SESSION EIGHT
FUN WITH NUMBERS

Outcomes

- To have fun doing number games and number tricks
- To explain why relationships occur the way they do
- To celebrate the accomplishment of the participants during this course

Overview

The eighth session of Thinking About Numbers focuses on number games and number tricks. This session is designed for participants to have fun with numbers. They will be looking at number games and number tricks and why the relationships occur the way they do.

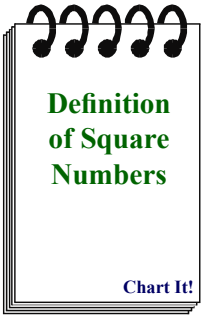
Time

10-15 minutes	The first part of the session allows participants to discuss their take home activities.
30-40 minutes	In the next activity participants explore perfect squares and related concepts. They then engage in a discovery activity in which they find the sum of several odd numbers and look for patterns. They look at multiplying consecutive even and odd numbers and their patterns.
30-40 minutes	Then participants explore number games and tricks. They try to figure out why the tricks work.
20-30 minutes	In the closing activity, participants insights that they have had during the course. Extra time is provided so that everyone can share.
10-15 minutes	The remaining class time can be used for celebration, recognition, and evaluation.

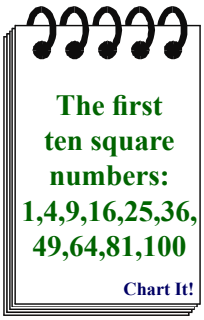
Materials

Facilitator	Transparencies (English & Spanish)
• Overhead calculator • Transparent colored tiles	**No transparencies**
Participant	**Handouts (English & Spanish)**
• Calculators • Colored tiles	**Two per participant for class and home** *BLM 44.1-2: Square Numbers* *BLM 45.1-2: Number Tricks* **One per participant for home** *BLM 46: Bringing Mathematics Home 8*

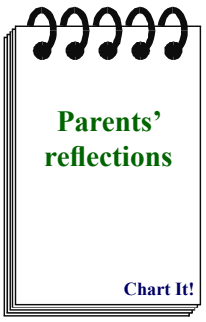
Activities

Preparation of Classroom	Notes
1. Set up the **Chart It!** 2. Place the name cards from last class near the front of the room where participants can easily find them.	
Discussion of Homework (10-15 minutes)	
1. Have participants discuss their experiences with **Bringing Mathematics Home 7**. • For younger children what was the exploration like? • For older children do they have models or pictures to share? How did they decide how far apart the planets were? Take a few minutes for them to share with their groups and then ask for a few volunteers to share with the whole class. 2. Answer any questions that the participants have about **Estimating and Writing Large Numbers**.	Order of planets from least to greatest distance: Mercury 5.79×10^7 Venus 1.082×10^8 Earth 1.496×10^8 Mars 2.279×10^8 Jupiter 7.783×10^8 Saturn 1.427×10^9 Uranius 2.87×10^9 Neptune 4.497×10^9 Pluto 5.9×10^9
Square Numbers (30-40 minutes)	
Introduction 1. Hand out a bag of tiles to each group. 2. You are about to tile your kitchen floor with tiles that are 1 foot by 1 foot squares. Your kitchen is a square kitchen that is 9 ft by 9 ft. Design your floor using the tiles on your table (you may use more than one color). • Give participants a little time to design their floor. • Have a few participants share their designs. • How many tiles did you need to do this floor? Say: • *Some refer to 81 as a square number.* Ask: • *Why do you suppose this is true?* • *What other square numbers can you name?* • *How can you prove to me that these are square numbers?* 3. Hand out **Square Numbers**. Say: *You have identified several square numbers. Notice that the number of tiles that make up the square represents the area of the square. For example, a square that is 3 tiles by 3 tiles consists of 9 tiles. The 9 represents 9 square tiles. Therefore, we say a square number is found by multiplying a number by itself: for example $3 \times 3 = 9$. We also write it this way: $3^2 = 9$*	Participants can prove that numbers are squares by building them with their tiles. 

Activities

Square Numbers (continued)	Notes
4. Have participants do problem 1. Have them check with their group to see if they all have the first ten. These numbers need to be charted so that they are visible for problems 3-5. 5. Say: *Perfect squares are used in many ways. The next few activities we all will be connected to perfect squares in one way or another.* • Have participants work on problems 2 and 3. • Discuss their findings. 6. Say: *Use tiles to model what is happening in problem 3?* Have a participant demonstrate. 7. Have participants do problems 4 and 5. • Ask them to model what is happening. • Ask for volunteers to present their findings.	 Problem 3: Rearrange 1 + 3 into a 2 x 2 square. ● ● ● ● can be rearranged to ● ● ● ● Problem 4: 3 x 5 may look like this: ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● but it is the same as ● ● ● ● ● ● ● ● ● ● ● and this is a square number (number between the two odd numbers) minus 1 Note: Participants may arrange the 3 x 5 as 3 groups of 5. Either way is acceptable.
Number Tricks (30-40 minutes)	
1. Pass out calculators and **Number Tricks**. Since this section is on number tricks the use of the calculator will ease the participants mind in computation and should focus on the "awe" of how these things work. 2. Say: *Number tricks are fascinating.. Mathematicians spend hours of their time figuring out how the process works. Today we are going to see the mystery behind numbers* • Have the participants do problem 1. • Have participants share their findings. • Take time to try puzzles made by participants.	Problem 1: The first magic number will result in 7 every time. In order for the result to be 11 the 14 must be changed to 22.

Activities

Number Tricks (continued)	Notes
3. Have participants do problem 2. Challenge participants who finish rapidly by asking them why does it work? 4. Have participants do problem 3. • Have participants share their findings. • Have participants that did the challenge share their findings. 5. Bring in some resources for number games that participants could use with their children.	Problem #2 I am 23 years old and was born Feb. 14, 1982. How old are you? 1. 2 2. 2 x 2 = 4 3. 4 + 5 = 9 4. 9 x 50 = 450 5. 450 – 250 = 200 6. 200 + 2003 = 2203 7. 2203 – 1982 = 221 The last two digits, 21, are my age in 2003 and hundreds digit, 2, is my birth month. Sites change rapidly. Search for "number tricks" on the internet for a wealth of ideas. Also check the local library for books.
Closure (20-30 minutes)	
Participants reflect on the course. • Pick three mathematical ideas that you have gained during this course. • Think about one interesting experience you had with your child as a result of this course. • Be ready to share your thoughts. Have everyone share their reflections.	A variation of the closure would be to have many simple objects for participants to choose. Each chooses one object and tells how it represents an idea that they gained from the class. 
Take Home Activities (5 minutes)	
1. There are three handouts for participants to take home: • **Bringing Mathematics Home 8** • **Square Numbers** • **Number Tricks** 2. Have participants look through the packet of materials as you explain them. The object of the take home activities is for them to practice with their children. Therefore, they need fresh copies of the session's activities.	
Celebration (15-20 minutes)	
1. Use the remaining time to hand out certificates or celebrate in any other way the class might desire. 2. This time can also be used for course evaluations and/or interviews of participants.	