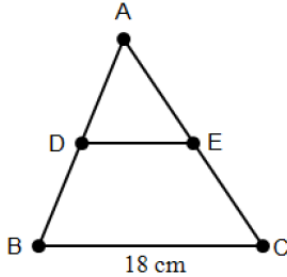


### SM2 9.3: More Triangle Theorems

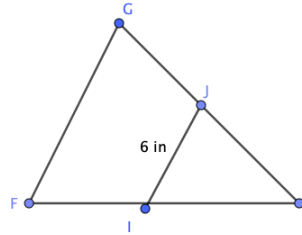
Problems: Use your knowledge of midsegments to solve each problem.

- 1) Find the length of  $\overline{DE}$  given that  $D$  and  $E$  are midpoints.



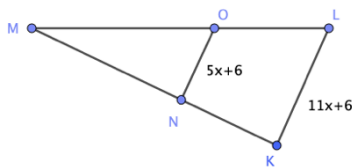
$DE = 9$

- 2) Find the length of  $\overline{FG}$  given that  $\overline{IJ}$  is a midsegment of the triangle.



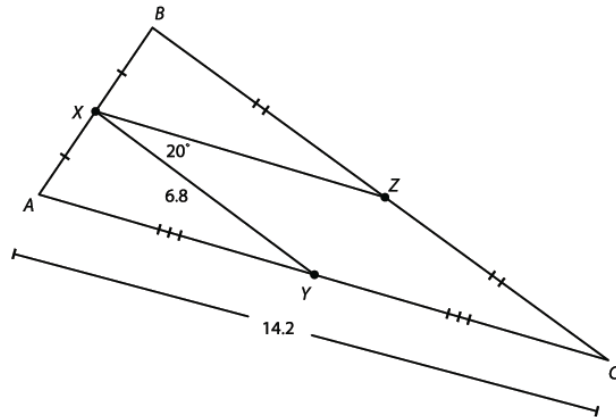
$FG = 12$

- 3) Solve for  $x$  given  $\overline{NO}$  is a midsegment of the triangle.



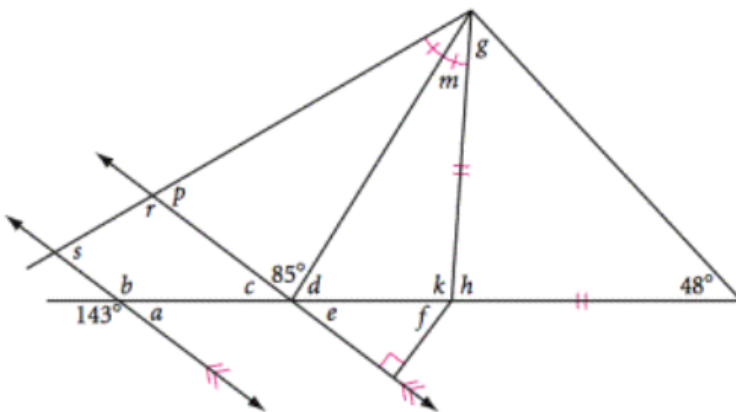
$x = 6$

- 4) Find the lengths of  $\overline{BC}$  and  $\overline{XZ}$  and  $m\angle BZX$ .



$BC = 13.6$   
 $XZ = 7.1$   
 $m\angle BZX = 20^\circ$

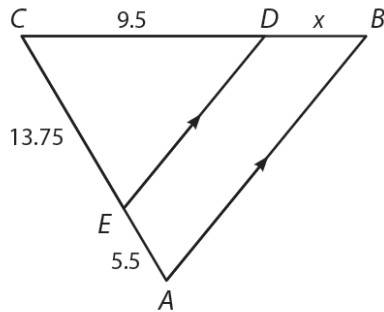
- 5) Find all of the missing angle measures



$m\angle a = 37^\circ$   
 $m\angle b = 143^\circ$   
 $m\angle c = 37^\circ$   
 $m\angle d = 58^\circ$   
 $m\angle e = 37^\circ$   
 $m\angle f = 53^\circ$   
 $m\angle g = 48^\circ$   
 $m\angle h = 84^\circ$   
 $m\angle k = 96^\circ$   
 $m\angle m = 26^\circ$   
 $m\angle p = 69^\circ$   
 $m\angle r = 111^\circ$   
 $m\angle s = 69^\circ$

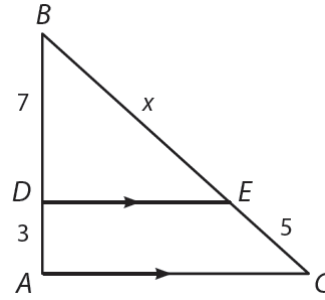
Use the Triangle Proportionality Theorem to find the indicated lengths.

6) Find the length of  $\overline{BD}$



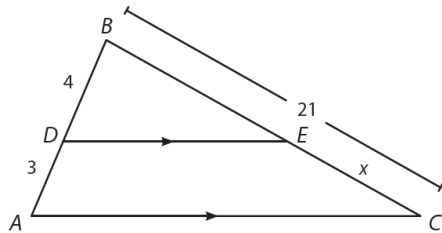
$$BD = 3.8$$

7) Find the length of  $\overline{BE}$



$$BE = 11.67$$

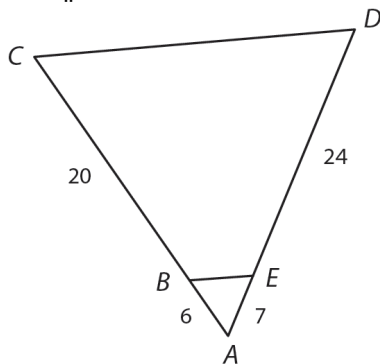
8) Find the length of  $\overline{EC}$



$$EC = 9$$

Use the Triangle Proportionality Theorem to determine if the given segments are parallel. Explain your reasoning.

9) Is  $\overline{BE} \parallel \overline{CD}$ ?

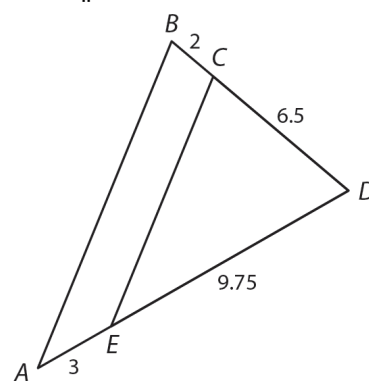


In order for  $\overline{BE} \parallel \overline{CD}$  then:  $\frac{6}{20} = \frac{7}{24}$

$$\frac{6}{20} = \frac{3}{10} = .3 \quad \frac{7}{24} = .292$$

$$\overline{BE} \not\parallel \overline{CD}$$

10) Is  $\overline{AB} \parallel \overline{EC}$ ?

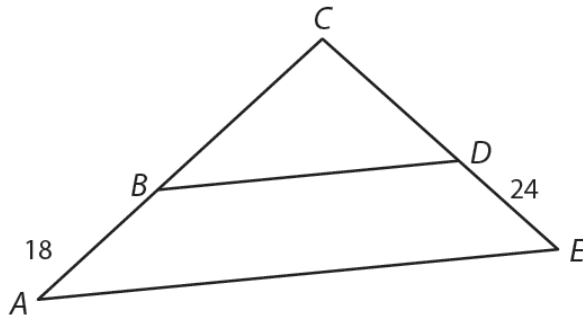


In order for  $\overline{AB} \parallel \overline{EC}$  then:  $\frac{9.75}{3} = \frac{6.5}{2}$

$$\frac{9.75}{3} = 3.25 \quad \frac{6.5}{2} = 3.25$$

$$\overline{AB} \parallel \overline{EC}$$

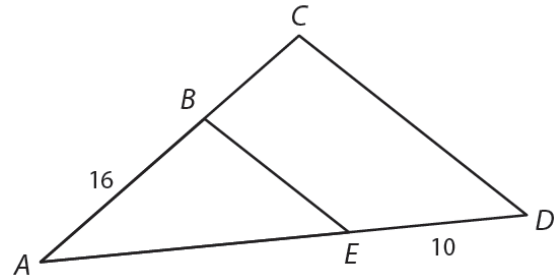
- 11) If  $AC = 60$  units and  $EC = 36$  units,  
is  $\overline{AE} \parallel \overline{BD}$ ?



$$\frac{60 - 18}{18} = 2.33 \quad \frac{36 - 24}{24} = .5$$

$\overline{AB} \not\parallel \overline{EC}$

- 12) If  $AC = 24$  units and  $AD = 30$  units,  
is  $\overline{BE} \parallel \overline{CD}$ ?

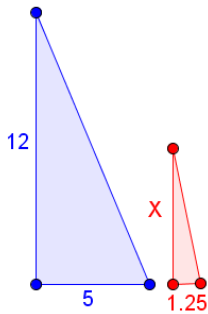


$$\frac{16}{24 - 16} = 2 \quad \frac{30 - 10}{10} = 2$$

$\overline{BE} \parallel \overline{CD}$

Application Problems: Use what you have learned about similar triangles to solve each problem.

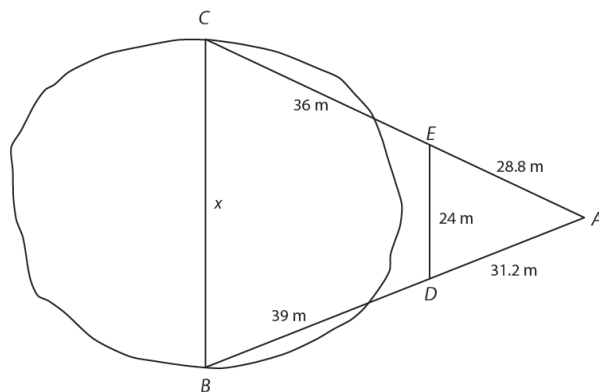
- 13) A 12-foot statue casts a shadow that is 5 feet long. At the same time, a fence post casts a shadow that is 1.25 feet long. What is the height of the fence post?



$$\frac{12}{x} = \frac{5}{1.25}$$

$$x = \frac{12(1.25)}{5} = 3 \text{ feet high}$$

- 14) To measure  $\overline{BC}$ , the distance across a lake, a surveyor stands at point A and locates points B, C, D, and E. What is the distance across the lake?



$$\frac{AE}{EC} = \frac{28.8}{36} = .8,$$

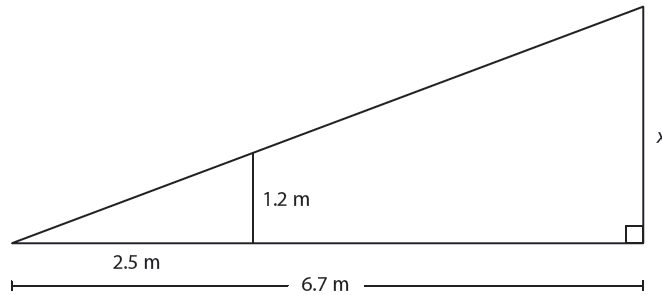
$$\frac{AD}{DB} = \frac{31.2}{39} = .8$$

So  $\overline{DE} \parallel \overline{CB}$

$$\text{Then: } \frac{28.8 + 36}{28.8} = \frac{x}{24}$$

$$x = \frac{24(28.8 + 36)}{28.8} = 54\text{m}$$

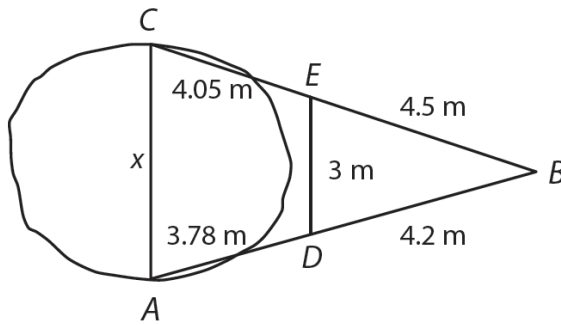
- 15) The height of a ramp at a point 2.5 meters from its bottom edge is 1.2 meters. If the ramp runs for 6.7 meters along the ground, what is its height at its highest point, to the nearest tenth of a meter?



$$\frac{6.7}{2.5} = \frac{x}{1.2}$$

$$x = \frac{6.7(1.2)}{2.5} = 3.2 \text{ m}$$

- 16) To measure  $\overline{AC}$ , the distance across a crater, an archeologist stands at point A and locates points B, C, D, and E. What is the distance across the crater?



$$\frac{BE}{EC} = \frac{4.5}{4.05} = 1.11,$$

$$\frac{BD}{DA} = \frac{4.2}{3.78} = 1.11$$

So  $\overline{DE} \parallel \overline{AC}$

$$\text{Then: } \frac{4.5+4.05}{4.5} = \frac{x}{3}$$

$$x = \frac{3(4.5 + 4.05)}{4.5} = 5.7 \text{ m}$$