Topic: Quadrilateral Properties and Relationships
Subject Area/Content: General Education Geometry/Integrated II
Course: 10th Grade
Time: 2 - 60 minute classes

Lesson Objectives:
1. Students will determine the similarities and differences between quadrilaterals by looking at their side, angle, and diagonal measures.
2. Students will discover the properties of the special quadrilaterals.
3. Students will look for and make use of structure (CCSS Mathematical Practice).

Materials:
1. Computer Lab with Projector
2. Power Thinking PowerPoint Document
3. Quadrilaterals: Who Am I? Document
4. Who Am I Follow-Up Exit Slip
5. Parallelograms: Family Tree of Properties worksheet

Warm-Up/Opening Activity/Pre-Assessment (10-minutes):
During the first 5 minutes of class, students will answer four warm-up questions that will be projected on the whiteboard. The warm-up questions will have students name four quadrilaterals in as many ways as possible. While students are working, the teacher will circulate around the room to observe students' work and provide help to students that need it. If some students complete the problems early, the teacher will ask them to also assist other students if needed. After the 5 minutes are over, the teacher will take 5 minutes to go over the correct answers to the problems with the students.

*Students will answer the following warm-up questions:
Name each of the following figures. Can each figure have more than one name? Why or why not?

1.

2.

3.

4.
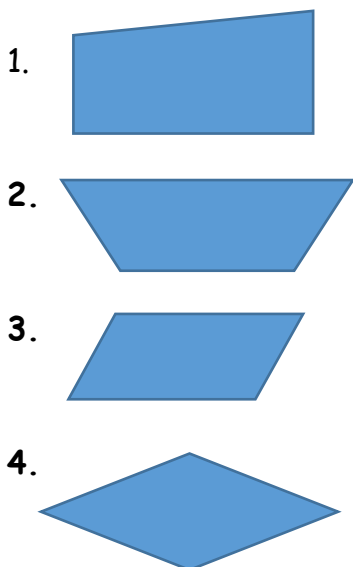
Main Activities:

1. **Parallelograms: Family Tree of Properties (25-minutes):** The teacher will go onto http://geogebratube.org/student/m3785 on their computer that will be hooked up to a projector so that the students can see what the teacher is doing. The teacher will demonstrate on how to measure sides, angles, and diagonals of figures on the site. Students will then go onto http://geogebratube.org/student/m3785 on their computer and will complete the QUADRILATERALS: Family Tree of Properties worksheet. The students will be able to work with other students, but each student will be responsible to turn in their own worksheet at the end of class. While students are working, the teacher will circulate around the room to observe students' work and provide help to students that need it.

2. **"Who am I?!" Activity (25-minutes):** Teacher will give students a Word document with mixed-up quadrilateral properties and a blank chart. Student will fill in the chart with the quadrilateral properties that belong to each specific quadrilateral. The students will be able to work with other students, but each student will be responsible to turn in their own work at the end of class. While students are working, the teacher will circulate around the room to observe students' work and provide help to students that need it.
   - **A successfully completed chart will look like the following example:**

Quadrilaterals: Who am I?!   ANSWER KEY

Parallelogram	**Who am I?** I am a quadrilateral Both pairs of my opposite sides are parallel Both pairs of my opposite sides are congruent Both pairs of my opposite angles are congruent My consecutive angles are supplementary My diagonals bisect each other but my diagonals are not congruent
Rectangle	**Who am I?** I am a parallelogram My diagonals are congruent I have all right angles
Rhombus	**Who am I?** I am a parallelogram My diagonals are perpendicular All my sides are congruent My diagonals bisect my angles
Square	**Who am I?** I am a parallelogram I am a rectangle I am a rhombus I have four congruent sides My diagonals are perpendicular and congruent
Trapezoid	**Who am I?** I am a quadrilateral I have exactly one pair of parallel sides. The angles that connect my bases are supplementary
Isosceles Trapezoid	**Who am I?** I am a trapezoid I have one pair of my opposite sides that are congruent

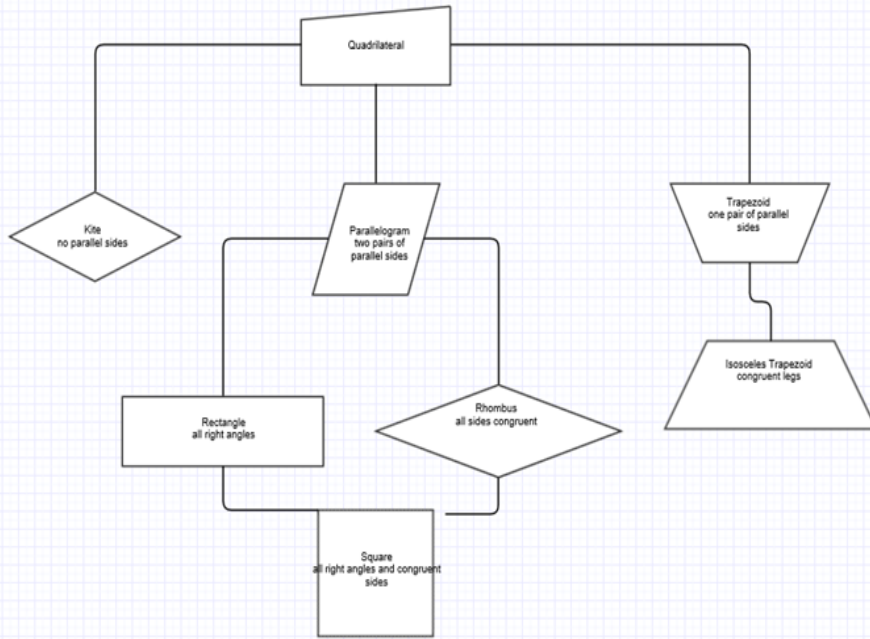|	
Kite	**Who am I?** I am a quadrilateral I have two pairs of consecutive sides that are congruent

3. **Power Thinking Introduction PowerPoint (15 minutes)**: Teacher will use the PowerPoint document to introduce the concept of Power Thinking to the students.
   o Power Thinking Group Candy Practice: During the PowerPoint the teacher will give students the opportunity to practice the Power Thinking concept with other students. Students will use Power Thinking to organize all different types of candy. The students will be able to work with other students. While students are working, the teacher will circulate around the room to observe students' work and provide help to students that need it.

4. **Power Thinking Activity (20 minutes):** Students use what they have learned about Power Thinking and will use it to demonstrate the relationships between quadrilaterals. They will organize all quadrilaterals from broadest to most specific and demonstrate the connections between the quadrilaterals. The students will be able to work with other students, but each student will be responsible to turn in their own work at the end of class. While students are working, the teacher will circulate around the room to observe students' work and provide help to students that need it.
   o **A successfully completed activity will look like the following example:**
     1) Quadrilateral
        2) Parallelogram
           3) Rectangle
           3) Rhombus
              4) Square
        2) Trapezoid
           3) Isosceles Trapezoid
        2) Kite

5. **Quadrilateral Family Tree Flow Chart/Concept Map (15-minutes):** Using the PARALLELOGRAMS: Family Tree Properties and Who Am I worksheet the teacher will have students create the Quadrilateral Family Tree Flow Chart/Concept Map demonstrating the quadrilateral relationships on **http://www.gliffy.com**. Students will create a flow chart/concept map that demonstrates the relationships between quadrilaterals. They will need the broadest quadrilateral at top and will need the most specific quadrilateral at the bottom and demonstrate the connections between the quadrilaterals. While students are working, the teacher will circulate around the room to observe students' work and provide help to students that need it. After the students have completed their flow chart/concept map they will need to print it and turn it into the teacher at the end of class. A success concept map should look like:

Quadrilaterals, v2 🔒

Quadrilateral

Kite
no parallel sides

Parallelogram
two pairs of
parallel sides

Trapezoid
one pair of parallel
sides

Isosceles Trapezoid
congruent legs

Rectangle
all right angles

Rhombus
all sides congruent

Square
all right angles and congruent
sides

Exit Slip (10-minutes):
Using their results from the "Who Am I" and Power Thinking activity students will complete the "Who Am I? Follow-Up Exit Slip". While students are working, the teacher will circulate around the room to observe students' work and provide help to students that need it. Students will turn in the exit slip at the end of class.

*Students will answer the following questions:

"Who am I?!" Follow Up Exit Slip:

Complete with **always, sometimes, or never**.

1) A rectangle _____ has perpendicular diagonals
2) A square is _____ a rhombus.
3) A rectangle _____ has consecutive sides congruent.
4) The diagonals of a quadrilateral _____ bisect each other.
5) If one pair of opposite sides of a quadrilateral is congruent and parallel, then the quadrilateral is _____ a parallelogram.