

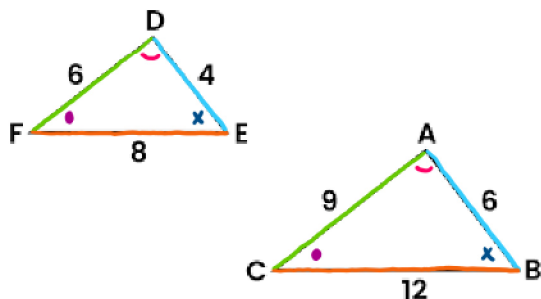
### 3.4 Similar Triangles

Math 9

#### Similar Triangles

Similar triangles have the same shape but are not the same size. Their corresponding angles are equal and their corresponding sides are proportional.

List the corresponding sides for the triangles below. Are the triangles similar?



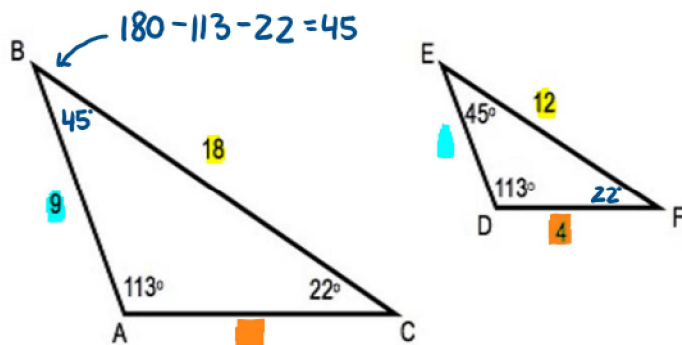
$$\begin{aligned} 4:6 &= 2:3 \\ 6:9 &= 2:3 \\ 8:12 &= 2:3 \end{aligned} \left. \begin{array}{l} \text{Since these ratios} \\ \text{are equivalent, the} \\ \text{corresponding sides} \\ \text{are proportional.} \end{array} \right\}$$

$\therefore \triangle FDE$  and  $\triangle CAB$  are similar.

$$\begin{aligned} \frac{4}{6} &= 0.\bar{6} \\ \frac{6}{9} &= 0.\bar{6} \\ \frac{8}{12} &= 0.\bar{6} \end{aligned}$$

$$\begin{aligned} \therefore \angle F &= \angle C \\ \angle D &= \angle A \\ \angle E &= \angle B \end{aligned}$$

Are the following triangles similar? If they are, determine the missing side lengths.

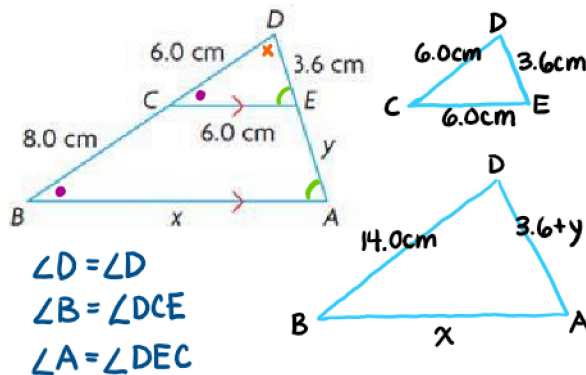


Corresponding angles are equal.  
 $\therefore \triangle BAC$  and  $\triangle EDF$  are similar.

$$\begin{aligned} 18:12 &= 9:6 \quad \text{or} \quad \frac{18}{12} = \frac{9}{6} \\ &\quad \div 2 \qquad \div 2 \\ 18:12 &= 6:4 \quad \text{or} \quad \frac{18}{12} = \frac{9}{6} \\ &\quad \div 3 \qquad \div 3 \end{aligned}$$

$$\begin{aligned} ED &= 6 \\ AC &= 6 \end{aligned}$$

Show that  $\triangle DBA \sim \triangle DCE$ . Then calculate the values of  $x$  and  $y$ .



$$\frac{x}{6.0} = \frac{14.0}{6.0}$$

$$x = 14.0 \text{ cm}$$

$$\frac{DA}{3.6} = \frac{14.0}{6.0}$$

$$DA = \frac{14.0 \times 3.6}{6.0} = 8.4$$

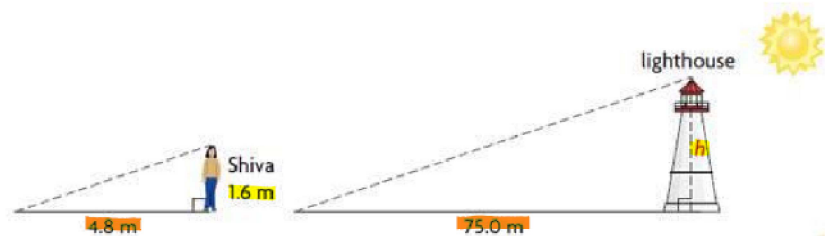
$$3.6 + y = 8.4$$

$$y = 4.8 \text{ cm}$$

Shiva is standing beside a lighthouse on a sunny day, as shown. She measures the length of her shadow and the length of the shadow cast by the lighthouse. How tall is the lighthouse?

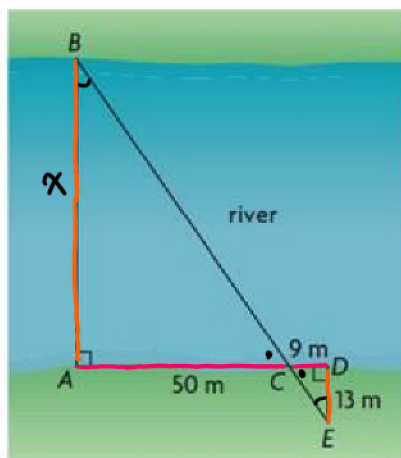
$$\frac{h}{1.6} = \frac{75.0}{4.8}$$

$$h = \frac{75.0 \times 1.6}{4.8} = 25$$



The lighthouse is 25 m tall.

A new bridge is going to be built across a river, but the width of the river cannot be measured directly. Surveyors set up posts at points A, B, C, D, and E. Then they took measurements relative to the posts. Determine the width of the river.



$$\frac{x}{13} = \frac{50}{9}$$

$$x = \frac{50 \times 13}{9} = 72.\bar{2}$$

The width of the river is about 72 m.

Assignment: p.150 #5 – 7, 9, 10, 12 – 16, 18a