EXPLORATIONS

Activity 6

How Totally Square!

Students will make a variety of sizes of squares using square color tiles. With the squares, the students will discover patterns and be able to make predictions based on the patterns observed.

Concept

- Patterns, relations, and functions

Skills

- Discovering patterns
- Working with square numbers
- Calculator skills: creating a table, Y=

Materials

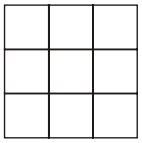
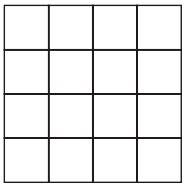
- Student Activity sheets (page 30)
- TI-73 calculators
- Square color tiles
- Crayons

Activity

Some fifth graders at a local school are planning a banquet for their end-of-the-year party. They are trying to decide how to seat people. Their only option for seating is student desks that measure 1 yard square. They want to arrange the desks in squares to make tables. What are some of their options?

Pass out the color tiles to the students and tell them that they represent the student desks. Have them build square tables with the dimensions of 1*1, 2*2, 3*3, 4*4 until they run out of pattern blocks. Instruct the students to draw the squares on the graph paper (part of the Student Activity sheet) as they work. Once they run out of pattern blocks, they can continue drawing the squares on graph paper.

Discuss with the students the patterns they are seeing. How are the total number of blocks related to the side length of each square? Create a table using the information that the students have gathered. (See the table example on the next page.)

Length of side	Total Number of Tiles	
1	1	
2	4	
3	9	
4	16	

Ask the students:

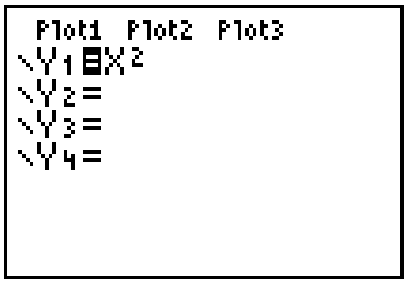
- *What do you notice happening to the total number of blocks?*
- *Can you see a pattern?*
- *What is it? (1*1=1, 2*2=4, and so forth.)*

Guide students to write the pattern using x and y. If the side length is x and the total number of blocks is y, how could we write the pattern using these variables?

$$x * x = y \text{ or } x^2 = y$$

Discuss square numbers with students. What are they? Why do they think they are called "square" numbers? (Point out that all of the shapes built for this activity were squares because the length and width used to build the tables were the same number.)

Show the students how to create a table using the calculator.



1. Press [Y=].
2. Be sure that the cursor is at the right of the equals sign.

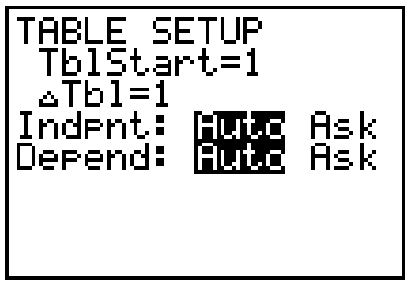
By now your class should have agreed on the formula of $y=x^2$.

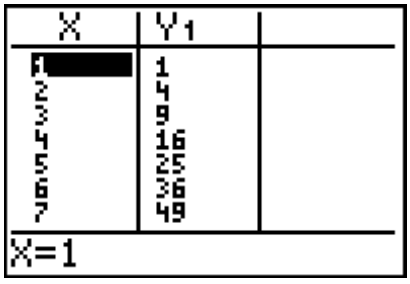
3. Press the [x] key and then the [x²] key.

4. Press [2nd] [TBLSET] and enter the Table Setup values shown at the right.

5. Press [2nd] [TABLE] and an extensive table will display.

Discuss the table with the students.





Wrap-Up

Use the table created on the calculator to ask the students these questions:

- *How many student desks would be needed to create an 8*8 square table? (64)*
- *If there are 121 total student desks, what is the largest size table that can be made? (11x11)*
- *Would that be an efficient way to seat every one? (No.)*
- *Why or why not? (You would have a lot of "extra" desks in the middle without anyone sitting at them.)*

Assessment

In a math journal, have students write what a square number is and why it is called "square." Have them give at least three examples of square numbers.

Extension

- Use the triangular pieces from pattern blocks and investigate triangular numbers and their patterns.

Student Activity

Name _____

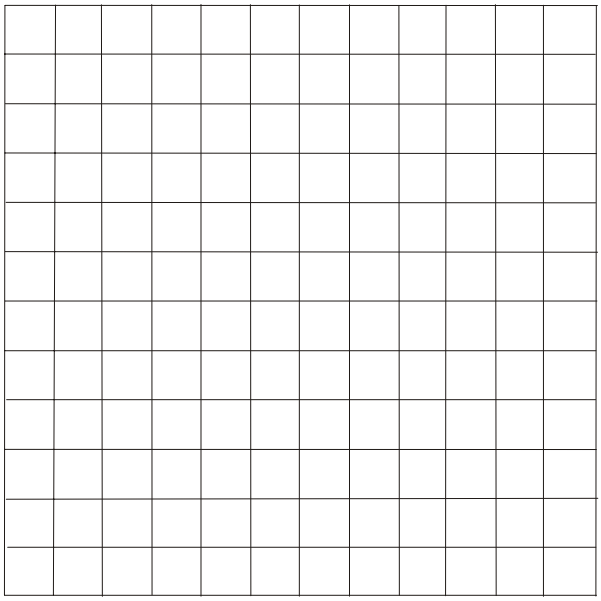
Date _____

Activity 6

How Totally Square

Use the color tiles to make squares. Record the length of each side of the square and the total number of tiles in the square in the table below. Look for any patterns that may appear.

Length of Each Side	Number of Tiles



What formula for area did you discover?