



PEBBLES and the BIGGEST NUMBER

MS. CRAB DIGS DEEPER

Understanding Big Numbers with Sand Play

Target Audience: K - 4th Grade

Time:

40-60 minutes for instruction and sand play

15-30 minutes for worksheet

10-30 minutes for extension



COMMON CORE STANDARDS:

• **CCSS.MATH.CONTENT.K.MD.A.2**

Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. For example, directly compare the size of two models and describe one model as bigger/smaller.

• **CCSS.MATH.CONTENT.2.NBT.A.3**

Read and write numbers to 1,000 using base-ten numerals, number names, and expanded form.

• **CCSS.MATH.CONTENT.4.NBT.A.2**

Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons. For example, $1,000 < 1,000,000$ / One thousand is less than one million.

NEXT GENERATION SCIENCE STANDARDS:

K-2-ETS1-2 Develop a simple model based on evidence to represent a proposed object or tool.

ACTIVITY GOAL:

After reading Pebbles and the Biggest Number, students will create models representing base-ten numbers.

LEARNING OBJECTIVE:

Students will compare the numbers 1 thousand, 1 million, and 1 billion through exploratory design and the construction of sand models.

MATERIALS:

- Play sand - 20 pounds for Sand Models #1 and #2
- Water
- Bucket(s)
- Magnifying glasses
- Outdoor sandbox - 110 pounds for Sand Model #3
- Sand castle tools, such as moldable shapes and shovels
- Sand Models Comparison worksheet

INTRODUCTION

Ms. Crab is teaching her class about the numbers 1 thousand, 1 million, and 1 billion. Her students can't agree which number is the biggest. Help Ms. Crab by creating three sand models of each number!

TEACHING PLAN

Using "Dig Deeper: Numbers" in Pebbles and the Biggest Number, share and compare the base-ten [sand] pictures of one thousand through one billion.



SAND MODEL #1: ONE THOUSAND

1 thousand

1,000



One thumbprint of wet sand contains around 1 thousand grains.

WHOLE GROUP TEACHING

★ Grades K-4:

- Model the pronunciation of one thousand.
- Model the numeral 1,000 and the number name one thousand in written form.

🔍 Check for Understanding:

- How many O's follow the 1? [answer: 3]

★ Grades 2-4:

- Point out the comma [thousand-separator] between the digits 1 and 0.
- For numbers greater than 999, commas are used to separate numbers.
- A comma is inserted every third digit from the right.

STUDENT ACTIVITY

★ Grades K-4:

- Students dip their thumbs into water and then sand.
- Allow time for students to observe grains with magnifying glasses.

🔍 Check for Understanding:

- Approximately how many grains of sand can stick to a thumb? [answer: about 1,000]

SAND MODEL #2: ONE MILLION

1 million

1,000,000



One handful of wet sand contains around 1 million grains.

WHOLE GROUP TEACHING

★ Grades K-4:

- Model the pronunciation of one million.
- Model the numeral 1,000,000 and the number name one million in written form.

🔗 Check for Understanding:

- How many 0's follow the 1? [answer: 6]

★ Grades 2-4:

🔗 Check for Understanding:

- How many thousand-separators/commas are used in one million? [answer: 2]

STUDENT ACTIVITY

★ Grades K-4:

- Mix sand with water until the sand sticks together.
- Model the molding of wet sand into the size of a golf ball.
- Students mold handfuls of sand into balls.
- Organize student-made balls by size (smallest to biggest).
- Students make estimated guesses on how many more grains of sand (in thousands) are in the biggest ball compared to the smallest ball.

🔗 Check for Understanding:

- How many grains of sand are stuck together? [answer: about 1,000,000]
- Which 3D shape is a ball also known as? [answer: sphere]

★ Grades 2-4:

- A sphere is a round, ball-shaped solid.
- It has one continuous surface with no edges or vertices.

SAND MODEL #3: ONE BILLION

1 billion

1,000,000,000



One sandcastle contains around 1 billion grains.

WHOLE GROUP TEACHING

★ Grades K-4:

Model the pronunciation of one billion.
Model the numeral 1,000,000,000 and the number name one billion in written form.

🔗 Check for Understanding:

How many 0's follow the 1? [answer: 9]

★ Grades 2-4:

🔗 Check for Understanding:

How many thousand-separators/commas are used in one billion? [answer: 3]

STUDENT ACTIVITY

★ Grades K-4:

Mix water with sand in an outdoor sandbox or indoor sensory table(s).
Challenge students to design, build, and create a sand castle of approximately one billion grains of sand using buckets and other play tools.

★ Grades 2-4:

🔗 Check for Understanding:

Students estimate how many grains of sand (in millions) can be contained within different molding containers.

LESSON & ACTIVITY REVIEW

Grades K-4:

Using Ms. Crab's Worksheet, students sketch their three sand models and circle corresponding number names. [Answers from left to right: 1 thousand; 1 million; 1 billion]

Grades 2-4:

Students practice writing numerals within each box, paying special attention to the number of zeros and thousand-separators/commas.

Grades 3-4:

Below sketch boxes, have students compare one thousand, one million, and one billion using $>$, $<$, and $=$ signs. Ex. 1 thousand $<$ 1 million; 1 million = 1,000,000; 1,000,000,000 $>$ 1,000,000.

EVALUATION

🔍 Check for Understanding:

- Which number is the biggest of the three sand models? [answer: one billion/sand castle]

★ **Grades K-1:** Stress model size comparison.

★ **Grades 2-4:** Stress both model size comparison and the number of zeros/place value.

EXTENSION

Ask students how they would explain which number is biggest to Ms. Crab's class via pictures, video, or written form. Students are invited to send letters to Ms. Crab's classroom! Please contact Joey @biggestnumber.com/contact/.

FAMILY OUTREACH

Take pictures of students' sand castles with the book "Pebbles and the Biggest Number" and share with families.