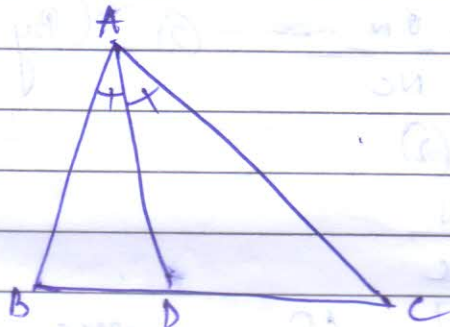


exercise 7.3

Q.1



In $\triangle ABC$

BD is the angle bisector of $\angle A$ } given

(i) $BD = 2.5 \text{ cm}$

$AB = 5 \text{ cm}$

$AC = 4.2 \text{ cm}$

} given

As AD bisects LA,

$$\therefore \frac{AB}{AC} = \frac{BD}{DC} \quad (\text{Bisector theorem})$$

$$\Rightarrow \frac{5}{4.2} = \frac{2.5}{DC}$$

$$\Rightarrow DC = \frac{2.5 \times 4.2}{5}$$

$$\Rightarrow \boxed{DC = 2.1 \text{ cm}}$$

(iii) $\left. \begin{array}{l} AB = 3.5 \text{ cm} \\ AC = 4.2 \text{ cm} \\ DC = 2.8 \text{ cm} \end{array} \right\} \text{ given}$

As AD bisects LA,

$$\therefore \frac{AB}{AC} = \frac{BD}{DC} \quad (\text{Bisector theorem})$$

$$\Rightarrow \frac{3.5}{4.2} = \frac{BD}{2.8}$$

$$\Rightarrow BD = \frac{3.5 \times 2.8}{4.2}$$

$$\Rightarrow \boxed{BD = 2.3 \text{ cm}}$$

(iv) $\left. \begin{array}{l} AC = 4.2 \text{ cm} \\ DC = 6 \text{ cm} \\ BC = 10 \text{ cm} \end{array} \right\} \text{ given}$

$$BD = BC - DC = 10 - 6$$

$$= 4 \text{ cm}$$

As AD bisects LA

$$\therefore \frac{AB}{AC} = \frac{BD}{DC} \quad (\text{Bisector theorem})$$

$$\Rightarrow \frac{AB}{4.2} = \frac{4}{6}$$

$$\Rightarrow AB = \frac{2 \cancel{4} \times 4.2}{\cancel{6} 3}$$

$$\Rightarrow \boxed{AB = 2.8 \text{ cm}}$$

(vii) $AD = 5.6 \text{ cm}$
 $BC = 6 \text{ cm}$
 $BD = 3.2 \text{ cm}$ } given

As AD bisects $\angle A$,

$$\frac{AD}{AC} = \frac{BD}{DC} \quad (\text{Bisector theorem})$$

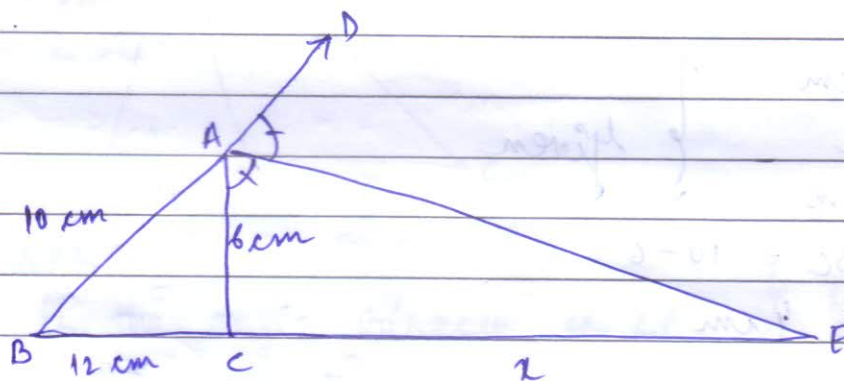
$$\Rightarrow \frac{5.6}{AC} = \frac{3.2}{6 - 3.2}$$

$$\Rightarrow \frac{5.6}{AC} = \frac{3.2}{2.8}$$

$$\Rightarrow AC = \frac{5.6 \times 2.8}{3.2}$$

$$\Rightarrow \boxed{AC = 4.9 \text{ cm}}$$

Q.2



Given - $\bullet$ AE bisects $\angle DAF$

$\bullet$ $AB = 10 \text{ cm}$, $AC = 6 \text{ cm}$, $BC = 12 \text{ cm}$

To find - CE

Solution - Let the length of CE be x

$$\therefore BE = BC + CE$$

$$= (12 + x) \text{ cm}$$

As AE bisects $\angle CAD$,

$$\therefore \frac{AB}{AC} = \frac{BD}{EC} \quad (\text{Bisector theorem})$$

$$\Rightarrow \frac{10}{6} = \frac{12+x}{x}$$

$$\Rightarrow 10x = 72 + 6x$$

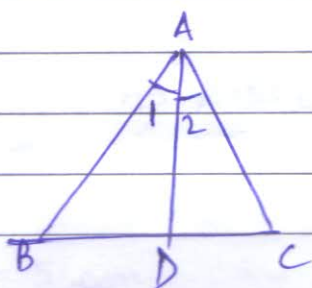
$$\Rightarrow 10x - 6x = 72$$

$$\Rightarrow 4x = 72$$

$$\Rightarrow x = \frac{72}{4} = 18$$

$$\Rightarrow \boxed{x = 18 \text{ cm}}$$

$\therefore$ The length of CE is 18 cm.



Given - In $\triangle ABC$,

$$\bullet \frac{AB}{AC} = \frac{BD}{DC}$$

$$\bullet \angle B = 70^\circ, \angle C = 50^\circ$$

To find - $\angle BAD$.

Solution - As $\frac{AB}{AC} = \frac{BD}{DC}$

$\therefore AD$ bisects $\angle A$ (By converse of bisector theorem)

$$\angle A + \angle B + \angle C = 180^\circ \text{ (Angle sum prop. of } \Delta \text{)}$$

$$\angle A + 70^\circ + 50^\circ = 180^\circ$$

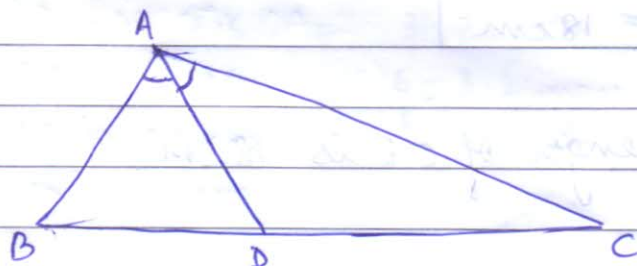
$$\angle A = 180^\circ - 120^\circ$$

$$\angle A = 60^\circ$$

$$\angle BAD = \frac{1}{2} \angle A \text{ (As AD bisects } \angle A \text{)}$$

$$= \frac{1}{2} \times 60^\circ = 30^\circ$$

Q.4



- (i) $AB = 5 \text{ cm}$
 $AC = 10 \text{ cm}$
 $BD = 1.5 \text{ cm}$
 $CD = 3.5 \text{ cm}$
- } given

$$\frac{AB}{AC} = \frac{5}{10} = \frac{1}{2} \quad \text{--- (1)}$$

$$\frac{BD}{CD} = \frac{1.5}{3.5} = \frac{3}{7} \quad \text{--- (2)}$$

from ① & ②

$$\frac{AB}{AC} \neq \frac{AD}{CD}$$

$\therefore AD$ does not bisect $\angle A$.

(iii)

$$AB = 8 \text{ cm}$$

$$AC = 24 \text{ cm}$$

$$BD = 6 \text{ cm}$$

$$BC = 24 \text{ cm}$$

} given

$$CD = BC - BD = 24 - 6 \\ = 18 \text{ cm}$$

$$\frac{AB}{AC} = \frac{8}{24} = \frac{1}{3} \quad \text{--- ①}$$

$$\frac{BD}{CD} = \frac{6}{18} = \frac{1}{3} \quad \text{--- ②}$$

from ① & ②

$$\frac{AB}{AC} = \frac{BD}{CD}$$

$\therefore AD$ bisects $\angle A$, (By converse of bisector theorem)

(iv)

$$AB = 5 \text{ cm}$$

$$AC = 12 \text{ cm}$$

$$BD = 2.5 \text{ cm}$$

$$BC = 9 \text{ cm}$$

} given

$$CD = BC - BD = 9 - 2.5 \\ = 6.5 \text{ cm}$$

$$\frac{AB}{AC} = \frac{5}{12} \quad \text{--- ①}$$

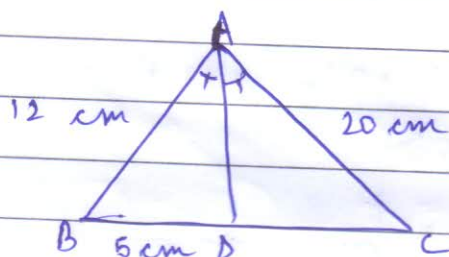
$$\frac{BD}{CD} = \frac{\cancel{2} \cancel{5} 5}{\cancel{6} \cancel{5} 13} = \frac{5}{13} \quad \text{--- ②}$$

From ① & ②

$$\frac{AB}{AC} \neq \frac{BD}{CD}$$

$\therefore$ AD does not bisect LA.

Q.5



AD bisects LA

$$AB = 12 \text{ cm}$$

$$AC = 20 \text{ cm}$$

$$BD = 5 \text{ cm}$$

} given

$\therefore$ AD bisects LA,

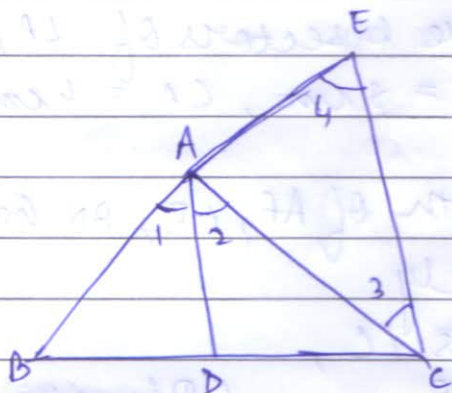
$$\therefore \frac{AB}{AC} = \frac{BD}{CD}$$

(Bisector theorem)

$$\Rightarrow \frac{12}{20} = \frac{5}{CD}$$

$$\Rightarrow CD = \frac{5 \times 20 \times 5}{12 \times 3}$$

$$\Rightarrow \boxed{CD = 8.33 \text{ cm}}$$



Given - $\cdot$ AD meets BC at D

$$\cdot \angle 1 = \angle 2$$

To prove - $\frac{AB}{AC} = \frac{BD}{DC}$

Cons. - Through C, draw CE $\parallel$ DA which meets BA at E on producing.

Proof - $\angle 2 = \angle 3$ (Alternate $\angle$ s, AD $\parallel$ CE) - ①

$\angle 1 = \angle 4$ (Corresponding $\angle$ s, AD $\parallel$ CE) - ②

$\angle 1 = \angle 2$ (Given) - ③

$\therefore \angle 3 = \angle 4$ (From ①, ②, ③)

$\therefore AC = AE$ (Sides opp. to equal $\angle$ s)

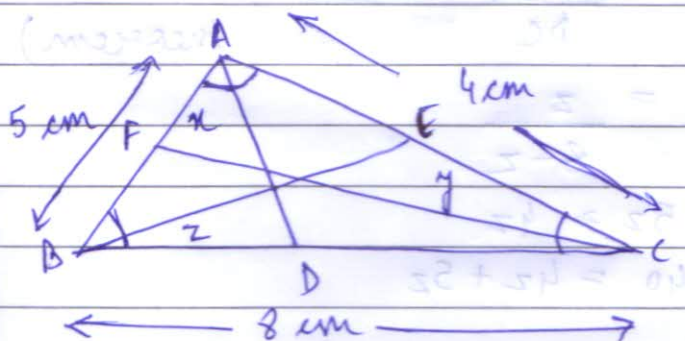
In $\triangle BCE$,

AD $\parallel$ CE (By cons.)

$\therefore \frac{BD}{DC} = \frac{AB}{AE}$ (By BPT)

$$\Rightarrow \boxed{\frac{BD}{DC} = \frac{AB}{AC}} \quad (AC = AE)$$

Hence, proved.



Given - • AD, BE, CF are bisectors of $\angle A, \angle B$ & $\angle C$
 • $AB = 5 \text{ cm}$, $BC = 8 \text{ cm}$, $CA = 4 \text{ cm}$

To find - AF, CE & BD

Solution - Let the length of AF, CE, BD be x, y, z respectively.

As CF bisects $\angle C$,

$$\therefore \frac{CA}{BC} = \frac{AF}{FB} \quad (\text{Bisector theorem})$$

$$\frac{4}{8} = \frac{x}{5-x}$$

$$20 - 4x = 8x$$

$$20 = 8x + 4x$$

$$x = \frac{20}{12}$$

$$x = 1.66$$

$$\boxed{x = 1.66 \text{ cm}}$$

As BE bisects $\angle B$,

$$\therefore \frac{BC}{AB} = \frac{CE}{EA} \quad (\text{Bisector theorem})$$

$$\frac{8}{5} = \frac{y}{4-y}$$

$$32 - 8y = 5y$$

$$32 = 8y + 5y$$

$$y = \frac{32}{13}$$

$$\boxed{y = 2.46 \text{ cm}}$$

As AD bisects $\angle A$,

$$\therefore \frac{AB}{AC} = \frac{BD}{DC} \quad (\text{Bisector theorem})$$

$$\frac{5}{4} = \frac{z}{8-z}$$

$$40 - 5z = 4z$$

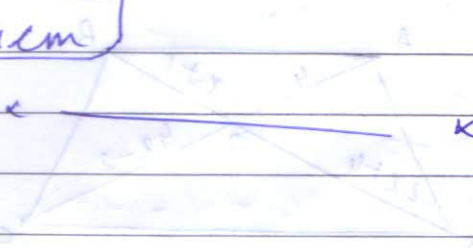
$$40 = 4z + 5z$$

$$40 = 9z$$

$$z = \frac{40}{9}$$

$$z = 4.44 \text{ cm}$$

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

$$1 + x = 1 - x$$

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

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

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

$$0 = 0$$

$$0 = 0$$

$$0 = 0$$

$$0 = 0$$

$$0 = 0$$

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