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35 Classifying Two-Dimensional Figures

1 Introduction

Polygons, or two-dimensional figures with line segments for sides, can be classified into groups based on their characteristics, such as angles, parallel sides, and congruent sides.

Congruent means "equal in size."

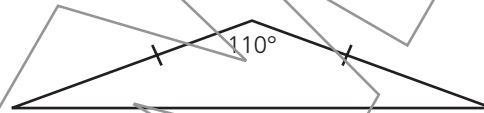
This table shows you how to classify a triangle.

TRIANGLES					
By Angles			By Sides		
Acute	Obtuse	Right	Equilateral	Isosceles	Scalene
3 angles that are less than 90° each	1 angle that is greater than 90°	1 angle that is equal to 90°	3 sides of equal length	at least 2 sides of equal length	no sides of equal length

Identifying both the angle and side attributes can help you classify triangles.

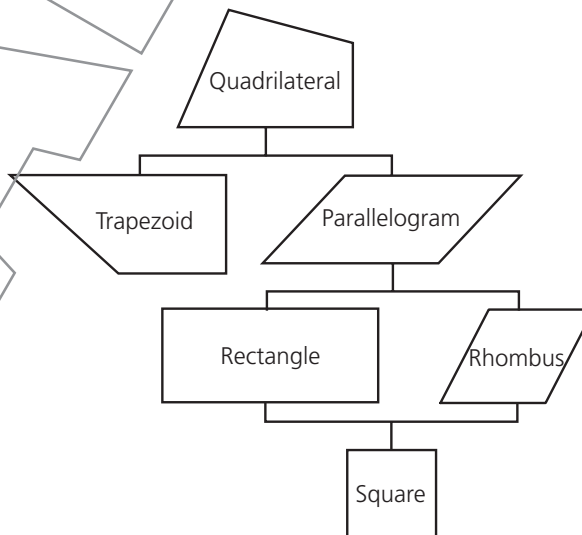
The triangle has 2 equal sides and an angle greater than 90° . Having 2 equal sides means the triangle is an isosceles triangle. The angle greater than 90° means that the triangle is obtuse.

Sides marked with tick marks are congruent.



This is both an isosceles and an obtuse triangle.

This chart shows you how to classify quadrilaterals.



All of the figures in the chart are quadrilaterals. A square is a type of rectangle and rhombus. The square, rectangle, and rhombus are parallelograms.

Think About It

A polygon is a closed figure with sides that are line segments. Is a circle considered a polygon and a plane figure? Explain.



2 Focused Instruction

Classify triangles based on their angles and their side lengths.

- ▶ Jeff's backyard has a triangular shape and is bordered by the house and two sides of fencing.



He knows that the angle created by the two fences measures 90° . He also knows that the shortest side is about 12 feet. The longest side is about 25 feet. The remaining side is 10 feet greater than the shortest side. Classify the yard shape using both the angles and side lengths.

What is the measure of the known angle of the backyard? _____

What is the name for an angle of this measure?

A right angle makes a square corner.

What is the measure of the longest side? _____

What is the measure of the shortest side? _____

How can you find the measure of the remaining side?

What is the measure of the remaining side? _____

Are any of the sides equal? _____

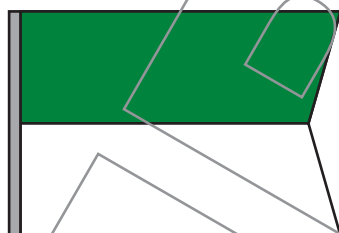
What type of triangle has sides with this relationship?

What are the angle and side classifications for this triangle?

What type of triangle is Jeff's backyard? _____

Classify quadrilaterals based on parallel and congruent sides and the number of right angles.

- ▶ A scouting group has a troop flag shaped like the one below.



The top of the flag is parallel to the bottom of the flag. The middle line of the flag is parallel to the bottom of the flag. Classify the green section of the flag.

Are the top and bottom of the flag parallel? _____

Are the bottom of the flag and the middle line parallel? _____

Are the middle line and top of the flag parallel? _____

How do you know?

Are the right and left sides of each section parallel? _____

What type of figure has these types of sides? _____

How many sides does the green section of the flag have? _____

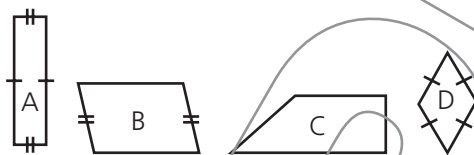
What larger group does this figure fit within?

Parallel lines never meet. They are always the same distance apart.

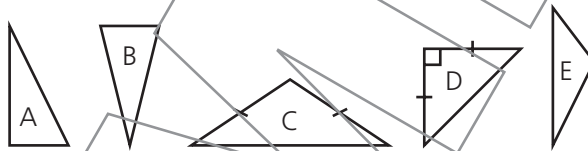
Is the figure in all of the same classifications as a rectangle? Why or why not?

Use what you know about two-dimensional figures to answer these questions.

- 1** Which of the figures is not a parallelogram?

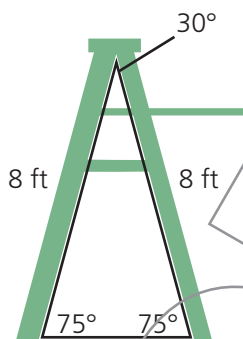


- 2** Which of the figures is an acute isosceles triangle?



Solve the following problems.

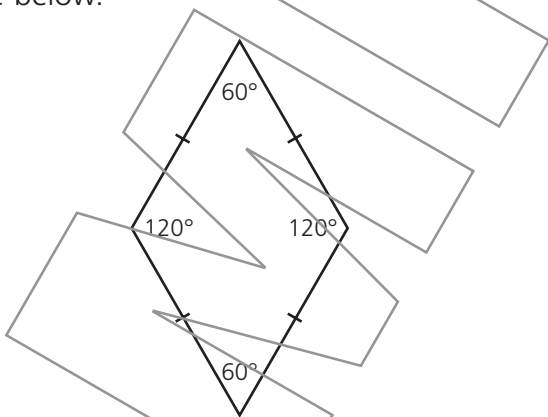
- 1** Mr. Delgado uses the ladder shown to hang pictures. What kind of triangle is formed by the sides of the ladder and the ground?



First, look at the triangle's angles. Then look at its sides.

Answer _____

- 2** Look at the figure below.



How many right angles are in the figure?

Use the angles to determine what type of figure it is.

Answer _____

- 3** Isabella classified a rectangle as a parallelogram. Is she correct? Explain.

What makes a figure a parallelogram? Is this true for a rectangle?

Solve the following problems.

- 1** A triangle has sides that are 16 feet, 16 feet, and 16 feet in length. One angle is 60° . Which choice best describes the triangle?

- A** right and isosceles
- B** obtuse and scalene
- C** acute and isosceles
- D** acute and equilateral

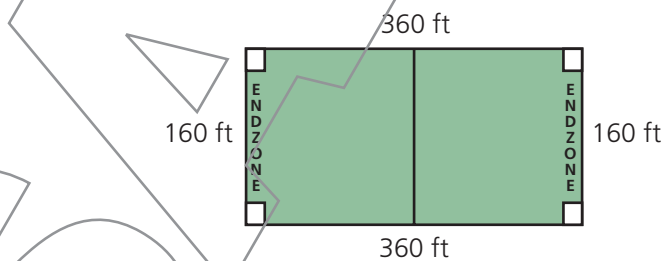
- 2** A four-sided figure with two right angles has two additional angles that are congruent to each other. The figure also has sides that are congruent.

Part A What is the measure of the two remaining angles? Explain how you found your answer.

Part B What are all of the classifications for this figure?

Answer _____

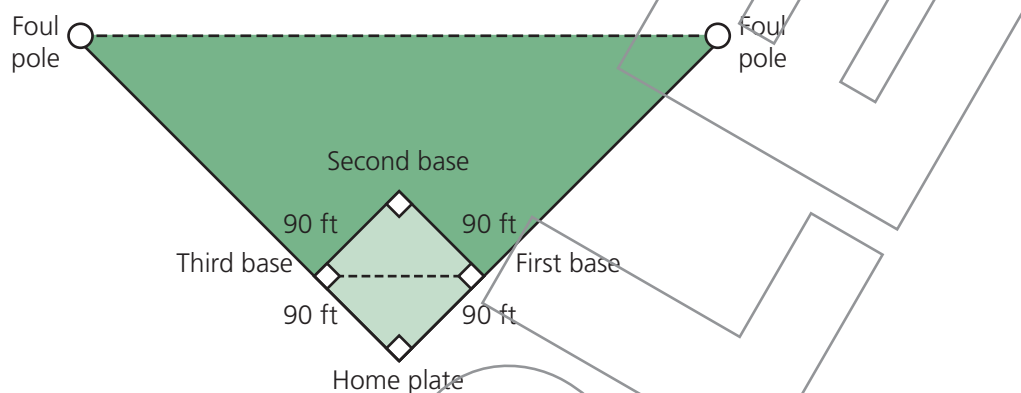
- 3** A typical football field is shown here.



What is the most specific description of the shape of the football field?

Answer _____

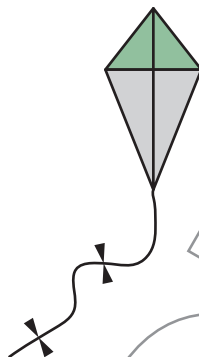
- 4** A typical baseball field is shown below. The right angle symbols mark the locations of first base, second base, third base, and home plate.



Part A During practice, the coach has the players throw the ball from first to second base, from second to third base, and from third base back to first base. What kind of triangle does the path of the ball make? Explain your answer.

Part B The first and third baselines extend into the outfield and end at the foul poles. The left field foul pole is 318 feet from home plate. The right field foul pole is 314 feet from home plate. Is the triangle formed by the first and third base lines and the dashed line between them the same as the triangle formed in Part A? Explain your answer.

- 5 Sen-Yung is flying her kite at the park. The outside edges of the green section of the kite are congruent. The outside edges of the gray section of the kite are congruent. There are no pairs of sides that are parallel.



Which classification group does the kite fit within?

Answer _____

- 6 Mark the correct space in the table to show the classifications for each polygon. You may mark more than one space for some polygons.

	Square	Rectangle	Rhombus	Parallelogram	Other Quadrilateral