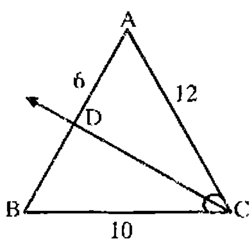
Exercise 14.2

1. In ΔABC as shown in the figure, $\overrightarrow{CD}$ bisects $\angle C$ and meets $\overline{AB}$ at D, $m\overline{BD}$ is equal to a) 5 b) 16 c) 10 d) 18

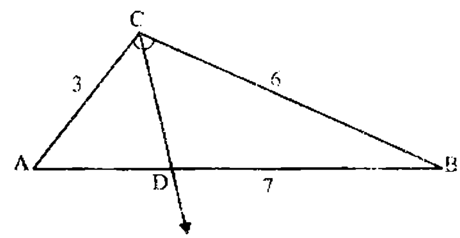


Ans. $$\frac{m\overline{BD}}{m\overline{DA}}=\frac{m\overline{BC}}{m\overline{CA}}$$

$$\frac{m\overline{BD}}{6}=\frac{10}{12}$$

$$m\overline{BD}=\frac{10}{12}\times 6=5$$

2. In ΔABC as shown in the figure, $\overrightarrow{CD}$ bisects $\angle C$. If $m\overline{AC}=3$, $m\overline{CB}=6$ and $m\overline{AB}=7$, then find $m\overline{AD}$ and $m\overline{DB}$.



Ans. $$m\overline{AD}=x$$

$$m\overline{BD}=7-x$$

$$\frac{m\overline{AD}}{m\overline{DB}}=\frac{m\overline{AC}}{m\overline{CB}}$$

$$\frac{x}{7-x}=\frac{3}{6}$$

$$\frac{x}{7-x}=\frac{1}{2}$$

$$2x=1(7-x)$$

$$2x=7-x$$

$$3x=7 \Rightarrow \quad x=\frac{7}{3}$$

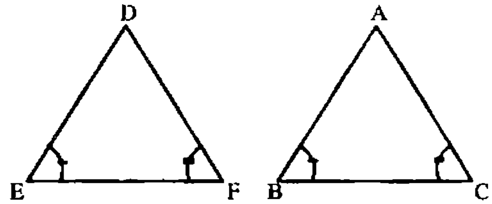
$$m\overline{AD}=\frac{7}{3}$$

$$m\overline{DB}=7-x$$

$$=7-\frac{7}{3}$$

$$=\frac{21-7}{3}=\frac{14}{3}$$

3. Show that in any correspondence of two triangles if two angles of one triangle are congruent to the corresponding angles of the other, then the triangles are similar.



Given: In ΔABC and ΔDEF

$m\angle B = m\angle E$

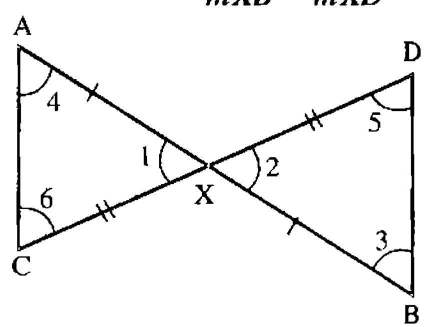
$m\angle C = m\angle F$

To Prove: $\Delta ABC \sim \Delta DEF$

Proof:

Statements	Reasons
$m\angle B + m\angle C + m\angle A = 180^\circ$ ---(i)	Sum of interior angles of triangle is 180°
$m\angle E + m\angle F + m\angle D = 180^\circ$....(ii)	Given
$m\angle B + m\angle C + m\angle D = 180^\circ$...(iii) $m\angle A - m\angle D = 0$ $m\angle A = m\angle D$ All Angles of ΔDEF and ΔABC are congruent Thus $\Delta ABC \sim \Delta DEF$.	Subtracting (i) from (ii)

4. If line segments $\overline{AB}$ and are $\overline{CD}$ intersecting at point X and $\frac{m\overline{AX}}{m\overline{XB}}=\frac{m\overline{CX}}{m\overline{XD}}$ then show that ΔAXC and ΔBXD are similar.



Given:

$\overline{AB}$ and $\overline{CD}$ intersect each other at point x and

$$\frac{m\overline{AX}}{m\overline{XB}}=\frac{m\overline{CX}}{m\overline{XD}}$$

To Prove:

$\Delta AXC \sim \Delta BXD$

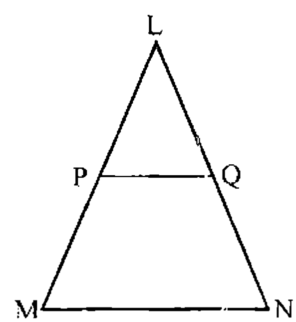
Proof:

Statements	Reasons
In ΔAXC and ΔBXD	
$\angle 1 \cong \angle 2$	Vertical angles
$\dfrac{m\overline{AX}}{m\overline{XB}} = \dfrac{m\overline{CX}}{m\overline{XD}}$	Given
Then $\overline{AC} \parallel \overline{BD}$	
$\angle 4 \cong \angle 3$	Alternate angles
$\angle 6 \cong \angle 5$	
Thus $\dfrac{m\overline{AX}}{m\overline{XB}} = \dfrac{m\overline{CX}}{m\overline{XD}} = \dfrac{m\overline{AC}}{m\overline{DB}}$	
Hence ΔAXC and ΔBXD are similar.	

5. Which of the following are true and which are false?

i.	Congruent triangles are of same size and shape.	True
ii.	Similar triangles are of same shape but different sizes.	True
iii.	Symbol used for congruent is '~'.	False
iv.	Symbol used for similarity is '≅'.	False
v.	Congruent triangles are similar.	True
vi.	Similar triangles are congruent.	False
vii.	A line segment has only one mid point.	True
viii.	One and only one line can be drawn through two points.	True
ix.	Proportion is non-equality of two ratios.	False
x.	Ratio has no unit.	True

6. In ΔLMN show in the figure, $\overline{MN} \parallel \overline{PQ}$.



i) If $m\overline{LM} = 5$cm, $m\overline{LP} = 2.5$cm, $m\overline{LQ} = 2.3$cm, then find $m\overline{LN}$.

ii) If $m\overline{LM} = 6$cm, $m\overline{LQ} = 2.5cm$, $m\overline{QN} = 5$cm, then find $m\overline{LP}$.

Given: In ΔLMN, $\overline{MN} \parallel \overline{PQ}$

$m\overline{LM} = 5$cm, $m\overline{LP} = 2.5$cm, $m\overline{LQ} = 2.3$cm

To Prove: mLN = ?

Proof:

Statements	Reasons
$\dfrac{m\overline{LN}}{m\overline{LQ}} = \dfrac{m\overline{LM}}{m\overline{LP}}$	$\overline{PQ} \parallel \overline{MN}$ (Given)

$\frac{m\overline{LN}}{2.3}=\frac{5}{2.5}$ $m\overline{LN}=\frac{5\times2.3}{2.5}$ $=\frac{5\times23}{25}$ $=4.6\text{cm}$	Putting Values

(ii)

Given: $\Delta LMN, \overline{MN} \parallel \overline{PQ}$

$m\overline{QN}=5\text{cm}, m\overline{LQ}=2.5\text{cm}, m\overline{LM}=6\text{cm}.$

To prove: $m\overline{LP}=?$

Proof:

$$\frac{m\overline{LP}}{m\overline{LM}}=\frac{m\overline{LQ}}{m\overline{LN}}$$

$$\frac{m\overline{LP}}{m\overline{LM}}=\frac{m\overline{LQ}}{m\overline{LQ}+m\overline{QN}}$$

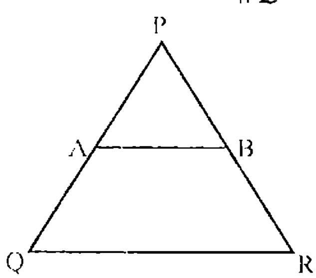
$$\frac{m\overline{LP}}{6}=\frac{2.5}{2.5+5}$$

$$m\overline{LP}=\frac{2.5}{7.5}\times6$$

$$m\overline{LP}=\frac{1}{3}\times6$$

$$=2\text{cm}.$$

7. In the shown figure, let $m\overline{PA}=8x-7$, $m\overline{PB}=4x-3$, $m\overline{AQ}=5x-3$, $m\overline{BR}=3x-1$. Find the value of x if $\overline{AB}\parallel\overline{QR}$.



If $\overline{AB}\parallel\overline{QR}$ then

$$\frac{m\overline{PA}}{m\overline{AQ}}=\frac{m\overline{PB}}{m\overline{BR}}$$

Putting values

$$\frac{8x-7}{5x-3}=\frac{4x-3}{3x-1}$$

$$(8x-7)(3x-1)=(5x-3)(4x-3)$$

$$24x^2-8x-21x+7=20x^2-15x-12x+9$$

$$24x^2-29x+7=20x^2-27x+9$$

$$24x^2-20x^2-29x+27x+7-9=0$$

$$4x^2-2x-2=0$$

$$2x^2-x-1=0$$

$$2x^2-2x+x-1=0$$

$$2x(x-1)+1(x-1)=0$$

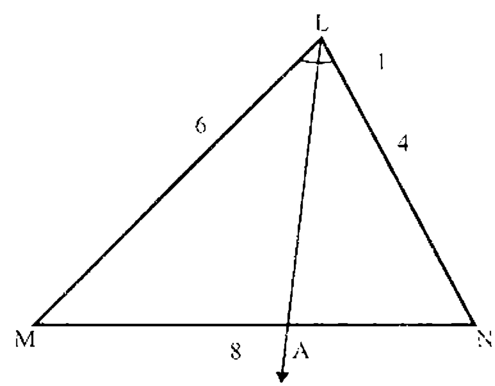
$$(2x+1)(x-1)=0$$

$$2x+1=0 \quad \text{or} \quad x-1=0$$

$$2x=-1 \qquad x=1$$

$$x=\frac{-1}{2}$$

8. In ΔLMN **shown in the figure** $\overrightarrow{LA}$ **bisects** $\angle L$**. If** $m\overline{LN}=4$, $m\overline{LM}=6$, $m\overline{MN}=8$, **then find** $m\overline{MA}$ **and** $m\overline{AN}$**.**



Given: In $\Delta LMN, \overline{LA}$ is angle bisector of $\angle L$.

$m\overline{LM} = 6cm, m\overline{LN} = 4cm, m\overline{MN} = 8cm.$

To Prove: $m\overline{MA} = ?$, $m\overline{AN} = ?$

Proof:

Let $m\overline{AN} = x cm$

$m\overline{MA} = 8 - x cm$

$$\frac{m\overline{MA}}{m\overline{AN}} = \frac{m\overline{LM}}{m\overline{LN}}$$

Putting values

$$\frac{8-x}{x} = \frac{6}{4}$$

$4(8-x) = 6x$

$32 - 4x = 6x$

$32 = 6x + 4x$

$10x = 32$

$$x = \frac{32}{10} = 3.2$$

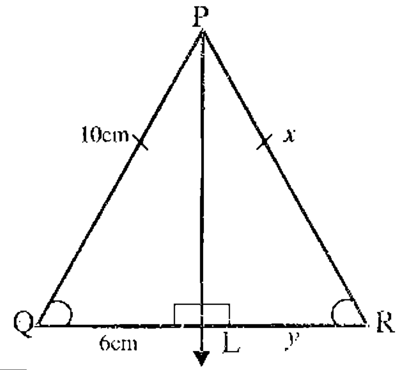
$\therefore$ $m\overline{AN} = 3.2cm.$

$m\overline{MA} = 8 - x$

$= 8 - 3.2$

$= 4.8cm.$

9. In Isosceles ΔPQR shown in the figure, find the value of x and y.



Given:

In $\Delta PQR, \overline{PQ} \cong \overline{PR}$ and $\overline{PL} \perp \overline{QR}$.

To Prove: $x = ?$ $y = ?$

Proof:

In ΔPRL and ΔPQL

$m\overline{PQ} = m\overline{PR}$ ...(i)	Isosceles triangle
$m\angle PLQ = m\angle PLR$	Each of right angle
$m\overline{PL} = m\overline{PL}$	Common
$\Delta PQL \cong \Delta PRL$	H.S. $\cong$ H.S

$m\overline{QL} = m\overline{LR}$

$6 = y$

$\Rightarrow y = 6cm.$

From (i) $x = 10cm.$