

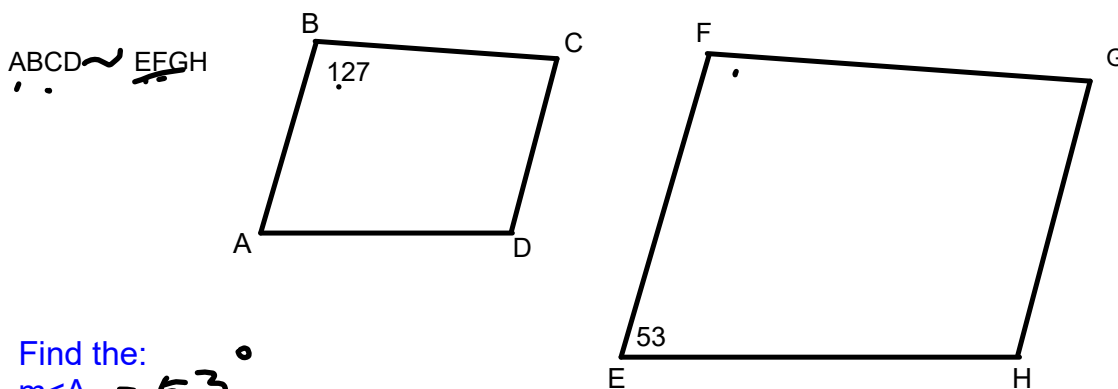
Section 7.2 Similar Polygons

Similar (\sim) Same shape but not necessarily the same size.

Similar Polygons:

1. corresponding angles are congruent
2. corresponding sides are proportional

The ratio of the lengths of the corresponding sides are called the *similarity ratio* or the *scale factor*.



Find the:
 $m\angle A = 53^\circ$

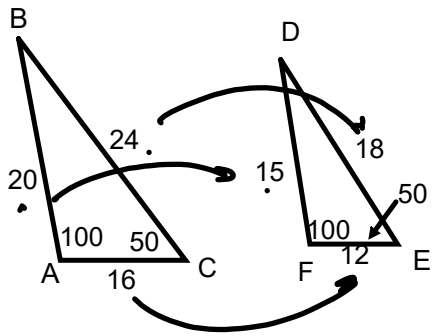
$m\angle F = 127^\circ$

List the corresponding sides.

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

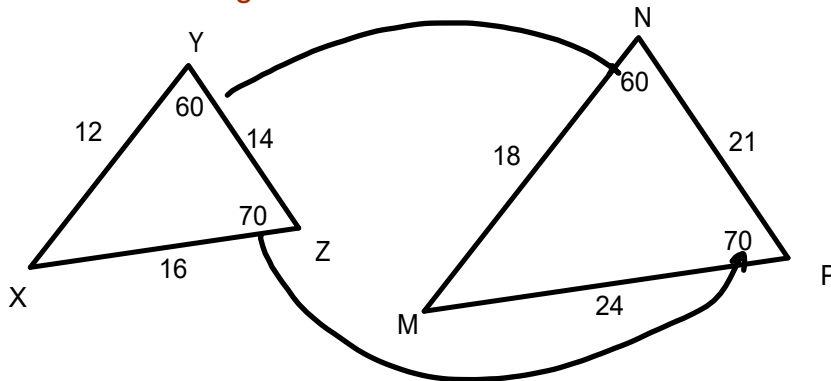
List the ratio of the corresponding sides that must be proportional.

Determine if the triangles are similar. If they are, write a similarity statement.



1. \angle are \cong
2. $\frac{20}{15} = \frac{24}{12} = \frac{16}{10}$

Determine if the triangles are similar.



$$\frac{12}{18} = \frac{14}{21} = \frac{16}{24}$$

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

The polygons are similar. Find the values of the variables.

Handwritten notes for the trapezoids: $\frac{2}{3}$ scale factor, $\frac{18}{4} = 4x$, $x = \frac{9}{2}$, $\frac{2y}{4} = \frac{18}{6}$, $2y = 12$, $y = 6$.

Handwritten notes for the pentagons: $\frac{3}{5} = \frac{x}{6}$, $x = \frac{18}{5}$.

Guided Practice

Find the value of each variable if

$\triangle JLM \sim \triangle QST$.

4A. x

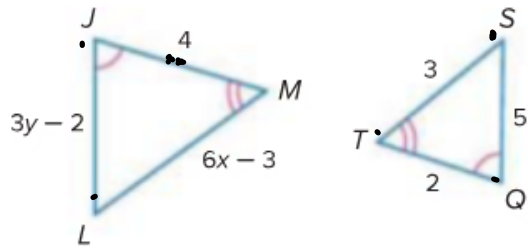
4B. y

$$\frac{4}{2} = \frac{2}{1} = \frac{3y-2}{5}$$

$$10 = 3y - 2$$

$$12 = 3y$$

$$y = 4$$



$$\frac{2}{1} = \frac{6x-3}{3}$$

$$6 = 6x - 3$$

$$9 = 6x$$

$$\frac{9}{6} = x$$

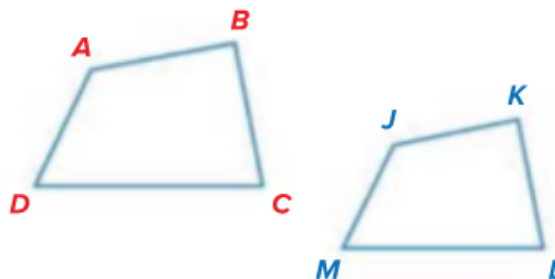
In similar polygons, the ratio of any two corresponding lengths is proportional to the scale factor between them. This leads to the following theorem about the perimeters of two similar polygons.

Theorem 7.1 Perimeters of Similar Polygons

If two polygons are similar, then their perimeters are proportional to the scale factor between them.

Example If $ABCD \sim JKLM$, then

$$\frac{AB + BC + CD + DA}{JK + KL + LM + MJ} = \frac{AB}{JK} = \frac{BC}{KL} = \frac{CD}{LM} = \frac{DA}{MJ}$$



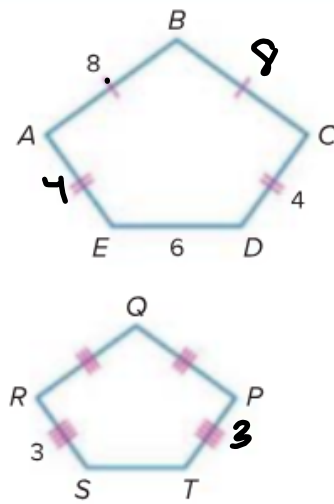
Example 5 Use a Scale Factor to Find Perimeter

If $ABCDE \sim PQRST$, find the scale factor of $ABCDE$ to $PQRST$ and the perimeter of each polygon.

$$\frac{4}{3} = \frac{30}{x}$$

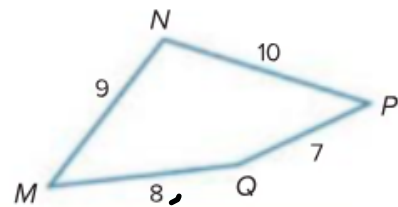
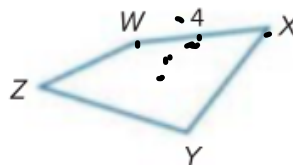
$$4x = \frac{90}{4}$$

$$x = \frac{45}{2}$$



Guided Practice

5. If $MNPQ \sim XYZW$, find the scale factor from $XYZW$ to $MNPQ$ and the perimeter of each polygon.



$$\frac{4}{8} = \frac{1}{2} = \frac{x}{34}$$

$$34 = 2x$$

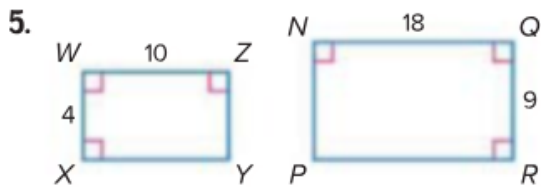
$$17 = x$$

$$\frac{8}{4} = \frac{34}{x}$$

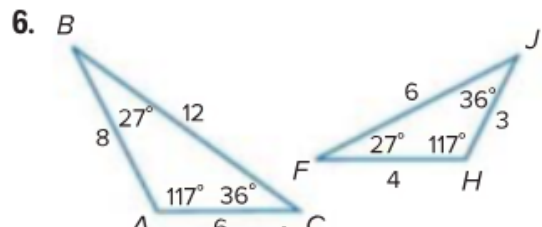
$$2x = 34$$

$$x = 17$$

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

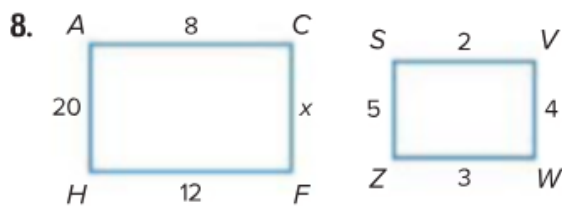
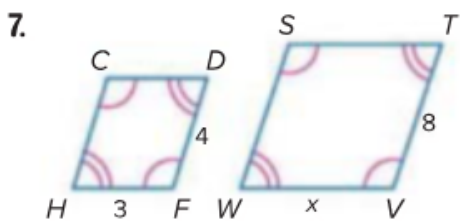


$WXYZ \not\sim NQRP$
 $\frac{10}{18} = \frac{4}{9}$
 $\frac{5}{9}$



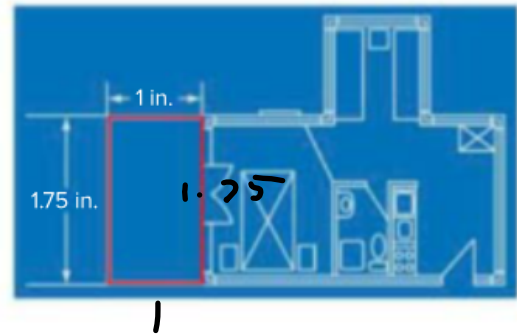
$\frac{8}{6} = \frac{12}{3} = \frac{6}{4} = 2$
 $\Delta BAC \sim \Delta FGH$

Each pair of polygons is similar. Find the value of x.



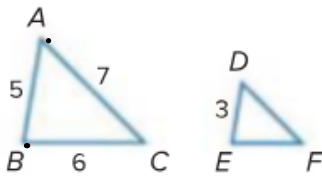
9. **DESIGN** On the blueprint of the apartment shown, the balcony measures 1 inch wide by 1.75 inches long. If the actual length of the balcony is 7 feet, what is the perimeter of the balcony?

$$\frac{1 \text{ in}}{72 \text{ in}} = \frac{5.5}{x}$$



Find the perimeter of the given triangle.

23. $\triangle DEF$, if $\triangle ABC \sim \triangle DEF$,
 $AB = 5$, $BC = 6$, $AC = 7$, and
 and $DE = 3$

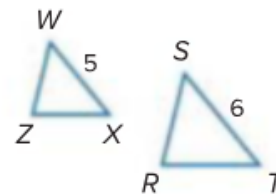


$$\frac{5}{3} = \frac{18}{x}$$

$$5x = 54$$

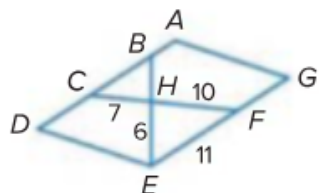
$$x = \frac{54}{5}$$

24. $\triangle WZX$, if $\triangle WZX \sim \triangle SRT$,
 $ST = 6$, $WX = 5$, and the perimeter
 of $\triangle SRT = 15$

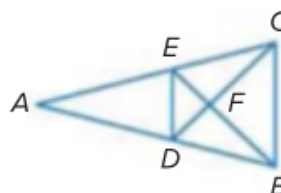


$$\frac{5}{6} = \frac{15}{x}$$

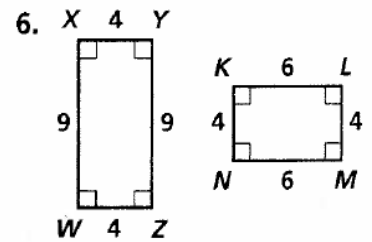
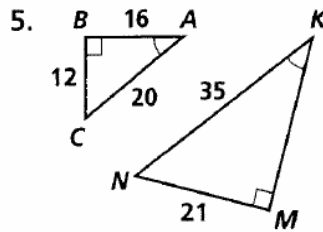
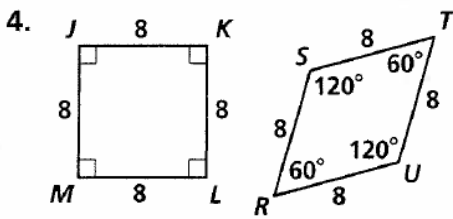
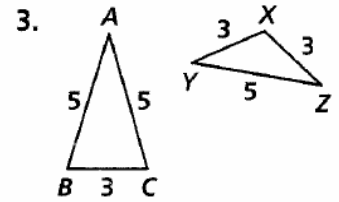
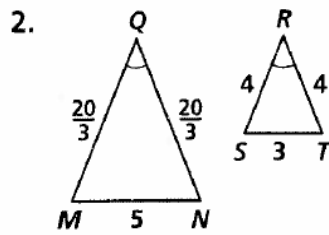
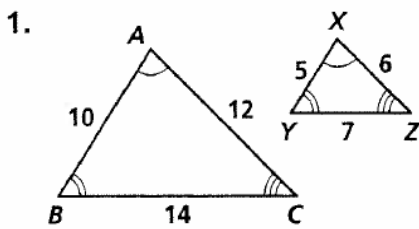
25. $\triangle CBH$, if $\triangle CBH \sim \triangle FEH$,
 $ADEG$ is a parallelogram, $CH = 7$,
 $FH = 10$, $FE = 11$, and $EH = 6$



26. $\triangle DEF$, if $\triangle DEF \sim \triangle CBF$,
 perimeter of $\triangle CBF = 27$,
 $DF = 6$, $FC = 8$

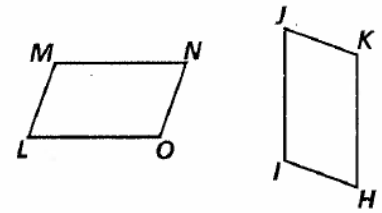


Are the polygons similar? If they are, write a similarity statement, and give the similarity ratio. If they are not, explain.

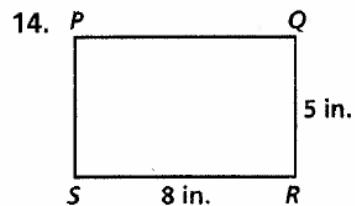
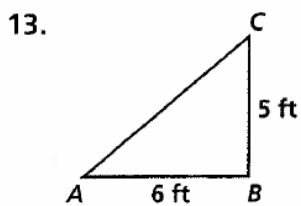


$LMNO \sim HIJK$. Complete the proportions and congruence statements.

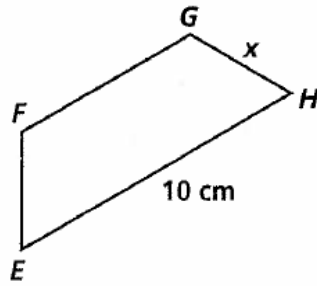
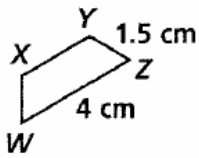
7. $\angle M \cong ?$ 8. $\angle K \cong ?$ 9. $\angle N \cong ?$
 10. $\frac{MN}{IJ} = \frac{?}{JK}$ 11. $\frac{HK}{?} = \frac{HI}{LM}$ 12. $\frac{IJ}{MN} = \frac{HK}{?}$



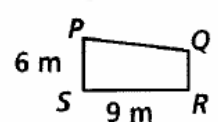
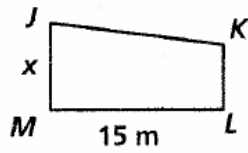
Algebra The polygons are similar. Find the values of the variables.



15.



16.



$\triangle WXZ \sim \triangle DFG$. Use the diagram to find the following.

17. the similarity ratio of $\triangle WXZ$ and $\triangle DFG$

18. $m\angle Z$

19. DG

20. GF

21. $m\angle G$

22. $m\angle D$

23. WZ

