# Square Numbers

## Summary

This lesson's activity has students model square numbers using arrays. An array is a grouping of objects that makes equal rows. They can visually see that the array makes a square.

## Materials

- *My Full Moon is Square*
  Centimeter cubes
  Overhead cubes
  Journals
- Square Numbers Foldable pdf
  Scissors
  Glue

Additional Resources
Books

- *My Full Moon is Square*
  , by Elinor J. Pinczes; ISBN 0-618-15489-2

## Background for Teachers

When a number is multiplied by itself, the product is called a square number. Example: 3 x 3 equals 9. When students model square numbers using arrays they can visually see that the array makes a square. An array is a grouping of objects that makes equal rows. It is important to teach students to read arrays by rows first, and then columns.

## Intended Learning Outcomes

2. Become effective problem solvers by selecting appropriate methods, employing a variety of strategies, and exploring alternative approaches to solve problems.

## Instructional Procedures

Invitation to Learn
Pass out a small bag of centimeter cubes to each student. Explain that the students are going to make arrays using the cubes. An array is a grouping of objects in equal rows. Ask the students to count out nine cubes. Have students share their arrays as they make them and then model them on the overhead. Students should come up with 1 x 9, 9 x 1, and 3 x 3. These numbers represent the factors of nine. Ask the students if they notice anything about the 3x3 array? Explain that nine is a square number. Can anyone tell why it is called a square number? Are there more square numbers?
Instructional Procedure

Read the story *My Full Moon is Square*, but stop and have the students model what the array for four fireflies would be using their cubes. Ask a student to share what the array should look like and then model it on the overhead projector.
Continue reading and stopping to have the students model and share the square arrays using their centimeter cubes that corresponds with the story. Continue modeling on the overhead projector.
After the story, have the students define what square numbers are and write the definition in their journals.
Pass out the *Square Numbers Foldable* black line, scissors, and glue to the students. Fold the title page into three equal parts vertically. Have the students cut out the cards and glue them

onto the title page.
In the inside of each card the students should draw the array that makes the square number.

## Extensions

Advanced learners could continue to explore larger square numbers.
Have learners with special needs use the centimeter cubes to model the array when making the foldable.

Family Connections

Have students share their *Square Number's Foldable* with family members.

## Assessment Plan

Walk around the room while students are working on the foldable activity and observe what they are doing and saying. Are they able to model square numbers with the centimeter cubes? Or are they struggling and making errors?
Assess students understanding during whole group discussion from their comments. Are the comments correct or do they have misconceptions?
Assess students individually. Dictate several square numbers for the student to model the array using the cubes.

## Bibliography

Research Basis

Jensen, E. (2000). Moving with the brain in mind. *Educational Leadership*, 58 (3), 34-37. Retrieved January 18, 2007 from from http://www.newsletteronline.com

Brain research has shown that physical movement -- moving, stretching, and acting out concepts, can increase the learning process. Active learners remember the information longer and better than sedentary learners. Teachers should have students: engage in a variety of postures throughout the day, engage in movement during class, use their bodies to demonstrate concepts, role play and include a variety of physical activities to help students learn and if these ideas are not possible then students should at least stop and stretch every 20 minutes.

Marzano, R.J., Pickering, D.J., & Pollock, J.E. (2001). *Nonlinguistic Representations. In classroom instruction that works*, (72-83). Alexandria, Virginia: ASCD.

Researchers believe that students learn and store information in two different ways. The first form is a linguistic form where the learner either listens to the information or reads it in a book. In the second form, non-linguistic, the learner forms a mental image or a physical sensation by touching, smelling, listening, tasting, or kinesthetic association. Research has shown that when students learn using both forms their achievement improves greatly. After a non-linguistic form of learning has taken place students should be asked to explain and justify what they have learned. When students are able to explain their thinking and reasoning to others their knowledge increases and they are able to recall it easier. Non-linguistic representations include: making physical models, using manipulatives, drawing pictures, graphic organizers, or engaging in kinesthetic activities.

## Authors

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