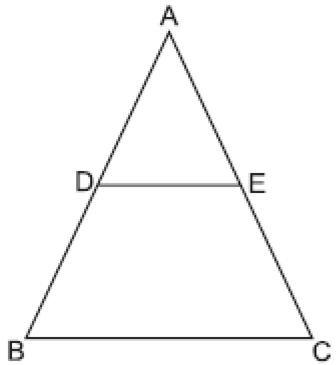
Chapter-Triangles
Question bank

Q1.

In Fig., $DE \parallel BC$, $AD = 1$ cm and BD = 2 cm. what is the ratio of the ar (ΔABC) to the ar (ΔADE)?



Q2.

In $\Delta\ DEW$, $AB \parallel EW$. If $AD = 4$ cm, $DE = 12$ cm and $DW = 24$ cm, then find the value of DB.

Q3.

In Fig. , if $\Delta ABC \sim \Delta DEF$ and their sides of lengths (in cm) are marked along them, then find the lengths of sides of each triangle.

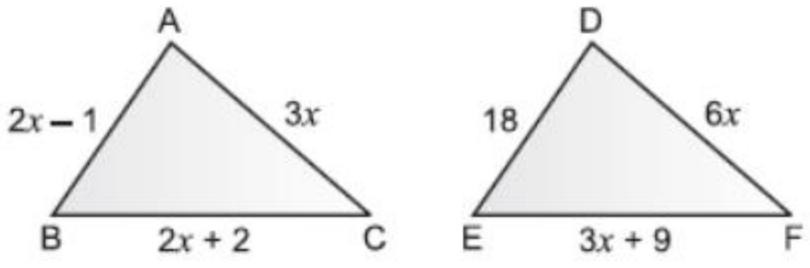


Fig.

Q4.

In Fig. , $\angle D = \angle E$ and $\frac{AD}{DB} = \frac{AE}{EC}$, prove that BAC is an isosceles triangle.

Q5.

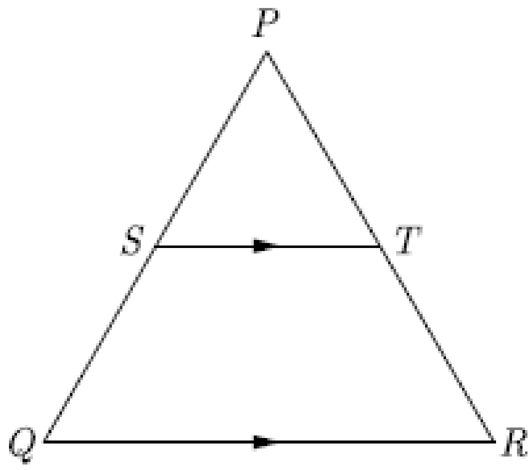
Two right triangles ABC and DBC are drawn on the same hypotenuse BC and on the same side of BC. If AC and BD intersect at P, prove that $AP \times PC = BP \times DP$.

Q6.

In ΔABC, if X and Y are points on AB and AC respectively such that $\frac{AX}{XB} = \frac{3}{4}$, $AY = 5$ and $YC = 9$, then state whether XY and BC parallel or not.

Q7.

In the given figure, in a triangle PQR, $ST || QR$ and $\frac{PS}{SQ} = \frac{3}{5}$ and $PR = 28$ cm, find PT.

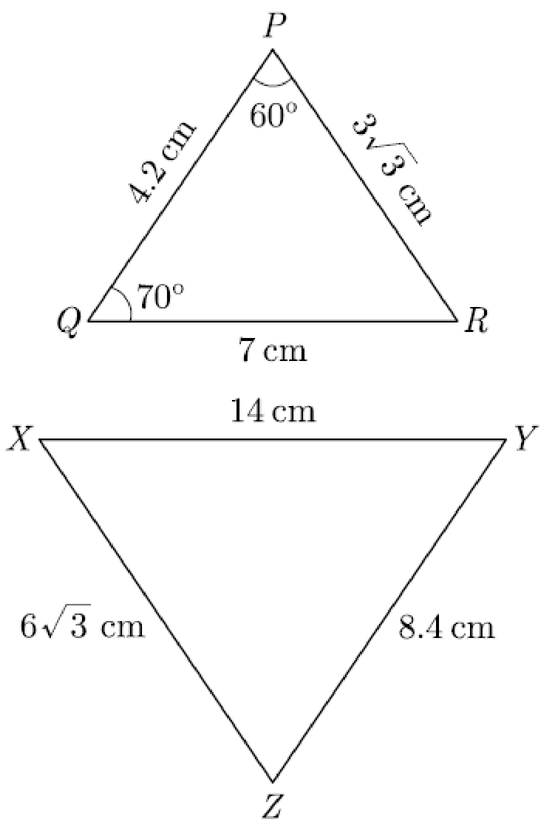


Q8.

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

Q9.

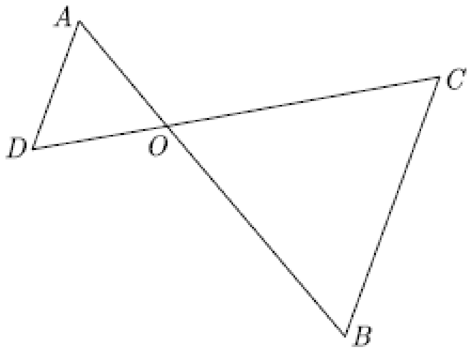
In the given figures, find the measure of $\angle X$.



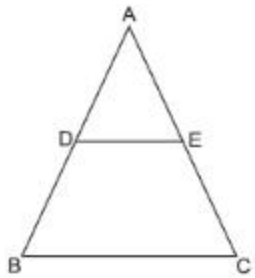
Q10.

In the given figure, $OA \times OB = OC \times OD$, show that

$\angle A=\angle C$ and $\angle B=\angle D$.



Solution 1.



Given,

$AD = 1 \text{ cm}, BD = 2 \text{ cm}$

$\therefore \quad AB = 1 + 2 = 3 \text{ cm}$

Also, $\quad DE \parallel BC \quad$ (Given)

$\therefore \quad \angle ADE = \angle ABC \quad$ ...(i)

(corresponding angles)

In ΔABC and ΔADE

$\angle A = \angle A \quad$ (common)

$\angle ABC = \angle ADE \quad$ [by equation (i)]

$\therefore \quad \Delta ABC \sim \Delta ADE \quad$ (by AA rule)

$$\therefore \quad \frac{\text{ar}(\Delta ABC)}{\text{ar}(\Delta ADE)} = \left(\frac{AB}{AD}\right)^2$$

or $$\frac{\text{ar}(\Delta ABC)}{\text{ar}(\Delta ADE)} = \left(\frac{3}{1}\right)^2 = \frac{9}{1}$$

$\therefore \quad \text{ar}(\Delta ABC) : \text{ar}(\Delta ADE) = 9 : 1$

Solution 2.

Let $BD = x$ cm.

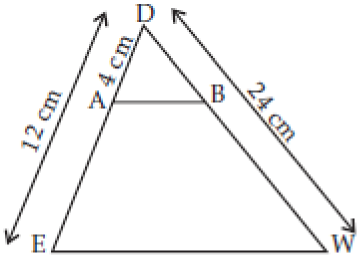
$\because DW = 24$ cm.

Then, $BW = (24 - x)$ cm, $AE = 12 - 4 = 8$ cm

In ΔDEW, $AB \parallel EW$

$\therefore \quad \dfrac{AD}{AE} = \dfrac{BD}{BW}$ [Thales' Theorem]

$\Rightarrow \quad \dfrac{4}{8} = \dfrac{x}{24 - x}$



$\Rightarrow \quad 8x = 96 - 4x$

$\Rightarrow \quad 12x = 96$

$\Rightarrow \quad x = \dfrac{96}{12} = 8$ cm

$\therefore \quad DB = 8$ cm

Solution 3.

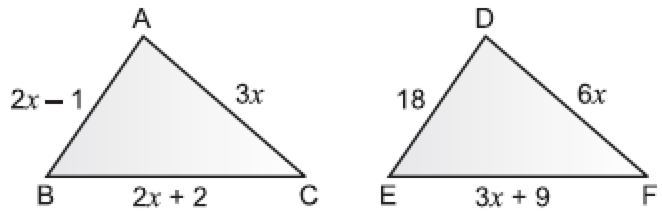


Fig.

Given : $\Delta ABC \sim \Delta DEF$

$$\therefore \quad \frac{AB}{DE} = \frac{AC}{DF}$$

[Corresponding parts of similar triangles]

$$\Rightarrow \quad \frac{2x-1}{18} = \frac{3x}{6x}$$

$$\Rightarrow \quad \frac{2x-1}{18} = \frac{1}{2}$$

$$\Rightarrow \quad 4x - 2 = 18$$

$$\Rightarrow \quad 4x = 20$$

$$\Rightarrow \quad x = 5$$

Now, lengths of sides of triangle ABC are,

$$AB = 2x - 1 = 9 \text{ cm}$$

$$BC = 2x + 2 = 12 \text{ cm}$$

$$AC = 3x = 15 \text{ cm}$$

And, lengths of sides of triangle DEF are,

$$DE = 18 \text{ cm}$$

$$EF = 3x + 9 = 24 \text{ cm}$$

$$DF = 6x = 30 \text{ cm}$$ **Ans.**

Solution 4.

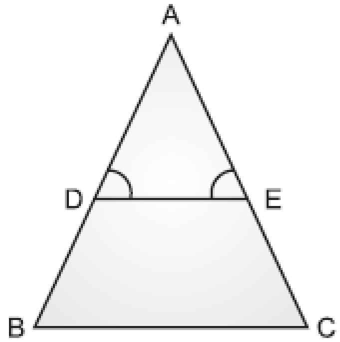


Fig.

Given : $\angle D = \angle E$

and, $\dfrac{AD}{DB} = \dfrac{AE}{EC}$

To prove : ΔBAC is an isosceles triangle

Proof : In ΔABC, $\dfrac{AD}{DB} = \dfrac{AE}{EC}$ (given)

$\Rightarrow$ $DE \parallel BC$

{By converse of Basic Proportionality theorem}

$\therefore$ $\angle ADE = \angle ABC$ ...(i)

{$\because$ Corresponding angles are equal as $DE \parallel BC$}

and $\angle AED = \angle ACB$ ...(ii)

But $\angle ADE = \angle AED$ (Given)...(iii)

$\therefore$ $\angle ABC = \angle ACB$

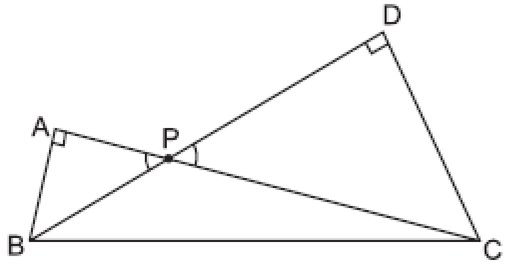
(From eq. (i), (ii) and (ii))

$\Rightarrow$ $AB = AC$

$\therefore$ ΔABC is an isosceles triangle as two of its sides are equal. **Hence Proved.**

Solution 5.

Given, ΔABC and ΔDBC are right angle triangles, right angled at A and D respectively, on same side of BC. AC & BD intersect at P.



In ΔAPB and ΔPDC,

$$\angle A = \angle D = 90^\circ$$

$$\angle APB = \angle DPC \quad \text{(Vertically opposite)}$$

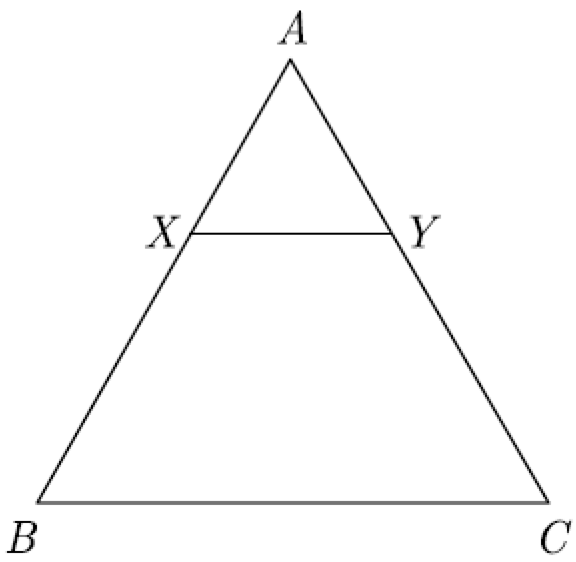
$$\therefore \quad \Delta APB \sim \Delta DPC \quad \text{(By AA Similarity)}$$

$$\therefore \quad \frac{AP}{BP} = \frac{PD}{PC} \quad \text{(by c.s.s.t.)}$$

$\Rightarrow AP \times PC = BP \times PD.$ **Hence Proved.**

Solution 6.

As per question we have drawn figure given below.



In this figure we have

$$\frac{AX}{XB} = \frac{3}{4}, AY = 5 \text{ and } YC = 9$$

Now $$\frac{AX}{XB} = \frac{3}{4} \text{ and } \frac{AY}{YC} = \frac{5}{9}$$

Since $$\frac{AX}{XB} \neq \frac{AY}{YC}$$

Hence XY is not parallel to BC.

Solution 7.

We have $\frac{PS}{SQ} = \frac{3}{5}$

$$\frac{PS}{PS+SQ} = \frac{3}{3+5}$$

$$\frac{PS}{PQ} = \frac{3}{8}$$

We also have, $ST || QR$, thus by BPT we get

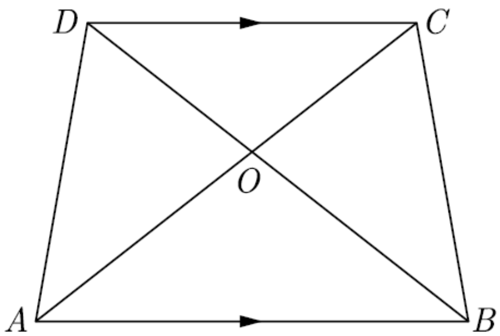
$$\frac{PS}{PQ} = \frac{PT}{PR}$$

$$PT = \frac{PS}{PQ} \times PR$$

$$= \frac{3 \times 28}{8} = 10.5 \text{ cm}$$

Solution 8.

As per given condition we have drawn the figure below.



In ΔAOB and ΔCOD, $AB \parallel CD$,

Thus due to alternate angles

$$\angle OAB = \angle DCO$$

and $\angle OBA = \angle ODC$

By AA similarity we have

$$\Delta AOB \sim \Delta COD$$

For corresponding sides of similar triangles we have

$$\frac{AO}{CO} = \frac{BO}{DO}$$

$$\frac{AO}{BO} = \frac{CO}{DO}. \qquad \text{Hence Proved}$$

Solution 9.

From given figures,

$$\frac{PQ}{ZY} = \frac{4.2}{8.4} = \frac{1}{2},$$

$$\frac{PR}{ZX} = \frac{3\sqrt{3}}{6\sqrt{3}} = \frac{1}{2}$$

and $\frac{QR}{YX} = \frac{7}{14} = \frac{1}{2}$

Thus $\frac{QP}{ZY} = \frac{PR}{ZX} = \frac{QR}{YX}$

By SSS criterion we have

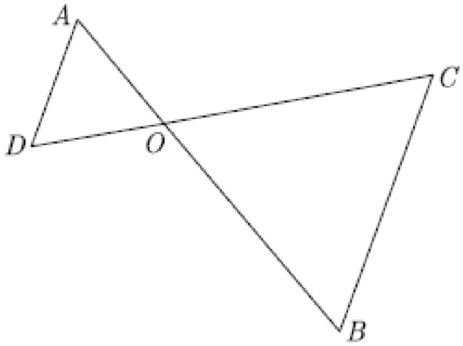
$$\Delta PQR \sim \Delta ZYX$$

Thus $\angle X = \angle R$

$$= 180^\circ - (60^\circ + 70^\circ) = 50^\circ$$

Thus $\angle X = 50^\circ$

Solution 10.



We have $OA \times OB = OC \times OD$

$$\frac{OA}{OD} = \frac{OC}{OB}$$

Due to the vertically opposite angles,

$$\angle AOD = \angle COB$$

Thus by SAS similarity we have

$$\Delta AOD \sim \Delta COB$$

Thus $\angle A = \angle C$ and $\angle B = \angle D$. because of corresponding angles of similar triangles.