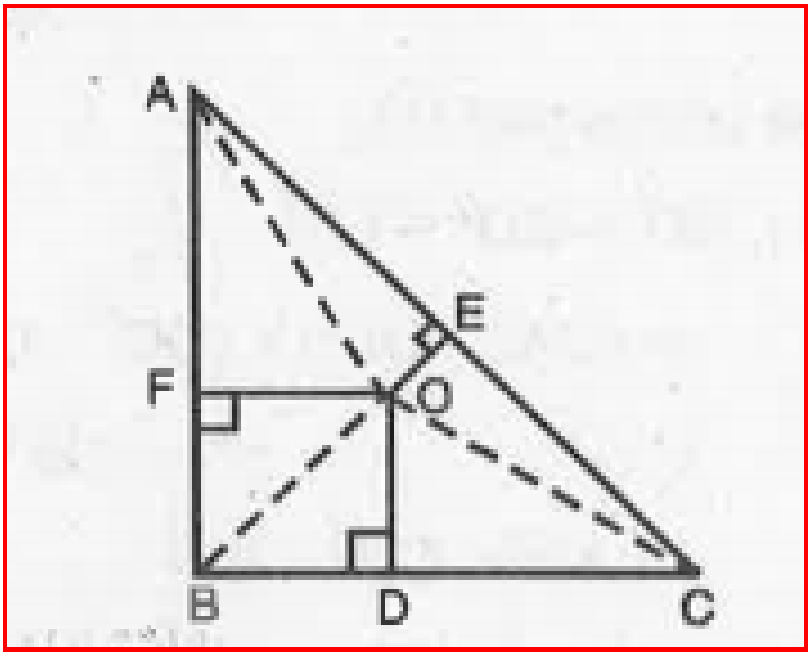
68. In fig., O is a point in the interior of a triangle ABC, OD $\perp$ BC, OE $\perp$ AC and OF $\perp$ AB. Show that:-

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



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69. 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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70. 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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71. An aeroplane leaves an airport and flies due north at a speed of 1000km 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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72. Two poles of heights 6 m and 11 m 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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73. D and E are points on the sides CA and CB respectively of a triangle ABC right angled at C. Prove that $AE^2 + BD^2 = AB^2 + DE^2$.

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74. The perpendicular from A on side BC of a ΔABC intersects BC at D such that DB =3CD (see Fig) Prove that

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

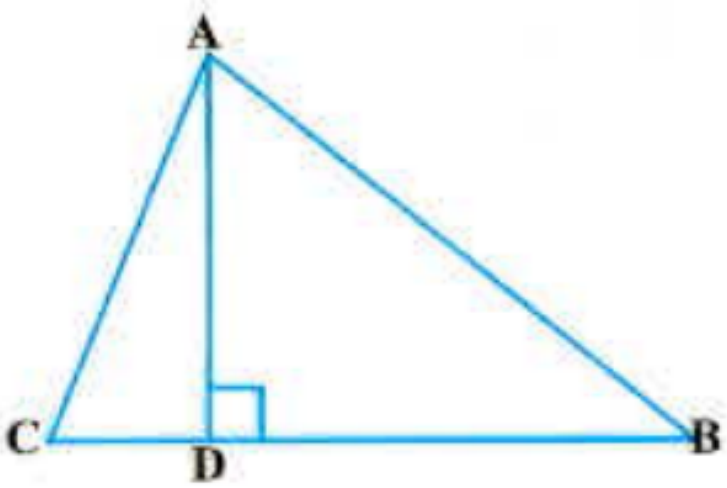

Fig. 6.55

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

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76. 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.

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

A. 120°

B. 60°

C. 90°

D. 45°

Answer:

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78. In Fig. 6.56, PS is the bisector of $\angle QPR$ of ΔPQR. Prove that

$$\frac{QS}{SR} = \frac{PQ}{PR}$$

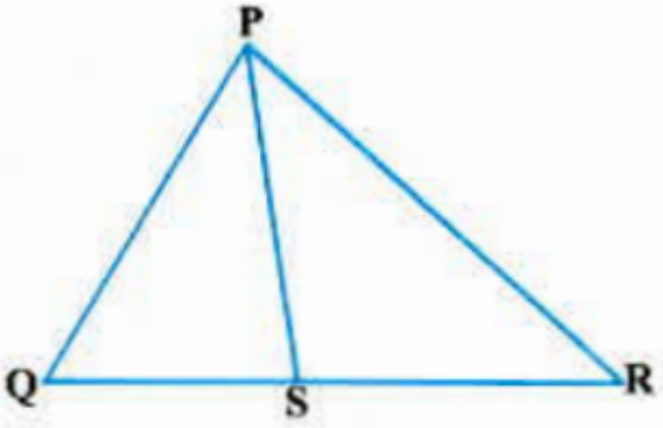

Fig. 6.56

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79. In Fig, D is a point on hypotenuse AC of ΔABC, such that $BD \perp AC$, $DM \perp BC$ and $DN \perp AB$.Prove that :-

$DM^2 = DN.MC$

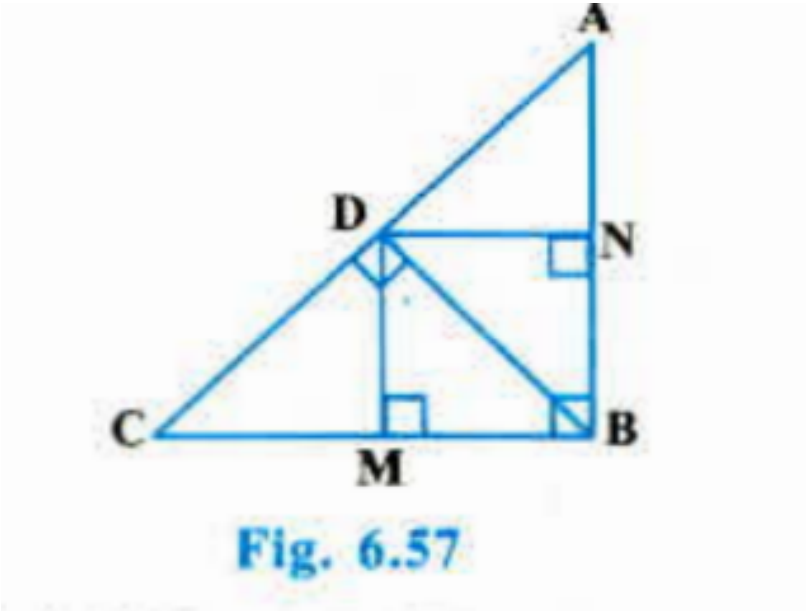

Fig. 6.57

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80. In Fig, D is a point on hypotenuse AC of ΔABC, such that $BD \perp AC$, $DM \perp BC$ and $DN \perp AB$.Prove that :-

$DN^2 = DM.\ AN$

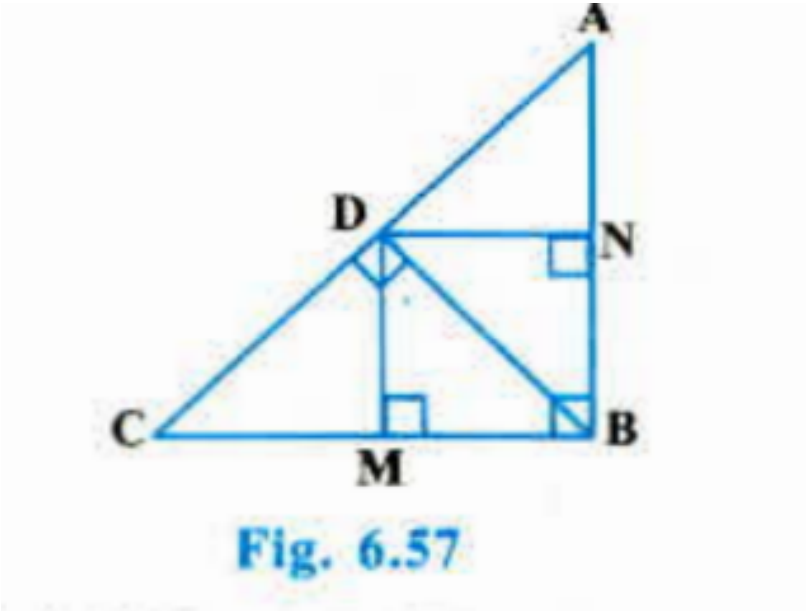

Fig. 6.57

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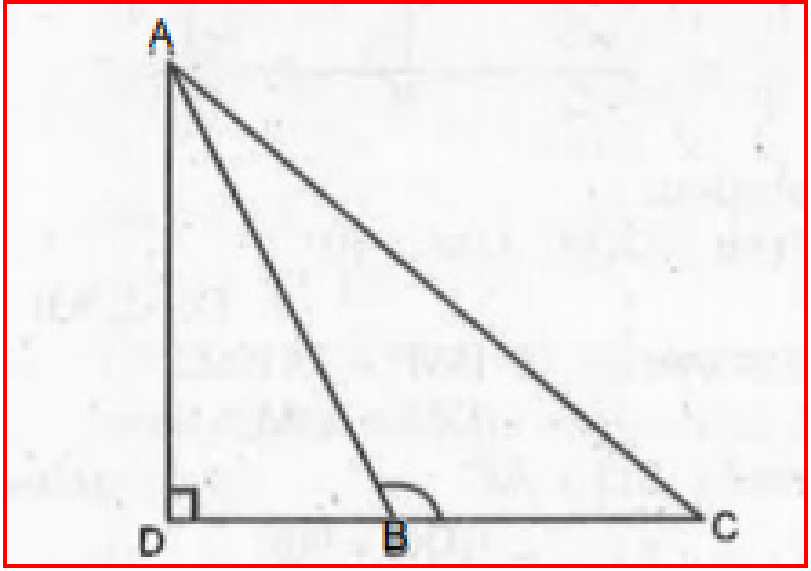
81. In fig., ABC is triangle in which $\angle ABC > 90 \circ 0$ and AD $\perp$ BC produced, prove that $AC^2 = AB^2 + BC^2 + 2BC.\ BD$.



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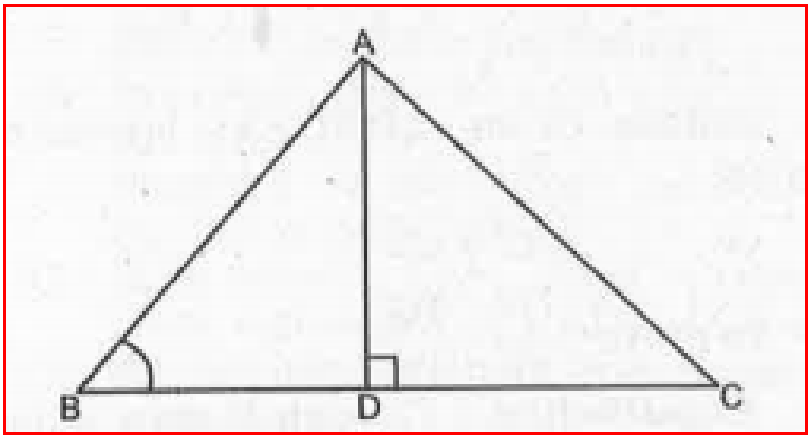
82. In fig., ABC is a triangle in which $\angle ABC < 90 \circ 0$, and $AD' \perp$ BC produced, prove that

$AC^2 = AB^2 + BC^2 - 2BC.\ BD$.



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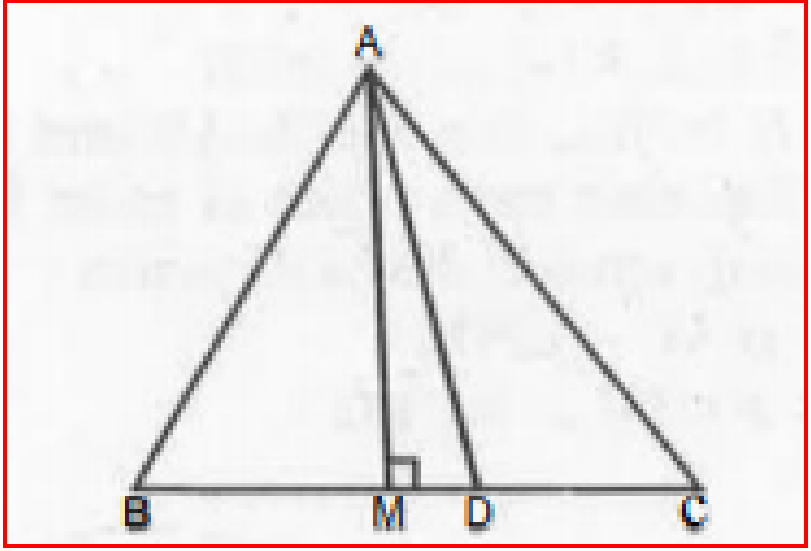
83. In fig., AD is a median of a triangle ABC and AM $\perp$ BC.Prove that :- $AC^2 = AD^2 + BC.\ DM + \left(\frac{BC}{2}\right)^2$.



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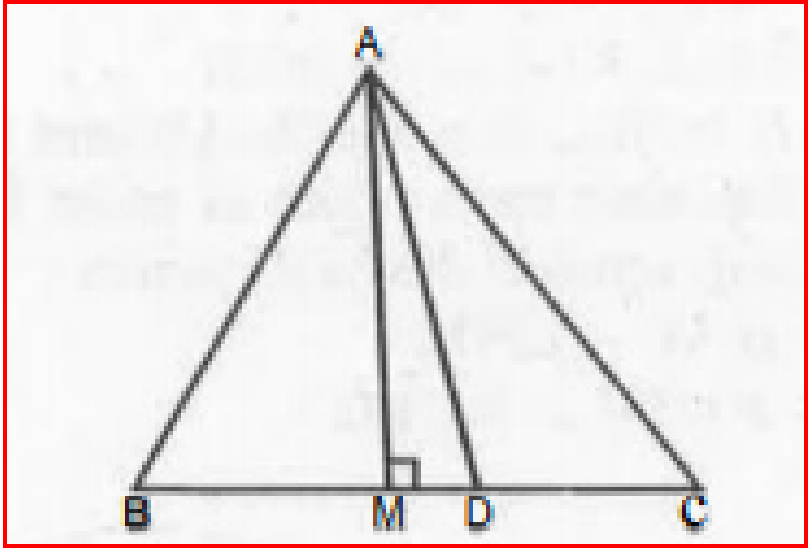
84. In fig., AD is a median of a triangle ABC and AM $\perp$ BC.Prove that :- $AB^2 = AD^2 - BC.DM + \left(\frac{BC}{2}\right)^2$.



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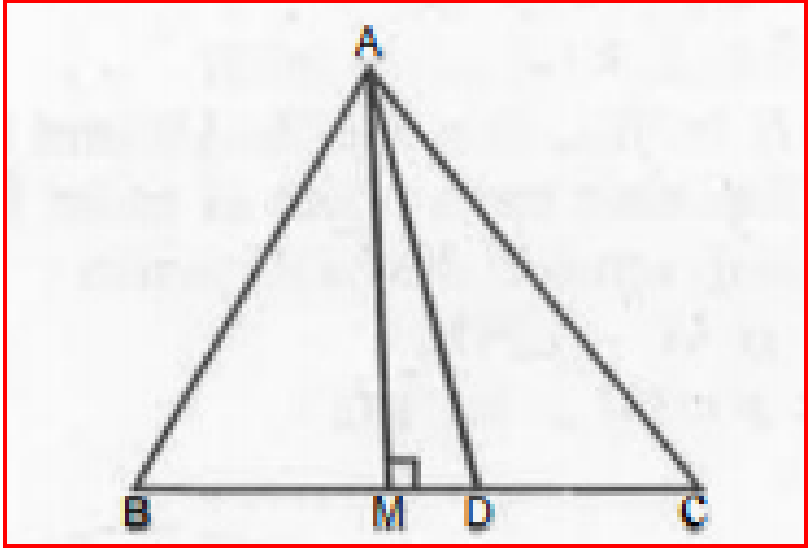
85. In fig., AD is a median of a triangle ABC and AM $\perp$ BC.Prove that :- $AC^2 + AB^2 = 2AD^2 + \frac{1}{2}BC^2$.



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

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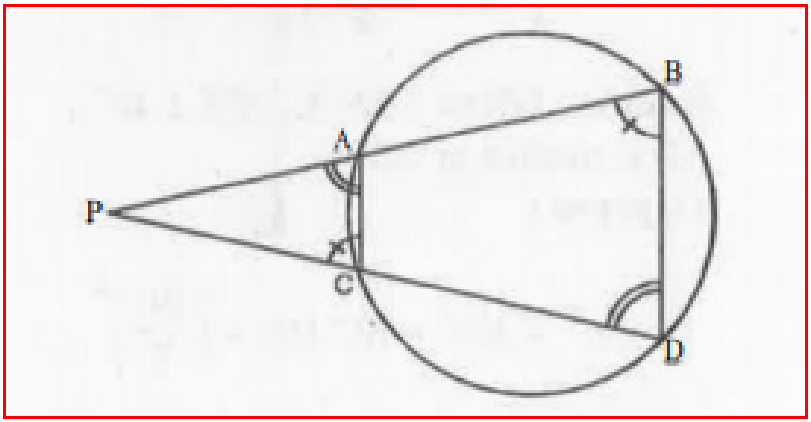
87. In fig., two chords AB and CD of a circle intersect each other at point P (when produced) outside the circle prove :-

$\triangle PCA \sim \triangle PDB$



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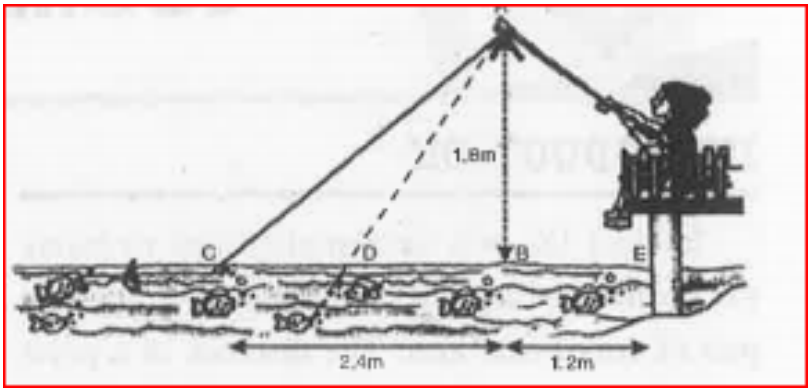
88. Nazima is fly fishing in a stream. The tip of her fishing rod is 1.8 m above the surface of the water and the fly at the end of the string rests on the water 3.6 m away and 2.4 m from a point directly under the tip of the rod. Assuming that her string (from the tip of her rod to the fly) is taut,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

seconds ?



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Example

1. if a line intersects sides AB and AC of a ΔABC at D and E respectively and is parallel to BC, prove that $\frac{AD}{AB} = \frac{AE}{AC}$ (see

Fig. 6,13).

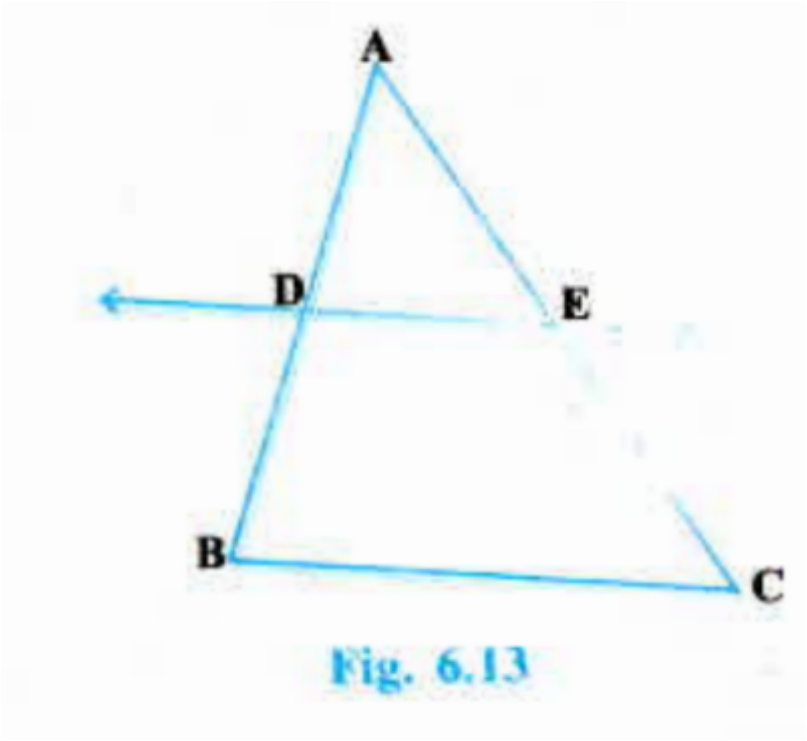

Fig. 6.13

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2. ABCD is a trapezium with AB II DC, E and F are paints on non-parallel sides AD and BC respectively such that EF is parallel to AB

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

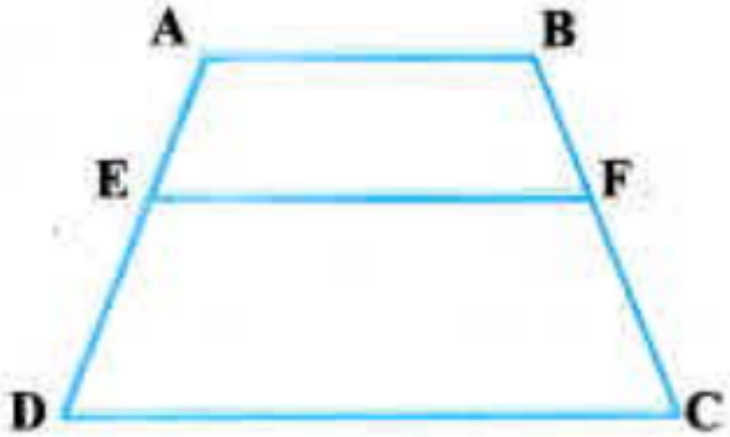

Fig. 6.14

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

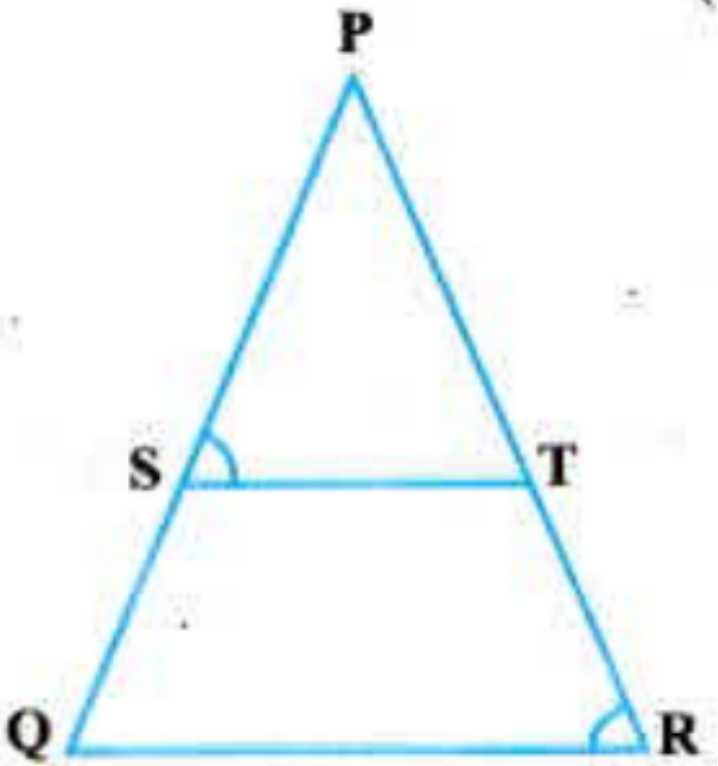

Fig. 6.16

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4. Observe Fig. 6.30 and then find $\angle P$.

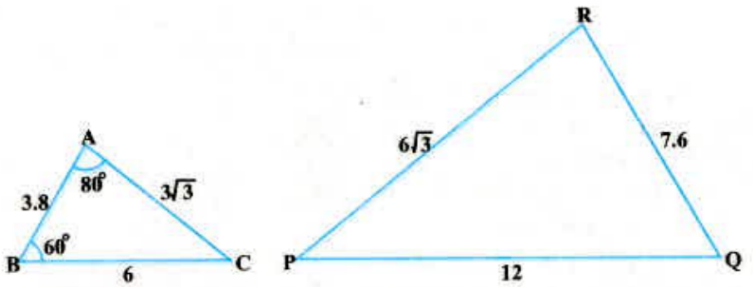

Fig. 6.30

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5. In Fig, OA . OB = OC . OD. Show that $\angle A = \angle C$ and $anl \geq B = \angle D$.

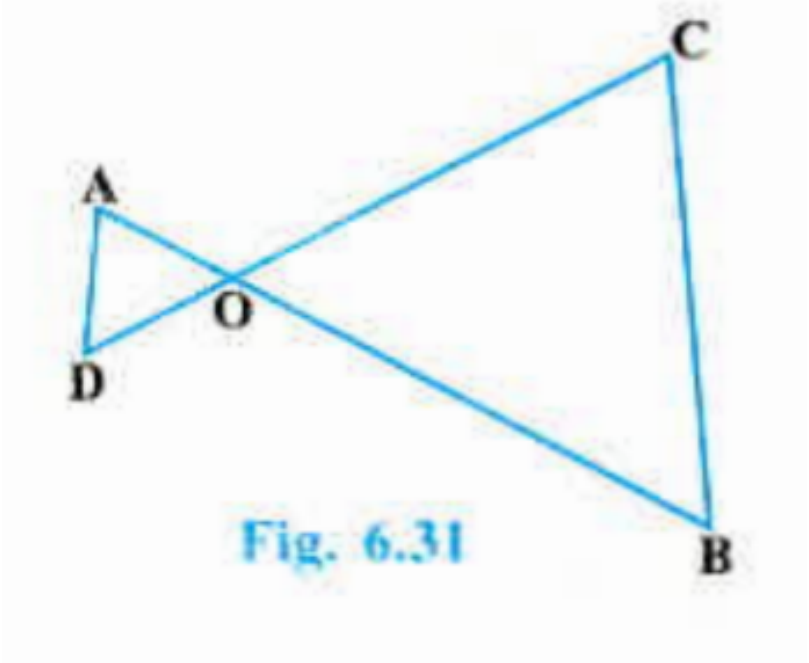

Fig. 6.31

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6. A girl of height 90cm cm is walking away from the base of a lamp-post at a speed of 1.2 m/s. If the lamp is 3.6 m above the

ground, find the length of her shadow after 4 seconds.

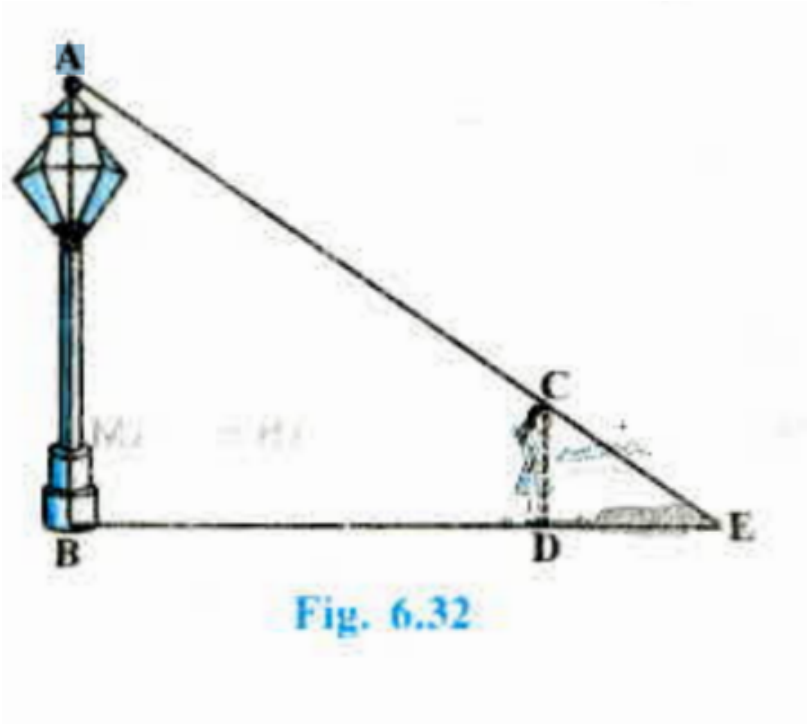

Fig. 6.32

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7. In Fig, the line segment XY is parallel to side AC of ΔABC and it divides the triangle into two parts of equal areas. Find the ratio

$\frac{AX}{AB}$.

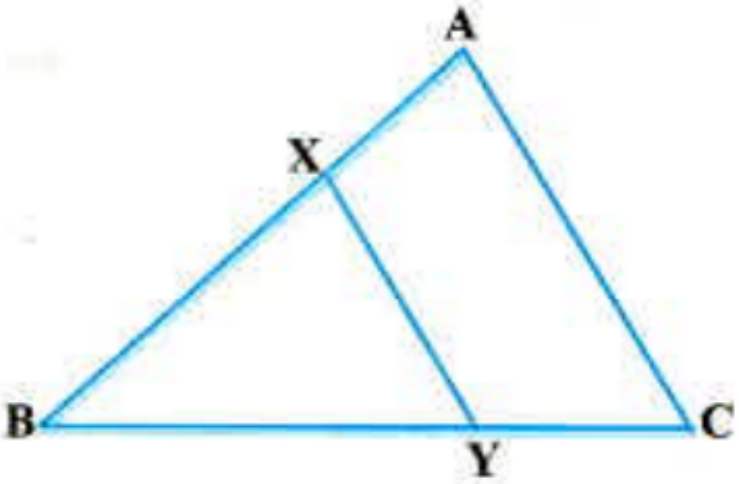

Fig. 6.43

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8. In Fig. 6.48, $\angle ACB = 90^\circ$ and $CD \perp AB$. Prove that $\frac{BC^2}{AC^2} = \frac{BD}{AD}$.

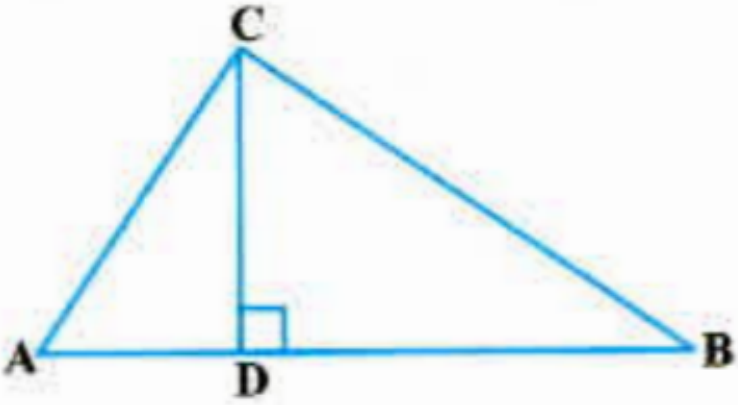

Fig. 6.48

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

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10. In Fig if $AD \perp BC$, prove that $AB^2 + CD^2 = BD^2 + AC^2$.

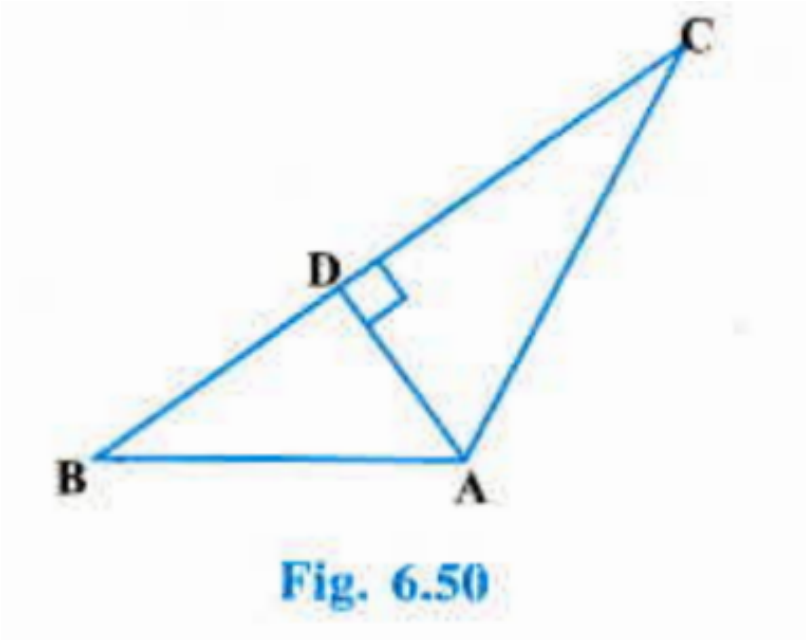

Fig. 6.50

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

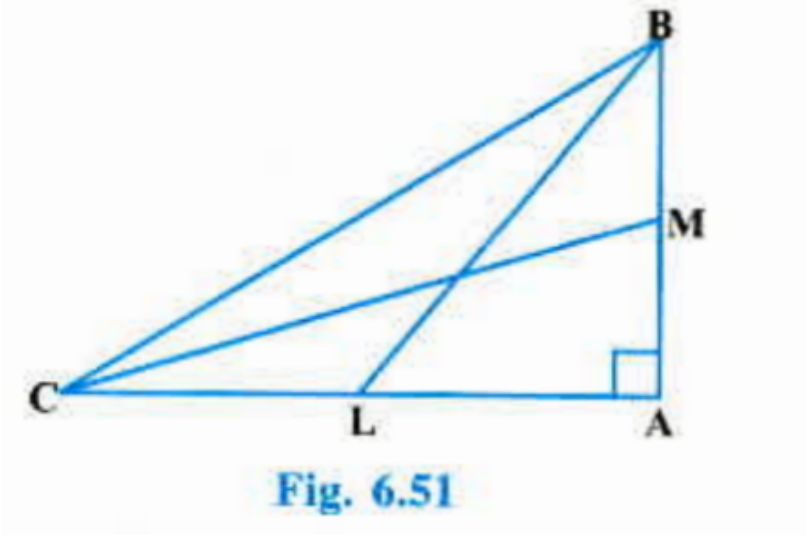

Fig. 6.51

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12. O is any point inside a rectangle ABCD (see Fig. 6.52). Prove that $OB^2 + OD^2 = OA^2 + OC^2$.

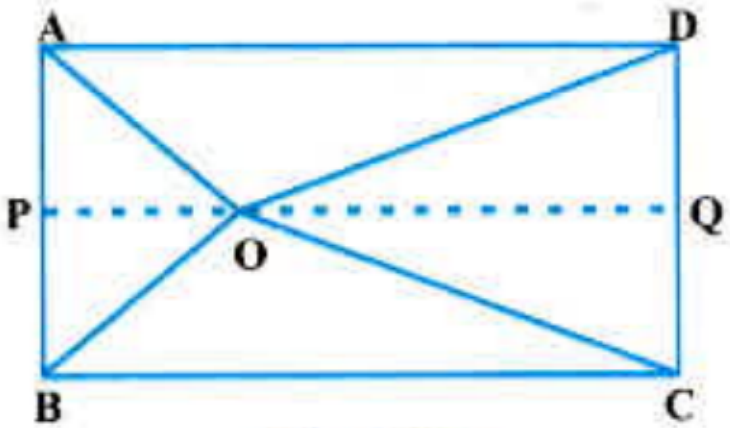

Fig. 6.52

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