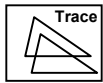
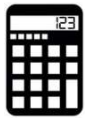


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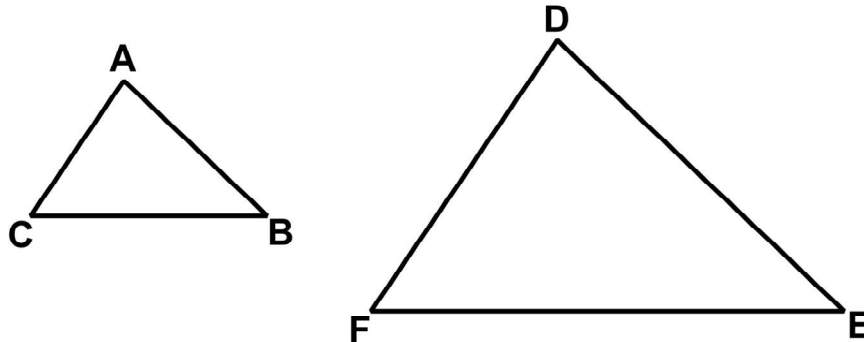


## SIMILAR FIGURES N-GEN MATH<sup>®</sup> 8



We have discussed figures that are **congruent**. **Congruent figures** are identical in shape and size. They are the result of one image being transformed using a **rigid motion** into another figure. In this lesson we will begin to look at **similar figures**, which are created by **dilations**.

**Exercise #1:** In the diagram below,  $\triangle DEF$  is the image of  $\triangle ABC$  after a dilation by a scaling factor of 2.



- (a) Using a straightedge, find the center of dilation and mark it as point G.
- (b) Measure the lengths of the sides of both triangles to the nearest tenth of a centimeter.

**Exercise #2:** Using your diagram in *Exercise #1*, state the value of each of the following ratios of lengths. Write the ratios and then simplify. (They should all turn out “nice.”)

(a)  $\frac{EF}{BC} =$

(b)  $\frac{DE}{AB} =$

(c)  $\frac{DF}{AC} =$

In each ratio above we divided the length of the image segment by the length of its **corresponding** pre-image segment. We should have seen that these ratios were all the same. We would say that **corresponding sides are proportional**.

**Exercise #3:** The angles of the two figures above also have a special relationship.

- (a) Trace  $\triangle ABC$  onto tracing paper and use this to compare its angles to those of its image,  $\triangle DEF$ .
- (b) What can you say about corresponding angles in a figure that is the image of another after a dilation?

Were the angles also scaled by a factor of 2?



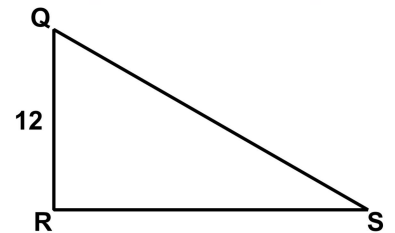
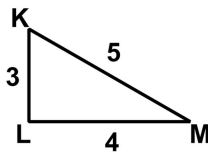
When one figure is the image of another after a dilation, we say that the two figures are **similar**. Similar figures have two extremely important properties that we noted in the previous problems.

### SIMILAR FIGURES

If **two figures are similar**, then their **corresponding sides** are **proportional** and their **corresponding angles** are equal in measure (or congruent). We use the symbol  $\sim$  to formally show that two figures are similar. In the previous problems,  $\triangle ABC \sim \triangle DEF$ .

**Exercise #4:** In the following diagram,  $\triangle KLM$  is similar to  $\triangle QRS$ . The diagram is **not drawn to scale**.

- (a) List the congruent angle pairs between the two figures. Use tracing paper to verify that the angles have equal measures.

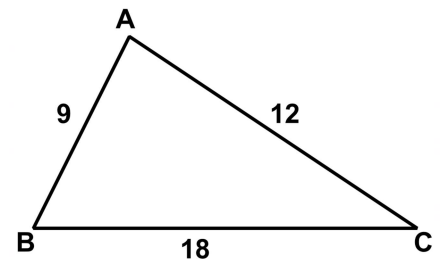


- (b) What is the scaling factor needed to map  $\triangle KLM$  onto  $\triangle QRS$  using a dilation?      (c) Fill in the missing sides of  $\triangle QRS$  using your answer to (b).

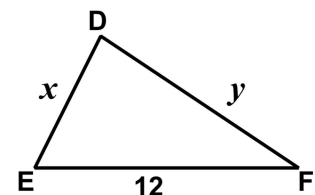
In *Exercise #4* the scaling factor was a whole number, so it was relatively easy to find the missing sides. Let's look at one where a bit more algebra would be helpful.

**Exercise #5:** In the diagram shown,  $\triangle ABC$  is similar to  $\triangle DEF$ .

- (a) Set up and solve a proportion to find the value of  $x$ .

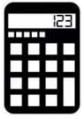


- (b) Set up and solve a proportion to find the value of  $y$ .



- (c) In  $\triangle ABC$ , side  $\overline{BC}$  is twice the length of side  $\overline{AB}$ . Is this true for their corresponding sides in  $\triangle DEF$ ?





## SIMILAR FIGURES

### N-GEN MATH<sup>®</sup> 8 HOMEWORK

#### FLUENCY

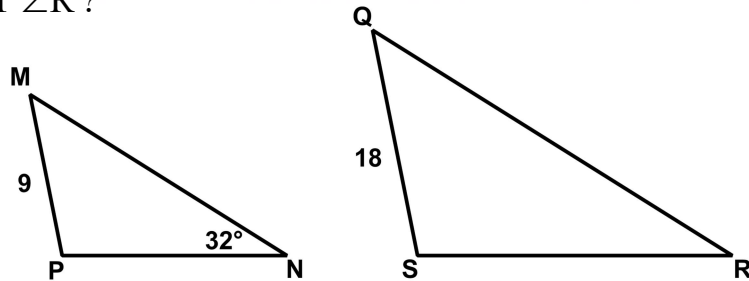
1. Which of the following is always true about two figures that are similar?

- (1) their corresponding side lengths are equal
- (2) their corresponding angle measures are equal
- (3) their perimeters are equal
- (4) their areas are equal

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2. In the diagram below,  $\triangle QRS$  is similar to  $\triangle MNP$  with the indicated measures. Which of the following is the measure of  $\angle R$ ?

- (1)  $16^\circ$
- (2)  $32^\circ$
- (3)  $41^\circ$
- (4)  $64^\circ$



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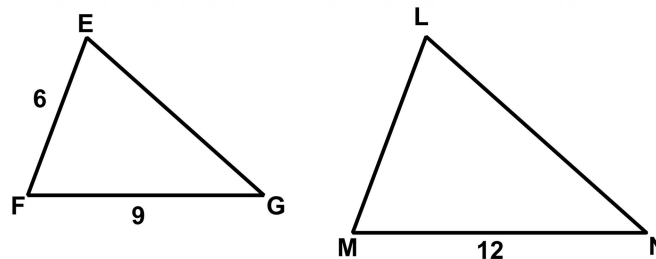
3. Triangle EFG is similar to triangle LMN shown below. Which of the following would be the value of the ratio  $\frac{LN}{EG}$  in simplest form?

(1)  $\frac{3}{2}$

(3)  $\frac{4}{3}$

(2) 2

(4)  $\frac{3}{4}$



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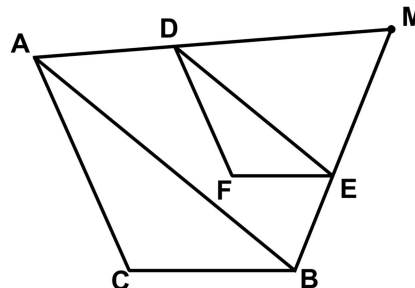
4. Triangle DEF is the image of triangle ABC after a dilation with a scale factor of  $k$  with a center of point M. Which of the following ratios would *not* equal the value of  $k$ ?

(1)  $\frac{DM}{AM}$

(3)  $\frac{DE}{AB}$

(2)  $\frac{AC}{DF}$

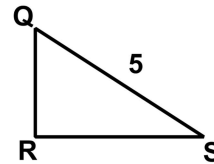
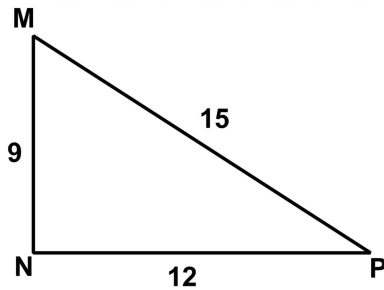
(4)  $\frac{FE}{CB}$



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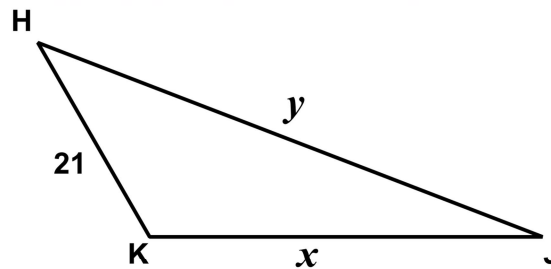
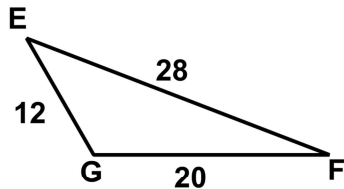


5.  $\triangle MNP$  and  $\triangle QRS$  are similar. Answer the following questions based on this similarity.



- (a) What is the length of the smallest side of  $\triangle QRS$ ? Explain. (b) If the measure of  $\angle N$  is  $90^\circ$  then what is the measure of  $\angle R$ ? Explain.

6. In the diagram below,  $\triangle EFG$  is similar to  $\triangle HJK$  with the noted measurements.



- (a) Set up a proportion and solve it to find the value of  $x$ . (b) Set up a proportion and solve it to find the value of  $y$ .

## USING YOUR MATH

7. A photo in the shape of a rectangle had a length of 5 inches and a width of 3 inches. It was enlarged so that it was similar to the original. If the length of the new picture is 8 inches, then what is its width? Do not round.

