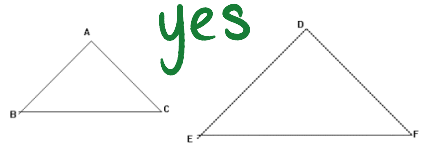
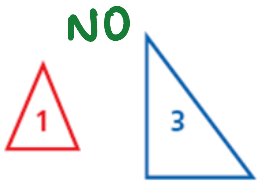
Ratios in Similar Polygons

Similar: **Figures that have the same** shape **but not necessarily the same** size.
Symbol for Similar: ~

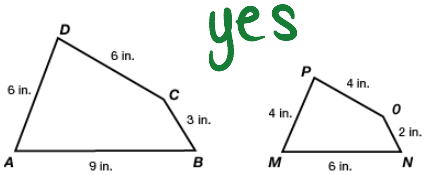
Do these figures appear similar?



yes



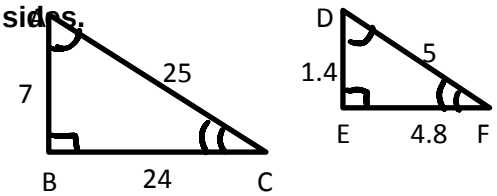
NO



yes

Similar Polygons: Two polygons are similar **if and only if their corresponding angles are** congruent **and their corresponding side lengths are** proportional.

Blast from the Past ,,, If $\triangle ABC \sim \triangle DEF$ **identify the pairs of corresponding angles and corresponding sides.**

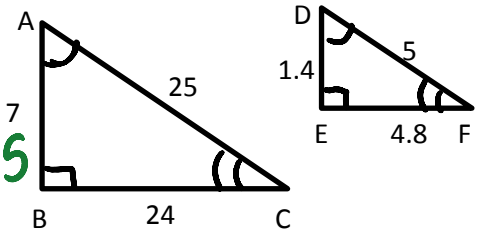


Corresponding Angles: $\angle A \cong \angle D$ $\angle B \cong \angle E$ $\angle C \cong \angle F$

Corresponding Sides: $\overline{AB} \to \overline{DE}$ $\overline{AC} \to \overline{DF}$ (NOT $\cong$) $\overline{BC} \to \overline{EF}$

Similarity Ratio: Ratio of the lengths **of the corresponding sides of two similar polygons.**

Example: $\triangle ABC \sim \triangle DEF$



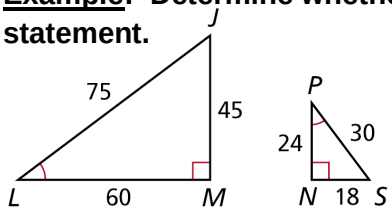
1. **Find the similarity ratio of** $\triangle ABC$ **to** $\triangle DEF$.

$\frac{AB}{DE} = \frac{7}{1.4} = 5$ $\frac{BC}{EF} = \frac{24}{4.8} = 5$ $\frac{AC}{DF} = \frac{25}{5} = 5$

2. **Find the similarity ratio of** $\triangle DEF$ **to** $\triangle ABC$.

$\frac{DE}{AB} = \frac{1.4}{7} = 0.2$ $\frac{EF}{BC} = \frac{4.8}{24} = 0.2$ $\frac{DF}{AC} = \frac{5}{25} = 0.2$

Example: Determine whether the polygons are similar. If so, write the similarity ratio and a similarity statement.



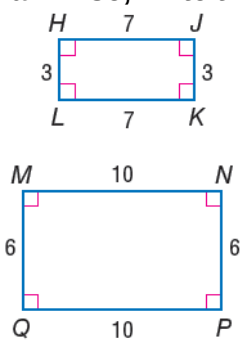
$\angle L \cong \angle P$, $\angle M \cong \angle N$, $\angle J \cong \angle S$

$\frac{LM}{PN} = \frac{60}{24} = 2.5$

$\frac{MJ}{NS} = \frac{45}{18} = 2.5$

$\frac{LJ}{PS} = \frac{75}{30} = 2.5$

similarity ratio same so $\triangle LJM \sim \triangle PSN$



$\angle H \cong \angle M$ $\angle L \cong \angle Q$

$\angle J \cong \angle N$ $\angle K \cong \angle P$

$\frac{HL}{MQ} = \frac{3}{6} = \frac{1}{2}$

$\frac{JK}{NP} = \frac{3}{6} = \frac{1}{2}$

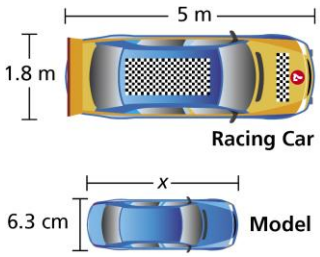
$\frac{HJ}{MN} = \frac{7}{10}$

$\frac{LK}{QP} = \frac{7}{10}$

Different ratios thus NOT similar!

Partner Practice

1. Find the length of the model to the nearest tenth of a centimeter.

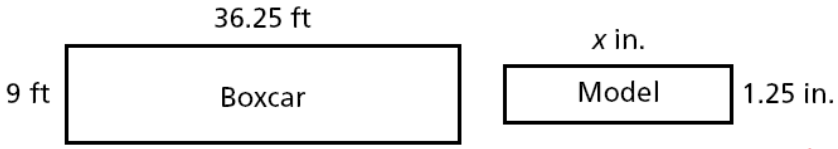


$$\frac{1.8}{6.3} = \frac{5}{x}$$

$$\frac{1.8x}{1.8} = \frac{31.5}{1.8}$$

$x = 17.5$ meters

2. A boxcar has the dimensions shown. A model of the boxcar is 1.25 in. wide. Find the length of the model to the nearest inch.

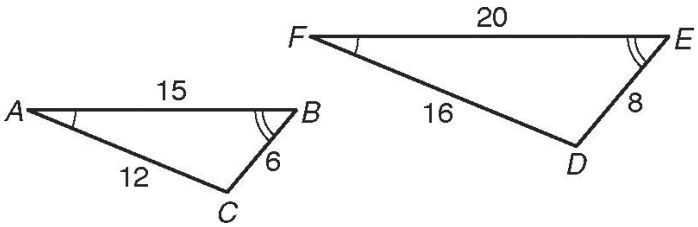


$$\frac{9}{1.25} = \frac{36.25}{x}$$

$$\frac{9x}{9} = \frac{45.3125}{9}$$

$x = 5.03$ in

Use the figures for Examples 3,4, and 5. The triangles are similar.



3. Name the pairs of congruent angles.

<A = $\angle F$

<B = $\angle E$

<C = $\angle D$

4. Write the corresponding side lengths in the proportion below.

$$\frac{AB}{FE} = \frac{CB}{DE} = \frac{AC}{FD}$$

5. Write the similarity ratio and a similarity statement about the triangles.

$$\frac{AB}{FE} = \frac{15}{20} = \frac{3}{4}$$

$$\frac{AC}{FD} = \frac{12}{16} = \frac{3}{4}$$

$$\frac{BC}{DE} = \frac{6}{8} = \frac{3}{4}$$

$\triangle ABC \sim \triangle FED$