



Title: Explorations in Place Value
Grade(s): 4th Grade
Subject(s): Math
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Overview: *Explorations in Place Value* is an interactive math mini-unit that incorporates the use of children’s literature, mathematical learning stations, and small group instructional strategies to reinforce basic principles of place value and to teach students about writing large numbers in expanded notation.

Content Standards:

- MA2010 (4) 6. Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. [4-NBT1]
- MA2010 (4) 7. 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. [4-NBT2]
- MA2010 (4) 8. Use place value understanding to round multi-digit whole numbers to any place. [4-NBT3]
- ELA2007 (4) 3. Use a wide range of strategies, including distinguishing fiction from nonfiction and making inferences, to comprehend fourth-grade recreational reading materials in a variety of genres.

Local/National Standards:

Primary Learning Objectives: The students will use their understanding of the place value system to order, compare, and expand whole numbers through the hundred-thousand’s place.

Additional Learning Objectives: Students will read the word form of numbers to match the numerical form of numbers through hundred-thousand’s place.

Approximate Duration of Lesson: 120 Minutes

Materials and Equipment: *A Million Dots* by Andrew Clements
 Construction paper to make a poster
 Markers and/or crayons
 Scissors, Pencils, Ruler
 Ziploc Bag
 Number Cubes
 Blank paper or graph paper
 Lined notebook paper



Technology Resources Needed: Document Camera
Computer with internet access

**Background/
Preparation:**

Teacher Background Information:

Expanded Form is a way to break up a number to show **how much each digit in the number represents**. In other words, expanded form is the method of pulling a number apart and expressing it as a sum of the values of each digit.

Student Background Information:

In order to teach this lesson successfully, students should have an understanding of the place value system to the hundred thousand's place. They should also be able to read numbers through 999,999 with accuracy.

**Procedures/
Activities:**

- Step 1 1. Engage students by sharing the cover of the book *A Million Dots*, by Andrew Clements. Ask the students what they think this book will be about.
- Step 2 2. As you begin reading to the students, explain that the pictures in the book contain dots, and by the end of the book they will have seen a million dots.
- Step 3 3. If you have access to a document camera, you can use this to display the book during the reading session. Stop after reading page 9. This page has a chart about the "tallest mountains." If you have a document camera, focus in on the chart at the bottom of the page that lists the mountain heights. If you do not have a document camera, use the chart you constructed prior to the lesson.
- Step 4 4. Pose the following problem to the students:
National Geographic wants to display a chart showing the heights of the tallest mountains on each of the Earth's seven continents. However, they need the information to be in order from the shortest to the tallest mountain. Can you arrange these numbers to show the correct order from shortest to the tallest height?
At this point, you should have the students form their cooperative learning groups.

Students will utilize the RAFT strategy to demonstrate what they have learned. See attachment.



- Step 5
5. Distribute the ordering cards to each group of students and have them begin working together to order the numbers. Allow students 5-10 minutes to order and discuss the numbers.

Attachments:

Rubrics
Worksheet Attachment Links List

**Assessment
Strategies:**

Evaluate:
Ongoing Assessment ideas are provided throughout the lesson above.

Ongoing Assessment:

As students are working with their partner, monitor student progress by observing their method of ordering numbers. What strategies do students use to order the numbers? Do the students use words to justify their reasoning for placing numbers in order? If students have numbers in an incorrect order, ask probing questions to help them find their mistakes. Don't tell students the order is wrong, instead ask, "Why did you place the numbers in this order?" and "How do you know this order is correct?"

Students should also be assessed on the Independent Practice documents.

The final Place Value Assessment should be given after students have had ample practice with all of the place value concepts noted in the Alabama Course of Study.

Extension:

- Students who finish assignments early can begin building a One Million Dot display. An example of this display can be found at:
<http://71.114.108.171/aemes/resource/million/default.htm>
- The following Web Quest guides students through a problematic learning situation where the purpose of the place value system is questioned and evaluated.
<http://studenthome.nku.edu/~webquest/gabbard/>
- Make the Place Value Game and High Number Toss Game available to the students (see "Worksheet Attachments" below). Continuing to play these games will increase understanding of place value concepts and will help students develop good number strategies.

Remediation:

If students experience difficulty understanding the concept of place value, peer tutoring, additional small group interaction and reteaching will be utilized.

RAFT for Place Value Activity

Role	Audience	Format	Topic
<ul style="list-style-type: none"> • Scientist • Historian 	<ul style="list-style-type: none"> • National Geographic Group 	<ul style="list-style-type: none"> • Bar Graph • Illustrations of Mountains 	<ul style="list-style-type: none"> • <i>Arranging the height of mountains from the 7 continents to show the correct order from shortest to the tallest height.</i>

Worksheet Attachments

- [PlaceValueGame.rtf](#)
- [TallestMountains.rtf](#)
- [PlaceValueAssessment.rtf](#)
- [OrderingCards.rtf](#)
- [HighNumberToss.rtf](#)
- [OrderingNumbers.rtf](#)
- [ArrowCards.rtf](#)
- [HowtoExpandLargeNumbers.rtf](#)
- [aMillionDots.rtf](#)
- [AssessmentChecklist.rtf](#)

Rubric for Graph

CATEGORY	4	3	2	1
Title	Title is creative and clearly relates to the topic. It is printed at the top of the graph.	Title clearly relates to the topic being graphed and is printed at the top of the graph.	A title is present at the top of the graph.	A title is not present.
Units	All units are described (in a key or with labels) and are appropriately sized for the data set.	Most units are described (in a key or with labels) and are appropriately sized for the data set.	All units are described (in a key or with labels) but are not appropriately sized for the data set.	Units are neither described NOR appropriately sized for the data set.
Type of Graph Chosen	Graph fits the data well and makes it easy to interpret.	Graph is adequate and does not distort the data, but interpretation of the data is somewhat difficult.	Graph distorts the data somewhat and interpretation of the data is somewhat difficult.	Graph seriously distorts the data making interpretation almost impossible.
Neatness and Attractiveness	Exceptionally well designed, neat, and attractive. Colors that go well together are used to make the graph more readable.	Neat and relatively attractive. Colors are distinguishable.	Neat, but the graph appears quite plain. Colors may be distinguishable. Software procedure may or may not be followed.	Appears messy and "thrown together" in a hurry.
Spelling, mechanics, punctuation, capitalization	No spelling, mechanics, punctuation, or capitalization errors	1-3 errors	4-6 errors	More than 6 errors

Rubric for Poster

CATEGORY	4	3	2	1
Required Elements	The poster includes all required elements as well as additional information.	All required elements are included on the poster.	All but 1 of the required elements are included on the poster.	Several required elements were missing.
Labels	All items of importance on the poster are clearly labeled with labels that can be read from at least 3 ft. away.	Almost all items of importance on the poster are clearly labeled with labels that can be read from at least 3 ft. away.	Many items of importance on the poster are clearly labeled with labels that can be read from at least 3 ft. away.	Labels are too small to view OR no important items were labeled.
Graphics - Relevance	All graphics are related to the topic and make it easier to understand. All borrowed graphics have a source citation.	All graphics are related to the topic and most make it easier to understand. Some borrowed graphics have a source citation.	All graphics relate to the topic. One or two borrowed graphics have a source citation.	Graphics do not relate to the topic OR several borrowed graphics do not have a source citation.
Attractiveness	The poster is exceptionally attractive in terms of design, layout, and neatness.	The poster is attractive in terms of design, layout and neatness.	The poster is acceptably attractive though it may be a bit messy.	The poster is distractingly messy or very poorly designed. It is not attractive.
Grammar	There are no grammatical/mechanical mistakes on the poster.	There are 1-2 grammatical/mechanical mistakes on the poster.	There are 3-4 grammatical/mechanical mistakes on the poster.	There are more than 4 grammatical/mechanical mistakes on the poster.