Mathematics

Planning Guide

Grade 3

Place Value

Number

Specific Outcome 5

This Planning Guide can be accessed online at:
http://www.learnalberta.ca/content/mepg3/html/pg3_placevalue/index.html

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Planning Guide: *Grade 3 Place Value*

Strand: Number
Specific Outcome: 5

This *Planning Guide* addresses the following outcome from the program of studies:

Strand: Number	
Specific Outcomes:	5. Illustrate, concretely and pictorially, the meaning of place value for numerals to 1000.

Curriculum Focus

This sample targets the following changes to the curriculum:

- The general outcome for the number strand in the revised program of studies states simply that the goal of this entire strand is to "develop number sense." The number strand is no longer divided into "number concepts" and "number operations." Number sense includes, for example, the ability to partition numbers and the ability to reason multiplicatively. These abilities apply to both numbers and operations.
- In the previous program of studies, general outcomes at each grade level specified magnitudes of numbers and particular operations, implying that number sense develops in a linear fashion. A more current understanding of student's mathematical development is that number sense broadens and deepens over time. Student's understanding of even 1-digit numbers is not fully developed until they are able to think of numbers abstractly (as quantities that do not necessarily refer to specific objects or as progressions on a scale).
- The wording of Specific Outcome 5 is somewhat different from the equivalent outcome in the previous program of studies; however, the intention of this outcome is virtually the same as previously. What is different is our understanding of how students show their understanding of the meaning of place value. Students can, and frequently do, learn or invent procedures for using expanded notation or base ten blocks that are utterly devoid of any understanding of place value. It is essential that students construct their own understanding of place value as it applies to real magnitudes of numbers and relevant contexts for counting and calculating quantities, rather than simply learning to use notations or manipulatives in a purely procedural way.

What Is a Planning Guide?

Planning Guides are a tool for teachers to use in designing instruction and assessment that focuses on developing and deepening students' understanding of mathematical concepts. This tool is based on the process outlined in *Understanding by Design* by Grant Wiggins and Jay McTighe.

Planning Steps

The following steps will help you through the Planning Guide:

Step 1: Identify Outcomes to Address

Guiding Questions

- What do I want my students to learn?
- What can my students currently understand and do?
- What do I want my students to understand and be able to do based on the Big Ideas and specific outcomes in the program of studies?

Big Ideas

- Place value refers to the idea that the place a digit occupies in a number affects its magnitude.
- In order to understand place value, students must be able to unitize. In other words they must be able to think of groups of numbers (e.g., tens) as units in and of themselves, while maintaining awareness of the total magnitude of each group (one 10 is the same as 10 ones).
- There are patterns in the way a number is said and written that communicates the magnitude of each digit and illustrates the meaning of place value.
- Successive places in a number represent successive powers of 10.
- Zero acts as a place holder in the written place value system.
- Digits in a given place are multiplied by the appropriate power of 10 to arrive at their actual value in that number.
- Values of digits are added together to get the total value of a number.
- Numbers can be thought of and taken apart in different ways. For example, 967 can be thought of as 9 hundreds, 6 tens and 7 ones. It can be grouped as 96 tens and 7 ones or 9 hundreds and 67 ones. It can also be partitioned in many different ways; for example, as 8 hundreds, 14 tens and 27 ones.
- An understanding of place value must be developed in relationship to concrete and visual representations of actual numbers and quantities.

Sequence of Outcomes from the Program of Studies

See http://www.education.alberta.ca/teachers/program/math/educator/progstudy.aspx for the complete program of studies.

Grade 2	Grade 3	Grade 4
Specific Outcomes	**Specific Outcomes**	**Specific Outcomes**
5. Compare and order numbers up to 100. 6. Estimate quantities to 100, using referents. 7. Illustrate, concretely and pictorially, the meaning of place value for numerals to 100.	5. Illustrate, concretely and pictorially, the meaning of place value for numerals to 1000.	2. Compare and order numbers to 10 000.

Step 2: Determine Evidence of Student Learning

Guiding Questions

- What evidence will I look for to know that learning has occurred?
- What should students demonstrate to show their understanding of the mathematical concepts, skills and Big Ideas?

Using Achievement Indicators

As you begin planning lessons and learning activities, keep in mind ongoing ways to monitor and assess student learning. One starting point for this planning is to consider the achievement indicators listed in *The Alberta K–9 Mathematics Program of Studies with Achievement Indicators*. You may also generate your own indicators and use them to guide your observation of the students.

The following indicators may be used to determine whether or not students have met this specific outcome. Can students:

- record, in more than one way, the number represented by given proportional materials (e.g., base ten materials) and non-proportional materials (e.g., money)?
- represent a given number in different ways, using proportional and non-proportional materials, and explain how the representations are equivalent; e.g., 351 can be represented as 3 hundreds, 5 tens and 1 one; or 2 hundreds, 15 tens and 1 one; or 3 hundreds, 4 tens and 11 ones?
- explain and show, with counters, the meaning of each digit for a given 3-digit numeral with all digits the same; e.g., for the numeral 222, the first digit represents 2 hundreds (200 counters), the second digit represents 2 tens (20 counters) and the third digit represents 2 ones (2 counters)?
- explain, using concrete materials, the meaning of zero as a place holder in a given number?

Sample behaviours to look for related to these indicators are suggested for some of the activities listed in **Step 3, Section C: Choosing Learning Activities** (p. 9).

Step 3: Plan for Instruction

Guiding Questions

- What learning opportunities and experiences should I provide to promote learning of the outcomes and permit students to demonstrate their learning?
- What teaching strategies and resources should I use?
- How will I meet the diverse learning needs of my students?

A. Assessing Prior Knowledge and Skills

Before introducing new material, consider ways to assess and build on students' knowledge and skills related to place value. For example:

- Make sure students can count by tens and identify place value patterns in the hundreds chart.
- See if students can count by hundreds.
- Check to see if students start counting at 90 and count past 100 to 120.
- Check to see if students can read and name 2-digit and 3-digit numbers.
- Check to see if students can subitize up to 10 by flashing ten frames with different numbers of squares filled in. Alternatively, string five beads or cubes of one colour and five of another colour on a slightly longer string, and push different numbers of beads to one side. Show briefly to see if students can subitize the amount.
- To see if students can unitize (i.e., think of a group as a countable unit in itself, as well as being made up of single units), have them make 3 ten bars by snapping cubes together and take 4 single cubes as well. Ask, "How many cubes?" and then observe whether students count by tens and ones or count each cube in each of the ten bars.
- To determine if students understand that a set contains the same amount of items whether you count by ones or by tens and ones, after completing the above exercise, ask students to break their ten bars apart to create a pile of single cubes, and ask "How many?" Students should be able to answer without counting all the cubes again.
- Check to see if students can make 2-digit numbers using small ten frames. Students should have a set of ten frame cards from 0–9 and several tens. Call out a 2-digit number and have the students make it using their cards. See if you have any students who can use these cards to make a number between 100 and 200.

If a student appears to have difficulty with these tasks, consider further individual assessment, such as a structured interview, to determine the student's level of skill and understanding. See **Sample Structured Interview: Assessing Prior Knowledge and Skills** (p. 8).

Sample Structured Interview: Assessing Prior Knowledge and Skills

Directions	Date:	
	Not Quite There	**Ready to Apply**
Have a number of new pencils bundled into groups of 10 with elastic bands. Have some single new pencils as well. Say, **"Please get 27 pencils. Tell me how many pencils you have and how you figured it out."**	The student attempts to count out 27 single pencils. The student does not count out the correct amount. The student counts bundles as if they were single pencils.	The student selects 2 bundles and 7 single pencils. The student is able to say that 27 means 20 and 7, and the 20 is represented by 2 tens.
Have three or four cards with random, non-consecutive 2-digit numbers written on them. Say, **"Please put these numbers in order through the lowest number to the highest number."**	The student is not able to put all the 2-digit numbers in order.	The student shows understanding of the magnitude of numbers by correctly ordering non-consecutive 2-digit numbers.
Show six or eight cards with random, non-consecutive 2-digit numbers written on them. Say, **"Please tell me what each of these cards says."**	The student is unable to read all 2-digit numbers.	The student is able to read 2-digit numbers correctly.
Ask the student to begin counting at 55 and to count by ones to see how far he or she can count. Stop the student at 120.	The student is unable to begin counting in the middle of the counting sequence. The student does not know the pattern of decades up to 100. The student is unable to reproduce the counting sequence between 100 and 120.	The student is able to count successfully to 120.

B. Choosing Instructional Strategies

Consider the following guidelines for teaching about place value:

- Use an "Assessment for Learning" approach to ensure that students understand the learning intentions for all activities, understand what distinguishes quality work, receive descriptive feedback about their progress and have opportunities for self and peer assessment. For example, use the "Traffic Lights for Place Value" masters found at the end of this document. Students can use this tool for self-assessment before and after learning about place value.
- Immediately after presenting a task, have students discuss the task with a partner and make predictions as to the outcome of the task.
- Have students work in partners or groups of three or four to complete tasks.
- Invite students to reflect on their predictions after a task has been completed.
- Plan a significant amount of time for students to compare strategies and outcomes as a whole class after a task has been completed. During this time, ask questions about the efficiency and mathematical thinking of particular responses in order to encourage greater abstraction and mathematical elegance.
- As much as possible, use real quantities and hands-on activities to teach about place value so that an understanding of place value number patterns and conventions is tied into an experience of the magnitude and meaning of numbers.
- Ensure that tasks are differentiated. Have students who are struggling do the same tasks using lower numbers, including 2-digit numbers. Students who have mastered 3-digit numbers can be introduced to the terminology and conventions for numbers into the millions. It is a good idea to post a chart showing how the number naming system works – progressing from units, tens and hundreds to units, tens and hundreds of thousands, then to units, tens and hundreds of millions. Some students are already beginning to form understandings and misconceptions about these large numbers in Grade 3.
- Make sure you include problems and activities that use numbers with zero in the tens place and the ones place.
- Rather than treating place value as a discrete unit, teach about place value as students need the concepts in order to solve problems and complete other number-related tasks.
- Reinforce place value concepts throughout the year, through solving problems involving 3-digit numbers in meaningful contexts and through games involving 3-digit numbers, cumulative scoring or bundling into tens and hundreds.

C. Choosing Learning Activities

The following learning activities are examples of activities that could be used to develop student understanding of the concepts identified in Step 1.

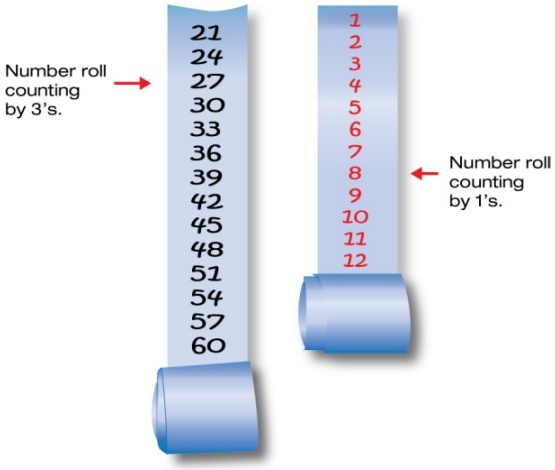
Sample Activities:

1. **Number Rolls** (p. 10)
2. **Make Your Own Materials** (p. 11)
3. **Party Paper Chains** (p. 13)
4. **Representing Numbers in Different Ways** (p. 14)
5. **Different Ways to Count Money** (p. 16)

Sample Activity 1: Number Rolls

What Is a Number Roll?

Number Rolls are simply strips of paper with the counting sequence written vertically, that are taped to a straw or a toilet roll at the top edge and then rolled up so that more numbers can be added.



Creating Number Rolls

If number rolls are made on strips of grid paper, they can also be used to measure and compare lists of numbers. One way to do this is to use a three-column format in a word processing document and make tables, 3 columns wide and 20 rows long, in each column. After these pages are photocopied they can be cut into three strips each. Students glue or tape strips onto the end of their number roll as they need them.

Using Number Rolls

Students can continue their number roll over the course of the whole school year, learning the pattern of digits in its increasing complexity, in order to gain greater and greater number sense. Some students are very motivated to do this, in order to see how high they can go. This generates lots of discussion about large numbers. It also shows how each new power of 10 is exponentially larger that the last. Encourage predictions and observations about patterns in the numbers and about magnitude of numbers. How long will it take to get to 2000? 3000? 10 000? Students often enjoy unrolling their long strips in a hallway or the gym. This helps them gain a visual and experiential sense of the magnitude of large numbers.

Initially, number rolls are a great way to make sure that all students can count and write numbers correctly over 100. In the beginning, number rolls are good as a whole class activity. Students can continue to work on number rolls as an activity for fast finishers or a choice or centre activity.

Variations of Number Roll Activities

Some variations on the basic number roll activity include having groups of students work together in a 20-minute window to see how far they can get along the number sequence by collaborating. This works best with 11-inch strips of pre-prepared grid paper. Students divide up the work in a way that shows whether or not they understand the patterns in how the numbers are written. At the end of the 20 minutes, the whole class can discuss its strategies, including why they worked and which strategies were most efficient.

A variation for students who show a good understanding of numbers to 1000 is to use a 4-column-wide-grid and have them start at 1000.

Sample Activity 2: Make Your Own Materials

Draw on prior knowledge by asking students to tell you what they know about large numbers. What do they think is the best way to group items to count a large group most efficiently? Why? If necessary, experiment with different ways to skip count a set of objects.

Look For …

Do students:

- ☐ group objects in order to count a large collection?
- ☐ appreciate that grouping in tens is efficient because it fits with how the number system works?
- ☐ count groups of 10 with the understanding that each 10 is both 10 ones and 1 ten?
- ☐ relate numbers in problems to real quantities in order to come up with realistic estimates and answers?
- ☐ explain their strategies?
- ☐ explain the relationships between different representations of large numbers?

Estimating Large Quantities

Let them know that you are going to work together as a class to make some materials that they can use to solve problems. As an initial activity, show them a container of about 1000 dried beans, and tell them that you are going to work together to estimate the number of beans. Then give each student or pair a miniature paper cup or deli container of the right size to hold about 50 beans and ask them to count the beans (if you cannot find the right size containers, use one small container and work together in a large group). Have students report their answers and figure out about how many beans in each deli container? Is there a "friendly number" that is close to the number?

Return the beans to the large container and brainstorm ways to arrive at an accurate estimation for the total amount. Once they have an idea about a way to figure out the total in the large container, have students work in pairs or small groups to estimate the number of beans.

Creating Place Value Manipulatives

As a class, discuss strategies and solutions to the estimation problem and agree on an estimation of the number of beans in the large container. Next, pose the following problem to the students: Given your estimation of the number of beans, how many popsicle sticks would we need if we were planning to glue 10 beans on each popsicle stick and we wanted to use up all the beans? Have students work in partners to solve this problem. Reconvene in a large group to talk about solutions. (An extension of this problem is to ask students who finish early to figure out how many packages of popsicle sticks you will need to buy in order to do this task. You will need to provide them with a sample package so they can figure out how many popsicle sticks in one package.)

Arrange for a work period when students can glue 10 beans on each popsicle stick. It is important that all students, who are in the process of forming place value understanding, get to experience this work. These materials are a little more fragile than regular base ten materials, but much more meaningful to students, especially students who are struggling to understand place value. They can be made a little stronger if a second line of glue is drawn over top of the beans after they have been glued on the sticks. Once they are dry, have students glue 10 popsicle sticks together using cross-pieces to make 100 flats. Continue until you have a large collection of both 10 sticks and 100 flats.

Using Place Value Manipulatives

Distribute materials to small groups, and see how quickly they can use the materials to represent 3-digit numbers that you call out or show on flash cards or the overhead. Is this better than if they had to represent these numbers with single beans? Can they think of other ways or other materials that would represent numbers as quickly? In what ways are these materials similar to the beans? Students will now have the choice of the materials they made or other materials or representations to use when solving problems involving 2-digit and 3-digit numbers.

Sample Activity 3: Party Paper Chains

Setting the Task
This activity builds place value understanding by helping students construct the relationships between the places, appreciate the magnitude of the digits, and unitize, while they prepare to decorate a room for a special event. You will need to prepare an 8.5 × 11 inch master that, when photocopied, will be cut into five or six 11-inch strips to make links in a paper chain. **Each** of these strips needs to have **10** similar images on it; for example, 10 pumpkins on each strip in the fall, 10 hearts for Valentine's Day or 10 flowers in the spring. A few students can help to prepare the master by drawing the images on the strips. All the images need to be of the same thing, or the same class of things; e.g., flowers.

Completing the Task
You will need to make photocopies of the master in different colours. Each student or pair of students needs to cut apart 10 links in one colour and make a chain that is 10 links long. Those who finish can make a second chain that is 10 links long in a different colour and use it to join their chain with someone else's chain. Each piece of chain should be joined to another piece of chain 10 links long of a different colour. In this way the group can make one long chain. Fast finishers can make extra lengths and join them on. The chain can then be hung up and used to answer any of the following questions:

- How many lengths of chain did we make? How many links was that? How many flowers (valentines, pumpkins, etc.)?
- If we wanted to extend the chain to the wall or along a different wall, about how many more 10-link lengths would we need? How many links would that be? How many flowers? How long would the total chain be in lengths, links and flowers?
- As the chain gets longer and longer, how could we mark it to make it easier to count? If we tied a ribbon on every 100th link, how many ribbons would we need? How many 10-link lengths in each 100 links? (For students who are beginning to understand numbers greater than 1000, how many flowers?)
- Imagine making the chain long enough to decorate all the way around the gym. How many 100-link lengths do you think we would need? How many links would that be? How many 10-link lengths?

Extensions
After experiencing the activity of making the chains, many students can answer these questions using mental mathematics. Students can also be asked to record their thinking on paper and explain to the group how they arrived at their solution. This is also a great activity to write about in a mathematics journal, in response to a question like, "What did you learn about numbers when we made the paper chain together?" Students can also write their own problems about party paper chains.

Sample Activity 4: Representing Numbers in Different Ways

Draw on prior knowledge by working with the whole class and counting a collection of objects first by ones, then by different groupings. What happens when you count a collection in different ways?

Look For …

Do students:

- ☐ clearly understand that a collection can be counted in different ways?
- ☐ understand that the total of the collection doesn't change no matter how it is arranged or counted?
- ☐ understand that when they get to single objects after counting groups of 10 × 10s, they count on by ones?
- ☐ show the ability to represent the same number in different ways, including different groupings, different manipulatives and different types of notations?

Warm-up

As a warm-up activity, have students work with a partner to count pre-prepared bags of objects (counters). Each bag should have between 30 and 60 objects inside. The first student counts the objects by ones and secretly records the number on a piece of paper. The second student groups the objects in tens and ones and records the answer. Then the students compare answers. To change roles, they switch their bag with another group (or with you if you have a few extra bags) and repeat the process. Discuss results with the whole group.

Next, ask students to arrange the objects in their bags using different groups of tens and ones. Challenge them to find all the different ways they can do this, and have the students record the ways by drawing on paper.

Solve a Problem

Pose a problem like the following:
"A candy shop sells chocolates in boxes of 10, placed on the shelves, or as singles in a display case. The shop receives the boxes in crates of 10 boxes per crate, which they keep behind the counter to restock the shelves and the display case. The shop has 824 candies in stock. The shopkeepers need to know that all of their chocolate is accounted for. What are some of the different ways those candies could be found in the shop, if some are in the display, some are on the shelves in boxes, and some are in crates?"

This problem helps students understand grouping and regrouping of numbers, because the context and the need to count the chocolates are based on reality. The need to see if different groupings are equal is a real need in this context. Most students can relate to the shopkeepers' need to keep track of their stock, especially because it is candy.

Share Solutions

Have students work on their own or with a partner to figure out at least four possibilities for the chocolate in the shop. They can use materials or paper to figure out their answers. You should circulate and encourage students to find ways to record their answers that are easy for others to understand.

When students have generated a number of solutions, bring the group together and share solutions. What seems like a good way to record solutions to this problem? Choose a recording strategy and use chart paper to record everyone's answers. Are there repeat solutions? Is it possible that there are solutions that students didn't discover? How many?

Are there any solutions that are unlikely? Why? Would it be likely for a shop to display only 2 boxes of chocolates and 4 single ones, keeping 800 chocolates in crates behind the counter? Can anyone think of different situations that would mean there were a lot of candies on display, or hardly any?

Extension
On another occasion, repeat this activity with a similar problem but this time use a number like 604, with a zero in the tens place.

Follow-up Activity
A follow-up to this activity involves using materials to represent a number without a problem or context. Pass out a selection of homemade materials made from beans and popsicle sticks or other pre-grouped base ten materials to groups of students. Ask students if they can figure out how the base ten materials are similar to the chocolates, chocolate boxes and shipping crates.

Make sure each group has a large number of units and tens. Pass out pre-prepared cards with 3-digit numbers on them. Have the students work together to show the number in four different ways, and record their results on paper using dots for units, lines for tens and squares for hundreds.

Using just the notation described above, groups can continue to work on finding different ways to show their number, or try to find all the ways of showing a different 3-digit number. Can they find all the ways? How do they know they have found all the ways?

Ask students to record their solutions using just numbers and addition symbols on a separate piece of paper. For example, if their solution was 8 hundred flats, 3 ten bars and 1 unit cube, they could write 800 + 30 + 1. (If this is challenging for students, work with place value cards to show how numbers can be composed and decomposed according to magnitude of each digit.) How would they write an expression to represent the solution 7 hundred flats, 13 ten bars and 1 unit cube?

Work with the large group to find as many ways as possible to represent a given 3-digit number. Challenge students to prove that they have found all the possible representations. Challenge them to also write their solutions using numbers and addition symbols, as in the example above. What do they notice about writing numbers this way?

Sample Activity 5: Different Ways to Count Money

Money is a great example of a non-proportional material. A dime does not look like 10 pennies, even though it is equivalent. In contrast, when using base ten materials, equivalent amounts look similar.

Students become invested in activities that involve the counting of money when there is a genuine purpose for counting coins, and the money represents something of real value to students.

Look For …

Do students:

- ☐ understand the value of different coins?
- ☐ group coins of different denominations in order to count them?
- ☐ understand that there are different ways to represent the same amount using different coins?

Warm-up

As a warm-up activity, use transparent coins and an overhead. Put the coins on the overhead in a random fashion, starting with just a few dimes and pennies. Have students work alone or in groups to count the money. Have students explain their counting strategies at the same time they give their answer. Increase the difficulty by including nickels and numbers of pennies and dimes that are greater than 10.

During this activity, have a discussion around the fact that 100 pennies is the same as one dollar. Introduce the overhead dollar coin and begin to include it in the questions you are asking. If your group is very comfortable with this activity, include quarters as well.

Solve a Problem

Next, let the students know that you will be giving each of them the same amount of money (for a particular purpose of your choosing). The amount you will be giving them will be $1.32. Ask a student to come to the overhead and show that amount using overhead coins. Encourage the student to use a fairly small, simple number of coins to show this amount. Repeat with another student. Make sure that someone shows the amount using 1 dollar, 3 dimes and 2 pennies, as well as 1 dollar, 1 quarter, 1 nickel and 2 pennies if you are using quarters.

Now tell students they will only get their money when they come up with a new and different way to make $1.32; one that is not already on the overhead. Have students come up with four or five ways, and then go through the class, adding the solutions to the board or the overhead, until you have a different solution from each member of the class.

Extension

A variation on this activity is to give identical amounts of money in baggies or envelopes to each of your students, made up in different ways; for example, in red envelopes as part of a Lunar New Year celebration. The students automatically count and compare the amounts, realizing that even though the make up of the coins is different for each of them, the amount is the same.

Step 4: Assess Student Learning

Guiding Questions

- Look back at what you determined as acceptable evidence in Step 2.
- What are the most appropriate methods and activities for assessing student learning?
- How will I align my assessment strategies with my teaching strategies?

In addition to ongoing assessment throughout the lessons, consider the following sample activities to evaluate students' learning at key milestones. Suggestions are given for assessing all students as a class or in groups, individual students in need of further evaluation, and individual or groups of students in a variety of contexts.

A. Whole Class/Group Assessment

Place Value Test

The following test, Understanding Place Value, can be given to the whole class, to small groups or to individual students, either as a written test or orally. It can be broken up by giving one question or a few questions at a time. The test can be easily modified using different numbers to give students many chances to succeed.

Circulate while students are completing the first question to make sure they are actually drawing 124 marks. When they are finished this part of the test, circle the 4 and ask them to circle the number of marks shown by this part of the number. Next, circle the 2 and ask the student to show in their drawing what the 2 means. Finally, circle the 1 and ask what it means. (This activity is adapted from *About Teaching Mathematics: A K–9 Resource* (p. 182) by Marilyn Burns, Copyright 2000 by Math Solutions Publications.)

Next, make notes on how students approach the final task, to represent numbers in different ways. Do they have a robust understanding of number that allows them to easily translate between; for example, 15 tens and 150? Can they explain their choices in terms of equalities between different groups and units (e.g., 4 hundreds, 40 tens, 100 + 100 + 100 + 100 units)?

Understanding Place Value

Name _____

Use marks to show the number 124:

How many ways can you make $0.32? Show all your ways.

Show the number 403 in three different ways using squares for hundreds, lines for tens, and dots for ones. Then use numbers to show what you did:

_____+_____+____	_____+_____+____	_____+_____+____

SCORING GUIDE
Place Value

Level / Criteria	4 Excellent	3 Proficient	2 Adequate	1 Limited	Insufficient / Blank
The Meaning of the Places	I drew 124 marks in a way that is easy to see and count. I know how many marks are represented by each of the different digits in the number. I communicated my understanding with clarity. ☐	I drew 124 marks. I was able to circle the correct number of marks represented by each of the digits in the number. ☐	I drew 124 marks. I may have been able to show how many marks were represented by the 4 but was not able to show how many were represented by the 2 or the 1. ☐	I had difficulty drawing and counting 124 marks. I may have been able to show how many marks were represented by the 4 but was not able to show how many were represented by the 2 or the 1. ☐	I could not draw and count 124 marks. ☐
Representing Money in Different Ways	I found 17 correct ways to represent $0.32. I approached this problem in a systematic and organized way and clearly communicated my solution. ☐	I found at least 13 correct ways to represent $0.32. There is some evidence of organization in my solution strategy. My work is readable. ☐	I found at least six correct ways to represent $0.32 using trial and error. My work may not be well organized or easy to read. ☐	I found three or fewer correct ways to represent $0.32. ☐	I could not show $0.32 using coins. ☐
Representing Numbers in Different Ways	I can represent a number in many different ways using base ten blocks, pictures, symbols and numbers. I can explain why I made all the choices that I made to represent numbers. ☐	I can represent a number in at least three different ways using base ten blocks, pictures, symbols and numbers. I can explain why my representations make sense. ☐	I can represent a number in at least one non-standard way using base ten blocks, pictures, symbols or numbers. ☐	I can represent a number as a numeral or as single counters, tallies or dots. I may be able to show a number using base ten materials without really understanding the materials. ☐	I cannot represent a number in any way other than as a numeral. ☐

Name _____

B. One-on-one Assessment

1. Using base ten materials, ask the student to predict and prove how many singles would equal a ten bar or a hundred flat, and then how many ten bars would equal a hundred flat. Then ask the student to show you how he or she might represent 1000 without using single beans or cubes.

   Use the following accommodations, if necessary:

   - Prompt the student to count the beans or cubes in the material.
   - Use base ten materials that can be joined together and broken apart again.

2. Give the student a number, such as 541, and ask the student to represent this number using base ten materials. Then ask the student to show the same number a different way. Ask the student to describe the two ways, including what is the same and what is different.

   Use the following accommodations, if necessary:

   - Use place value cards (number cards that show expanded notation when pulled apart, or conventional notation when stacked) to make the number.
   - Use base ten materials that can be joined together and broken apart again.
   - Prompt the student to say first what is the same, and then what is different.

3. Make a number, such as 216, using base ten materials, without saying the number. Ask the student to write the number represented. Circle each of the digits, starting from the units, and ask the student to show you that amount in single beans or cubes.

   Use the following accommodations, if necessary:

   - Prompt the student to pay attention to the grouped materials that were used to make the number in the first place.
   - Have the student use place value cards (number cards that show expanded notation when pulled apart, or conventional notation when stacked) to make the number.

C. Applied Learning

- Provide opportunities for students to experience bundling or grouping for a real purpose in a way that makes counting a collection more efficient. For example, to recycle juice containers, squash and bundle with elastic bands in groups of 10, and put 10 bundles each in grocery bags.
- Provide opportunities for students to group money in order to count it; for example, 10 pennies in each of 10 stacks is the equivalent of $1.00.
- Read aloud from the selection of children's books that exist on topics like large numbers, counting objects or bundling to count.

- Have students do inventories of classroom materials for you by grouping to count; e.g., craft materials, mathematics manipulatives, toys, general supplies.

Step 5: Follow-up on Assessment

Guiding Questions

- What conclusions can be made from assessment information?
- How effective have instructional approaches been?
- What are the next steps in instruction?

A. Addressing Gaps in Learning

Students who have difficulty with place value may not understand how numbers work. They may need more experience with counting large collections, reading and writing numbers, ordering numbers and grouping to count.

For example:

- Have students continue to create their own base ten materials, and use linking cubes to compose and decompose groupings of 10 and 10 tens. Encourage students who seem to use base ten materials without understanding to count sets both by ones, and by ones, tens and hundreds to show that the count is the same.
- Allow students to use base ten materials and place value cards when figuring out problems involving 2- and 3-digit numbers.
- Encourage students to use base ten materials and place value cards when filling in their number roll to create a visual understanding of magnitude of large numbers.
- Allow students to use their number rolls as reference materials to order cards printed with non-sequential 3-digit numbers.
- Have students talk about their understanding of the magnitude of numbers and how numbers are written. Ask questions that prompt students to explain their thinking and the rules they are applying as they write, record, compose, decompose and use 3-digit numbers.
- Have students use the constant function on a calculator to count up by ones, and encourage them to predict what comes next, especially as they transition between hundreds, and between, for example, 109 and 110, 209 and 210, and subsequent numbers into the teens and twenties of each hundred.

B. Reinforcing and Extending Learning

Students who have achieved or exceeded the outcomes will benefit from ongoing opportunities to apply and extend their learning. These activities should support students in developing a deeper understanding of the concept and should not progress to the outcomes in subsequent grades.

Consider strategies, such as the following.

- Use a chart to illustrate the place value pattern of naming numbers through the thousands and into the millions. Have students copy this chart and extend it into the billions and trillions.

- Have students research the naming of numbers greater than one trillion according to the North American numbering system.
- Have students, who have a clear understanding of the North American numbering system, research the Indian and British numbering systems and make up a guide or table to show how the same number would be named in the three different systems. How might the different definitions of the meaning of a billion be confusing for people who use either the British system or the North American system but read the same news stories? Students can make up an activity for their classmates (and teachers) to translate different number names between the systems.

Traffic Lights for Place Value

Colour the light

- green for **yes**
- yellow for **maybe**
- red for **no**

Student Name_____

Before		After
O	I can say, read and write numbers correctly, in order, to 1000.	O
O	I know how much is represented by each of the digits in any 3-digit number.	O
O	I can use different coins to show an amount of money in more than one way.	O
O	I can use materials to show a number in more than one way.	O

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