

7-1

Similar Polygons

To identify and apply
similar polygons

OBJECTIVE

VOCABULARY

- Similar figures - figures that have the same shape but not necessarily the same size (similar symbol is \sim)



- Similar polygons - polygons with corresponding angles congruent and the lengths of the corresponding sides proportional.



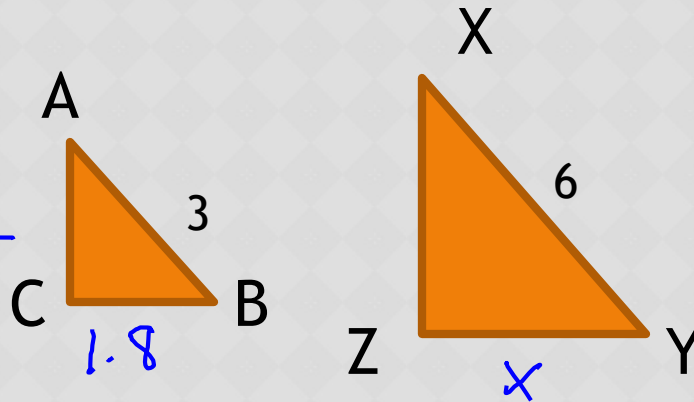
VOCABULARY

Extended proportion - shows three or more ratios are equal:

If $\triangle ABC \sim \triangle XYZ$

$$\angle A \cong \angle X, \angle B \cong \angle Y, \angle C \cong \angle Z$$

$$\frac{AB}{XY} = \frac{BC}{YZ} = \frac{AC}{XZ}$$



Similarity Ratio (Scale factor) - ratio of corresponding linear measurements of two similar figures.

$$\frac{AB}{XY} = \frac{3}{6} = \frac{1}{2}$$

$$\frac{1}{2} = \frac{1.8}{x} \quad x = 3.6$$

VOCABULARY

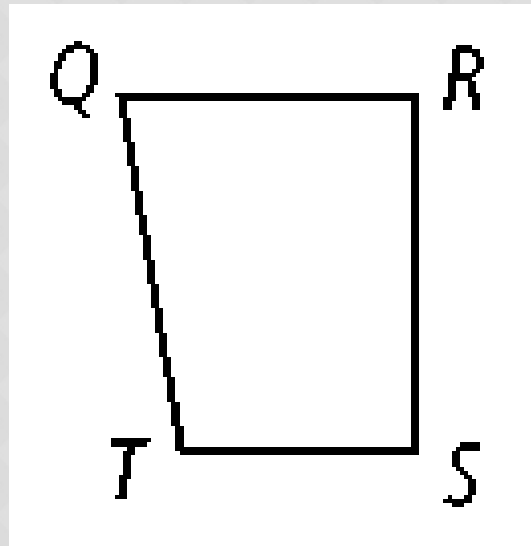
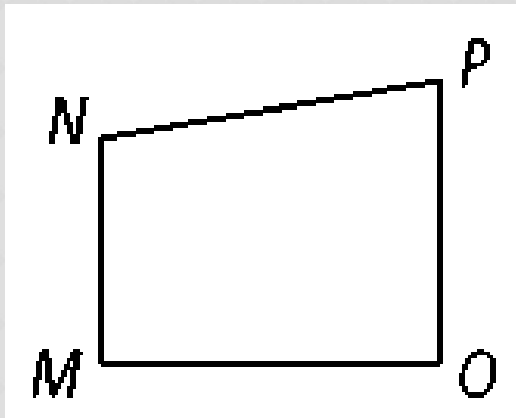
- ◎ Scale drawing - all lengths in drawing are proportional to their actual lengths (examples: blueprint or map)
- ◎ Scale - ratio that compares each length in the drawing to the actual length. The lengths can be different units.
(example: 1 inch = 5 miles)

CLASS WORK

List the pairs of congruent angles and the extended proportion that relates the corresponding sides for the similar polygons.

1. $NPOM \sim TQRS$

$$\angle N \cong \angle T; \angle P \cong \angle Q; \angle O \cong \angle R; \angle M \cong \angle S$$

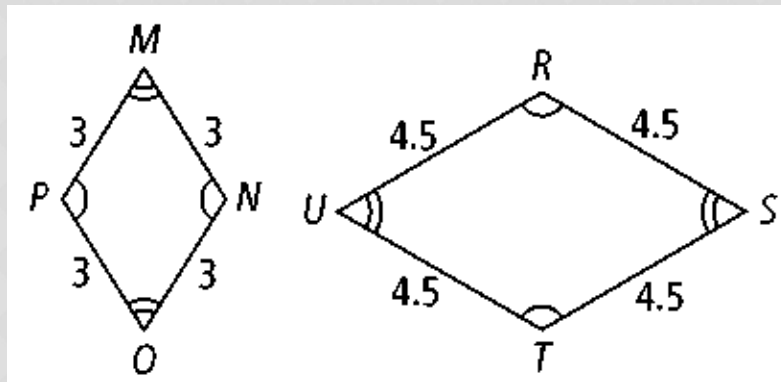


$$\frac{NP}{TQ} = \frac{PO}{QR} = \frac{OM}{RS} = \frac{NM}{TS}$$

CLASS WORK

Determine whether the polygons are similar. If so, write a similarity statement and give the scale factor. If not, explain.

2.

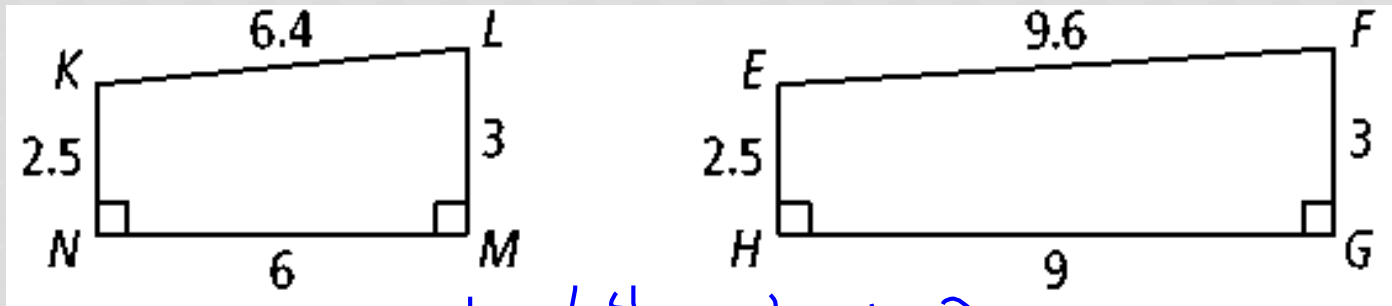


$$PMNO \sim RSTU$$

$$\frac{3}{4.5} = \frac{3}{4.5} = \frac{3}{4.5} = \frac{3}{4.5}$$

$$SF = \frac{3}{4.5} = \frac{30}{45} = \frac{2}{3}$$

3.



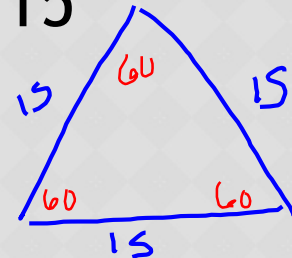
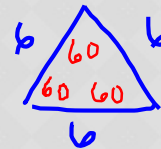
$$\frac{2.5}{2.5} = \frac{3}{3} = \frac{6}{9} = \frac{6.4}{9.6}$$

$$1 = 1 + \frac{2}{3} = \frac{2}{3}$$

CLASS WORK

4. Determine whether the polygons are similar:
an equilateral triangle with side length 6 and
an equilateral triangle with side length 15

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



5. An architect is making a scale drawing of a building. She uses the scale 1 in. = 15 ft.

a. If the building is 48 ft tall, how tall should the scale drawing be?

$$\frac{1 \text{ in}}{15 \text{ ft}} = \frac{x \text{ in}}{48 \text{ ft}} \quad 15x = 48$$
$$x = 3.2 \text{ in.}$$

b. If the building is 90 ft wide, how wide should the scale drawing be?

$$\frac{1 \text{ in}}{15 \text{ ft}} = \frac{x \text{ in}}{90 \text{ ft}} \quad x = 6 \text{ in.}$$

CLASS WORK

In the diagram below, $\triangle PRQ \sim \triangle DEF$. Find each of the following.

6. the scale factor of $\triangle PRQ$ to $\triangle DEF$

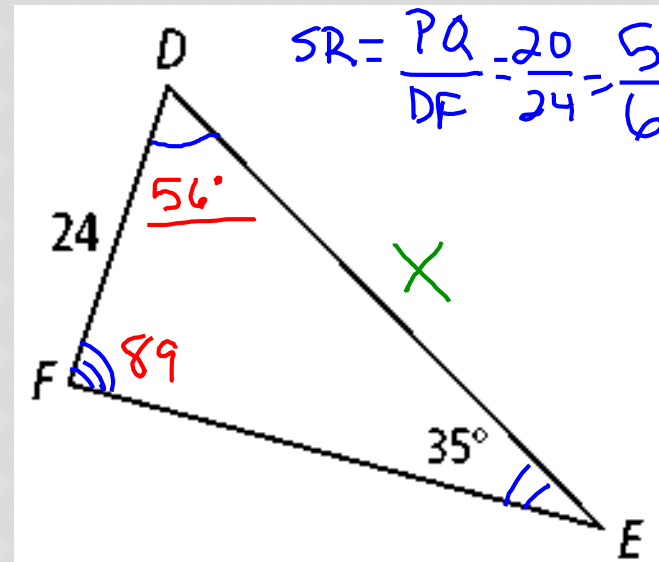
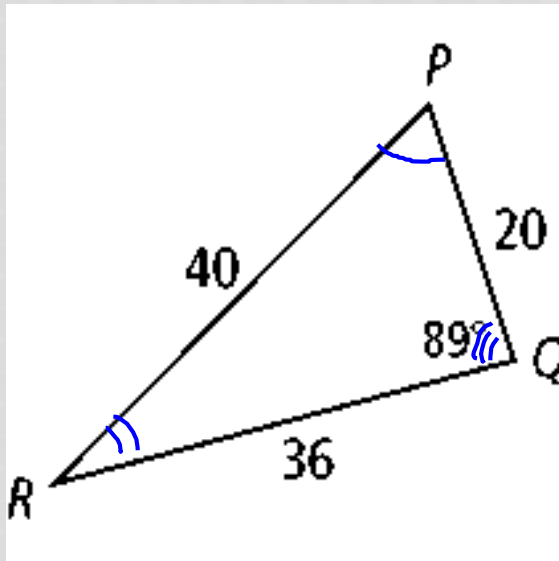
7. $m\angle D = 56^\circ$

8. DE

$$\frac{5}{6} = \frac{40}{x}$$

$$5x = 240$$

$$x = 48$$



CLASS WORK

9. Determine whether the polygons are similar:

a triangle with side lengths 3 cm, 4 cm, and 5 cm, and a triangle with side lengths 18 cm, 19 cm, and 20 cm

10. A scale drawing of a building was made using the scale $15 \text{ cm} = 120 \text{ ft}$. If the scale drawing is 45 cm tall, how tall is the actual building?

CLASS WORK

9. Determine whether the polygons are similar:

a triangle with side lengths 3 cm, 4 cm, and 5 cm, and a triangle with side lengths 18 cm, 19 cm, and 20 cm

$$\frac{3}{18} \neq \frac{4}{19} \neq \frac{5}{20} \rightarrow \frac{1}{6} \neq \frac{4}{19} \neq \frac{1}{4} \quad \text{not } \sim$$

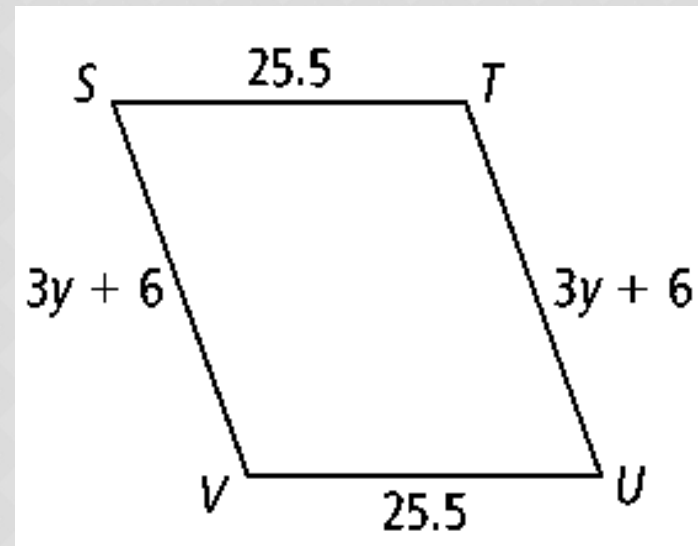
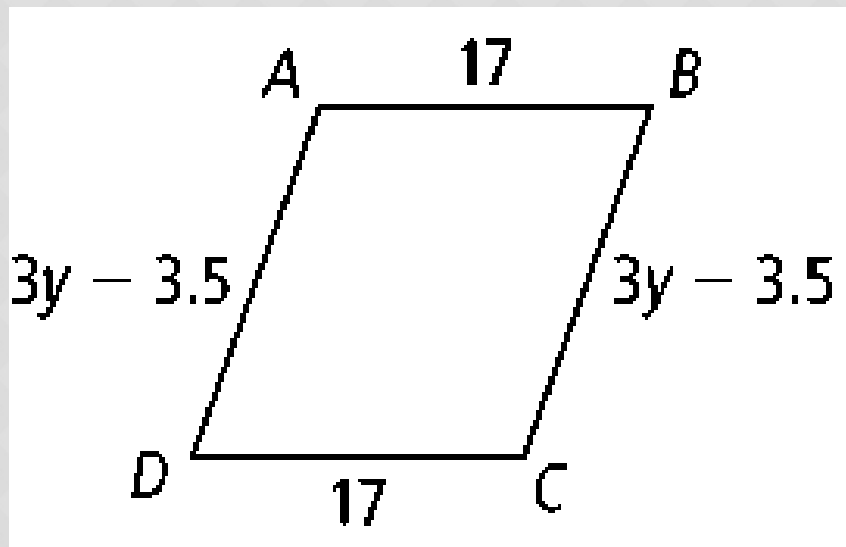
10. A scale drawing of a building was made using the scale 15 cm = 120 ft. If the scale drawing is 45 cm tall, how tall is the actual building?

$$\frac{15\text{cm}}{120\text{ft}} = \frac{45\text{cm}}{x\text{ft}} \quad x = 360\text{ft}$$

CLASS WORK

Find the value of y . Give the scale factor of the polygons.

11. $ABCD \sim TSVU$

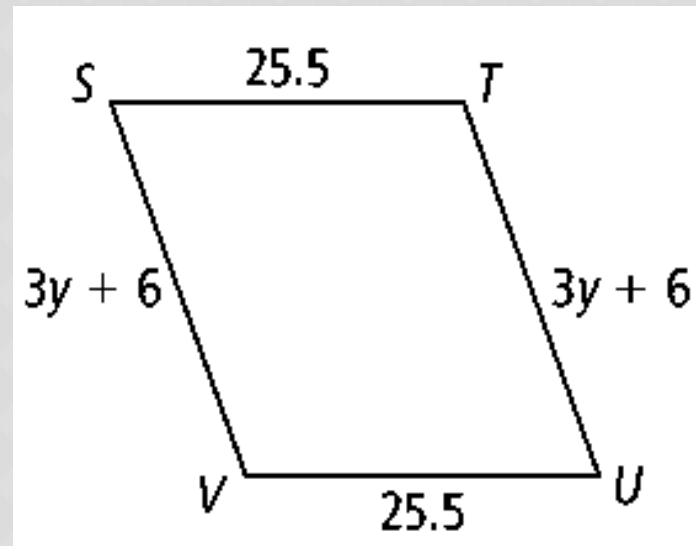
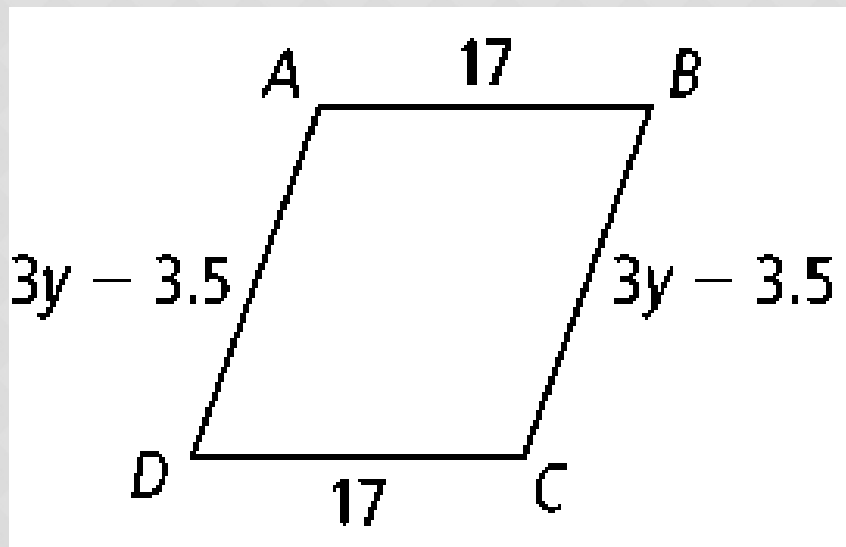


CLASS WORK

Find the value of y . Give the scale factor of the polygons.

11. $ABCD \sim TSVU$

$$SF = \frac{AB}{TS} = \frac{17}{25.5} = \frac{34}{51} = \frac{2}{3}$$



$$\frac{2}{3} = \frac{3y - 3.5}{3y + 6}$$

$$2(3y + 6) = 3(3y - 3.5)$$

$$6y + 12 = 9y - 10.5$$

$$22.5 = 3y$$

$$7.5 = y$$

CLASS WORK

Determine whether each statement is *always*, *sometimes*, or *never* true.

12. Two squares are similar.

13. Two hexagons are similar.

14. Two similar triangles are congruent.

15. A rhombus and a pentagon are similar.

CLASS WORK

Determine whether each statement is *always*, *sometimes*, or *never* true.

12. Two squares are similar. *always*

13. Two hexagons are similar. *Sometimes*

14. Two similar triangles are *sometimes* congruent.

15. A rhombus and a pentagon are similar. *Never*

- Similar polygons have congruent corresponding angles and proportional corresponding sides.
- The scale factor is the ratio of the corresponding sides.

SUMMARY

Pages 469 - 471

8 - 12 even

13 - 17 all

20 - 28 even

HOMework