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Lesson Plan for Seventh Grade Mathematics

Stage 1 – Desired Results

Established Goals:

This lesson plan addresses objective 7.9 of the SOL for Geometry:

The student will compare and contrast the following quadrilaterals: parallelogram, rectangle, square, rhombus, and trapezoid. Deductive reasoning and inference will be used to classify quadrilaterals.

Specifically, this lesson plan will teach students the properties of parallelograms (parallelogram, rectangle, rhombus, and square) by highlighting the similarities and differences among and between them.

This lesson is designed for a 90-minute class period.

Understandings: *Students will understand...*

- That parallelograms are a subset of the general category, quadrilaterals.
- That the two distinguishing attributes in classifying parallelograms are the absence or presence of right angles and whether or not all four sides of the object are equal.
- That the classification of parallelograms is hierarchical, yet a square falls into both branches of the hierarchy.
- That a square, a rhombus, a rectangle, and a parallelogram are all forms of the category of quadrilaterals known as parallelograms.

Essential Questions:

Which of the four types of parallelograms is most commonly encountered in the real world? Why do you think that is the case?

If you lived in a windy area and you wanted to put up a fence, would the fence be stronger against the wind if it were shaped like a rhombus or if it were shaped like a square?

Students are expected to know...

- The definition of a right angle: an angle that is 90 degrees; the angle formed by 2 lines that are perpendicular
- The definition of a quadrilateral: a 4-sided, closed, geometric figure
- The definition of a vertex/vertices: the point where 2 lines meet or intersect

Students will be able to...

- identify the parallelograms in a group of pictures of quadrilaterals
- name all of the classifications that apply to a square, a rhombus, a rectangle, and a parallelogram within the class of quadrilaterals using visual representations of these shapes
- explain the reason that a specific picture of a parallelogram is classified as it is

Stage 2 – Assessment Evidence

Formative Assessment:

Students will respond to questions posed in class by writing answers on their whiteboards at various points in the lesson and show these responses to the teacher. Students will receive immediate feedback on their responses. If students present incorrect responses, the teacher will ask a student to show their solution on the SmartBoard or chalkboard.

Students will complete worksheets (included below) that will be reviewed during class.

Summative Assessment:

Students will be given the quiz that is included with this lesson.

Stage 3 – Learning Plan

Learning Activities:

Required materials:

- Individual student whiteboards and markers
- Computer images showing parallelograms in the real world, including neighborhood plots, buildings, a baseball diamond, paper, an overhead view of a car, a bed, and a parking lot
- System setup for displaying images on the classroom screen
- bulletin board and pins
- cutout shapes of quadrilaterals
- teacher-created manipulative for rectangles-to-parallelograms and squares-to-rhombuses (I made this at home and it really works! I made a square out of 4 strips of heavy plastic and joined the corners with brads. I did the same thing for a rectangle. You can then flex the shapes back and forth from rhombus to square and from parallelogram to rectangle.)

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Diagnostic Assessment as Bell Ringer: (10 minutes)

- Show a picture of a right angle facing left. Ask if it is a right angle, a left angle, a sharp angle, or a corner
- Show several quadrilaterals and an open four-sided figure - ask which are not quadrilaterals
- Define a right angle
- Define a quadrilateral

Engage (20 minutes):

Display an assortment of quadrilaterals on the bulletin board. Include examples of each of the 4 kinds of parallelograms (square, rectangle, rhombus, parallelogram) plus a selection of quadrilaterals that are not parallelograms.

Put the basic definition of a parallelogram on the screen:

"A parallelogram is a quadrilateral that is made up of 2 pairs of parallel sides where opposite sides are equal."

Systematically move the non-parallelograms to another area of the board while the teacher and class discuss the reasons that the objects do not qualify. Leave the valid parallelograms on the board, visually separated from the objects that do not qualify as parallelograms.

Leave the bulletin board in view, while displaying the real-life photos and asking the students to identify the parallelograms that they see. Students can identify any shape that they see including triangles and circles but the emphasis is on the parallelograms. This should be a fun, interactive activity.

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Direct Instruction: (15 minutes):

Display a slide containing a rectangle and a parallelogram. Ask the students to identify similarities and differences. Point out the features that they do not identify on their own.

Display a slide containing a rectangle and a square. Ask the students to identify similarities and differences. Point out the features that they do not identify on their own.

Display a slide containing a rectangle, a parallelogram, a square, and a rhombus. Ask the students to identify similarities and differences. Point out the features that they do not identify on their own. Emphasize that the presence of right angles and the congruence of all four sides are important distinguishing features.

Display a slide containing the hierarchical organization of parallelograms by their

defining characteristics as identified above.

Introduce the teacher-created manipulative for rectangles-to-parallelograms and squares-to-rhombuses, showing how closely related these objects are and how "stretched out" rhombuses and parallelograms can be, yet still maintain their defining features. Using the bulletin board, I pin up the square, then point out and describe its identifying characteristics. I then change the square into a rhombus by unpinning one side and stretching it out. I describe its characteristics and show how many shapes the rhombus can assume. This is a helpful manipulative because it is not always easy to tell that the sides of a rhombus are equal and this way the students know that they are. I do the same thing with the rectangle - showing it as a rectangle and as a parallelogram.

Group work - Guided Practice: (15 minutes)

Have the students complete the worksheet *What Am I?* while in small groups of 2-4 students.

Class Discussion of Group work: (10 minutes)

Quiz: (20 minutes)

Hand out quiz and require that students work independently. Work the room to watch for students needing extra assistance.

When the bell rings, collect the papers and dismiss the class. Return them, graded, the next day.

What am I?

1. All four of my sides are the same length but I don't any right angles. What am I? (Answer for teacher: rhombus)
2. My vertices are all right angles and a side of length 4 is adjacent to a side of length 7. What am I? (Answer for teacher: rectangle)
3. All four of my sides are the same length but my vertices don't all have the same measure. What am I? (Answer for teacher: rhombus)
4. I have 2 pairs of sides that are parallel. I don't have any right angles. A side of length 8 is adjacent to a side of length 4. What am I? (Answer for teacher: parallelogram)
5. I was a rectangle until a strong wind came along. What am I now? (Answer for teacher: rectangle)
6. I look the same from every direction. What am I? (Answer for teacher: square)
7. I have 4 equal sides and 4 right angles. What am I? (Answer for teacher: square)
8. I am almost a square but I'm not as tall as I am wide. What am I? (Answer for teacher: rectangle)
9. I was a square until somebody bumped into me. What am I now? (Answer for teacher: rhombus)