

Study Guide

Parallel Lines and Proportional Parts

The following theorems involve proportional parts of triangles.

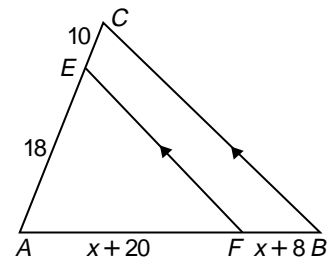
- If a line is parallel to one side of a triangle and intersects the other two sides, then it separates these sides into segments of proportional lengths.
- If a line intersects two sides of a triangle and separates the sides into corresponding segments of proportional lengths, then the line is parallel to the third side.
- A segment whose endpoints are the midpoints of two sides of a triangle is parallel to the third side of the triangle and its length is one-half the length of the third side.

Example: In $\triangle ABC$, $\overline{EF} \parallel \overline{CB}$, find the value of x .

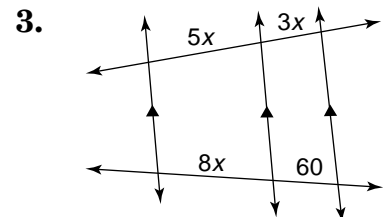
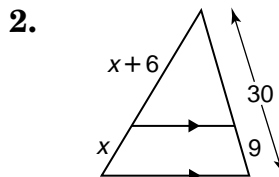
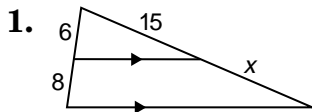
$$\overline{EF} \parallel \overline{CB} \text{ implies that } \frac{AF}{FB} = \frac{AE}{EC}.$$

Rewrite the proportion and solve.

$$\begin{aligned} \frac{x+20}{x+8} &= \frac{18}{10} \\ 10x+200 &= 18x+144 \\ 56 &= 8x \\ 7 &= x \end{aligned}$$



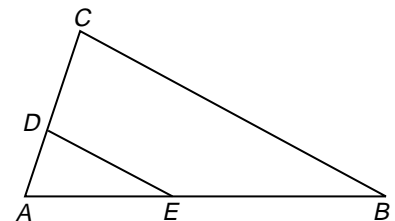
Find the value of x .



In $\triangle ABC$, find x so that $\overline{DE} \parallel \overline{CB}$.

4. $DC = 18$, $AD = 6$,
 $AE = 12$, $EB = x - 3$

5. $AC = 30$, $AD = 10$,
 $AE = 22$, $EB = x + 4$



6. In $\triangle RST$, M is the midpoint of \overline{RS} , N is the midpoint of \overline{ST} , and P is the midpoint of \overline{RT} . Find the perimeter of $\triangle MNP$ if $RS = 28$, $ST = 34$, and $RT = 30$.