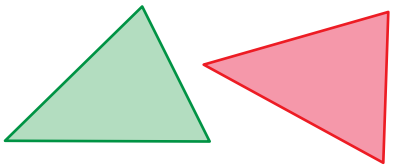
2.1 Congruent Figures

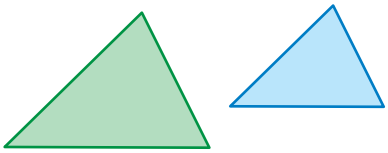
Essential Question How can you identify congruent triangles?

Two figures are congruent when they have the same size and the same shape.



Congruent

Same size *and* shape



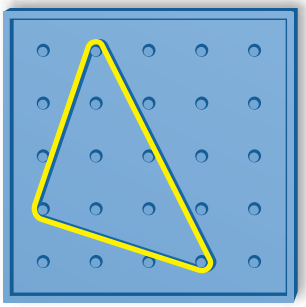
Not Congruent

Same shape, but not same size

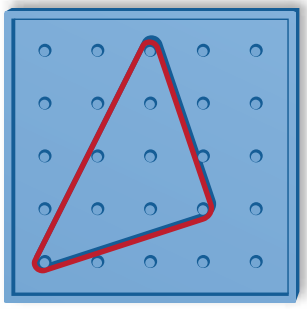
1 ACTIVITY: Identifying Congruent Triangles

Work with a partner.

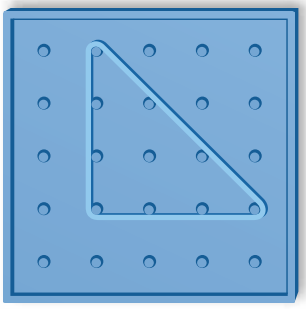
- **Which of the geoboard triangles below are congruent to the geoboard triangle at the right?**
- **Form each triangle on a geoboard.**
- **Measure each side with a ruler. Record your results in a table.**
- **Write a conclusion about the side lengths of triangles that are congruent.**



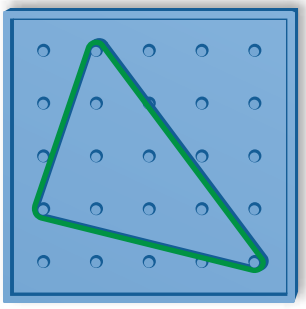
a.



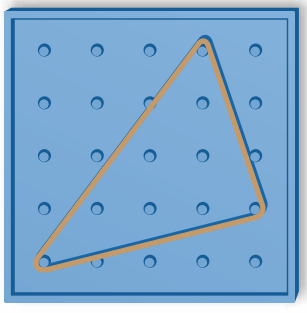
b.



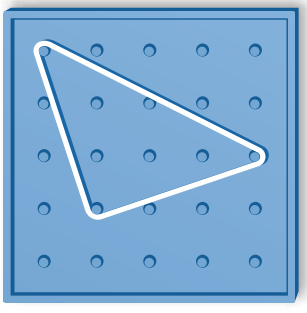
c.



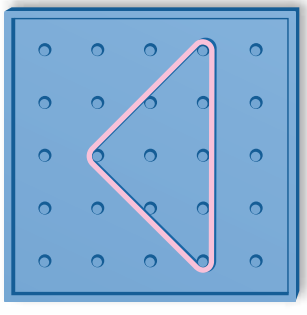
d.



e.



f.



Common Core

Geometry

In this lesson, you will

- name corresponding angles and corresponding sides of congruent figures.
- identify congruent figures.

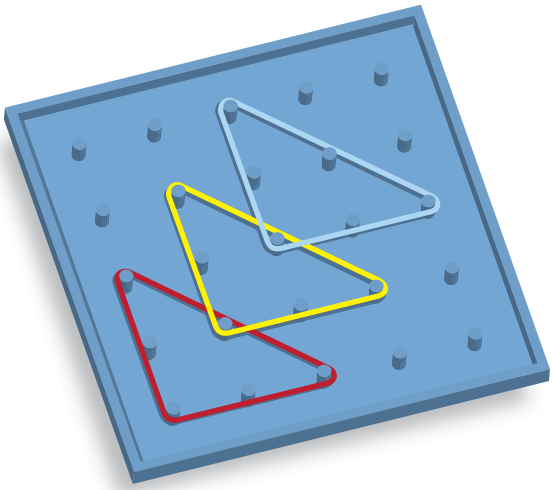
Preparing for Standard 8.G.2

Math Practice 5

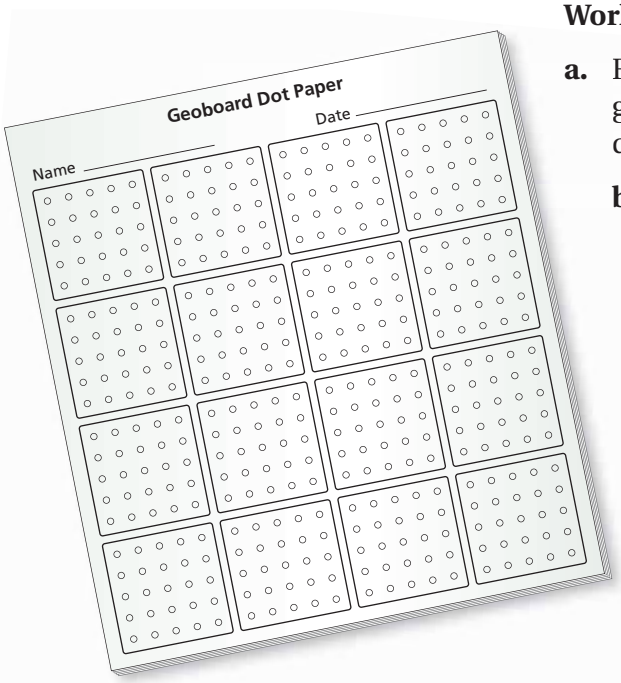
Recognize Usefulness of Tools

What are some advantages and disadvantages of using a geoboard to construct congruent triangles?

The geoboard at the right shows three congruent triangles.



2 ACTIVITY: Forming Congruent Triangles



Work with a partner.

a. Form the yellow triangle in Activity 1 on your geoboard. Record the triangle on geoboard dot paper.

b. Move each vertex of the triangle one peg to the right. Is the new triangle congruent to the original triangle? How can you tell?

c. On a 5-by-5 geoboard, make as many different triangles as possible, each of which is congruent to the yellow triangle in Activity 1. Record each triangle on geoboard dot paper.

What Is Your Answer?

3. **IN YOUR OWN WORDS** How can you identify congruent triangles? Use the conclusion you wrote in Activity 1 as part of your answer.

4. Can you form a triangle on your geoboard whose side lengths are 3, 4, and 5 units? If so, draw such a triangle on geoboard dot paper.

Practice Use what you learned about congruent triangles to complete Exercises 4 and 5 on page 46.

2.1 Lesson

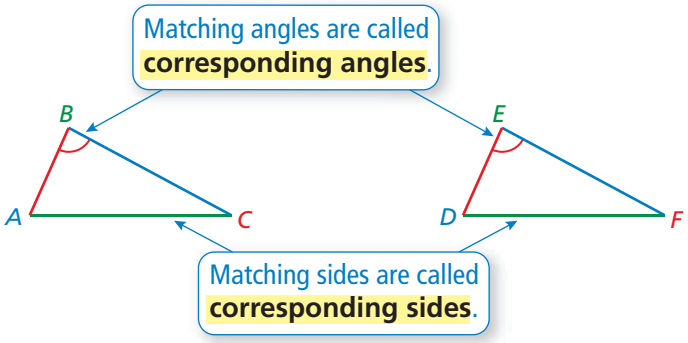
Check It Out
Lesson Tutorials
BigIdeasMath.com

Key Vocabulary
congruent figures, *p. 44*
corresponding angles, *p. 44*
corresponding sides, *p. 44*

Key Idea

Congruent Figures

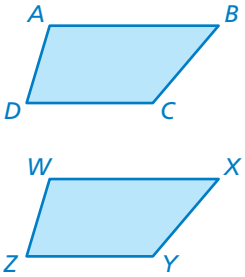
Figures that have the same size and the same shape are called **congruent figures**. The triangles below are congruent.



EXAMPLE 1 Naming Corresponding Parts

The figures are congruent. Name the corresponding angles and the corresponding sides.

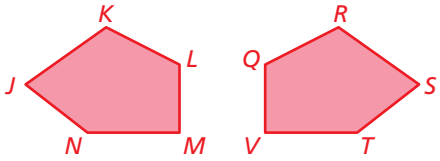
Corresponding Angles	*Corresponding Sides*
$\angle A$ and $\angle W$	Side AB and Side WX
$\angle B$ and $\angle X$	Side BC and Side XY
$\angle C$ and $\angle Y$	Side CD and Side YZ
$\angle D$ and $\angle Z$	Side AD and Side WZ



On Your Own

Now You're Ready
Exercises 6 and 7

1. The figures are congruent. Name the corresponding angles and the corresponding sides.



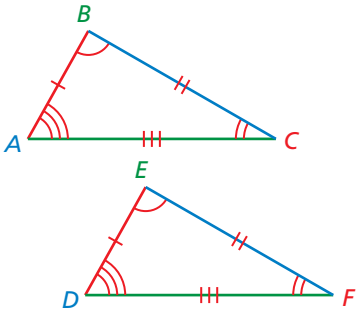
Key Idea

Identifying Congruent Figures

Two figures are congruent when corresponding angles and corresponding sides are congruent.

Triangle ABC is congruent to Triangle DEF.

$\triangle ABC \cong \triangle DEF$



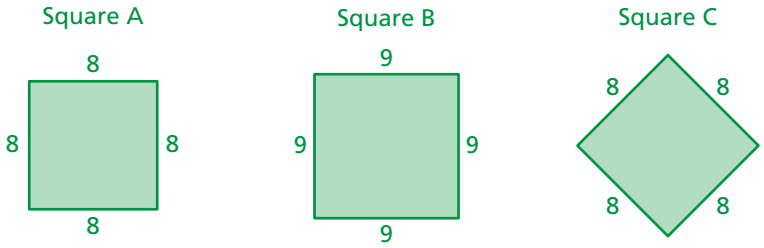
Reading

The symbol $\cong$ means *is congruent to*.

Multi-Language Glossary at BigIdeasMath.com

EXAMPLE 2 Identifying Congruent Figures

Which square is congruent to Square A?



Each square has four right angles. So, corresponding angles are congruent. Check to see if corresponding sides are congruent.

Square A and Square B

Each side length of Square A is 8, and each side length of Square B is 9. So, corresponding sides are not congruent.

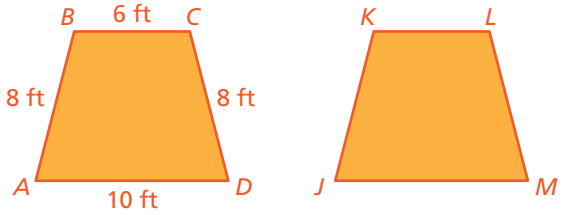
Square A and Square C

Each side length of Square A and Square C is 8. So, corresponding sides are congruent.

∴ So, Square C is congruent to Square A.

EXAMPLE 3 Using Congruent Figures

Trapezoids *ABCD* and *JKLM* are congruent.



a. What is the length of side *JM*?

Side *JM* corresponds to side *AD*.

∴ So, the length of side *JM* is 10 feet.

b. What is the perimeter of *JKLM*?

The perimeter of *ABCD* is $10 + 8 + 6 + 8 = 32$ feet. Because the trapezoids are congruent, their corresponding sides are congruent.

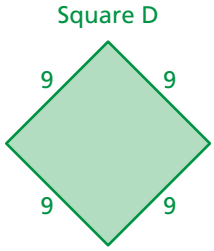
∴ So, the perimeter of *JKLM* is also 32 feet.

On Your Own

Now You're Ready
Exercises 8, 9, and 12

2. Which square in Example 2 is congruent to Square D?

3. In Example 3, which angle of *JKLM* corresponds to $\angle C$? What is the length of side *KJ*?



2.1 Exercises

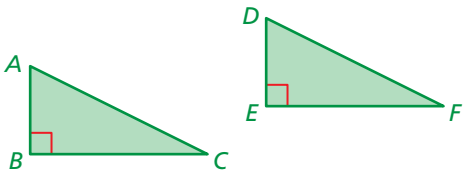
Check It Out
Help with Homework
BigIdeasMath.com

Vocabulary and Concept Check

1. **VOCABULARY** $\triangle ABC$ is congruent to $\triangle DEF$.

   a. Identify the corresponding angles.

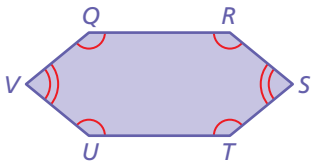
   b. Identify the corresponding sides.



2. **VOCABULARY** Explain how you can tell that two figures are congruent.

3. **WHICH ONE DOESN'T BELONG?** Which one does *not* belong with the other three? Explain your reasoning.

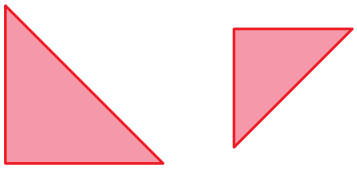
$\angle R$ $\angle U$ $\angle V$ $\angle Q$



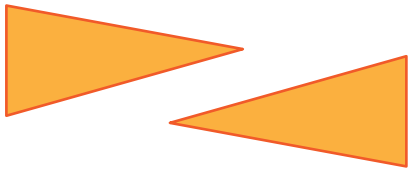
Practice and Problem Solving

Tell whether the triangles are *congruent* or *not congruent*.

4.

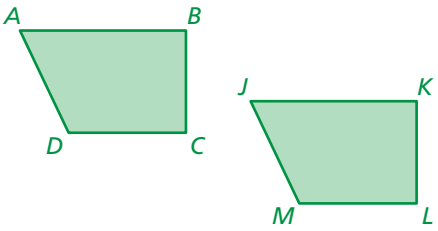


5.

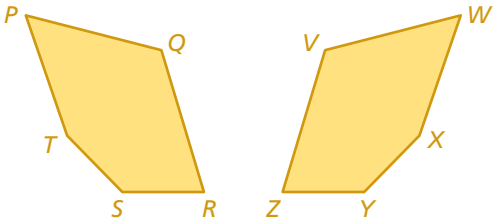


The figures are congruent. Name the corresponding angles and the corresponding sides.

1 6.

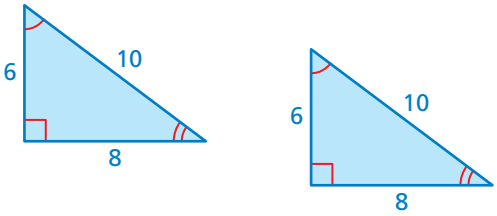


7.

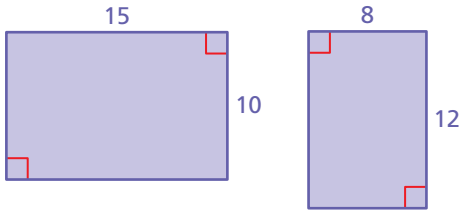


Tell whether the two figures are congruent. Explain your reasoning.

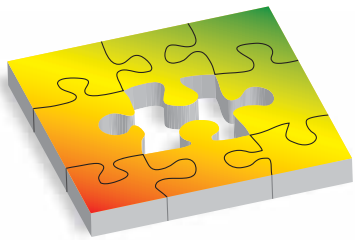
2 8.



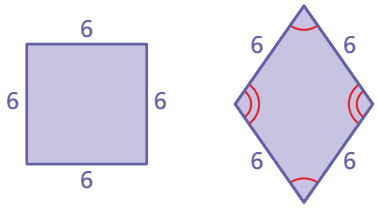
9.



10. **PUZZLE** Describe the relationship between the unfinished puzzle and the missing piece.

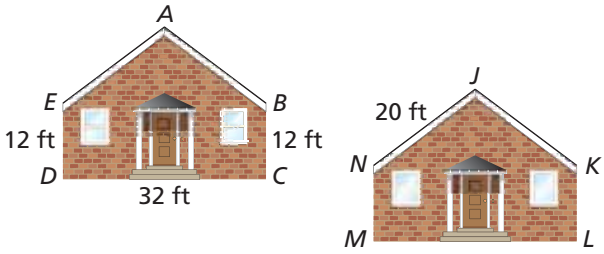


11. ERROR ANALYSIS Describe and correct the error in telling whether the two figures are congruent.



> Both figures have four sides, and the corresponding side lengths are equal. So, they are congruent.

3 12. HOUSES The fronts of the houses are identical.



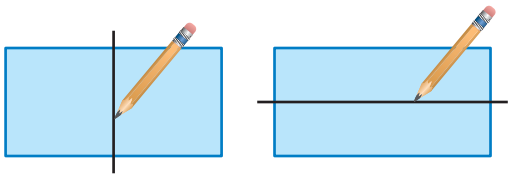
a. What is the length of side LM?

b. Which angle of $JKLMN$ corresponds to $\angle D$?

c. Side AB is congruent to side AE. What is the length of side AB?

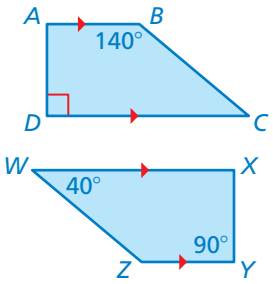
d. What is the perimeter of $ABCDE$?

13. REASONING Here are two ways to draw *one* line to divide a rectangle into two congruent figures. Draw three other ways.



14. CRITICAL THINKING Are the areas of two congruent figures equal? Explain. Draw a diagram to support your answer.

15. True or False? The trapezoids are congruent. Determine whether the statement is *true* or *false*. Explain your reasoning.



a. Side AB is congruent to side YZ.

b. $\angle A$ is congruent to $\angle X$.

c. $\angle A$ corresponds to $\angle X$.

d. The sum of the angle measures of $ABCD$ is 360°.

Fair Game Review *What you learned in previous grades & lessons*

Plot and label the ordered pair in a coordinate plane. *(Skills Review Handbook)*

16. $A(5, 3)$ **17.** $B(4, -1)$ **18.** $C(-2, 6)$ **19.** $D(-4, -2)$

20. MULTIPLE CHOICE You have 2 quarters and 5 dimes in your pocket. Write the ratio of quarters to the total number of coins. *(Skills Review Handbook)*

A $\frac{2}{5}$ **B** 2 : 7 **C** 5 to 7 **D** $\frac{7}{2}$