

## TOPIC 7-1: SIMILAR POLYGONS and Proportions

### Proportion

A **proportion** is a statement that two ratios are equal. To solve a **proportion** cross multiply.

$$\frac{a}{b} = \frac{c}{d}$$

ratio = ratio

$$\frac{a}{b} = \frac{c}{d}$$

Solve the following proportions

$$\frac{2}{5} = \frac{x-6}{x}$$

**EXAMPLES:** Solve each of the following proportions.

2)  $-\frac{3}{7} = \frac{x+2}{x}$

3)  $\frac{3x-2}{4} = \frac{2x+1}{5}$

4)  $\frac{3}{x} = \frac{5}{x+6}$

5)  $\frac{x-2}{2} = \frac{x+6}{4}$

6. Josefina sells helium balloons. She charges \$9 for 12 balloons. At this rate, what would she charge for 50 balloons?

7. Mrs. Jones can grade 10 tests in 30 minutes. At that rate, how long would it take her to grade 125 papers?

8. The ratio of two segment lengths is 3:5. What is the length of the smaller segment if the larger segment is 45 inches?

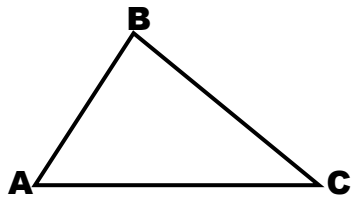
| <b>TERM</b>             | <b>DEFINITION</b>  | <b>SKETCH</b> |
|-------------------------|--|---------------|
| <b>SIMILAR POLYGONS</b> | <b>Polygons with the same shape but different sizes.</b> |               |

If two polygons are similar, two things are true:

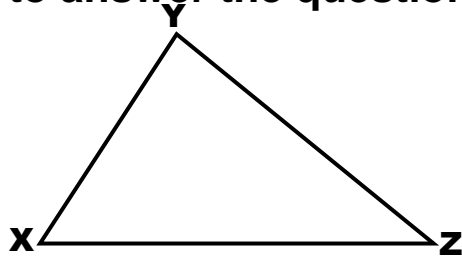
1) Corresponding angles are \_\_\_\_\_.

2) Corresponding sides are \_\_\_\_\_.

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**EXAMPLE 1** Use the figures below to answer the questions that follow.



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a)  $\angle A \cong$  \_\_\_\_\_

b)  $\overline{BC} :$  \_\_\_\_\_

c)  $\angle B \cong$  \_\_\_\_\_

d)  $\overline{AB} :$  \_\_\_\_\_

e)  $\angle C \cong$  \_\_\_\_\_

f)  $\overline{CA} :$  \_\_\_\_\_

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**EXAMPLE 2** If  $\triangle LMN$  is similar to  $\triangle RST$ , what must be true?

**About the angles:**

**About the sides:**

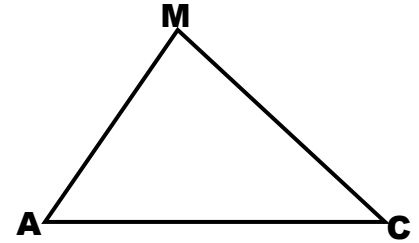
A very important term to know when talking about similar polygons is ***INCLUDED***.

An angle is said to be ***INCLUDED*** between two sides, and a side is said to be ***INCLUDED*** between two angles.

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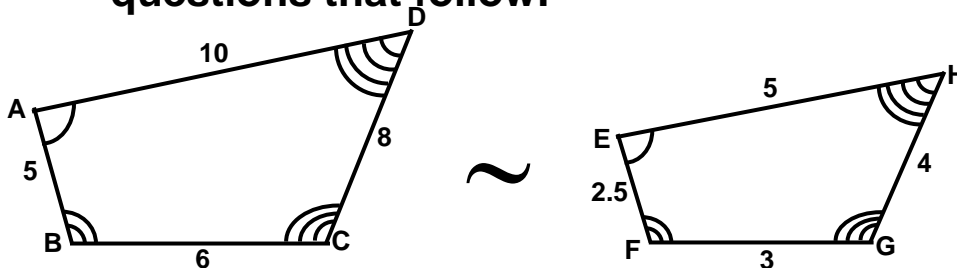
**EXAMPLE 3** Use the figure below to answer the questions that follow.

- a) Name the angle included between  $\overline{AM}$  and  $\overline{MC}$ : \_\_\_\_\_
- b) Name the side included between  $\angle A$  and  $\angle M$ : \_\_\_\_\_
- c) Name the side included between  $\angle A$  and  $\angle C$ : \_\_\_\_\_



| TERM         | DEFINITION   | SKETCH |
|--------------|--|--------|
| Common Ratio | The ratio of the lengths of two corresponding sides. |        |

**EXAMPLE 6** Use the similar figures below to answer the questions that follow.



What is the common ratio of quadrilateral ABCD to quadrilateral EFGH above?

**EXAMPLE 7** Show that the ratio of the perimeters is the same as the common ratio.

**EXAMPLE 8** What is the common ratio of quadrilateral EFGH to quadrilateral ABCD in EXAMPLE 6?