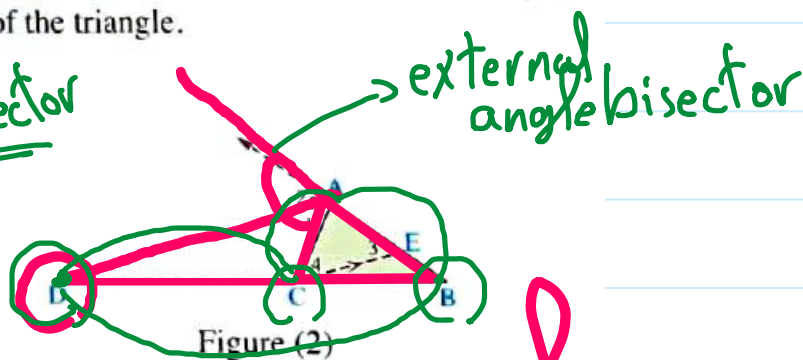
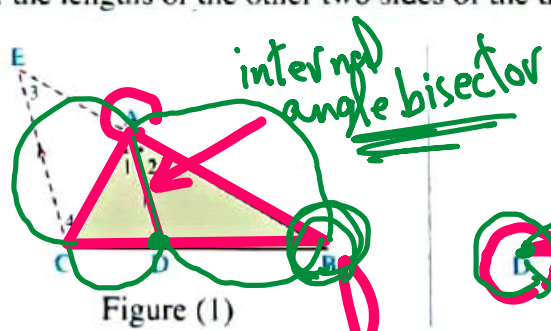


# Angle bisector and proportional parts\_1

Saturday, November 22, 2025 6:43 PM

## Theorem 3

The bisector of the interior or exterior angle of a triangle at any vertex divides the opposite base of the triangle internally or externally into two parts, the ratio of their lengths is equal to the ratio of the lengths of the other two sides of the triangle.



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

ABC is a triangle in which  $AB = 4 \text{ cm}$ ,  $BC = 5 \text{ cm}$ ,  $CA = 6 \text{ cm}$ , draw  $\overline{AD}$  to bisect the angle A and intersects  $\overline{BC}$  at D  
Find the length of each of:  $\overline{BD}$ ,  $\overline{DC}$

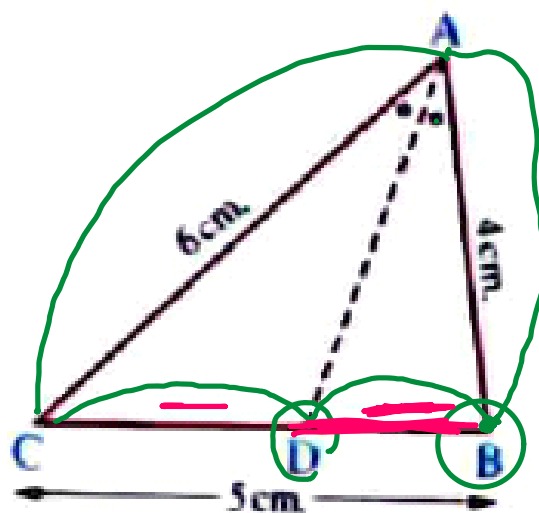
$$\frac{BD}{DC} = \frac{AB}{AC}$$

$$\frac{x}{5-x} = \frac{4}{6}$$

$$6x = 20 - 4x$$

$$\frac{10x}{10} = \frac{20}{10}$$

$$x = 2$$



# Angle bisector and proportional parts\_2

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ABC is a triangle in which  $AB = 6 \text{ cm}$ ,  $BC = 5 \text{ cm}$ ,  $CA = 9 \text{ cm}$ , draw  $\overline{AE}$  to bisect the exterior angle  $\angle A$  and intersects  $\overline{BC}$  at E

Find the length of each of:  $\overline{BE}$ ,  $\overline{EC}$

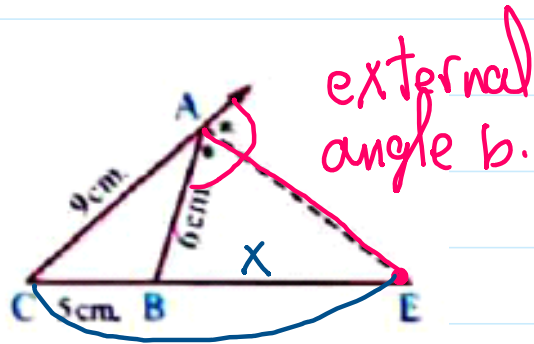
$$\frac{CE}{EB} = \frac{CA}{AB}$$

$$\frac{5+x}{x} = \frac{9}{6}$$

$$9x = 30 + 6x$$

$$3x = 30$$

$$x = 10$$



$$\frac{CE}{EB} = \frac{CA}{AB}$$

$$\therefore BE = 10 \text{ cm}$$

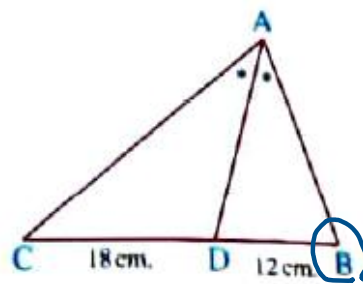
$$\therefore CE = 10 + 5 = 15 \text{ cm}$$

In the opposite figure :

ABC is a triangle,  $\overline{AD}$  bisects  $\angle A$  and intersects  $\overline{BC}$  at D, where

$BD = 12 \text{ cm}$ ,  $DC = 18 \text{ cm}$ , if the perimeter of  $\triangle ABC = 80 \text{ cm}$ .

Find the length of each of:  $\overline{AC}$ ,  $\overline{AB}$



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

Let  $AB = x$

$$\therefore P. \triangle ABC = 80 \text{ cm}$$

$$\therefore AB + BC + AC = 80$$

$$\therefore AB + 30 + AC = 80 - 30$$

$$AB + AC = 50 \text{ cm}$$

$$\therefore AC = 50 - x$$

$$\frac{12}{18} = \frac{AB}{AC}$$

$$\frac{2}{3} = \frac{AB}{AC}$$

$$\frac{2}{3} = \frac{x}{50-x}$$

$$3x = 100 - 2x$$

$$5x = 100$$

$$x = 25$$

$$\therefore AB = 25 \text{ cm}$$

$$AC = 25 \text{ cm}$$