Title: Place Value Made Simple

Brief Overview:

This concept development unit will provide students with the knowledge and understanding of place value of whole numbers (0 - 1,000,000). Students will be able to read, write, and represent whole numbers using symbols, models, and words. Students will also express whole numbers in expanded form.

NCTM Content Standard/National Science Education Standard:

Numbers and Operations

• Understand numbers, ways of representing numbers, relationships among numbers, and number systems
  o Understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals

Grade/Level:

Grade 3: Read, write, and represent whole numbers 0 – 10,000
Grade 4/5: Read, write, and represent whole numbers 0 – 1,000,000

Duration/Length:

60 minutes per lesson
20 minutes for summative assessment

Student Outcomes:

Students will:

• Read, write, and represent place value of whole numbers using models and symbols
• Read, write, and represent whole numbers in standard form, expanded form, and word form

Materials and Resources:

Lesson 1

• Place Value Pocket Chart for each student (Refer to Teacher Resource 1a for directions)
• Large Place Value Pocket Chart
• 1 set of Number Cards (0-9), Teacher Resource 1c, for each student
• Base Ten Blocks
• Transparencies of Teacher Resource 2a and 2b, Would you rather have…?
• Sentence strips with vocabulary words:
Ones Period, ones, tens, hundreds (purple sentence strip or purple writing)  
Thousands Period, one thousands, ten thousands, hundred thousands (green sentence strip or green writing)  
Millions Period, one millions (red sentence strip or red writing)  
• One die for each student  
• Place Value Folder for each student in re-teach group (Refer to Teacher Resource 4 for directions)  
• Copies of Teacher Resource 3, Place Value 1 Checklist, to record observations  
• Copies of Student Resource 1a and 1b, Rolling with Place Value (class set)  
• Copies of Student Resource 2, What’s the Largest?, for early finishers  
• Overhead marker for each student in re-teach group

Lesson 2  
• Base Ten Blocks  
• 1 rubber band  
• Large Place Value Pocket Chart  
• Sentence strips with vocabulary words: standard form, word form, expanded form  
• Copies of Teacher Resource 3, Place Value 2 Checklist, to record observations  
• Expanded Form Accordion, Teacher Resource 5  
• Transparency of Student Resource 3, Check Writing  
• Laminated check for each student, Student Resource 3, Check Writing  
• One baggie with pre-cut cards for each pair of students, Student Resource 4, Shopping Spree  
• Copies of Student Resource 5, Another Shopping Spree, for early finishers  
• Place Value Pocket Chart for each student in re-teach group (Refer to Teacher Resource 1a for directions)  
• 1 set of Number Cards (0-9), Teacher Resource 1c, for each student in re-teach group

Summative Assessment  
• Copies of Student Resource 6a and 6b, Place Value of Whole Numbers (class set)

Development/Procedures:  

Lesson 1  
Pre-Assessment  
• Provide students with pre-assembled pocket place value charts. Refer to Teacher Resource 1a, Directions for Pocket Place Value Chart.  
• Model where students should write the labels on the place value chart.  
  Have students label the periods and places on the place value chart based on their previous knowledge of place value.
• Place pocket place value charts on the corner of students’ desks. Inform students that they will be discussed later in the lesson.

Launch
• Engage students in the “Would You Rather Have…?” activity. Display the top portion of Teacher Resource 2a, Would You Rather Have…?, on the overhead with only the question displayed: Would you rather have 6 Playstation games or 60 Playstation games?
• Have students raise their hand if they would rather have 6 Playstation games. Then, have students raise their hand if they would rather have 60 Playstation games. Ask students to explain their reasoning.
• Guide students to see the relationship between place and value. The place of a digit within a number is important because it tells us the value of that digit.
• Display the bottom portion of Teacher Resource 2a to provide a visual of the value of 6 Playstation games and the value of 60 Playstation games.
• Continue the “Would You Rather Have…?” activity as stated above using Teacher Resource 2b. Discuss the importance of the relationship between place and value. The amount of pennies shown is the actual amount of pennies. Graphic of pennies was taken from the website, http://www.kokogiak.com/megapenny/
• Refer to the objective and discuss with students that today they will be working with place value of whole numbers.

Teacher Facilitation
• Write the number 583 on the board and use the Think Aloud strategy to model how to represent the number using base ten blocks. Think Aloud: I know that the 3 is in the ones place, so I will represent that digit with 3 units. Count the units to demonstrate that there are 3. I know that the 8 is in the tens place, so I will represent that digit with 8 rods. Skip-count the rods by 10 to demonstrate that there are 80 units. I know that there is a 5 in the hundreds place, so I will represent that digit with 5 flats. Skip-count the flats by 100 to demonstrate that there are 500. Let’s see if we really have 583. Begin counting the flats: 100, 200, 300...continue counting the rods 510, 520, 530...and continue counting the units 581, 582, 583. I can represent the number using the models to help me see the value of the number.
• Distribute Base 10 Blocks to all students.
• Display a number on the board, and ask the students to represent the number at their desks using the base ten blocks. Determine the amount of practice students will need representing numbers using base ten blocks, based on teacher observations. Provide additional practice as needed.
• Display an enlarged pocket place value chart that is not labeled. Tell the students that they will represent larger numbers using a place value chart.
• Have students move their pocket place value chart in front of them. Distribute sentence strips with vocabulary words to students. Call students to the board to label the large place value chart in the following order: *Ones Period*, *ones*, *tens*, *hundreds*, *Thousands Period*, *one thousands*, *ten thousands*, *hundred thousand*, *Millions Period*, *one millions*.

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<tr>
<th>Millions Period</th>
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• Ask students if they know the other places in the millions period (ten millions and hundred millions).
• Distribute baggies with precut labels and number cards to students, (Teacher Resource 1b, Pocket Place Value Chart Labels.) Have students glue the labels on their pocket place value charts to match the class chart. Have the students write a zero on the back of each number card.
• Restate that the place of a digit in a number tells the value of that digit. Base ten blocks were used to see the value of each digit. Use the place value chart as another strategy.
• Model by correctly placing each digit of the number 372 in the displayed large pocket place value chart.
• Display 2 units, 7 rods, and 3 flats above each digit in the pocket chart as you place each digit in the pocket. Explain to students why each digit was placed in its corresponding pocket. Take the 3 out of the hundreds place and display it above the chart. Take the 7 out of the tens place and flip it over to display the written 0. Place the 0 above the pocket chart to the right of the 3. Repeat the same steps for the 2 in the ones place. Explain to students that the 3 in the hundreds place has a value of 300.
• Place 372 back into the pockets. Take the 7 out of the tens place and place it above the chart. Take the 2 out of the ones place and flip it over to display the written 0.
• Place the 0 above the pocket chart to the right of the 7. Explain that a 7 in the tens place has a value of 70.
• Place 372 back into the pockets.
• Take the 2 out of the ones place and place above the chart. Notice there are no digits after the ones place. A 2 in the ones place has a value of 2.
• Model the same process above using 80,531. Point out to students that the 0 in the thousands place is a placeholder indicating that there are no thousands.
• Elicit student help applying the same process with numbers between 1 and 1,000,000. Students should use their individual pocket place value charts and number cards, (Teacher Resource 1C), to practice with several examples provided by the teacher.

Student Application
• Pair the students with a partner and distribute Student Resource 1a and 1b, Rolling with Place Value, and one die for each partner.
• Explain that each student will roll a die three times to create a three-digit number. After each roll, students should record the number on the resource sheet. Students may place the numbers rolled in any order as long as they record a three-digit number.
• Underline the place and write the value of the digit as directed on the resource sheet.
• Switch papers and check their partner’s work.
• Continue the steps indicated on the resource sheet to create various numbers.
• Summarize the learning for the day.
• Ask students to independently create a seven and eight digit number and complete the task on the resource sheet. (formative assessment)

Embedded Assessment
• Observe students as they complete Student Resource 1a and 1b, Rolling with Place Value, and record observations on the Teacher Resource 3, Place Value 1 Checklist. The checklist contains the words: has difficulty with/is able to. The teacher can circle the appropriate statement depending on how he/she is collecting student performance data. If this information is going to be shared with parents, remember to identify students’ strengths.
• Collect Student Resource 1a and 1b, Rolling with Place Value, to determine if students can correctly identify place and write the value of a digit.

Re-teaching/Extension
• Refer to Teacher Resource 4, Directions for Place Value Folder.
• Work with a small group using the place value folder.
• Write a three-digit number on the place value folder using an overhead marker. Direct students to copy the number onto their folder.
• Have the students demonstrate the value of each digit using base ten blocks.
• Allow the students to write additional numbers onto their place value folder. After the number is written, students must demonstrate the value of their number using base ten blocks.
• Ask students who have understood the lesson to complete Student Resource 2, What’s the Largest? to create the largest number possible.

Lesson 2
Pre-assessment
• Say the number, 532,498 aloud and ask students to write the number in word form, standard form, and expanded form in their math notebook or on a scrap sheet of paper.
• Observe students during the launch to gain more insight about students’ number sense and understanding of place value.

Launch
• Place base ten blocks on students’ desk.
• Write the number 587 on the board and ask students to show the number in as many ways as they can.
• Ask students to share their responses as you record them on the board. Accept all correct examples such as pictorial representations, word name, expanded form, expressions (580+7), models, etc. Students should explain their example as you record them.
• Discuss why it is important to write numbers in many different ways. *Pictures and models help us to see the value of the number.*
• Ask students:  Can you think of any time in your life when you might need to write a number using words?  (Possible responses: *Writing a check, writing a paper, or writing a story.* )
• Refer to the objective and discuss with students that they will be writing numbers in standard form (the standard or “regular” way to write numbers), in expanded form, which like pictures and models, helps us to see the value of the digits, and in word form which is using words to write numbers.

Teacher Facilitation
• Display a large place value pocket chart on the board that was used in the previous lesson.
• Model how to write a number in standard form by using the think aloud strategy. *Think Aloud: Standard means regular so to write a number in standard form is to write the number the regular way.*
• Write 50,736 on the board and label it with a sentence strip, “standard form.”
• Say: *Fifty thousand seven hundred thirty-six. I know that I write a number with words the exact same way that I say it. It helps for me to look at my place value chart to make sure that I say it correctly. I read the number starting from left to right. I read all the numbers in that period, or all the numbers before the comma, 50,736 fifty. Write the word name as you are thinking aloud. I see a comma so that means I say the name of the period. I will use the place value chart to help me. Point to the place value chart and to the comma in the thousands period. It is the thousands period, fifty thousand. Now I keep reading the numbers in the next period, 50,736.*
seven hundred thirty-six. There is no comma after the 6 so I don’t need to say the name of the period. I will never have to use ones when I am reading and writing numbers because there are never any commas between the ones, tens, or hundreds place.

- Label fifty thousand seven hundred thirty-six on the board with the sentence strip, “word name.”
- Say: To help me see the value of 50,736 I will write the number in expanded form. Show the students a rubber band and stretch the rubber band out as a visual to help them understand the words expand. I will need to look at each digit starting with the largest place. We will be writing a long (expanded) addition expression. The 5 is in the ten thousands place so I know that it has a value of 50,000.
- Write 50,000 + on the board and continue writing the number in expanded form as you think aloud. You can use the strategy of flipping the number cards you used in the previous lesson or place value models to help students see the value if needed based on teacher observations from the previous lesson. The 0 is in the thousands place and the 0 is a placeholder indicating that there are no thousands. I don’t need to write anything. (It is also correct to write + 0 when there is a 0 in the number you are writing in expanded form).
- Say: I’m not sure what place the 7 is in so I will need to look at the place value chart. Look at the place value chart and point to the hundreds place. The 7 is in the same place as this so I know the 7 is in the hundreds place and the value is 700. 50,000 + 700 +. The 3 is in the tens place and it has a value of 30. 50,000 + 700 + 30 +. The 6 is in the ones place and it has value of 6.
- Write 50,000 + 700 + 30 + 6 on the board and label it with a sentence strip, “expanded form.”
- Show the students the accordion visual of a number written as standard form and expanded form. Refer to Teacher Resource 5, Directions for Expanded Form Accordion.
- Place a transparency of Student Resource 3, Check Writing, on the overhead. Tell students that every day many adults write checks and they need to know how to write numbers in standard form and word name correctly. Although we don’t write numbers in expanded form on checks it is important to know how to do it to ensure that you are writing the correct value when you are writing numbers. You wouldn’t want to write a check to someone for $53,600 when you only wanted to write the check for $536. The place of the digit tells us the value of that digit. Today you are going to get a chance to practice writing numbers in several ways by writing your own checks.
- Model how to fill out the check. Students can practice writing in expanded form on the line below the check.
- Write a number in expanded form on the line below the check on the transparency.
• Elicit student help to write the number in standard form and in word name. Be sure that the display you posted during the think aloud is still visible for the students to refer to as they write the numbers in various ways.
• Distribute Student Resource 3, Check Writing, (laminated checks) and dry erase markers and provide students with several examples where they are using their check to write the word name and to write numbers in standard form and expanded form.

Student Application
• Distribute one baggie with pre-cut cards cut from Student Resource 4, Shopping Spree, for each set of partners.
• Ask students to place the cards face up on their desks so that they can see the item and the cost for each item.
• Explain that each student will select one item that they would like to purchase. They will write the amount on their laminated checks in word form, standard form, and/or expanded form depending on how the value is written on the item card.
• Explain that once students have written the check they should give their partner their completed check and item card to check for accuracy. Provide time for students to practice using the laminated checks and item cards.
• Summarize the learning for the day and tell students to write their names on the back of the laminated checks and inform them that they will write one more amount. Tell students that the jackpot for the lottery this week is $287,453. Ask them to write this number on their check in word form, standard form, and expanded form for a chance to win the jackpot. Collect the laminated checks. (Formative assessment)

Embedded Assessment
• Observe students as they complete Student Resource 4, Shopping Spree Activity and record observations on the Teacher Resource 6, Place Value 2 Checklist. The checklist contains the words: has difficulty with/is able to. The teacher can circle the appropriate statement depending on how he/she is collecting student performance data. If this information is going to be shared with parents, remember to identify students’ strengths.
• Collect laminated checks that students have written on to determine if students can correctly write word form, standard form, and expanded form.

Re-teaching/Extension
• Work with a small group of students who are struggling with writing numbers in word form, expanded form, and standard form by using the place value pocket chart and the strategy of flipping the number cards so that students can see the value of each digit. Refer to the place value chart as you model for students how to look at the periods and places to help them write numbers in word form, standard form, and expanded form.
• Ask early finishers to complete Student Resource 5, Another Shopping Spree, by creating their own Shopping Spree Activity. They will draw their
own item cards and write the price on the card in expanded form, word form, or standard form. On the back of the item card they should write an answer key, showing the other two ways to write the number correctly. They can write whole numbers greater than one million.

**Summative Assessment:**

Students should complete Student Resource 6a and 6b, Place Value of Whole Numbers, an assessment of the skills taught in this unit. The assessment consists of two selected responses, two short answer responses, and one brief constructed response that are aligned with state instructional expectations. The skills addressed in the summative assessment include:

- Read, write, and represent place value of whole numbers using models and symbols.
- Read, write, and represent whole numbers in standard form, expanded form, and word name.
- Answers can be found on Teacher Resource 7.

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Rolling with Place Value
Roll the die three times and use those digits to write a three-digit number. Underline the digit in the tens place. Write the value of the digit on the line.

Roll the die four times and write a four-digit number. Underline the digit in the hundreds place. Write the value of the digit on the line.

Roll the die five times and write a five-digit number. Underline the digit in the thousands place. Write the value of the digit on the line.

Roll the die six times and write a six-digit number. Underline the digit in the ten thousands place. Write the value of the digit on the line.
Roll the die seven times and write a seven-digit number. Underline the digit in the hundred thousands place. Write the value of the digit on the line.

________________________

Roll the die eight times and write an eight-digit number. Underline the digit in the millions place. Write the value of the digit on the line.

________________________
What’s the Largest?

Your task is to create the largest number possible using the numbers below. Cutout each number square. Arrange the numbers so that you have created the largest number possible. Glue the numbers in the box below in the order you have chosen. When you have finished, write an explanation for your reasoning using place value terms.

5 2 7 9 8 1
Check Writing

On each line below the check, write the expanded form of the check amount.

I.M. Rich
7878
123 Penny Lane
Millionaire, Maryland 21220

Pay to the
    Order of __________________________

__________________________
Dollars

__________________________
## Shopping Spree

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<th>Item</th>
<th>Cost</th>
<th>Description</th>
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<tbody>
<tr>
<td>Shopping Spree</td>
<td>$20,000+7,000+300+20+5</td>
<td>Twelve dollars</td>
</tr>
<tr>
<td>Your Own Castle</td>
<td>$3,000+500+40</td>
<td>Ten dollars</td>
</tr>
<tr>
<td>Family Vacation &amp; 2 World Series Tickets</td>
<td>$30,000+500+80+1</td>
<td>One hundred sixty-eight thousand, two hundred thirty-nine dollars</td>
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</tbody>
</table>

- **Jeep:** Cost: $20,000+7,000+300+20+5
- **Clothes:** Cost: $50+3
- **Castle:** Cost: $3,000+500+40
- **Ring:** Cost: $30,000+500+80+1
- **Sailing Trip & World Series Tickets:** Cost: $30,000+500+80+1

**Total Cost:** $247,680

**Grand Total:** $999,999

**Total Cost:** $30,000+500+80+1
Another Shopping Spree

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Place Value Assessment

1. Matt’s video game score was 346,453. Name the value of the underlined digit in his score.
   - a. 3,000,000
   - b. 300,000
   - c. 3,000
   - d. 30

2. On the line below, write the amount in standard form that is the same as the word name written on the check.

   I.M. Rich
   123 Money Lane
   Millionaire, Maryland 20223

   Pay to the Order of U.R. Wealthy

   $__________________________

   Sixty thousand, two hundred eighty-two Dollars

   Signed ____________________________

3. What is the word name for 975,400?
   - a. nine hundred seventy-five, four
   - b. seventy-five thousand, four
   - c. nine hundred seventy-five thousand, four hundred
   - d. nine hundred seventy-five

4. Write 20,456 in expanded form.

   ________________
Brief Constructed Response

Malcolm wrote the expanded form of \(407,905\) incorrectly. He wrote \(40,000 + 700 + 900 + 5\).

Step A
Write the number \(407,905\) correctly in expanded form.

____________________________________________________________________________________

Step B
Explain why your answer is correct.
Use what you know about place value and expanded form in your explanation.
Use words, numbers, and/or symbols in your explanation.

____________________________________________________________________________________
Directions for Pocket Place Value Charts

Materials:
18 in. x 12 in. piece of construction paper (1 sheet makes 2 pockets)
Stapler
Glue
3 different colored papers to copy labels if you don’t have a color printer (optional)
Teacher Resource 1b (labels)
Teacher Resource 1c (number cards 0-9)

Procedure:

1. Cut the construction paper in half so that the dimensions will be 18 in. x 6 in.

2. Fold the bottom of the construction paper up to create a 1-inch pocket.

3. Staple vertically across the bottom of the folded pocket every 2 inches starting with the first staple at the edge of the paper to create the pockets for the numbers.

4. Cut out labels and glue the periods and places on the pocket chart.

<table>
<thead>
<tr>
<th>Millions Period</th>
<th>Thousands Period</th>
<th>Ones Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>one millions</td>
<td>hundred thousands</td>
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<td>hundred thousands</td>
<td>ten thousands</td>
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## Pocket Place Value Chart Labels

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Would you rather have…

6

playstation games?

60

playstation games?
Would you rather have...

500,000 pennies?

50,000 pennies?
<table>
<thead>
<tr>
<th>Student</th>
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<tbody>
<tr>
<td><strong>has difficulty</strong> with / <strong>is able to:</strong></td>
<td><strong>has difficulty</strong> with / <strong>is able to:</strong></td>
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<tr>
<td>- Identifying place value</td>
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<td>- Showing value of a digit</td>
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<td>- Representing numbers with models</td>
<td>- Representing numbers with models</td>
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<tr>
<td>- Understanding numbers greater than 100</td>
<td>- Understanding numbers greater than 100</td>
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Directions for Place Value Folder

Materials
• File folders (one per student)
• Place value labels (one set per folder)

Directions
1. Open file folder and lay flat on surface.
2. Divide the file folder into columns to create a place value chart. Make sure that base ten blocks can be placed within the columns.
3. Use a marker to draw the lines of the columns.
4. Cut-out the labels and glue in the correct column.
5. Laminate folders so that students can write on them with overhead markers
Directions for Expanded Form Accordion

Materials:
Sentence strip
Ruler
Marker
Pencil

Procedure:

1. Mark the sentence strip at 2 inches, then 3 inches, then 2 inches, then 3 inches, with a pencil and continue until you get to the end of the sentence strip. The lines represent where to mark the sentence strip and should not be visible on the sentence strip.

2. Write the number 36,572 in expanded form as shown below. Use any five digit number

3. Fold like an accordion so that you can only see the number written in standard form. The dotted lines below represent folds.

4. Unfold one fold at a time to show the value of each digit. If you open it the entire way you will have the number in expanded form.
## Place Value 2 Checklist

<table>
<thead>
<tr>
<th>Student</th>
<th>Student</th>
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<tbody>
<tr>
<td><strong>has difficulty with / is able to:</strong></td>
<td><strong>has difficulty with / is able to:</strong></td>
</tr>
<tr>
<td>• Word Name ↔ Standard Form</td>
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Place Value Assessment Answer Key

1. Matt’s video game score was 346,453. Name the value of the underlined digit in his score.
   ○ a. 3,000,000
   ○ c. 3,000
   ● b. 300,000
   ○ d. 30

2. On the line below, write the amount in standard form that is the same as the word name written on the check.
   60,282

   I.M. Rich
   123 Money Lane
   Millionaire, Maryland 20223

   Pay to the Order of U.R. Wealthy $

   Sixty thousand, two hundred eighty-two Dollars

   Signed I.M. Rich

3. What is the word name for 975,400?
   ○ a. nine hundred seventy-five, four
   ○ b. seventy-five thousand, four
   ● c. nine hundred seventy-five thousand, four hundred
   ○ d. nine hundred seventy-five

4. Write 20,456 in expanded form.
   20,000 + 400 + 50 + 6
Brief Constructed Response

Malcolm wrote the expanded form of 407,905 incorrectly. He wrote 40,000 + 700 + 900 + 5.

Step A
Write the number 407,905 correctly in expanded form.

400,000 + 7,000 + 900 + 5

Step B
Explain why your answer is correct.
Use what you know about place value and expanded form in your explanation.
Use words, numbers, and/or symbols in your explanation.

- 4 is in the hundred thousands place \(\rightarrow\) 400,000
- 7 is in the thousands place \(\rightarrow\) 7,000
- 9 is in the hundreds place \(\rightarrow\) 900
- 5 is in the ones place \(\rightarrow\) 5

400,000 + 7,000 + 900 + 5 = 407,905