

Title: Expanding Place Value

Brief Overview:

This unit is designed to introduce place value from 0 to 999. In the first lesson, students will develop an understanding of hundreds, tens, and ones. Students will create a Number Wheel in order to identify digits and their value. In the second lesson, students will extend student understanding of place value by writing word names for numbers. The last lesson introduces expanded form and builds on the concept that numbers can be represented in several ways.

NCTM Content Standard/National Science Education Standard:

- Understand numbers, ways of representing numbers, relationships among numbers, and number systems.
- Connect number words and numerals to the quantities they represent, using various physical models and representations.

Grade/Level:

Grade 2

Duration/Length:

3 days, 75-90 minutes each

Student Outcomes:

Students will:

- Identify the place value of a digit in whole numbers up to 999
- Build and describe models of numbers using concrete materials, and discuss the models
- Read, write, and represent whole numbers using models, symbols, and words through 999
- List multiple representations for a number
- Express whole numbers up to 999 using expanded form

Materials and Resources:

- *How Much, How Many, How Far, How Heavy, How Long, How Tall is 1,000* by Helen Nolan (optional)
- Masking tape, scissors, pencils, markers, crayons
- White cardstock (class set)

- Colored cardstock (class set)
- Brads/fasteners (3 per student)
- Transparencies (2)
- Base ten blocks
- Playing cards (at least 5 decks)
- *The Big Wide Mouthed Frog* by Ana Larranaga (optional)
- Student journals
- Expansion tools (1 rubber band per student)
- Construction paper (1 pack of red, yellow, and brown)

Development/Procedures:

Lesson 1

The book *How Much, How Many, How Far, How Heavy, How long, How Tall is 1,000* by Helen Nolan is an excellent resource that can be used to introduce this lesson.

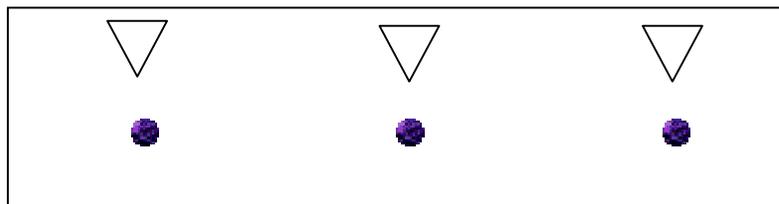
Preassessment:

Explain directions in order for students to complete "Number Sort" (Student Resource Sheet 1). Pairs of students will work to complete the activity. Elicit students' knowledge of number sense by having students group the numbers into three categories of their choice. While students are sorting, circulate around the room to observe students grouping strategies. After 3-5 minutes the class will have a short discussion to share their grouping strategies.

Launch:

Create three columns on the board representing three digit, two digit, and one digit numbers. Each pair of students will bring a different number to post in the appropriate column, making sure not to repeat a number that has already been posted. As numbers are posted, guide students to explain why they put their numbers into a particular column. (Possible response- "*We put our number into the three digit column because it has three digits.*")

Each student will create a "Place Value Number Wheel" (Student Resource Sheet 2). See below for image of a completed number wheel.



Directions to make the number wheel:

1. Fold one sheet of heavy cardstock in half vertically. Cut on the fold. Each student gets one half. (*Note: This should be done before the lesson)

2. Each student will receive a copy of "Place Value Number Wheels" (Student Resource Sheet 2) and cut each wheel out.
3. Cut three small triangles, as shown above, and label the hundreds, tens, and ones column.
4. Clasp the wheels using brads and put the wheels horizontally behind the appropriate triangle.
5. Have students mark the first space on each wheel zero, and turn the wheel to write all numbers up to nine in order (0,1,2,3,4,5,6,7,8,9).

Teacher Facilitation:

- Guide the students as they use their number wheel.
- Ask the students to show 4 ones on their number wheel. After they have moved the wheel to show 4 ones, discuss why zero should be placed in the other columns. Then have students hold up their wheels to check for understanding.
- Next, ask the students to show the number 24 on their number wheels. After they have moved the wheel in the tens and ones column to show 2 tens and 4 ones the teacher will have the students hold up their wheels to check for understanding.
- Then, ask the students to show the number 724 on their number wheels.
- After they have moved the wheels in the hundreds, tens, and ones column to show 7 hundreds, 2 tens, and 4 ones the teacher will have the students hold up their wheels to check for understanding.

Student Application:

Allow students to use a "Place Value Mat" (Student Resource Sheet 3) and base ten blocks to build models of numbers up to 999 shown on "Number Models" (Student Resource Sheet 4).

Assessment:

Students will work independently to complete "Place Value: Lesson 1 Assessment" (Student Resource Sheet 5). Follow directions given on the activity sheet. Complete the first question with the students reviewing the place value of each digit in the number.

Instructional Modification:

Students *experiencing difficulty* will color each place value wheel on their number wheel a different color. Have the students color the wheel for the ones column-yellow, tens column-red, and hundreds column-brown. **Make sure students color lightly so that they will still be able to see the numbers.** Students experiencing difficulty will then complete Student Resource Sheet 4. Follow directions on the activity sheet.

Extension:

Students that have *mastered the concept* will work with a partner to play the following game.

Set Up: From a regular deck of playing cards, remove all the Jokers, Tens, Aces, Jacks, and Kings. Leave the Queens in the deck. They will count as zeros (0). You should now have 36 cards. Make sure students understand that the Queens represent zero.

Object of the Game: Build the largest 3-digit number and win all the cards (A variation could be to build the smallest 3-digit number).

Players will sit next to each other and put the Place Value Mat (SR 3) in front of them. Each player picks a card from the deck. The player with the lowest card deals.

Start: The dealer will shuffle the cards and deal 3 cards to each player, one at a time and face down. Each player should have the same number of cards. Players should stack their cards in a pile face down. They should not look at them.

1. Player on the dealer's left will go first. The first player flips over the top card on his/her deck and places it in the Hundreds, Tens, or Ones place on the Place Value Mat. Remember, you are trying to build the largest number.
2. Play goes around to the left with each player placing a card in their Hundreds, Tens, or Ones place on the Place Value Mat.
3. After all players have made a 3-digit number, the player with the largest number wins the round. Winner: In order to collect all the cards on the mat, you must correctly read the value of your number and all other losing numbers in this manner: If your winning number was 523 and the losing numbers were 321 and 212, you would say: "Five hundred forty three is larger than three hundred twenty one and two hundred twelve.
4. Other players check to make sure the winner says the numbers correctly. If s/he makes a mistake, the player with the second largest number wins the round and collects all the cards on the mat. Place the winning cards face down at the bottom of your deck.

Lesson 2

Preassessment:

Students will complete "Matching Numbers" (Student Resource Sheet 6) and follow directions given. In order for the students to check their work, write the number word form on the board and have volunteers write the number in standard form next to the word form.

Launch:

Read the story *The Big Wide-Mouthed Frog* by Ana Martin Larranaga to the students stopping occasionally to count objects on each page.

Teacher Facilitation:

Teacher Reference: Numbers to Words 1-90

The words for 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 are: one, two, three, four, five, six, seven, eight, nine, and ten.

The words for 11, 12, 13, 14, 15, 16, 17, 18, 19 and 20 are: eleven, twelve, thirteen, fourteen, fifteen, sixteen, seventeen, eighteen, nineteen and twenty.

After twenty, there is a pattern to the words. The tens place uses the words twenty, thirty, forty, fifty, sixty, seventy, eighty and ninety for 20, 30, 40, 50, 60, 70, 80 and 90.

If the ones place has more than zero, the word is formed by using the ten's place word, a hyphen, and then the ones place word. Examples are:

38 is thirty-eight

84 is eighty-four

25 is twenty-five

Source: www.321know.com

- In students' journals, they will write the numbers 0-19. Ask student volunteers to write the correct spelling of each number on the board or overhead.
- Next students will count by tens to 100, writing these numbers and their correct spelling in their journals also. (10-ten, 20-twenty, 30-thirty, etc...)
- Next, pose the question: If I had 22 *Smarties* in my treat bag, how would I write the number 22 in words?
- Have volunteers attempt to answer. Most likely a hyphen (-) will be missing between the two words. Explain to the students that a hyphen is needed to separate the two number words.
- Show several other examples on the board and have volunteers tell where the hyphen should be placed. Students should be recording these examples into their journals.
- Next, ask the students the following question: If there were 238 students in the parade, how would I write that number in words? Students can turn to their partner in order to Think-Pair-Share. Call on volunteers to share their thinking. Have students record the correct way to write 238 (Two hundred thirty-eight) in their journals.

Student Application:

Students will play the "Memory Matching Game" (Student Resource Sheets # 7 A-B) with a partner.

Object: To correctly match the standard and number-word form of a number.

How to win: Correctly match the most pairs.

How to play the game:

1. Each pair of students will receive 1 copy of Student Resource Sheets # 7 A-B. (Duplicate on thick paper so students cannot see through the paper to the opposite side.)
2. Point out, before cutting out each square, that the numbers are correctly matched with the number word form. Read the number words together.
3. Partners will shuffle the numbers so that they are mixed up and place them face down.
4. Each student will take turns picking two cards, attempting to find a match. Students should verbally say the number word form of the card they choose.
5. If they find a match they will need to tally their score. If they do not find a match they need to replace the cards in the same spot they were chosen from and their turn is then over.
6. The game is over when all of the cards have been matched. The winner is the partner with the most tallies.

Assessment:

Students will complete a selected response assessment "Number Word Quiz" (Student Resource Sheet 8).

**Before allowing students to complete the reteaching and enrichment activities, teacher should make a transparency of the checks and fill out 1 check together so they will have an example to reference.*

Reteaching:

Students will pretend to write checks using the "Fall Checks" (Student Resource Sheets # 9 A-B). First page of checks has a word bank provided.

Extension:

Students will pretend to write checks using the "Fall Checks" (Student Resource Sheets # 9 A-B). Second page of checks is intended for independent completion.

Lesson 3

Preassessment:

Write 358 on the board or overhead. Ask students to record the number of hundreds, tens, and ones in this number in their journals. Students will be asked to share how they know that there are 3-hundreds, 5-tens, and 8-ones. As students are sharing the teacher will write on the board $300 + 50 + 8$.

Launch/ Teacher Facilitation:

- Introduce the concept by using an “Expansion Tool” (rubber band). (*Teacher stretches the rubber band*) Ask the students “What am I doing with this tool?” (Possible responses include: Pulling it, stretching it, making it longer, etc...)
- Explain that the tool was expanding when it was stretched out. Just as the tool can expand, numbers can expand too. Point out the number 358 on the board that was expanded during the preassessment.
- Give each student a thick rubber band (preferably ½ inch thick). Guide the students to practice expanding their tool and remind them how numbers can be stretched out, or expanded.
- Write 784 on the board or overhead while students write the number in their journals. Ask the following questions:
 - *How many hundreds are in this number? (7. How do you write seven hundred? (700)*
 - *How many tens are in this number? (8) How much is 8 tens? (80)*
 - *How many ones are in this number? 4.*
- Students will then write the definition of Expanded Form in their journals. Expanded Form shows the number expanded into an addition statement.
Example: 457 is the same as 400 + 50 + 7
- Students can offer other examples to record. Then students can tape their expansion tool into their journals as a visual reference.

Student Application:

Students will complete an activity sheet “Expanded Form Practice” (Student Resource Sheet 10). They may work with a partner or independently.

Assessment:

Students will fill in the blanks of a story using number words and also including the expanded form of a number. “Autumn Story” (Student Resource Sheet 11)

Reteaching:

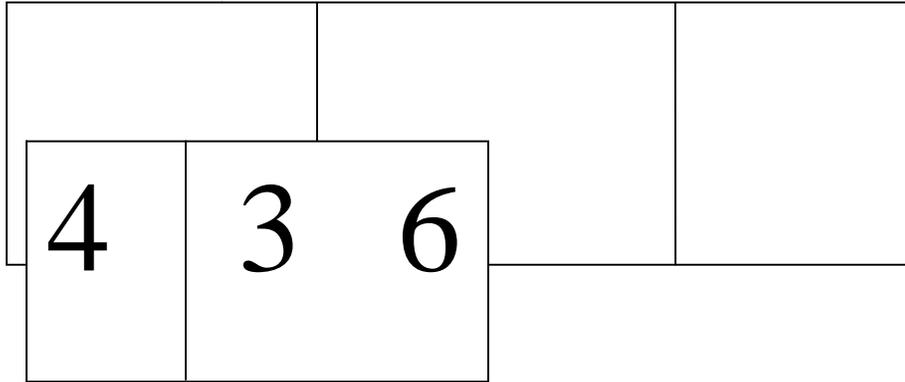
Guide students to work with “Expando Cards” so that they are able to see the expanding process in a concrete way.

How to make “Expando Cards”

Use yellow, red, and brown construction paper. Cut 10 pieces of yellow into 3X5 inches and number them 0-9. Cut 10 pieces of red into 6X3 inches and number them 0-90, counting by tens. Cut 10 pieces of brown into 8X3 inches and number them 0-900 counting by hundreds.

Three cards separated represent the expanded form. See example below:

Three cards placed together represent the standard form. See example below:



Extension:

Students will create “Extend Flashcards” (Student Resource Sheets # 12 A-B) and play a game with a partner.

How to Play:

1. Each set of students will get 20 flashcards to cut out (Student Resource Sheets # 12 A-B). Students will take turns showing a flashcard to their partners with the standard form facing their partners and the expanded form side facing them.
2. The partner not holding a flashcard needs to write the number in expanded form in his/her journal.
3. If the partner writes the expanded form correctly, his/her gets 1 tally mark.
4. Next, partners switch roles and repeat the directions.
5. The partner with the most tallies when time is up wins the game.

*Another way to play is to have the students show the expanded form to a partner and the other student will need to write the standard form of the number.

Summative Assessment:

Students will complete a brief constructed response to check for their understanding of place value. (Student Resource Sheet 13)

Authors:

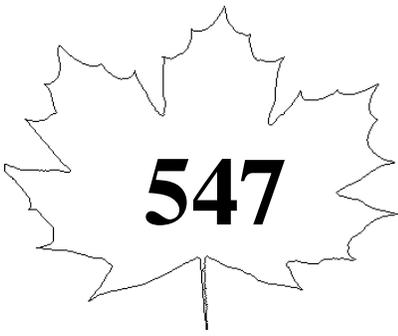
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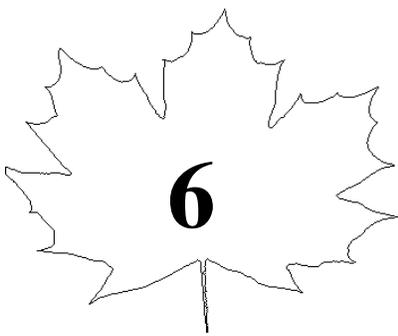
Number Sort

Student Resource Sheet 1

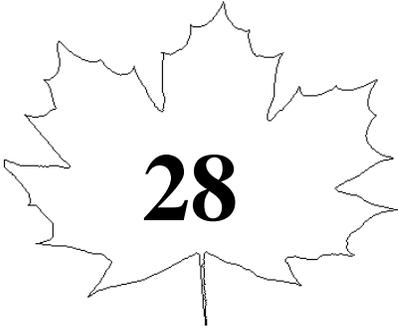
Directions: Cut out each leaf and sort the numbers into three leaf piles.



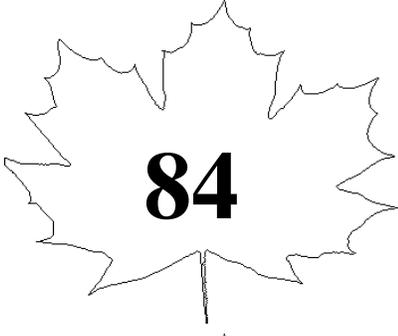
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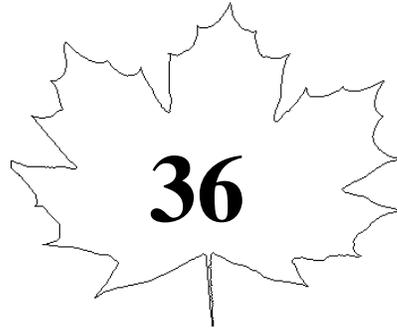
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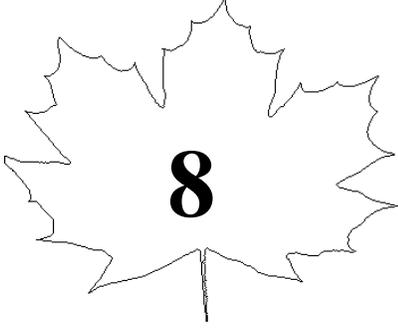
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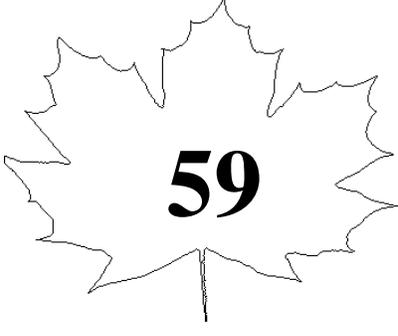
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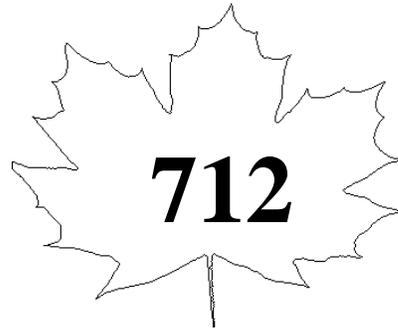
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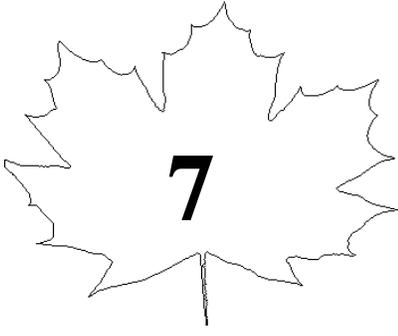
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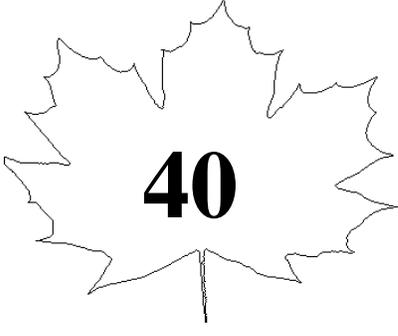
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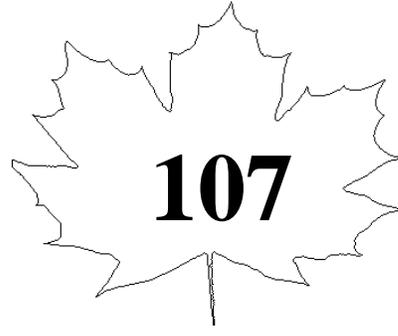
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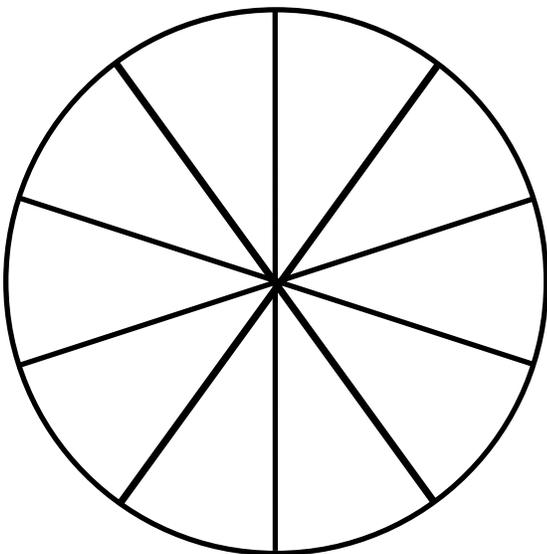
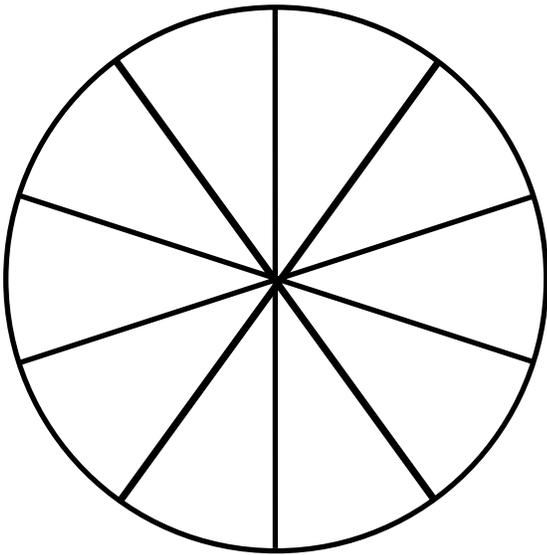
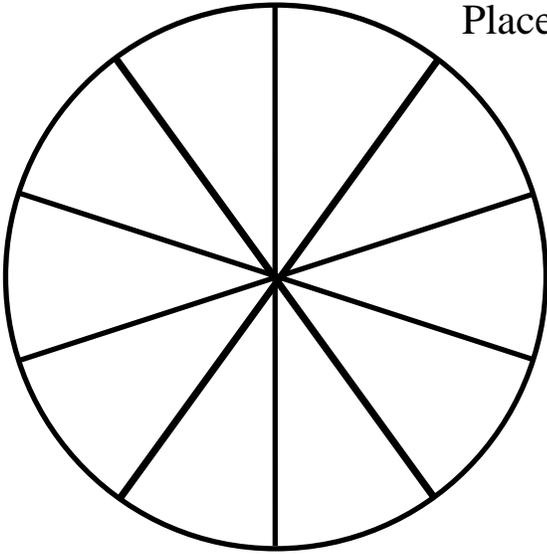


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Place Value Number Wheels



Place Value Mat

Hundreds	Tens	Ones

Number Models

Directions: Use models to make the following numbers on your place value mat.

347

198

245

71

440

606

238

550

731

856

36

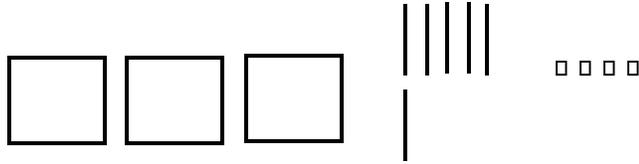
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Place Value: *Lesson 1 Assessment*

Directions: Draw models of base ten blocks to show the following numbers.

Example:

364



1) **13**

2) **85**

3) **171**

4) **329**

5) **760**

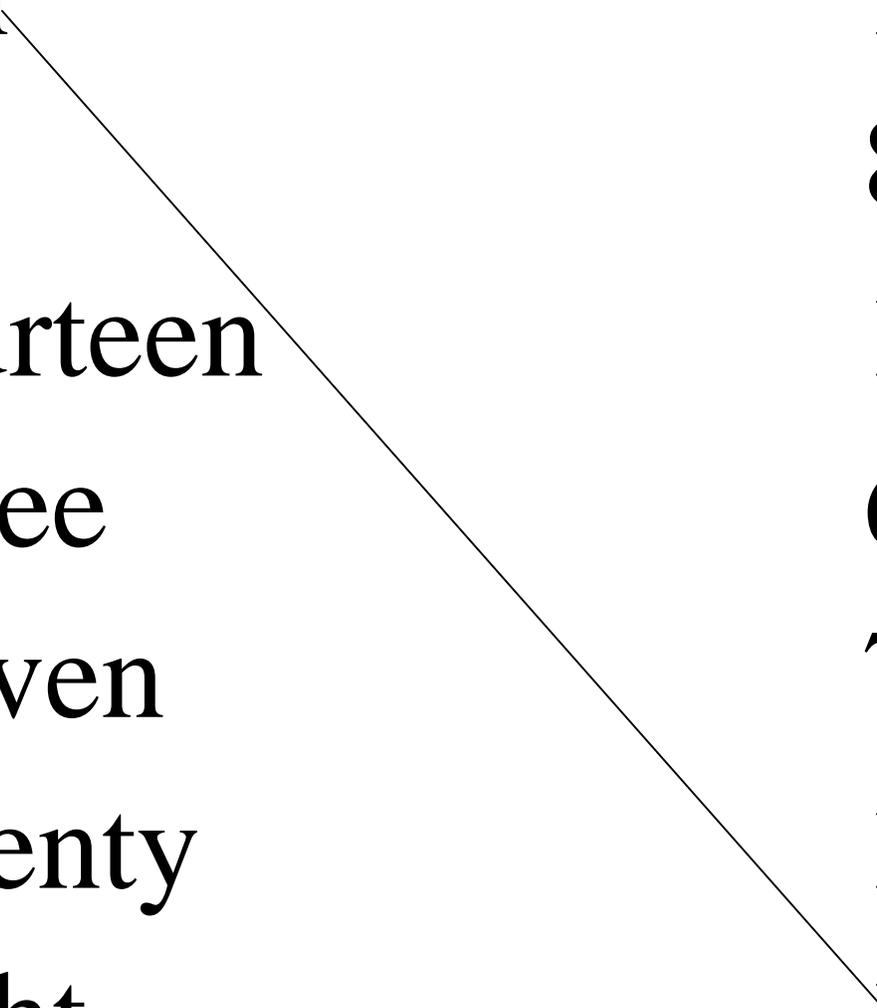
6) **844**

Name _____ Date _____

Draw a line to match the word form to the number. The first line has been drawn for you.

Matching Numbers

Ten	12
Six	8
Fourteen	11
Three	6
Eleven	7
Twenty	14
Eight	10
Twelve	3
Seven	20



453	Four hundred fifty-three
78	Seventy-eight
297	Two hundred ninety-seven
11	Eleven
111	One hundred eleven
273	Two hundred seventy-three
457	Four hundred fifty-seven

953	Nine hundred fifty-three
17	Seventeen
697	Six hundred ninety-seven
67	Sixty-seven
115	One hundred fifteen
273	Two hundred seventy-three
45	Forty-five

Number-Word Quiz

Name _____ Date _____

Directions: Choose the letter that spells the given number correctly. Circle the letter you choose.

1) **423**

- a. four hundred twenty-three
- b. forty two and three
- c. four two three
- d. 423

2) **79**

- a. seven nine
- b. seventy-nine
- c. 79
- d. seven hundred-eight

3) **111**

- a. one hundred one
- b. eleven
- c. one hundred eleven
- d. eleven one

4) **52**

- a. fifty-two
- b. five two
- c. five hundred two
- d. five-two

5) **608**

- a. sixty-eight
- b. six zero eight
- c. six hundred eight
- d. six hundred-eighty

Fall Checks

Use the number words to complete the checks.

Number Words

Three hundred sixty-four 364

Eight hundred twenty-seven 827

Six hundred thirty-nine 639

_____ Elem. Bank
 Prince George's County



_____ Date

Pay to the order of _____ \$

_____ Dollars

_____ For _____ Signature

_____ Elem. Bank
 Prince George's County



_____ Date

Pay to the order of _____ \$

_____ Dollars

_____ For _____ Signature

_____ Elem. Bank
 Prince George's County



_____ Date

Pay to the order of _____ \$

_____ Dollars

_____ For _____ Signature

Use numbers and words to complete the checks.

_____ Elem. Bank
Prince George's County



_____ Date

Pay to the order of _____ \$

_____ Dollars

_____ For _____ Signature

_____ Elem. Bank
Prince George's County



_____ Date

Pay to the order of _____ \$

_____ Dollars

_____ For _____ Signature

_____ Elem. Bank
Prince George's County



_____ Date

Pay to the order of _____ \$

_____ Dollars

_____ For _____ Signature

Name _____ Date _____

Autumn Story

Fill in the autumn story using the expanded number and word form of the following numbers:

67 18 620 213 75 329

At the autumn celebration, sixty-seven $60 + 7$ second graders had a pumpkin. Ms. Pugh's class gathered _____ apples. There was a pile of _____ red and yellow leaves. The second grade had a race, and the prize was a jar with _____ pieces of candy. Ms. Thomson's class shared _____ candy corns after lunch. At the end of the autumn celebration, the school had raised _____ dollars.

273

164

94

731

657

208

14

62

128

951

784

446

364

307

$200+70+3$	$100+60+4$
$90+4$	$700+30+1$
$600+50+7$	$200+8$
$10+4$	$60+2$
$100+20+8$	$900+50+1$
$700+80+4$	$400+40+6$
$300+60+4$	$300+7$

Name _____ Date _____

Expanding Place Value- Summative Assessment
Brief Constructed Response

Part A. Write the number 692 in expanded form.

Part B. Use what you know about place value and expanded form to explain how you answered Part A. Use numbers, words, and/or symbols in your response.

BCR ANSWER KEY

PART A:

$$600 + 90 + 2$$

PART B:

Expanded form is when you spread out a number. The number 692 can be spread out into $600 + 90 + 2$. The 6 means there are 6 hundreds. The 9 means there are 9 tens and the 2 means there are 2 ones. The number 692 is really the same as $600 + 90 + 2$.