



MATHS

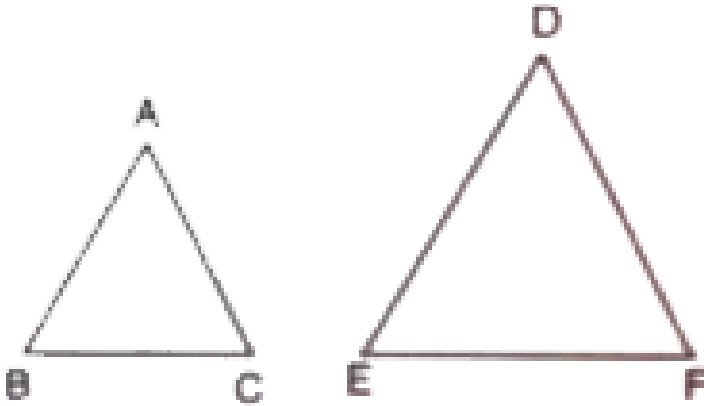
BOOKS - SELINA MATHS (ENGLISH)

SIMILARITY (WITH APPLICATIONS TO MAPS AND MODELS)

Questions

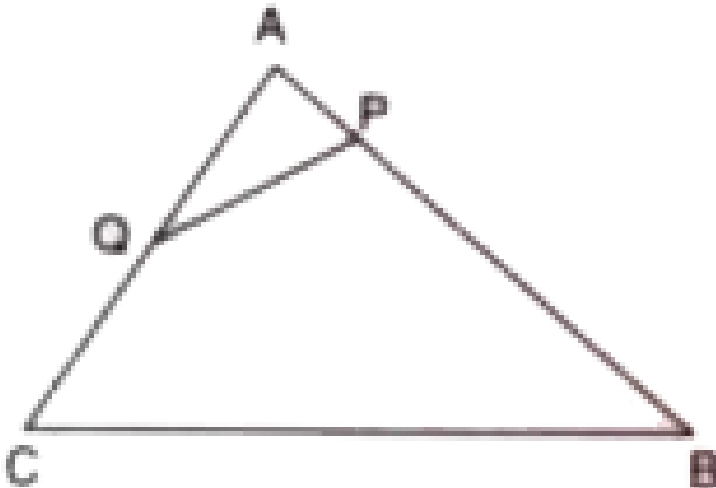
1. In the given figure, $\triangle ABC$ is similar to $\triangle DEF$, $AB = (x - 0.5)$ cm, $AC = 1.5x$ cm, $DE = 9$ cm, and $DF = 3x$ cm. Find the

lengths of AB and DF.



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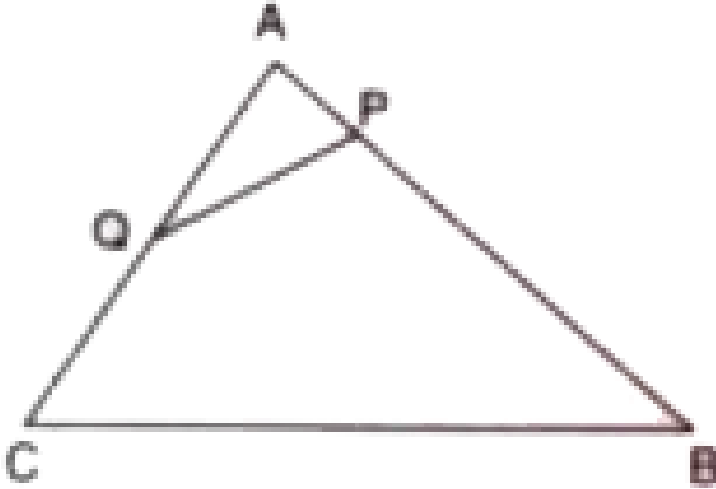
2. In the given figure, $AP = 8$ cm, $BP = 22$ cm, $AQ = 12$ cm and $QC = 8$ cm



Show that $\triangle APQ$ is similar to $\triangle ACB$.

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3. In the given figure, $AP = 8$ cm, $BP = 22$ cm, $AQ = 12$ cm and $QC = 8$ cm



If $PQ = 14$ cm, find BC .

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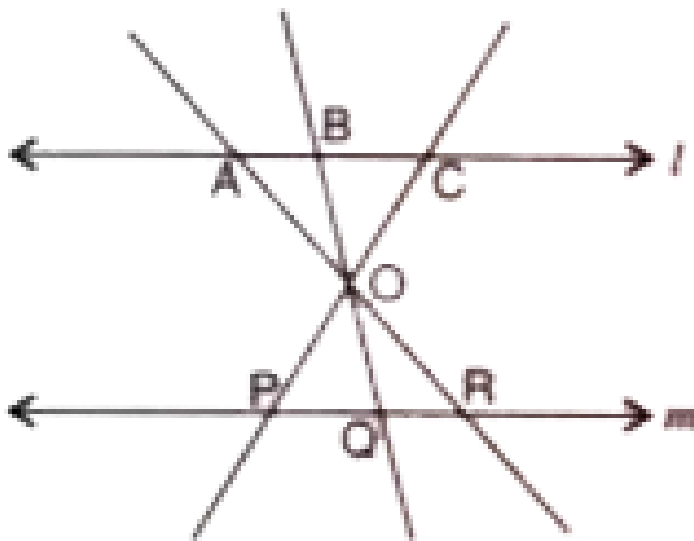
4. Theorem 6.7 : If a perpendicular is drawn from the vertex of the right angle of a right triangle to the hypotenuse then triangles on

both sides of the perpendicular are similar to the whole triangle and to each other.

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5. In the given figure, lines l and m are parallel. Three concurrent lines through point O meet line l at points A , B and C , and line m at points P , Q and R as shown. Prove that :

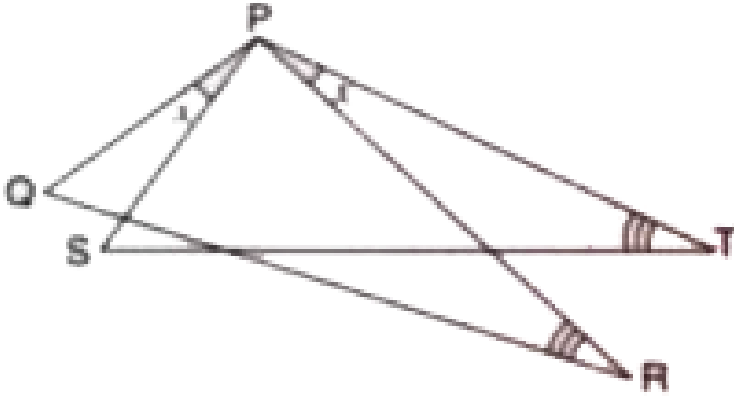
$$\frac{AB}{BC} = \frac{QR}{PQ}$$



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6. In the figure, given alongside, $\angle QPS = \angle RPT$

and $\angle PRQ = \angle PTS$.

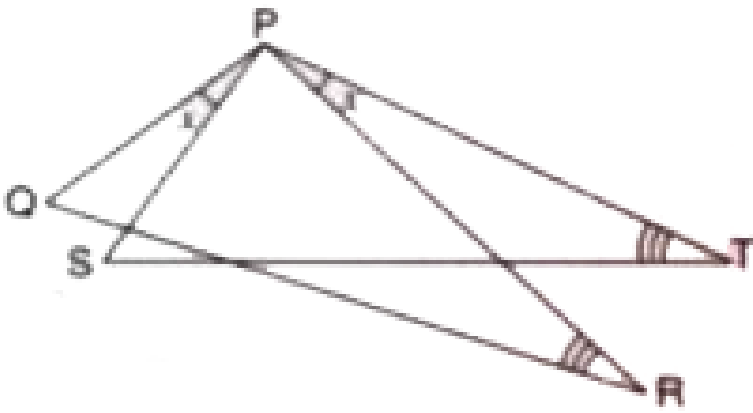


Prove that triangles PQR and PST are similar.

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7. In the figure, given alongside, $\angle QPS = \angle RPT$

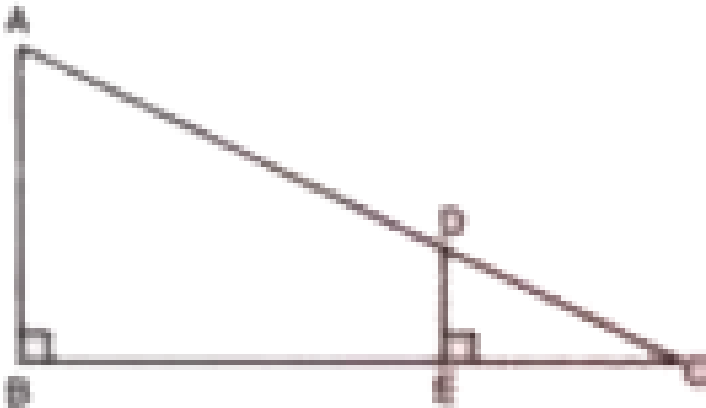
and $\angle PRQ = \angle PTS$.



If $PT : ST = 3:4$, find the ratio between $QR : PR$.

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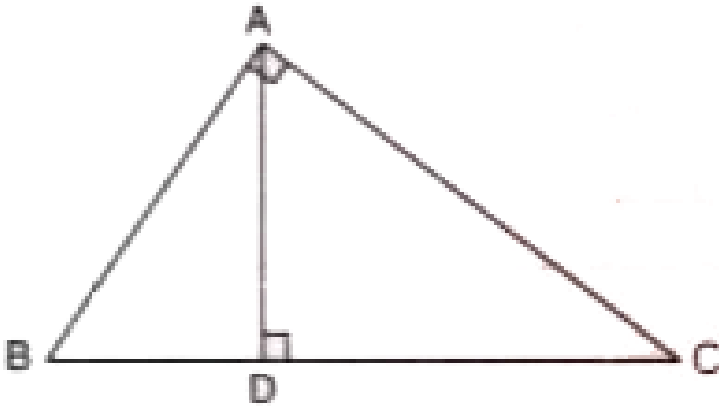
8. In the given figure, AB and DE are perpendiculars to BC . If $AB = 9$ cm, $DE = 3$ cm and $AC = 24$ cm, calculate AD .



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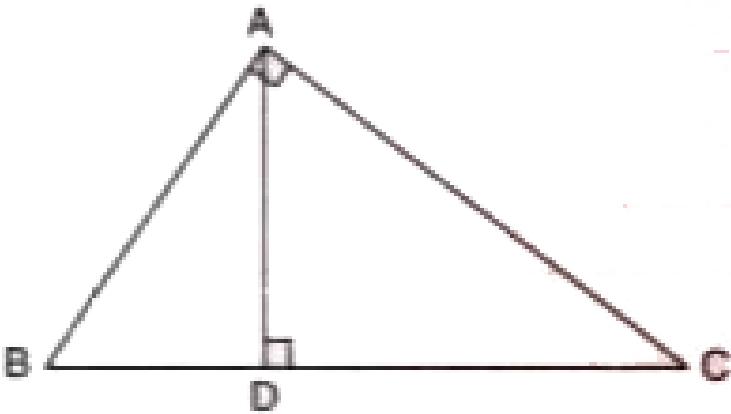
9. In the adjoining figure, ABC is a triangle right-angled at vertex A and AD is altitude.



Prove that : $\triangle ABD$ is similar to $\triangle CAD$.

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10. In the adjoining figure, ABC is a triangle right-angled at vertex A and AD is altitude.

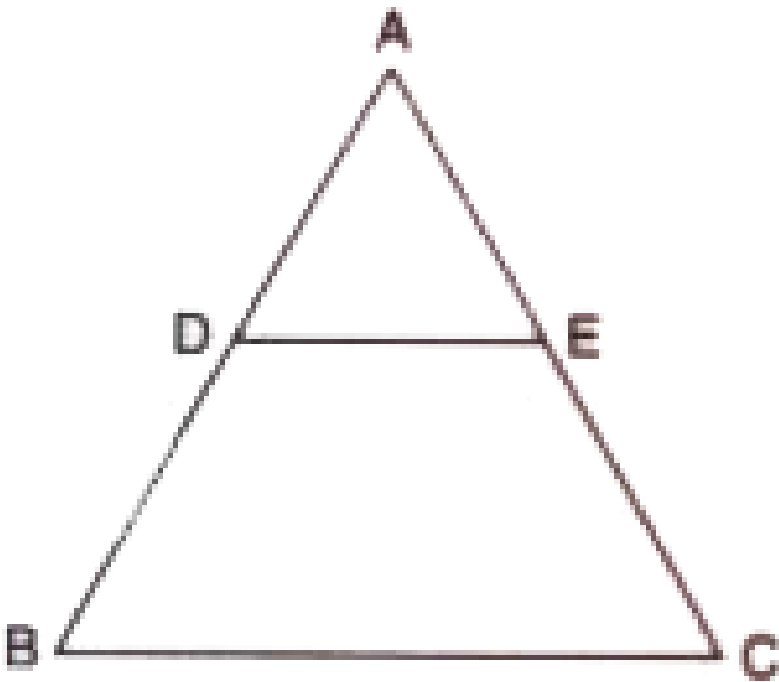


If $BD = 3.6$ cm and $CD = 6.4$ cm, find the length of AD .

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11. In the adjoining figure, $DE \parallel BC$ and D divides AB in the ratio $2 :$

3. Find :



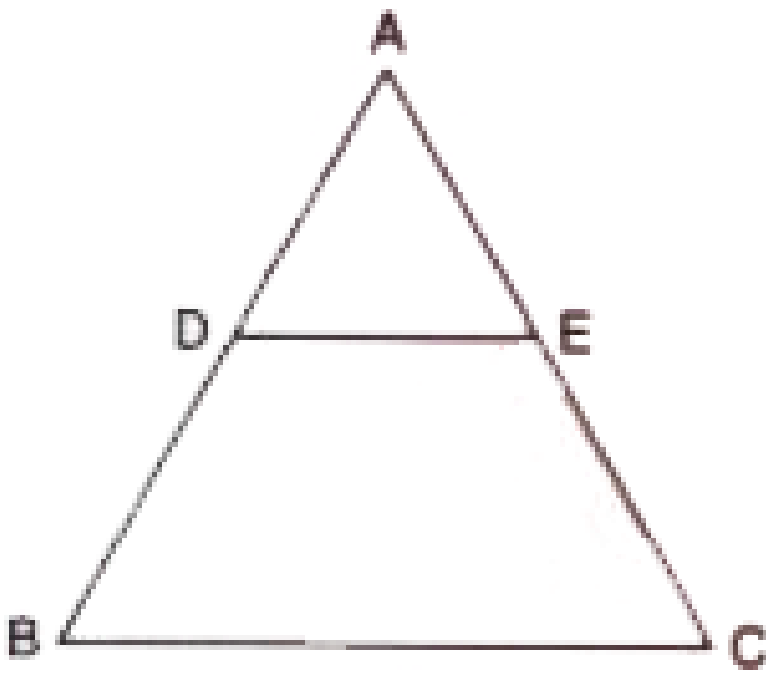
$$\frac{AE}{EC}$$



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12. In the adjoining figure, $DE \parallel BC$ and D divides AB in the ratio 2 :

3. Find :



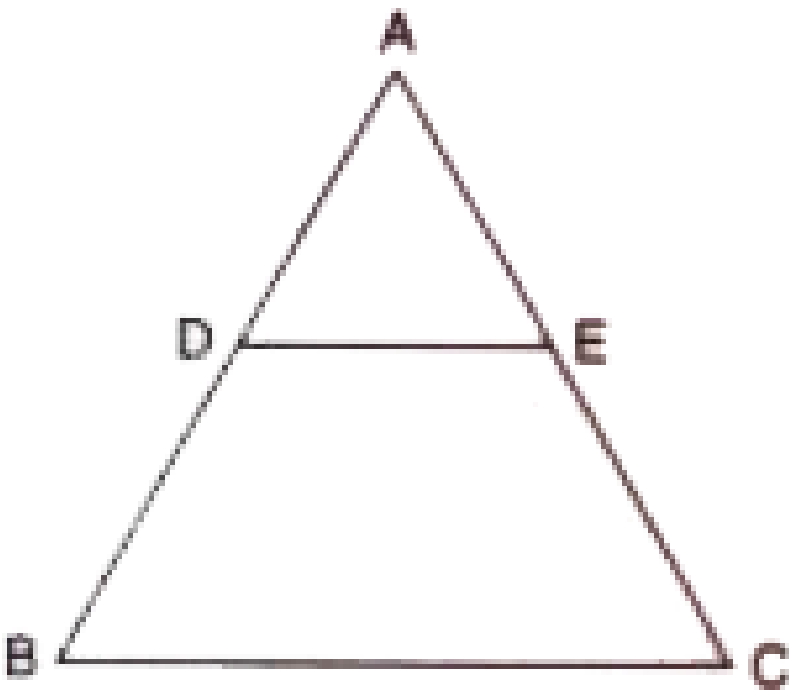
$$\frac{AE}{AC}$$



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13. In the adjoining figure, $DE \parallel BC$ and D divides AB in the ratio 2 :

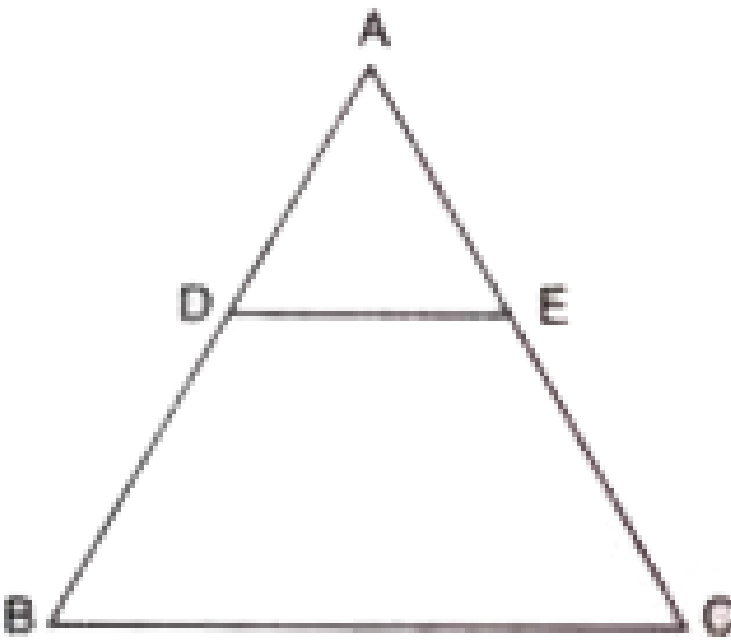
3. Find DE, if $BC = 7.5$ cm.



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14. In $\triangle ABC$, D and E are points on the sides AB and AC respectively.

Find whether $DE \parallel BC$, if :

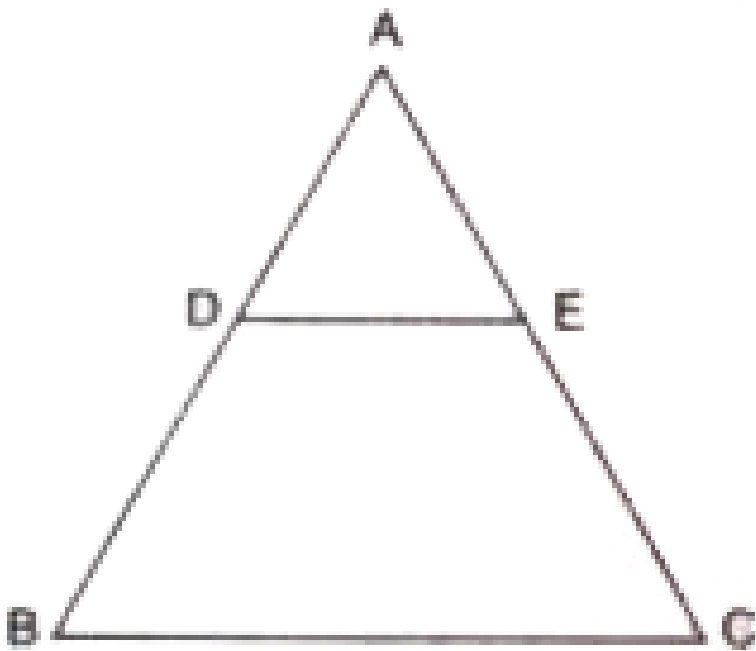


$AD = 3\text{cm}$, $BD = 4.5\text{cm}$, $AE = 4\text{cm}$ and $AC = 10\text{cm}$

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15. In $\triangle ABC$, D and E are points on the sides AB and AC respectively.

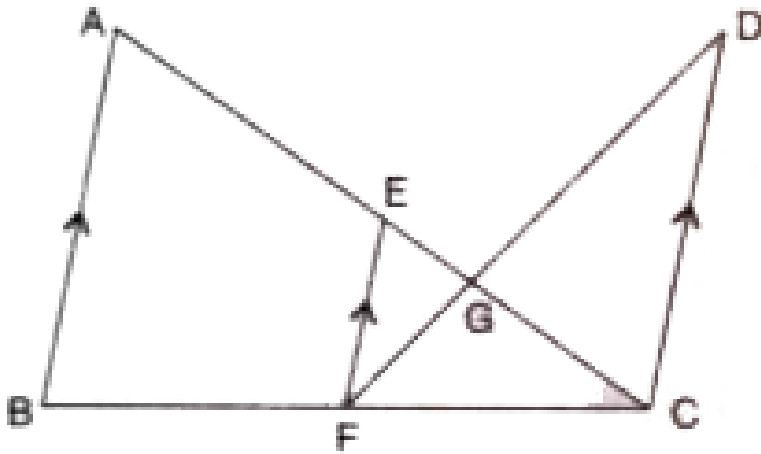
Find whether $DE \parallel BC$, if :



$AD = 7\text{cm}$, $BD = 45\text{cm}$, $AE = 35\text{cm}$ and $CE = 56\text{cm}$

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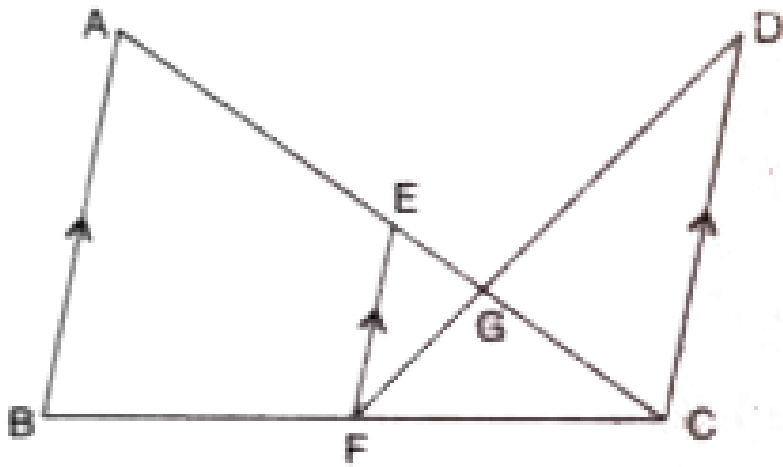
16. In the given figure, $AB \parallel EF \parallel CD$. Given that $AB = 7.5\text{ cm}$, $EG = 2.5\text{ cm}$, $GC = 5\text{ cm}$ and $DC = 9\text{ cm}$. Calculate :



EF

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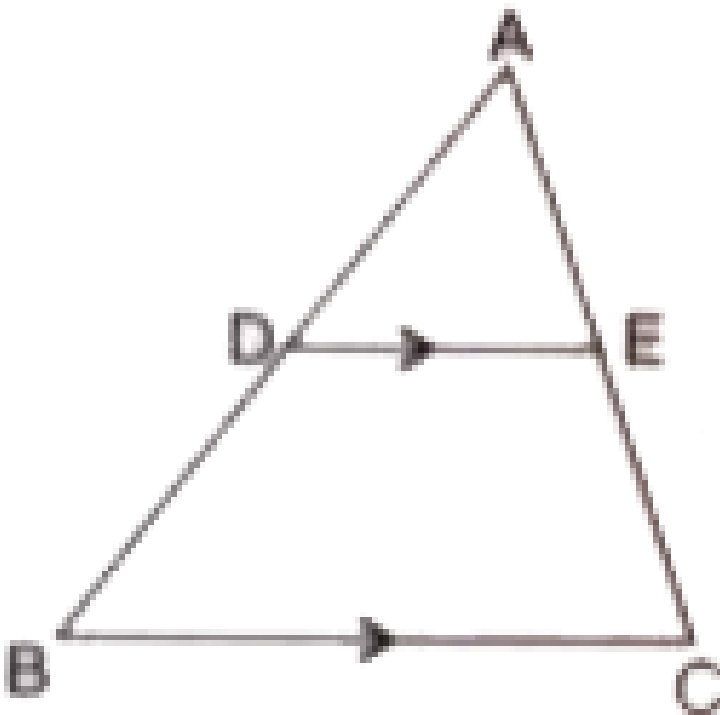
17. In the given figure, $AB \parallel EF \parallel CD$. Given that $AB = 7.5$ cm, $EG = 2.5$ cm, $GC = 5$ cm and $DC = 9$ cm. Calculate :



AC.

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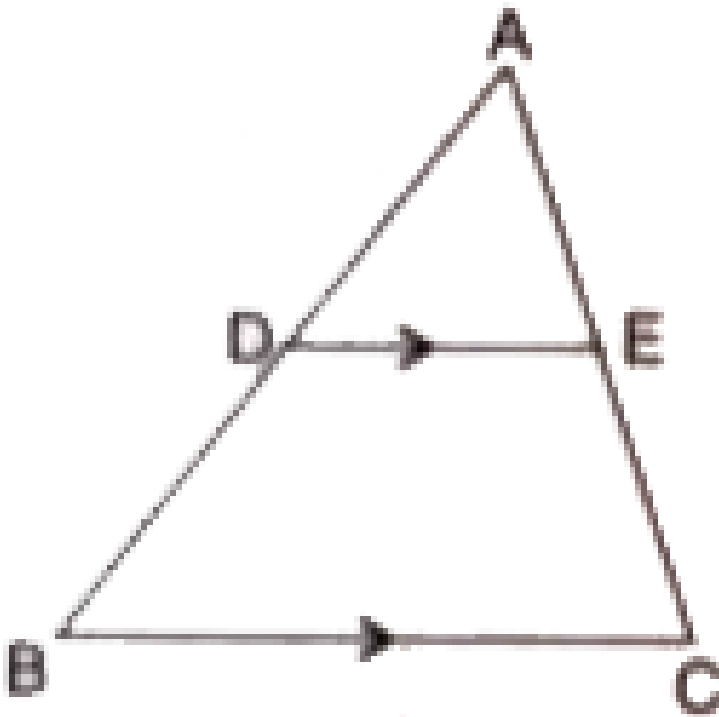
18. In the given figure, $DE \parallel BC$.



Prove that $\triangle ADE$ and $\triangle ABC$ are similar

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19. In the given figure, $DE \parallel BC$.

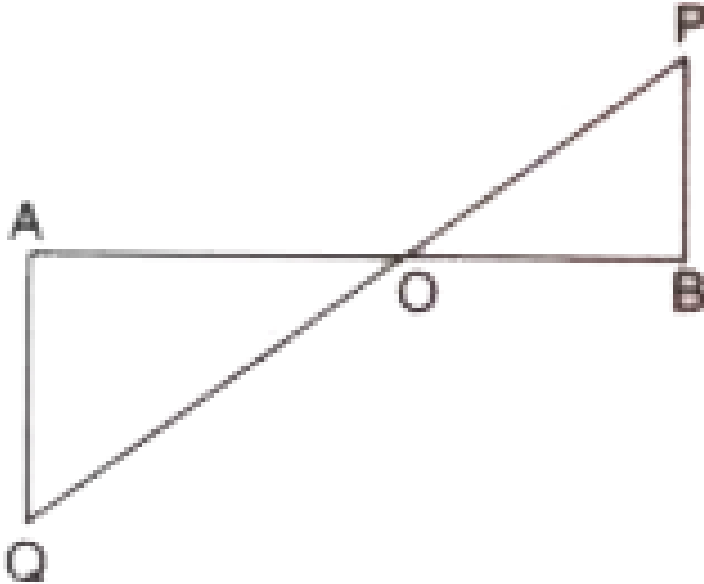


Given that $AD = \frac{1}{2}BD$, calculate DE, if $BC = 45$ cm.

Also, find $\frac{Ar. (\triangle ADE)}{Ar. (\triangle ABC)}$ and $\frac{Ar. (\triangle ADE)}{Ar. (\text{trapezium BCED})}$

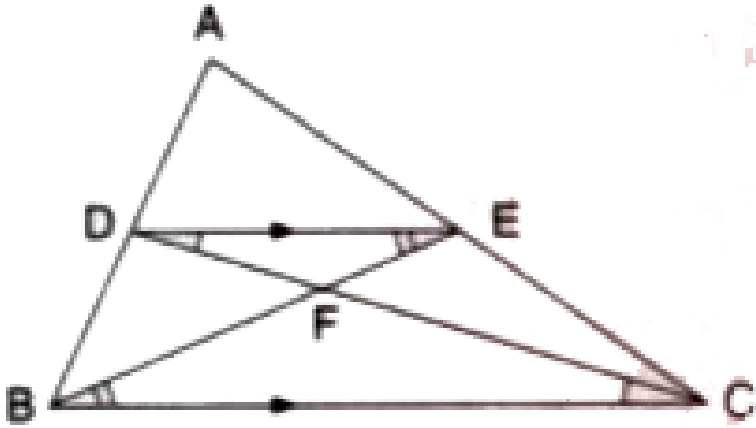
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20. In the figure, given alongside, PB and QA are perpendiculars to the line segment AB. If $PO = 6$ cm, $QO = 9$ cm and area of $\Delta POB = 120\text{cm}^2$. find the area of ΔQOA .



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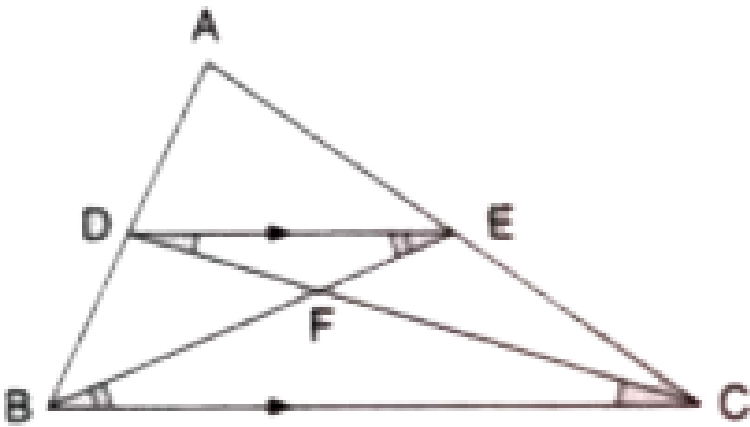
21. In the given figure, DE is parallel to the base BC of triangle ABC and $AD:DB = 5:3$. Find the ratio :



$\frac{AD}{AB}$ and then $\frac{DE}{BC}$

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22. In the given figure, DE is parallel to the base BC of triangle ABC and AD: DB = 5: 4. Find the ratio :

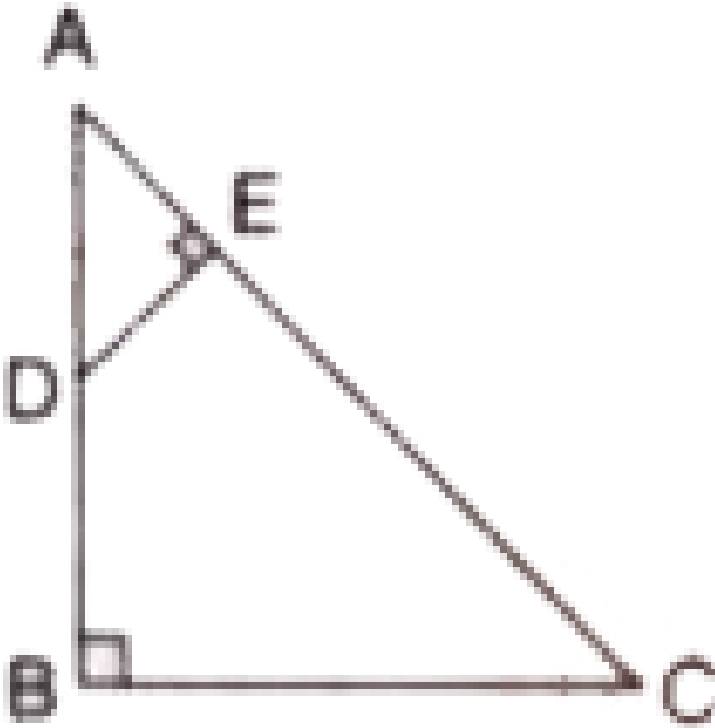


$$\frac{\text{Area of } \triangle DEF}{\text{Area of } \triangle BFC}$$

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23. In $\triangle ABC$, $\angle B = 90^\circ$, $AB = 12\text{cm}$ and $AC = 15\text{cm}$. D and E are points on AB and AC respectively such that $\angle AED = 90^\circ$ and DE

= 3 cm. Calculate the area of $\triangle ABC$ and then the area of $\triangle ADE$.



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24. A model of a ship is made to a scale of 1:200. If the length of the model is 4 m, calculate the length of the ship.

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25. The scale of map is 1 : 50,000. In the map, a triangular plot ABC of land has the following dimensions :

$$AB = 2\text{cm}, BC = 3.5\text{cm} \text{ and angle } ABC = 90^\circ.$$

Calculate : the actual length of side BC, in km, of the land.

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26. The scale of map is 1 : 50,000. In the map, a triangular plot ABC of land has the following dimensions :

$$AB = 2\text{cm}, BC = 3 - 5\text{cm} \text{ and angle } ABC = 90^\circ.$$

Calculate : the area of the plot in sq. km.

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27. A rectangular tank has length = 4 m, width = 3 m and capacity = 30m^3 . A small model of the tank is made with capacity 240cm^3 . Find : the dimensions of the model.



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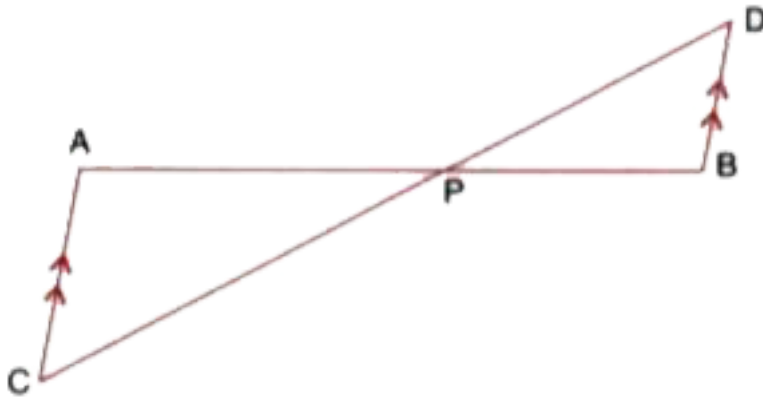
28. A rectangular tank has length = 4 m, width = 3 m and capacity = $30m^3$. A small model of the tank is made with capacity $240cm^3$. Find :
the ratio between the total surface area of the tank and its model.



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Exercise 15 A

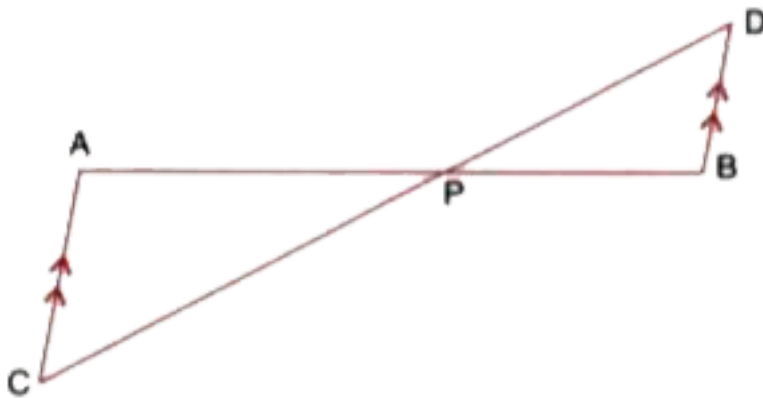
1. In the figure, given below, straight lines AB and CD intersect at P, and $AC \parallel BD$. Prove that :



$\triangle APC$ and $\triangle BPD$ are similar.

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2. In the figure, given below, straight lines AB and CD intersect at P , and $AC \parallel BD$.



If $BD = 2.4$ cm, $AC = 3.6$ cm, $PD = 4.0$ cm and $PB = 3.2$ cm, find the lengths of PA and PC .

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3. In a trapezium $ABCD$, side AB is parallel to side DC , and the diagonals AC and BD intersect each other at point P . Prove that :

$\triangle APB$ is similar to $\triangle CPD$.

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4. In a trapezium $ABCD$, side AB is parallel to side DC , and the diagonals AC and BD intersect each other at point P . Prove that :

$PA \times PD = PB \times PC$.

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5. P is a point on side BC of a parallelogram ABCD. If DP produced meets AB produced at point L, prove that :

$$DP:PL = DC:BL.$$



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6. P is a point on side BC of a parallelogram ABCD. If DP produced meets AB produced at point L, prove that :

$$DL:DP = AL:DC$$



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7. In quadrilateral ABCD, the diagonals AC and BD intersect each other at point O.

If $AO = 2CO$ and $BO = 2DO$, show that:

$\triangle AOB$ is similar to $\triangle COD$.



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8. In quadrilateral ABCD, the diagonals AC and BD intersect each other at point O.

If $AO = 2CO$ and $BO = 2DO$, show that:

$$OA \times OD = OB \times OC.$$

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9. In $\triangle ABC$, angle ABC is equal to twice the angle ACB, and bisector of angle ABC meets the opposite side at point P. Show that :

$$CB:BA = CP:PA$$

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10. In $\triangle ABC$, angle ABC is equal to twice the angle ACB, and bisector of angle ABC meets the opposite side at point P. Show that :

$$AB \times BC = BP \times CA$$



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11. In $\triangle ABC$, $BM \perp AC$ and $CN \perp AB$, show that :

$$\frac{AB}{AC} = \frac{BM}{CN} = \frac{AM}{AN}$$

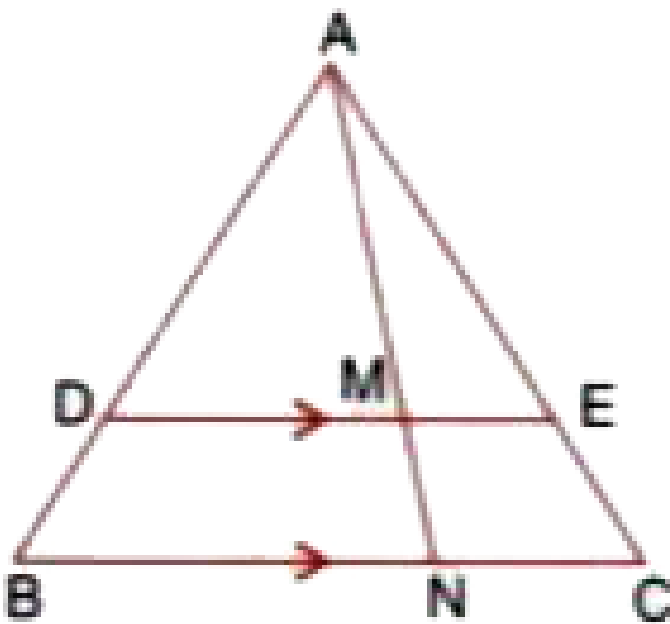


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12. In the given figure,

$DE \parallel BC$, $AE = 15\text{cm}$, $EC = 9\text{cm}$, $NC = 6\text{cm}$ and $BN = 24\text{cm}$

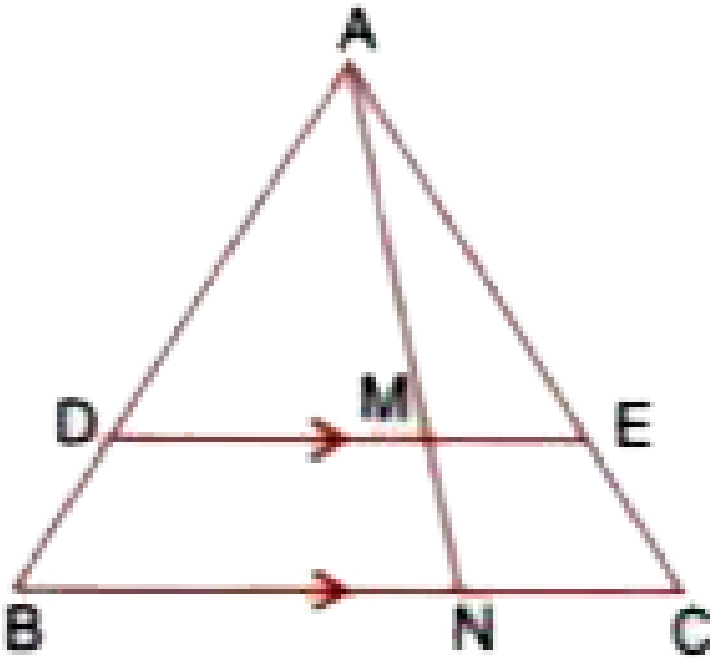
.



Write all possible pairs of similar triangles.

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13. In the given figure, $DE \parallel BC$, $AE = 15\text{cm}$, $EC = 9\text{cm}$, $NC = 6\text{cm}$ and $BN = 24\text{cm}$.

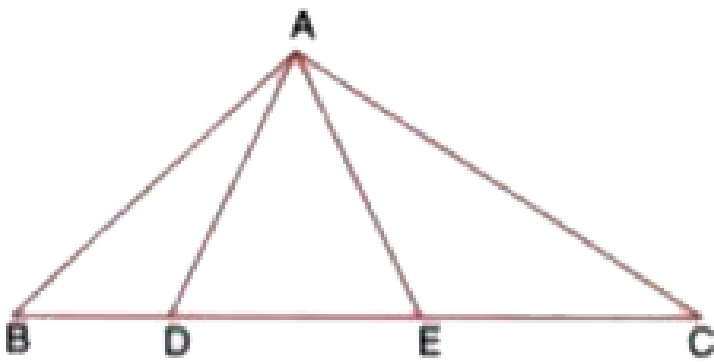


Find lengths of ME and DM.

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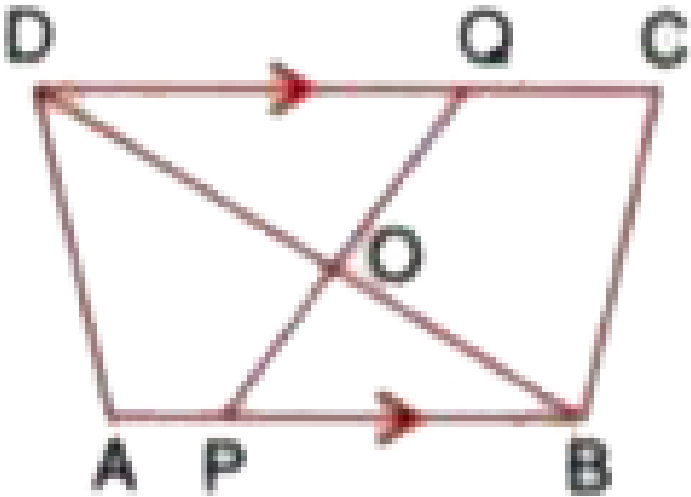
14. In the given figure, $AD = AE$ and $AD^2 = BD \times EC$.

Prove that : triangles ABD and CAE are similar.



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15. In the given figure, $AB \parallel DC$, $BO = 6\text{cm}$ and $DQ = 8\text{cm}$, find:
 $BP \times DO$.



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16. Angle BAC of triangle ABC is obtuse and $AB = AC$. P is a point in BC such that $PC = 12$ cm. PQ and PR are perpendiculars to sides AB and AC respectively. If $PQ = 15$ cm and $PR = 9$ cm, find the length of PB.

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17. State, true or false :

Two similar polygons are necessarily congruent.

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18. State, true or false :

Two congruent polygons are necessarily similar.

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19. State, true or false :

All equiangular triangles are similar.

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20. State, true or false :

All isosceles triangles are similar.

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21. State, true or false :

Two isosceles-right triangles are similar.

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22. State, true or false :

Two isosceles triangles are similar, if an angle of one is congruent to

the corresponding angle of the other.



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23. State, true or false :

The diagonals of a trapezium divide each other into proportional segments.

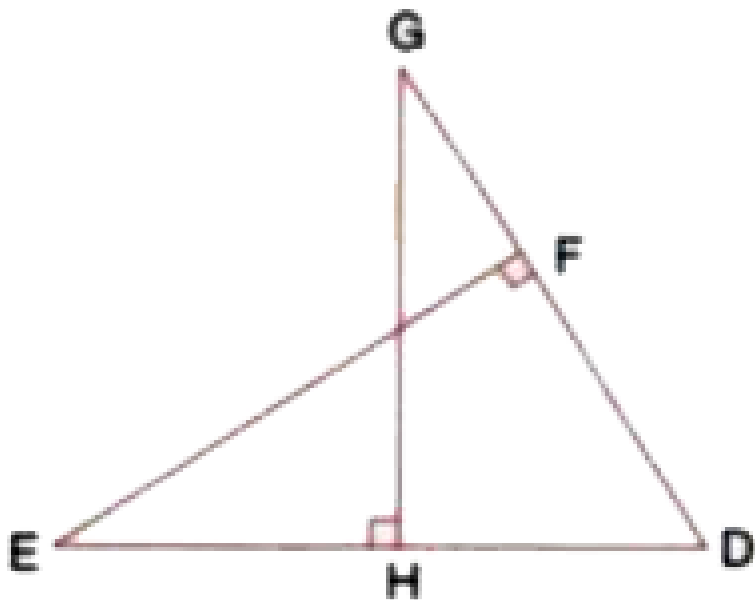


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24. Given : $\angle GHE = \angle DFE = 90^\circ$,

$$DH = 8, DF = 12,$$

$$DG = 3x - 1 \text{ and } DE = 4x + 2.$$



Find : the lengths of segments DG and DE.

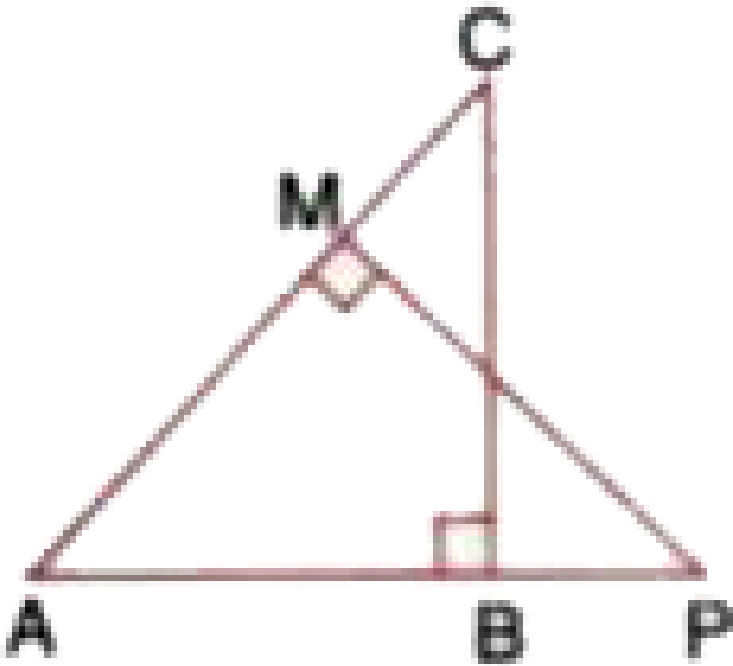
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25. D is a point on the side BC of a triangle ABC such that $\angle ADC = \angle BAC$. Show that $CA^2 = CB \cdot CD$.

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26. In the given figure, $\triangle ABC$ and $\triangle AMP$ are right angled at B and M respectively.

Given $AC = 10\text{cm}$, $AP = 15\text{cm}$ and $PM = 12\text{cm}$.

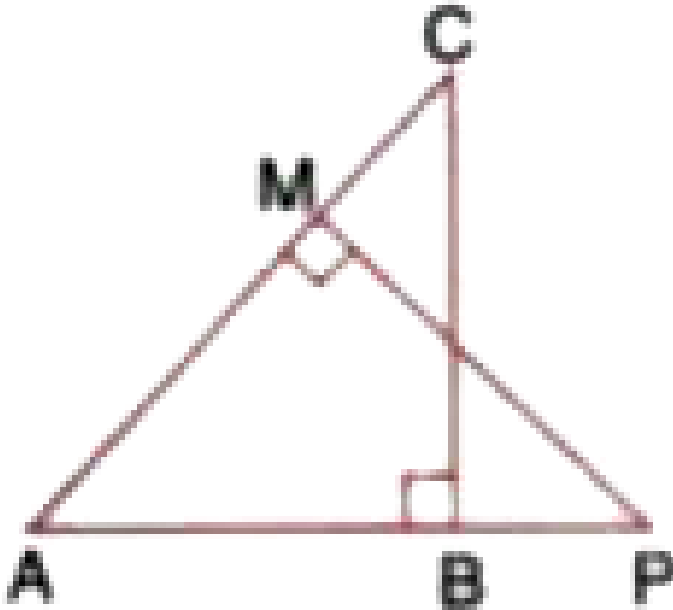


Prove that : $\triangle ABC \sim \triangle AMP$

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27. In the given figure, $\triangle ABC$ and $\triangle AMP$ are right angled at B and M respectively.

Given $AC = 10\text{cm}$, $AP = 15\text{cm}$ and $PM = 12\text{cm}$.



Find : AB and BC.

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28. Given : RS and PT are altitudes of $\triangle PQR$. Prove that:

$\triangle PQT \sim \triangle QRS$.

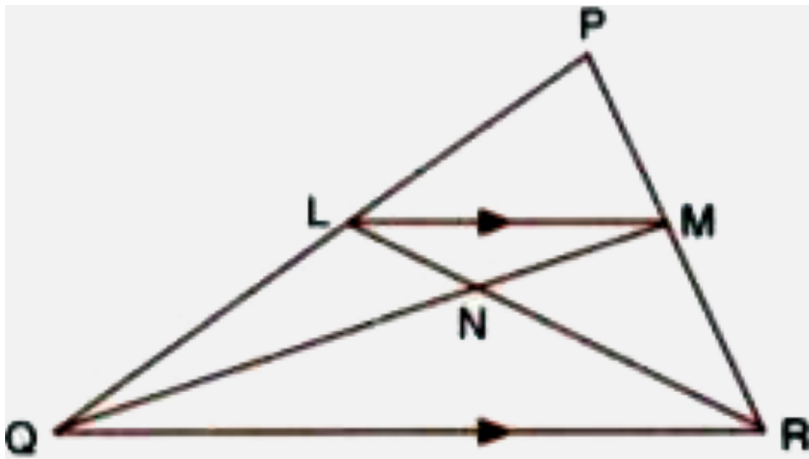
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29. Given : RS and PT are altitudes of $\triangle PQR$. Prove that:

$$PQ \times QS = RQ \times QT.$$

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30. Given : ABCD is a rhombus, DPR and CBR are straight lines.

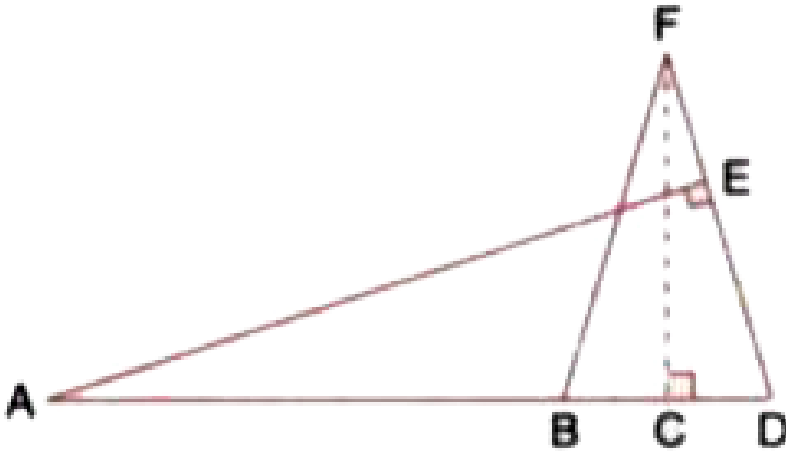


Prove that : $DP \times CR = DC \times PR$.

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31. Given : $FB = FD$, $AE \perp FD$ and $FC \perp AD$.

Prove that : $\frac{FB}{AD} = \frac{BC}{ED}$



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32. In $\triangle PQR$, $\angle Q = 90^\circ$ and QM is perpendicular to PR . Prove that :

$$PQ^2 = PM \times PR$$

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33. In $\triangle PQR$, $\angle Q = 90^\circ$ and QM is perpendicular to PR . Prove that :

$$QR^2 = PR \times MR$$

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34. In $\triangle PQR$, $\angle Q = 90^\circ$ and QM is perpendicular to PR . Prove that :

$$PQ^2 + QR^2 = PR^2$$

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35. In $\triangle ABC$, $\angle B = 90^\circ$ and $BD \perp AC$.

If $CD = 10$ cm and $BD = 8$ cm, find AD .

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36. In $\triangle ABC$, $\angle B = 90^\circ$ and $BD \perp AC$.

If $AC = 18$ cm and $AD = 6$ cm, find BD .



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37. In $\triangle ABC$, $\angle B = 90^\circ$ and $BD \perp AC$.

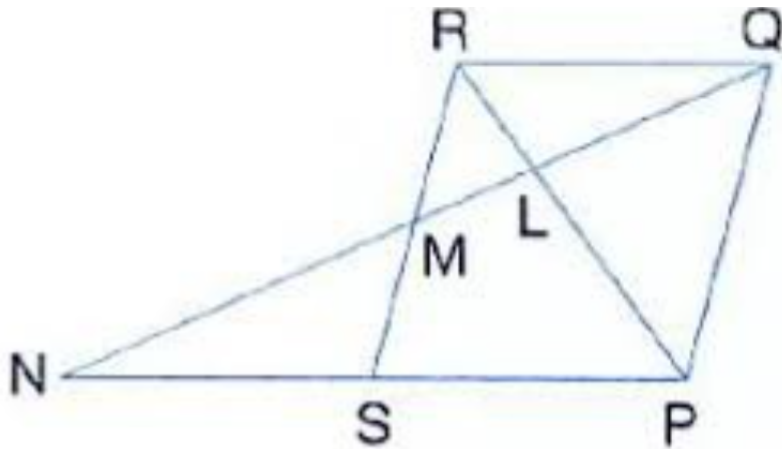
If $AC = 9$ cm and $AB = 7$ cm, find AD .



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38. In the figure, PQRS is a parallelogram with $PQ = 16$ cm and $QR = 10$ cm. L is a point on PR such that $RL:LP = 2:3$. QL produced meets RS at M and PS produced at N.

Find the lengths of PN and RM.



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39. In quadrilateral ABCD, diagonals AC and BD intersect at point E such that

$$AE:EC = BE:ED.$$

Show that : ABCD is a trapezium.

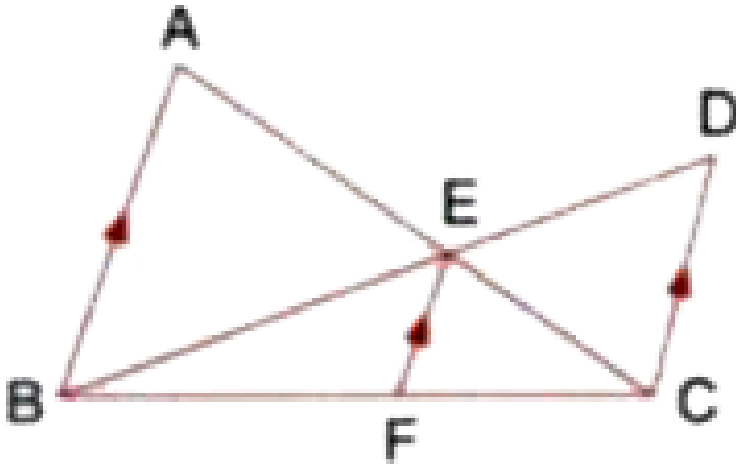
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40. In triangle ABC , AD is perpendicular to side BC and $AD^2 = BD \times DC$.

Show that angle $BAC = 90^\circ$.

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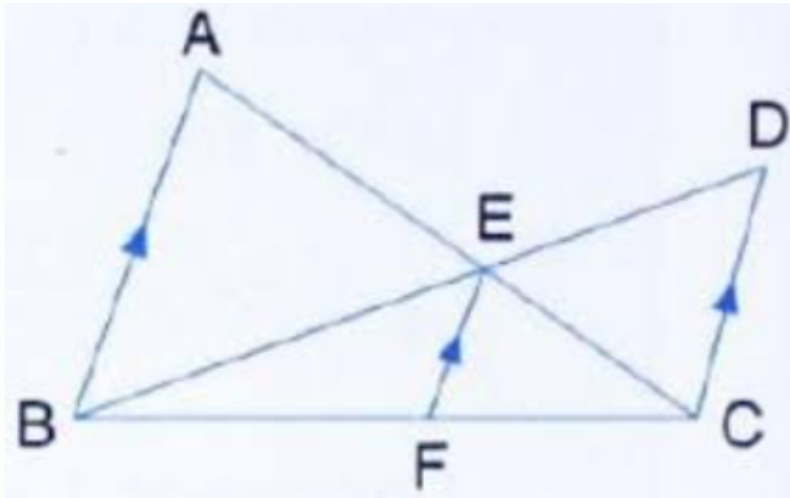
41. In the given figure, $AB \parallel EF \parallel DC$, $AB = 67.5\text{cm}$, $DC = 40.5\text{cm}$ and $AE = 52.5\text{cm}$.



Name the three pairs of similar triangles.

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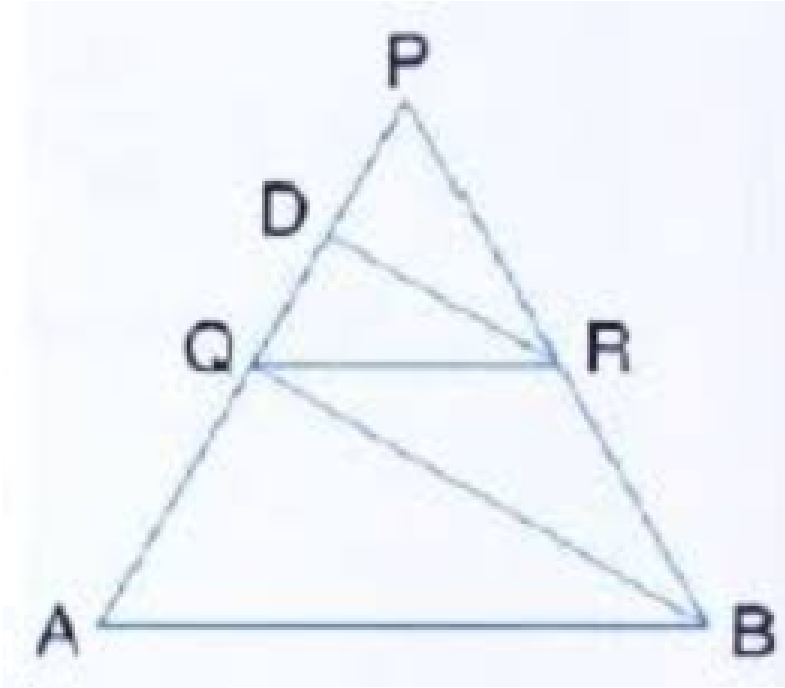
42. In the given figure, $AB \parallel EF \parallel DC$, $AB = 67.5\text{cm}$, $DC = 40.5\text{cm}$ and $AE = 52.5\text{cm}$.



Find the lengths of EC and EF.

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43. In the given figure, QR is parallel to AB and DR is parallel to QB .



Prove that : $PQ^2 = PD \times PA$.

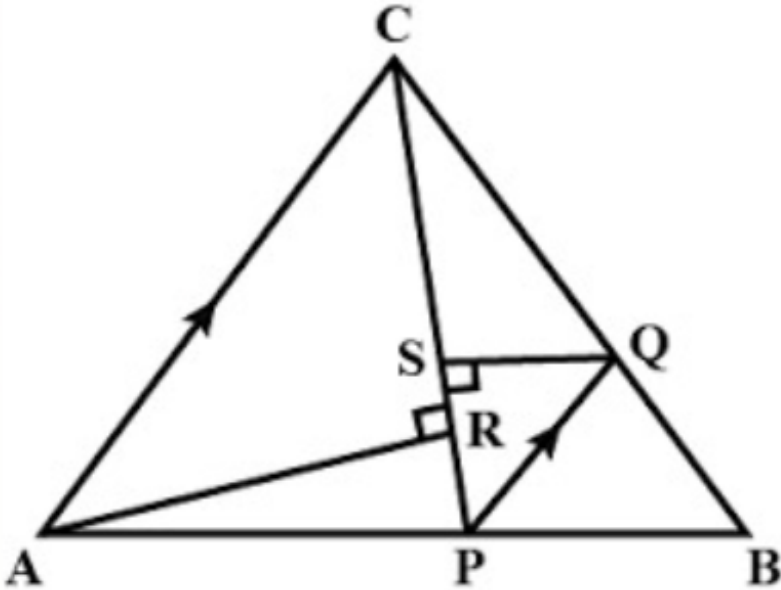
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44. Through the mid-point M of the side CD of a parallelogram $ABCD$, the line BM is drawn intersecting AC at L and AD produced at E . Prove that $EL = 2BL$.

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45. In the given figure, P is a point on AB such that $AP:PB = 4:3$.

PQ is parallel to AC.

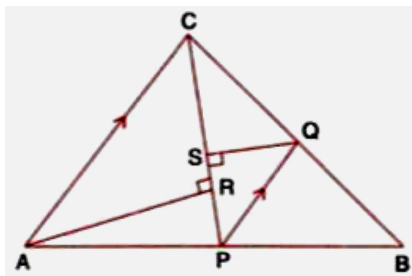


Calculate the ratio $PQ : AC$, giving reason for your answer.

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46. In the given figure, P is a point on AB such that $AP:PB = 4:3$.

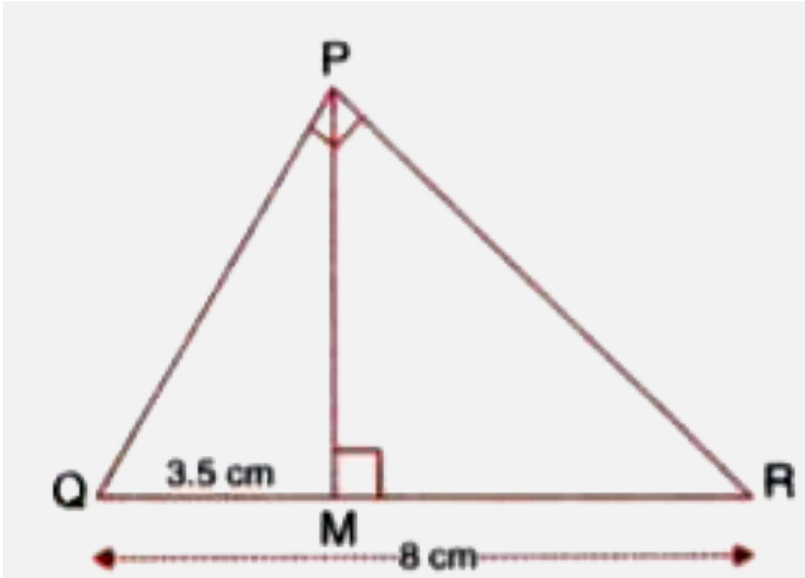
PQ is parallel to AC.



In triangle ARC , $\angle ARC = 90^\circ$ and in triangle PQS , $\angle PSQ = 90^\circ$. Given $QS = 6\text{cm}$, calculate the length of AR.

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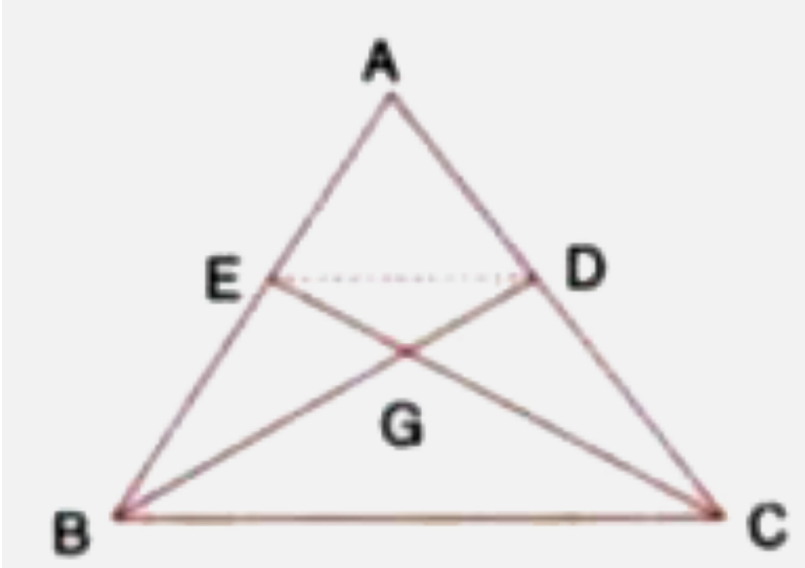
47. In the right-angled triangle QPR, PM altitude.



Given that $QR = 8$ cm and $MQ = 3.5$ cm, calculate the value of PR .

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48. In the figure, given below, the medians BD and CE of a triangle ABC meet at G . Prove that:

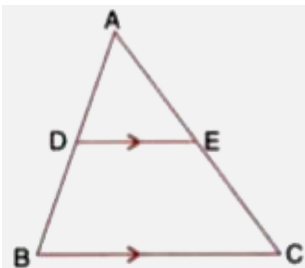


$\triangle EGD \sim \triangle CGB$ and (ii) $BG = 2GD$ from (i) above.

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Exercise 15 B

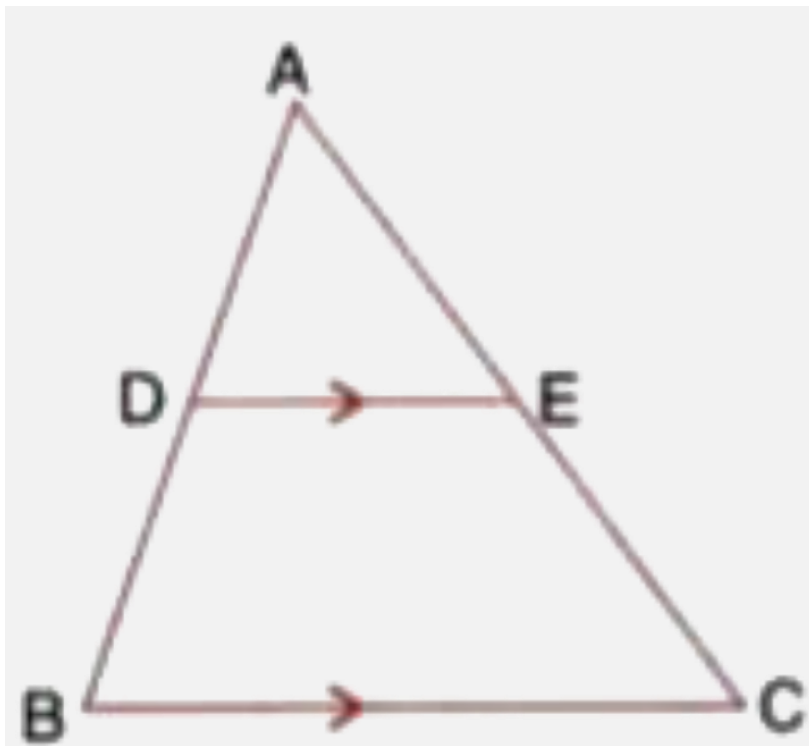
1. In the following figure, point D divides AB in the ratio 3: 5. Find :



$$\frac{AE}{EC}$$

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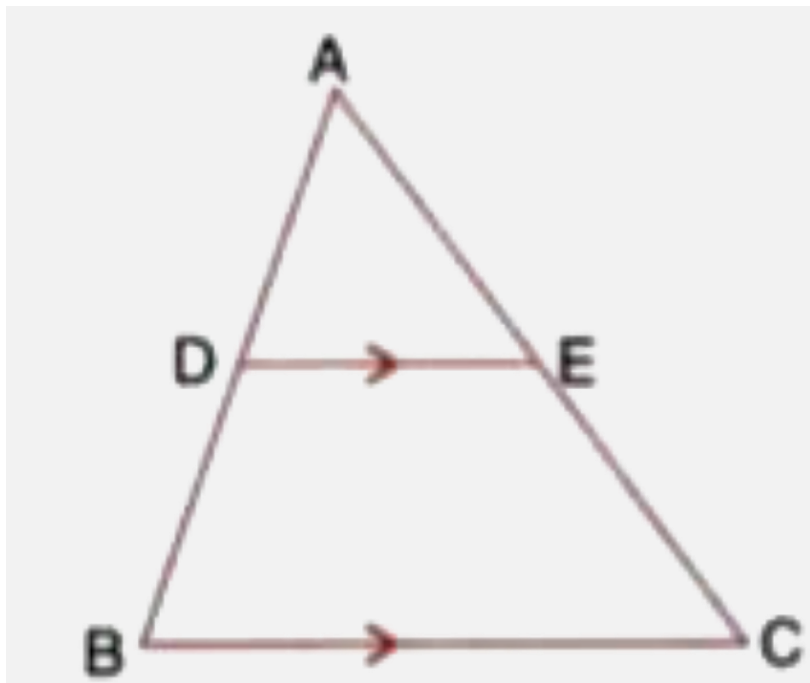
2. In the following figure, point D divides AB in the ratio 3: 5. Find :



$$\frac{AD}{AB}$$

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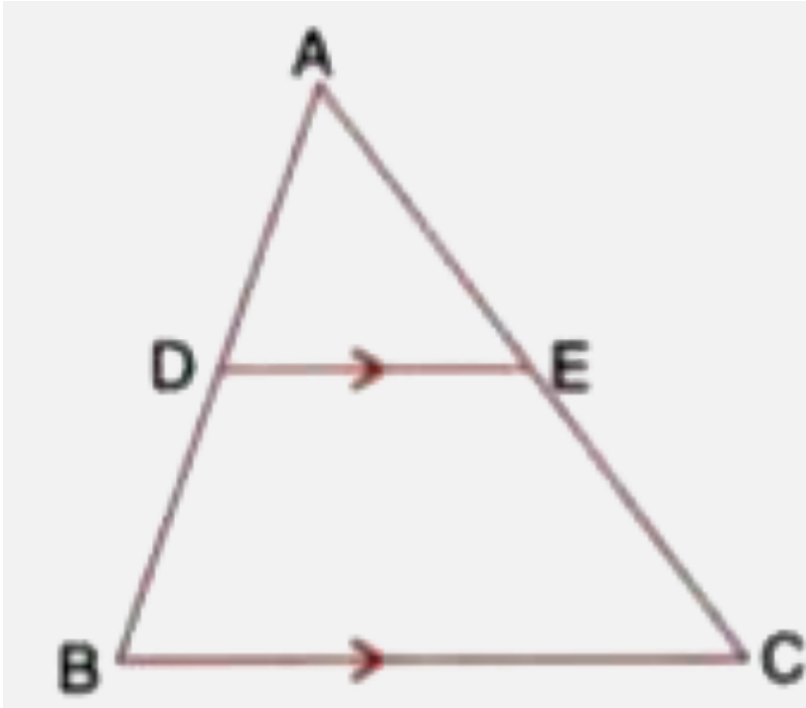
3. In the following figure, point D divides AB in the ratio 3: 5. Find :



$$\frac{AE}{AC}$$

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4. In the following figure, point D divides AB in the ratio 3: 5. Find :



Also, if:

DE = 24 cm, find the length of BC.

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5. In the following figure, point D divides AB in the ratio 3: 5. Find :



Also if :

BC = 4.8 cm, find the length of DE.

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6. In the given figure, $PQ \parallel AB$, $CQ = 4.8$ cm $QB = 3.6$ cm and $AB = 6.3$ cm.

Find :



$$\frac{CP}{PA}$$

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7. In the given figure, $PQ \parallel AB$, $CQ = 4.8$ cm $QB = 3.6$ cm and $AB = 6.3$ cm.

Find :



PQ

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8. In the given figure, $PQ \parallel AB$, $CQ = 4.8$ cm $QB = 3.6$ cm and $AB = 6.3$ cm.

Find :



PQ



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9. A line PQ is drawn parallel to the side BC of $\triangle ABC$ which cuts side AB at P and side AC at Q . If $AB = 90$ cm, $CA = 60$ cm and $AQ = 4.2$ cm, find the length of AP .



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10. In $\triangle ABC$, D and E are the points on sides AB and AC respectively.

Find whether $DE \parallel BC$, if :

$AB = 9$ cm, $AD = 4$ cm, $AE = 6$ cm and $EC = 7.5$ cm.

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11. In $\triangle ABC$, D and E are the points on sides AB and AC respectively.

Find whether $DE \parallel BC$, if :

$AB = 6.3$ cm, $EC = 11.0$ cm, $AD = 0.8$ cm and $AE = 1.6$ cm.

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12. In the given figure, $\triangle ABC \sim \triangle ADE$. If $AE:EC = 4:7$ and $DE = 6.6$ cm, find BC . If ' x ' be the length of the perpendicular from A to DE , find the length of perpendicular from A to BC in terms of ' x '.



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13. A line segment DE is drawn parallel to base BC of $\triangle ABC$ which cuts AB at point D and AC at point E. If $AD = 5$ BD and $EC = 3.2$ cm, find the length of AE.

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14. In the figure, given below, AB, CD and EF are parallel lines. Given $AB = 7.5$ cm, $DC = y$ cm, $EF = 4.5$ cm, $BC = x$ cm and $CE = 3$ cm, calculate the values of x and y .



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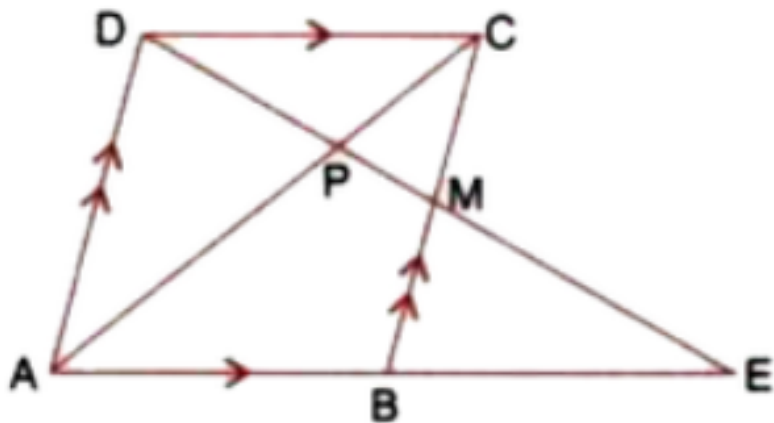
15. In the figure, given below, $\triangle PQR$ is a right angled triangle right angled at Q. XY is parallel to QR, $PQ = 6$ cm, $PY = 4$ cm and $PX : XQ =$

1:2. Calculate the lengths of PR and QR.



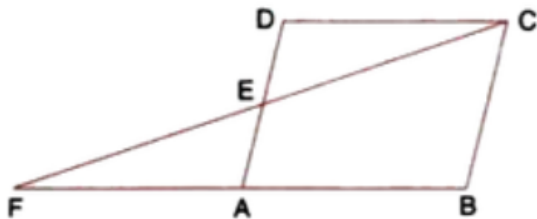
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16. In the following figure, M is mid-point of BC of a parallelogram ABCD. DM intersects the diagonal AC at P and AB produced at E. Prove that : $PE = 2 PD$.



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17. The given figure shows a parallelogram ABCD. E is a point in AD and CE produced meets BA produced at point F. If $AE = 4$ cm, $AF = 8$ cm and $AB = 12$ cm, find the perimeter of the parallelogram ABCD.



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Exercise 15 C

1. The ratio between the corresponding sides of two similar triangles is 2 is to 5. Find the ratio between the areas of these triangles.

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2. Areas of two similar triangles are 98 sq. cm and 128 sq. cm. Find the ratio between the lengths of their corresponding sides.

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3. A line PQ is drawn parallel to the base BC of $\triangle ABC$ which meets sides AB and AC at points P and Q respectively. If $AP = \frac{1}{3}PB$, find the value of :

$$\frac{\text{Area of } \triangle ABC}{\text{Area of } \triangle APQ}$$

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4. A line PQ is drawn parallel to the base BC of $\triangle ABC$ which meets sides AB and AC at points P and Q respectively. If $AP = \frac{1}{3}PB$, find the value of :

$$\frac{\text{Area of } \triangle APQ}{\text{Area of trapezium } PBCQ}$$

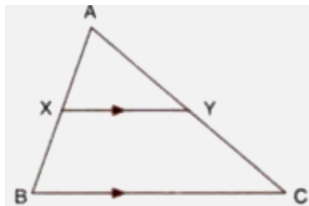
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5. The perimeters of two similar triangles are 30 cm and 24 cm. If one side of the first triangle is 12 cm, determine the corresponding side of the second triangle.

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6. In the given figure, $AX : XB = 3 : 5$

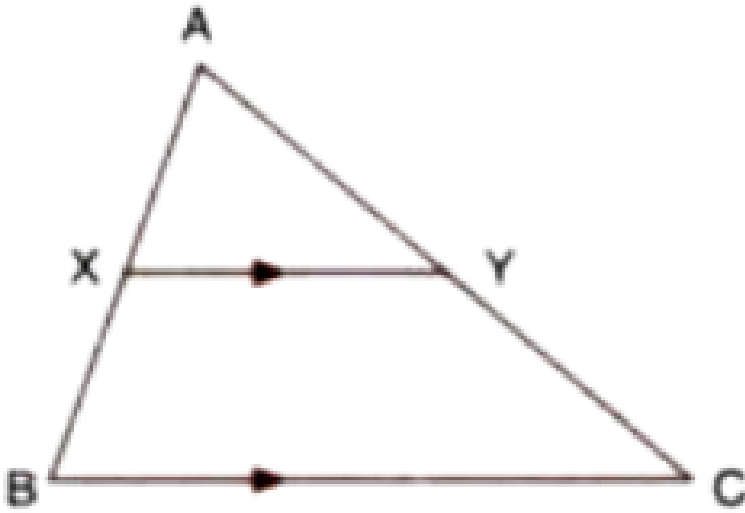


Find :

the length of BC, if the length of XY is 18 cm.

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7. In the given figure, $AX : XB = 3 : 5$



Find :

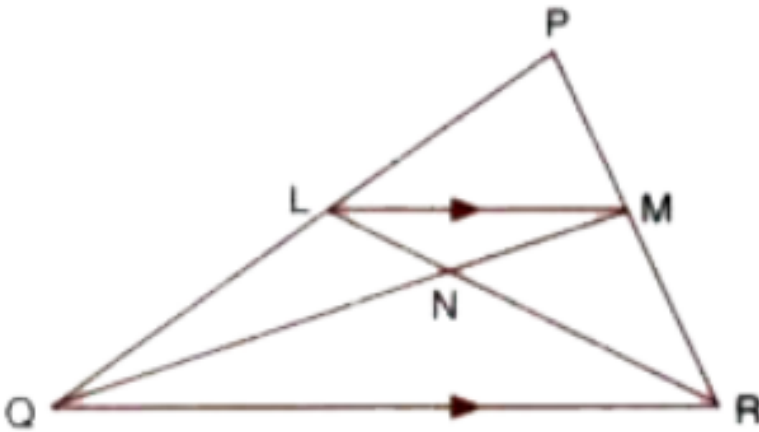
the ratio between the areas of trapezium XBCY and triangle ABC.

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8. ABC is a triangle. PQ is a line segment intersecting AB in P and AC in Q such that $PQ \parallel BC$ and divides triangle ABC into two parts equal in area. Find the value of ratio BP: AB.

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9. In the given triangle PQR, LM is parallel to QR and $PM : MR = 3 : 4$.

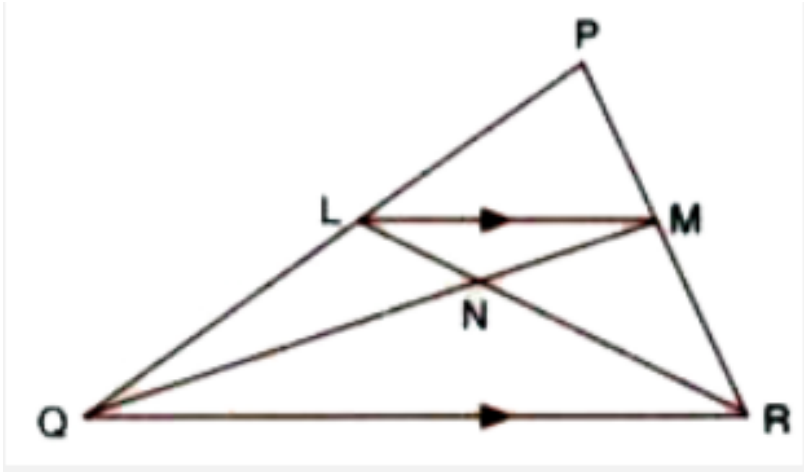


Calculate the value of ratio :

$$\frac{PL}{PQ} \text{ and then } \frac{LM}{QR}$$

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10. In the given triangle PQR, LM is parallel to QR and $PM : MR = 3 : 4$.

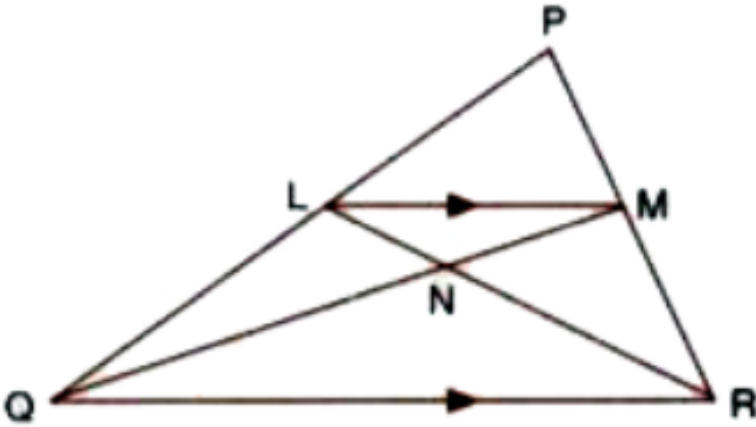


Calculate the value of ratio :

$$\frac{\text{Area of } \triangle LMN}{\text{Area of } \triangle MNR}$$

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11. In the given triangle PQR, LM is parallel to QR and $PM : MR = 3 : 4$.



Calculate the value of ratio :

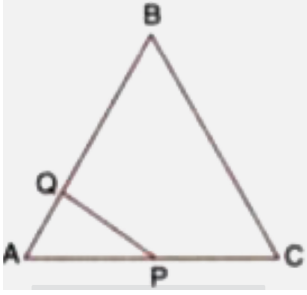
$$\frac{\text{Area of } \triangle LQM}{\text{Area of } \triangle LQN}$$

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12. The given diagram shows two isosceles triangles which are similar.

In the given diagram, PQ and BC are not parallel, $PC = 4$, $AQ = 3$, $QB =$

12 , $BC = 15$ and $AP = PQ$. Calculate :

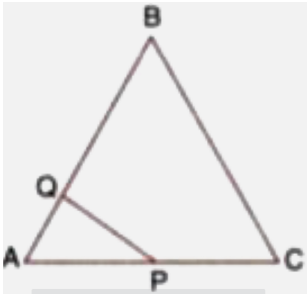


the length of AP.

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13. The given diagram shows two isosceles triangles which are similar.

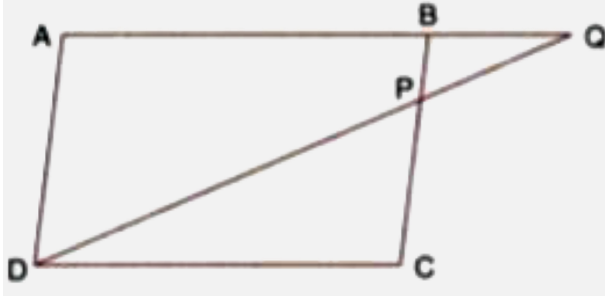
In the given diagram, PQ and BC are not parallel, $PC = 4$, $AQ = 3$, $QB = 12$, $BC = 15$ and $AP = PQ$. Calculate :



the ratio of the areas of triangle APQ and triangle ABC.

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14. In the figure, given below, ABCD is a parallelogram. P is a point on BC such that $BP : PC = 1 : 2$. DP produced meets AB produced at Q. Given the area of triangle $CPQ = 20\text{cm}^2$



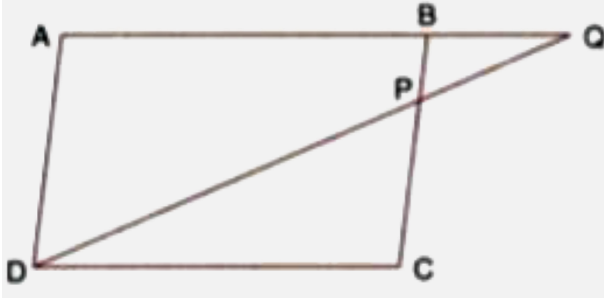
Calculate :

area of triangle CDP.



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15. In the figure, given below, ABCD is a parallelogram. P is a point on BC such that $BP : PC = 1 : 2$. DP produced meets AB produced at Q. Given the area of triangle $CPQ = 20\text{cm}^2$



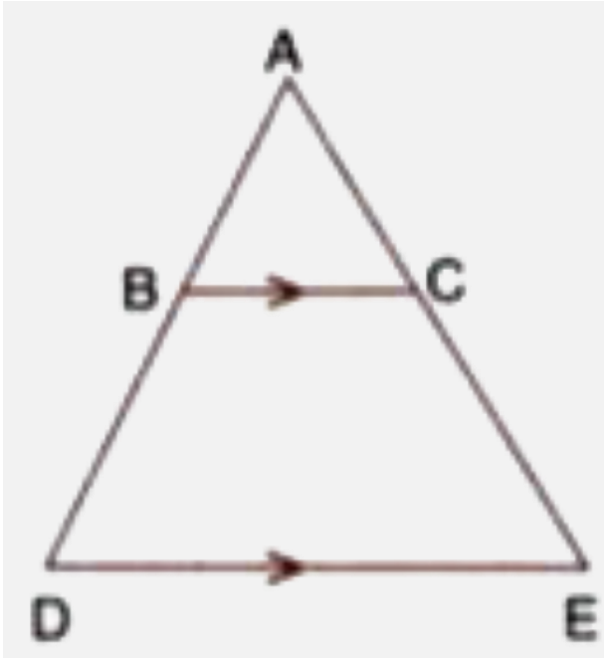
Calculate :

area of parallelogram ABCD.

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16. In the given figure, BC is parallel to DE. Area of triangle $ABC = 25\text{cm}^2$, Area of trapezium $BCED = 24\text{cm}^2$ and $DE = 14\text{cm}$. Calculate the length of BC.

Also, find the area of triangle BCD.



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17. The given figure shows a trapezium in which AB is parallel to DC and diagonals AC and BD intersect at point P. If $AP : CP = 3:5$,

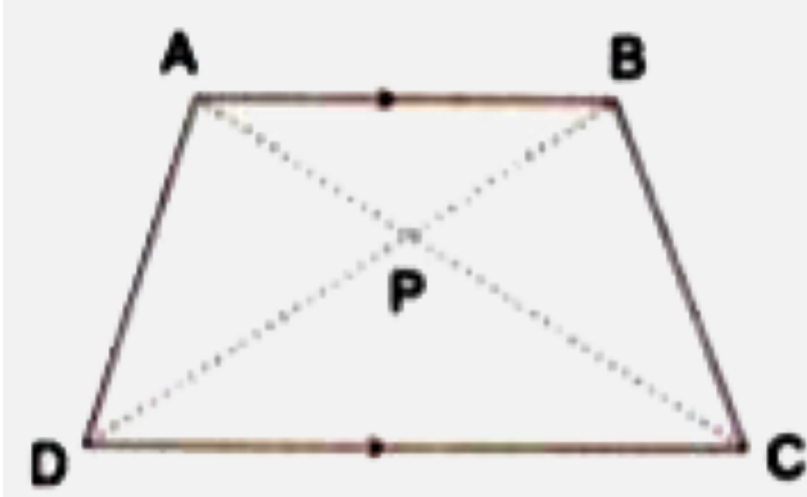


Find :

$\triangle APB : \triangle CPB$

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18. The given figure shows a trapezium in which AB is parallel to DC and diagonals AC and BD intersect at point P . If $AP : CP = 3:5$,



Find :

$$\triangle DPC : \triangle APB$$

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19. The given figure shows a trapezium in which AB is parallel to DC and diagonals AC and BD intersect at point P . If $AP : CP = 3:5$,

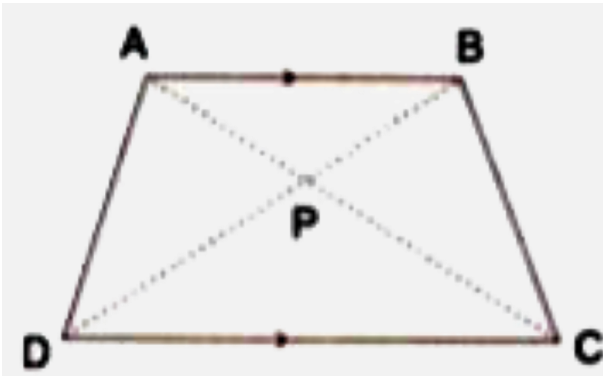


Find :

$$\triangle ADP : \triangle APB$$

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20. The given figure shows a trapezium in which AB is parallel to DC and diagonals AC and BD intersect at point P . If $AP : CP = 3:5$,



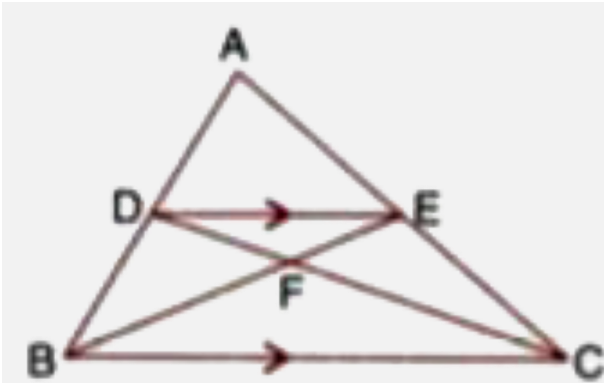
Find :

$$\triangle APB : \triangle ADB$$

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21. In the given figure, ABC is a triangle. DE is parallel to BC and

$$\frac{AD}{DB} = \frac{3}{2}$$



Determine the ratios and $\frac{AD}{AB}$

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22. In the given figure, ABC is a triangle. DE is parallel to BC and

$$\frac{AD}{DB} = \frac{3}{2}$$



Prove that $\triangle DEF$ is similar to $\triangle CBF$. Hence, find $\frac{EF}{FB}$.

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23. In the given figure, ABC is a triangle. DE is parallel to BC and

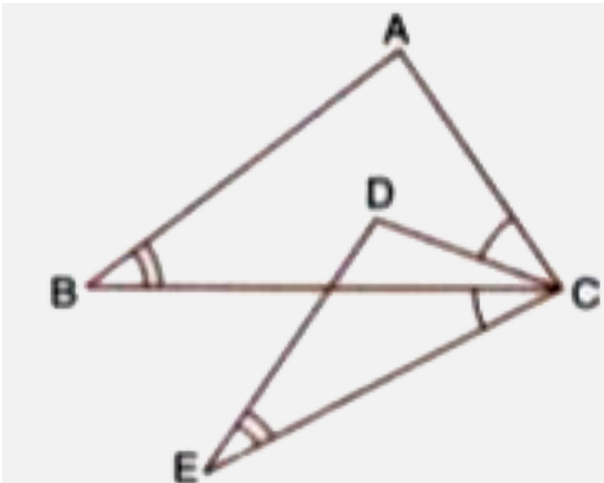
$$\frac{AD}{DB} = \frac{3}{2}$$



What is the ratio of the areas of $\triangle DEF$ and $\triangle BFC$?

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24. In the given figure, $\angle B = \angle E$, $\angle ACD = \angle BCE$, $AB = 10.4$ cm and $DE = 7.8$ cm. Find the ratio between areas of the $\triangle ABC$ and $\triangle DEC$.



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Exercise 15 D

1. A triangle ABC has been enlarged by scale factor $m = 2.5$ to the triangle A' B'C' Calculate :
the length of AB, if A' B' = 6 cm.



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2. A triangle ABC has been enlarged by scale factor $m = 2.5$ to the triangle A' B'C' Calculate :
the length of C'A' if CA = 4 cm.



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3. A triangle LMN has been reduced by scale factor 0.8 to the triangle L' M' N'. Calculate:

the length of M' N', if MN = 8 cm.

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4. A triangle LMN has been reduced by scale factor 0.8 to the triangle L' M' N'. Calculate:

the length of LM, if L' M' = 5.4 cm.

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5. A triangle ABC is enlarged, about the point O as centre of enlargement, and the scale factor is 3. Find :

A' B', if AB = 4 cm.

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6. A triangle ABC is enlarged, about the point O as centre of enlargement, and the scale factor is 3. Find :

BC , if $B'C' = 15$ cm.

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7. A triangle ABC is enlarged, about the point O as centre of enlargement, and the scale factor is 3. Find :

OA , if $OA' = 6$ cm.

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8. A triangle ABC is enlarged, about the point O as centre of enlargement, and the scale factor is 3. Find :

OC' , if $OC = 21$ cm.

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9. A triangle ABC is enlarged, about the point O as centre of enlargement, and the scale factor is 3. Find state the value of :

$$\frac{OB'}{OB}$$

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10. A triangle ABC is enlarged, about the point O as centre of enlargement, and the scale factor is 3. Find state the value of :

$$\frac{C'A'}{CA}$$

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11. A model of an aeroplane is made to a scale of 1 : 400. Calculate :
the length, in cm, of the model, if the length of the aeroplane is 40 m.

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12. A model of an aeroplane is made to a scale of 1 : 400. Calculate :
the length, in m, of the aeroplane, if length of its model is 16 cm.

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13. The dimensions of the model of a multistorey building are $1.2m \times 75cm \times 2m$. If the scale factor is 1 : 30, find the actual dimensions of the building.

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14. On a map drawn to a scale of 1 : 2,50,000, a triangular plot of land has the following measurements: $AB = 3cm$, $BC = 4cm$ and angle $ABC = 90^\circ$ Calculate :
the actual lengths of AB and BC in km.

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15. On a map drawn to a scale of $1 : 2,50,000$, a triangular plot of land has the following measurements: $AB = 3\text{cm}$, $BC = 4\text{cm}$ and angle

$ABC = 90^\circ$ Calculate :

the area of the plot in sq. km.

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16. A model of a ship is made to a scale $1 : 300$.

The length of the model of the ship is 2 m. Calculate the length of the ship.

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17. A model of a ship is made to a scale $1 : 300$.

The area of the deck of the ship is $180,000\text{m}^2$. Calculate the area of the deck of the model.

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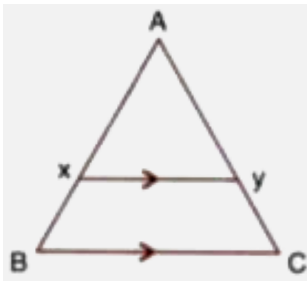
18. A model of a ship is made to a scale 1 : 300.

The volume of the model is $6.5m^3$. Calculate the volume of the ship.

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Exercise 15 E

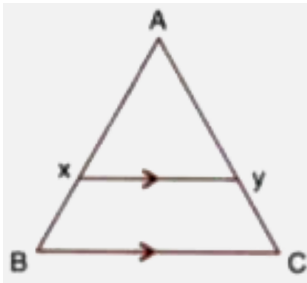
1. In the following figure, XY is parallel to BC , $AX = 9cm$, $XB = 4.5cm$ and $BC = 18cm$.



$$\frac{AY}{YC}$$

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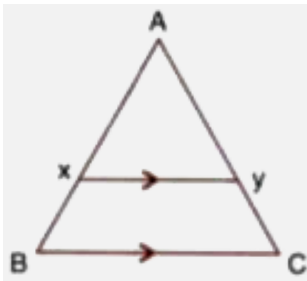
2. In the following figure, XY is parallel to BC , $AX = 9\text{cm}$, $XB = 4.5\text{cm}$ and $BC = 18\text{cm}$.



$$\frac{YC}{AC}$$

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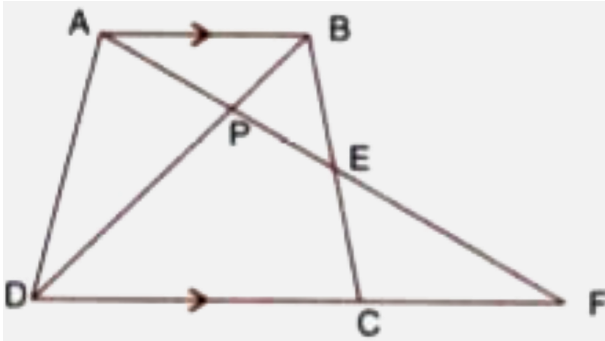
3. In the following figure, XY is parallel to BC , $AX = 9\text{cm}$, $XB = 4.5\text{cm}$ and $BC = 18\text{cm}$.



XY

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4. In the following figure, ABCD to a trapezium with $AB \parallel DC$. If $AB = 9cm$, $DC = 18cm$, $CF = 13.5cm$, $AP = 6cm$ and $BE = 15cm$

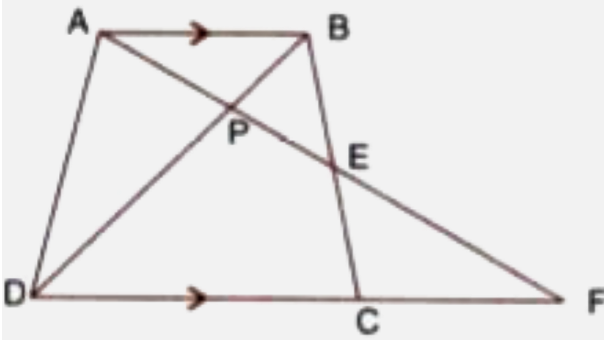


Calculate

EC

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5. In the following figure, ABCD to a trapezium with $AB \parallel DC$. If $AB = 9cm$, $DC = 18cm$, $CF = 13.5cm$, $AP = 6cm$ and $BE = 15cm$

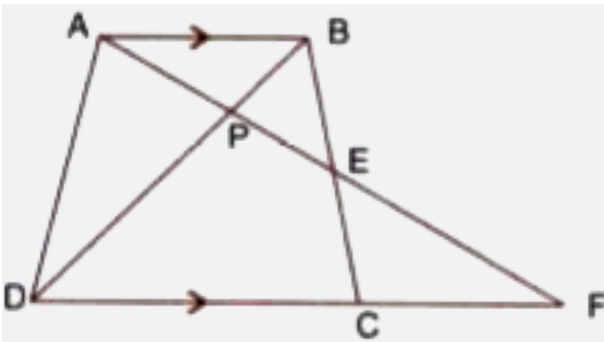


Calculate

AF

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6. In the following figure, ABCD to a trapezium with $AB \parallel DC$. If $AB = 9cm$, $DC = 18cm$, $CF = 13.5cm$, $AP = 6cm$ and $BE = 15cm$

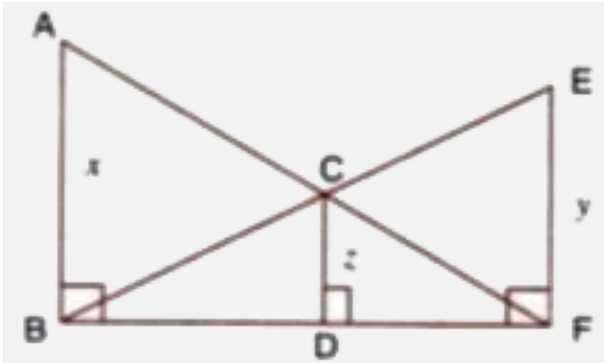


Calculate

PE

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7. In the following figure, AB , CD and EF are perpendicular to the straight line BDF .



If $AB = x$ and $CD = z$ unit and $EF = y$ unit, prove that :

$$\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$$

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8. Triangle ABC is similar to triangle PQR . If AD and PM are corresponding medians of the two triangles, prove that :

$$\frac{AB}{PQ} = \frac{AD}{PM}$$

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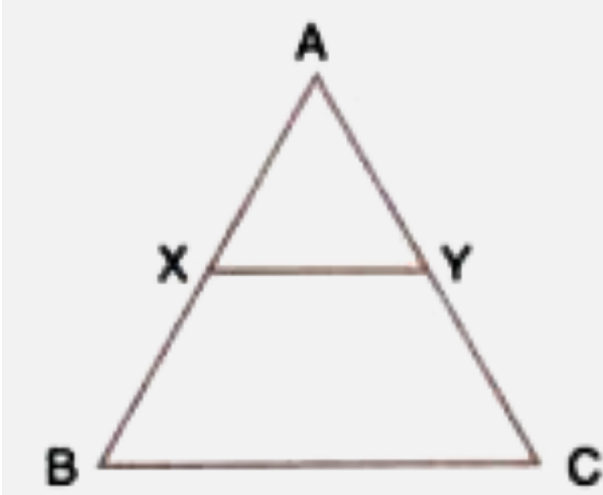
9. Triangle ABC is similar to triangle PQR. If AD and PM are altitudes of the two triangles, prove that : $\frac{AB}{PQ} = \frac{AD}{PM}$

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10. Triangle ABC is similar to triangle PQR. If bisector of angle BAC meets BC at point D and bisector of angle QPR meets QR at point M, prove that : $\frac{AB}{PQ} = \frac{AD}{PM}$

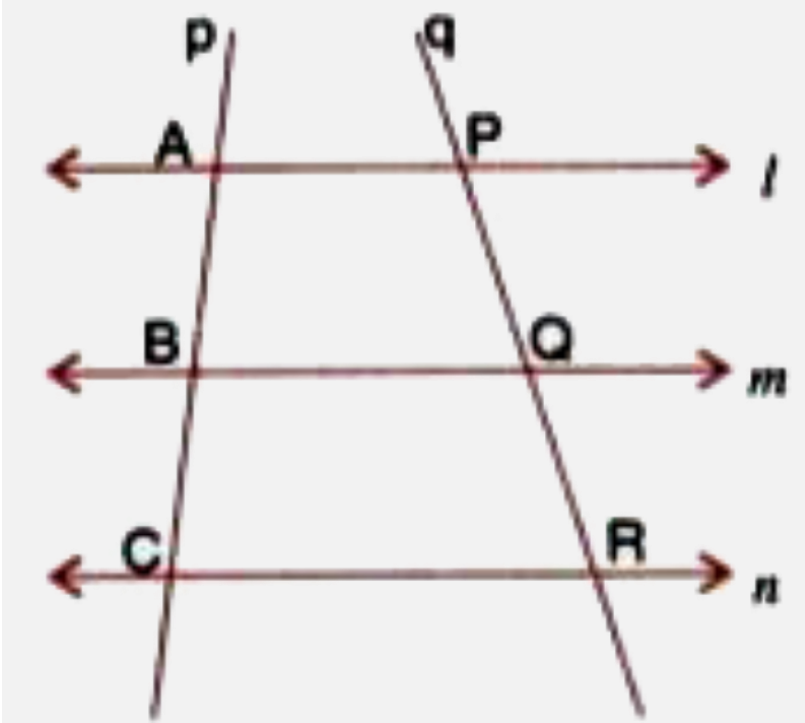
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11. In the following figure, $\angle AXY = \angle AYX$. . If $\frac{BX}{AX} = \frac{CY}{AY}$, show that triangle ABC is Isosceles.



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12. In the following diagram, lines l , m and n are parallel to each other. Two transversals p and q intersect the parallel lines at points A , B , C and P , Q , R as shown.



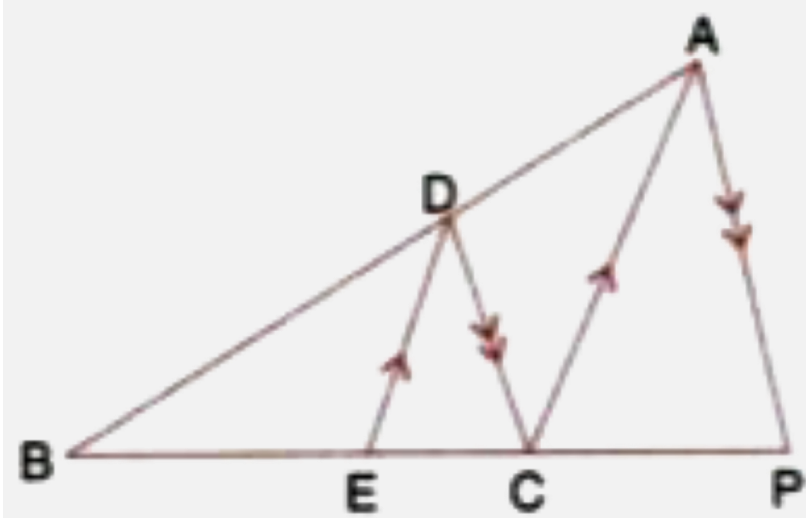
Prove that : $\frac{AB}{BC} = \frac{PQ}{QR}$

Join A and R. Let AR meets BQ at point D.

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13. In the following figure, $DE \parallel AC$ and $DC \parallel AP$. Prove that :

$$\frac{BE}{EC} = \frac{BC}{CP}$$

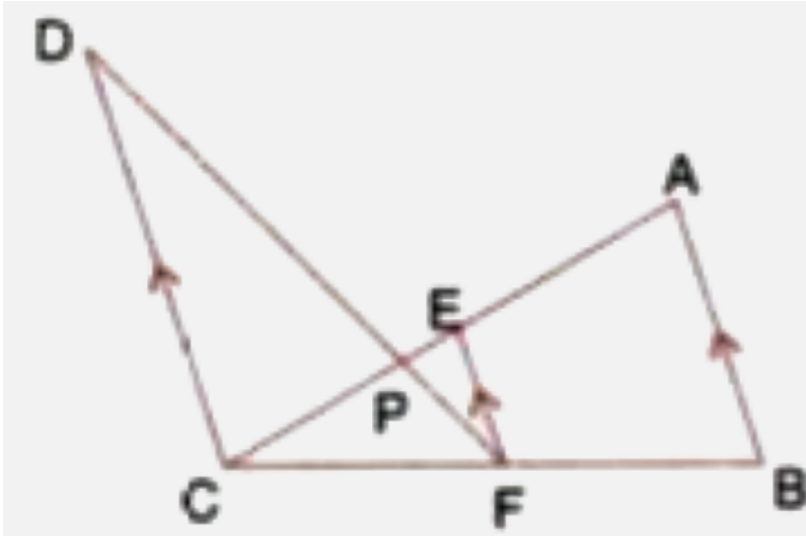


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14. In the figure given below, $AB \parallel EF \parallel CD$. If $AB = 22.5$ cm, $EP = 7.5$ cm, $PC = 15$ cm and $DC = 27$ cm.

Calculate :

EF



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15. In the figure given below, $AB \parallel EF \parallel CD$. If $AB = 22.5$ cm, $EP = 7.5$ cm, $PC = 15$ cm and $DC = 27$ cm.

Calculate :

AC



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16.

In

ΔABC , $\angle ABC = \angle DAC$, $AB = 8\text{cm}$, $AC = 4\text{cm}$ and $AD = 5\text{cm}$

.



Prove that ΔACD is similar to ΔBCA .



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17.

In

ΔABC , $\angle ABC = \angle DAC$, $AB = 8\text{cm}$, $AC = 4\text{cm}$ and $AD = 5\text{cm}$

.



Find BC and CD.



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18.

In

ΔABC , $\angle ABC = \angle DAC$, $AB = 8\text{cm}$, $AC = 4\text{cm}$ and $AD = 5\text{cm}$

.



Find area of ΔACD : area of ΔABC .



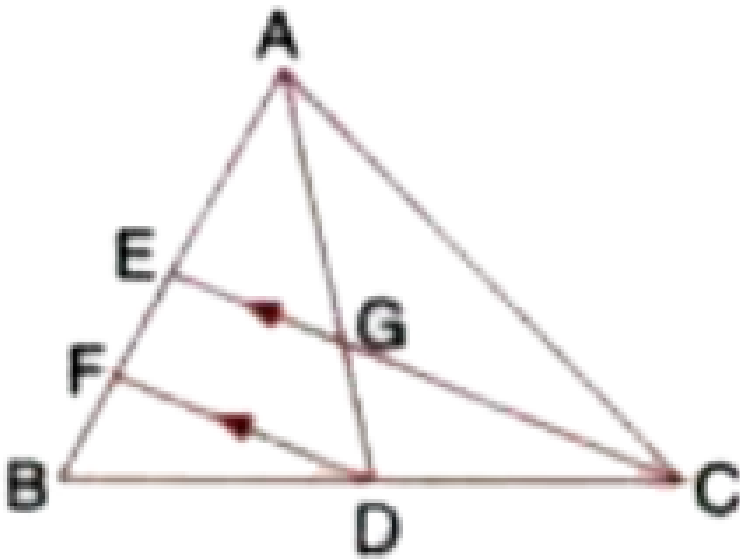
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19. In the given triangle P, Q and R are the mid points of sides AB, BC and AC respectively. Prove that triangle PQR is similar to triangle ABC.



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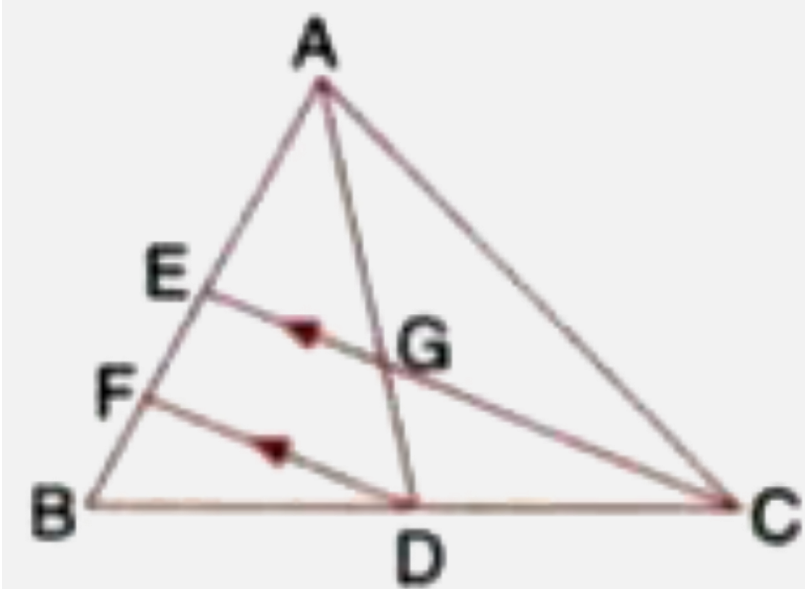
20. In the following figure, AD and CE are medians of ΔABC . DF is drawn parallel to CE. Prove that :



$$EF = FB$$

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21. In the following figure, AD and CE are medians of $\triangle ABC$. DF is drawn parallel to CE . Prove that :



$$AG:GD = 2:1.$$

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

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23. The ratio between the altitudes of two similar triangles is $3 : 5$, write the ratio between their :
corresponding medians.

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24. The ratio between the altitudes of two similar triangles is $3 : 5$, write the ratio between their :
perimeters.

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25. The ratio between the altitudes of two similar triangles is $3 : 5$, write the ratio between their :
areas.

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26. The ratio between the areas of two similar triangles is $16 : 25$. Find the ratio between their :
perimeters.

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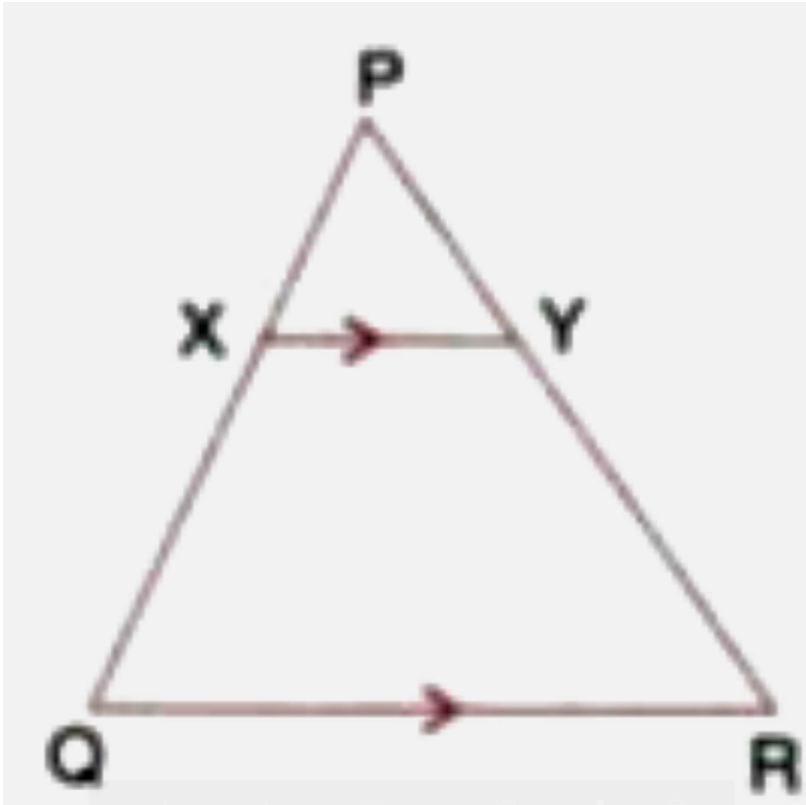
27. The ratio between the areas of two similar triangles is $16 : 25$. Find the ratio between their :
corresponding altitudes.

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28. The ratio between the areas of two similar triangles is $16 : 25$. Find the ratio between their :
corresponding medians.

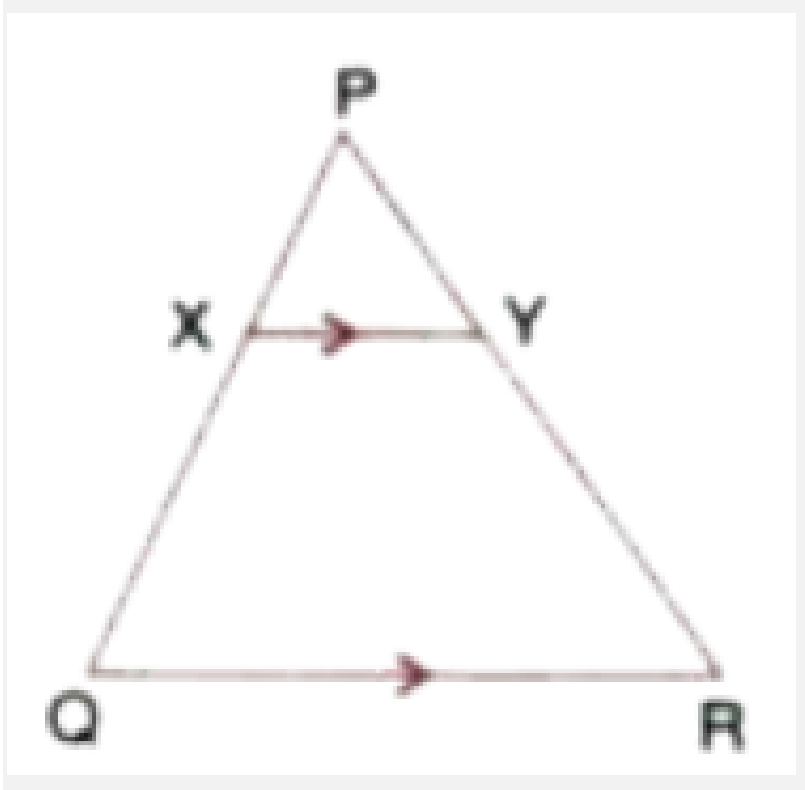
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29. The given figure shows $\triangle PQR$ in which XY is parallel to QR . If $PX : XQ = 1:3$ and $QR = 9$ cm, find the length of XY . Further, if the area of $\triangle PXY = x\text{ cm}^2$, find, in terms of x , the area of triangle PQR .



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30. The given figure shows $\triangle PQR$ in which XY is parallel to QR . If $PX : XQ = 1:3$ and $QR = 9$ cm, find the length of XY . Further, if the area of $\triangle PXY = x \text{ cm}^2$, find, in terms of x , the area of trapezium $XQRY$.



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31. On a map, drawn to a scale of $1 : 20000$, a rectangular plot of land ABCD has $AB = 24\text{cm}$ and $BC = 32\text{cm}$. Calculate :
the diagonal distance of the plot in kilometre.

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32. On a map, drawn to a scale of $1 : 20000$, a rectangular plot of land ABCD has $AB = 24\text{cm}$ and $BC = 32\text{cm}$. Calculate :
the area of the plot in sq. km.

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33. The dimensions of the model of a multi storeyed building are 1 m by 60 cm by 1.20 m. If the scale factor is $1 : 50$, find the actual dimensions of the building. Also, find :
the floor area of a room of the building, if the floor area of the corresponding room in the model is 50 sq. cm.



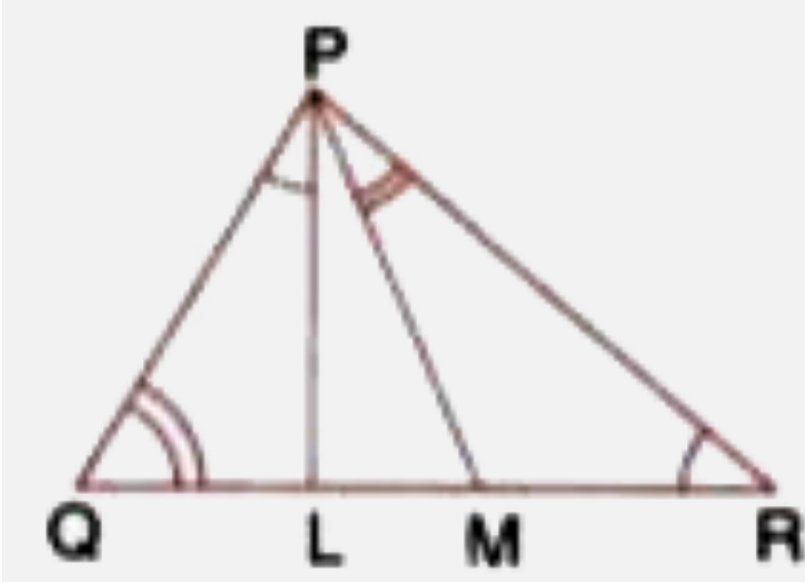
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34. The dimensions of the model of a multi storeyed building are 1 m by 60 cm by 1.20 m. If the scale factor is 1 : 50, find the actual dimensions of the building. Also, find :
the space (volume) inside a room of the model, if the space inside the corresponding room of the building is $90m^3$.



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35. In a triangle PQR, L and M are two points on the base QR, such that $\angle LPQ = \angle QRP$ and $\angle RPM = \angle RQP$. Prove that:



$$\triangle PQL \sim \triangle RPM$$

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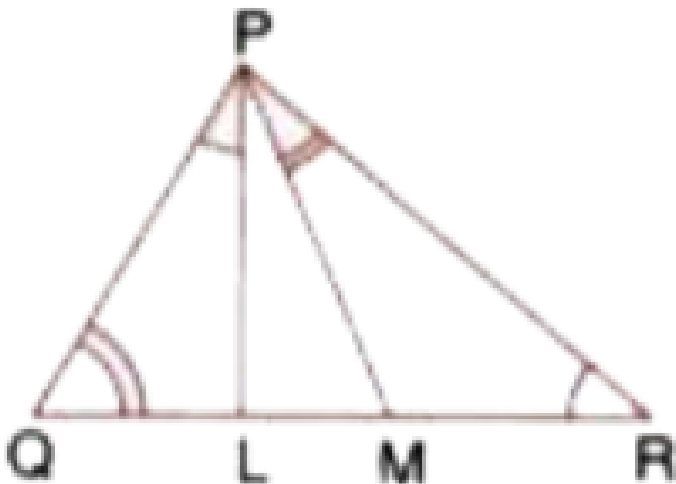
36. In a triangle PQR , L and M are two points on the base QR , such that $\angle LPQ = \angle QRP$ and $\angle RPM = \angle RQP$. Prove that:



$$QL \times RM = PL \times PM$$

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37. In a triangle PQR, L and M are two points on the base QR, such that $\angle LPQ = \angle QRP$ and $\angle RPM = \angle RQP$. Prove that:



$$PQ^2 = QR \times QL$$

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38. A triangle ABC with $AB = 3\text{cm}$, $BC = 6\text{cm}$ and $AC = 4\text{cm}$ is enlarged to a DEF such that the longest side of $\triangle DEF = 9\text{cm}$. Find the scale factor and hence, the lengths of the other sides of $\triangle DEF$.

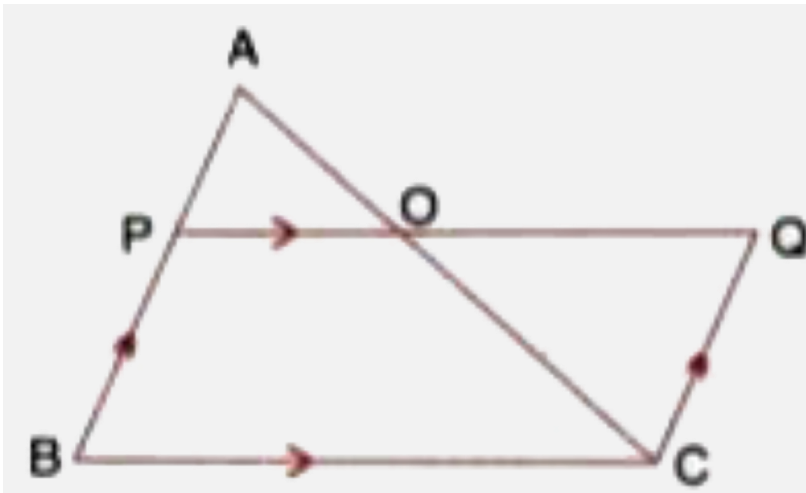
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39. Two isosceles triangles have equal vertical angles. Show that the triangles are similar.

If the ratio between the areas of these two triangles is $16 : 25$, find the ratio between their corresponding altitudes.

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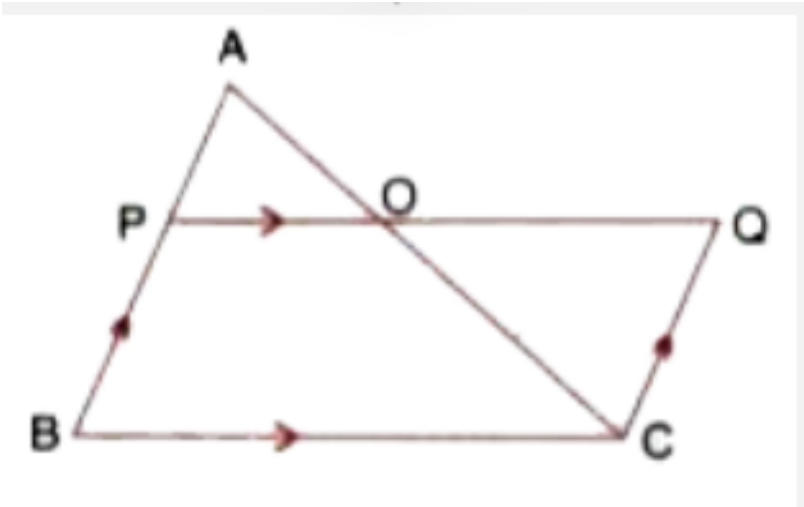
40. In triangle ABC , $AP : PB = 2 : 3$. PO is parallel to BC and is P extended to Q so that CQ is parallel to BA . Find :



area $\triangle APO$: area $\triangle ABC$.

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41. In triangle ABC , $AP:PB = 2:3$. PO is parallel to BC and is P extended to Q so that CQ is parallel to BA . Find :



area $\triangle APO$: area $\triangle CRO$.

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42. The following figure shows a triangle ABC in which AD and BE are perpendiculars to BC and AC respectively. Show that :

$$\triangle ADC \sim \triangle BEC$$



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43. The following figure shows a triangle ABC in which AD and BE are perpendiculars to BC and AC respectively. Show that :

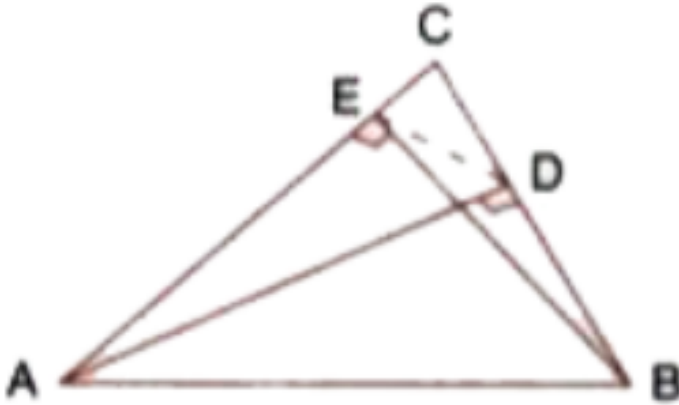
$$CA \times CE = CB \times CD$$



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44. The following figure shows a triangle ABC in which AD and BE are perpendiculars to BC and AC respectively. Show that :

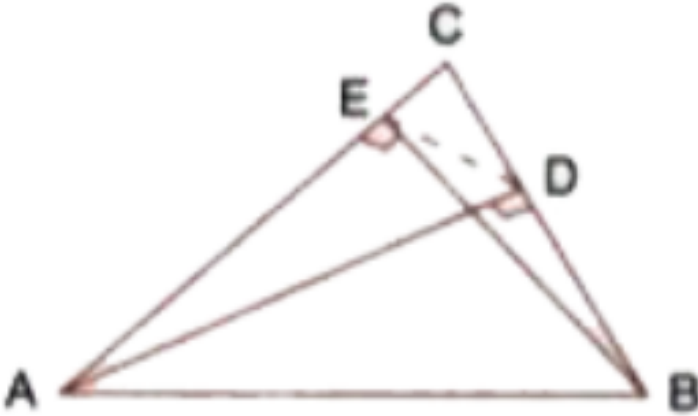
$$\triangle ABC \sim \triangle DEC$$



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45. The following figure shows a triangle ABC in which AD and BE are perpendiculars to BC and AC respectively. Show that :

$$CD \times AB = CA \times DE$$



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46. In the given figure, ABC is a triangle with $\angle EDB = \angle ACB$. Prove that $\triangle ABC \sim \triangle EBD$.

If $BE = 6\text{cm}$, $EC = 4\text{cm}$, $BD = 5\text{cm}$ and area of $\triangle BED = 9\text{cm}^2$.

Calculate the :



length of AB

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47. In the given figure, ABC is a triangle with $\angle EDB = \angle ACB$. Prove that $\triangle ABC \sim \triangle EBD$.

If $BE = 6\text{cm}$, $EC = 4\text{cm}$, $BD = 5\text{cm}$ and area of $\triangle BED = 9\text{cm}^2$.

Calculate the :

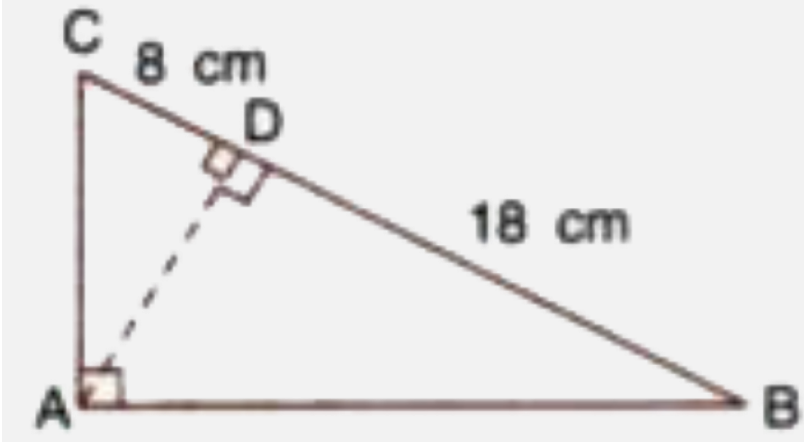


area of $\triangle ABC$



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48. In the given figure, ABC is a right angled triangle with $\angle BAC = 90^\circ$.



Prove that : $\triangle ADB \sim \triangle CDA$.

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49. In the given figure, ABC is a right angled triangle with $\angle BAC = 90^\circ$.



If $BD = 18$ cm and $CD = 8$ cm, find AD.

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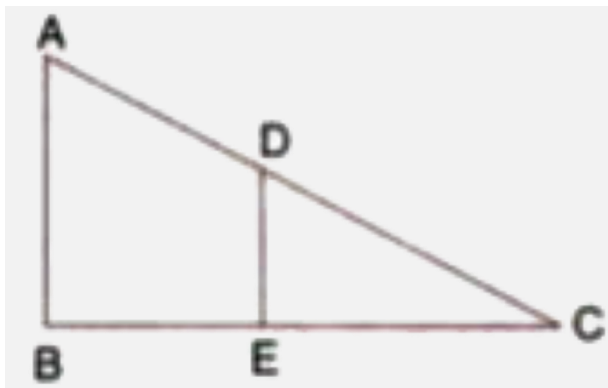
50. In the given figure, ABC is a right angled triangle with $\angle BAC = 90^\circ$.



Find the ratio of the area of ΔADB is to area of ΔCDA .

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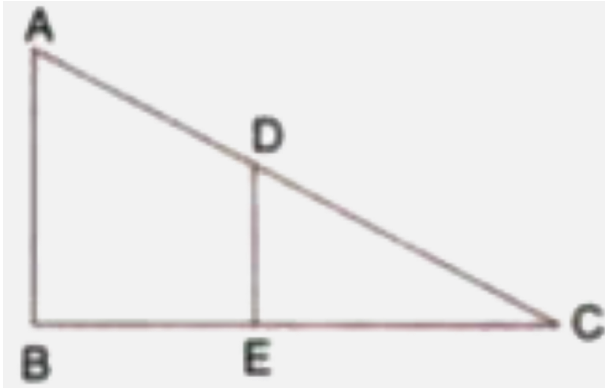
51. In the given figure, AB and DE are perpendiculars to BC



Prove that : $\Delta ABC \sim \Delta DEC$

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52. In the given figure, AB and DE are perpendiculars to BC



If $AB = 6$ cm, $DE = 4$ cm and $AC = 15$ cm. Calculate CD.

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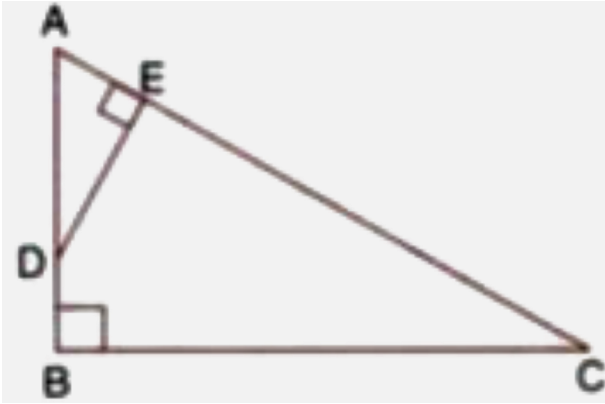
53. In the given figure, AB and DE are perpendiculars to BC



Find the ratio : area of a ΔABC : area of ΔDEC .

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54. ABC is a right angled triangle with $\angle ABC = 90^\circ$. D is any point on AB and DE is perpendicular to AC. Prove that:



$\triangle ADE \sim \triangle ACB$.

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55. ABC is a right angled triangle with $\angle ABC = 90^\circ$. D is any point on AB and DE is perpendicular to AC. Prove that:



If $AC = 13$ cm, $BC = 5$ cm and $AE = 4$ cm. Find DE and AD.

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56. ABC is a right angled triangle with $\angle C = 90^\circ$. D is any point on AB and DE is perpendicular to AC. Prove that:



Find, area of AADE: area of quadrilateral BCED.

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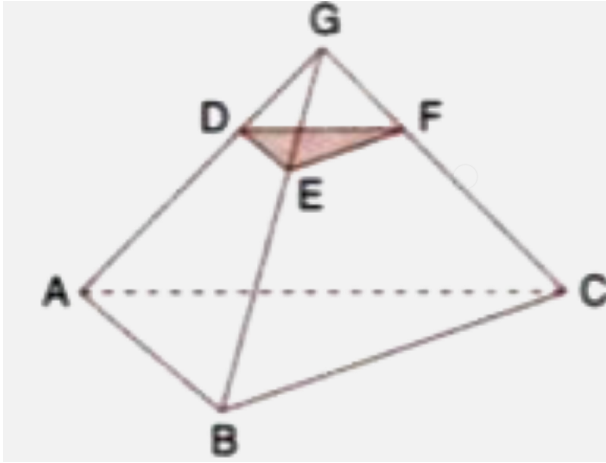
57. Given : $AB \parallel DE$ and $BC \parallel EF$. Prove that:



$$\frac{AD}{DG} = \frac{CF}{FG}$$

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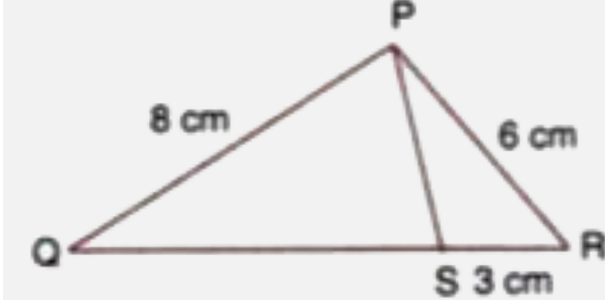
58. Given : $AB \parallel DE$ and $BC \parallel EF$. Prove that:



$\triangle DFG \sim \triangle ACG$.

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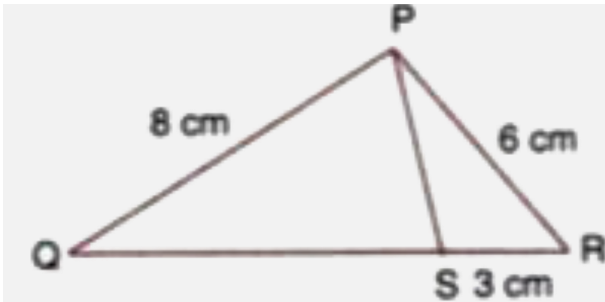
59. PQR is a triangle. S is a point on the side QR of $\triangle PQR$ such that $\angle PSR = \angle QPR$. Given $QP = 8$ cm, $PR = 6$ cm and $SR = 3$ cm.



Prove $\triangle PQR \sim \triangle SPR$.

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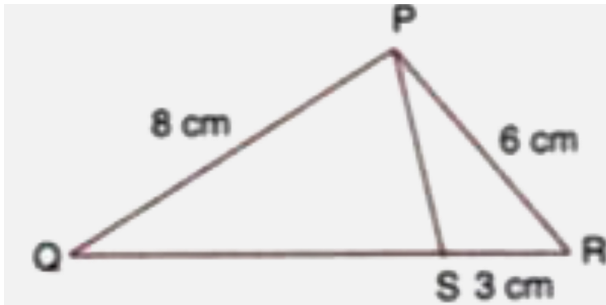
60. PQR is a triangle. S is a point on the side QR of $\triangle PQR$ such that $\angle PSR = \angle QPR$. Given $QP = 8$ cm, $PR = 6$ cm and $SR = 3$ cm.



Find the lengths of QR and PS .

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61. PQR is a triangle. S is a point on the side QR of $\triangle PQR$ such that $\angle PSR = \angle QPR$. Given $QP = 8$ cm, $PR = 6$ cm and $SR = 3$ cm.



$$\frac{\text{area of } \triangle PQR}{\text{area of } \triangle SPR}$$

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