

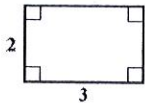
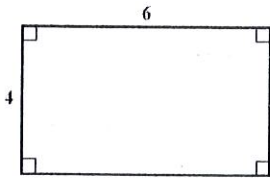
Geometry
Similar Polygons

Name Key
Date _____

Two polygons are similar if and only if

- their corresponding angles are congruent
- their corresponding sides are proportional

The symbol \sim is read "is similar to".

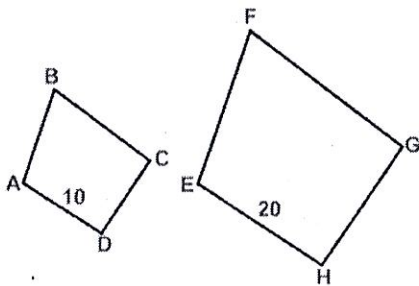


The two rectangles are similar because all corresponding angles measure 90 degrees. All corresponding sides have a ratio of 2/1.

$$\frac{6}{3} = \frac{4}{2} = \frac{2}{1}$$

The common ratio of the sides of the similar polygons is the scale factor.

ABCD ~ EFGH



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

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

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

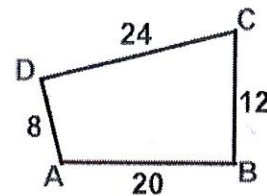
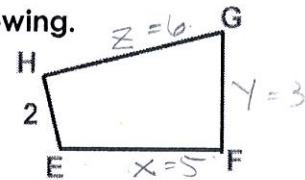
$$\angle D \cong \angle H$$

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

The scale factor of polygon ABCD to polygon EFGH is $\frac{10}{20} = \frac{1}{2}$.

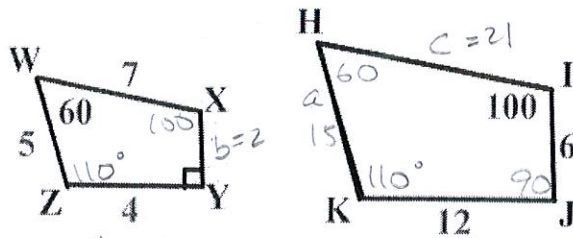
If quadrilateral ABCD ~ quadrilateral EFGH, find each of the following.

1. Scale factor of ABCD to EFGH $\frac{8}{2} = \frac{4}{1}$
2. EF $\frac{2}{8} = \frac{x}{20}$ $8x = 40$ $x = 5$
3. FG $\frac{2}{8} = \frac{y}{12}$ $8y = 24$ $y = 3$
4. GH $\frac{2}{8} = \frac{z}{24}$ $8z = 48$ $z = 6$
5. Perimeter of ABCD $8 + 24 + 12 + 20 = 64$
6. Perimeter of EFGH $2 + 6 + 3 + 5 = 16$
7. Ratio of perimeter of ABCD to perimeter of EFGH $\frac{64}{16} = 4$



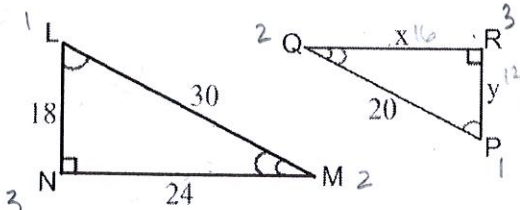
You try this one!! Given $WXYZ \sim HIJK$

- $m\angle H = 60^\circ$
- $m\angle J = 90^\circ$
- $m\angle X = 100^\circ$
- If $m\angle Z = 110^\circ$, then $m\angle K = 110^\circ$
- The scale factor of quad. $WXYZ$ to quad $HIJK$ is $\frac{4}{12} = \frac{1}{3}$



- $HK = 15$
 - $XY = 2$
 - $HI = 21$
 - What is the ratio of their perimeters? $\frac{18}{54} = \frac{1}{3}$
- $\frac{4}{12} = \frac{5}{a}$ $4a = 60$ $a = 15$ $\frac{4}{12} = \frac{b}{6}$ $12b = 24$ $b = 2$ $\frac{4}{12} = \frac{c}{21}$ $4c = 84$ $c = 21$
 $WXYZ = 7 + 2 + 5 + 4 = 18$ $HIJK = 6 + 12 + 15 + 21 = 54$

$\triangle LMN \sim \triangle PQR$. Find the values of x and y .



$\frac{24}{x} = \frac{30}{20}$ $30x = 480$ $x = 16$
 $\frac{30}{20} = \frac{18}{y}$ $30y = 360$ $y = 12$

Perimeter: $20 + 16 + 12 = 48$

What is the ratio of their perimeters? $\frac{72}{48} = \frac{3}{2}$

What is the ratio of their areas? $\frac{216}{96} = \frac{9}{4}$

Area $LMN = \frac{1}{2}(24)(18) = 216$ Area $PQR = \frac{1}{2}(16)(12) = 96$

If two polygons are similar:

the ratio of their perimeters is the same as the scale factor.

the ratio of their areas is equal to the square of the scale factor.

PRACTICE

Given $\triangle CAT \sim \triangle DOG$.

- Corresponding angles are congruent.

$\angle C \cong \angle D$ $\angle T \cong \angle G$ $\angle A \cong \angle O$

- Corresponding sides are proportional.

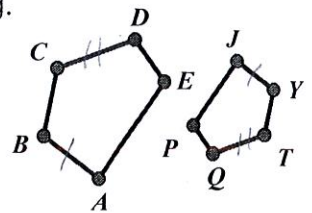
$\frac{CA}{DO} = \frac{AT}{OG} = \frac{CT}{DG}$

- Pentagon $ABCDE$ is similar to Pentagon $JYTQP$. Complete the following.

$\angle E \cong \angle P$

$\frac{AB}{JY} = \frac{CD}{TQ}$

$\frac{AB}{CD} = \frac{JY}{TQ}$



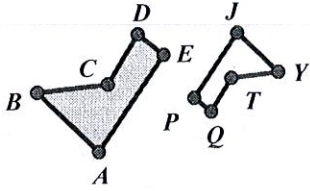
$\angle T \cong \angle C$

$\frac{TQ}{CD} = \frac{PJ}{EA}$

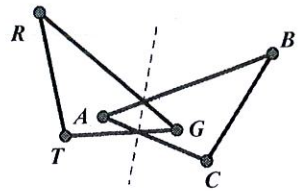
$\frac{CD}{DE} = \frac{TQ}{QP}$

4. The two figures in each question are similar. Create the similarity statement from the diagram.

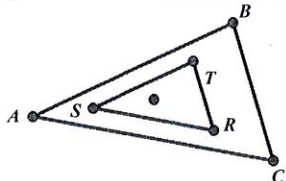
a) Pentagon ABCDE ~ JYTOP



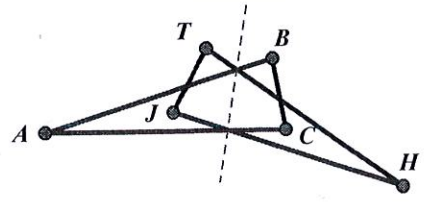
b) $\triangle ABC \sim \triangle$ GRT



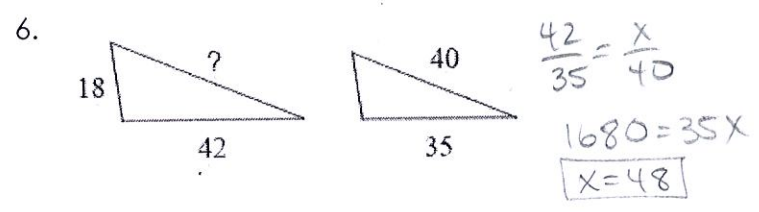
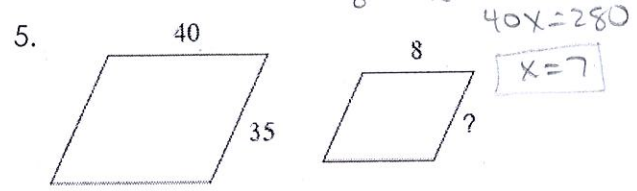
c) $\triangle ABC \sim \triangle$ SRT



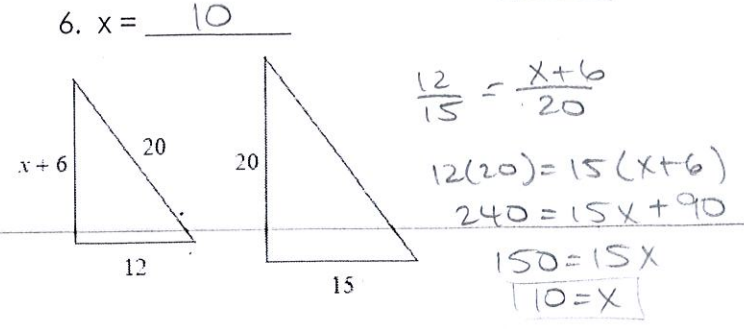
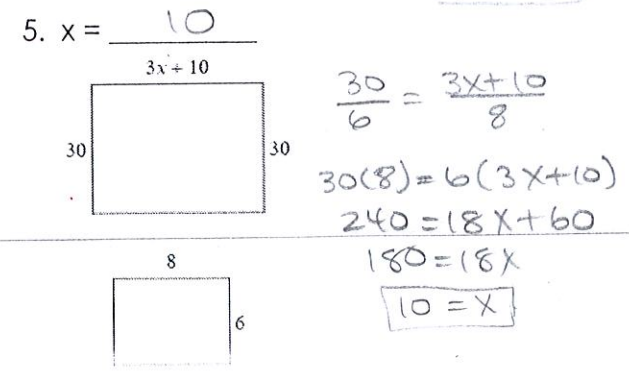
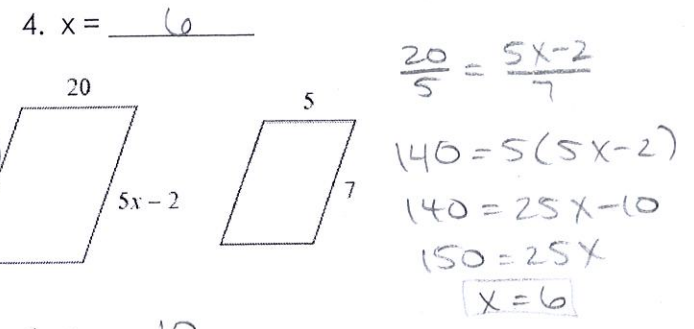
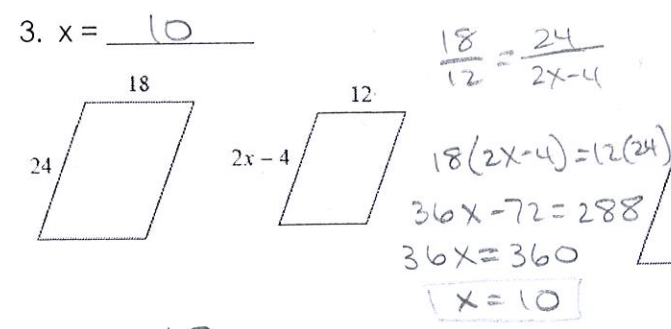
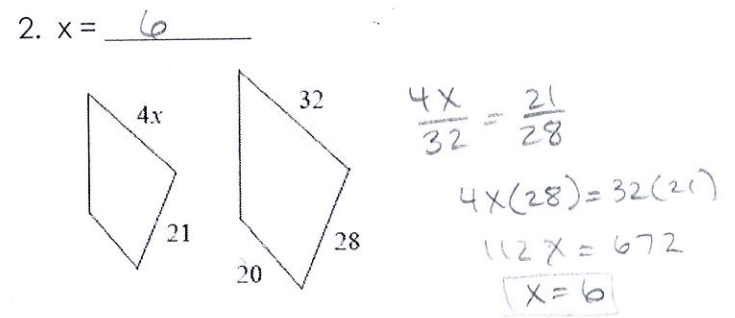
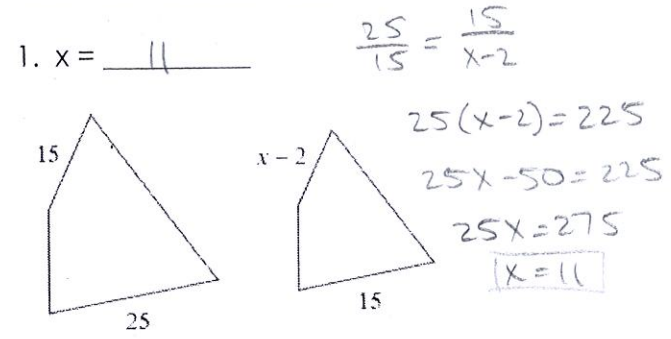
d) $\triangle BAC \sim \triangle$ THJ



Find the missing side. $\frac{40}{8} = \frac{35}{x}$



Now what about these?



What Is a Termite's Favorite Breakfast?

For each pair of similar figures, find the length x . Cross out the letter next to your answer. When you finish, the answer to the title question will remain.

- OAK MEAL**
- ~~W~~ 9 cm
 - L 14 cm
 - ~~H~~ 15 ft
 - A 20 m
 - ~~G~~ 50 in.
 - ~~S~~ 8 m
 - E 24 in.
 - ~~S~~ 12 cm
 - M 16 ft
 - K 46 m
 - ~~D~~ 21 in.
 - A 44 cm
 - ~~G~~ 10 cm
 - ~~O~~ 18 m
 - O 48 in.
 - ~~F~~ 40 cm
 - ~~V~~ 42 m

