

## Compare and Contrast Quadrilaterals

**Established Goals:** 7.9 The student will compare and contrast the following quadrilaterals: parallelogram, rectangle, square, and rhombus. Physical demonstration, deductive reasoning and inference will be used to classify quadrilaterals. <sup>(1)</sup>

### Understandings: <sup>(1)</sup>

- A quadrilateral is a closed planar (two-dimensional) figure with four sides that are line segments.
- A parallelogram is a quadrilateral whose opposite sides are parallel and congruent.
- A rectangle is a parallelogram with four right angles.
- A square is a rectangle with four congruent sides or a rhombus with four right angles.
- A rhombus is a parallelogram with four congruent sides.
- Quadrilaterals can be sorted according to common attributes, using a variety of materials.
- A chart or graphic organizer can be made to organize quadrilaterals according to attributes such as sides and/or angles.
- For all parallelograms, both pairs of opposite sides and both pairs of opposite angles are congruent.
- Parallelograms have special characteristics (such as both pairs of opposite sides are parallel and congruent) that are true for any parallelogram.
  - Rectangles have special characteristics (such as diagonals are perpendicular bisectors) that are true for any rectangle.

### Essential Questions/Prior Knowledge:

Relate this lesson to triangles, they are 3-sided polygons now we'll talk about 4-sided polygons.

Recognize the general shape of a square and a rectangle. What do they have in common? How many sides do they have? (4)

Recall information about angles (particularly right angles), parallel lines, and the concept of congruency.

What does "quad" mean (4)

What is a quadrilateral? (4 sided figure/polygon)  
So squares and rectangles are quadrilaterals

Give me examples of quadrilaterals in the room?  
Ceiling, floor tiles, windows, blackboard, computer screen, books, desks, calculators, door

Anyone ever ski and ride in the quad chair lift?  
(For 4 people)

**Reminders:** parallel, congruent, right angle, polygon, parallelogram

**Students will know:** How to describe, classify, and compare parallelograms according to their attributes.

That a quadrilateral can belong to one or more subsets of the set of quadrilaterals.

That every quadrilateral in a subset has all of the defining attributes of the subset. (If a quadrilateral is a rhombus, it has all the attributes of a rhombus.) How to identify quadrilaterals and parallelograms that exist in the real world.

## Stage 2 – Assessment Evidence

**Formative Assessment:** Guided practice will consist of creating shapes that match a given description, and classifying the given shapes with **all** the correct classifications. i.e., parallelogram, square, rectangle and/or rhombus

In pair share exercise, pairs will draw their own shapes and ask partner to classify.

Check for understanding by walking around room, talking with pairs, checking their classifications, Thumbs up/thumbs down

**Summative Assessment: Quiz**

**See below**

Students will be allowed to redo if they do not understand.

## Stage 3 – Learning Plan

**Learning Activities:** Class duration – 90 minutes (80 minutes new lesson, 10 min HW review and warm up)

**1)(5 min) Pre-assessment questions, warm-up** (on overhead)

1. 3 sided figure is called?

2. 3 sided figure with 1 right angle is called?

3. What is a polygon?

4. What is a quadrilateral? What does quad mean?

5. Describe congruent.

6. What is the description of parallel lines?

**2) Lesson:** We are going to learn about and classify quadrilaterals first via a power point presentation, and then by using the good old fashioned method of graph paper, scissors and color pencils because I think my students will learn this lesson best by actually drawing, creating, and cutting parallelograms.

**Go to:** <http://www.slideshare.net/sedanor/classifying-quadrilaterals-presentation><sup>(2)</sup>

**Quadrilaterals in the real world:** <http://www.slideshare.net/mrwilliams/9-5-classifying-quadrilaterals><sup>(3)</sup>

(will not show the last slide which is not relevant to my lesson)

**The following lesson was adapted from:** (<http://www.shodor.org/interactivate/discussions/Parallelograms/>)<sup>(4)</sup>

### 1. Quadrilateral – A Polygon with 4 sides and 4 angles.

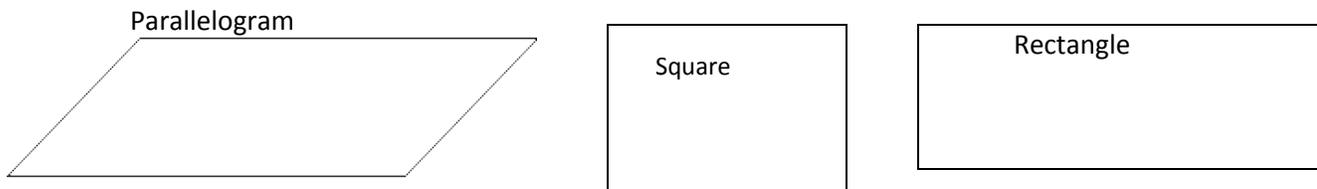
General Quadrilateral - 4 sides, 4 angles

2 lines run side-by-side and never cross? [parallel](#) lines.

### 2. Quadrilaterals with parallel sides are Parallelogram.

How can all the sides be parallel if a quadrilateral is a polygon and is all closed off?

A parallelogram has **two** pairs of opposite sides that are parallel, like these:



Top is parallel to the bottom and the sides are parallel to each other.

### 3. There is a special kind of parallelogram, called a rhombus. A rhombus is a parallelogram, but all four sides have the SAME length.

A rhombus is a type of parallelogram just like a banana is a type of fruit.

We should not say that all parallelograms are rhombii, just like we don't say that all fruits are bananas.

### 4. Rectangle (<http://www.shodor.org/interactivate/discussions/Rectangles/>)<sup>(5)</sup>

What are the similarities between a rectangle and a square? (4 sides) What are the differences? (They both have 4 sides)

But are the sides the same length? (In a square all the sides are the same. But in a rectangle, only two of the sides are the same. The opposite sides are the same. )

## 2) Lesson cont.

### 5. Square

All the sides of a square are [congruent](#), or have equal lengths, and only the opposite sides of the rectangle must be congruent. Are there any other parts of the squares and rectangles that seem to be the same? (The opposite sides are [parallel](#), like in a [parallelogram](#), only they go straight up in the air. They don't lean to the side like some parallelograms do.)

Rectangles and squares ARE parallelograms. By noticing that all sides "go straight up in the air," You noticed, that the angles in the rectangle and square are the same. Do you remember what we call angles that are straight up like that? ([right angles](#))

So rectangles and squares have how many right angles? (4 right angles)

Can we make a general rule to determine what defines a rectangle and a square? (First, each shape has to have 4 right angles)

What do we need to say about the sides? (They are parallel and that in a square all four sides are congruent while in a rectangle only the opposite sides are congruent)

A rectangle must have opposite sides that are parallel and equal and four right angles. A square must have opposite sides parallel, all sides congruent, and four right angles. We could also say that a rectangle is a parallelogram with four right angles, while a square is a parallelogram with four congruent sides and four right angles. Does that mean that a square is a rectangle??? (It is since it has opposite sides that are congruent and parallel and it has four right angles)

A square IS a rectangle. Can anyone tell me why a rectangle is NOT a square? (A rectangle is not a square because it is not required to have **four** congruent sides)

**Extended learning:** Trapezoid is also a 4-sided polygon, but its top base and bottom base are different sizes. Can you draw a trapezoid and classify its properties?

## 3) Guided Practice

With graph paper (large grid), scissors, colored pencils, interactive notebooks

Together we will draw and cut out the following:

1. parallelogram that has 2 sides that are 6 units, and 2 sides that are 4 units
2. square that has sides of 4 units (draw in green)
3. rectangle that has sides of 4 units and 6 units (draw in red)
4. rhombus with sides of 4 units (draw in blue)

Instruct students to label each parallelogram, place side by side, on top of each other to look at their similarities and differences.

Instruct students to place parallelograms in their interactive notebook, in the appropriate locations. Notebook page should be set up the following way:

Label quadrilateral with all subsets and note by circling classification, which is the BEST description of the parallelogram.

Quadrilateral	Example/Picture	Properties				
		Only 1 pair of sides parallel	Both pairs of sides parallel	4 right angles	4 equal sides	All classifications
Parallelogram						
Rectangle						
Rhombus						
Square						
<i>Trapezoid</i> <i>(extension)</i>						

#### 4) Pair share/group work – each student in pair group shall:

Create 3 shapes (parallelograms) and ask partner to label and classify.

Give classification of 3 parallelograms, (ex. Rhombus, square), with specific dimensions and ask partner to draw and label.

#### 5) Formative Assessment

1. Name the types of quadrilaterals that have both pairs of opposite sides parallel.

**Answer:** All parallelograms. Parallelograms include rectangles, rhombuses and squares.

2. Name the types of quadrilaterals that have four right angles.

**Answer:** Rectangles and squares

3. Name the types of quadrilaterals that have at least one pair of parallel sides.

**Answer:** Parallelograms, rectangles, rhombuses, squares

Thumbs up/thumbs down to check for understanding

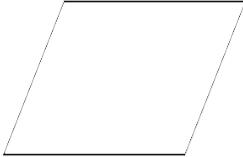
**6) Summative Assessment – Quiz**

Draw an example and classify (label) Quadrilateral described. Label quadrilateral with all subsets and note which is the BEST description of the parallelogram.

Extended learning: Trapezoid is also a 4-sided polygon, but its top base and bottom base are different sizes. Can you draw a trapezoid and classify its properties?

Quadrilateral	Example/Picture	Properties				
		Only 1 pair of sides parallel	Both pairs of sides parallel	4 right angles	4 equal sides	All properties that identify polygon
Parallelogram						
Rectangle						
Rhombus						
Square						
<i>Trapezoid</i>						

**Answer Key:**

Quadrilateral	Example/Picture	Properties				
		Only 1 pair of sides parallel	Both pairs of sides parallel	4 right angles	4 equal sides	All properties that identify polygon
Parallelogram			Yes			Parallelogram
Rectangle			Yes	Yes		Rectangle Parallelogram
Rhombus			Yes		Yes	Rhombus Parallelogram
Square			Yes	Yes	Yes	Square Rhombus Parallelogram
<i>Trapezoid</i>		Yes				Trapezoid Parallelogram

C. Robinson

**Materials:**

Power Point Presentation, Print out in Note form so students may take notes and add all to their Notebooks

Student's interactive vocabulary notebook

Smartboard or overhead/transparencies

Graph paper, scissors, glue,

Color pencils : **B**lue – Rhom**B**us, **R**ed – **R**ectangle, **G**reen - **S**quare

**Differentiation:** Handout definitions along with pictures to describe parallelograms. Instruct all students to put it in their notebooks or paste into their interactive notebooks

VIP: Table of Classifications or Use Venn Diagram to show how each parallelogram fits into each subset.

References:

- (1) "Mathematics Standards of Learning Curriculum Framework", <[http://www.doe.virginia.gov/VDOE/Instruction/Math/curriculum\\_framework\\_2002/index.html](http://www.doe.virginia.gov/VDOE/Instruction/Math/curriculum_framework_2002/index.html)/grade7mathcf.doc>
- (2) "Classifying Quadrilaterals", <<http://www.slideshare.net/sedanor/classifying-quadrilaterals-presentation>>
- (3) "Classifying Quadrilaterals", <<http://www.slideshare.net/mrwilliams/9-5-classifying-quadrilaterals>>
- (4) "Parallelograms", <<http://www.shodor.org/interactivate/discussions/Parallelograms/>>
- (5) "Rectangles", <<http://www.shodor.org/interactivate/discussions/Rectangles/>>