

SQUARES OF NUMBERS UP TO 500

Subject

Mathematics

Prepared By

[Instructor Name]

Grade Level

5

Overview

This lesson plan covers teaching content for;

1. Recognizing and using square numbers, and the notation for squared (2)
2. Solving problems involving squares

Objectives

Students should be able to;

1. Recognize and use square numbers, and the notation for squared (2).
2. Discover patterns by finding perfect squares.
3. Solve problems involving squares.

Activity Starter/Instruction

1. Explain to pupils that when they multiply a number by itself, the result is a square number.

$10 \times 10 = 100$	$16 \times 16 = 256$
$11 \times 11 = 121$	$17 \times 17 = 289$
$12 \times 12 = 144$	$18 \times 18 = 324$
$13 \times 13 = 169$	$19 \times 19 = 361$
$14 \times 14 = 196$	$20 \times 20 = 400$
$15 \times 15 = 225$	$21 \times 21 = 441$

And so on.

2. To write the mathematical formula for square numbers we add a small (2) next to above the number, for example: 14^2 .
3. The square of a number having:
 - 1 or 9 at the units place ends in 1.
 - 2 or 8 at the unit place ends in 4.
 - 3 or 7 at the unit place ends in 9.
 - 4 or 6 at the unit place ends in 6.
 - 5 at the unit place ends in 5.
4. There are $2n$ natural numbers between the squares of numbers n and $n+1$.

Teacher Guide

Day 1/ Lesson 1: 15 Mins

1. Divide the class into teams of 5–6 students and ask the teams to choose a spokesperson.
2. Display or distribute the rules, review them with the class, and answer any questions.
3. Select the team that will go first, using a random method of selection, such as having spokespersons choose numbered cards and determining the order from highest to lowest draw.
4. Ask the team spokesperson to choose a category and a point value.
5. Reveal the prompt/question that corresponds with the square the students have selected.
6. Give the team time as stated in your rules (for example, one minute) to confer and develop a consensus answer. Ask the team for its response.
7. If the team provides a correct response, award the team the point value.
8. If the response is incorrect, leave the question open and allow the other teams to ring in to try to answer it.

Materials Required

- White board
- Marker

Additional Resources

- <https://www.superteacherworksheets.com/featured-items/pz-squares-and-square-roots.html>
- <http://mathworld.wolfram.com/SquareNumber.html>
- <https://www.math-only-math.com/worksheet-on-squares.html>
- <https://study.com/academy/lesson/perfect-squares-square-roots-up-to-144-lesson-for-kids.html>
- <https://www.mathsisfun.com/activity/drawing-squares.html>
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Additional Notes

Guided Practice

Day 2/ Lesson 2: 20mins

1. Build a few squares out of square tiles, and count how many tile you need to make each one, and records those numbers. Then you ask the class: what other numbers of square tiles could you use to build a square?
2. Once students have put forward some guesses, let them build squares of different sizes and write down their list of numbers.
3. Students may work together as the number of tiles proves insufficient to build the next square. They can also transition to graph paper and draw out the squares.
4. After students have their lists, have them compare them with another classmate to see if they found the same numbers. Then bring the class together and have the students give you the numbers they found. They should look like this: 1, 4, 9, 16, 25, 36, 49, 64, 81, 100 ...
5. Once the numbers are up on the board, ask your students if they see any patterns. Three patterns your students might see:
The numbers go 1×1 , 2×2 , 3×3 , 4×4 , and so on
The sequence goes Odd, Even, Odd, Even

9. If the team is unable to provide a response, deduct five points from the total number of points.
10. Move to the next team, and repeat steps 4–6 until all the squares have been crossed off.
11. The team with the most points wins.

Guided Practice

Day 3/ Lesson 3: 15mins

1. A gardener is planning to create a square patio using square concrete slabs. A row of 11 large slabs just fits across the width of the areas she wants to cover.
 - How many rows of slabs will she use?
 - How many slabs will she need altogether?
 2. Since the patio is square and it is 11 slabs wide, it must be 11 slabs long too, so there are 11 rows of slabs.
 3. That means that altogether she will need 11×11 , or $11^2 = 121$ slabs
 4. In an art course the teacher plans to asks each of the pupils to draw a sketch of every child in the class, including a self-portrait, on separate sheets of paper. There are 26 children in the class. Find an upper estimate for the number of sheets of drawing paper he should supply for the whole class. Find a lower estimate. Use your calculator to find the exact number of sheets of paper.
 5. Each of the 26 children will need 26 pieces of paper, so altogether 26×26 , i.e. 26^2 sheets of paper are required.
 6. Upper estimate: If there were 30 pupils in the class he would need $30 \times 30 = 900$ sheets of paper.
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	<p>To get from one number to the next, you go +3, +5, +7, +9</p> <p>6. Use a five by five square to explain. Can you see 5 x 5? Look horizontally or vertically, there are five rows of five each, which is a very natural way to see five group of five.</p> <p>7. Adding L – shapes gives this pattern quite nicely. $1 + 2 + 3 + 4 + 5 + 4 + 3 + 2 + 1$? The trick here is to look on the diagonals.</p>	<p>7. Lower estimate: If there were only 20 pupils the teacher would need $20^2 = 400$ sheets of paper.</p> <p>8. So he will need something in between 400 and 900.</p> <p>9. On the calculator, $26^2 = 676$.</p> <p>10. This is in reasonable agreement with the rough check, so 676 sheets of paper are required.</p>
<p>Summary</p> <p>Go over some activities with students for clarity.</p>	<p>Assessment Activity</p> <p>Assess if students can;</p> <p>1. Solve square problems correctly.</p>	<p>Assessment Activity</p> <p>Pupils should be familiar with squared notation.</p>