Grade 2 Mathematics

Number

Grade 2: Number (2.N.1)

Enduring Understanding:

Counting is a strategy for finding the answer to how many.

Essential Question:

Is there a quicker way to find the answer than counting by ones from one?

Specific Learning Outcome(s):	**Achievement Indicators:**
2.N.1 Say the number sequence from 0 to 100 by ■ 2s, 5s, and 10s, forward and backward, using starting points that are multiples of 2, 5, and 10 respectively ■ 10s using starting points from 1 to 9 ■ 2s starting from 1. [C, CN, ME, R]	➢ Extend a skip-counting sequence by 2s, 5s, or 10s forward and backward. ➢ Skip-count by 10s, given any number from 1 to 9 as a starting point. ➢ Count by 2s starting from 1 or from any odd number. ➢ Identify and correct errors and omissions in a skip-counting sequence. ➢ Count a sum of money with pennies, nickels, or dimes (to 100¢). ➢ Count quantity using groups of 2s, 5s, or 10s and counting on.

Prior Knowledge

Students may have had experience

- counting by
  - 1s forward and backward between any two given numbers (0 to 100)
  - 2s to 30, forward starting at 0
  - 5s and 10s to 100, forward starting at 0
- demonstrating an understanding of counting by
  - using the counting-on strategy
  - using parts or equal groups to count sets

Background Information

Stages of Counting

Rote Counting (Ages 2 to 6): Most preschool children learn some counting words, even though they may not say these words in the correct order.

With experience, they learn the proper sequence (stable order) but may be unable to make one-to-one correspondence between the object being counted and the number names that are applied to them.

Rational Counting (Ages 5 to 7): The students attach the correct number name to each object as it is counted (one-to-one correspondence).

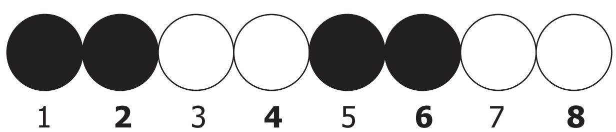
The students understand that the final count number indicates the number of objects in a set (cardinality).

Strategic Counting (Ages 5 to 8): Counting on and counting back are two strategies that extend students' understanding of numbers and provide a basis for later development of addition and subtraction concepts.

In counting on, the students count forwards beginning at any number. Counting back is challenging for many young students, and students need many opportunities to gain skill and confidence in counting backwards from different numbers.

It is important that students realize that skip-counting sequences relate to putting groups of the same number together.

Example of counting by 2s



Therefore the count is 2, 4, 6, 8 …

Mathematical Language

Counting numbers:

one to one hundred	count back
count on	penny
skip count	nickel
set	dime
number	money
numeral	

Learning Experiences

Assessing Prior Knowledge: Interview

Rote Counting

1. Ask the student to
   a) count forward by 1s starting at 36 (stop the count at 46)
   b) count backward by 1s starting at 82 (stop at 72)
   c) count by 2s starting at 0 (stop at 30)
   d) count by 5s starting at 0 (stop at 100)
   e) count by 10s starting at 0 (stop at 100)

2. Tell students
   a) "I have a set of 27. Finish the counting so the set will equal 35."
   b) "Here are 63 pennies. Count in more pennies until there are 80."

Observation Checklist

Students are able to

- ❑ count forward by 1s over the decade
- ❑ count backward by 1s over the decade
- ❑ count by 2s to 30
- ❑ count by 5s to 100
- ❑ count by 10s to 100
- ❑ count on from a given number in the range 0 to 40
- ❑ count on from a given number in the range 60 to 80

- **Extend a skip-counting sequence by 2s, 5s, or 10s forward and backward.**
- **Skip-count by 10s, given any number from 1 to 9 as a starting point.**
- **Count by 2s starting from 1 or from any odd number.**
- **Identify and correct errors and omissions in a skip-counting sequence.**
- **Count a sum of money with pennies, nickels, or dimes (to 1004).**
- **Count quantity using groups of 2s, 5s, or 10s and counting on.**

Suggestions for Instruction

- Use groups/tallies for everyday counting, for example,
  - by 2s: "If everyone in our class wanted to wear 2 rings, how many rings would be needed?"

    ○○ ○○ ○○ ...
    2 4 6 …

  - by 5s: "How many students are having milk today? How much milk does our class drink at lunch in 1 month?"
  - by 10s: "How many fingers are there at our table/in our group? How many fingers are there in our classroom?"

BLM 2.N.1.1

- Have students create visuals to represent counting by 2s, 5s, and 10s. This could be done with a digital camera, drawings (hand or computer drawn), prints, etc.

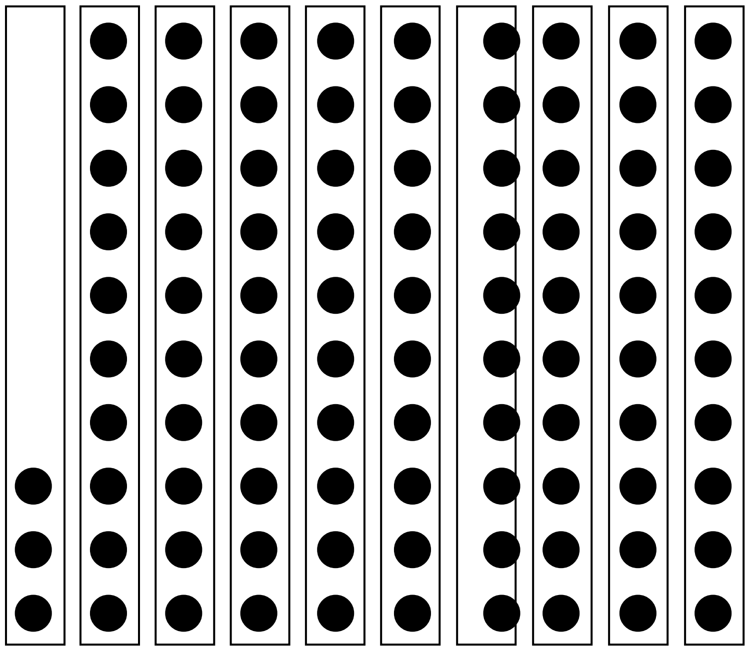
5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80

- **Skip-Counting Songs:** As a class, make up skip-counting songs by piggybacking the words on to familiar songs.

  Go to websites such as CanTeach at <www.canteach.ca> for examples of songs.

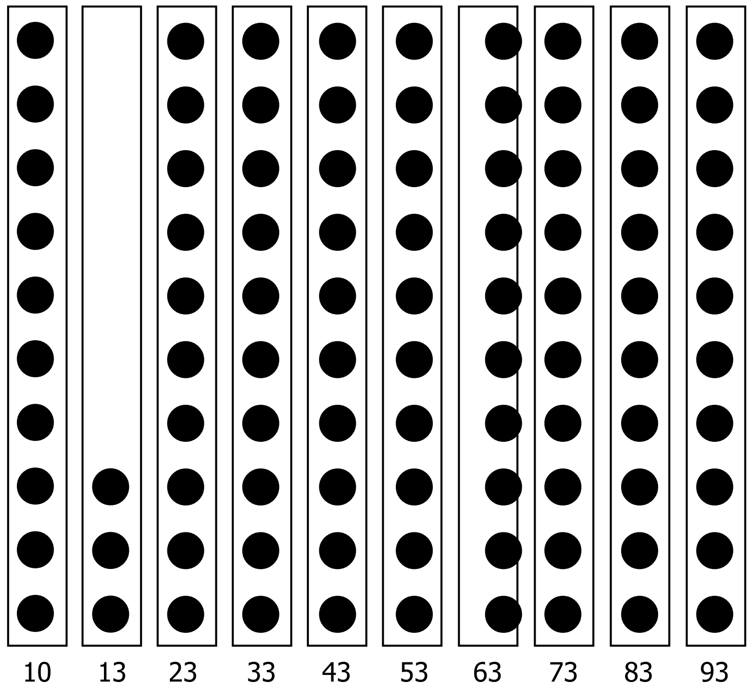
BLM 2.N.1.2

- **Ten-Strips:** Use a set of ten-strips along with strips containing 1 to 9 dots (digit strips) to help students count by 10s off the decade.
  - Begin by using only ten-strips. Have students count by 10s, forward and backward, as you add or subtract the strips one at a time.
  - Begin with a digit strip and then add ten-strips. Some students will need to count the first couple of strips by 1s at first. Remove strips as they count backward.



3 13 23 33 43 53 63 73 83 93

- Begin with a ten-strip and then add a digit strip followed by a series of ten-strips. Remove strips as they count backward.



BLM 2.N.1.3

- **Skip-Counting Patterns on the Hundred Chart:** Have students shade in or place counter on the skip-counting patterns for 2, 5, and 10 on a hundred chart. Ask questions such as the following:
  - What pattern do you see when you count by 2s and begin with 2?
  - What do you notice when you count by 2s and begin with 1? Why?
  - What happens if you skip count by 10s and start with 6? What do you notice? What if you start with 4?

- **Calculator Counting:** Have students use the constant key on the calculator for skip counting. For example,

  Key in 1 + = then keep pressing equal. The calculator continues to count on in steps of 1.

  Key in 1 + 2 = = then keep pressing equal. The calculator counts on in steps of 2, starting at 1.

  Students can record the skip-counting patterns on a hundred chart.

The constant function key (=) on the calculator provides an opportunity for students to see patterns in counting.

Subtraction: Key in the start number then the subtraction sign followed by the number you want to subtract. Continue pressing equal.

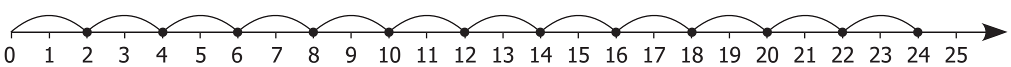
Use an overhead calculator or an interactive whiteboard calculator if possible. Use the constant key function to enter the start of a skip-counting pattern. Have students predict the next number.

Extension: Have students key in the skip-counting pattern you want to explore, for example, enter

3 + 10 =

Have them place their finger over the equal symbol without pressing the key and close their eyes. Ask them to press the equal symbol until they think their display will show 83. Open their eyes and check. Repeat with other forward and backward counting sequences.

- **Number Line Jumps:** Use a number line to show the skip-counting patterns, for example, counting by 2s.



- Orally present a skip-counting sequence with an error or an omission (for example, 5, 10, 15, 20, 30, 35, 40). Have students identify the incorrect or missing number.

BLM 2.N.1.4

- Prepare sets of cards for the different skip-counting sequences (2s on and off the multiple, 5s on the multiple, 10s on and off the multiple). Have students
  - work with one set and order them
  - find the error or omission in a pre-arranged sequence
  - work with two sets and sort them according to the sequence (for example, counting by 2s and counting by 5s) (**Note:** Students will recognize that some of the counting sequences share the same numbers. This would be a good opportunity to use a Venn diagram for the sorting.)

- **Problem Solving:** Present the following problem.

  Two friends are counting. One starts at 25 and counts by 5s to 100. The other starts at 20 and counts by 10s to 100. Predict who will say the most numbers. Explain.

  Ask:
  - What numbers do they say?
  - What numbers are the same for both?

  Extension:
  - What are the next two numbers they will both say if they count past 100? Explain how you know.

- **What's in My Bank?** Place a collection of pennies, nickels, or dimes in small containers (representing piggy banks). Have students count the collections and record their results.

  Extension: Make collections using two different coins. Have students count from the largest coin and then count on.

> Students need to be able to identify pennies, nickels, and dimes, and to state their value.

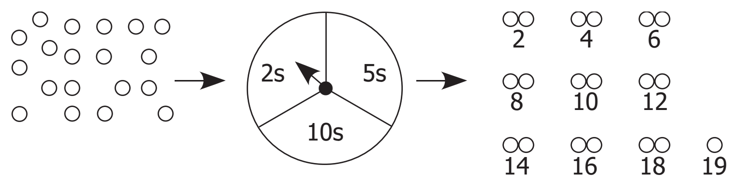
BLM 2.N.1.5

- **It's a Handful!**

  Materials: small counters (centimetre cubes, pennies, beans), spinner

  Directions: The student takes a handful of counters and then spins the spinner. The counters are grouped by the number shown on the spinner and then counted.

  Example:



Assessing Understanding: Interview

Ask the students to

- start at 42 and count by 2s (stop at 60)
- start at 13 and count by 2s (stop at 31)
- start at 78 and count backward by 2s (stop at 64)
- start at 30 and count by 10s (stop at 100)
- start at 7 and count by 10s (stop at 57)
- start at 100 and count backward by 10s (stop at 40)
- start at 15 and count by 5s (stop at 60)
- start at 85 and count backward by 5s (stop at 55)
- count a set of counters by 2s, 5s, or 10s, and count on

Observation Checklist

Students are able to

- ❑ Count by 2s
  - ❑ forward on the multiple
  - ❑ forward off the multiple
  - ❑ backward on the multiple
- ❑ Count by 10s
  - ❑ forward on the multiple
  - ❑ forward off the multiple
  - ❑ backward on the multiple
- ❑ Count by 5s
  - ❑ forward on the multiple
  - ❑ backward on the multiple
- ❑ Count a set in groups and count on.

NOTES

Grade 2: Number (2.N.2, 2.N.3)

Enduring Understandings:

Numbers are used to represent quantities or position.

Numbers can be described in many ways.

Essential Questions:

What makes a quantity odd or even?

How do you know if a number is odd or even?

How are numbers used to describe position?

Specific Learning Outcome(s):	Achievement Indicators:
2.N.2 Demonstrate if a number (up to 100) is even or odd. [C, CN, PS, R]	➣ Determine if a number is even or odd by using concrete materials or pictorial representations. ➣ Identify even and odd numbers in a sequence, such as in a hundred chart. ➣ Sort a set of numbers into even and odd.
2.N.3 Describe order or relative position using ordinal numbers. [C, CN, R]	➣ Indicate the position of an object in a sequence by using ordinal numbers. ➣ Compare the relative position of an object in two different sequences.

Prior Knowledge

Students may have had no formal instruction in this area.

Background Information

Even numbers end in 0, 2, 4, 6, or 8. Odd numbers end in 1, 3, 5, 7, or 9. Students should arrive at these generalizations through hands-on experiences.

The terms "odd" and "even" are used in real-life situations as well as in mathematics. Odd means strange, extraordinary, or unusual outside of mathematics. The term "even" can relate to a balance scale. It can also be used in sharing situations; for example, if you are sharing 12 candies with 3 people you could say that they all have an even number. In this case "even" means "the same." It is important that the vocabulary be explored with students so that they have a clear understanding of the mathematical definitions as they relate to number.

Ordinal numbers should be used in meaningful ways in the classroom (e.g., lining up, giving directions, dates, etc.).

Mathematical Language

odd

even

ordinal numbers (to 100)

position

Learning Experiences

Assessing Prior Knowledge: Informal Classroom Discussion

Arrange a group of students in a line. Ask students to identify the position of each person. Make note of the language used.

Ask students to tell you what the words *odd* and *even* mean. Make note of their interpretation of the terms.

- **Determine if a number is even or odd by using concrete materials or pictorial representations.**
- **Identify even and odd numbers in a sequence, such as in a hundred chart.**
- **Sort a set of numbers into even and odd.**

Suggestions for Instruction

- Read a book such as *My Even Day* by Doris Fisher and Dani Sneed, or *Even Steven and Odd Todd* (Hello Math Reader, Level 3) by Kathryn Cristaldi, or *The Odds Get Even: The Day the Numbers Went on Strike* by Pamela Hall to introduce the terms *odd* and *even* as they relate to number.

- **Partner Up!** Have students line up in pairs. Ask, "Do we have an even number or an odd number of students here today? How do you know?" **Note:** This could be done as a quick attendance routine.

  Have the girls line up in partners. Ask, "Do we have an even number or an odd number of girls in the class today? How do you know?" Repeat with the boys.

  Use a set of bear counters if available (any type of counter will work as well). In partners, students take turns taking a handful of counters, estimating how many, pairing them up to check, and then recording the results.

  Example:

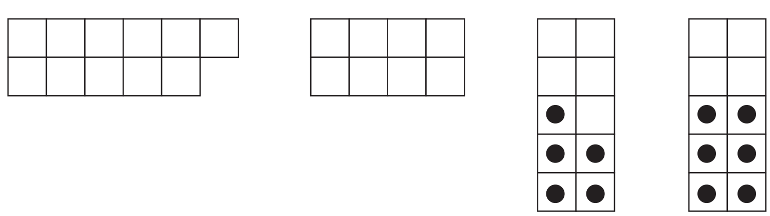
Turn Number	Estimate	Actual	Odd or Even?
1	20	19	Odd
2	18	18	Even

  Compile the class information, listing the odd numbers in one column and the even numbers in another.

- **Odd or Even?** Use grid pictures and ten frames. Have students identify whether the represented number is odd or even and give reasons for their answer.

BLM 2.N.2.1

  Example:



Introduce the poem "Odd and Even" by Marg Wadsworth, which can be found at <www.canteach.ca/elementary/songspoems72.html>.

Discuss the poem with the class.

- **Working through to 50**

BLM 2.N.2.2

Materials: centimetre grid paper, chart paper with 50 spaces in rows of 10

Directions: Assign (or have students draw out of a hat) one or two numbers (1 to 50). Using the grid paper, students cut out a two-column grid to represent each number. Glue the grids on to the chart under the appropriate number.

Example:

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

Ask students to describe the patterns they see on the chart. Possible patterns include

- even, odd, even, odd, . . .
- all the numbers in the 1s column are odd . . .
- all the numbers in the 4s column are even . . .

Assessing Understanding: Paper-and-Pencil/Journal Task

Student Directions:

1. Pick any two numbers between 10 and 100.
2. Tell whether each number is even or odd.
3. Explain how you know.

- **Indicate the position of an object in a sequence by using ordinal numbers.**
- **Compare the relative position of an object in two different sequences.**

Suggestions for Instruction

- Read a book such as *Ten Little Rubber Ducks* by Eric Carle or *The 13 Nights of Halloween* by Rebecca Dickinson to introduce or reacquaint students with ordinal numbers.

  Discuss the use of ordinal numbers in the book and how counting with ordinal numbers is different from "regular" counting. Ask for other examples of when we count using ordinal numbers.

  Line up 10 students in a row. Have the remainder of the students identify a particular person's position in the line using ordinal numbers.

  Have students work in small groups to write their own "ordinal" story.

BLM 2.N.3.1

- **Ordinal Concentration:** Prepare a set of 12 cards—6 cards with matching double (colours, numbers, pictures, etc.) or use the blackline master.

  Show students the cards and explain that they will be looking for pairs.

  Have 12 students line up in front of the room. Give each student one of the cards. Have them hold the cards against their chests so that no one can see the front of their card. Go down the row and identify each person's position (e.g., Paul is first, Mary is second, etc.).

  Select one student from the "audience" to try to make a match. Have the student identify the position of the students whose cards they want to see (e.g., the second person and the seventh person). Note: Students should not call them by name; they should use only ordinal numbers. If the cards match, the students sit down where they are in line so that they maintain the ordinal positions. If they do not match, they turn the cards around and someone else takes a turn. Continue until all matches have been made.

- Use ordinal numbers in everyday classroom activities—lining up, reading the calendar, giving directions, counting the days in school, et cetera.

Assessing Understanding: Paper-and-Pencil

Provide students with a picture.

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Give oral directions such as the following:

- Circle the tenth happy face.
- Draw a line under the third happy face.
- Put a box around the seventh happy face.
- Put a check mark on the twelfth happy face.
- Colour the first happy face.

Grade 2: Number (2.N.4, 2.N.5, 2.N.6, 2.N.7)

Enduring Understandings:

Quantities can be represented in a variety of ways with objects, pictures, and numerals.

The position of a digit in a number determines the quantity it represents.

Essential Questions:

How can quantities be shown?

How many different ways can you represent a number?

Specific Learning Outcome(s):	**Achievement Indicators:**
2.N.4 Represent and describe numbers to 100, concretely, pictorially, and symbolically. [C, CN, V]	➛ Represent a number using concrete materials, such as ten frames and base-10 materials. ➛ Represent a number using coins (pennies, nickels, dimes, and quarters). ➛ Represent a number using tallies. ➛ Represent a number pictorially. ➛ Represent a number using expressions (e.g., 24 + 6, 15 + 15, 40 – 10). ➛ Read a number (0–100) in symbolic or word form. ➛ Record a number (0–20) in words. ➛ Determine compatible number pairs for 20 or 50.
2.N.5 Compare and order numbers up to 100. [C, CN, R, V]	➛ Order a set of numbers in ascending or descending order, and verify the result using a hundred chart, number line, ten frames, or by making reference to place value. ➛ Identify errors in an ordered sequence. ➛ Identify missing numbers in a hundred chart. ➛ Identify errors in a hundred chart.

(continued)

Specific Learning Outcome(s):	Achievement Indicators:
2.N.6 Estimate quantities to 100 using referents. [C, ME, PS, R]	➣ Estimate a quantity by comparing it to a referent (known quantity). ➣ Estimate the number of groups of 10 in a quantity using 10 as a referent. ➣ Select between two possible estimates for a quantity, and explain the choice.
2.N.7 Illustrate, concretely and pictorially, the meaning of place value for numbers to 100. [C, CN, R, V]	➣ Explain and show with counters the meaning of each digit for a 2-digit numeral with both digits the same (e.g., for the numeral 22, the first digit represents two tens [twenty counters] and the second digit represents two ones [two counters]). ➣ Count the number of objects in a set using groups of 10s and 1s, and record the result as a 2-digit numeral under the headings of 10s and 1s. ➣ Describe a 2-digit numeral in at least two ways (e.g., 24 as two tens and four ones, twenty and four, two groups of ten and four left over, and twenty-four ones). ➣ Illustrate using 10 frames and diagrams that a numeral consists of a certain number of groups of 10 and a certain number of 1s. ➣ Illustrate using proportional base-10 materials that a numeral consists of a certain number of tens and a certain number of ones. ➣ Explain why the value of a digit depends on its placement within a numeral.

Prior Knowledge

Students may have had experience

- representing and describing numbers to 20 concretely, pictorially, and symbolically
- reading number words to 20
- determining compatible number pairs for 5, 10, and 20
- placing numerals on a number line with benchmarks 0, 5, 10, and 20

Note: Students may have had no formal instruction in place value.

In Grade 1, students may have had experience "demonstrating, concretely and pictorially, how a number, up to 30, can be represented by a variety of equal groups with and without singles."

Background Information

Part-whole relationships refer to the idea that numbers can be broken down into parts, and that these parts can be compared to the whole. According to John Van de Walle, to conceptualize a number as being made up of two or more parts is the most important understanding that can be developed about number relationships.

A pair of numbers that is easy to work with mentally (also known as friendly or nice numbers) are said to be **compatible**.

$$3 + 6 + 7 + 4 =$$

$$10 + 10 = 20$$

When solving this number sentence, it is easier to look for combinations that make 10.

Note: Students are able to represent numbers in different ways before understanding place value. As place value understanding develops, student representations will become more complex.

In order to understand and use place value, students need to be able to "think in groups" or to unitize. They need to see 10 as a unit and not as a collection of 10 individual parts.

In 1989, Sharon Ross (cited in Van de Walle and Folk 205) identified five distinct levels of understanding of place value based on responses to the following task:

- Place 36 blocks on the table and have the students count them.
- Have them write the number that tells how many there are.
- Circle the 6. Ask, "Does this part of your 36 have anything to do with how many blocks there are?"
- Circle the 3. Ask, "Does this part of your 36 have anything to do with how many blocks there are?"
- Do not give clues.

Levels of Understanding of Place Value

1. **Single numeral:** The students write 36 but view it as a single numeral. The individual digits 3 and 6 have no meaning by themselves.
2. **Position names:** The students identify correctly the tens and ones positions but still make no connections between individual digits and the blocks.
3. **Face value:** The students match six blocks with the 6 and 3 blocks with the 3.
4. **Transition to place value:** The 6 is matched with the six blocks and the 3 with the remaining 30 blocks but not as three groups of 10.
5. **Full understanding:** The 3 is correlated with three groups of 10 blocks and the 6 with six single blocks.

At the end of Grade 2, level 4 understanding (transition to place value) is expected.

Mathematical Language

ten frame
represent
place value
base-10 blocks
tally
coins
penny
nickel
dime
quarter
number words to 100
number sentence
expression
order
ascending
descending
greatest
least

Learning Experiences

Assessing Prior Knowledge: Cooperative Group Activity

Materials: various math materials/manipulatives, chart paper, markers

Put students into small groups (two to four students). Assign each group a number between 15 and 20 (adjust the numbers if needed). Have each group represent their number in as many ways as possible.

Have each group present their representations to the class.

Observation Checklist

Observe students as they work and during their presentation to determine if they are able to represent their number in a variety of ways using

- ❑ materials such as counters, cubes, ten frames, beaded number line, fingers, money, base-10 materials, dominoes, et cetera
- ❑ pictures and tallies
- ❑ number sentences or expressions

Also determine if students are able to explain their representations.

Record the various representations used on a chart for students to use as a reference. Additional representations can be added over the course of the year.

- **Represent a number using concrete materials, such as ten frames and base-10 materials.**
- **Represent a number using coins (pennies, nickels, dimes, and quarters).**
- **Represent a number using tallies.**
- **Represent a number pictorially.**
- **Represent a number using expressions (e.g., 24 + 6, 15 + 15, 40 – 10).**
- **Read a number (0–100) in symbolic or word form.**
- **Record a number (0–20) in words.**

Suggestions for Instruction

- **Daily Routine—Number of the Day:** Organize students into teams of two. Assign the routine to a different team each day. This can be used as assessment for learning. It also helps to keep the concepts "fresh" in the minds of the students over the course of the year.

  BLM 2.N.4.1

  Note: The Number of the Day can be done on a laminated chart (although after a while it becomes difficult to erase). Some teachers have put words/phrases from the chart on individual strips of paper with magnetic strip on the back and for use on a whiteboard. This enables the teacher to differentiate for groups of students by adding or deleting representations.

- Although there are no specific learning outcomes related to money, students will need to be introduced to the names and values of pennies, nickels, dimes, and quarters in order to be able to use them in their representations.

  Provide students with a set of coins. Include dimes, nickels, and pennies initially. Have them do the following:

  - Sort the coins according to their value.
  - Name the types of coins found in each set. Tell the value of each type of coin.
  - Show how many pennies equal one dime and how many equal one nickel.
  - Solve a problem such as the following: You want to buy a toy for 104. Use the chart to show three different ways that you can pay for it.

Dimes	Nickels	Pennies

Note: The Royal Canadian Mint has ceased the distribution of pennies to financial institutions. The penny will retain its value indefinitely. The penny is a representation for one. If you still have real or play pennies, use the penny to represent values and for counting. Pennies are a good support for counting and can be used to help build number sense.

Assessing Understanding: Paper-and-Pencil Task

Periodically have students fill in a printed version of the Number of Day chart independently.

Student Self-Assessment

BLM
2.N.4.2

Have students add to the chart several times during the year (perhaps at reporting times).

Sample

Name:				
Represent and describe numbers to 100, concretely, pictorially, and symbolically.				
	September	**November**	**March**	**June**
I can	*represent numbers to 20*	*represent numbers to 50*	*represent numbers to 100*	*work with numbers larger than 100*
I can	*represent numbers using pictures, tallies, ten frames, cubes, counters, and other math materials*	*represent numbers using money*	*represent numbers using base-10 blocks*	*represent numbers using place value*
I can	*write addition and subtraction number sentences for numbers to 20*	*write addition and subtraction number sentences for numbers to 50*	*write addition and subtraction number sentences for numbers to 100*	*write addition and subtraction number sentences for numbers beyond 100*

- **Determine compatible number pairs for 20 or 50.**

Assessing Prior Knowledge: Small Group Activity

Play a game of "I say . . . You say . . ." to review compatible number pairs for 10.

Example:

Target number is 10. The teacher says 6. Students respond by saying 4.

Observation Checklist

Students are able to

- ❑ confidently give the compatible number for 10 without counting
- ❑ count on to determine the answer
- ❑ count from 1 to determine the answer

Suggestions for Instruction

- Use word problems to provide meaningful contexts for students to explore compatible number pairs.

  Examples:

  - Meg needs 20 cards to complete her collection. She already has 12. How many more does she need?
  - Tom's team scored 50 points in the football game. They scored 30 points in the first half. How many points did they score in the second half?

BLMs
2.N.4.3
2.N.4.4
2.N.4.5
2.N.4.6

- **Race to Twenty:** Use a double ten-frame mat. Have students roll a dice and place counters on the mat to match the number rolled. As they play ask questions such as:

  - How many counters do you have altogether? How do you know?
  - How many more do you need to make 20? How do you know?

  This activity can be extended by changing the ten-frame mats to hold 3, 4, or 5 ten frames. It can also be played in reverse by having students fill the ten frames and then roll to remove counters.

BLM
2.N.4.7

- **How Many More to Make _____ ? Game**

Materials: game grid for each student, game markers, number cards

Directions: Decide on a target number (20, 30, 40, or 50). Have students write numbers between 0 and the target number anywhere on their grid. Numbers can be repeated. The teacher/leader draws a number card and calls it out. Students cover the compatible number on their game board. The first player to get 3 or 4 in a row is the winner.

How Many More?
Target Number 20

6	9	10	1	2
7	19	18	15	14
11	12	12	13	13
16	17	18	5	5
8	2	20	3	4

Note: Students do not have to memorize these. Provide supports such as ten frames, counters, and base-10 materials as needed.

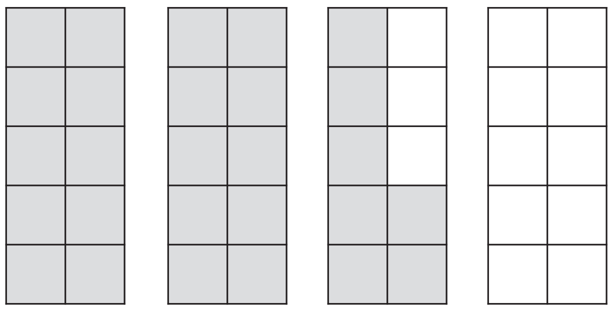
Assessing Understanding

Prepare partially filled ten-frame mats. Show them one at a time to students and ask:

- How many counters do you have altogether? How do you know?
- How many more do you need to make 20 (30, 40, 50)? How do you know?

BLM 2.N.4.8

Example:



Teacher: "How many do you have now?'
"How many more do you need to get to 40?"

Student: "I have 27. I need 13 more because one ten frame and 3 more spaces are empty."

Teacher: "If you rolled 5 on your next turn how many would you have?"

Student : "I would have 32 because 3 would fill the third ten frame and remaining 2 would go on the last ten frame. There would be 8 empty spaces."

Observation Checklist

Students are able to

- ❑ identify the total number without counting by ones
  - to 20
  - to 30
  - to 40
  - to 50
- ❑ identify the remaining number without counting by ones
- ❑ see the compatible number pairs for 10 and 5 within a ten frame
- ❑ make an accurate prediction based on a fictitious dice roll

- **Order a set of numbers in ascending or descending order, and verify the result using a hundred chart, number line, ten frames, or by making reference to place value.**
- **Identify errors in an ordered sequence.**
- **Identify missing numbers in a hundred chart.**
- **Identify errors in a hundred chart.**

Assessing Prior Knowledge: Small Group or Individual Activity

BLM 2.N.5.1

Materials: numeral cards from 10 to 20
numeral cards with multiples of 10 to 100
numeral cards with numbers from 32 to 42

Have students order the cards (10 to 20) in order from least to greatest and then read them.

If correct, have them order and read the multiples of 10. Continue with the last group of cards.

Observation Checklist

Students	Order and Read Numbers 10 to 20	Order and Read Multiples of 10 to 100	Order and Read Numbers 32 to 42

Suggestions for Instruction

- **Number Sticks**

  Materials: 100 tongue depressors numbered from 1 to 100
  container

  Directions:

  Students draw a stick from the container and then order themselves in ascending or descending order.

  Differentiating instruction:

  - Sticks can be handed out in numerical order or selected randomly.
  - The range of numbers can be reduced (e.g., Select sticks from 1 to 30 or from 30 to 60 only).

  Note: A small strip magnet on the back of the sticks makes it possible for students to take a handful of the sticks and then order them on a magnetic whiteboard or cookie sheet. This is a good formative assessment task.

- Order a random group of the number sticks making one or two errors. Have students identify the errors and correct them.

- **Guess My Number**

  Materials: number line from 1 to 100
  2 sticks (metre sticks work well) with an arrow on one end

  Directions:

  The leader selects a number and identifies the range for students (e.g., "I am thinking of a number between 1 and 60.").

  Students take turns asking questions in order to guess the number.

  The leader can only answer "yes," "no," "too small," or "too large."

  The metre sticks can be used at either end of the number line and moved as numbers are eliminated. In the example the first metre stick would start the game at the 1 and the second stick would be on the 60. Students can then see that the numbers 61 to 100 are out of play.

  If the first student asks if the number is 20 and the leader's answers, "too small" the metre stick can be moved from 1 to the 20. The range is then narrowed to between 20 and 60.

  It is important to model "good" questions rather than have students guess random numbers.

  Example:

  - Is the number greater than ___?
  - Is it less than ___?
  - Is it an even/odd number?

- **Hundred Chart:** Have students
  - fill in missing numbers
  - identify and correct errors
- Ask questions such as the following:
  - Which is less: 36 or 63? How do you know?
  - A number is between 38 and 42. What could it be?
  - Put a number in the blank so that the three numbers are in order

    25 _____ 31   75 _____ 68
  - Which is more: 874 or 794? How do you know?

BLM 2.N.5.2

Assessing Understanding: Small Group or Individual Student Task

1. Give each student a hundred chart. Ask them to put a marker on
   - a number greater than 36
   - a number less than 84
   - a number between 53 and 60
2. Have each student select 8 number sticks and order them from least to greatest.
3. Ask students, "Which is greater: 76 or 67? Explain/show how you know."

- **Estimate a quantity by comparing it to a referent (known quantity).**
- **Estimate the number of groups of 10 in a quantity using 10 as a referent.**
- **Select between two possible estimates for a quantity, and explain the choice.**

Suggestions for Instruction

- **How Many?** Place between 20 and 50 small counters/centicubes on the overhead projector. (Increase the number as students become more confident with their estimating.) Turn the projector on for five seconds and then turn it off. Ask the students to write down their estimate. Turn the projector on and move 10 counters (referent) off to the side (but still on the screen). Tell students, "Here are 10 counters. How many groups of 10 do you think there are altogether? Do you want to change your estimate? If you do, will you change it to be more or less than your first estimate?" Ask students to explain their decision.

  Note: In the beginning, give the minimum and maximum number in the set (e.g., between 20 and 50). This will help students make a more reasonable initial estimate.

BLMs
2.N.6.1
2.N.6.2
2.N.6.3
2.N.6.4

- **Picture Estimation:** Find or create pictures of sets of objects. Use pictures of objects your students show interest in. Show a picture and suggest two possible quantities. Have students make a selection and justify their choice.
- Provide opportunities in the classroom for estimation. These might include
  - using estimation jars filled with different objects
  - the number of math materials in a container
  - the number of buttons the class has on their clothing
  - the number of pages in a book

Observation Checklist

Students are able to

- ❑ use a referent to make reasonable estimates in the range
  - 20 to 50
  - 50 to 100
- ❑ select an appropriate estimate and justify their choice

Student Self-Assessment

BLM
2.N.6.5

Handfuls: Provide three different sets of small objects such as centicubes, pennies, or beans. Have students take a handful (or a scoop) of one of the objects, estimate, and then count to check. Record results on the record sheet. Students can then self-assess indicating whether they thought their estimate was too small, just right, or too large. They can then set a goal based on their findings. (Decide as a class what an allowable difference is for an estimate that is just right, for example, ± 4.)

Sample

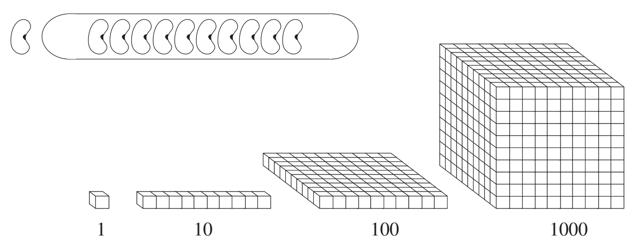
Object	Estimate	Actual	My Estimate Was Too Small, Just Right, Too Large
centicubes	38	45	too small
pennies	52	41	too large
beans	68	65	just right
My goal: I will try more activities so I know how much my hand (a scoop) can hold.			

- **Explain and show with counters the meaning of each digit for a 2-digit numeral with both digits the same (e.g., for the numeral 22, the first digit represents two tens [twenty counters] and the second digit represents two ones [two counters]).**
- **Count the number of objects in a set using groups of 10s and 1s, and record the result as a 2-digit numeral under the headings of 10s and 1s.**
- **Describe a 2-digit numeral in at least two ways (e.g., 24 as two tens and four ones, twenty and four, two groups of ten and four left over, and twenty-four ones).**
- **Illustrate using 10 frames and diagrams that a numeral consists of a certain number of groups of 10 and a certain number of 1s.**
- **Illustrate using proportional base-10 materials that a numeral consists of a certain number of tens and a certain number of ones.**
- **Explain why the value of a digit depends on its placement within a numeral.**

Suggestions for Instruction

Proportional models for base ten, such as craft (popsicle) sticks, Digi-Blocks, Base-10 Blocks, and bean sticks are proportional in size. The representation for 10 is ten times the size of the representation for 1; 100 is ten times the size of 10, etc. Non-proportional models, such as money, do not have any size relationship.

Note: Students need opportunities to construct their own understanding of our place value system. In order to do this they should work with materials such as craft sticks that they have to group themselves. Base-10 Blocks and Digi-Blocks are useful materials once their understanding is in place, but they are adult rather than student- or child-developed constructs.



- **Counting and Grouping Stations**

  Station 1: Place different numbers of craft sticks into numbered paper bags. Students count them by grouping them into bundles of 10s with elastic bands. Have them record their answers as a two-digit numeral under the headings of tens and ones.

  Station 2: Place a different number of counters, such as bingo chips or beans, into numbered bags. Provide empty ten frame cards/mats. Have students count them using the ten frames to group them. Have them record their answers as a two-digit numeral under the headings of tens and ones.

  Station 3: Place a set of two-digit numeral cards and a container of craft sticks at the station. Have students select a numeral card and then represent it using the craft sticks. Record the results pictorially.

Station 4: Place a set of two-digit numeral cards and a collection of empty ten-frame cards/mats at the station. Have students select a numeral card and then represent it using the ten-frame cards/mats. Record the results pictorially.

- Finger representations: Have students show 7, 5, 2, 9, and 6 with their fingers. Ask them to show 12. Observe students to see whether they realize that they will need two people. Have them make 14, 18, and 16.

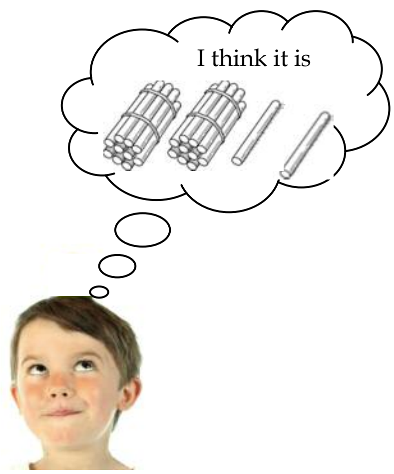
  Extend to represent numbers in the 20s, 30s, and 40s. Have students count to check (e.g., 45 would have 4 groups of ten fingers and 5 additional fingers up). Students count 10, 20, 30, 40, 45.

  Change the order of the people by putting the 5 first. Students count 5, 15, 25, 35, 45.

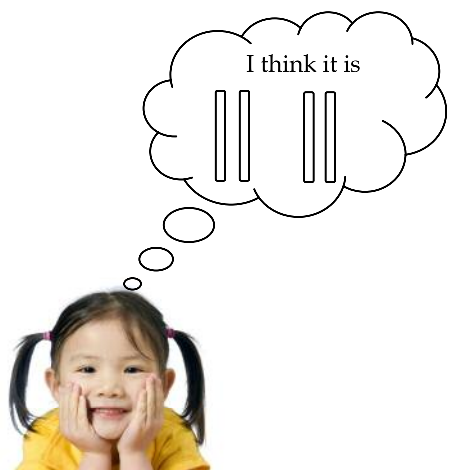
  Extend to place value by having the groups of ten stand one behind each other. Use a numeral card to represent the number of tens in the row and the number of ones.

- Present the following problem:

  > Mr. Jones asked his students to represent the number 22 with craft sticks. Here are the answers from two students:



Jack



Jill

Which student is right?

Why is the other student wrong? What could you tell them so that they know why they made their mistake?

- **Same Number—Different Representations:** Show students a two-digit numeral such as 37. Have them brainstorm different ways to describe the number. Record their ideas on a chart for future reference.

  Examples:

  - 37 ones
  - 3 tens and 7 ones
  - 30 and 7
  - 3 groups of 10 and 7 left over
  - 2 groups of 10 and 17 ones
  - 1 group of 10 and 27 ones

  (Grade 3 learning outcome)

  Students select a two-digit number and describe it in different ways. Have the class guess their number from the descriptions.

- Ask students to explain/show the difference between the 2 in 24 and the 2 in 32. For example, "The 2 in 24 means 2 tens or 20. The 2 in 32 means 2 ones."

- Add place value representations to the Number of the Day routine.

- Record the days of school attended on a vertical number line. It serves as a good visual model of the need to shift to the left when an additional digit is needed. It also shows the increasing pattern in our place value system.

1	2
1	1
1	0
0	9
0	8

Assessing Understanding: Interview

Give the students a collection of 25 counters or pennies.

Ask them to count the collection and write down the number.

Point to the 5 and ask them to use the counters to show what the digit means/represents.

Repeat for the 2.

Observation Checklist

Observe to determine the level of place value understanding:*

1. Single numeral: The student writes 25 but views it as a single numeral. The individual digits 2 and 5 have no meaning by themselves.
2. Position names: The student identifies correctly the tens and ones positions but still makes no connections between individual digits and the counters.
3. Face value: The student matches five counters with the 5 and two counters with the 2.
4. Transition to place value: The 5 is matched with the five counters and the 2 with the remaining 20 counters but not as two groups of 10.
5. Full understanding: The 2 is correlated with two groups of 10 counters and the 5 with five single counters.

Journal Entry

In your journal explain/show the difference between 54 and 45.

* These levels of place value understanding were determined by Sharon Ross in 1989 (cited in Van de Walle and Folk 205).

"All About Number _____" Flip Book

Have students make a flip book by taking three letter-sized sheets of paper and lining them up one on top of the other leaving about 3 centimetres at the bottom of each one (Figure 1).

Figure 1

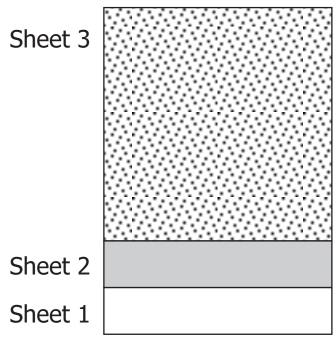
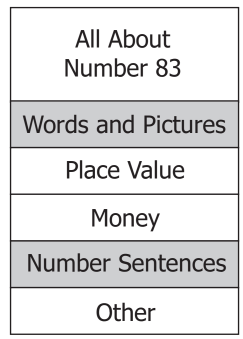


Figure 2



Fold the papers (together) over so that they end up with six flaps.

Put two staples across the top.

With the class determine the different representations to be included in the book (Figure 2).

Assign each student (or pair of students) a number to represent or have them select their own.

Share the completed book with the class.

NOTES

Grade 2: Number (2.N.8, 2.N.9, 2.N.10)

Enduring Understandings:

Quantities can be taken apart and put together.

Addition and subtraction are inverse operations.

Essential Questions:

How can symbols be used to represent quantities, operations, or relationships?

How can strategies be used to compare and combine numbers?

What questions can be answered using subtraction and/or addition?

SPECIFIC LEARNING OUTCOME(S):	ACHIEVEMENT INDICATORS:
2.N.8 Demonstrate and explain the effect of adding zero to or subtracting zero from any number. [C, R]	➛ Add zero to a number and explain why the sum is the same as the addend. ➛ Subtract zero from a number and explain why the difference is the same as the number.
2.N.9 Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by ■ using personal strategies for adding and subtracting with and without the support of manipulatives ■ creating and solving problems that involve addition and subtraction ■ explaining that the order in which numbers are added does not affect the sum ■ explaining that the order in which numbers are subtracted may affect the difference [C, CN, ME, PS, R, V]	➛ Model addition and subtraction using concrete materials or visual representations, and record the process symbolically. ➛ Create an addition or a subtraction number sentence and a story problem for a solution. ➛ Solve a problem involving a missing addend, and describe the strategy used. ➛ Solve a problem involving a missing minuend or subtrahend, and describe the strategy used. ➛ Match a number sentence to a missing addend problem. ➛ Match a number sentence to a missing subtrahend or minuend problem. ➛ Add a set of numbers in two different ways, and explain that the sum is the same (e.g., 2 + 5 + 3 + 8 = 2 + 3 + 5 + 8 or 5 + 3 + 8 + 2).

(continued)

Specific Learning Outcome(s):	**Achievement Indicators:**
2.N.10 Apply mental mathematics strategies, including ■ using doubles ■ making 10 ■ using one more, one less ■ using two more, two less ■ building on a known double ■ using addition for subtraction to develop recall of basic addition facts to 18 and related subtraction facts. [C, CN, ME, R, V] Recall of facts to 10, doubles to 9 + 9, and related subtraction facts is expected by the end of Grade 2.	➢ Explain the mental mathematics strategy that could be used to determine an addition or subtraction fact, such as ■ using doubles (e.g., for 4 + 6, think 5 + 5) ■ using doubles plus one (e.g., for 4 + 5, think 4 + 4 + 1) ■ using doubles take away one (e.g., for 4 + 5, think 5 + 5 – 1) ■ using doubles plus two (e.g., for 4 + 6, think 4 + 4 + 2) ■ using doubles take away two (e.g., for 4 + 6, think 6 + 6 – 2) ■ making 10 (e.g., for 7 + 5, think 7 + 3 + 2) ■ building on a known double (e.g., 6 + 6 = 12, so 6 + 7 = 12 + 1 = 13) ■ using addition for subtraction (e.g., for 7 – 3, think 3 + ? = 7) ➢ Use and describe a personal strategy for determining a sum to 18 and the corresponding subtraction.

Prior Knowledge

Students may have had experience

- representing numbers from 2 to 20 in two parts (part-part-whole)
- adding and subtracting numbers up to 20

The following mental math strategies for determining basic addition and subtraction facts to 18 may have been introduced

- counting on or counting back
- using one more or one less
- making 10
- starting from known doubles
- using addition to subtract

To help students become efficient with computational fluency, students need to develop mental math skills and recall math facts automatically. Learning math facts is a developmental process where the focus of instruction is on thinking and building number relationships. Facts become automatic for students through repeated exposure and practice. When a student recalls facts, the answer should be produced without resorting to inefficient means, such as counting. When facts are automatic, students are no longer using strategies to retrieve them from memory.

Background Information

Zero cannot be represented by concrete items. Create opportunities to discuss adding and subtracting zero using contextual situations. Using zero in story problems is a good way to help children understand zero in addition and subtraction.

There are many different types of addition and subtraction problems. Students should have experience with all types.

Addition				**Both + and –**
Result Unknown ($a + b = ?$)	**Change Unknown ($a + ? = c$)**	**Start Unknown ($? + b = c$)**	**Combine ($a + b = ?$)**	**Compare**
Pat has 8 marbles. Her brother gives her 4. How many does she have now? (8 + 4 = ?)	Pat has 8 marbles but she would like to have 12. How many more does she need to get? (8 + ? = 12)	Pat has some marbles. Her brother gave her 4 and now she has 12. How many did she have to start with? (? + 4 = 12)	Pat has 8 blue marbles and 4 green marbles. How many does she have in all? (8 + 4 = ?)	Pat has 8 blue marbles and 4 green marbles. How many more blue marbles does she have? (8 – 4 = ? or 4 + ? = 8)
Subtraction				
Result Unknown ($a - b = ?$)	**Change Unknown ($a - ? = c$)**	**Start Unknown ($? - b = c$)**	**Combine ($a - b = ?$)**	**Compare**
Pat has 12 marbles. She gives her brother 4 of them. How many does she have left? (12 – 4 = ?)	Pat has 12 marbles. She gives her brother some. Now she has 8. How many marbles did she give to her brother? (12 – ? = 8)	Pat has some marbles. She gives her brother 4 of them. Now she has 8. How many marbles did she have to start with? (? – 4 = 8)	Pat has 12 marbles. Eight are blue and the rest are green. How many are green? (12 – 8 = ?)	Pat has 8 blue marbles and some green marbles. She has 4 more blue marbles than green ones. How many green marbles does she have? (8 – 4 = ? or 4 + ? = 8)

Note: Addition and subtraction should be taught together. This will enable students to see the relationships between the two operations.

Addend: One of the numbers in a designated sum of two or more numbers (e.g., 3 + 5 + 1 = 9; 3, 5, and 1 are addends).

Minuend: In a subtraction problem, the number from which another number is to be subtracted (e.g., in 5 – 3 = 2, the 5 is the minuend).

Subtrahend: In subtraction, the number being subtracted from a given number (e.g., in 5 – 2 = 3, 2 is the subtrahend).

Learning outcome 2.N.9 states that students "Demonstrate an understanding of addition . . . with answers to 100 and the corresponding subtraction by . . . explaining that the order in which numbers are subtracted may affect the difference." Although negative numbers are not explored in the Early Years mathematics curriculum, students should not hear, for example, that you cannot subtract 11 from 2. Instead, tell students you can do this, but you would end up with a negative number. Students will explore negative numbers in the Middle Years.

Mathematical Language

Operations:

- addition
- add
- sum
- total
- more
- subtraction
- subtract
- difference
- less
- story problem
- number sentence
- complementary (compatible)

Strategies:

- counting on
- counting back
- one/two more
- one/two less
- making ten
- doubles
- doubles ±1 or 2
- addition fact
- subtraction fact

Learning Experiences

Assessing Prior Knowledge: Individual Student or Small-Group Task

Give students the following questions and have them explain how they solved them.

12 + 2   16 – 1   9 + 4   11 – 2   8 + 9

Observation Checklist

Look for

- counting on
- counting back
- making 10
- using doubles
- one more
- one less
- known fact

Some students will already have committed the fact to memory. This is usually evident when there is no hesitation giving the answer and therefore no opportunity to have used another strategy. If we ask students to "make up" a strategy we are suggesting to students that they should always use a strategy rather than committing facts to memory.

- **Add zero to a number and explain why the sum is the same as the addend.**
- **Subtract zero from a number and explain why the difference is the same as the number.**

Suggestions for Instruction

- Have students use the pan balance with equal amounts on each side and have the students explore what needs to be added or subtracted to keep the balance.
- Create story problems involving zero to help students understand zero in addition and subtraction.

- **Model addition and subtraction using concrete materials or visual representations, and record the process symbolically.**

Suggestions for Instruction

- Present the following problems.

  Owen has 53 baseball cards. He got 24 more for his birthday. How many cards does Owen have now?

  This is the 33rd day of school. How many more days until the 100th day?

  Students work with a partner to solve the problems. Provide large sheets of paper for work to be shown. Manipulative materials should be available.

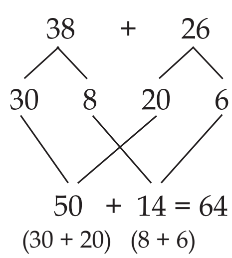
  Have students share their solutions and strategies with the class.

  Note: Students will come up with their own strategies for solving the problems even if they have not experienced two-digit addition and subtraction before. Instruction should build on these beginning strategies.

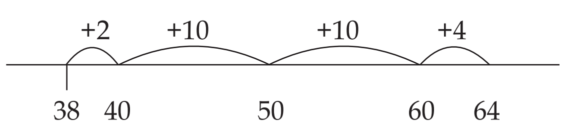
Possible Strategies for Addition

38 + 26

Breaking Up Numbers: This method requires place value understanding.



Empty Number Line (Jump Strategy)

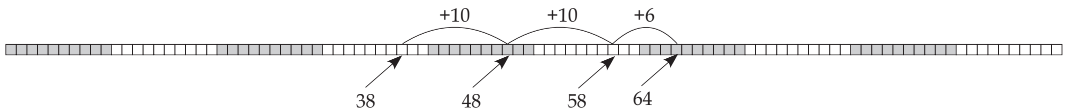


There are many possibilities.

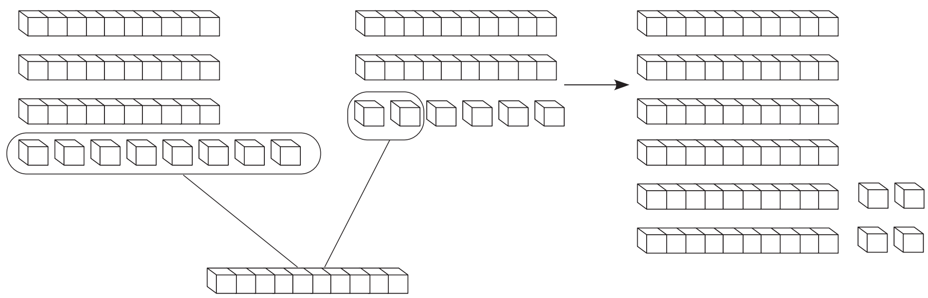
Note: In order to be able to use the empty number line students need to be able to count by tens on and off the decade both forward and backward.

Use a beaded hundred string or a unifix number line to help students begin to be able to use an empty number line.

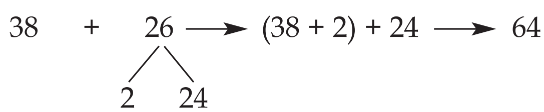
Example: 38 + 26



Representations of Materials such as Base-10 Blocks or Ten Frames



Compensating (Making "nice" or "friendly" numbers)

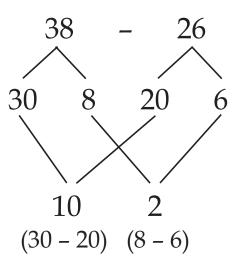


Note: Students need to use their knowledge of compatible number pairs for 10 to use this strategy.

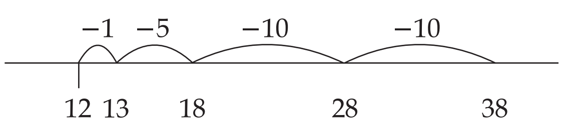
Strategies for Subtraction

38 – 26

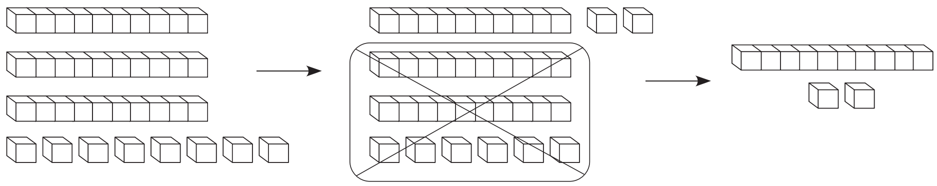
Breaking up Numbers (Split Strategy): Using Place Value



Empty Number Line (Jump Strategy)



Representations of Materials such as Base-10 Blocks or Ten Frames



Compensating (Making "nice" or "friendly" numbers)

(38 + 2) – (26 + 2) ⟶ 40 – 28 = 12

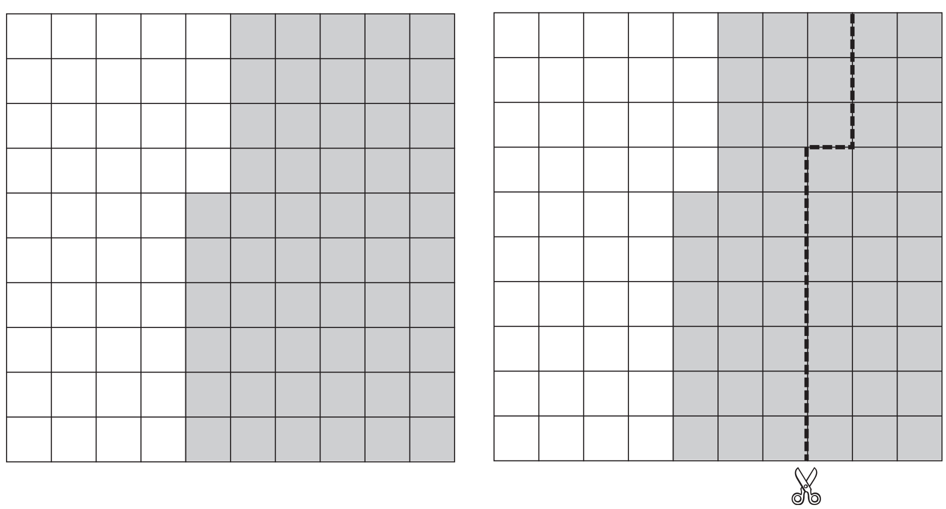
or

(38 + 4) – (26 + 4) ⟶ 42 – 30 = 12

- Have students use a blank 10 x 10 grid to demonstrate the subtraction process. Students shade in the larger number and cut the smaller number from the shaded part.

  Example:

  56 – 27



Step 1: Shade in 56.

Step 2: Cut out 27.
Count the remaining shaded squares.

Grids can also be used to demonstrate the addition process.

- **Create an addition or a subtraction number sentence and a story problem for a solution.**

Suggestions for Instruction

- **"The Answer Is ______" Books:** Make a booklet with six to eight pages. On the front cover write "The answer is 25 (or any other number). What is the question?" Have students create their own addition and subtraction word problems that would result in an answer of 25 and write them on a page in the booklet.
- Build problem writing into class routines by having two students each day responsible for writing an addition and a subtraction problem that would result in an answer equal to the Number of the Day or day of the month.

- **Solve a problem involving a missing addend, minuend, or subtrahend, and describe the strategy used.**
- **Match a number sentence to a missing addend, subtrahend, or minuend problem.**

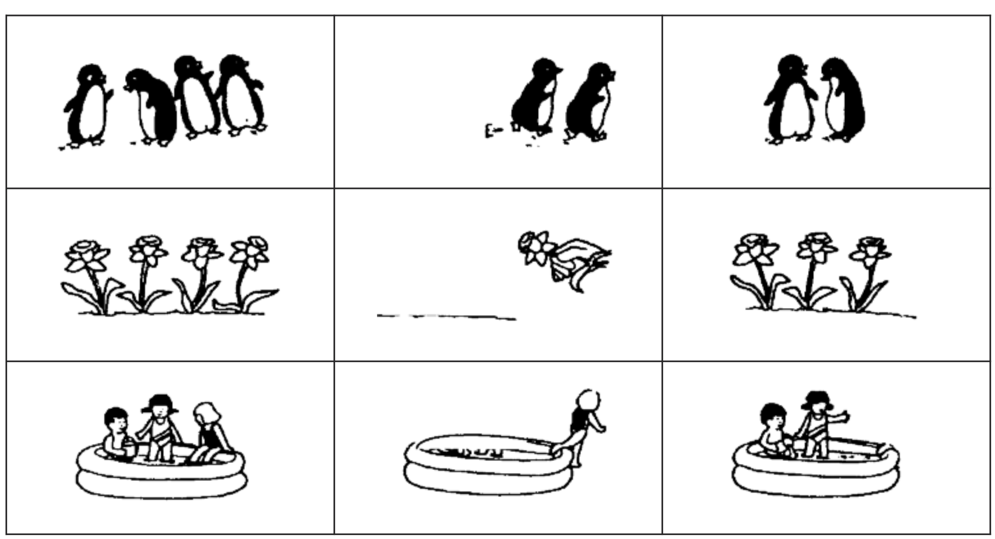
Suggestions for Instruction

BLMs
2.N.9.1
2.N.9.2
2.N.9.3

- Word problems are really like story writing in language arts. They have a beginning, middle, and an end. They are different in that in the problem one of the parts is missing. Using word problems and representing them pictorially will help students with missing addend, minuend, or subtrahend questions.

  For example: Problem strips like these can be used to have students tell the story first.

1.
2.
3.



Example:

Beginning: Four penguins were on the ice floe.
Middle: Two penguins had to leave.
End: Now there are two penguins left on the ice floe.

Make a paper slider that can be moved along the problem strip. The slider should be large enough to cover one of the sections of the strip. Cover the last section of the strip and have the students retell the story leaving out the end. Record the problems.

Beginning: Four penguins were on the ice floe.
Middle: Two penguins had to leave.
End: How many penguins are left on the ice floe?

Repeat leaving out the middle.

Beginning: Four penguins were on the ice floe.
Middle: Some penguins had to leave.
End: Now there are two penguins left on the ice floe.

How many penguins had to leave the ice floe?

Repeat leaving out the beginning.

Beginning: There were some penguins on the ice floe.
Middle: Two penguins had to leave.
End: Now there are two penguins left on the ice floe.

How many penguins were on the ice floe at the start?

Revisit the problems asking students how they would represent the problem using a number sentence.

End missing: $4 - 2 = \_\_\_\_$

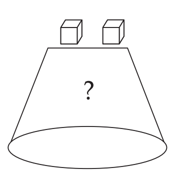
Middle missing: $4 - \_\_\_\_ = 2$

Beginning missing: $\_\_\_\_ - 2 = 2$

Discuss student strategies used for solving the missing part. Possible strategies might include counting on, counting back, and thinking addition for subtraction.

- **Screened Problems:** Use an opaque container (e.g., margarine, yogurt). Invert the container and place a number of counters underneath. Have students look away. Remove some of the counters and place them on top of the container. Ask students to identify how many are still under the container.

  Example:



There are six cubes altogether. How many are hidden?

BLM 2.N.9.4

- **Domino Problems:** "If I cover half of a domino, you see only 4 dots. Altogether the domino has 10 dots. Which domino am I thinking about? How do you know?"

Assessing Understanding

A. Match the number sentences and the problems.

a) Mark has ten loonies in his bank. His mother gives him four more. How many loonies does he have now?		14 – ____ = 10
b) Mark has some loonies in his bank. His mother gives him four more and now he has 14 loonies in his bank. How many loonies did he have to start with?		10 + ____ = 14
c) Mark has 14 loonies. He spends 10 loonies on a new book. How many loonies does he have left?		10 + 4 = ____
d) Mark has 10 loonies in his bank. His mother gives him some more and now he has 14. How many loonies did his other give him?		14 – 10 = ____
e) Mark has 14 loonies in his bank. He spends some to buy a treat. Now he has 10 loonies in his bank. How many loonies did he spend?		____ + 4 = 14

B. In your journal, solve the following number sentences and explain the strategies you used.

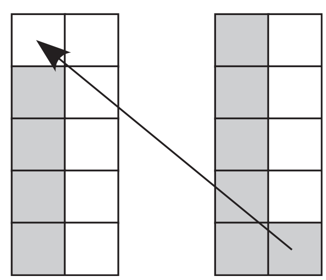
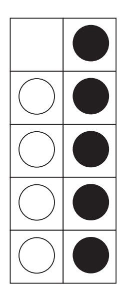
12 – ______ = 5

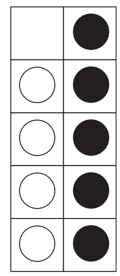
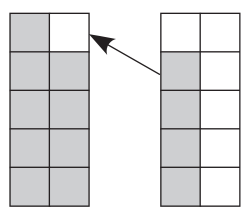
______ + 6 = 15

- **Explain the mental mathematics strategy that could be used to determine an addition or subtraction fact, such as**
  - **using doubles (e.g., for 4 + 6, think 5 + 5)**
  - **using doubles plus one (e.g., for 4 + 5, think 4 + 4 + 1)**
  - **using doubles take away one (e.g., for 4 + 5, think 5 + 5 – 1)**
  - **using doubles plus two (e.g., for 4 + 6, think 4 + 4 + 2)**
  - **using doubles take away two (e.g., for 4 + 6, think 6 + 6 – 2)**
  - **making 10 (e.g., for 7 + 5, think 7 + 3 + 2)**
  - **building on a known double (e.g., 6 + 6 = 12, so 6 + 7 = 12 + 1 = 13)**
  - **using addition for subtraction (e.g., for 7 – 3, think 3 + ? = 7)**
- **Use and describe a personal strategy for determining a sum to 18 and the corresponding subtraction.**

Suggestions for Instruction: Mental Math

Note: The development of mental math strategies is greatly enhanced by sharing and discussion. Students should be given the freedom to adapt, combine, and invent their own strategies.

Strategy	Teaching Strategies
Using doubles: for 4 + 6, think 5 + 5	■ Use ten frames to help students visualize the strategies (e.g., 4 + 6).  Students can see that moving the one square (counter) to the other ten frame will make the addition easier by adding 5 + 5.
Using doubles plus one or two: ■ for 4 + 5, think 4 + 4 + 1 ■ for 4 + 6, think 4 + 4 + 2	■ Use two-colour counters (beans). Example: 4 + 5 

Strategy	Teaching Strategies
Using doubles take away one or two: ■ for 4 + 5, think 5 + 5 – 1 ■ for 4 + 6, think 6 + 6 – 2	■ Students can see that they can either add 4 + 4 + 1 or 5 + 5 – 1. 
Building on a known double ■ 6 + 6 = 12, so 6 + 7 = 12 + 1 = 13	■ Use a set of double nine dominoes. Have students sort them into five groups: doubles, doubles ±1, doubles ±2, make 10, and other.
Make 10 ■ for 7 + 5, think 7 + 3 + 2	■ Use a double ten frame to help students visualize the strategy. Example: When adding 9 + 4, students can see that moving one from the 4 to make 10 makes adding easier. This is a practical application of part-part-whole understanding. Eventually, students will be able to show the steps without the ten frames.  $9 + 4 =$ $\underbrace{9 + 1}_{10} + 3$ $10 + 3 = 13$
Using addition for subtraction ■ for 7 – 3, think 3 + ? = 7	■ Note: Thinking addition is an efficient strategy for subtraction. Teaching addition and subtraction at the same time helps students see this relationship between the operations. For example, for 9 – 5, think "5 and how many more to make 9?" (5 + _____ = 9).

- A series of math fact games, activities, and centres can be found in the mathematics group on <www.maple4teachers.ca>. Look under the K–4 Math Resources Wiki.

BLM
2.N.10.1

Assessing Understanding

Strategy Sort: Give students a set of addition and subtraction problem cards and strategy cards. Have them sort the problem cards under the strategy headings. Ask students to tell how they would use the strategy to arrive at the answer.

Observation Checklist

Use a checklist. Show students a number sentence. Have individual students explain the strategy used to solve the problem. Record the strategy used on the chart.

Student	Doubles	Doubles ±1	Doubles ±2	Known Double	Make 10	Addition for Subtraction	Known Fact	Other