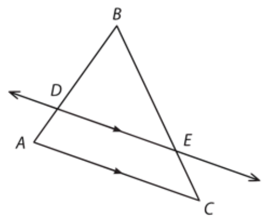
UNIT 4 LESSON 6 RATIO SEGMENTS

Theorem

Triangle Proportionality Theorem

If a line parallel to one side of a triangle intersects the other two sides of the triangle, then the parallel line divides these two sides proportionally.



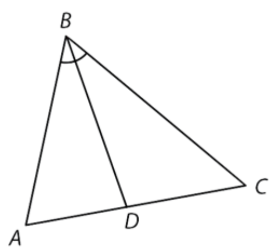
- In the figure above, $\overline{AC} \parallel \overline{DE}$; therefore, $\frac{AD}{DB} = \frac{CE}{EB}$.

<u>Notice the arrows in the middle of DE and AC, which indicate the segments are parallel</u>**

Theorem

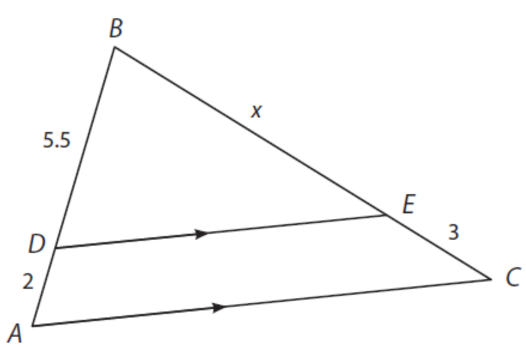
Triangle Angle Bisector Theorem

If one angle of a triangle is bisected, or cut in half, then the angle bisector of the triangle divides the opposite side of the triangle into two segments that are proportional to the other two sides of the triangle.



Example 1

Find the length of $\overline{BE}$.



Since AC||DE , the figure proves the Triangle Proportionality Theorem.

$$\frac{BD}{DA} = \frac{BE}{EC}$$

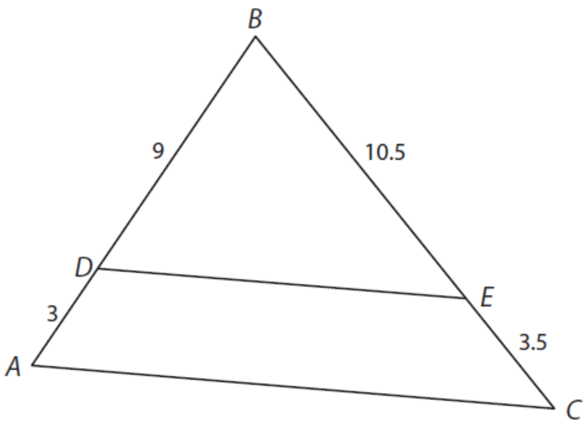
$$\frac{5.5}{2} = \frac{x}{3}$$

2x = 16.5

x = 8.25

Example 2

Prove that $\overline{DE} \parallel \overline{AC}$.



We must show that the triangles are proportional for the line segments to be parallel.

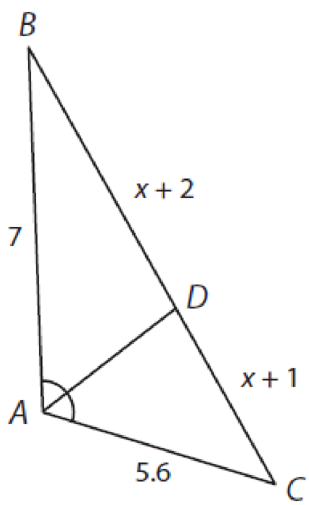
$$\frac{BD}{DA} = \frac{9}{3} = 3$$

$$\frac{BE}{EC} = \frac{10.5}{3.5} = 3$$

We have proven that the triangles are proportional, thereby $\overline{DE} \parallel \overline{AC}$.

Example 3

Find the lengths of $\overline{BD}$ and $\overline{DC}$.



Use the Triangle Proportionality Theorem to solve.

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

$$\frac{x+2}{x+1} = \frac{7}{5.6}$$

5.6(x+2) = 7(x+1)

5.6x + 11.2 = 7x + 7

x = 3

Plug in the value of x.

BD = 3+2 = 5

DC = 3+1 = 4