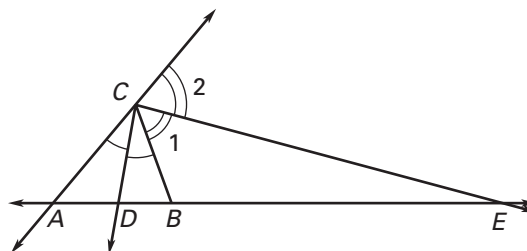


Challenge: Skills and Applications

For use with pages 498–505

1. Figure ABC is a triangle, and D and E are points on $\overleftrightarrow{AB}$ such that $\overrightarrow{CD}$ and $\overrightarrow{CE}$ bisect the interior and exterior angles at C , respectively.



Complete the following steps to prove that $\frac{AD}{BD} = \frac{AE}{BE}$.

- Use the fact that $\overrightarrow{CD}$ is an angle bisector to write a proportion.
- Copy the diagram. Then draw $\overline{BF}$ such that F is on $\overleftrightarrow{AC}$ and $\overleftrightarrow{BF} \parallel \overleftrightarrow{CE}$.
Use the fact that $\overleftrightarrow{BF} \parallel \overleftrightarrow{CE}$ to write a proportion involving AE and BE .
- Show that $\triangle FBC$ is an isosceles triangle. (Hint: Use the fact that $\overleftrightarrow{BF} \parallel \overleftrightarrow{CE}$.)
- Use the results from parts (a) through (c) to show that $\frac{AD}{BD} = \frac{AE}{BE}$.

2. If $AC = BC$, is the theorem given in Exercise 1 still true? Explain.

In Exercises 3–11, refer to the diagram in Exercise 1.

- If $AD = 10$, $BD = 8$, and $AC = 15$, what are BC and BE ?
- If $BE = 9$, $BD = 6$, and $BC = 8$, what are AC and AD ?
- If $AC = 9$, $BC = 6$, and $AE = 30$, what are AD and BE ?
- If $AB = 11$, $BC = 10$, and $BD = 5$, what are AC and BE ?
- If $AC = 10$, $AD = 5$, and $BE = 12$, what are BC and AE ?
- If $AD = 3x$, $AC = 4x$, $BC = x + 1$, and $BD = x$, what is x ?
- If $AD = x + 4$, $BC = x + 2$, $BD = x$, and $AC = BE$, what is x ?
- If $CD = 3$ and $CE = 8$, what is DE ?
- If $m\angle CAB = 40^\circ$ and $m\angle ADC = 110^\circ$, what are $m\angle ABC$ and $m\angle BCE$?