

### What We Are Learning

#### Lines and Angles

#### Vocabulary

These are the math words we are learning:

**acute angle** an angle that measures less than  $90^\circ$

**adjacent angles** angles that are side by side and have a common vertex and ray

**angle** a figure formed by two rays with a common endpoint called a vertex

**complementary angles** two angles whose measures add to  $90^\circ$

**congruent** angles that have the same measure

**line** a set of points that extends without end in opposite directions

**line segment** a part of a line with two endpoints

**obtuse angle** an angle whose measure is greater than  $90^\circ$  but less than  $180^\circ$


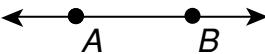
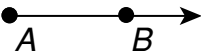

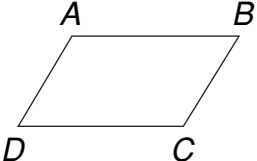
**parallel lines** lines that are in the same plane and never intersect

**perpendicular lines** lines that intersect to form right angles

**plane** a flat surface that extends without end in all directions

### Dear Family,

In this section, your child will be learning the necessary terminology for understanding and applying the concepts of geometry. When given a figure, your child will be able to identify **points**, **segments**, **rays**, **lines**, and **planes**. Use the chart to review of these basic concepts.

| Concept      | Definition   | Symbols   |
|--------------|--|---|
| Point        | An exact location in space.<br>                                 | Named by a capital letter, $P$ .  |
| Line         | A set of points that extends in both directions without end.<br> | Named by two points on the line, $\overleftrightarrow{AB}$ .                            |
| Ray          | A part of a line that has one endpoint and extends forever.<br> | Named by the endpoint first and then another point on the line, $\overrightarrow{AB}$ . |
| Line Segment | A part of a line with two endpoints.<br>                       | Named by the endpoints, $\overline{AB}$ .   |
| Plane        | A flat surface that extends without end in all directions.<br> | Named by three points on the plane that are not on a line, plane $ABC$ .                |

Ask your child to explain the difference between a line, a ray, and a segment and how to differentiate between the symbols that are used to describe each of these terms in a given figure.

**point** an exact location in a plane

**ray** a part of a line that has one endpoint and extends forever

**right angle** an angle that measures exactly  $90^\circ$

**skew lines** lines that lie in different planes that are neither intersecting nor parallel

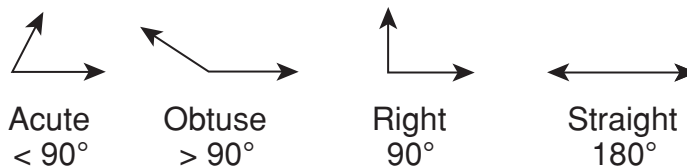
**straight angle** an angle that measures exactly  $180^\circ$

**supplementary angles** two angles whose measures add to  $180^\circ$

**vertex** the common endpoint formed by two rays

**vertical angles** a pair of opposite congruent angles formed by intersecting lines

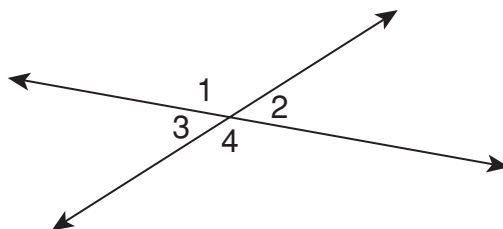
Now that your child has a basic understanding of geometric terms, he or she will begin to apply this knowledge to other geometric concepts. One concept includes angles and angle relationships. Your child will learn to recognize and classify angles into four different categories: **acute**, **obtuse**, **right**, and **straight**.



Angles and angle relationships are an important part of understanding geometry. Two angles whose measures add to  $90^\circ$  are called **complementary angles**. Two angles whose measures add to  $180^\circ$  are called **supplementary angles**.

When two angles are opposite of each other, as when two lines intersect, **vertical angles** are created. These angles are said to be **congruent**, or have the same measure. By knowing these basic relationships among angles, your child will be able to find missing angle measures.

**Identify a pair of vertical angles.**



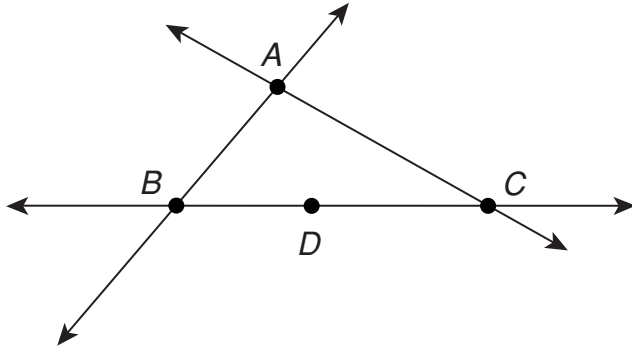
$\angle 1$  and  $\angle 4$  are opposite each other and are formed by intersecting lines. They are congruent vertical angles.

This is just an overview of what your child will be learning in this section. The information covered here will provide a strong foundation for the concepts and applications your child will be using throughout this chapter and future mathematic courses.

**Sincerely,**

**CHAPTER** **Family Letter**  
**8** **Lines and Angles**

Use the diagram to name each geometric figure.



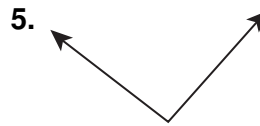
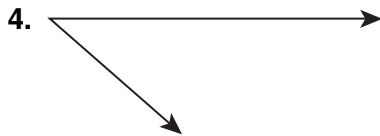
1. two points

2. a plane

3. three segments

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Use a protractor to measure each angle. Tell what type of angle it is.

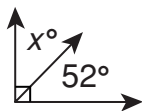


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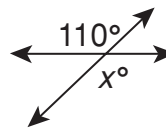
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Find each unknown angle measure.

6. The angles are complementary.



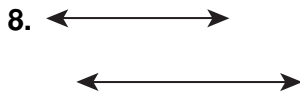
7. The angles are vertical.



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\_\_\_\_\_

Classify the pair of lines.



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**Answers:** 1.  $A, B, C$ , or  $D$  2. Any three letters, such as  $ABC$  3.  $\overline{AB}, \overline{BD}, \overline{DC}, \overline{BC}$ , or  $\overline{AC}$  4.  $45^\circ$ ; acute 5.  $90^\circ$ ; right 6.  $38^\circ$  7.  $110^\circ$  8. parallel 9. intersecting

CHAPTER

8

**Family Fun**

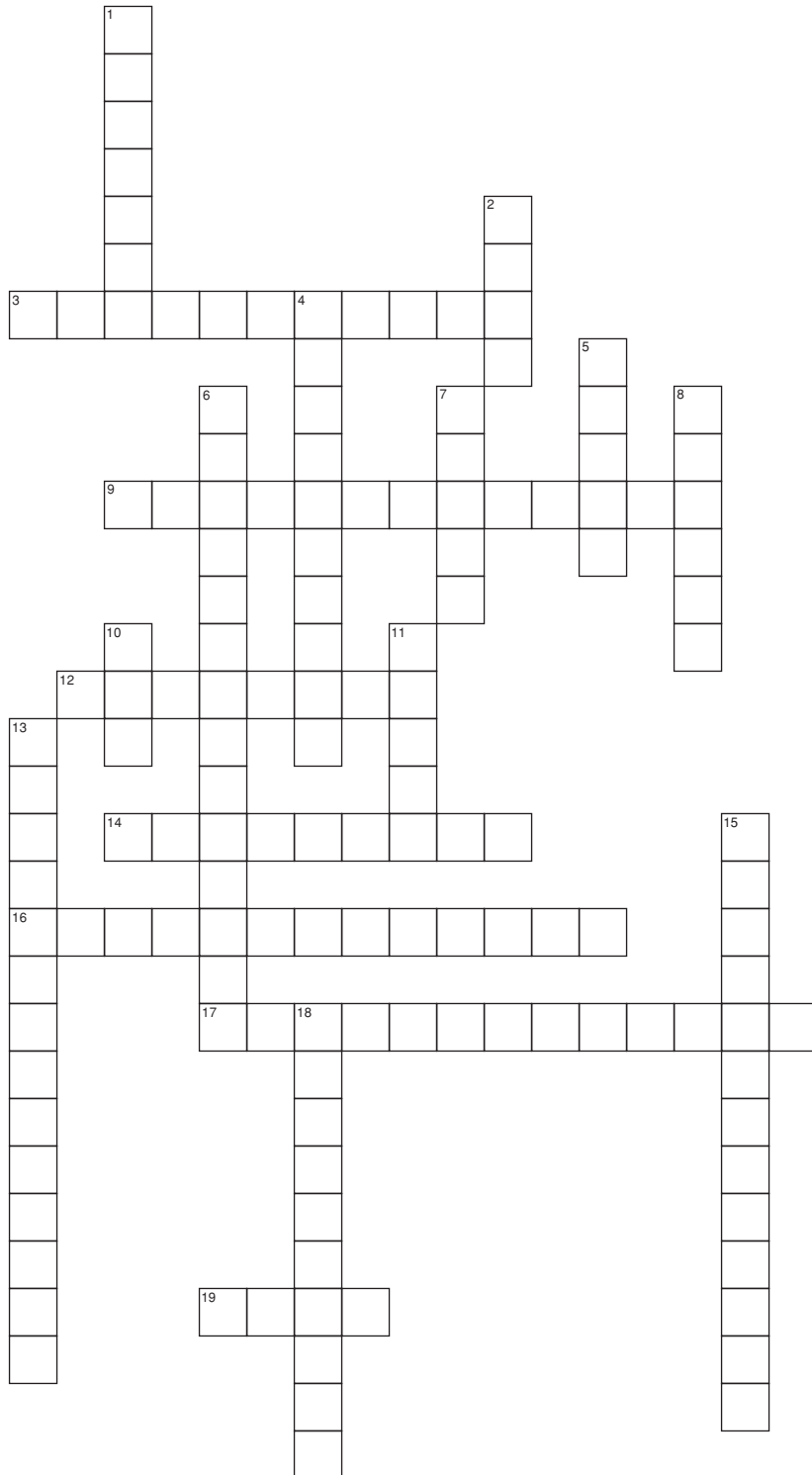
**Crossword Geometry**

**Across**

- 3. Angle that measures more than  $90^\circ$
- 9. Lines that intersect to form  $90^\circ$  angles
- 12. Lines in the same plane that will never meet
- 14. Angles with the same angle measure
- 16. Two angles whose measures add to  $90^\circ$
- 17. Angle that measures exactly  $180^\circ$
- 19. A straight path that extends without end in opposite directions

**Down**

- 1. A line \_\_\_\_\_ is made up of two endpoints
- 2. Lines that are not parallel and will never intersect
- 4. Angle less than  $90^\circ$
- 5. Formed by two rays
- 6. Angles that are always congruent
- 7. An exact location
- 8. The common point of an angle
- 10. Only has one endpoint
- 11. A flat surface that extends without end in all directions
- 13. Share a common vertex and ray
- 15. Two angles whose measures add to  $180^\circ$
- 18. An angle that is exactly  $90^\circ$



**Answers:** Across 3. obtuse angle 9. perpendicular 12. parallel 14. congruent 16. complementary 17. straight angle 19. line Down: 1. segment 2. skew 4. acute angle 5. angle 6. vertical angles 7. point 8. vertex 10. ray 11. plane 13. adjacent angles 15. supplementary 18. right angle

## What We Are Learning

## Polygons

## Vocabulary

These are the math words we are learning:

**acute triangle** a triangle with all angles less than  $90^\circ$

**equilateral triangle** a triangle with three congruent sides

**isosceles triangle** a triangle with at least two congruent sides

**obtuse triangle** a triangle containing one obtuse angle

**parallelogram** a quadrilateral with two pairs of parallel sides

**polygon** a closed plane figure formed by three or more line segments that intersect only at their endpoints

**quadrilateral** a four-sided polygon

**rectangle** a parallelogram with four right angles

**regular polygon** a polygon with congruent sides and angles

**rhombus** a parallelogram with congruent sides





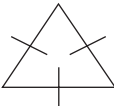
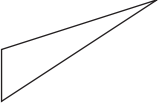
**right triangle** a triangle with a right angle

**scalene triangle** a triangle with no congruent sides

*Dear Family,*

In this section, your child will be learning the properties of various triangles and other polygons. She or he will also learn the relationship between these geometric figures.

Triangles are special **polygons** that are closed figures with three sides and three angles. The sum of the angle measures in any triangle is  $180^\circ$ . Like angles, triangles have special names and characteristics. Triangles can be classified by their angles or by the length of their sides.

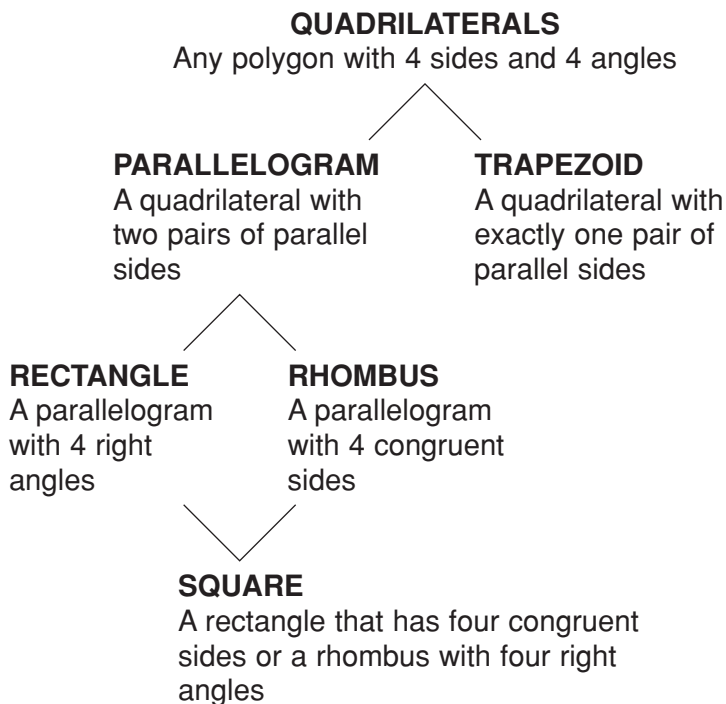
|                      |   |  |
|----------------------|---|--|
| Acute Triangle       |    | All angles measure less than $90^\circ$ .              |
| Right Triangle       |    | There is one right angle.                              |
| Obtuse Triangle      |     | There is one angle measuring greater than $90^\circ$ . |
| Isosceles Triangle   |   | The lengths of two sides are congruent.                |
| Equilateral Triangle |  | The lengths of all three sides are congruent.          |
| Scalene Triangle     |  | The lengths of the sides are not congruent.            |

Your child will use the information about the different triangles to classify triangles and to help find the measure of an angle or the length of a side.

**square** a rectangle with four congruent sides

**trapezoid** a quadrilateral with exactly one pair of parallel sides

**Quadrilaterals** are another type of special polygon. Quadrilaterals are four-sided closed figures. Some quadrilaterals are unique and have special names and characteristics. Your child will learn to identify and classify given quadrilaterals based on the following properties.



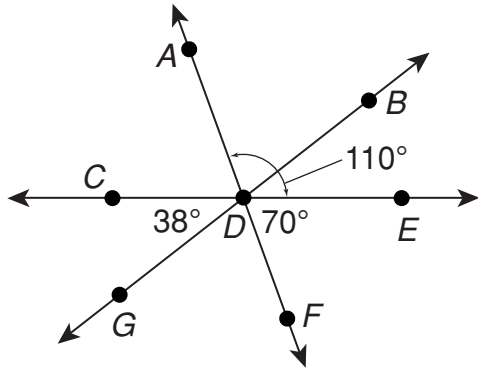
Triangles and quadrilaterals are just two types of polygons your child will study in this section. Your child will also study other polygons, and learn to identify them as being either regular or irregular.

Knowing the basic figures of geometry and their properties are necessary in the study of geometry. Review the different figures and their special properties with your child to help with mastery of these concepts.

**Sincerely,**

**CHAPTER** **Family Letter**  
**8** **Polygons**

Use the diagram to find the measure of each indicated angle.



1.  $\angle CDA$

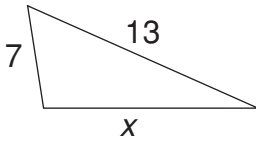
2.  $\angle BDE$

3.  $\angle ADB$

\_\_\_\_\_

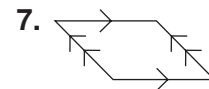
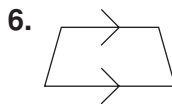
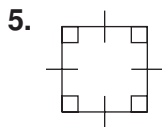
Classify the triangle using the given information.

4. The sum of the lengths of the three sides is 36 inches.



\_\_\_\_\_

Give the most descriptive name for each figure.



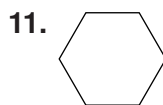
\_\_\_\_\_

Complete each statement.

8. A parallelogram with four right angles is a \_\_\_\_\_.

9. A quadrilateral with exactly one pair of parallel sides is a \_\_\_\_\_.

Name each polygon and tell whether it appears to be *regular* or *not regular*.



\_\_\_\_\_

**Answers:** 1.  $70^\circ$  2.  $38^\circ$  3.  $72^\circ$  4. scalene 5. square or rhombus 6. trapezoid 7. parallelogram 8. rectangle 9. trapezoid 10. not regular quadrilateral 11. regular hexagon, 12. not regular pentagon

**CHAPTER**

**Family Fun**

**8**

**Draw It!**

**Directions**

The goal is for your team to be the first team to correctly draw the given polygon.

- Pick someone to be the announcer and the judge.
- Form teams of two people.
- Cut out the cards. The announcer picks a card from the deck and reads the description.
- Each team has to name and draw that object.
- The first team finished shows their picture to the announcer who decides if the picture is accurate. If the picture is correct, that team earns one point. The team with the most points wins!

**Be creative and make your own description cards to add to the pile.**

|  |  |   |   |  |
|--|--|---|---|--|
| 1.<br><br><b>A regular polygon with six sides.</b>           | 2.<br><br><b>A 3-sided figure with one right angle.</b>                    | 3.<br><br><b>A quadrilateral with four right angles.</b>  | 4.<br><br><b>A 6-sided figure with different side lengths.</b>                          | 5.<br><br><b>A 3-sided figure with equal angle measures.</b>             |
| 6.<br><br><b>A figure with four sides.</b>                   | 7.<br><br><b>A figure with four congruent sides and four right angles.</b> | 8.<br><br><b>A figure with 8 congruent sides.</b>   | 9.<br><br><b>A figure with 2 pairs of parallel sides and opposite congruent angles.</b> | 10.<br><br><b>A 4-sided figure with only one pair of parallel sides.</b> |
| 11.<br><br><b>A parallelogram with four congruent sides.</b> | 12.<br><br><b>A rectangle with four congruent sides.</b>                   | 13.<br><br><b>A parallelogram that is not a rectangle or a square but has diagonals that are perpendicular.</b> | 14.<br><br><b>A 5-sided figure with congruent angles and sides.</b>                     | 15.<br><br><b>A 3-sided figure with two congruent sides.</b>             |

**Answers:** 1. Regular hexagon 2. Right triangle 3. Rectangle 4. Irregular hexagon 5. Equilateral triangle 6. Quadrilateral 7. Square 8. Regular Octagon 9. Parallelogram 10. Trapezoid 11. Rhombus 12. Square 13. Rhombus 14. Regular pentagon 15. Isosceles triangle

### What We Are Learning

#### Polygon Relationships

#### Vocabulary

These are the math words we are learning:

**line of reflection** a line over which a figure flips in order to create a mirror image of the original figure

**line symmetry** occurs when a figure can be reflected or folded so the two parts of the figure match or are congruent

**line of symmetry** the line over which a figure is folded or flipped to create line symmetry

**reflection** occurs when a figure is flipped over a line of reflection

**rotation** the movement of a figure around a point

**transformation** a change in the size or position of a figure

**translation** the movement of a figure along a straight line

### Dear Family,

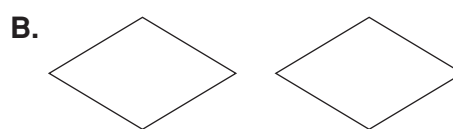
Now that your child has a solid understanding of basic geometric concepts, he or she will begin to explore the relationships that can be applied to polygons. One such application is the concept of congruence.

Your child studied congruent angles in the previous sections. Now this concept will be applied to figures. Figures are congruent when they have the same size and the same shape. Your child will learn to identify if a pair of figures are congruent.

#### Decide whether the two figures in each pair are congruent. If not, explain.



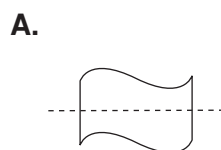
The figures are both trapezoids. They are neither the same shape nor the same size. The figures are not congruent.



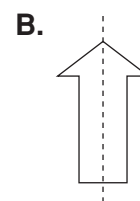
These figures have the same shape and size. The figures are congruent.

Another geometric concept that can be applied to polygons is **symmetry**. If a figure is folded or reflected and the two parts of the figure match, then the figure is symmetrical. The line of reflection is also called the **line of symmetry**.

#### Determine whether each dashed line appears to be a line of symmetry.

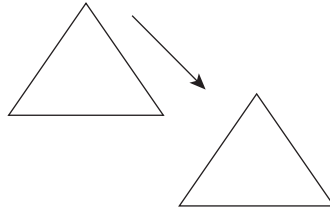


The two parts of the figure are congruent, but do not match exactly when reflected over the line. The line does not appear to be a line of symmetry.

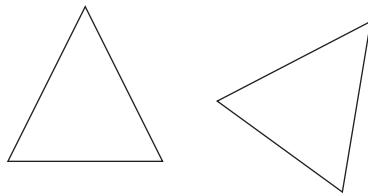


The two parts of the arrow appear to match exactly when reflected over the line. The line appears to be a line of symmetry.

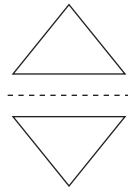
When a figure is moved along a plane and does not change its shape or size, it is called a **transformation**. There are three types of transformations: translations, reflections, and rotations.



A **translation** moves the figure along a straight line. Only the location changes when a figure is translated.



In a **rotation**, the figure rotates around a point. Both the location and the position change during a rotation.



With a **reflection**, the figure is flipped over a line, called the **line of reflection**, which creates a mirror image of the figure. The location and the position of the figure change during a reflection.

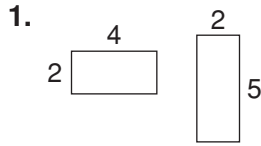
Review these geometric applications often with your child. Encourage your child to find transformations, symmetry, and tessellations in everyday situations. Being able to connect these ideas and concepts with real life examples will be helpful to your child.

**Sincerely,**

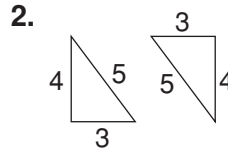
**CHAPTER**  
**8**

**Family Letter**  
**Polygon Relationships**

Decide whether the figures in each pair are congruent. If not, explain.

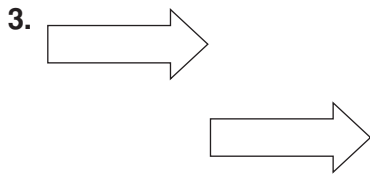


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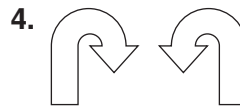


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Tell whether each is a translation, rotation, or reflection.

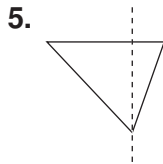


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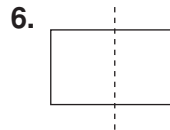


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Determine whether each dashed line appears to be a line of symmetry.

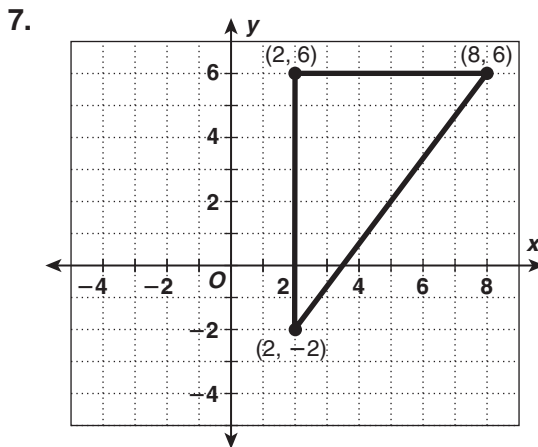


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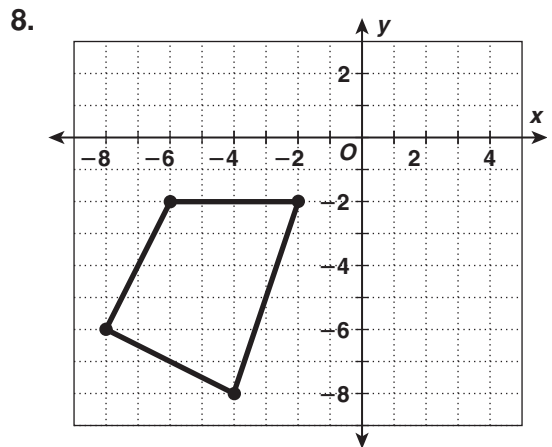
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Name the coordinate of each vertex when the transformation is made.



reflected over the y-axis

\_\_\_\_\_



translated 4 to the right and 2 up

\_\_\_\_\_

**Answers:** 1. The figures are not congruent. Sides are not the same size. 2. The figures are congruent. 3. Translation 4. Reflection 5. No, 6. Yes 7.  $(-2, 6)$ ,  $(-2, -2)$ ,  $(-2, -8)$ ,  $(-6, -8)$  8.  $(2, 6)$ ,  $(6, 6)$ ,  $(6, -2)$ ,  $(2, -2)$

## Family Fun

### Art Fun

Geometric concepts and applications of symmetry, reflection, and tessellations are often used in drawings and paintings. Become a mathematical artist by creating your own work of art!

#### Materials

- Magazines and/or pictures
- Glue and scissors
- Large sheets of construction paper

#### Directions

- Look for real life images that are symmetrical in your magazines or pictures.
- Cut these images out and put them off to one side.
- Categorize the pictures as to whether they have a horizontal or vertical line of symmetry.
- Create a collage with all of the images you found that have the same type of line of symmetry. Glue these images onto the construction paper.

Share your masterpiece with your family.

For example, these images all have a vertical line of symmetry. Can you identify each one?

