



MATHS

BOOKS - NAVBODH MATHS (HINGLISH)

SIMILARITY

2 1 1 Mark Each

1. $\Delta ABC \sim \Delta PQR$. If $A(\Delta ABC) = 25$, $A(\Delta PQR) = 16$ find $AB : PQ$.

A. 25 : 16

B. 4 : 5

C. 16 : 25

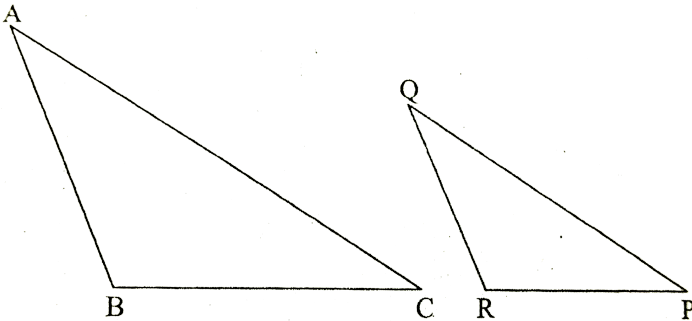
D. 5:4

Answer: D

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2. In $\triangle ABC$ and $\triangle PQR$, in a one-to-one correspondence

$$\frac{AB}{QR} = \frac{BC}{PR} = \frac{CA}{PQ} \text{ then.....}$$



A. $\triangle PQR \sim \triangle ABC$

B. $\triangle PQR \sim \triangle CAB$

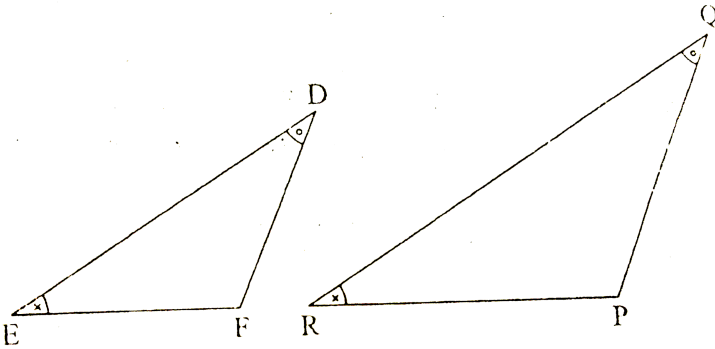
C. $\triangle CBA \sim \triangle PQR$

D. $\triangle BCA \sim \triangle PQR$

Answer: B

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3. If in $\triangle DEF$ and $\triangle PQR$, $\angle D \cong \angle Q$, $\angle E \cong \angle R$, then which of the following statements is false?



A. $\frac{EF}{PR} = \frac{DF}{PQ}$

B. $\frac{DE}{PQ} = \frac{EF}{RP}$

C. $\frac{DE}{QR} = \frac{DF}{PQ}$

$$D. \frac{EF}{RP} = \frac{DE}{QR}$$

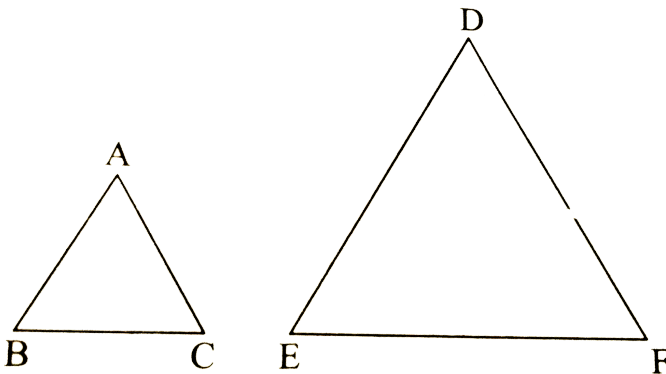
Answer:



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4. $\triangle ABC$ and $\triangle DEF$ are equilateral triangles,
 $A(\triangle ABC) : A(\triangle DEF) = 1 : 2$.

If $AB = 4$ then what is the length of DE ?



A. $2\sqrt{2}$

B. 4

C. 8

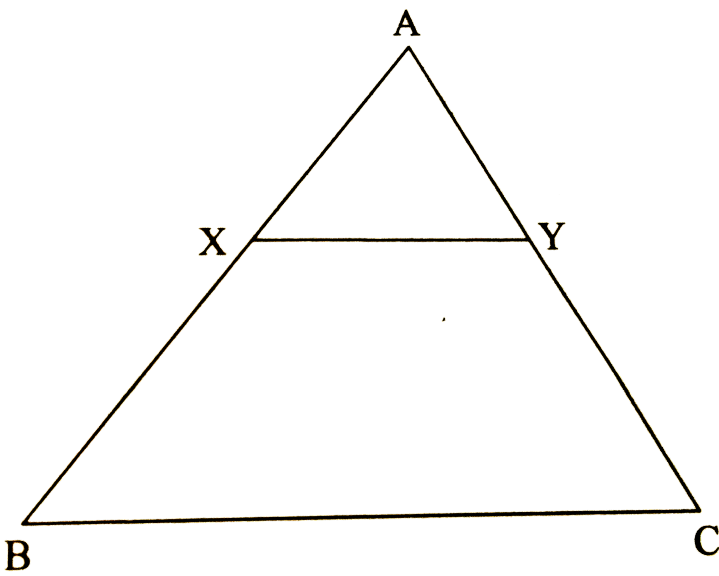
D. $4\sqrt{2}$

Answer:



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5. In figure, $XY \parallel BC$. Which of the following statements is true



A. $\frac{AB}{AC} = \frac{AX}{AY}$

B. $\frac{AX}{XB} = \frac{AY}{AC}$

C. $\frac{AX}{YC} = \frac{AY}{XB}$

D. $\frac{AB}{YC} = \frac{AC}{XB}$

Answer: A

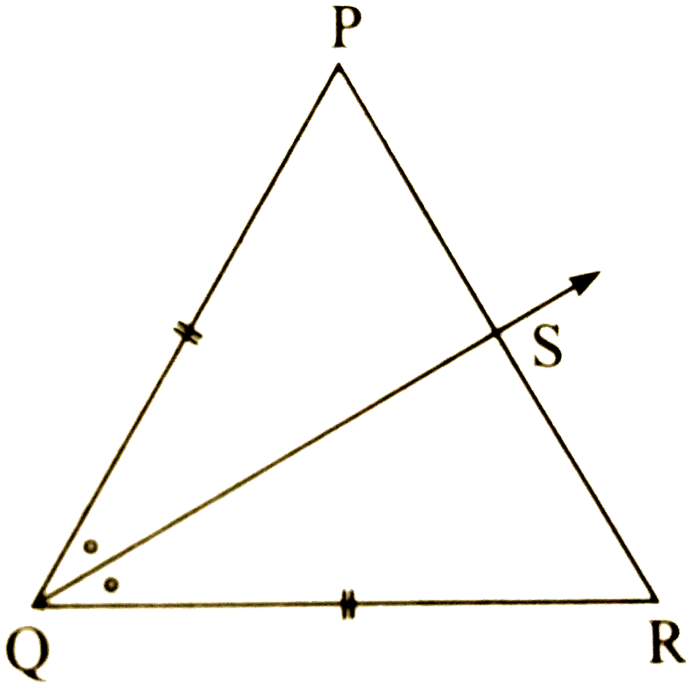


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6. In the figure, ray QS is the bisector of $\angle PQR$ and

$$PQ = QR.$$

Then $\frac{PS}{SR} = \dots\dots\dots$



A. 1:1

B. 1:2

C. 2:1

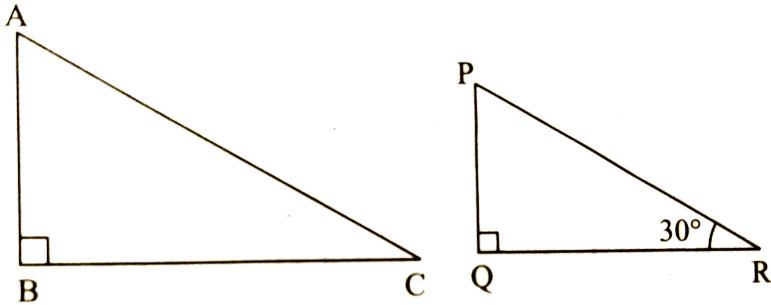
D. cannot be determined

Answer:



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7. In the figure, $\triangle ABC \sim \triangle PQR$ $\angle R = 30^\circ$, then $\angle A = ?$



A. 45°

B. 90°

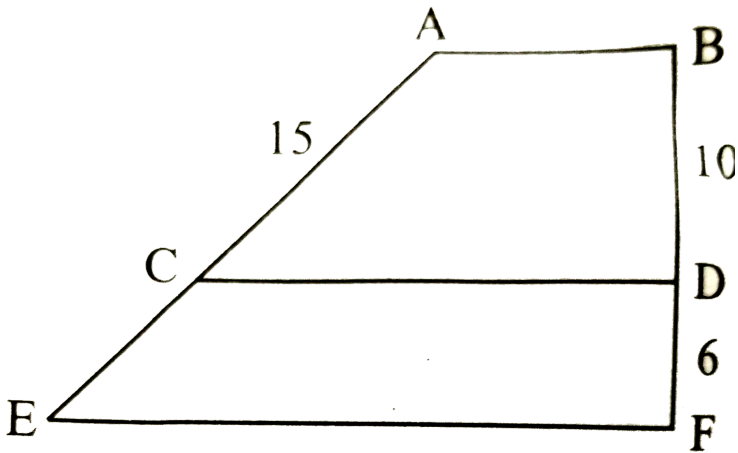
C. 30°

D. 60°

Answer: D

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8. In the figure, $\text{seg } AB \parallel \text{seg } CD \parallel \text{seg } EF$ $AC = 1.5$,
 $BD = 10$, $DF = 6$ then $AE = ?$



A. 26

B. 22

C. 20

D. 24

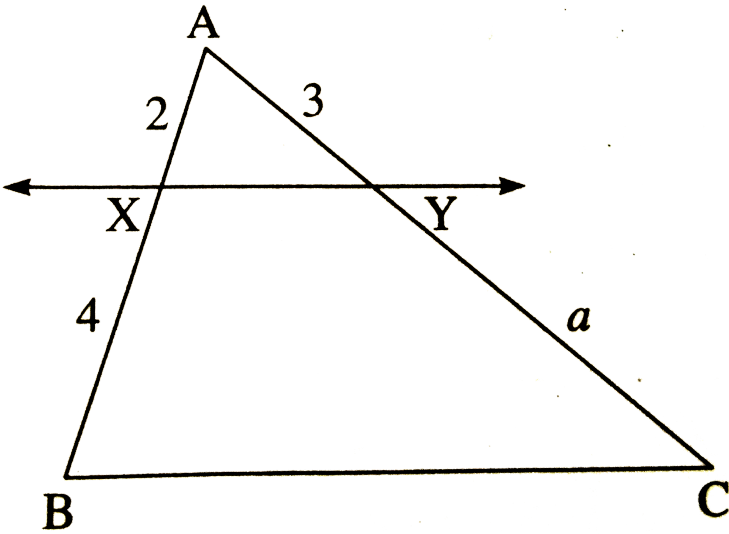
Answer:



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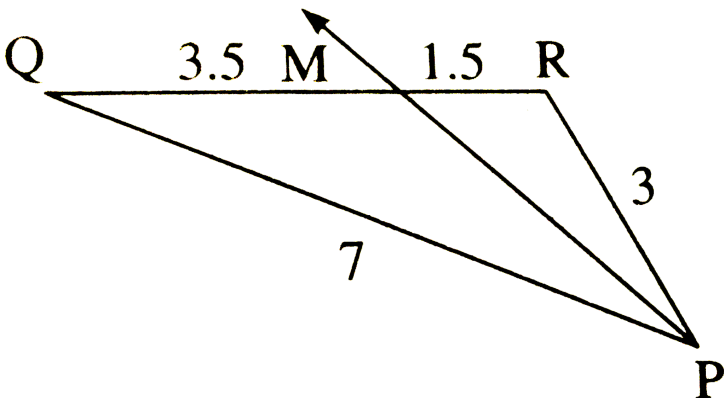
2 2 1 Mark Each

1. In the figure, line $XY \parallel$ side BC . $AX = 2$, $XB = 4$, $AY = 3$ and $YC = a$ then the value of a is



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2. Observe the figure and state whether ray PM bisects $\angle QPR$ or not. Support your answer with a reason.



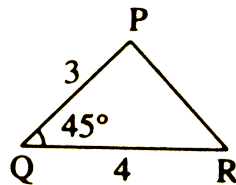
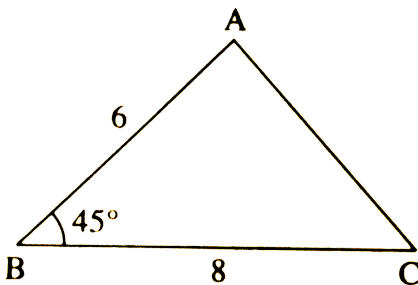


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3. $\Delta PQR \sim \Delta XYZ$, write its corresponding sides in proportion.



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4.

Observe the figure and state whether ΔABC is similar to ΔPQR ? If so, by which test?



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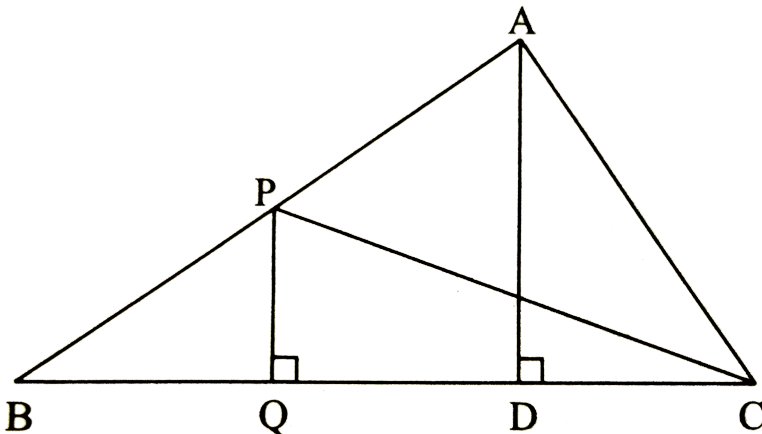
5. The ratio of corresponding sides of similar triangles is 3 : 5, then what is the ratio of their areas.

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2 3 2 Mark Each

1. In adjoining figure, $PQ \perp BC$, $AD \perp BC$ then find the following ratios.

(i) $\frac{A(\Delta PQB)}{A(\Delta PBC)}$ (ii) $\frac{A(\Delta PBC)}{A(\Delta ABC)}$

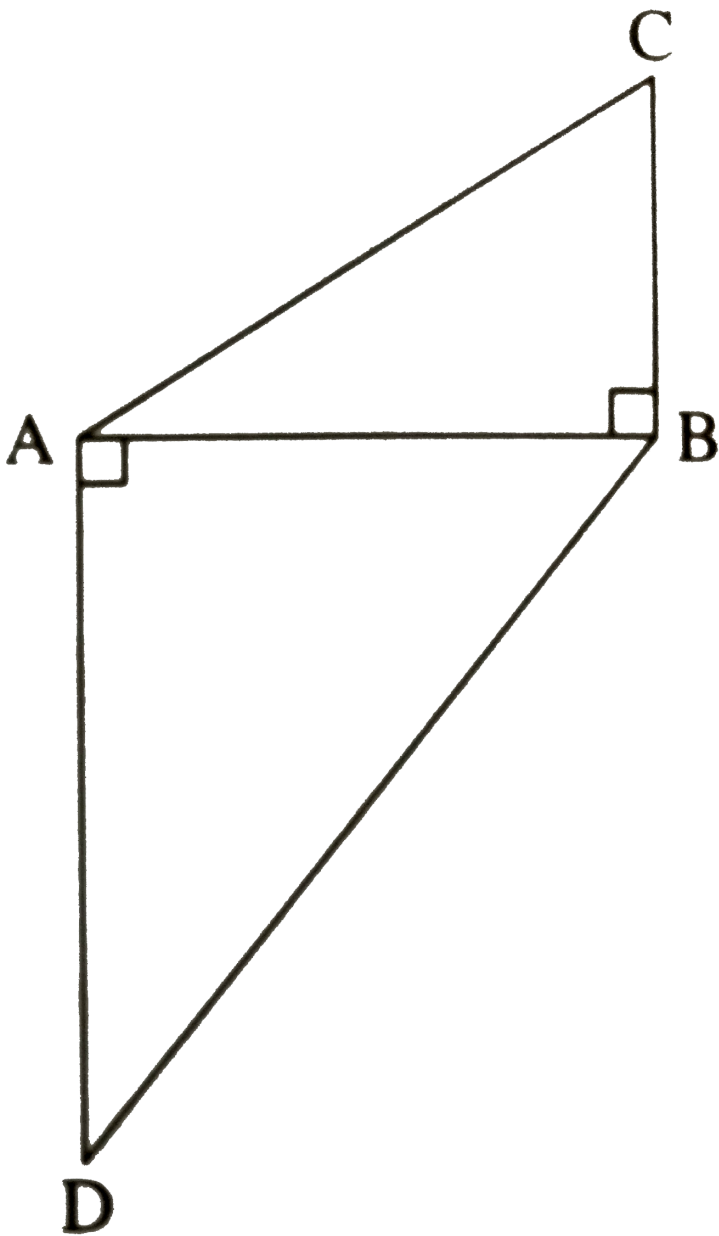




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2. In the figure $BC \perp AB$, $AD \perp AB$, $BC = 4$, $AD = 8$,

then find $\frac{A(\Delta ABC)}{A(\Delta ADB)}$.



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3. In the figure, if $AB \parallel CD \parallel FE$ then complete the following activity to find x .

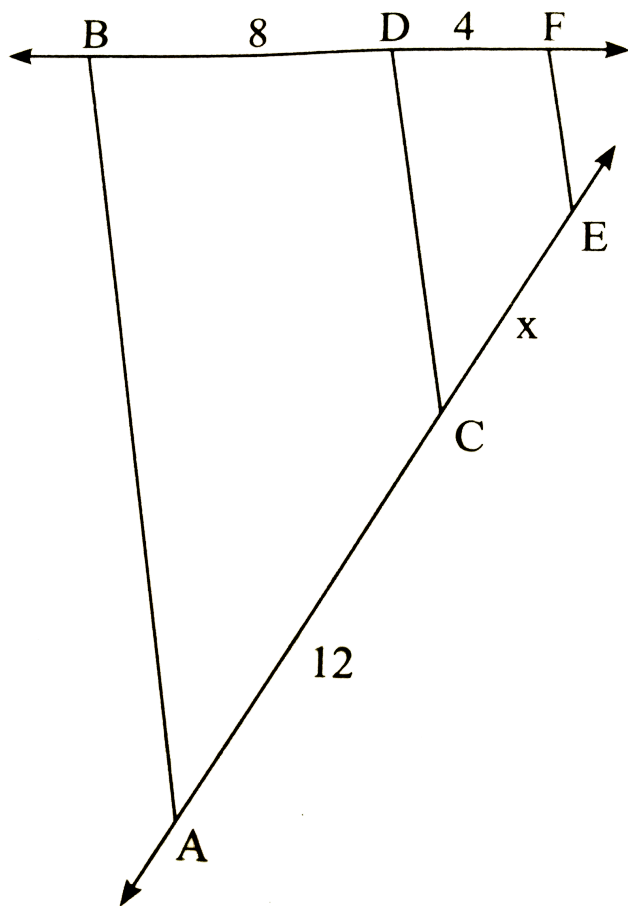
Line $AB \parallel$ line $CD \parallel$ line EF

\therefore by property of three parallel lines and their transversal,

$$\frac{BD}{\square} = \frac{AC}{CE} \therefore \frac{8}{4} = \frac{\square}{x}$$

$$\therefore 8 \times x = 4 \times \square$$

$$\therefore x = \square$$

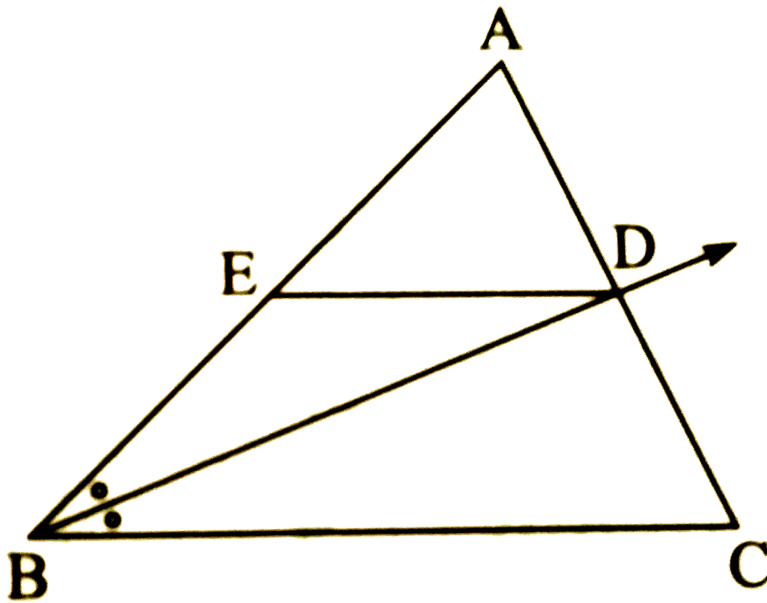


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4. In $\triangle ABC$, ray BD bisects $\angle ABC$. $A - D - C$, side $DE \parallel$ side BC , $A - E - B$.

Prove that, $\frac{AB}{BC} = \frac{AE}{EB}$.

Complete the activity by filling the boxes.



In $\triangle ABC$, ray BD is the bisector of $\angle ABC$

$$\therefore \frac{AB}{BC} = \square \dots\dots(I) \text{ (By angle bisector theorem)}$$

In $\triangle ABC$, seg $DE \parallel$ side BC

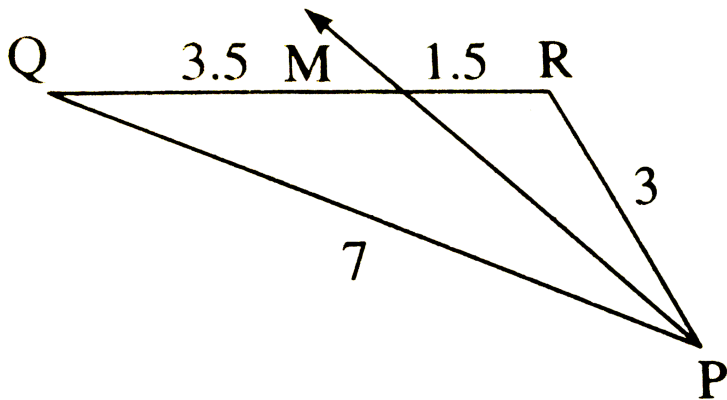
$$\therefore \frac{AE}{EB} = \frac{AD}{DC} \dots\dots(II) \square$$

$$\therefore \frac{AB}{BC} = \frac{AE}{EB} \dots\dots[\text{From (I) and (II)}]$$



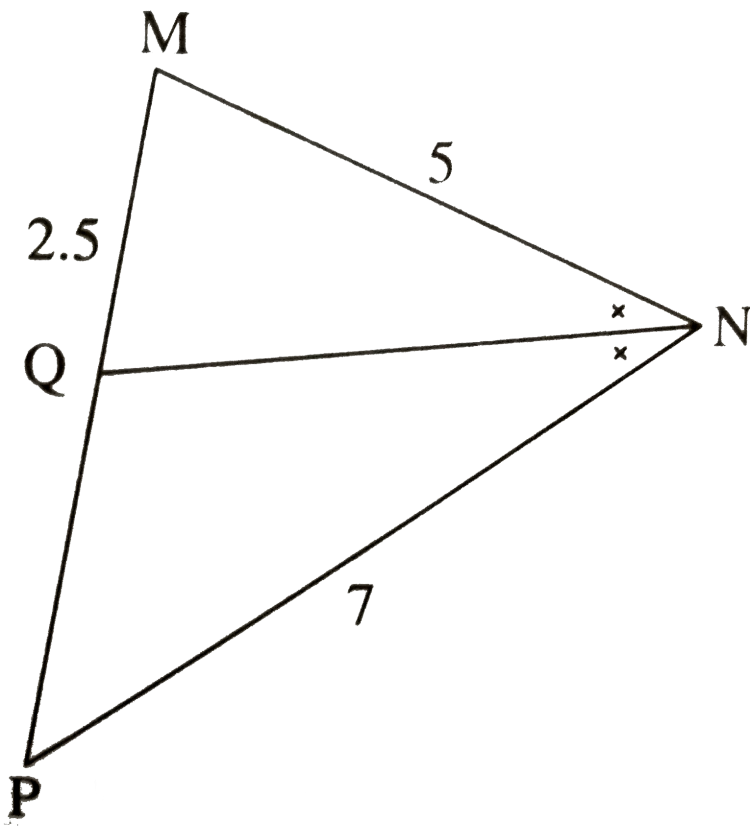
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5. Observe the figure and state whether ray PM bisects $\angle QPR$ or not. Support your answer with a reason.



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6. In $\triangle MNP$, NQ is a bisector of $\angle N$. If $MN = 5$, $PN = 7$, $NQ = 2.5$, find QP .



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7. In the adjoining figure, $BP \perp AC$, $CQ \perp AB$, $A - P - C$, $A - Q - B$. Complete the following activity to Prove $\triangle APB \sim \triangle AQC$.

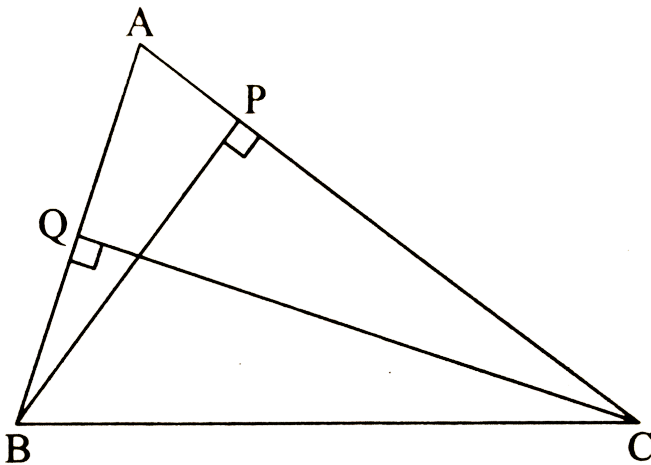
In $\triangle APB$ and $\triangle AQC$

$$\angle APB = \square^\circ \dots\dots(1)$$

$$\angle AQC = \square^\circ \dots\dots(2)$$

$$\therefore \angle APB \cong \angle AQC \dots\dots(\square)$$

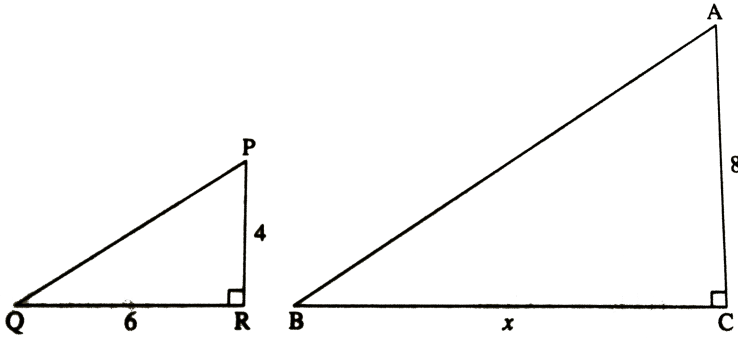
$$\therefore \triangle APB \sim \triangle AQC \dots\dots(\square)$$



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8. As shown in the figures, two poles of height 8m and 4m are perpendicular to the ground. If the length of shadow smaller

pole due to sunlight is 6 m then long will be the shadow of the bigger pole of the same time?



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9. $\triangle LMN \sim \triangle PQR$, $9 \times A(\triangle PQR) = 16 \times A(\triangle LMN)$. If $QR = 20$, then find MN .

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10. In the figure, seg AC and seg BD intersect each other in point P and $\frac{AP}{CP} = \frac{BP}{DP}$. Prove that $\Delta ABP \sim \Delta CDP$.



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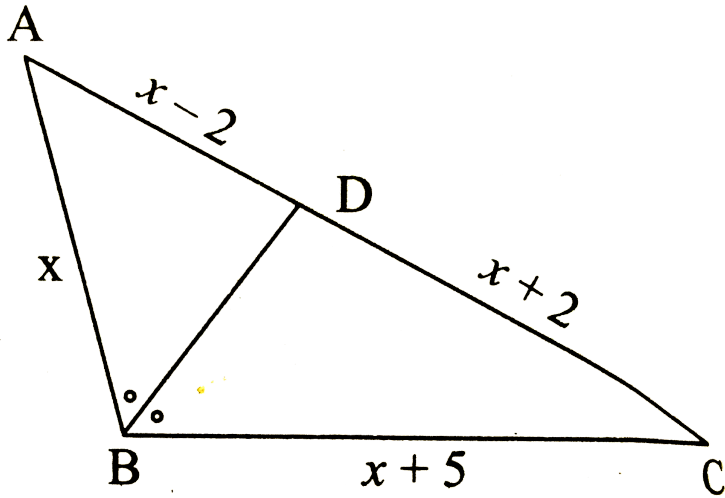
2 4 3 Mark Each

1. Two triangles are similar. The lengths of the sides of the smaller triangle are $4cm$, $5cm$ and $6cm$ respectively. The perimeter of the larger triangle is $90cm$ then find the length of sides of larger triangle.



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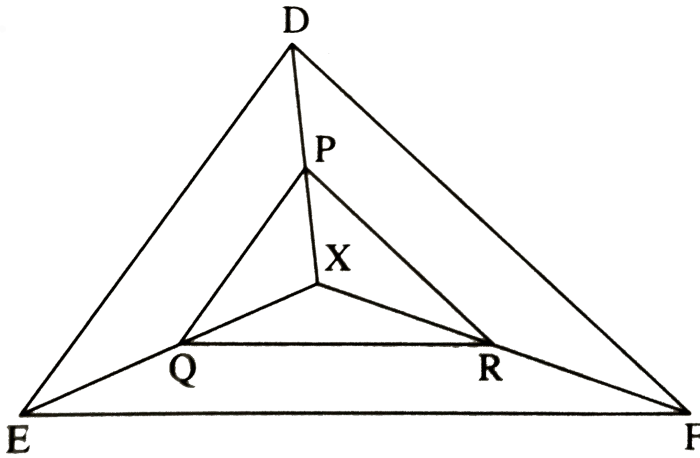
2. In $\triangle ABC$, seg BD bisects $\angle ABC$. If $AB = x$, $BC = x + 5$, $AD = x - 2$, $DC = x + 2$. Find the value of x .



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3. In the figure X is any point in the interior of triangle. Point X is joined to vertices of triangle. Seg $PQ \parallel$ set DE , set $QR \parallel$

set EF . Fill in the blanks to prove that set $PR \parallel \text{seg } DF$.



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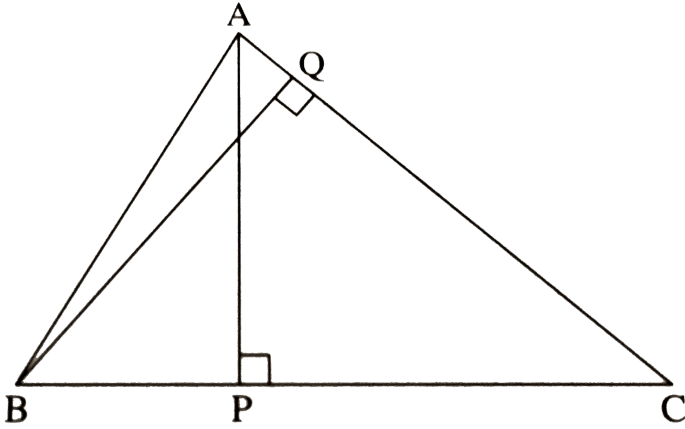
4.

In

$\triangle ABC$, $AP \perp BC$, $BQ \perp AC$. $B - P - C$, $A - Q - C$,

then prove that $\triangle CPA \sim \triangle CQB$.

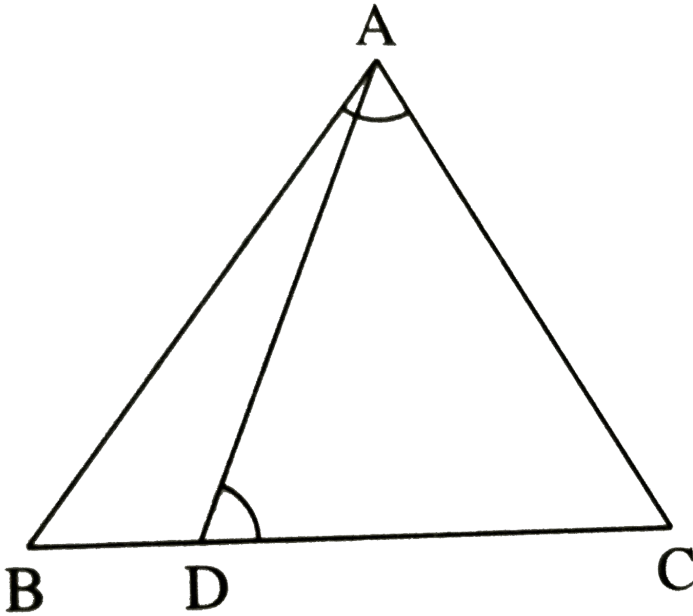
If $AP = 7$, $BQ = 8$, $BC = 12$ then find AC.



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5. In the figure in $\triangle ABC$, point D on side BC is such that $\angle BAC = \angle ADC$.

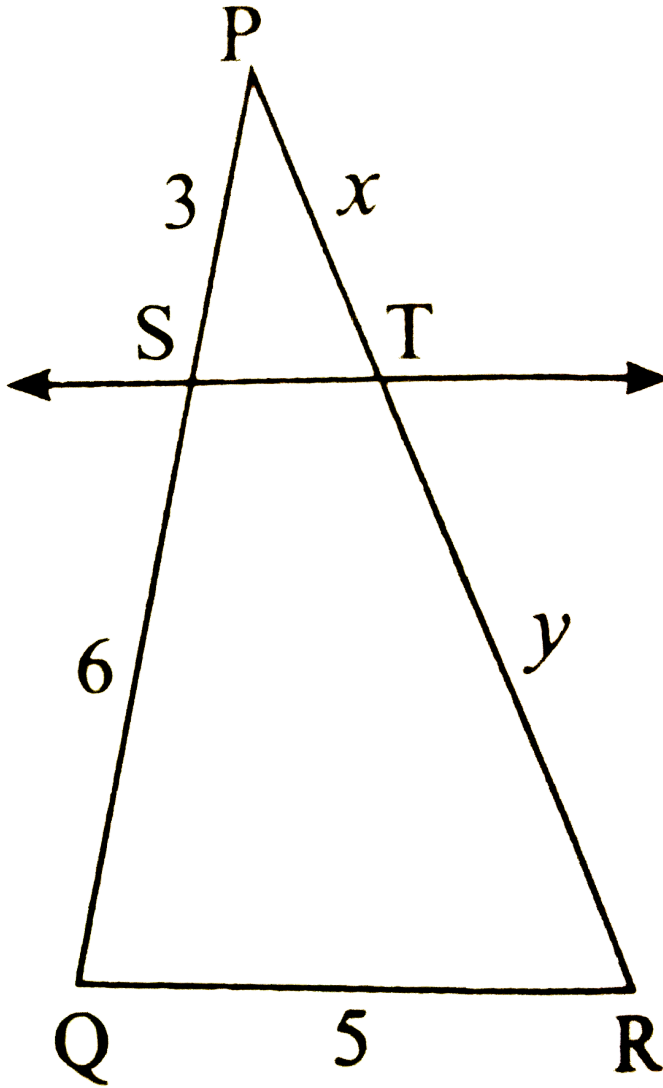
Prove that $CA^2 = CB \times CD$.



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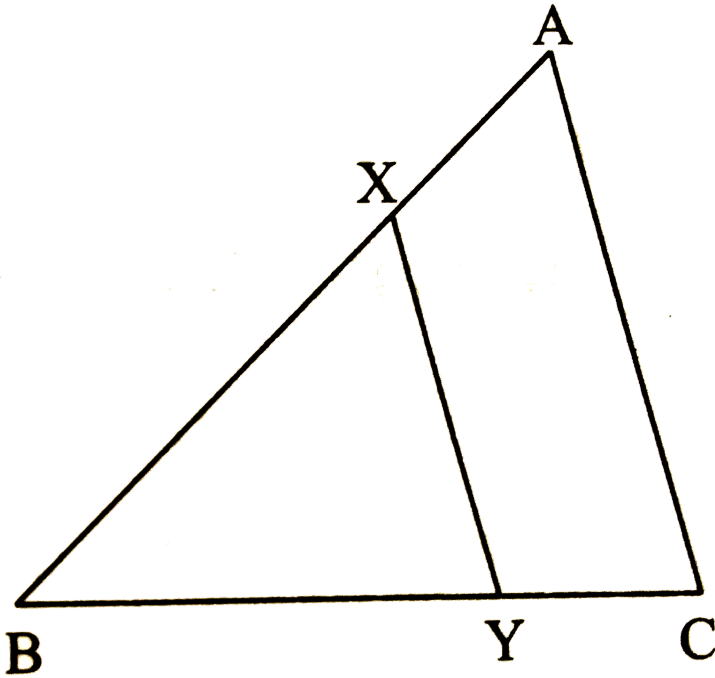
6. In the figure, $PS = 3$, $SQ = 6$, $QR = 5$, $PT = x$ and $TR = y$. Give any two pairs of values of x and y such that line

$ST \parallel$ side QR .



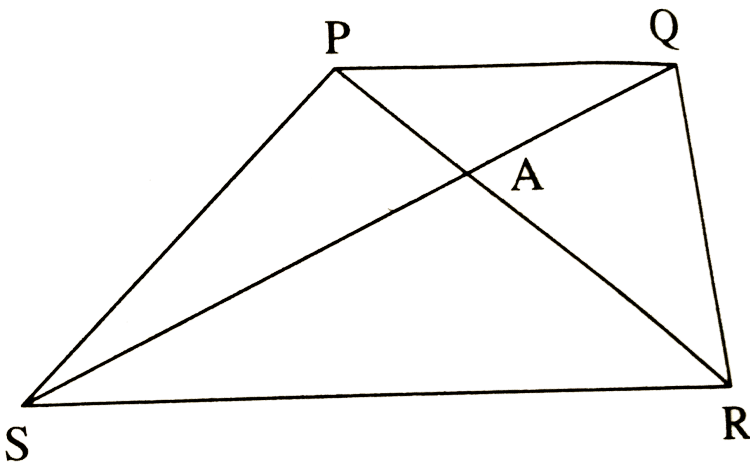
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7. In the adjoining figure, seg $XY \parallel \parallel$ seg AC , IF $3AX = 2BX$ and $XY = 9$ then find the length of AC .



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8. In trapezium $PQRS$, side $PQ \parallel \parallel$ side SR , $AR = 5AP$, $AS = 5AQ$ then prove that $SR = 5PQ$ by completing the following activity.



In $\triangle PQA$ and $\triangle RSA$,

$$\angle PQA \cong \angle RSA \dots (\square)$$

$$\angle PAQ \cong \angle RAS \dots (\square)$$

$$\therefore \triangle PQA \sim \triangle RSA \dots (\square)$$

$$\frac{PQ}{SR} = \frac{AQ}{AR} \dots \dots \dots (\text{Corresponding sides of similar triangles}) \dots$$

(1)

Substituting $AR = 5AP$ in (1)

$$\therefore \frac{PQ}{SR} = \frac{AQ}{5AP}$$

$$\therefore \frac{PQ}{SR} = \frac{1}{5}$$

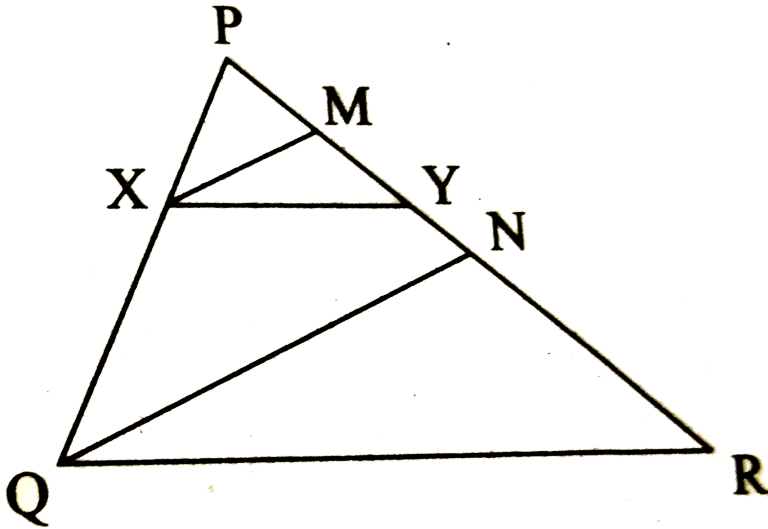
$$\therefore SR = 5PQ$$

2 5 4 Mark Each

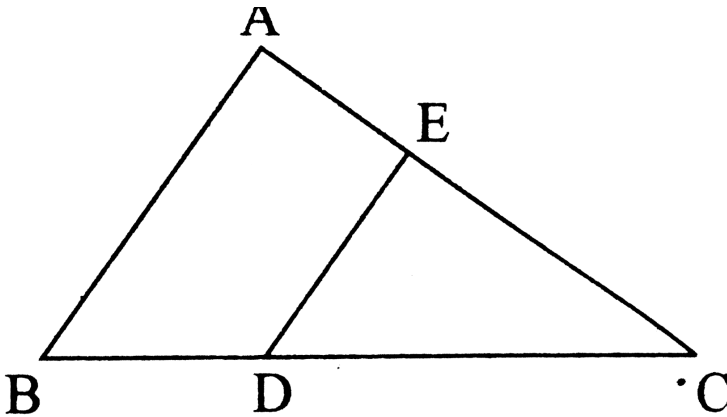
1. In ΔPQR , seg $XY \parallel$ side QR . M and N are the midpoints of seg PY and side PR respectively, $P - M - Y - N - R$.

Prove that (i) $\Delta PXM \sim \Delta PQN$

(ii) seg $XM \parallel$ seg QN .



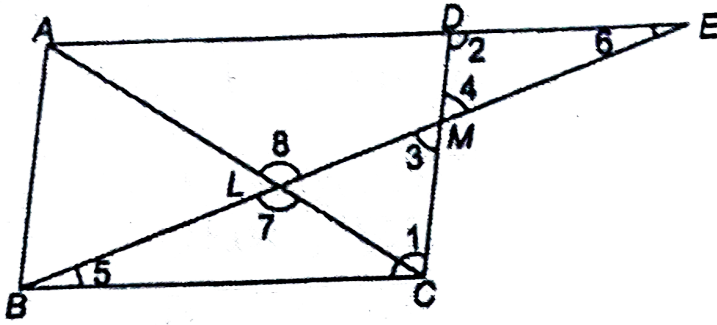
2. In the figure, $\text{seg } DE \parallel \text{side } AB$. $DC = 2BD$, $A(\triangle CDE) = 20\text{cm}^2$. Find $A(\square ABDE)$.



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3. Through the mid-point M of the side CD of a parallelogram $ABCD$, the line BM is drawn, intersecting AC in L and AD

produced in E. Prove that $EL = 2BL$



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Assignment 2 1

1. The ratio of corresponding sides of similar triangles is $5:7$, then what is the ratio of their areas?

A. $25:49$

B. $49:25$

C. 5:7

D. 7:5

Answer:



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2. A vertical stick $40m$ long casts a shadow $20m$ long on the ground. At the same time, a tower of height..... Casts a shadow $50m$ long on the ground.

A. $100m$

B. $50m$

C. $25m$

D. $150m$

Answer:



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3. The areas of two similar triangles are 36cm^2 and 121cm^2 .

The ratio of their corresponding sides are

A. 36 : 121

B. 121 : 36

C. 6 : 11

D. 11 : 6

Answer:



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4. If $\triangle ABC \sim \triangle DEF$ and $\angle A = 45^\circ$, $\angle E = 87^\circ$, then $\angle C =$
..... .

A. 45°

B. 87°

C. 48°

D. cannot be determined

Answer:



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5. In a ABC , AD is the bisector of $\angle BAC$. If $AB = 8cm$,
 $BD = 6cm$ and $DC = 3cm$. Find AC 4cm (b) 6cm (c) 3cm
(d) 8cm

A. 4cm

B. 3cm

C. 6cm

D. 8cm

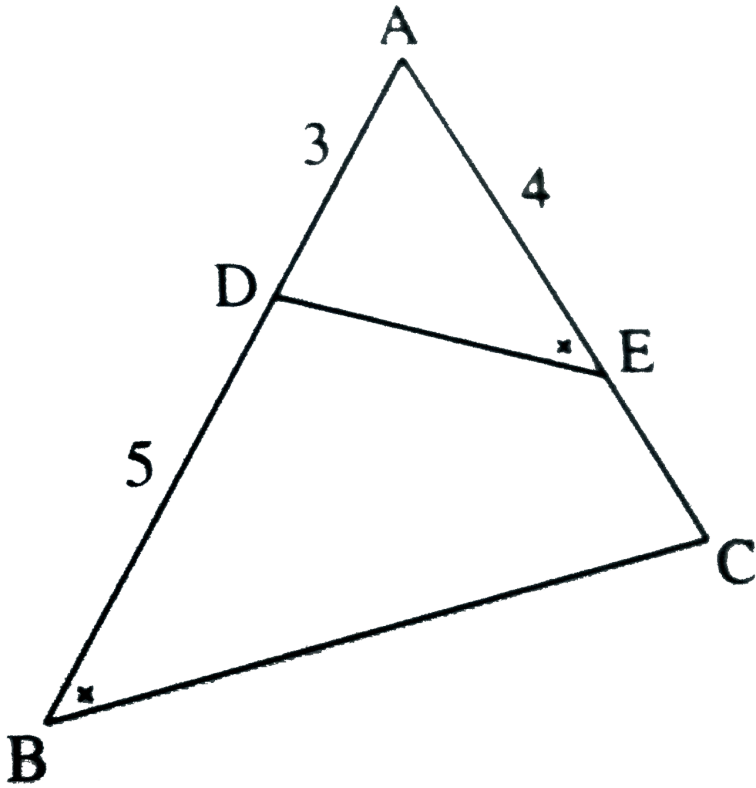
Answer:



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6. In the figure $\angle AED = \angle ABC$, $AD = 3$, $DB = 5$, $AE = 4$ then length

of AC is ..



A. 2

B. 6

C. 8

D. 12

Answer:



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7. The areas of two similar triangles are 9cm^2 and 16cm^2 . The ratio of their corresponding heights is

A. 9:16

B. 3:4

C. 4:3

D. 16:9

Answer:



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8. The corresponding medians of two similar triangles are in the ratio $4:7$. Let their respective areas be A_1 and A_2 . $A_1 : A_2 = \dots$.

A. $16:49$

B. $4:7$

C. $7:4$

D. $49:16$

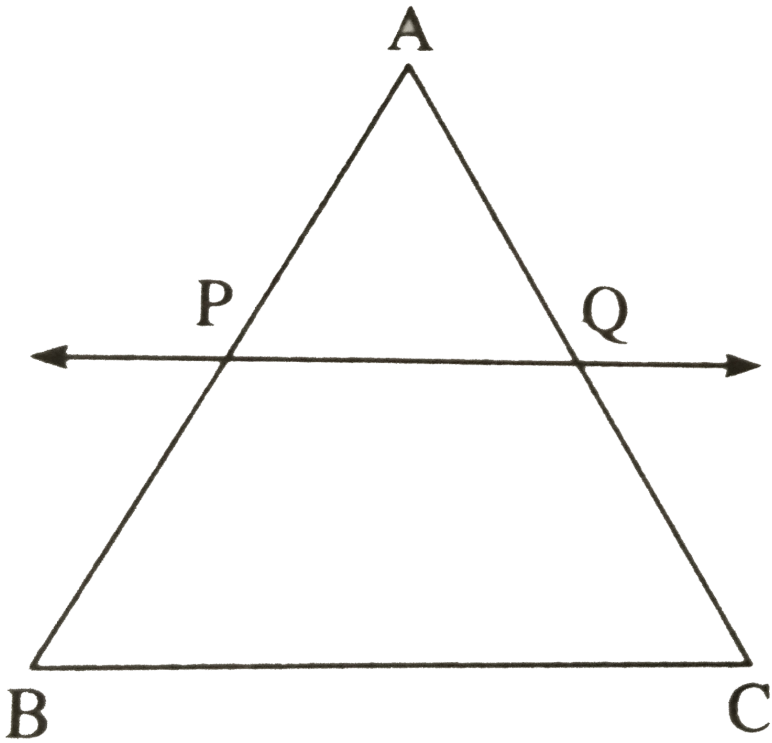
Answer:



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Assignment 2 2

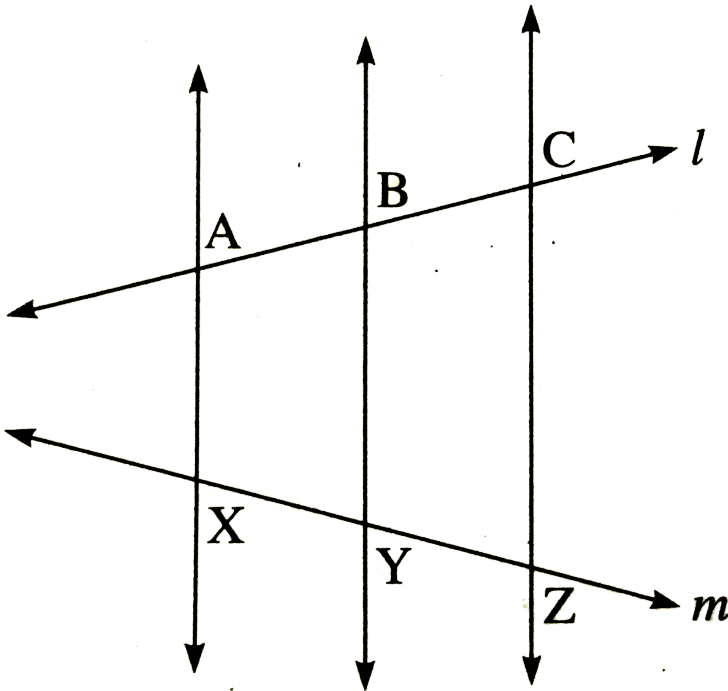
1. In the figure, line $PQ \parallel \parallel$ side BC then write the ratio in which sides AB and AC are divided proportionately. Also give your reason.



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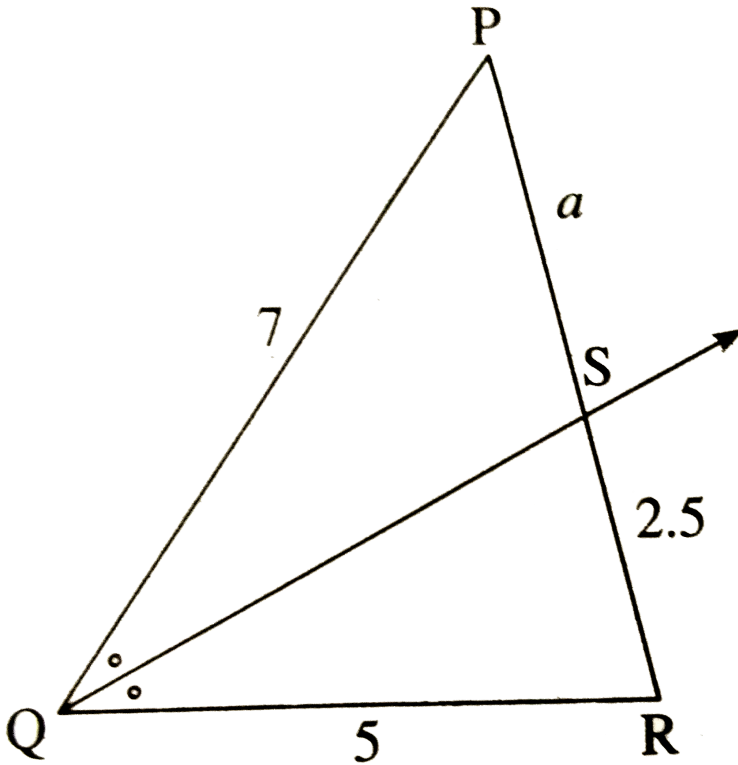
2. In the figure, line $AX \parallel \parallel$ line $BY \parallel \parallel$ line CZ then complete the ratio

$$\frac{AB}{\square} = \frac{\square}{YZ}.$$



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3. In the figure, ray QS bisects $\angle PQR$. $PQ = 7$, $QR = 5$, $SR = 2.5$ and $PS = a$ then the value of a is

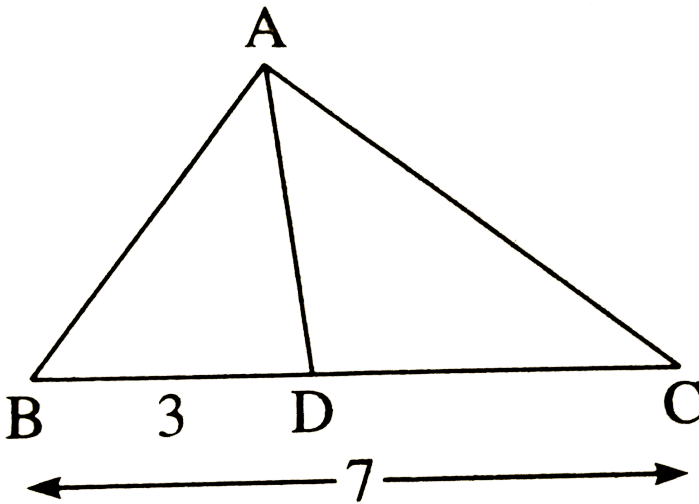


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4. If $\triangle ABC \sim \triangle DEF$ and $AB: PQ = 5:7$ then write the ratio of $A(\triangle ABC): A(\triangle PQR)$.

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5. In the figure, $BC = 7$ and $BD = 3$ then write the ratio of $A(\triangle ADC): A(\triangle ABC)$.



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Assignment 2 3

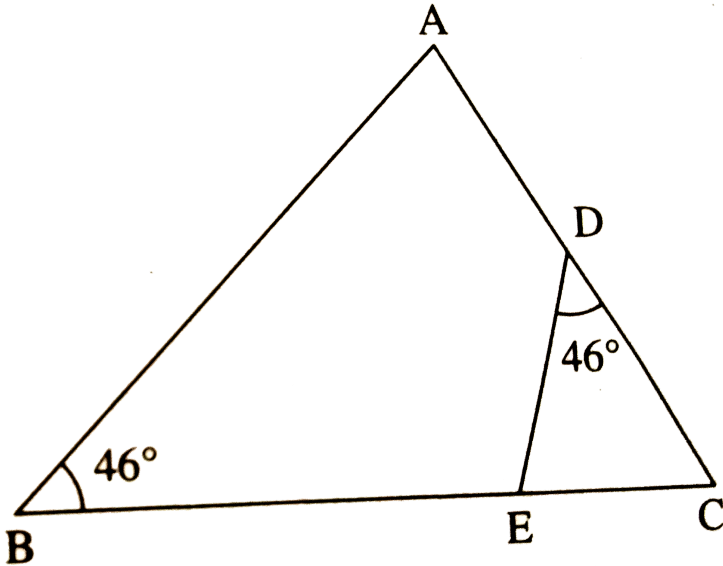
1. Observe the figure and complete the following activity.

In $\triangle ABC$ and $\triangle EDC$,

$\angle ABC \cong \angle \square$ (Each measures 46°)

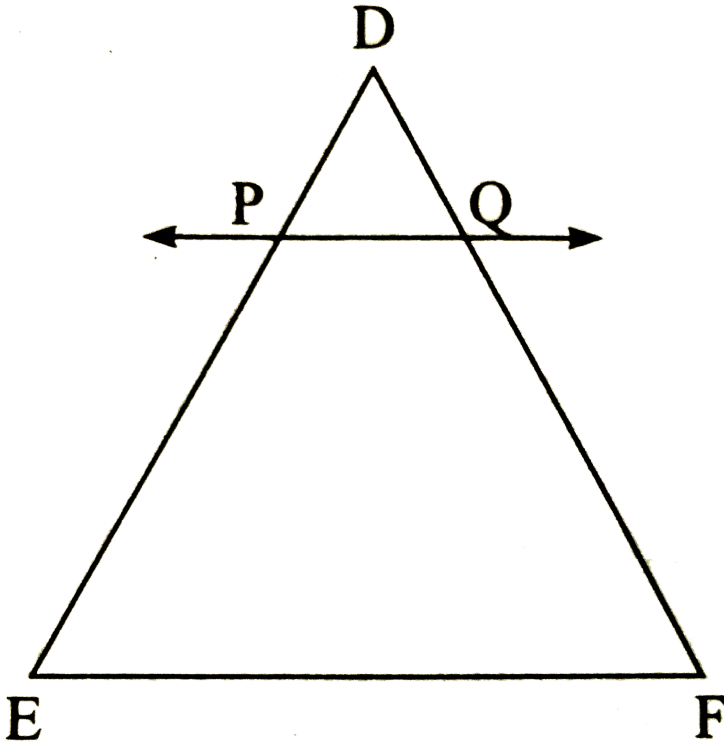
$\angle C \cong \angle C$(\square)

$\therefore \triangle ABC \sim \triangle EDC$[\square test for similarity]



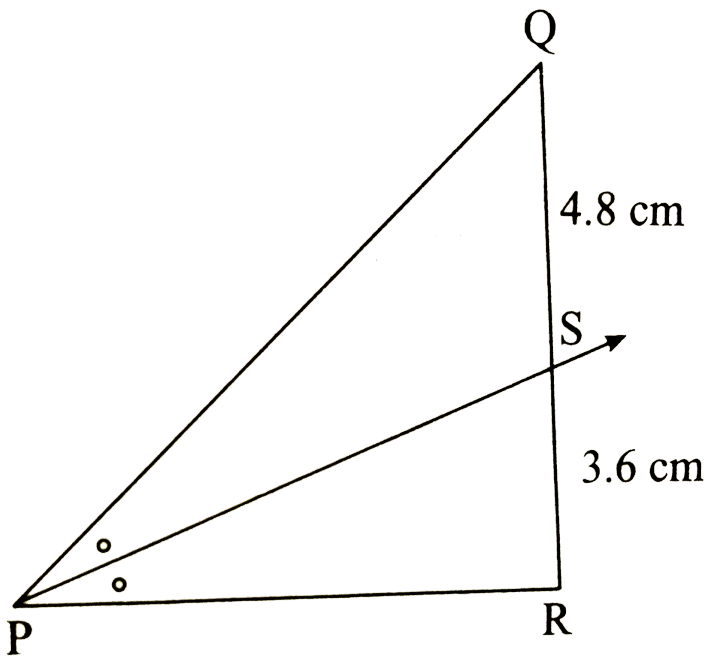
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2. In $\triangle DEF$, line $PQ \parallel$ side EF , if $DP = 2.4$, $PE = 7.2$, $DQ = 1.8$ then find QF .



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3. In $\triangle PQR$, ray PS is the bisector of $\angle QPR$, $Q - S - R$. If $Qs = 4.8\text{cm}$, $SR = 3.6\text{cm}$, find $PQ : PR$.



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4. $\triangle ABC \sim \triangle PQR$. If $AB = 4\text{ cm}$, $PQ = 6\text{ cm}$ and $QR = 9\text{ cm}$. Find BC .

A. 5 cm

B. 6 cm

C. 7 cm

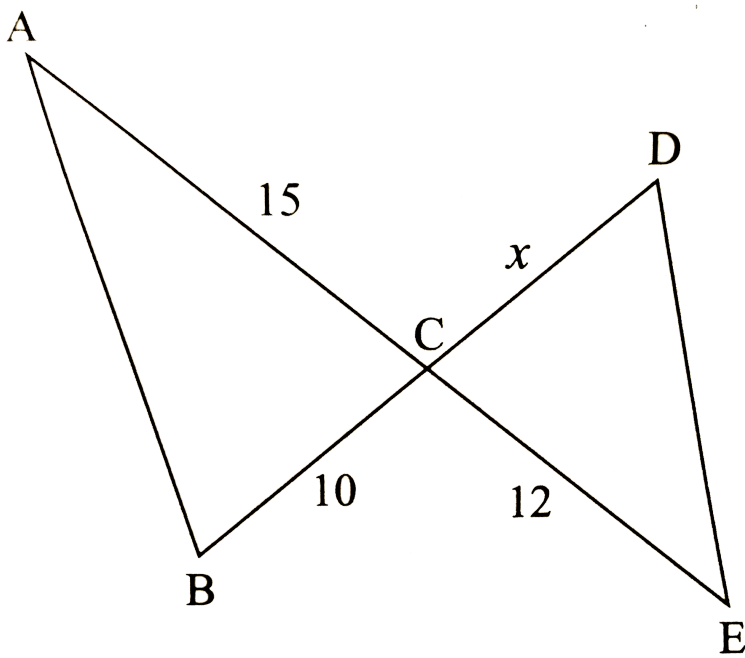
D. 8 cm

Answer: option 2



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5. In the figure, $\triangle ABC \sim \triangle EDC$, $AC = 15$, $BC = 10$,
 $CE = 12$. Find x



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6. $\triangle ABC \sim \triangle PQR$. If $AB:PQ = 4:5$, find $A(\triangle ABC):A(\triangle PQR)$.

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7. $\triangle ABC \sim \triangle DEF$. $A(\triangle ABC) : A(\triangle DEF) = 49 : 100$. Find the ratio of $AB : DE$.

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8. In order to prove, 'The bisector of an angle of a triangle divides the side opposite to the angle in the ratio of the remaining sides.'

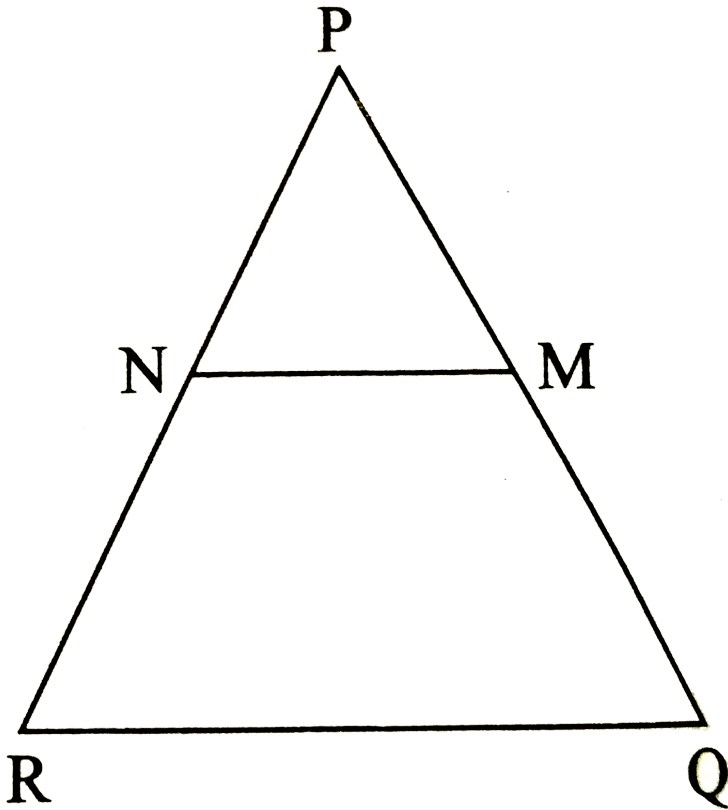
(i) Draw a neat labelled figure.

(ii) Write 'Given' and 'To prove'.

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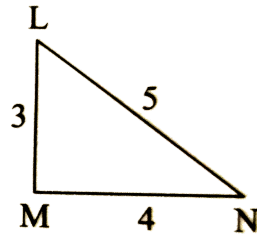
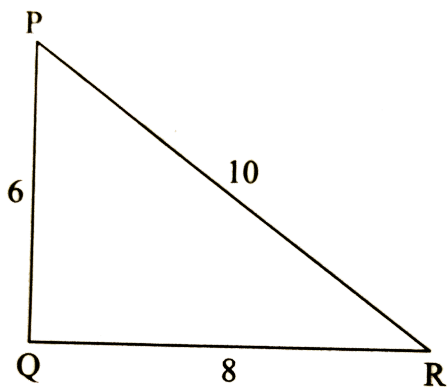
9. In $\triangle PQR$, $PM = 15$, $MQ = 10$, $PN = 12$ and $NR = 8$. State whether line NM is parallel to side RQ or not. Give

reason.



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10. Are the triangles in the following figures similar . If yes, by which test?

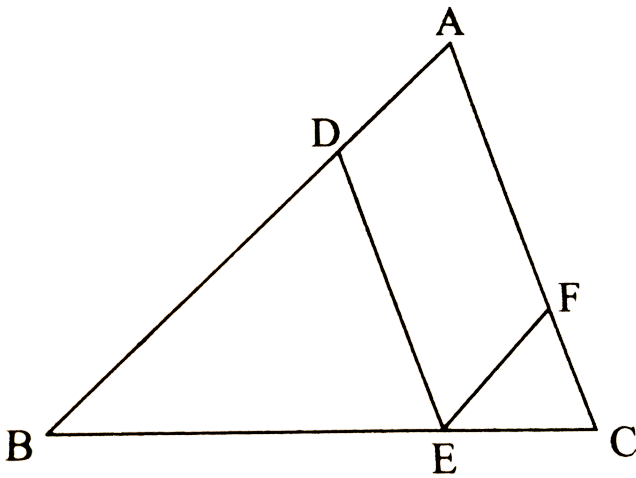


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Assignment 2 4

1. In the figure, seg $DE \parallel$ side AC and seg $EF \parallel$ side BA

then prove that $\frac{AD}{DB} \times \frac{AF}{FC} = 1$

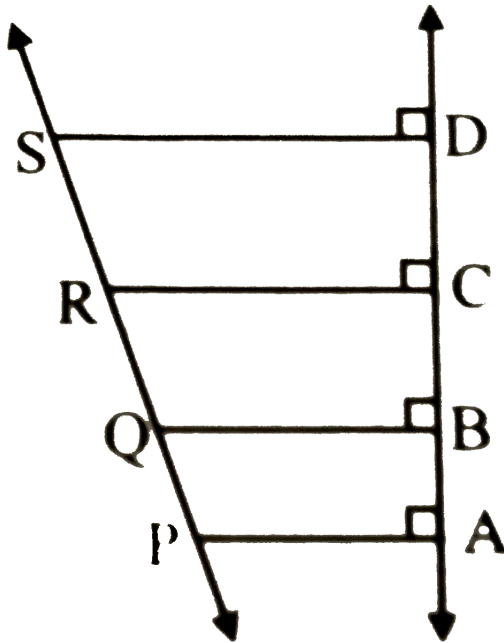


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2. In trapezium $PQRS$, side $PQ \parallel SR$. Diagonals PR and QS intersect each other at point M . $PQ = 2RS$. Prove that $PM = 2RM$ and $QM = 2SM$.

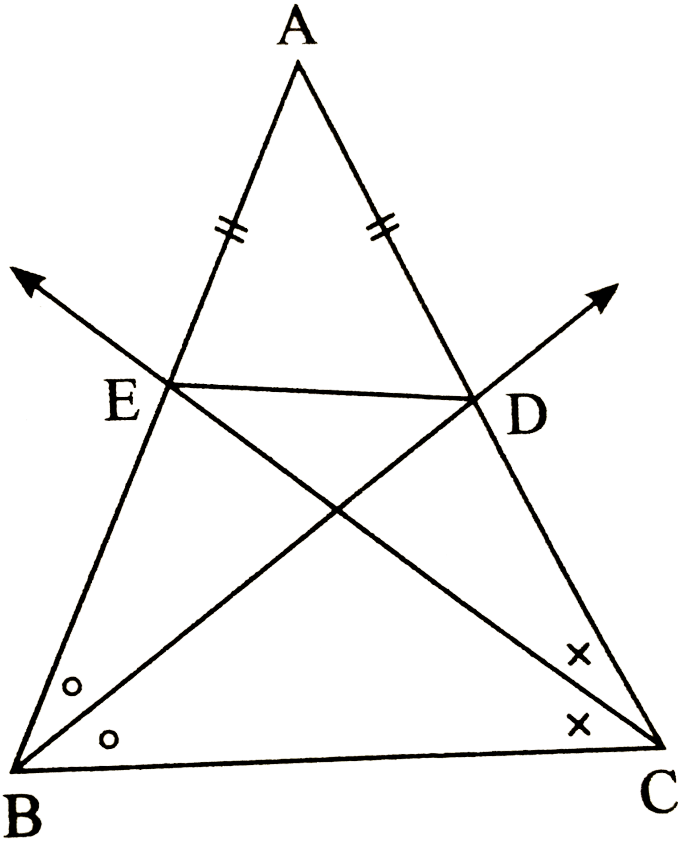
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3. In the adjoining figure, seg PA, seg QB, seg RC and seg SD are perpendicular to line AD. $AB = 60$, $BC = 70$, $CD = 80$, $PS = 280$, then find PQ, QR and RS.



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4. In the figure, $\text{seg } AB \cong \text{seg } AC$, ray CE bisects $\angle ACB$, ray BD bisects $\angle ABC$. Prove that ray $ED \parallel$ side BC .



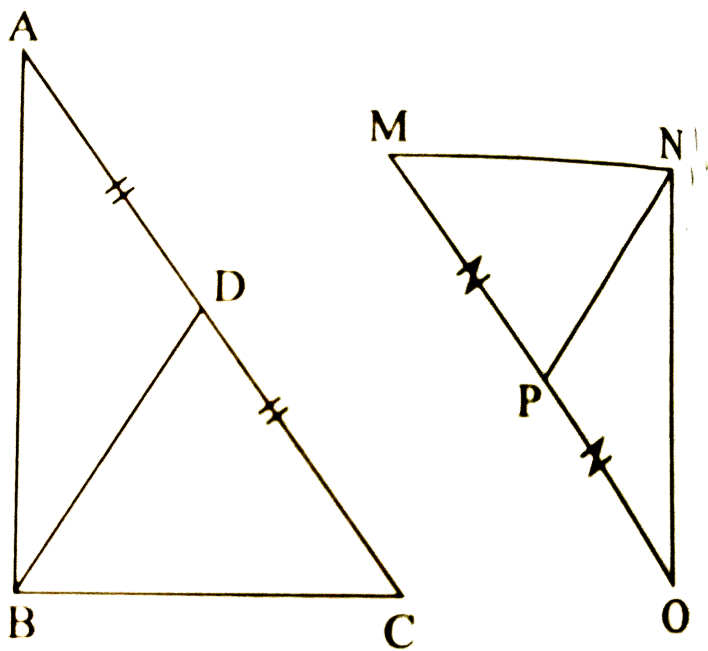
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5. In the figure, $\triangle ABC \sim \triangle MNO$, D is the midpoint of side AC and P is the midpoint of side MO .

Prove : (i) $\triangle ABD \sim \triangle MNP$

(ii) $\frac{BD}{NP} = \frac{AB}{MN}$

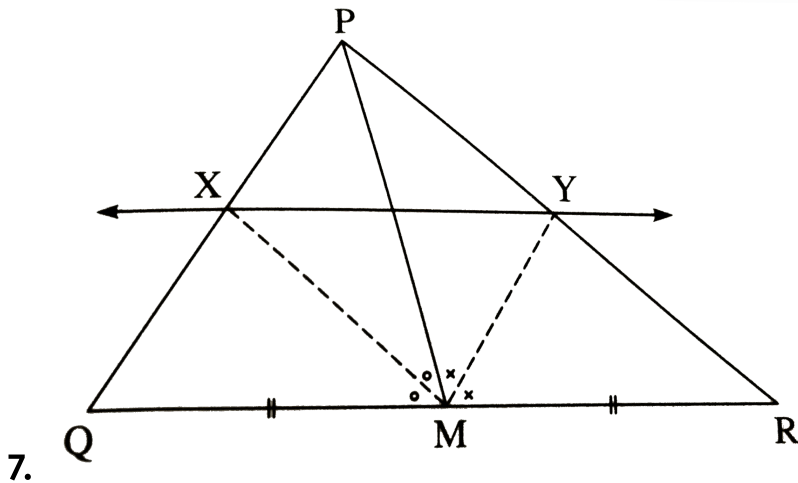
(iii) Write your conclusion of the result obtained in (ii).



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6. $\square ABCD$ is a parallelogram. Point E is on side BC . Line DE intersects ray AB in point T . Prove that $DE \times BE = CE \times TE$.

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In $\triangle PQR$ seg PM is a median. Angle bisectors of $\angle PMQ$ and $\angle PMR$ intersect side PQ and side PR in points X and Y respectively. Prove that $XY \parallel QR$.

Complete the proof by filling in the boxes:

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8. Prove that , "If a line parallel to a side of a triangle intersects the remaining sides in two distinct points then the line divides the sides in the same proportion".

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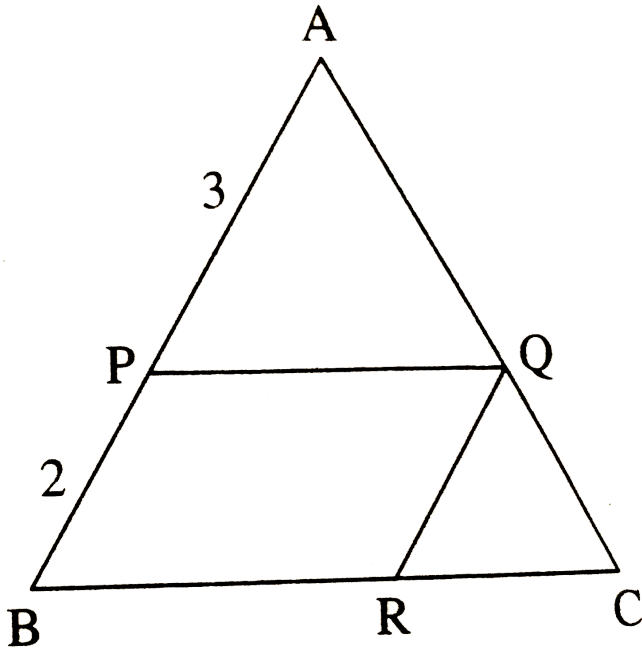
Assignment 2 5

1. In the figure, $\text{seg } PQ \parallel \text{side } BC$ and $\text{seg } QR \parallel \text{side } AB$.

(i) Find $\frac{AQ}{QC}$.

(ii) What would be $\frac{CR}{RB}$?

(iii) Is $\frac{BP}{PA} = \frac{BR}{RC}$?



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2. In $\square ABCD$, side $BC \parallel$ side AD . Diagonals AC and BD intersect each other at P . If $AP = \frac{1}{3}AC$ then prove $DP = \frac{1}{2}BP$.

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3. यदि दो समरूप त्रिभुजों के क्षेत्रफल बराबर हो तो सिद्ध कीजिए कि वे त्रिभुज सर्वांगसम होते हैं

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4. A line cuts two sides AB and AC of $\triangle ABC$ at points P and Q respectively. Prove $\frac{A(\triangle APQ)}{A(\triangle ABC)} = \frac{AP \times AQ}{AB \times AC}$.

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5. In $\triangle ABC$, E is the midpoint of the median AD . BE produced meets AC at F . Prove that $AF = \left(\frac{1}{3}\right)AC$

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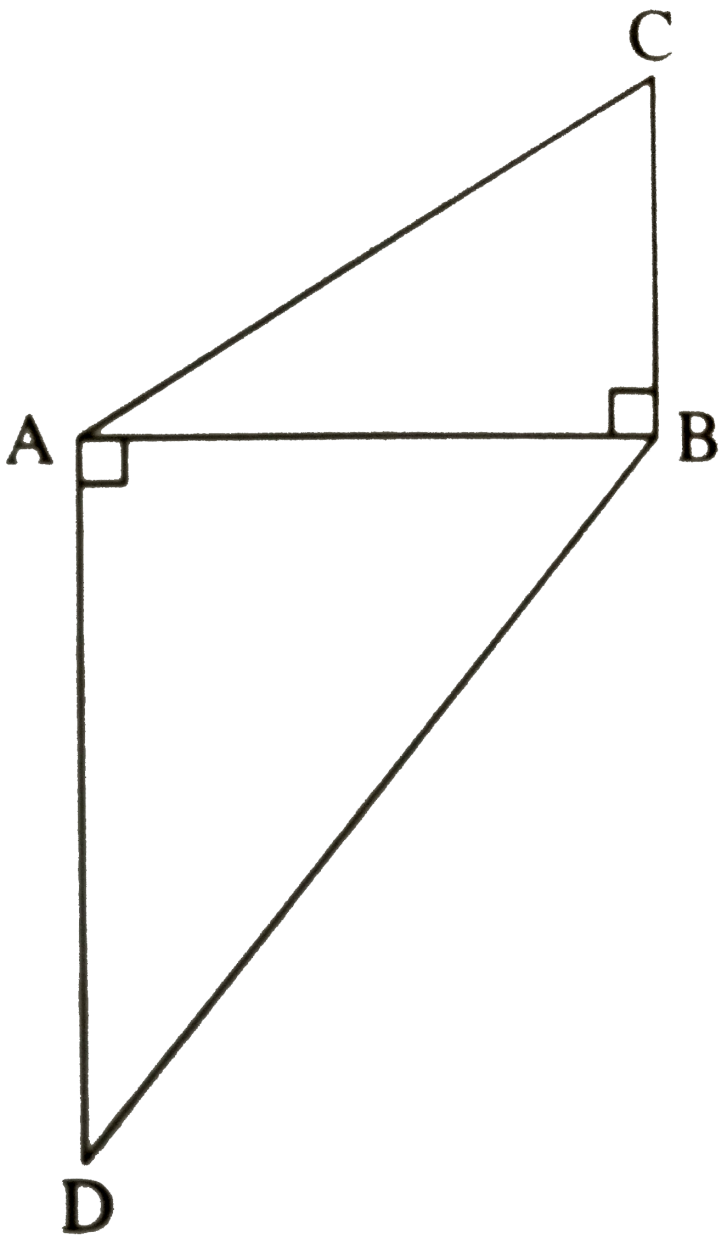
Example Type

1. Base of a triangle is 9 and height is 5. Base of another triangle is 10 and height is 6. Find the ratio of areas of these triangles.

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2. In the figure $BC \perp AB$, $AD \perp AB$, $BC = 4$, $AD = 8$,

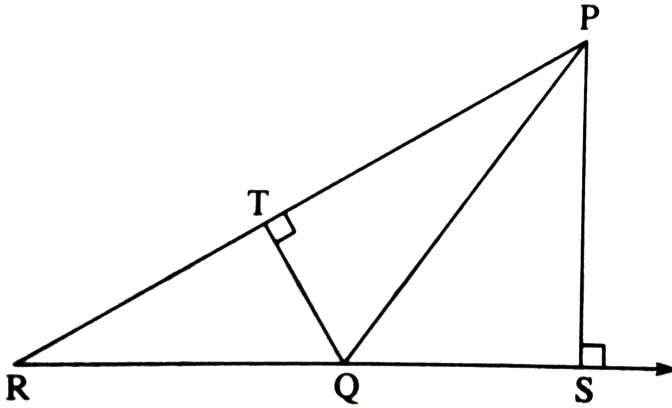
then find $\frac{A(\Delta ABC)}{A(\Delta ADB)}$.



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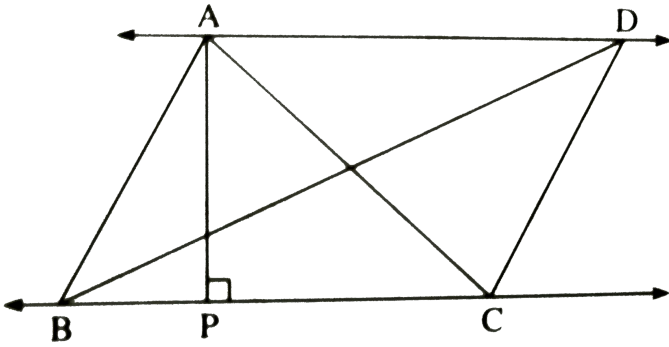
3. In the following figure set $PS \perp \text{seg } RQ$, set $QT \perp \text{seg } PR$.

If $RQ = 6$, $PS = 6$ and $PR = 12$, then find the QT .



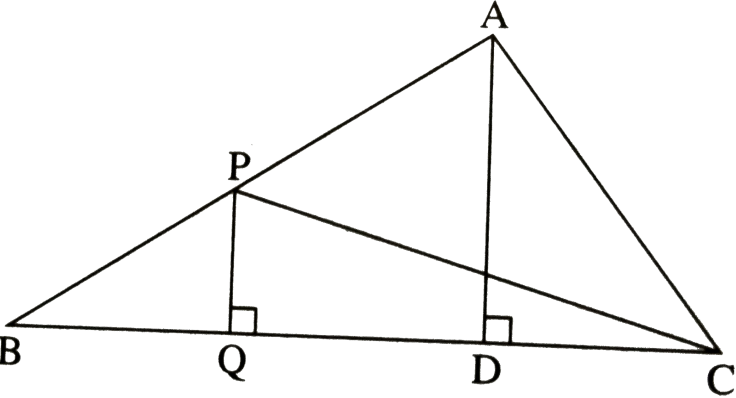
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4. In the following figure $AP \perp BC$, $AD \parallel BC$, then find $A(\Delta ABC) : A(\Delta BCD)$.



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5. In the adjoining figure $PQ \perp BC$, $AD \perp BC$, then find following ratios:

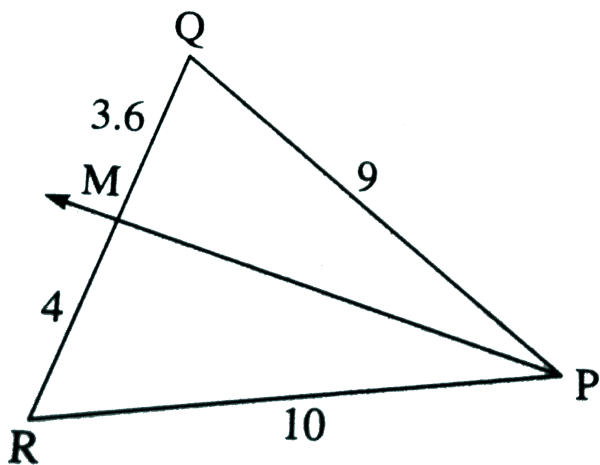
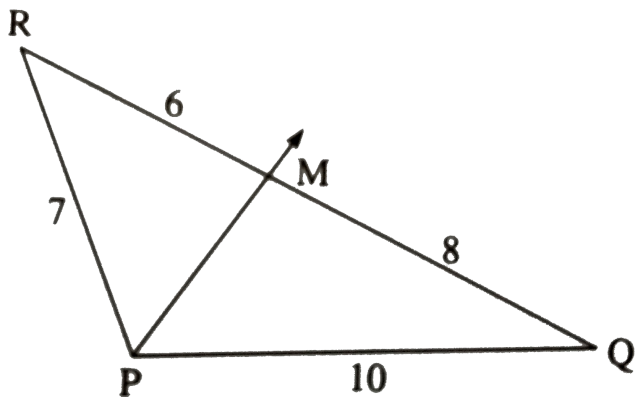
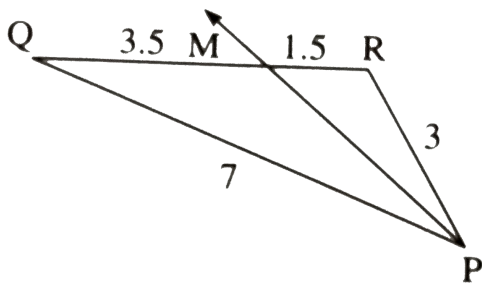


$$(i) \frac{A(\Delta PQB)}{A(\Delta PBC)} \quad (ii) \frac{A(\Delta PBC)}{A(\Delta ABC)}$$
$$(iii) \frac{A(\Delta ABC)}{A(\Delta ADC)} \quad (iv) \frac{A(\Delta ADC)}{A(\Delta PQC)}$$

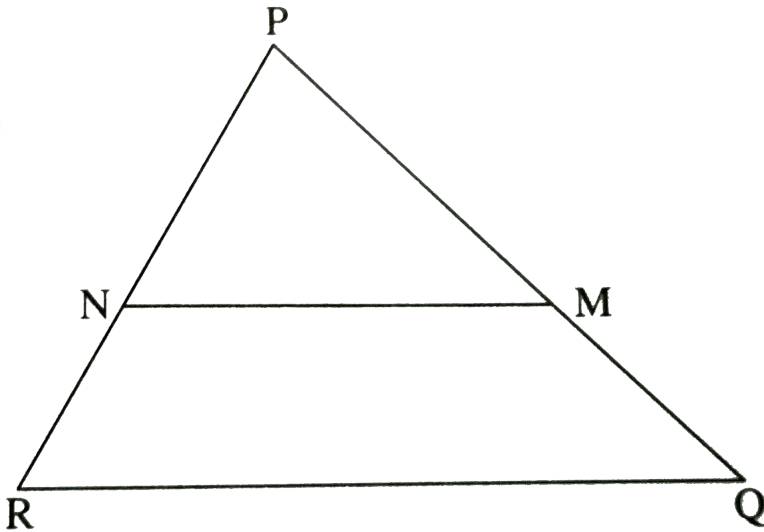


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6. Given below are some triangles and lengths of line segments. Identify in which figures, ray PM is the bisector of $\angle QPR$.

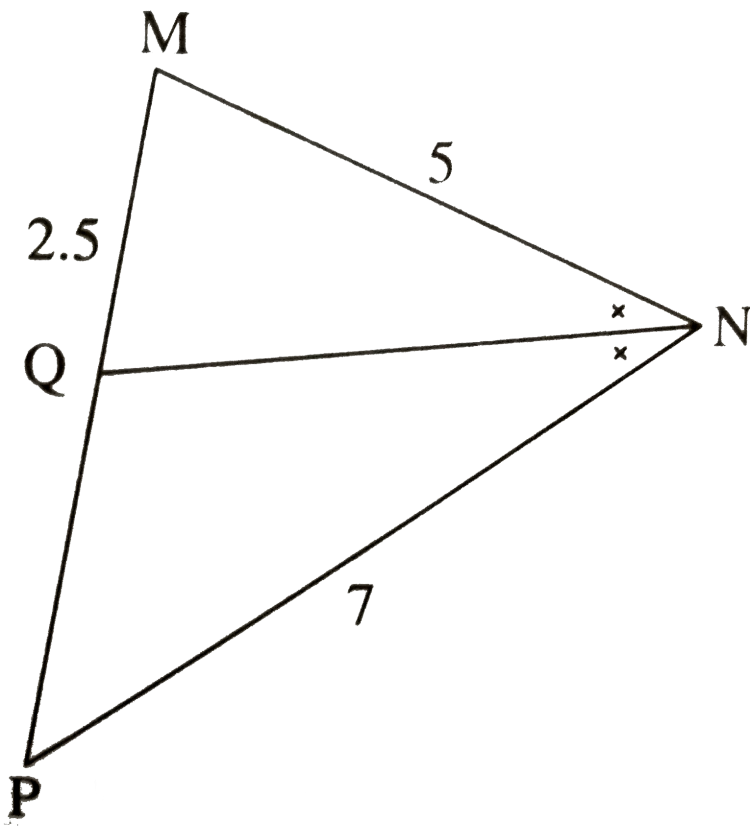


7. In $\triangle PQR$, $PM = 15$, $PQ = 25$, $PR = 20$, $NR = 8$. State whether line NM is parallel to side RQ or not. Given Reason.



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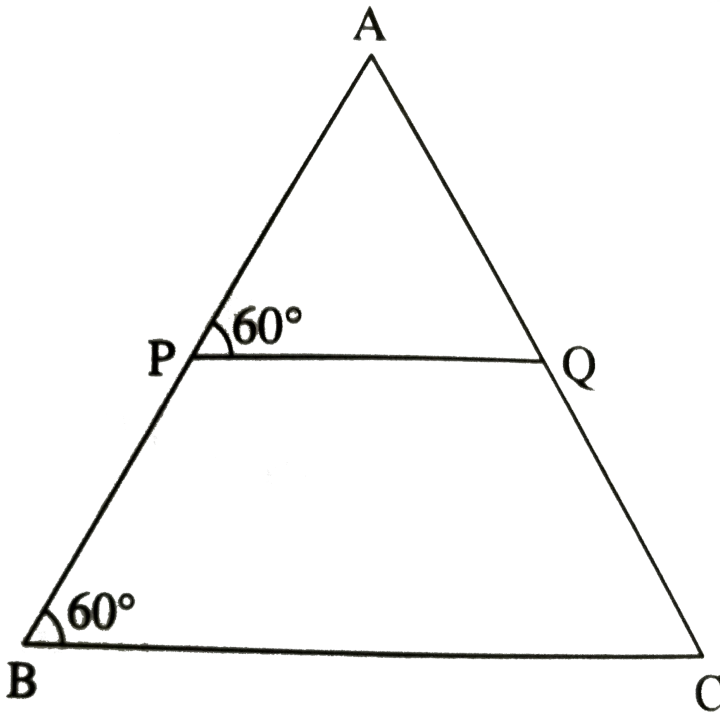
8. In $\triangle MNP$, NQ is a bisector of $\angle N$. If $MN = 5$, $PN = 7$, $MQ = 2.5$, the find QP .



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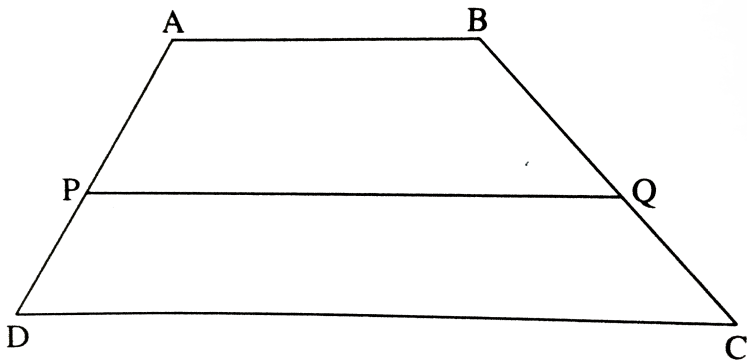
9. Measures of some angles in the figures are given. Prove

that
$$\frac{AP}{PB} = \frac{AQ}{QC}$$



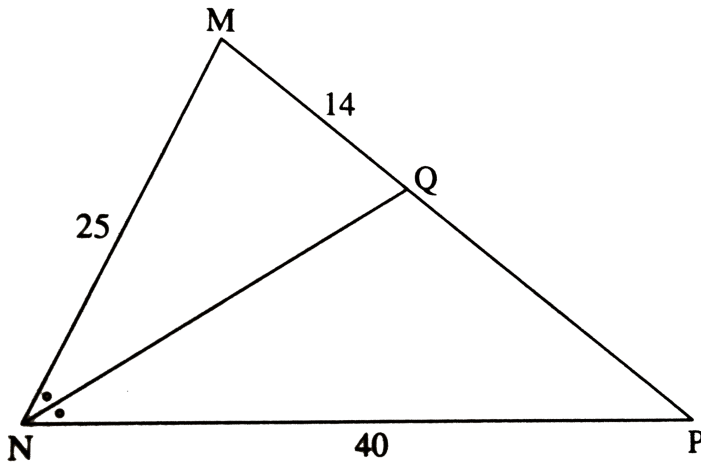
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10. In trapezium $ABCD$ side $AB \parallel$ side $PQ \parallel$ side DC , $AP = 15$, $PD = 12$, $QC = 14$, find BQ .



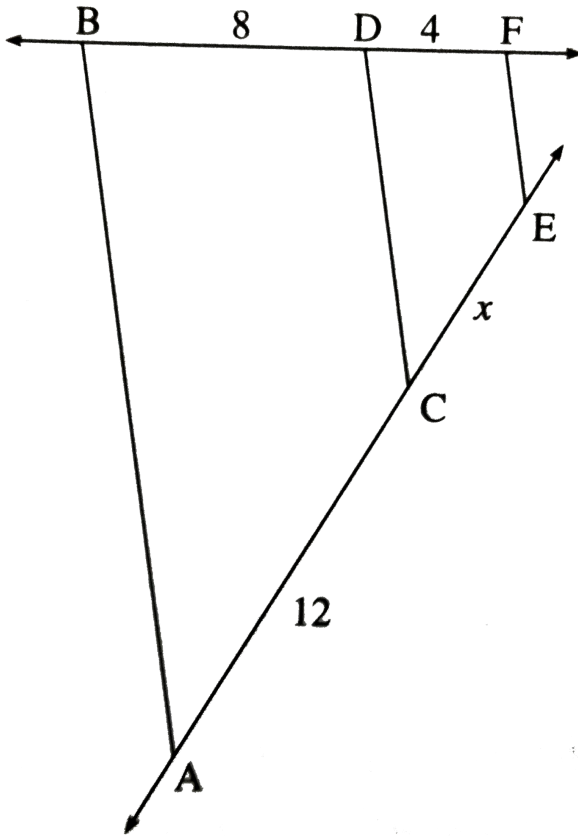
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11. Find QP using given information in the figure.



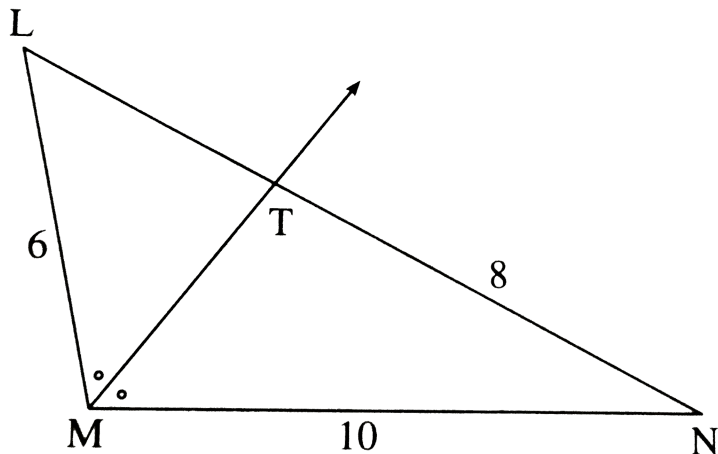
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12. In the figure if $AB \parallel CD \parallel FE$ then find x and AE .



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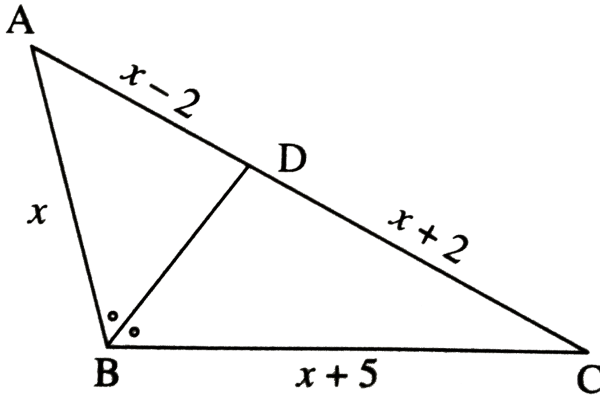
13. In $\triangle LMN$, ray MT bisects $\angle LMN$. If $LM = 6$, $MN = 10$. $TN = 8$ then find LT .



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14. In $\triangle ABC$ set BD bisects $\angle ABC$. If $AB = x$, $BC = x + 5$, $AD = x - 2$, $DC = x + 2$, then find

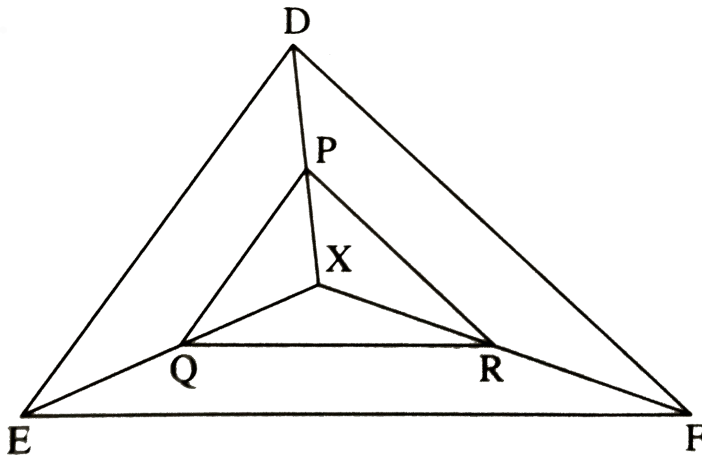
the value of x .



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15. In the figure X is any point in the interior of triangle. Point X is joined to vertices of triangle. Seg $PQ \parallel$ set DE , set $QR \parallel$ set EF . Fill in the blanks to prove that set $PR \parallel$ seg

DF.



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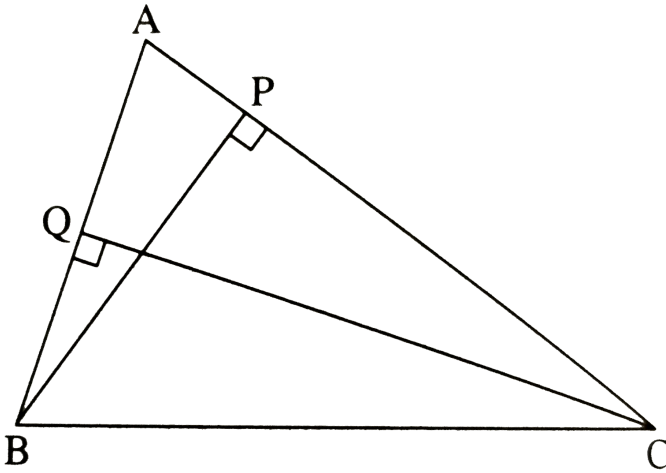
16. In $\triangle ABC$, ray BD bisects $\angle ABC$ and ray CE bisects $\angle ACB$

. If $\text{seg } AB \cong \text{seg } AC$, then prove that $ED \parallel BC$.



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17. In the adjoining figure $BP \perp AC$, $CQ \perp AB$, $A - P - C$, $A - Q - B$, then prove that $\triangle APB$ and $\triangle AQC$ are similar.

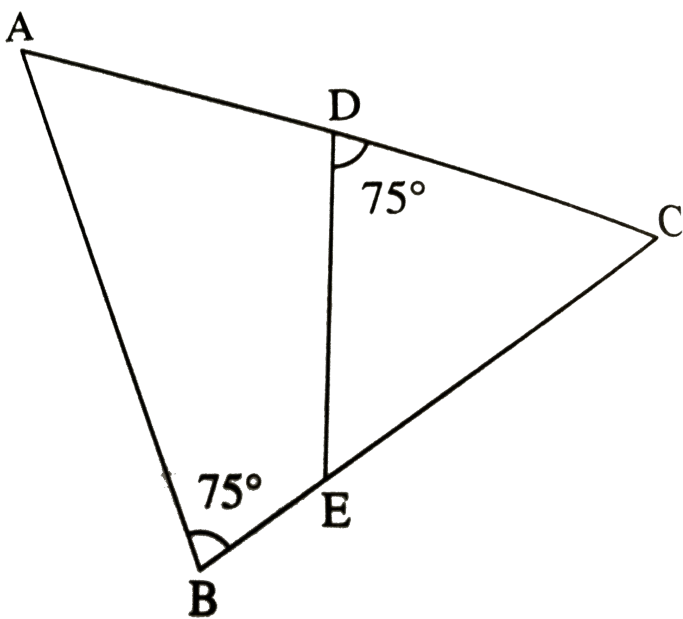


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18. In the figure $\angle ABC = 75^\circ$

$\angle EDC = 75^\circ$

State which two triangles are similar and by which test? Also

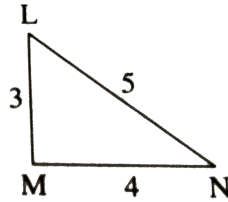
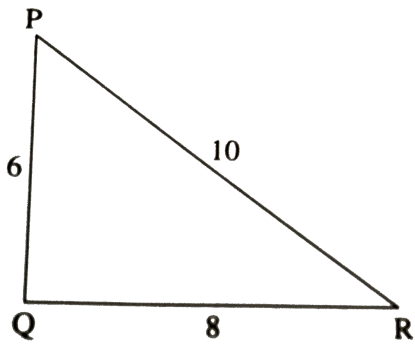


write the similarity of these two triangles by a proper one to one correspondence.

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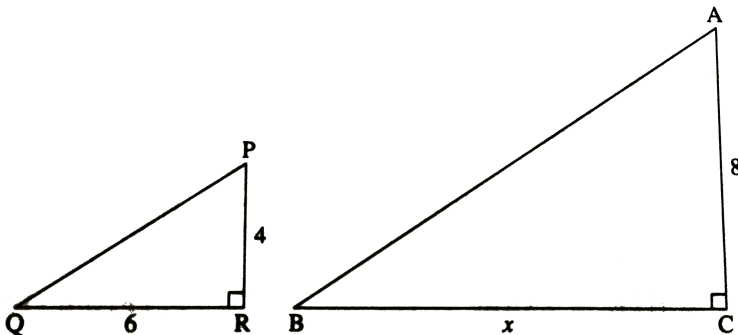
19. Are the triangles in following figures similar?

If yes by which test?



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20. As shown in the figures, two poles of height 8m and 4m are perpendicular to the ground. If the length of shadow smaller pole due to sunlight is 6 m then long will be the shadow of the bigger pole of the same time?





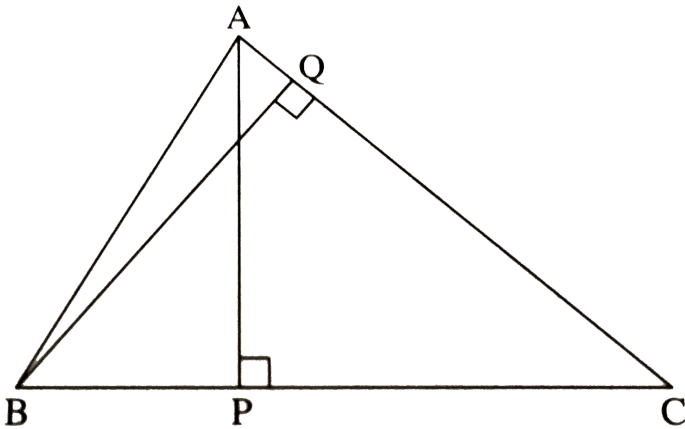
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21. In

$\triangle ABC$, $AP \perp BC$, $BQ \perp AC$. $B - P - C$, $A - Q - C$,

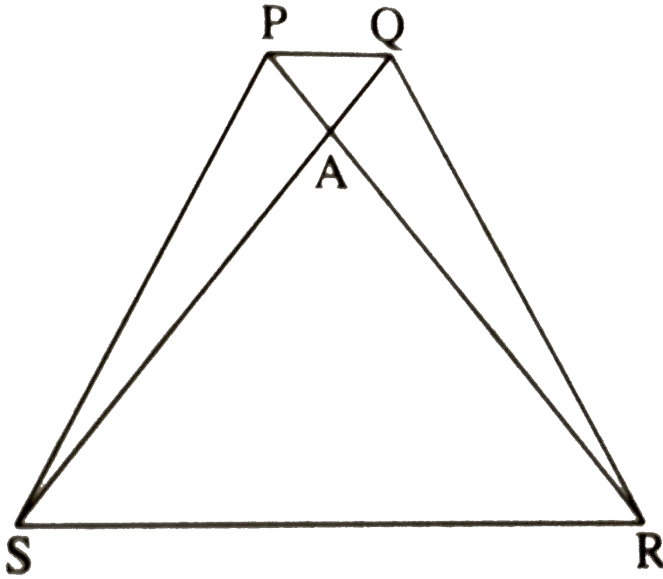
then prove that $\triangle CPA \sim \triangle CQB$.

If $AP = 7$, $BQ = 8$, $BC = 12$ then find AC .



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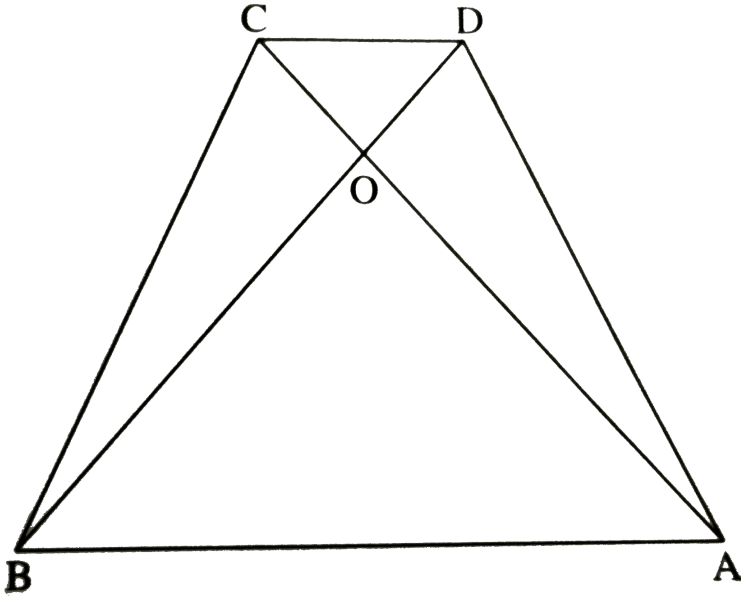
22. Given: In trapezium PQRS, sides $PQ \parallel$ sides SR , $AR = 5AP$, $AS = 5AQ$, then prove that $SR = 5PQ$.



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23. In trapezium ABCD side $AB \parallel$ side DC, diagonals AC and BD intersect in point O. If $AB = 20$, $DC = 6$, $OB = 15$ then

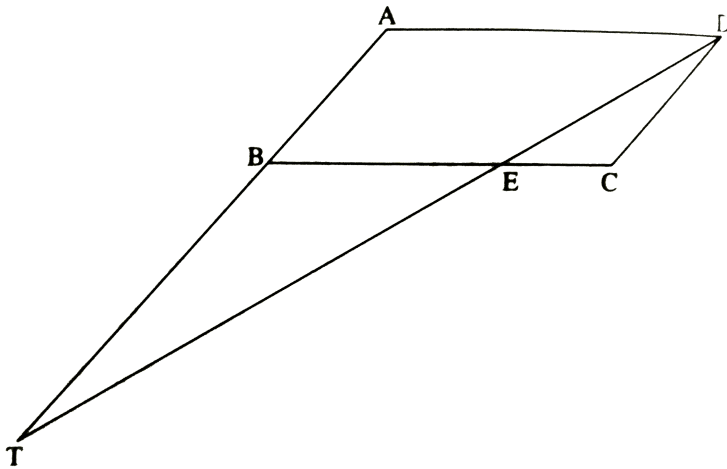
find OD.



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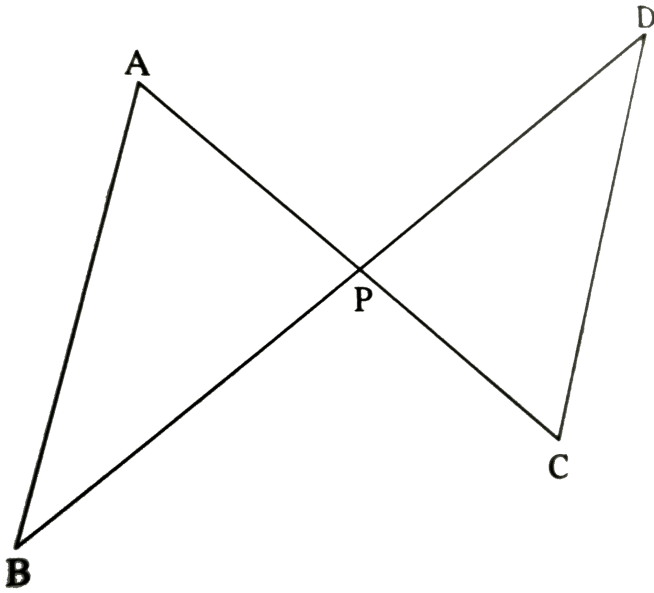
24. $\square ABCD$ is a parallelogram point E is on side BC . Line DE intersects ray AB in point T . Prove that

$$DE \times BE = CE \times TE.$$



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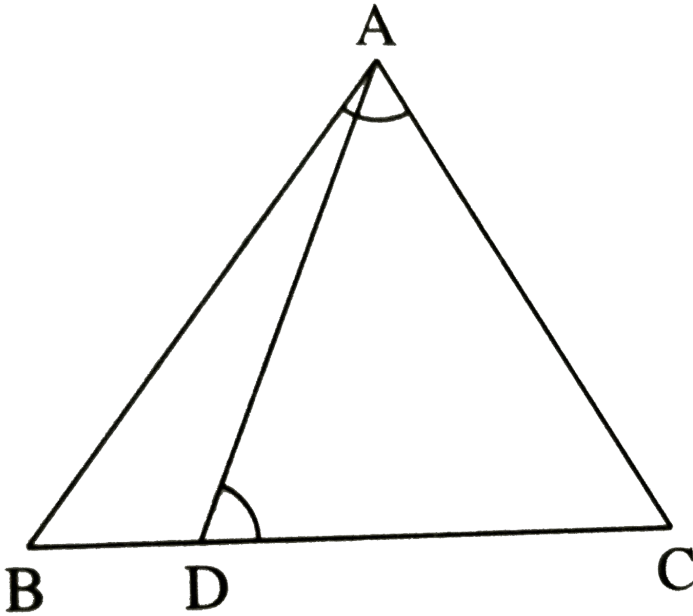
25. In the figure, set aC and seg BD intersect each other in point P and $\frac{AP}{CP} = \frac{BP}{DP}$. Prove that $\triangle ABP \sim \triangle CDP$.



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26. In the figure in $\triangle ABC$, point D on side BC is such that $\angle BAC = \angle ADC$.

Prove that $CA^2 = CB \times CD$.



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27. The ratio of corresponding sides of similar triangles is 3 : 5, then what is the ratio of their areas.

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28. If $\triangle ABC \sim \triangle PQR$ and $AB:PQ = 2:3$, then fill in the blanks:

$$\frac{A(\triangle ABC)}{A(\triangle PQR)} = \frac{(AB)^2}{\square} = \frac{2^2}{3^2} = \frac{\square}{\square}$$

$$\frac{A(\triangle ABC)}{A(\triangle PQR)} = \frac{AB^2}{PQ^2} = \frac{2^2}{3^2} = \frac{4}{9}$$

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29. If $\triangle ABC \sim \triangle PQR$, $A(\triangle ABC) = 80$, $A(\triangle PQR) = 125$, then fill in the blanks:

$$\frac{A(\triangle ABC)}{A(\triangle \dots\dots\dots)} = \frac{80}{125} \therefore \frac{AB}{PQ} = \frac{\square}{\square}$$

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30. $\triangle LMN \sim \triangle PQR$, $9 \times A(\triangle PQR) = 16 \times A(\triangle LMN)$. If $QR = 20$, then find MN .



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31. Areas of two similar triangles are 225 sq cm and 81 sq cm. If a side of the smaller triangle is 12 cm, then find the corresponding side of the bigger triangle.



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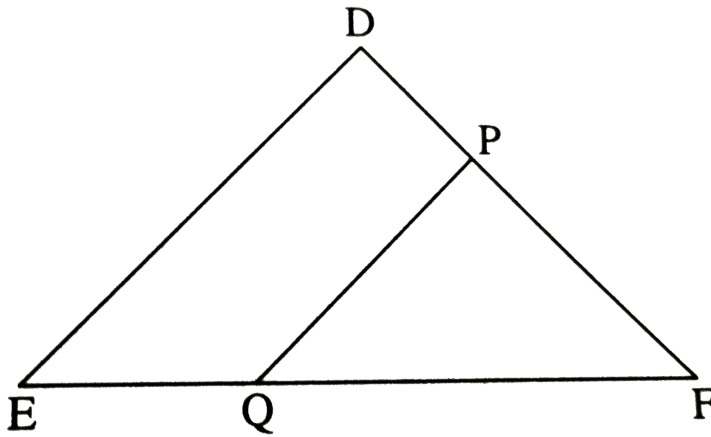
32. $\triangle ABC$ and $\triangle DEF$ are equilateral triangles. If $A(\triangle ABC) : A(\triangle DEF) = 1 : 2$ and $AB = 4$, find DE .



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33. In the figure $\text{seg } PQ \parallel \text{seg } DE$, $A(\triangle PQF) = 20$ units $PF = 2DP$, then find $A(\square DPQE)$ by completing the

following activity:



Activity: $A(\Delta PQF) = 20$ sq units, $PF = 2DP$.

Let us assume $DP = x$

$$\therefore PF = 2x$$

$$DF = DE + \square = \square + \square = 3x$$

In ΔFDE and ΔFPQ .

$$\angle FDE \cong \angle \square \dots\dots(\text{Corresponding angles})$$

$$\angle FED \cong \angle \square \dots(\text{Corresponding angles})$$

$$\therefore \Delta FDE \sim \Delta FPQ \dots(\text{AA test})$$

$$\therefore \frac{A(\Delta FDE)}{A(\Delta FPQ)} = \frac{\square}{\square} = \frac{(3x)^2}{(2x)^2} = \frac{9}{4}$$

$$A(\Delta FDE) = \frac{9}{4}A(\Delta FPQ) = \frac{9}{4} \times \square = \square$$

$$A(\square DPQE) = A(\triangle FDE) - A(\triangle FPQ)$$

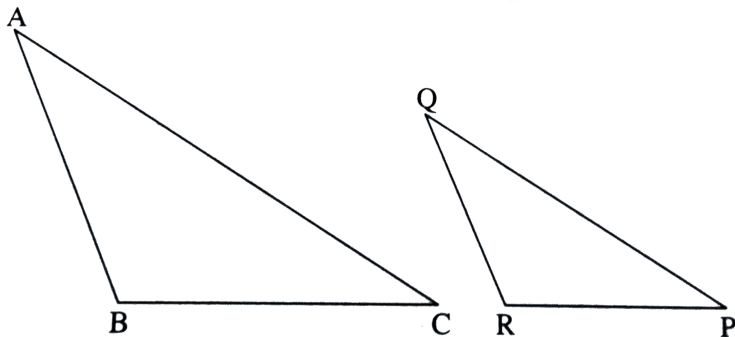
$$= \square - \square$$

$$= \square$$

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34. In $\triangle ABC$ and $\triangle PQR$ in a one-to-one correspondence

$$\frac{AB}{QR} = \frac{BC}{PR} = \frac{CA}{PQ} \text{ then}$$



A. $\triangle PQR \sim \triangle ABC$

B. $\triangle PQR \sim \triangle CAB$

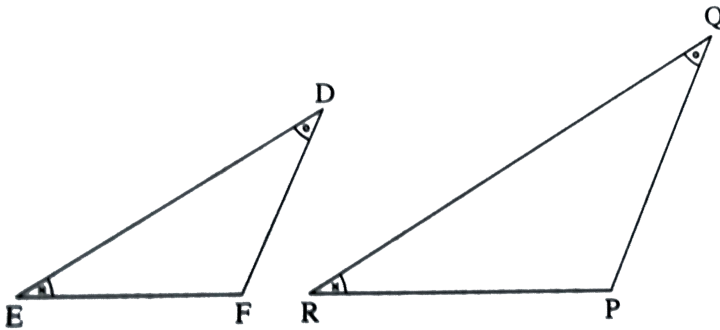
C. $\triangle CBA \sim \triangle PQR$

D. $\triangle BCA \sim \triangle PQR$

Answer: B

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35. If in $\triangle DEF$ and $\triangle PQR$, $\angle D \cong \angle Q$, $\angle R \cong \angle E$, then when of the following statements is false?



A. $\frac{EF}{PR} = \frac{DF}{PQ}$

B. $\frac{DE}{PQ} = \frac{EF}{RP}$

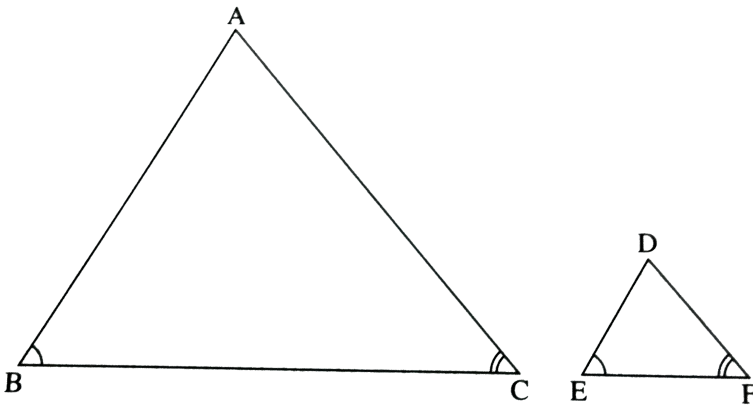
$$C. \frac{DE}{QR} = \frac{DF}{PQ}$$

$$D. \frac{EF}{RP} = \frac{DE}{QR}$$

Answer: D

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36. In $\triangle ABC$ and $\triangle DEF$ $\angle B = \angle E$, $\angle F = \angle C$ and $AB = 3DE$ then which of the statements regarding the two triangles is true ?



- A. The triangles are not congruent and not similar.
- B. The triangles are similar but not congruent.
- C. The triangles are congruent and similar.
- D. None of the statements above is true.

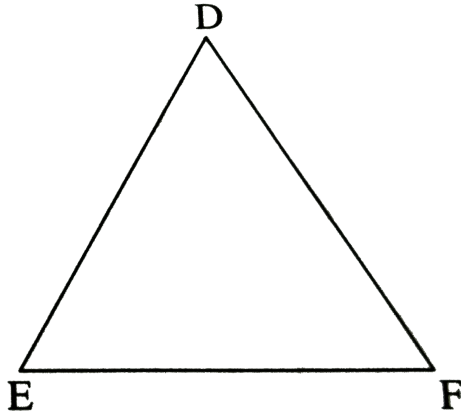
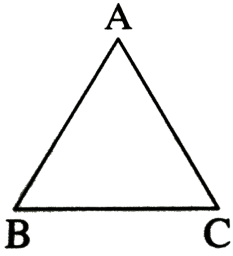
Answer: B



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37. $\triangle ABC$ and $\triangle DEF$ are equilateral triangles,
 $A(\triangle ABC) : A(\triangle DEF) = 1 : 2$

If $AB = 4$ then what is length of DE ?



A. $2\sqrt{2}$

B. 4

C. 8

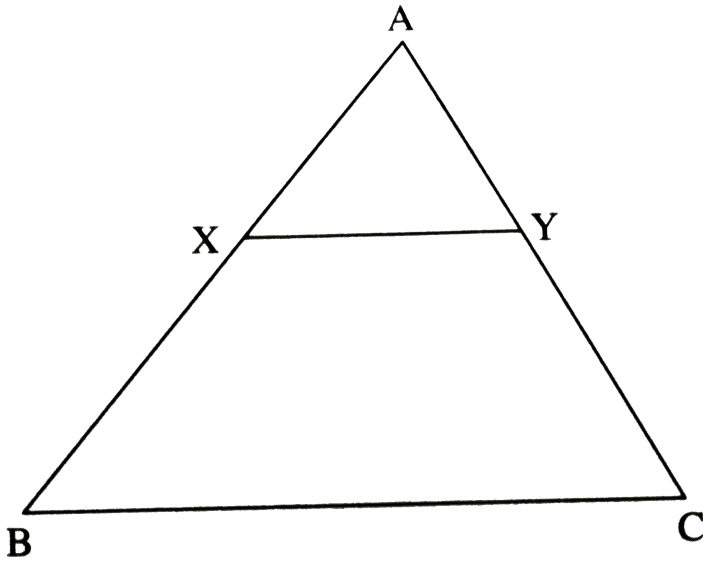
D. $4\sqrt{2}$

Answer: D



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38. In figure $XY \parallel BC$, then which of the following statements is true?



A. $\frac{AB}{AC} = \frac{AX}{AY}$

B. $\frac{AX}{XB} = \frac{AY}{AC}$

C. $\frac{AX}{YC} = \frac{AY}{XB}$

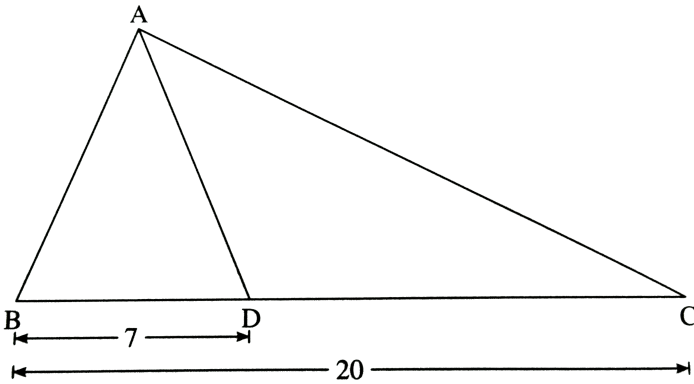
D. $\frac{AB}{YC} = \frac{AC}{XB}$

Answer: A



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39. In $\triangle ABC$, $B - D - C$ and $BD = 7$, $BC = 20$, then find followig ratios:



$$\frac{A(\triangle ABD)}{A(\triangle ADC)}$$

$$\frac{A(\triangle ABD)}{A(\triangle ABC)}$$

$$\frac{A(\triangle ABC)}{A(\triangle ADC)}$$

$$\frac{A(\triangle ABC)}{A(\triangle ABD)}$$

$$\frac{A(\triangle ADC)}{A(\triangle ABC)}$$

$$\frac{A(\triangle ABC)}{A(\triangle ABC)}$$



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40. Ratio of areas of two triangles with equal height is 2 : 3. If base of the smaller triangle is 6 cm, the what is the corresponding base of the bigger triangle?

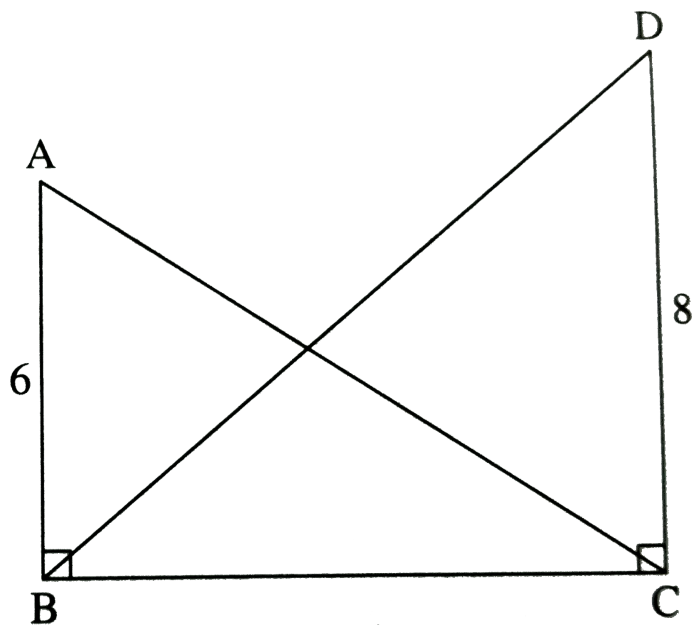


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41. In the figure

$$\angle ABC = \angle DCB = 90^\circ, AB = 6, DC = 8,$$

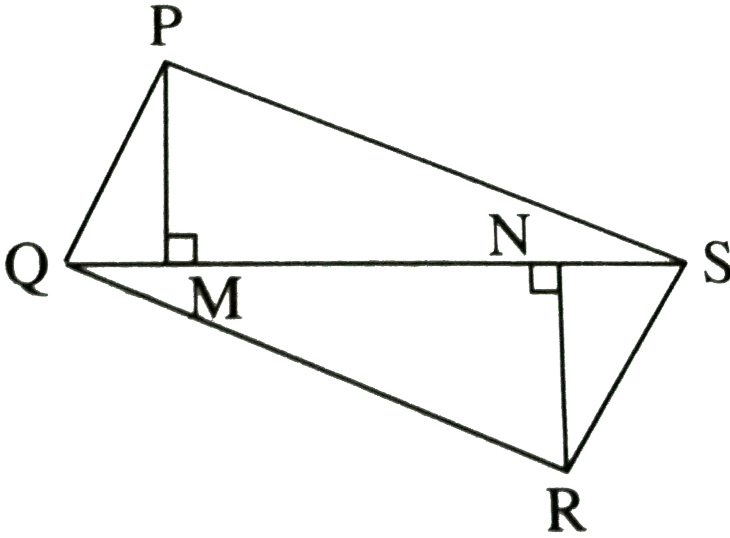
then $\frac{A(\triangle ABC)}{A(\triangle DCB)} = ?$



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42. In the figure
 $PM = 10\text{cm}$, $A(\triangle PQS) = 100\text{sqcm}$, $A(\triangle QRS) = 110\text{sq. cm}$,

then find NR.



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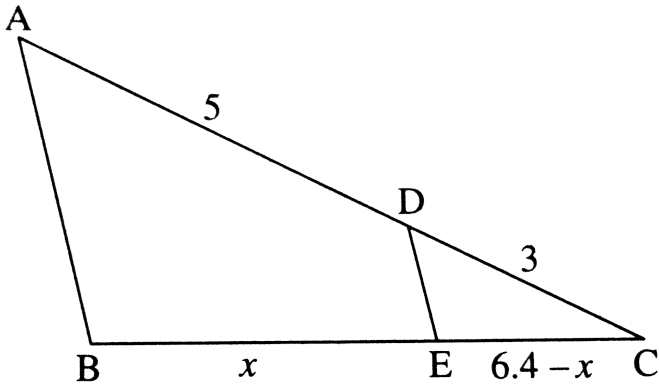
43. $\Delta MNT \sim \Delta QRS$. Length of altitude drawn from point T is

5 and length of altitude drawn from point S is 9. Find the ratio

$$\frac{A(\Delta MNT)}{A(\Delta QRS)}.$$

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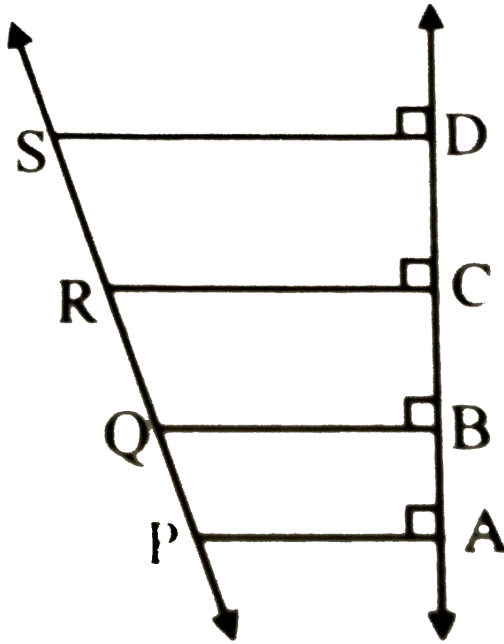
44. In the figure $A - D - C$ and $B - E - C$ seg $DE \parallel$ side AB . If $AD = 5$, $DC = 3$, $BC = 6.4$ then find BE .



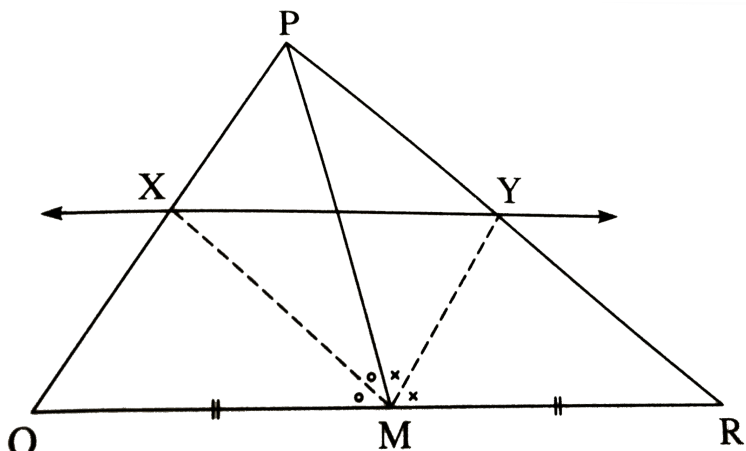
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45. In the adjoining figure, seg PA , seg QB , seg RC and seg SD are perpendicular to line AD . $AB = 60$, $BC = 70$, $CD = 80$, $PS =$

280, then find PQ, QR and RS.



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46.

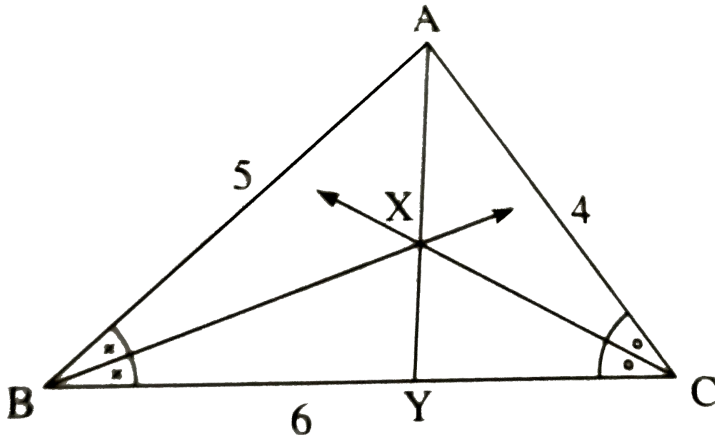
In $\triangle PQR$ seg PM is a median. Angle bisectors of $\angle PMQ$ and $\angle PMR$ intersect side PQ and side PR in points X and Y respectively. Prove that $XY \parallel QR$.

Complete the proof by filling in the boxes:

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47. In the figure bisectors of $\angle B$ and $\angle C$ of $\triangle ABC$ intersect each other in point X . Line AX intersects side BC in point Y .

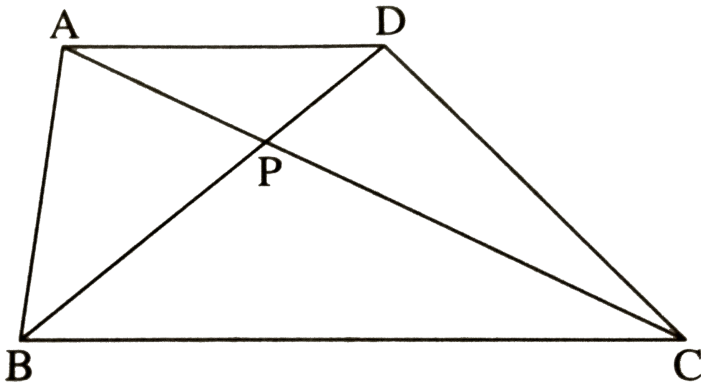
$AB = 5, AC = 4, BC = 6$ then find $\frac{AX}{XY}$



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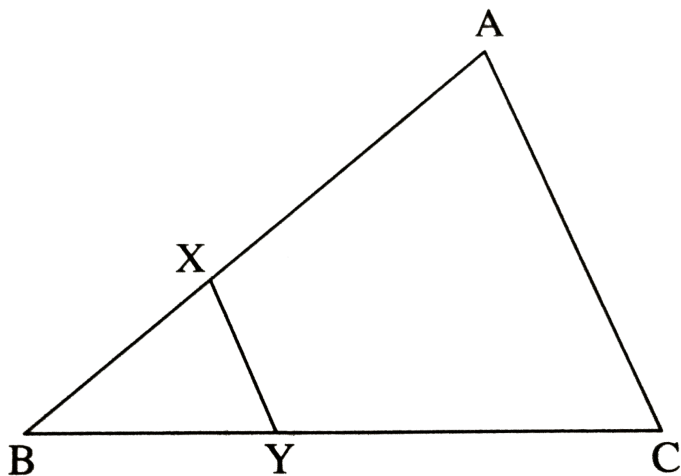
48. In $\square ABCD$, $\text{seg } AD \parallel \text{seg } BC$. Diagonal AC and diagonal BD intersect each other in point P . Then show that

$$\frac{AP}{PD} = \frac{PC}{BP}$$



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49. In figure $XY \parallel \text{seg } AC$. If $2AX = 3BX$ and $XY = 9$, complete the activity to find the value of AC.



Activity: $2AX = 3BX$

$$\therefore \frac{AX}{BX} = \frac{\square}{\square}$$

$$\therefore \frac{AX + BX}{BX} = \frac{\square + \square}{\square} \dots\dots(\text{By componendo})$$

$$\therefore \frac{AB}{BX} = \frac{\square}{\square} \dots\dots\dots 1$$

$\triangle BCA \sim \triangle BYX$(\square test of similarity)

$$\therefore \frac{BA}{BX} = \frac{AC}{XY}$$

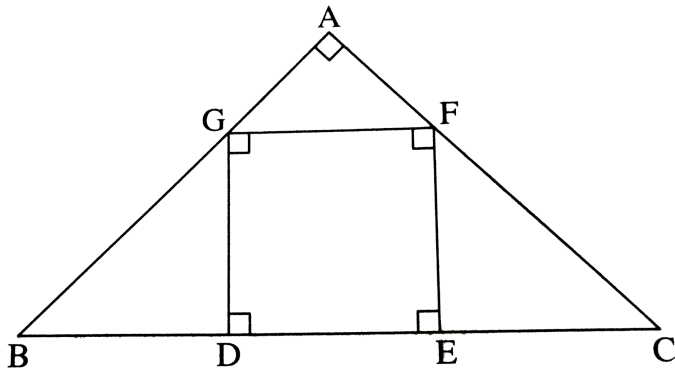
.....(Corresponding sides of similar triangles)

$$\therefore \frac{\square}{\square} = \frac{AC}{9}$$

$$\therefore AC = \square \dots\dots\dots[\text{From 1}]$$

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50. In figure, the vertices, of square DEFG are on the sides of $\triangle ABC$. $\angle A = 90^\circ$. Then prove that $DE^2 = BD \times EC$.

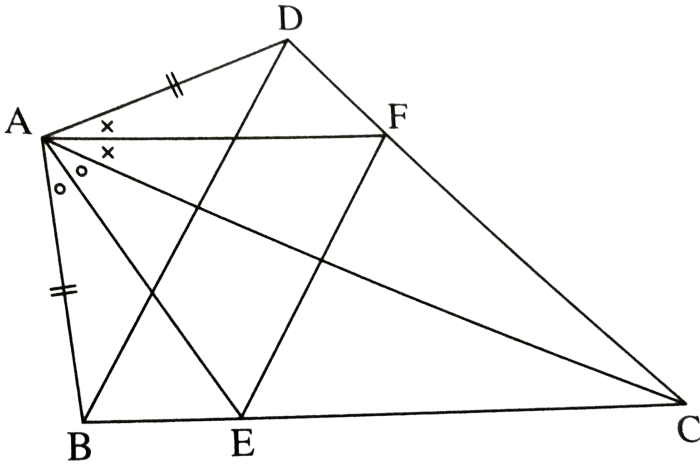


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Challenging Questions

1. In $\square ABCD$, side $AB \cong$ side AD . Bisector of $\angle BAC$ cuts side BC at E and bisector of $\angle DAC$ cuts side CD at F . Prove

that set $EF \parallel \text{seg } BD$.



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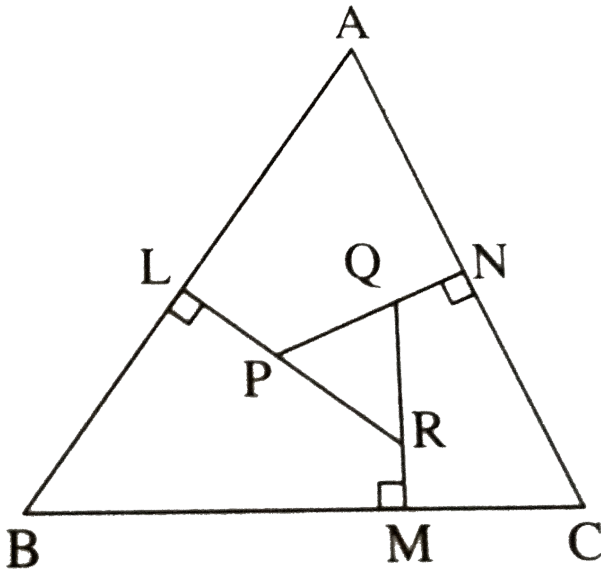
2. A line cuts two sides AB and AC of $\triangle ABC$ at points P and Q respectively. Prove $\frac{A(\triangle APQ)}{A(\triangle ABC)} = \frac{AP \times AQ}{AB \times AC}$.

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3. In $\triangle ABC$, L, M, N are points on side AB, BC, AC respectively.

Perpendiculars drawn at L, M, N form $\triangle PQR$.

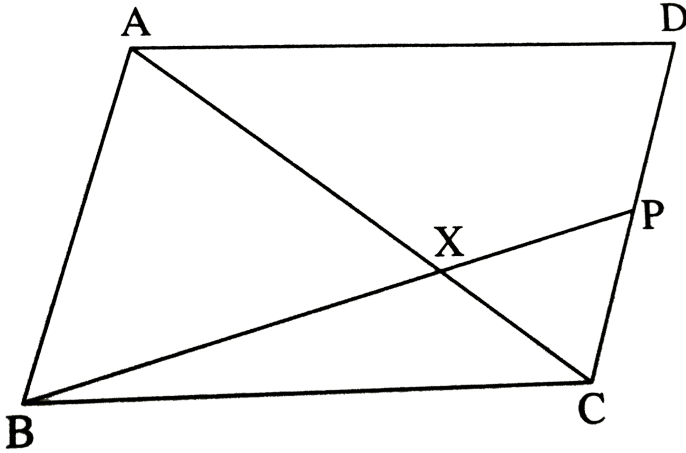
Prove that $\triangle ABC \sim \triangle PQR$.



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4. $\square ABCD$ is a parallelogram. P is the midpoint of side CD.

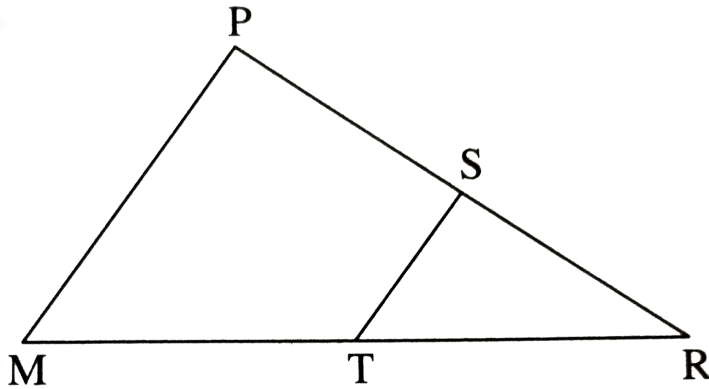
Seg BP meets diagonal AC at X. Prove that $3AX = 2AC$.



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5. Points S is on the side PR of $\triangle PMR$ such that $3SR = 2SP$, set $ST \parallel$ side PM. If $A(\triangle PMR) = 50cm^2$ then find (i)

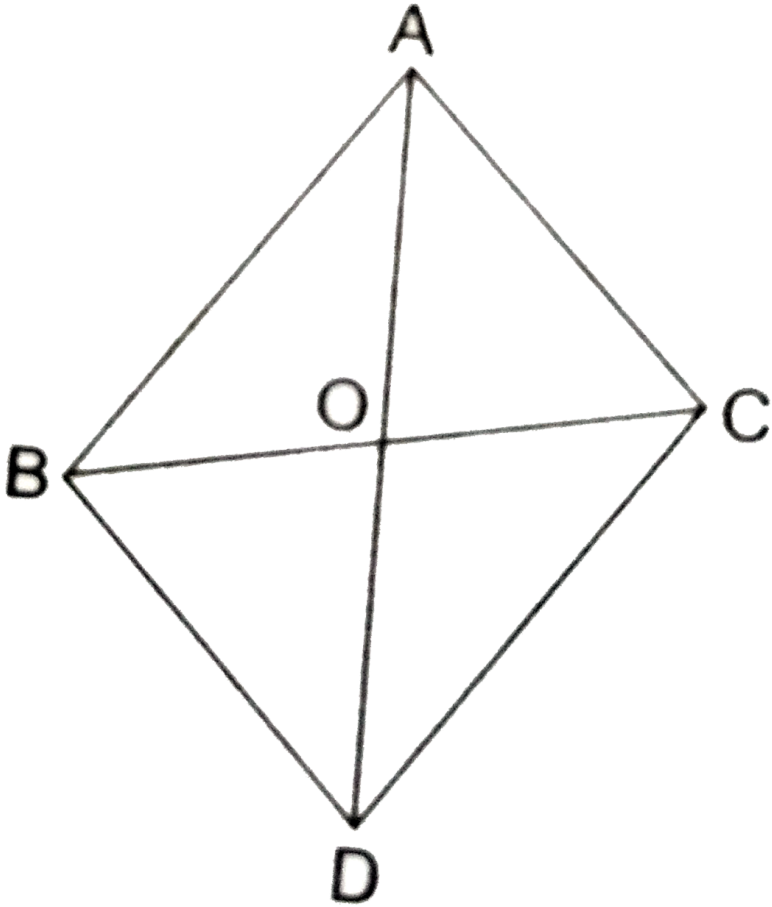
$A(\Delta RST)$ (ii) $A(\square PMTS)$



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6. In the same figure, ΔABC and ΔDBC are on the same base BC . If AD is intersects BC at O, prove that

$$\frac{ar(\Delta ABC)}{ar(\Delta DBC)} = \frac{AO}{DO}$$



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7. In $\triangle ABC$ and $\triangle PQR$, $\angle ABC \cong \angle PQR$ eg BD and seg QS are angles bisectors . If

$$\frac{l(AD)}{l(PS)} = \frac{l(DC)}{l(SR)} = \text{ then } \triangle ABC \sim \triangle PQR$$

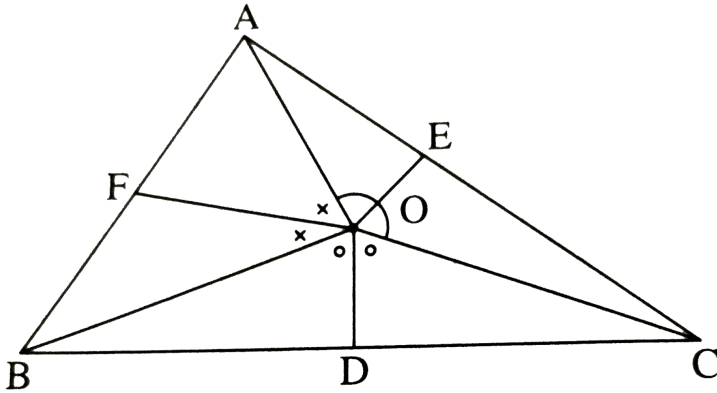
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8. O is any point in the interior of $\triangle ABC$. Bisectors of $\angle AOB$, $\angle BOC$ and $\angle AOC$ intersect side AB, side BC, side AC in F, D and E respectively.

Prove that $BF \times AE \times CD = AF \times CE \times BD$.



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Mcq Type

1. $\triangle ABC \sim \triangle DEF$, then $\frac{AB}{DE} = \frac{\dots\dots\dots}{EF}$

A. AC

B. DF

C. BC

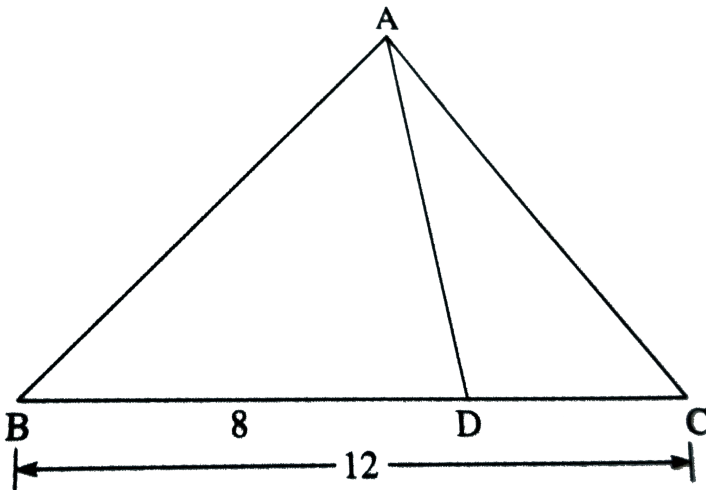
D. None of these

Answer: C

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2. In the figure $BD = 8$, $BC = 12$ and $B - D - C$ then

$$\frac{A(\triangle ABD)}{A(\triangle ADC)} = \dots\dots\dots$$



A. 1:2

B. 2: 1

C. 2: 3

D. 3: 2

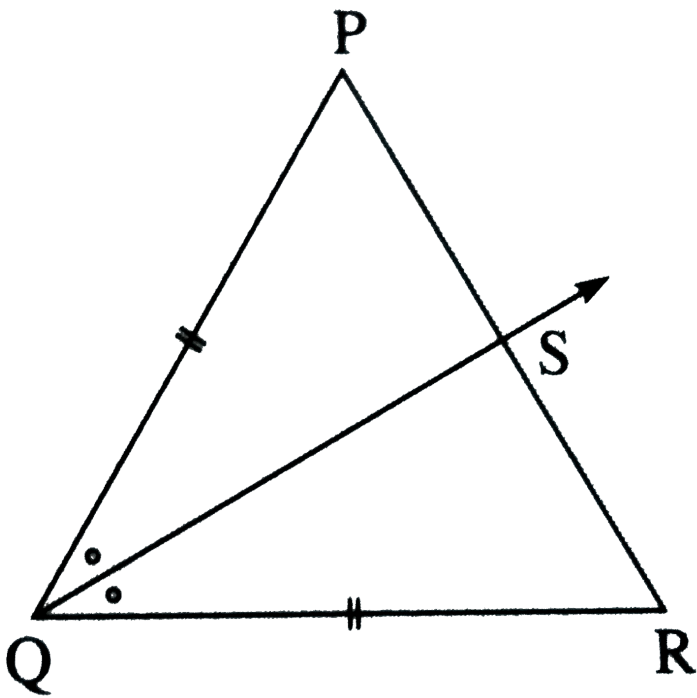
Answer: B



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3. In the figure ray QS is the bisector of $\angle PQR$ and

$PQ = QR$, then $\frac{PS}{SR} = \dots\dots\dots$



A. 1:1

B. 1:2

C. 2:1

D. Cannot be determined

Answer: A



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4. In the figure for what value of x will seg DE be parallel to Bc?

A. 2

B. 3

C. 20

D. 2 and 20

Answer: A



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5. A vertical pole 40 m long casts a shadow 20 m long on the ground. At the same time a..... Tower casts a shadow 50 m

long on the ground.

A. 100m

B. 50m

C. 25 m

D. 150 m

Answer: A



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6. Sides of two similar triangles are in the ratio 3: 5, Areas of these triangles are in the ratio..

A. 1.0479166666667

B. 0.12847222222222

C. 0.3923611111111111

D. 0.210416666666667

Answer: C



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7. The areas of two similar triangles are 36cm^2 and 121cm^2 .

The ratio of their corresponding sides are

A. 36 : 121

B. 121 : 36

C. 6 : 11

D. 11 : 6

Answer: C



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8. If $\triangle ABC \sim \triangle DEF$ and $\angle A = 45^\circ$, $\angle E = 87^\circ$, then $\angle C =$

.....

A. 45°

B. 87°

C. 48°

D. Cannot be determined

Answer: C



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9. In a ABC , AD is the bisector of $\angle BAC$. If $AB = 8cm$,
 $BD = 6cm$ and $DC = 3cm$. Find AC 4cm (b) 6cm (c) 3cm
(d) 8cm

A. 4cm

B. 3cm

C. 6cm

D. 8cm

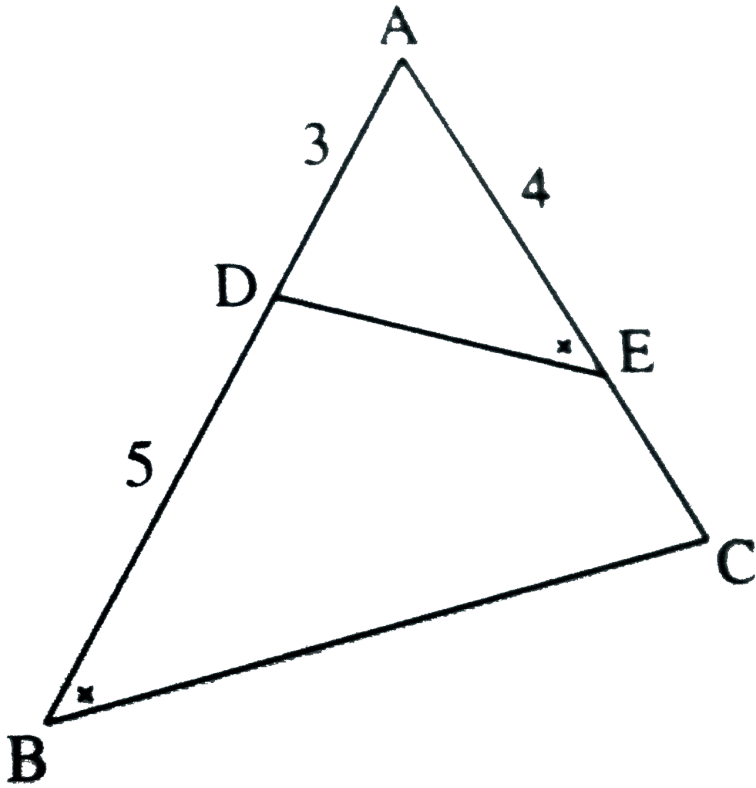
Answer: A



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10. In the figure
 $\angle AED = \angle ABC$, $AD = 3$, $DB = 5$, $AE = 4$ then length

of AC is ..



A. 2

B. 6

C. 8

D. 12

Answer: B



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11. The areas of two similar triangles are 9cm^2 and 16cm^2 . The ratio of their corresponding heights is.

A. 0.386111111111111

B. 0.127777777777778

C. 0.16875

D. 0.672916666666667

Answer: B



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12. Which of the following is not the test of similarity : AAA test, SAS test, ASA test, SSS test?

- A. AAA test
- B. SAS test
- C. SAA test
- D. SSS test

Answer: C



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13. The corresponding medians of two similar triangles are in the ratio 4:7. Let their respective areas be A_1 and A_2 . $A_1 : A_2 = \dots$

A. 0.7006944444444444

B. 0.171527777777778

C. 0.2944444444444444

D. 2.05277777777778

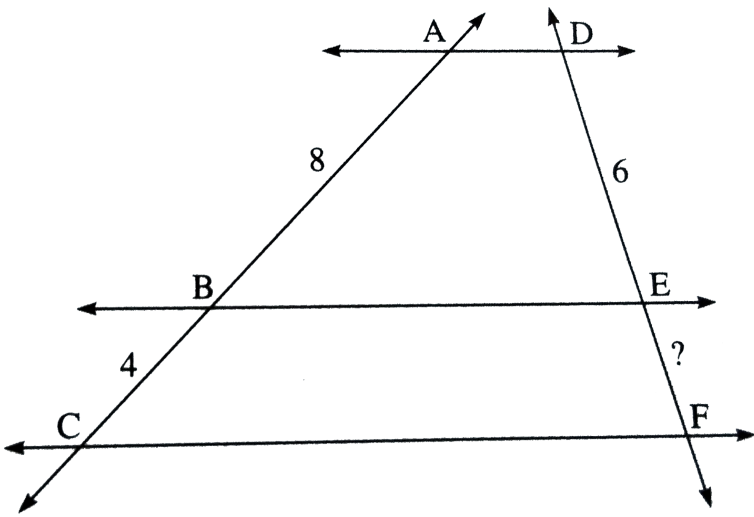
Answer: A



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14. In the figure line $AD \parallel BE \parallel CF$

$AB = 8, BC = 4, DE = 6$ then $EF = ?$



A. 3

B. 12

C. 8

D. 4

Answer: A



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15. If two similar triangles are of equal areas, then the two triangles are

- A. similar but not congruent
- B. similar and congruent
- C. neither similar nor congruent
- D. none fo the above

Answer: B



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Subjective Type

1. The heights of $\triangle ABC$ and $\triangle DBC$ are 4 cm and 6 cm respectively. Find $\frac{A(\triangle ABC)}{A(\triangle DBC)}$.

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2. In $\triangle PQR$, ray PS is the bisector of $\angle QPR$.

$Q - S - R$. If $QS = 4.8\text{cm}$, $SR = 3.6\text{cm}$ then find $PQ : PR$.

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3. If $\triangle ABC \sim \triangle EDC$, $AC = 15$, $BC = 10$, $CE = 12$, then find CD .

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4. $\triangle ABC \sim \triangle PQR$. If $AB:PQ = 4:5$, find

$A(\triangle ABC):A(\triangle PQR)$.

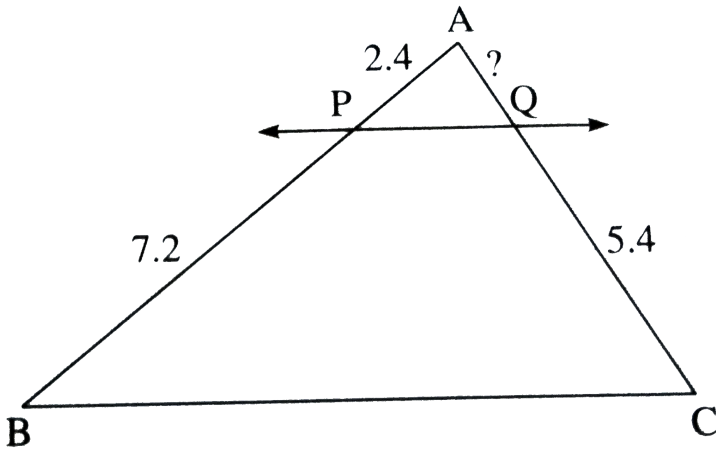
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5. The ratio of the areas of two triangles $A_1:A_2$ is 3:2. The corresponding bases are b_1 and b_2 . The height of the triangles are equal. If $b_2 = 12\text{cm}$. Find b_1 .

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6. In the figure line $PQ \parallel$ side

BC , $AP = 2.4\text{cm}$, $PB = 7.2\text{cm}$, $QC = 5.4\text{cm}$ then find AQ



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7. $\triangle ABC \sim \triangle DEF$, $BC = 4.8\text{cm}$, $EF = 7.2\text{cm}$. Complete the following activity to find $A(\triangle ABC) : A(\triangle DEF)$.

Activity:

$\triangle ABC \sim \triangle DEF$

$$\frac{A(\triangle ABC)}{A(\triangle DEF)} = \frac{BC^2}{\square^2}$$

.....Theorem on _____

$$\therefore \frac{A(\triangle ABC)}{A(\triangle DEF)} = \frac{4.8^2}{(\square)^2}$$

$$\therefore \frac{A(\triangle ABC)}{A(\triangle DEF)} = \frac{4}{\square}$$

$$A(\triangle ABC) : A(\triangle DEF) = 4 : \square$$



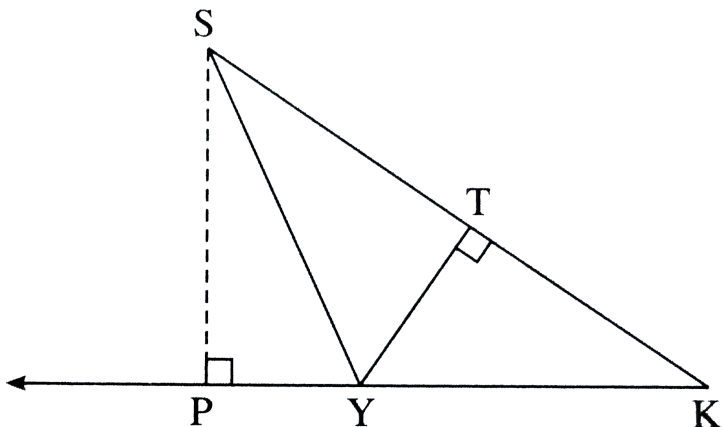
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8. In $\triangle ABC$, D is the midpoint of side AB. Line $DE \parallel$ side BC.

$A - E - C$. Prove that point E is the midpoint of side AC.



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9.

In the figure $SP \perp$ side YK , and $seg Yt \perp$ side SK . If $SP = 6$, $YK = 13$, $YT = 5$ and $TK = 12$, then find $A(\Delta SYK) : A(\Delta YTK)$.

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10. Line m intersects sides AB and AC of ΔABC in the points P and Q respectively.

$AP = 4.2$, $PB = 6.3$, $AQ = 4$, $QC = 6$. State with reason whether line m is parallel to side BC or not.



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11. In trapezium $PQRS$, side $PQ \parallel$ side SR . Diagonals PR and QS intersect each other at point M . $PQ = 2RS$. Prove that $PM = 2RM$ and $QM = 2SM$.



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12. In the figure D is a point on BC such that $\angle ABD = \angle CAD$. If $AB = 5cm$, $AD = 4cm$ and $AC = 3cm$. Find (i) BC (ii) DC (iii) $A(\Delta ACD) : A(\Delta BCA)$.

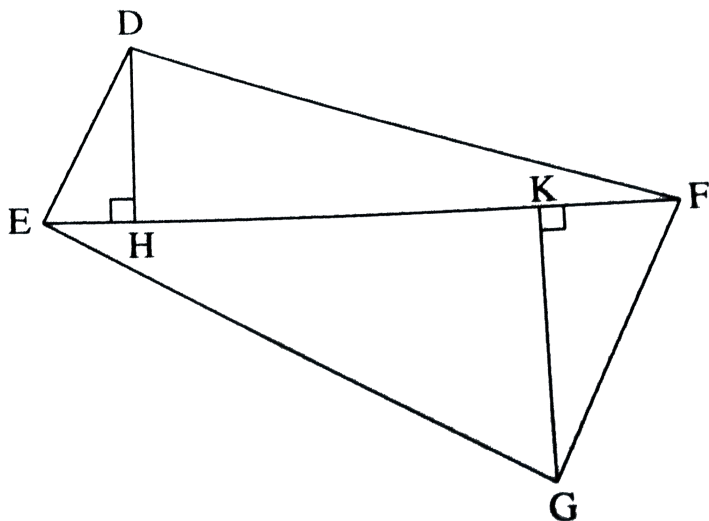


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13. In the figure, set $DH \perp$ side EF and seg $GK \perp$ side EF . If

$$DH = 12\text{cm}, GK = 20 \text{ and } A(\triangle DEF) = 300\text{cm}^2.$$

Find (i) EF (ii) $A(\triangle GEF)$ (iii) $A(\square DEGF)$.



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14. Two triangles are similar. The lengths of the sides of the smaller triangle are 4cm , 5cm and 6cm respectively. The

perimeter of the larger triangle is 90cm then find the length of sides of larger triangle.

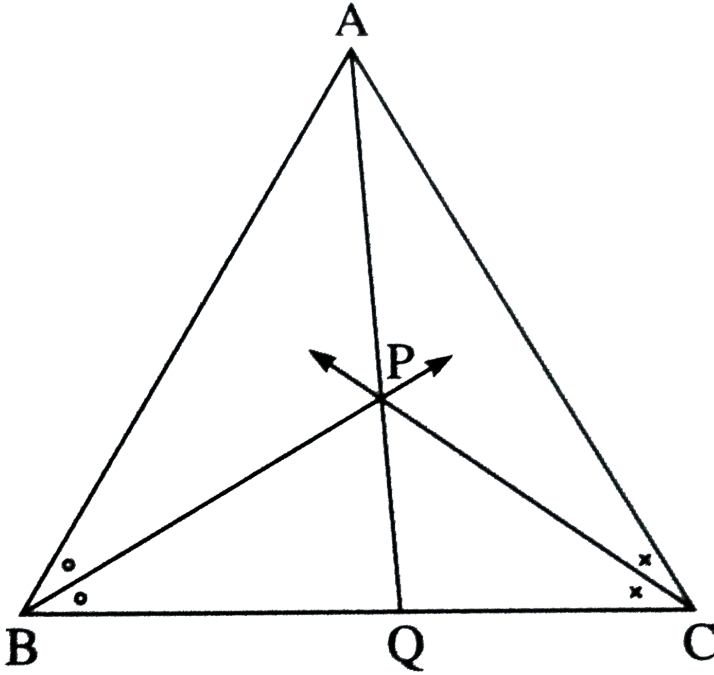


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15. Bisector of $\angle B$ and $\angle C$ in $\triangle ABC$ meet each other at P.

Line AP cuts the sides BC at Q.

Prove: $\frac{AP}{PQ} = \frac{AB + AC}{BC}$.



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16. In $\triangle ABC$ seg $MN \parallel$ side AC . Seg MN divides $\triangle ABC$ into two parts equal in area. Determine $\frac{MB}{AB}$.

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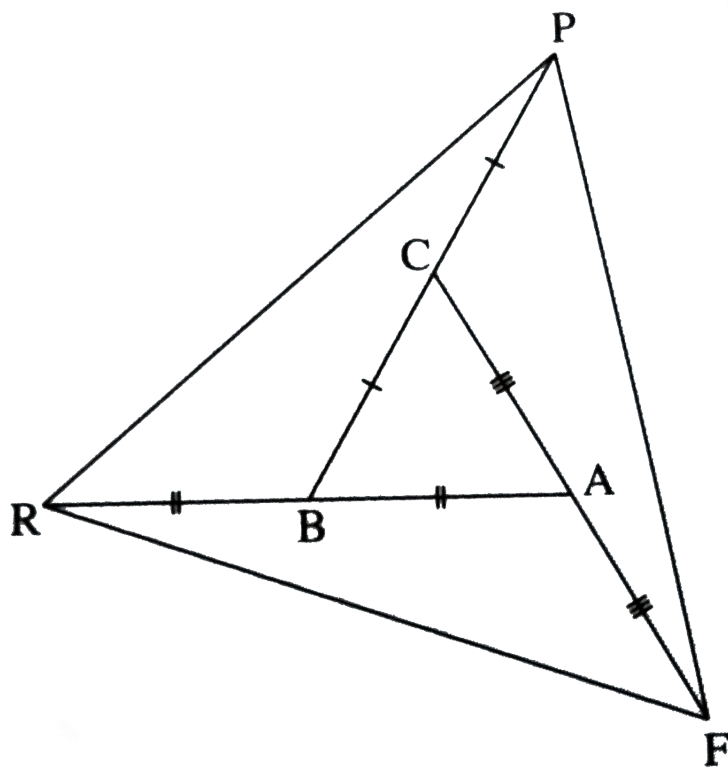
17. यदि दो समरूप त्रिभुजों के क्षेत्रफल बराबर हो तो सिद्ध कीजिए कि वे त्रिभुज सर्वांगसम होते हैं



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18. In the figure sides AB, BC, CA of $\triangle ABC$ are produced upto points R, P, F respectively such that $AB = BR, BC = CP$ and $CA = AF$. Prove that:

$$(\Delta PFR) = 7A(\Delta ABC)$$

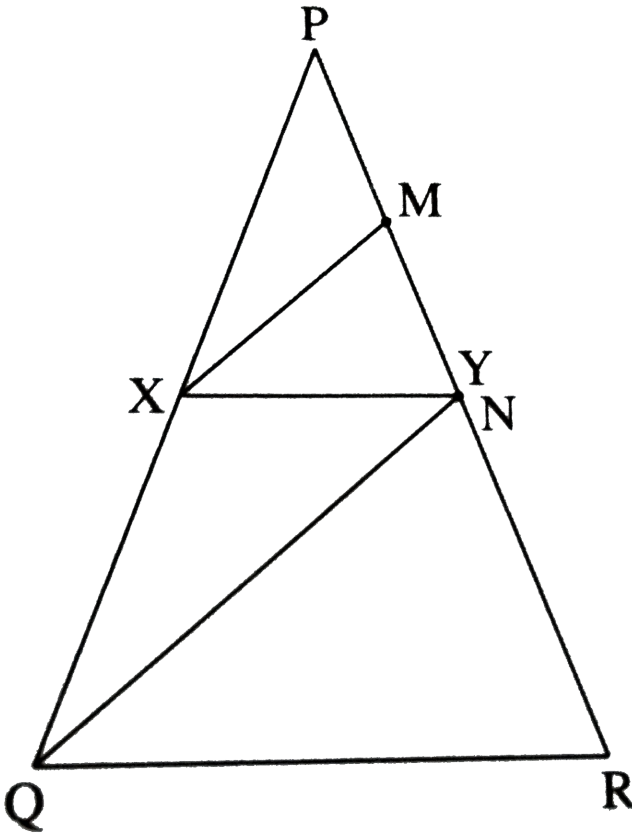


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19. In $\square ABCD$, side $BC \parallel$ side AD . Diagonals AC and BD intersect each other at P . If $AP = \frac{1}{3}AC$ then prove $DP = \frac{1}{2}BP$.

20. In $\triangle PQR$, set $XY \parallel$ sides QR , M and N are midpoints of seg PY and seg PR respectively. Prove that:

(i) $\triangle PXM \sim \triangle PQN$ (ii) $\text{seg } XM \parallel \text{seg } QN$.





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