

SQUARES

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Lesson Objective: Geometry students should be able to identify and differentiate a square from other shapes.

Prerequisite Skills:

- Students should be familiar with the names and properties of all regular polygons and the following quadrilaterals: rectangles, parallelograms, rhombuses, and trapezoids.
- Students should understand the following vocabulary terms and their definitions: vertex, polygon, quadrilateral.

Definition:

A square is a polygon with four equal sides of equal length and four right angles.

Critical Attributes:

Being a polygon (straight sides, closed shape)

Having four sides of equal length

Having four right internal angles.

We put the square as the last polygon for discussion because it has the strictest conditions.

Opening:

Gain Attention:

T: Hi Students! What types of quadrilaterals do you like the most?

S: I like my chromebook shaped quadrilateral the most.

S: I like the floor's shape because it is the perfect shape.

Review:

T: Over the last couple of weeks, we've been learning about different types of quadrilaterals. We've talked about rectangles, parallelograms, rhombuses, and trapezoids.

T:

S:

1. Can someone remind me what makes a rectangle a rectangle?	1. It has four right angles
2. How about a parallelogram?	2. A parallelogram has 2 pairs of parallel sides
3. What makes a rhombus a rhombus?	3. Four sides of equal length
4. Finally, what makes a trapezoid a trapezoid?	4. One set of parallel sides.

Goal:

T: Today, we are going to learn what makes a square a square, and how you can tell whether a shape is a square or something else. I want to make a note for you guys too that I'm not trying to trick you. If something looks like a right angle, you can assume it's a right angle and if sides look like they're the same length, it's okay to assume they are.

Relevance/Rationale:

T: Being able to identify the properties of a square will help you if you ever have to work on a construction project or do any kind of design.

S: That sounds really interesting! I love construction and design

Body

Models (I do)

Student Friendly definition

T: Explain the concept using the student friendly definition

A square is a polygon with four equal sides of equal length and four right angles.

T: List and explain/discuss the critical attributes

Critical Attributes:

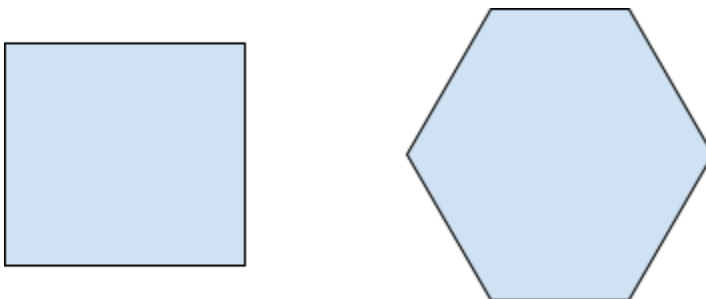
Being a polygon (straight sides, closed shape)

Having four sides of equal length

Having four right internal angles.

Model 1

T: Here is our first example. We have two shapes.



1. For our first step, we identify if our shapes are polygons. We see both of these shapes are composed entirely of straight line segments, and every vertex is connected. So we can be sure both shapes are polygons.
2. Next we look at the side lengths. In both shapes, the side lengths appear equal, so they pass this step.
3. Finally, we look at the angles. In the shape on the right, we can see the internal angles are probably larger than 90 degrees, so it must not be a square. On the left, the angles appear to be 90 degrees. So the shape on the left is a square.

Model 2

T:

1. Similarly, for our first step we identify if our shapes are polygons. Clearly, the floor tile is composed of only straight lines and vertices. The chalkboard might warrant closer inspection, but its edges appear straight as well, and the vertices are also connected. So we can be sure both the floor tile and the chalkboard are polygons.
 - a. Next we look at the side lengths. Looking at the chalkboard, we can clearly see that one side length is longer, and we conclude it is not a square. On the floor, we see the tiles are the same length on each side.
 - b. At this point, we do not need to check the angles for the chalkboard, we already know it is not a square since its side lengths are not equal. But we should still look and make sure that the angles on the tile are right angles, and it appears that they essentially are. So we can be sure that the tiles are in fact squares.

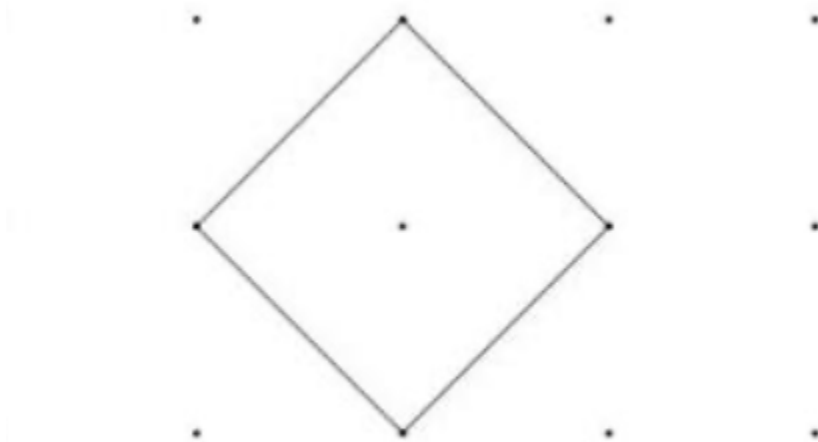
Example: Tile on the floor in the classroom (square)

Non-example: A rectangle in the classroom (chalkboard or window)

Prompts* *only 2 prompts needed, tell & ask, or ask & remind

T: (Tell the students that you will be doing the skill together, now.)

Prompt 1: Ask



T: We have this figure on the projector, and we want to know what type of shape it is.

Any guesses?

S: I think it is a square.

S: No, I think it is a rhombus.

T: What is the first step to identify if it is a square or not?

S: First, we have to confirm that it is an even polygon.

T: Right! Then, how can we confirm that it is an even polygon or not?

S: We need to check if a shape is composed of straight line segments and every vertex is connected by the line segments; and we need an even number of lines and segments. Since the figure is composed of 4 line segments and vertices, it is an even polygon.

T: That is correct. Now, we know that it is an even polygon and then what should we check next?

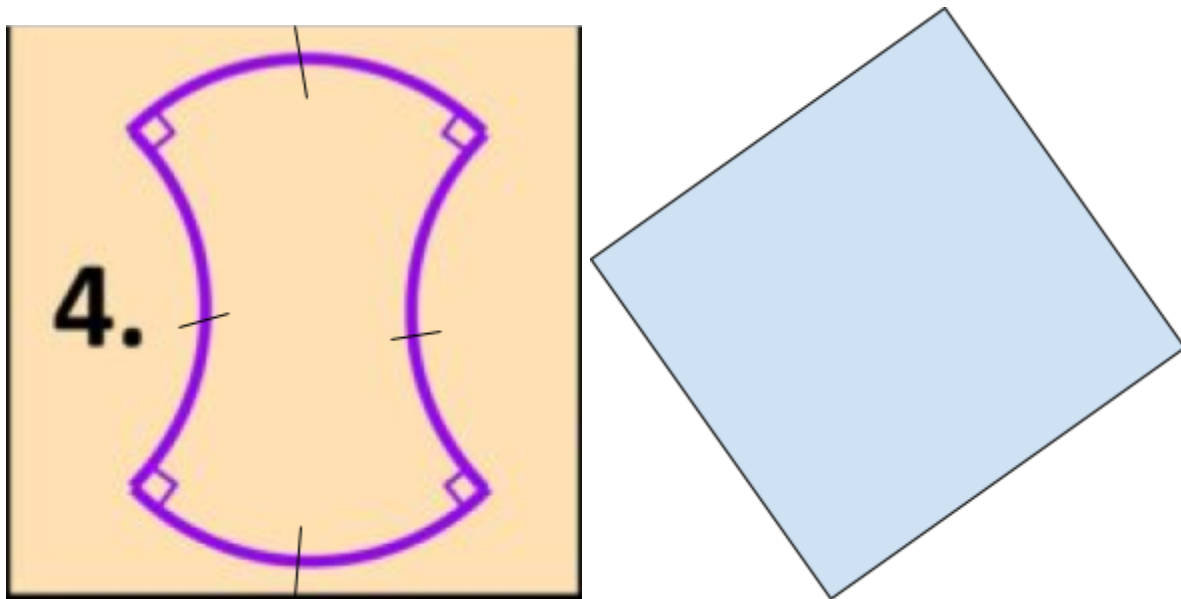
S: Check the side lengths if they are the same. If each side length is equal to each other, we can also check if all the angles are 90 degrees.

T: Yes, you pointed out an important step. In order to check if a polygon is a square, you have to check both the angles and side lengths.

Good job guys, now, can we say that this shape is a square?

S: Yes!!

Prompt 2: Remind



T: Now it's your turn. Turn and talk to a partner about which of these shapes is a square. Make sure you identify why and why not each shape fits into our definition.