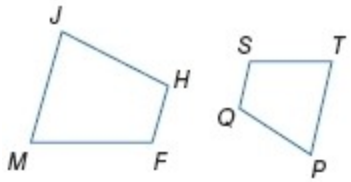
7-2 Similar Polygons

List all pairs of congruent angles, and write a proportion that relates the corresponding sides for each pair of similar polygons.

9. $JHFM \sim PQST$



SOLUTION:

The order of vertices in a similarity statement identifies the corresponding angles and sides. Since we know that $JHFM \sim PQST$, we can take the corresponding angles of this statement and set them congruent to each other. Then, since the corresponding sides of similar polygons are proportional to each other, we can write a proportion that relates the corresponding sides to each other.

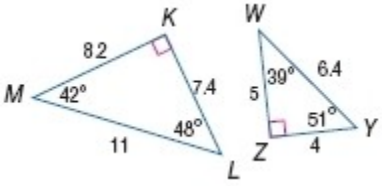
$$\angle J \cong \angle P, \angle H \cong \angle Q, \angle F \cong \angle S, \angle M \cong \angle T;$$
$$\frac{PQ}{JH} = \frac{TS}{MF} = \frac{SQ}{FH} = \frac{TP}{MJ}$$

ANSWER:

$\angle J \cong \angle P$, $\angle F \cong \angle S$, $\angle M \cong \angle T$; $\angle H \cong \angle Q$,
$$\frac{PQ}{JH} = \frac{TS}{MF} = \frac{SQ}{FH} = \frac{TP}{MJ}$$

JUSTIFY ARGUMENTS Determine whether each pair of figures is similar. If so, write the similarity statement and scale factor. If not, explain your reasoning.

12.



SOLUTION:

Compare corresponding angles:

$$m\angle K = 90 = m\angle Z$$
$$m\angle M = 42 \neq m\angle Y$$
$$m\angle L = 48 \neq m\angle W$$

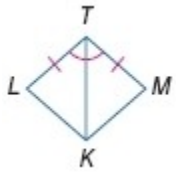
Since, $\angle M \ncong \angle Y$ and $\angle L \ncong \angle W$, then the triangles are not similar.

ANSWER:

no; $\angle L \ncong \angle W$

7-2 Similar Polygons

13.



SOLUTION:

Since the $\Delta LTK \cong \Delta MTK$ (by SAS triangle congruence theorem), then their corresponding parts are congruent

Step 1: Compare corresponding angles:

$\angle L \cong \angle M$, $\angle LTK \cong \angle MTK$, *and* $\angle TKL \cong \angle TKM$

Step 2: Compare corresponding sides:

$\frac{TL}{TM} = \frac{1}{1}$

$\frac{LK}{MK} = \frac{1}{1}$

$\frac{TK}{TK} = \frac{1}{1}$

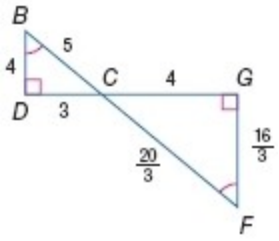
Therefore $\frac{TL}{TM} = \frac{LK}{MK} = \frac{TK}{TK}$ and the corresponding sides are proportional, with a scale factor of $\frac{1}{1}$.

So, $\Delta LTK \sim \Delta MTK$ because $\Delta LTK \cong \Delta MTK$. The scale factor is 1.

ANSWER:

Yes; $\Delta LTK \sim \Delta MTK$ because $\Delta LTK \cong \Delta MTK$; scale factor: 1.

14.



SOLUTION:

Step 1: Compare corresponding angles:

$\angle B \cong \angle F$ Given

$\angle D \cong \angle G$ All right angles are congruent.

$\angle BCD \cong \angle FCG$ Vertical angles are congruent.

Therefore, $\angle B \cong \angle F$, $\angle D \cong \angle G$, *and* $\angle BCD \cong \angle FCG$.

Step 2: Compare corresponding sides:

$\frac{BD}{FG} = \frac{4}{\frac{16}{3}} = 4 \cdot \frac{3}{16} = \frac{12}{16} = \frac{3}{4}$

$\frac{DC}{GC} = \frac{3}{4}$

$\frac{CB}{CF} = \frac{5}{\frac{20}{3}} = 5 \cdot \frac{3}{20} = \frac{15}{20} = \frac{3}{4}$

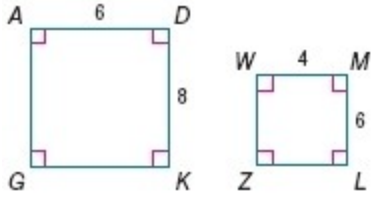
Therefore $\frac{BD}{FG} = \frac{DC}{GC} = \frac{CA}{CF}$ and the corresponding sides are proportional with a scale factor of $\frac{3}{4}$.

So $\Delta BDC \sim \Delta FGC$ because $\angle B \cong \angle F, \angle D \cong \angle G, \angle BCD \cong \angle FCG$, $\frac{BD}{FG} = \frac{DC}{GC} = \frac{CB}{CF}$. The scale factor is $\frac{3}{4}$.

ANSWER:

Yes; $\Delta BDC \sim \Delta FGC$ because $\angle B \cong \angle F, \angle D \cong \angle G, \angle BCD \cong \angle FCG$, $\frac{BD}{FG} = \frac{DC}{GC} = \frac{CB}{CF}$; scale factor: $\frac{3}{4}$.

7-2 Similar Polygons

15. 

SOLUTION:

Step 1: Compare corresponding angles:

Since all of the angles in the polygons are right angles, they are all congruent to each other. Therefore, corresponding angles are congruent.

Step 2: Compare corresponding sides:

$\frac{AD}{WM} = \frac{6}{4} = \frac{3}{2}$

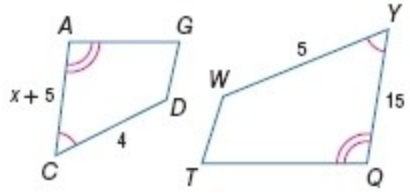
$\frac{DK}{ML} = \frac{8}{6} = \frac{4}{3}$

Since $\frac{AD}{WM} \neq \frac{DK}{ML}$, the figures are not similar.

ANSWER:

no; $\frac{AD}{WM} \neq \frac{DK}{ML}$

ANALYZE RELATIONSHIPS Each pair of polygons is similar. Find the value of *x*.

18. 

SOLUTION:

Use the corresponding side lengths to write a proportion.

$\frac{x+5}{15} = \frac{4}{5}$

Solve for *x*.

$5(x+5) = 60$

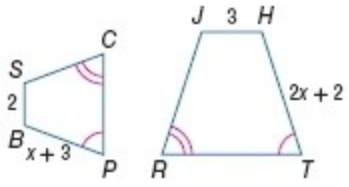
$5x + 25 = 60$

$5x = 35$

$x = 7$

ANSWER:

7

19. 

SOLUTION:

Use the corresponding side lengths to write a proportion.

$\frac{2x+2}{x+3} = \frac{3}{2}$

Solve for *x*.

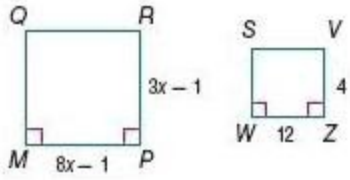
$2(2x+2) = 3(x+3)$

$4x + 4 = 3x + 9$

$x = 5$

ANSWER:

5

20. 

SOLUTION:

Use the corresponding side lengths to write a proportion.

$\frac{3x-1}{4} = \frac{8x-1}{12}$

Solve for *x*.

$12(3x-1) = 4(8x-1)$

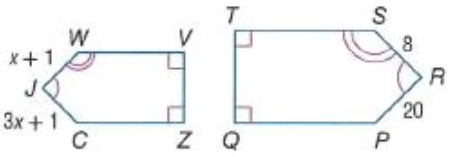
$36x - 12 = 32x - 4$

$4x = 8$

$x = 2$

ANSWER:

2

21. 

SOLUTION:

Use the corresponding side lengths to write a proportion.

$$\frac{x+1}{8}=\frac{3x+1}{20}$$

Solve for x.

$$20(x+1)=8(3x+1)$$
$$20x+20=24x+8$$
$$4x=12$$
$$x=3$$

ANSWER:

3