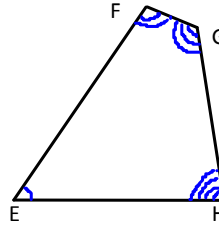
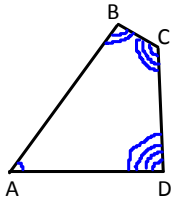


Similar Polygons

Two polygons are similar if their corresponding angles are congruent and their corresponding sides are in proportion.



Corresponding Angles are Congruent

$$\angle A \cong \angle E$$

$$\angle B \cong \angle F$$

$$\angle C \cong \angle G$$

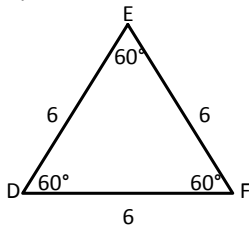
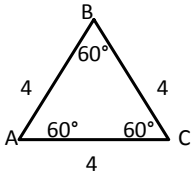
$$\angle D \cong \angle H$$

Corresponding Sides are in Proportion

$$\frac{AB}{EF} = \frac{BC}{FG} = \frac{CD}{GH} = \frac{DA}{HE}$$

$$ABCD \sim EFGH$$

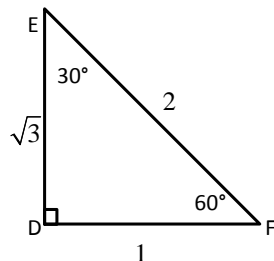
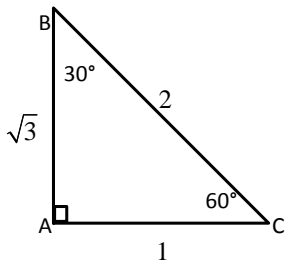
Equilateral triangles are always similar.



$$\frac{4}{6} = \frac{2}{3} \text{ scale factor}$$

$$\triangle ABC \sim \triangle DEF$$

Congruent triangles are always similar.



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

$$\frac{AB}{DE} = \frac{\sqrt{3}}{\sqrt{3}} = 1$$

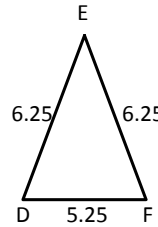
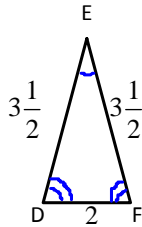
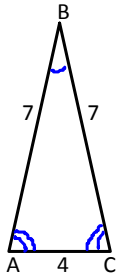
scale factor = 1

$$\triangle ABC \sim \triangle DEF$$

$$\frac{BC}{EF} = \frac{2}{2} = 1$$

$$\frac{AC}{DF} = \frac{1}{1} = 1$$

Isosceles triangles are sometimes similar.



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

$$\frac{AB}{DE} = \frac{7}{3.5} = \frac{70}{35} = 2$$

$$\frac{BC}{EF} = \frac{7}{3.5} = 2$$

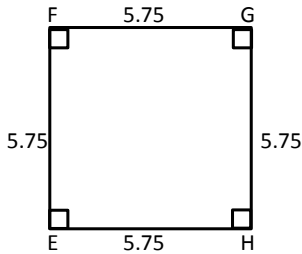
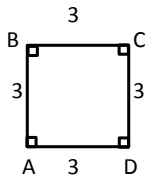
$$\frac{AC}{DF} = \frac{4}{2} = 2$$

scale factor = 2 $\triangle ABC \sim \triangle DEF$

$$\frac{AB}{DE} = \frac{700}{625} = \frac{700 \div 25}{625 \div 25} = \frac{28}{25}$$

$$\frac{AC}{DF} = \frac{400}{525} = \frac{400 \div 25}{525 \div 25} = \frac{16}{21}$$

Squares are always similar.

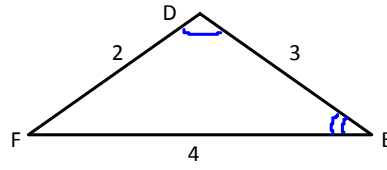
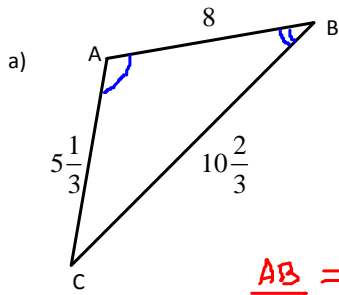


$$\frac{300}{575} = \frac{300 \div 25}{575 \div 25} = \frac{12}{23}$$

$$\text{scale factor} = \frac{12}{23}$$

$$\square ABCD \sim \square EFGH$$

1. Determine whether the triangles are similar. Justify your answer.



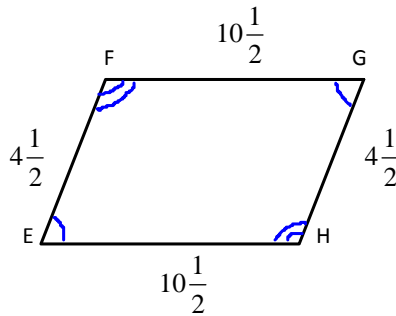
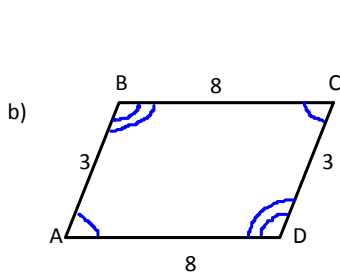
$$\frac{AB}{DE} = \frac{8}{2} = \frac{8}{2} = 4$$

$$\frac{AC}{DF} = \frac{5\frac{1}{3}}{3} = \frac{\frac{16}{3}}{3} = \frac{16}{9} \neq 4$$

$$\frac{BC}{EF} = \frac{10\frac{2}{3}}{4} = \frac{\frac{32}{3}}{4} = \frac{32}{12} = \frac{8}{3} \neq 4$$

Scale factor = $\frac{8}{3}$ $\triangle ABC \sim \triangle DEF$

$\angle A \cong \angle D$
 $\angle B \cong \angle E$
 $\angle C \cong \angle F$



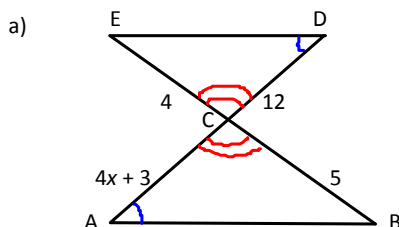
$$\frac{AB}{EF} = \frac{8}{4.5} = \frac{80}{45} = \frac{16}{9}$$

$$\frac{BC}{FG} = \frac{3}{10.5} = \frac{30}{105} = \frac{2}{7}$$

$\angle A \cong \angle E$
 $\angle B \cong \angle F$
 $\angle C \cong \angle G$
 $\angle D \cong \angle H$

The polygons are not similar.

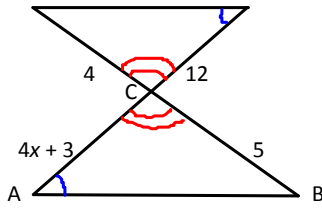
2. Each pair of polygons is similar. Write a similarity statement and find the value of x.



$$\frac{EC}{BC} = \frac{DC}{AC} = \frac{ED}{BA}$$

$$\frac{4}{4x+3} = \frac{12}{5}$$

~~4~~ ~~12~~



$$\frac{EC}{BC} = \frac{DC}{AC} = \frac{ED}{BA}$$

$$\frac{4}{5} = \frac{12}{4x+3}$$

$\triangle ABC \sim \triangle DEC$

$$4(4x+3) = 60$$

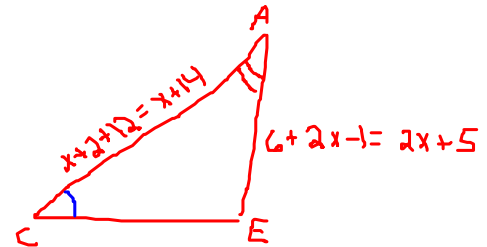
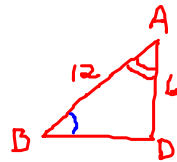
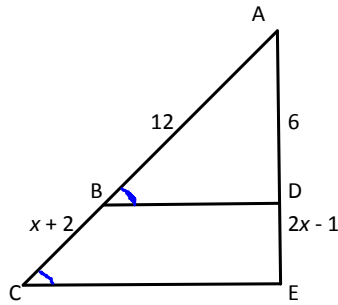
$$16x + 12 = 60$$

$$-12 \quad -12$$

$$\frac{16x}{16} = \frac{48}{16}$$

$$x = 3$$

b)



$\triangle ABD \sim \triangle ACE$

$$\frac{AB}{AC} = \frac{AD}{AE} = \frac{BD}{CE}$$

$$\frac{12}{x+14} = \frac{6}{2x+5}$$

$$12(2x+5) = 6(x+14)$$

$$24x + 60 = 6x + 84$$

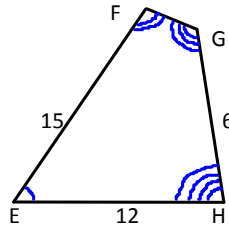
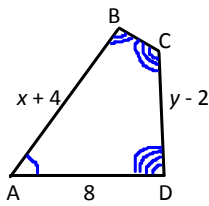
$$-6x \quad -60 \quad -6x \quad -60$$

$$\frac{18x}{18} = \frac{24}{18}$$

$$x = \frac{24 \div 6}{18 \div 6} = \frac{4}{3}$$

3. Each pair of polygons is similar. Write a similarity statement and find the values of x and y.

a)



$ABCD \sim EFGH$

$\frac{AB}{EF} = \frac{BC}{FG} = \frac{CD}{GH} = \frac{AD}{EH}$ ✓

Find x

$\frac{AD}{EH} = \frac{AB}{EF}$

~~$\frac{8}{12} = \frac{x+4}{15}$~~

$12(x+4) = 120$

$12x + 48 = 120$

$\frac{12x}{12} = \frac{72}{12}$ $x = 6$

Find y

$\frac{AD}{EH} = \frac{CD}{GH}$

~~$\frac{8}{12} = \frac{y-2}{6}$~~

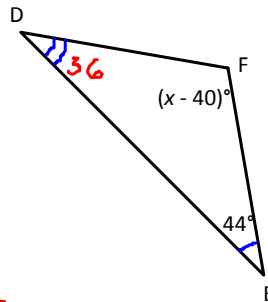
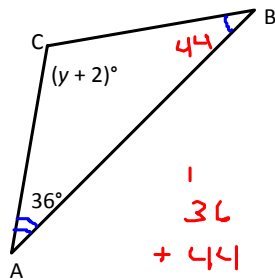
$12(y-2) = 48$

$12y - 24 = 48$
 $+24 +24$

$\frac{12y}{12} = \frac{72}{12}$

$y = 6$

b)



$\triangle ABC \sim \triangle DEF$

1	
36	180
+ 44	- 80
80	100

$\angle C = 100^\circ$

$y + 2 = 100$
 $-2 -2$

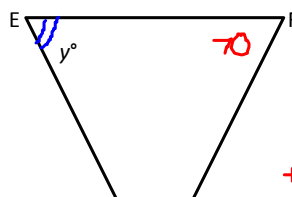
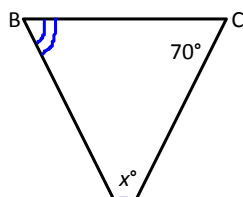
$y = 98$

$\angle F = 100^\circ$

$x - 40 = 100$
 $+40 +40$

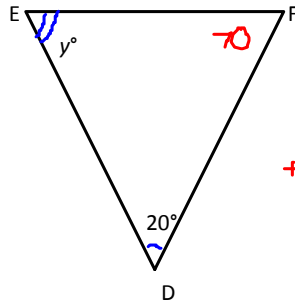
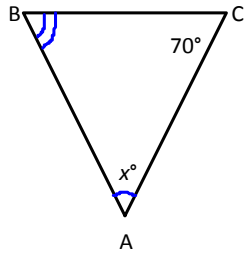
$x = 140$

c)



70	180
+ 26	- 90

c)



$$\triangle ABC \sim \triangle DEF$$

$$\angle A = 20^\circ$$

$$\boxed{x=20}$$

$$\begin{array}{r} 70 \\ + 20 \\ \hline 90 \end{array} \quad \begin{array}{r} 180 \\ - 90 \\ \hline 90 \end{array}$$

$$\angle E = 90^\circ$$

$$\boxed{y=90}$$