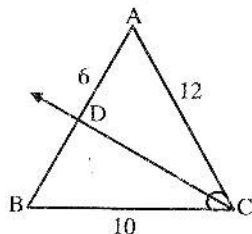


Exercise 14.2

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

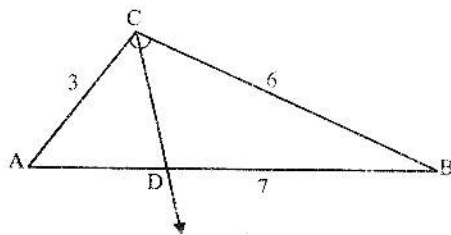


Ans. $\frac{m\overline{BD}}{m\overline{DA}} = \frac{m\overline{BC}}{m\overline{CA}}$

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

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

2. In $\triangle ABC$ as shown in the figure, $\overline{CD}$ 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. $m\overline{AD} = x$

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

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

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

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

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

$$2x = 7 - x$$

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

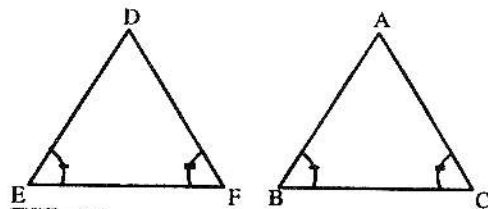
$$m\overline{AD} = \frac{7}{3}$$

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

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

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

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 $\triangle ABC$ and $\triangle DEF$

$$m\angle B = m\angle E$$

$$m\angle C = m\angle F$$

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

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)	Subtracting (i) from (ii)
$m\angle A - m\angle D = 0$	
$m\angle A = m\angle D$	
All Angles of $\triangle DEF$ and $\triangle ABC$ are congruent	
Thus $\triangle ABC \sim \triangle DEF$.	

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

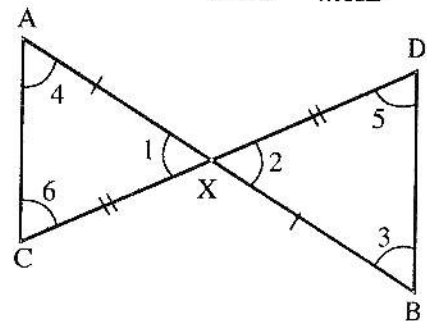
Given:

$\overline{AB}$ 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:

$$\triangle AXC \sim \triangle BXD$$



Proof:

Statements		Reasons
In	$\triangle AXC$ and $\triangle BXD$ $\angle 1 \cong \angle 2$ $\frac{m\overline{AX}}{m\overline{XB}} = \frac{m\overline{CX}}{m\overline{XD}}$	Vertical angles Given
Then	$\overline{AC} \parallel \overline{BD}$ $\angle 4 \cong \angle 3$ $\angle 6 \cong \angle 5$	Alternate angles
Thus	$\frac{m\overline{AX}}{m\overline{XB}} = \frac{m\overline{CX}}{m\overline{XD}} = \frac{m\overline{AC}}{m\overline{DB}}$	
Hence $\triangle AXC$ and $\triangle BXD$ 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 ' $\cong$ '. | False |
| iv. Symbol used for similarity is ' $\sim$ '. | 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 $\triangle LMN$ show in the figure, $\overline{MN} \parallel \overline{PQ}$.

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

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

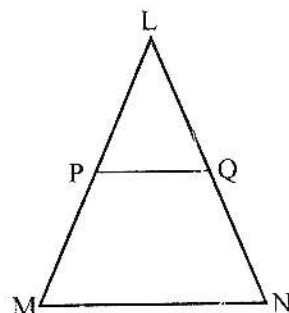
Given: In $\triangle LMN$, $\overline{MN} \parallel \overline{PQ}$

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

To Prove: $m\overline{LN} = ?$

Proof:

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



$\frac{m\overline{LN}}{2.3} = \frac{5}{2.5}$ $m\overline{LN} = \frac{5 \times 2.3}{2.5}$ $= \frac{5 \times 23}{25}$ $= 4.6\text{cm}$	Putting Values
--	----------------

(ii)

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

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

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

Proof:

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

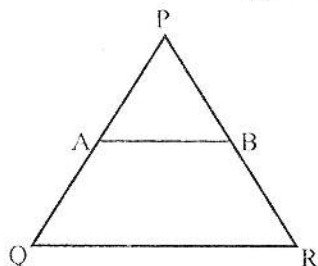
$$\frac{m\overline{LP}}{6} = \frac{m\overline{LQ}}{2.5 + 5}$$

$$m\overline{LP} = \frac{2.5}{7.5} \times 6$$

$$m\overline{LP} = \frac{1}{3} \times 6$$

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

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

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

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

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

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

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

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

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

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

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

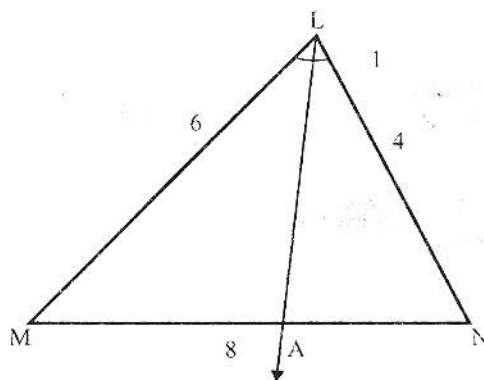
$$(2x + 1)(x - 1) = 0$$

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

$$2x = -1 \quad x = 1$$

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

8. In $\triangle LMN$ shown in the figure $\overline{LA}$ 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 $\triangle LMN$, $\overline{LA}$ is angle bisector of $\angle L$.

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

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

Proof:

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

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

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

Putting values

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

$$4(8-x) = 6x$$

$$32 - 4x = 6x$$

$$32 = 6x + 4x$$

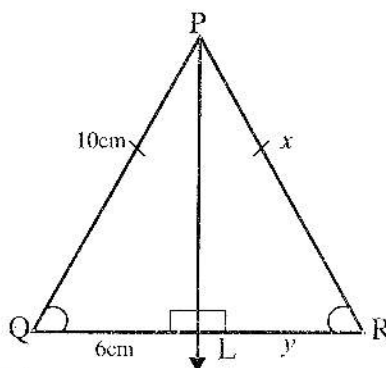
$$10x = 32$$

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

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

$$\begin{aligned} m\overline{MA} &= 8 - x \\ &= 8 - 3.2 \\ &= 4.8\text{cm}. \end{aligned}$$

9. In Isosceles $\triangle PQR$ shown in the figure, find the value of x and y .



Given:

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

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

Proof:

In $\triangle PRL$ and $\triangle PQL$

$m\overline{PQ} = m\overline{PR} \dots (i)$ Isosceles triangle

$m\angle PLQ = m\angle PLR$ Each of right angle

$m\overline{PL} = m\overline{PL}$ Common

$\triangle PQL \cong \triangle PRL$ H.S. $\cong$ H.S

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

$$6 = y$$

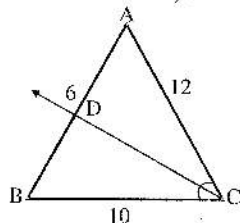
$$\Rightarrow y = 6\text{cm}.$$

From (i) $x = 10\text{cm}$.

OBJECTIVE

1. In $\triangle ABC$ as shown in figure, $\overline{CD}$ bisects $\angle C$ and meets $\overline{AB}$ at D , a $m\overline{BD}$ is equal to:

- (a) 5
(b) 16
(c) 10
(d) 18



2. In $\triangle ABC$ shown in figure, $\overline{CD}$ bisects $\angle C$, if $m\overline{AC} = 3$, $m\overline{CB} = 6$ and $m\overline{AB} = 7$ then

(i) $\overline{AD} = \underline{\hspace{2cm}}$

(a) $\frac{7}{3}$ (b) $\frac{14}{3}$

(c) $\frac{9}{2}$ (d) $\frac{11}{2}$

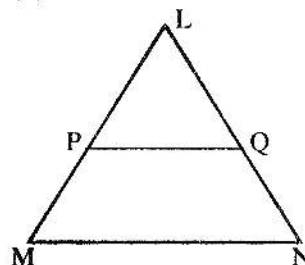
(ii) $m\overline{BD} = \underline{\hspace{2cm}}$

(a) $\frac{7}{3}$ (b) $\frac{14}{3}$

(c) $\frac{15}{2}$ (d) $\frac{11}{2}$

3. One and only one line can be drawn through ____ points:
 (a) Two (b) Three
 (c) Four (d) Five
4. The ratio between two alike quantities is defined as:
 (a) $a : b$
 (b) $b : a$
 (c) $a : b = c : d$
 (d) None
5. If a line segment intersects the two sides of a triangle in the same ratio then it is parallel to the ____ side:
 (a) Third (b) Fourth
 (c) Second (d) None
6. Two triangles are said to be similar if these are equiangular and their corresponding sides are ____
 (a) Proportional
 (b) congruent

- (c) concurrent
 (d) None
7. In $\triangle LMN$ shown in the figure $\overline{MN} \parallel \overline{PQ}$ if $m\overline{LM} = 5\text{cm}$, $m\overline{LP} = 2.5\text{cm}$, $m\overline{LQ} = 2.3\text{cm}$ then $m\overline{LN} = \underline{\hspace{1cm}}$:
 (a) 4.6cm
 (b) 4.5cm
 (c) 3.5cm
 (d) 4.0



ANSWER KEY

1.	a	2.	(i) a (ii) b	3.	a	4.	a	5.	a
6.	a	7.	a						