

Topic: quadrilaterals, plane figures, 2-dimensional shapes

Overview

Students learn the names and characteristics of the different types of quadrilaterals.

Grades 4 – 6

Time Allotment

Two to three 45-minute periods

Learning Objectives

On completion of this lesson students will be able to:

- Recognize and identify the properties of squares, rectangles, parallelograms, rhombi, kites, and trapezoids.
- Describe the properties of squares, rectangles, parallelograms, rhombi, kites, and trapezoids.
- Analyze the properties of squares, rectangles, parallelograms, rhombi, kites, and trapezoids.

This lesson addresses Va. SOLs Math 5.15

Media Components

- SmartBoard (projector & computer)
- Geometry Journey #6: Polygons, (DVD/VHS) Lincoln, Nebraska: GPN Educational Media. 2001. (Available through WVPT broadcast)

Materials and Student Handouts

- Chart – attached, 1/ student

Teacher Preparations

- Prep SmartBoard
- Obtain copy of video
- Copy handout

Introductory Activity

Focus: Write the following sentence on the SmartBoard: “I am a ____.” Tell the students that they are to list 5 - 6 nouns that they could use to complete the sentence.

Start Activity: Give the students a couple of minutes to list their nouns. If needed, remind them of the definition of nouns.

End Activity: After 2 minutes or when everyone has at least 4 nouns.

Follow-up: Have the students take turns coming to the SmartBoard to list different nouns. Discuss with the students how they can be more than one “thing”. Rearrange the nouns in order from smallest group to largest group. Discuss how some of the groups overlap and that all of the groups are part of the largest group “person”. Make a diagram that shows how one group is part of another and how the groups overlap.

Learning Activities

Divide the students into groups of 4 for these activities. Each group will need one sheet of unlined paper and one pencil for the first activity.

1. **Focus:** Ask the students how many different 4-sided figures they think they could draw. After several answers have been given, tell the students that they are going to work in their group to draw different four-sided figures.

Start Activity: Explain the rules for this activity:

You will have 5 minutes to draw different shapes.

You must work quietly.

Each group will have only one pencil and one sheet of paper.

When time begins the first person draws a shape then passes the paper and pencil to the next person. Each person draws one shape each time they get the paper.

End Activity: After 5 minutes.

Follow-up: Have each group take turns coming to the SmartBoard and drawing a four-sided figure that is different from the ones already drawn. Make sure there is at least one of each of the following shapes: square, rectangle, parallelogram, rhombus, kite, and trapezoid. Add these shapes if needed. Label the sheet “four sides” and print a copy for each group. Also save it so you can use it later.

2. **Focus:** Give each group a copy of the four-sided figures drawn in the previous activity. Tell them “that just like the nouns describing you name different groups of people, these shapes can be divided into smaller groups with the same characteristics. Your job in your group is to find at least 4 smaller groups and be able to describe the characteristics that make each group different from the rest of the shapes.” Remind them “that some shapes may belong in more than one group”.

Activity: Give the students approximately 7 minutes to work on making groups of the shapes. End after 7 minutes or when all the groups have made at least 3 shape groups.

Follow-up: Have each group take turns coming to the SmartBoard and moving the shapes to show the group they made. Have the characteristics written beside each group. Ask the other student groups: “Did you have the same group? Did you have any different characteristics for the group?” Make sure everyone agrees on the characteristics then print a copy of each shape group for each group of students. Also save each shape group so you can use it later. Make sure the groups that represent squares, rectangles, parallelograms, rhombi, kites, and trapezoids are shown. If necessary create some of these groups yourself and get the students to list the characteristics that describe the group. DO NOT let the student name the groups.

3. **Focus:** Say: “We are now going to watch sections of a video to learn the names of some of our groups of shapes and to make sure we have all the characteristics listed.” Show the “four sides” sheet on the SmartBoard and say, “This is the group we will do first.”

Play: Geometry Journey: program #6: Polygons Start at the beginning of the program.

Pause/Stop: Stop when it says, “A quadrilateral is a polygon with four sides.” (visual cue: diagram of polygons)

Follow-up: Ask, “What do we call four sided figures?” (quadrilaterals) Have the answer written on the SmartBoard and save.

4. **Focus:** Show the shape group that will be called parallelograms on the SmartBoard. Say, “This is the group we will find out about next. Listen to see what its name is and to determine if we have all the characteristics listed.”

Play: Geometry Journey: program #6: Polygons Show parallelogram section. (visual cue: list of sections and pointing to parallelogram)

Pause/Stop: Stop when it says, “the opposite sides are congruent”. (visual cue: diagram with both pairs of opposite sides marked congruent)

Follow-up: Ask “What is the name of this group?” (parallelograms) Have the name written on the SmartBoard. Ask “Do we have all the characteristics they gave listed?” (both pairs of opposite sides are parallel, both pairs of opposite sides are congruent) Add any characteristic that was not listed. Save changes on SmartBoard.

5. **Focus:** Show the shape group that will be called rectangles on the SmartBoard. Say “This is the group we will find out about next. Listen to see what its name is and to determine if we have all the characteristics listed.”

Play: Geometry Journey: program #6: Polygons Show rectangle section. (visual cue: list of sections and pointing to rectangle)

Pause/Stop: Stop at the end of the section. (visual cue: list is shown)

Follow-up: Ask “What is the name of this group? (rectangles) Have the name written on the SmartBoard. Ask “What was the major characteristic they gave?” (four right angles) Ask “Why did they call the rectangle a parallelogram?” (A rectangle is a smaller group within the parallelogram group.) Ask “What characteristics does it have since it is a parallelogram?” (opposite sides are parallel, opposite sides are congruent) Add any characteristic that was not listed. Save changes on SmartBoard.

6. **Focus:** Show the shape group that will be called rhombus/rhombi on the SmartBoard. Say “This is the group we will find out about next. Listen to see what its name is and to determine if we have all the characteristics listed.”

Play: Geometry Journey: program #6: Polygons Show rhombus section. (visual cue: list of sections and pointing to rhombus)

Pause/Stop: Stop when it says “A rhombus is actually an equilateral parallelogram”. (visual cue: diagram with sides marked as congruent)

Follow-up: Ask “What is this group called?” (rhombus) Say “Rhombus is a singular noun. The plural of rhombus is rhombi.” Have both words written on the SmartBoard. Ask “What was the major characteristic they gave?” (four congruent sides) Ask “Why did they call the rhombus a parallelogram?” (Rhombi name a smaller group within the parallelogram group.) Ask “What characteristics does it have since it is a parallelogram?” (opposite sides are parallel, opposite sides are congruent) Add any characteristic that was not listed. Save changes on SmartBoard.

7. **Focus:** Show the shape group that will be called squares on the SmartBoard. Say “This is the group we will find out about next. Listen to see what its name is and to determine if we have all the characteristics listed.”

Play: Geometry Journey: program #6: Polygons Show square section. (visual cue: list of sections and pointing to square)

Pause/Stop: Stop when it says “it is an equilateral rectangle as well as an equiangular rhombus”. (visual cue: diagram with angles and sides marked as congruent)

Follow-up: Ask “What is the name of this group?” (squares) Have the name written on the SmartBoard. Ask “What are its major characteristics?” (four congruent sides and four right angles) Ask “What two groups did they say the square belonged to?” (rectangles and rhombi) Ask “Since a square is a rhombi and a rectangle, it also has to belong to another group we have discussed. Which other group does it belong to?” (parallelogram) Ask “What characteristics does a square have since it is a parallelogram?” (opposite sides are parallel, opposite sides are congruent) Add any characteristic that was not listed. Save changes on SmartBoard.

8. Focus: Show the shape group that will be called trapezoids on the SmartBoard. Say “This is the group we will find out about next. Listen to see what its name is and to determine if we have all the characteristics listed.”

Play: Geometry Journey: program #6: Polygons Show trapezoid section. (visual cue: list of sections and pointing to trapezoid)

Pause/Stop: Stop when it says “If a quadrilateral has only one pair of opposite sides that are parallel, then the quadrilateral is a trapezoid.” (visual cue: diagram shown with red sections showing parallel sides)

Follow-up: Ask “What is the name of this group?” (trapezoids) Have the name written on the SmartBoard. Ask “What is the characteristic that defines a trapezoid?” (only one pair of opposite sides that are parallel) Save changes on SmartBoard.

9. Focus: Show the shape group that will be called kites on the SmartBoard. Say “We do not have a video clip about this shape. We are going to work together to determine the name of this group and its characteristics.”

Activity: Say “This shape has the same name at the outdoor toy that often has this shape. Does anyone know what this shape is?” (kite) Ask “Which sides of the kite are congruent?” (top 2 and bottom 2) Explain “A mathematician would say that adjacent sides are congruent.”

Follow-up: Say “These are the only groups of four-sided figures that mathematicians give special name to.”

Culminating Activities

Focus: Say “Do you remember what each shape look like? Let’s see if you can complete this chart on the shapes.”

Activity: Give each student a copy of the chart to complete.

Follow-up: Show the chart on the SmartBoard and have the students take turn filling in the sections.

Assessment

- Chart used in culminating activity.



Four by Fours
Jayne Coulter
Warren County Public Schools



Community Connections

- Invite someone who works in one of the following occupations to talk about how they use shapes in their profession: jewelry designer, landscape designer, artist, or architect.

Cross-Curricular Extensions

Art

- Create a picture using different types of quadrilaterals.
- Create a poster of one of the groups with examples and characteristics.

Language Arts

- Write an SOL test questions about plane figures.

About the Author

Jayne Coulter is a fifth grade teacher at Leslie Fox Keyser Elementary School in Warren County, Virginia.

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Chart
 Plane (two-dimensional) Figures

Figure	Diagram	Number of sides	Number of vertices	Parallel sides
Square				
Rectangle				
Parallelogram				
Rhombus				
Kite				
Trapezoid				