SOUTH CAROLINA SUPPORT SYSTEMS INSTRUCTIONAL GUIDE	
Content Area	Kindergarten Mathematics
Recommended Days of Instruction	**Fourth Nine Weeks**

Standards/Indicators Addressed:

Standard K-2: The student will demonstrate through the mathematical processes an emerging sense of quantity and numeral relationships, sets, and place values.

K-2.1* Recall numbers, counting forward through 99 and backward from 10. (A1)

K-2.2* Translate between numeral and quantity through 31. (B2)

K-2.3* Compare sets of no more than 31 objects by using the terms *more than, less than*, and *the same as.* (B2)

K-2.4* Represent simple joining and separating situations through 10. (B2)

K-2.5* Understand that addition results in increase and subtraction results
in decrease. (B2)

K-2.6* Analyze the magnitude of digits through 99 on the basis of their place values. (B4)

K-2.7* Represent the place value of each digit in a two-digit whole number. (B2)

K-2.8* Identify ordinal positions through 31st. (A1)

Standard K-5: The student will demonstrate through the mathematical processes an emerging sense of coin values and the measurement concepts of length, weight, time, and temperature.

K-5.7* Use a calendar to identify dates, days of the week, and months of the year. (A3)

K-5.8* Recall equivalencies associated with time: 7 days = 1 week and 12 months = 1 year. (A1)

* These indicators are covered in the following 2 Modules for this Nine Weeks Period.

Teaching time should be adjusted to allow for sufficient learning experiences in each of the modules.

Module 4-1 Number Structure and Relationships- Whole Numbers / Calendar			
Indicator	**Recommended Resources**	**Suggested Instructional Strategies**	**Assessment Guidelines**
Module 4-1 Lesson A: Counting K-2.1 Recall numbers, counting forward thorugh 99	NCTM's Online Illuminations http://illuminations.nctm.org NCTM's Navigations Series SC Mathematics Support	See instructional Planning Guide Module 4-1 Introductory Lesson A See Instructional Planning Guide Module 4-1, Lesson A	See Instructional Planning Guide Module 4-1 Lesson A Assessment

	Document	Additional Instructional Strategies	
and backward from 10. (A1)	Teaching Student-Centered Mathematics Grades 5-8 and		
Module 4-1 Lesson B: Matching Numeral and Quantity K-2.2 Translate between numeral and quantity through 31. (B2)	Teaching Elementary and Middle School Mathematics Developmentally 6th Edition, John Van de Walle Website for Van de Walle resources: www.ablongman.com/vandewalleseries	See instructional Planning Guide Module 4-1 Introductory Lesson B See Instructional Planning Guide Module 4-1, Lesson B Additional Instructional Strategies	See Instructional Planning Guide Module 4-1 Lesson B Assessment
Module 4-1 Lesson C: Comparing Sets K-2.3 Compare sets of no more than 31 objects by using the terms *more than, less than*, and *the same as.* (B2)	NCTM's Principals and Standards for School Mathematics (PSSM) Hands On Standards Grade PreK-K and 1-2, Learning Resources	See instructional Planning Guide Module 4-1 Introductory Lesson C See Instructional Planning Guide Module 4-1, Lesson C Additional Instructional Strategies	See Instructional Planning Guide Module 4-1 Lesson C Assessment
Module 4-1 Lesson D: Ordinal Numbers K-2.8 Identify ordinal positions through 31st.		See instructional Planning Guide Module 4-1 Introductory Lesson D See Instructional Planning Guide Module 4-1, Lesson D Additional Instructional Strategies	See Instructional Planning Guide Module 4-1 Lesson D Assessment
Module 4-1 Lesson E:		See instructional Planning Guide Module 4-1 Introductory Lesson E	See Instructional Planning Guide Module 4-1 Lesson E Assessment

Place Value K-2.6 Analyze the magnitude of digits through 99 on the basis of their place value. K-2.7 Represent the pace value of each digit in a two-digit whole number. (B2)		See Instructional Planning Guide Module 4-1, Lesson E Additional Instructional Strategies	
Module 4-1 Lesson F: Using a Calendar K-5.7 Use a calendar to identify dates, days of the week, and months of the year. (A3) K-5.8 Recall equivalencies associated with time: 7 days=1 week and 12 months=year **(A1)**		See instructional Planning Guide Module 4-1 Introductory Lesson F See Instructional Planning Guide Module 4-1, Lesson F Additional Instructional Strategies	See Instructional Planning Guide Module 4-1 Lesson F Assessment

Module 4-2 Operations: Addition and Subtraction			
Indicator	**Recommended Resources**	**Suggested Instructional Strategies**	**Assessment Guidelines**
Module 4-2 Lesson A Joining and Separating through 10 K-2.4 Represent simple joining and separating	NCTM's Online Illuminations http://illuminations.nctm.org/ NCTM's Navigations Series SC Mathematics Support Document Teaching Student-Centered	See Instructional Planning Guide Module 4-2 Introductory Lesson A See Module 4-2, Lesson A Additional Instructional Strategies	See Instructional Planning Guide Module 4-2 Lesson A Assessment

situations through 10	Mathematics Grades 5-8 and Teaching Elementary and Middle School Mathematics Developmentally 6th Edition, John Van de Walle		
Module 4-2 Lesson B Increase and Decrease with Subtraction and Addition K-2.5 Understand that addition results in increase and subtraction results in decrease. (B2)	NCTM's Principals and Standards for School Mathematics (PSSM) Hands On Standards Grade PreK-K and 1-2, Learning Resources	See Instructional Planning Guide Module 4-2 Introductory Lesson B See Module 4-2, Lesson B Additional Instructional Strategies	See Instructional Planning Guide Module 4-2 Lesson B Assessment

MODULE

4-1

Number Structure and Relationships- Whole Numbers

Calendar

(Year-long Indicators)

This module addresses the following indicators:

K-2.1   Recall numbers, counting forward through 99 and backward from 10. (A1)

K-2.2   Translate between numeral and quantity through 31. (B2)

K-2.3   Compare sets of no more than 31 objects by using the terms *more than, less than*, and *the same as.* (B2)

K-2.6*   Analyze the magnitude of digits through 99 on the basis of their place values. (B4)

K-2.7*   Represent the place value of each digit in a two-digit whole number. (B2)

K-2.8   Identify ordinal positions through 31st. (A1)

K-5.7 Use a calendar to identify dates, days of the week, and months of the year. (A3)

K-5.8 Recall equivalencies associated with time: 7 days = 1 week and 12 months = 1 year. (A1)

Module 4-1 consists of 6 lesson(s) that continue to develop concepts introduced in Module 1-1 and Module 1-4.

These lessons are **INTRODUCTORY ONLY**. Lessons in S^3 begin to build the conceptual foundation students need. **ADDITIONAL LESSONS will be required** to fully develop the concepts.

I. Planning the Module

The first bullet under the Continuum of Knowledge represents student's prior knowledge and/or skills related to the standard. It is recommended that students are pre-assessed on this prior knowledge.

Continuum of Knowledge

K-2.1 Recall numbers, counting forward through 99 and backward from 10.
- Pre-Kindergarten students have some foundation for counting. They are motivated to count everything from the treats they eat to the stairs they climb.
- In First grade, students will use estimation to determine the approximate number of objects in a set of 20 to 100 objects (1-2.2) and compare whole-number quantities through 100. (1-2.5)

K-2.2 Translate between numeral and quantity through 31.
- Pre-Kindergarten students come to school counting up to five using a one-to-one correspondence as they share items during playtime (i.e., sharing cookies as they count 1,2,3,4 and 5). They may not understand the standard numeral 5 to represent the number of cookies shared.
- In First grade, students will translate between numeral and quantity to 100(1-2.1) and represent quantities in word form through ten. (1-2.3)

K-2.3 Compare sets of no more than 31 objects by using the terms *more than*, *less than*, and *the same as*.
- Pre-Kindergarten students have beginning concepts of size with sets of objects. They understand when someone has more cookies than they do, more blocks than they have, etc…
- In First grade, students will compare whole number quantities through 100, *is greater than, is less than,* and *is equal to* (1-2.5) and use estimation to determine the approximate number of objects in a set. (1-2.2)

K-2.6 Analyze the magnitude of digits through 99 on the basis of their place values.
- Pre-kindergarten students come to school rote counting and have very little understanding of numbers having an assigned place.
- In First grade, students will represent quantities in word form through 10 (1-2.3), recognize whole-number words (1-2.4) and analyze the magnitude of digits through 999 on the basis of their place values. (1-2.9)

K-2.7 Represent the place value of each digit in a two-digit whole number.
No continuum of knowledge is included in the support document at this time.

K-2.8 Identify ordinal positions through 31st.
No continuum of knowledge is included in the support document at this time.

K-5.7 Use a calendar to identify dates, days of the week, and months of the year. (A3)
- Pre-kindergarten students experience marking birthdays on calendars, singing songs about the days of the week and months of the year.
- In First grade, students will illustrate past and future dates on a calendar   (1-5.9) and represent dates in standard form (i.e., June 1, 2009) and numeric form (i.e., 6-1-2009). (1-5.10)

K-5.8   Recall equivalencies associated with time: 7 days = 1 week and 12 months = 1 year
- Pre-kindergarten students experience counting days on a calendar while singing rote songs for the days of week and months of the year.
- In First grade, students will illustrate past and future dates on a calendar (1-5.9) and represent dates in standard form (i.e., June 1, 2007) and numeric form (i.e., 6-1-2007). (1-5.10)

Key Concepts/Key Terms
*These are vocabulary terms that are reasonable for students to know and be able to use. Terms without the * are additional terms for teacher awareness, knowledge and use in conversation with students.*

Number Structure and Relationships

Quantity	More than*	Less than*
The same as*	Digit	Forward
Backward	After*	Before*
Numeral	Counting	Quantity
Compare	Sets	Place Value
Tens*	Ones*	Size

Calendar

Dates	Days*	Week*
Months *	Year*	Equal*
Yesterday*	Today *	Tomorrow*

7 days= 1 week*   12 months=1 year*

Days of the week   (Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, and Sunday)*
Months of the year   (January, February, March, April, May, June, July, August, September, October, November, and December)*

II. Teaching the Lesson(s)
These lessons continue to develop the concepts that were introduced in Module 1-1 and Module 1-4.

1. *Teaching Lesson A: Counting*

   Teacher Notes
   Since there is a developmental progression from counting to understanding place value, it is important to break the numbers 0-99 into smaller, more manageable groups for students to work with. It is for this reason that the first nine weeks has been designated to working with 0-10, the second nine weeks 1-20, the third nine weeks 0-99. **The fourth nine weeks will focus on joining and separating**

   a. *Indicators with Taxonomy*
   K-2.1   Recall numbers, counting forward through 99 and backward from 10.   (A1)
   Cognitive Process Dimension: Remember
   Knowledge Dimension: Factual Knowledge

   For this indicator, it is **essential** for students to:
   - Understand how to count using a number line or number chart.
   - Recognize the counting numbers and be able to rote count.
   - Say the counting words in order and then connect this sequence with a one-to-one match of the items being counted.
   - Recognize counting objects in a different order does not alter the result.
   - Recognize the next number in the counting sequence is one more than the number just named.

   For this indicator, it is **not essential** for students to:
   - Recognize three digit numbers, which students will translate in first grade.
   - Add and subtract two digit numbers.

   b. *Introductory Lesson*
   (Adapted from Teaching Student Centered Mathematics Grades K-3, Van de Walle, John A. and Lovin, LouAnn, Pearson Learning, 2006, Pages 57.)

   Materials Needed
   - Hundreds chart
   - Sets of objects to count
   - Straws or craft sticks
   - Rubber bands

Suggested Literature Connection:

Numbers by Henry Pluckrose. A Math Counts book illustrating the use of numbers in the real-world through photographs.

Introductory Lesson A: Counting

In Module 1-1, students counted up to a target number between 0-10 and   then counted back down to zero.
In Module 2-1, students counted up to 20 objects and then counted back from ten to zero.
In Module 3-1, students counted sets of objects up to 99 and located the number on the hundreds chart.

In this module, continue to have students count larger sets of objects (up to 99) and locate the number on the hundreds chart. (Refer to Module 3-1, Lesson A). At this point in the year, extend this lesson by having students represent the number of objects with bundles and singles of straws or craft sticks or alternate counting activities to include sets of objects or bundles/singles of straws.

c. Misconceptions/Common Errors
- Students who are able to count forward easily may have difficulty counting on and counting back.
- Although, many children come to school with the ability to rote count and recognize some numbers, they may not have developed a good sense of number.
- Students may omit numbers when counting objects and struggle to recount them for accuracy.
- Students may be able to count, but not have an understanding of where a number is located on a hundreds chart.

d. Additional Instructional Strategies/Differentiation

- **Enrichment**: For more advanced students, cover random numbers on a hundreds chart and have them use strategies to determine what the covered numbers are.
- **Remediation Activity:** Use a hundreds chart and 1 inch counters, for students who miscount because of the larger size of the set. As students count, have them place each counter in a square of the hundreds chart. This will slow the students down so they do not skip over objects and/or help them see the one-to-one correspondence between the object and the count.
- Students should have a fair understanding of counting, but children must construct this idea. It cannot be forced. Only the counting sequence is a rote procedure. There should be

meaning attached to counting. That is the key concept upon which all other number concepts are developed.
- Saying the counting words in order with a one-to-one correspondence takes a lot of practice and should be done with a variety of concrete items.

e. Technology

Virtual manipulatives should NOT take the place of concrete manipulation of objects/materials. Once conceptual understanding has been reached, you may move to pictorial representations and then virtual manipulatives. Concrete manipulatives should be the focus of learning to build conceptual understanding. Real life situations/representations are critical for conceptual understanding.

http://www.apples4theteacher.com/math/games/100-number-chart-one.htm
Interactive Hundreds Chart

http://www.harcourtschool.com/activity/count/index.htm
Computer counts along a hundreds chart that has missing numbers. When the computer reaches an empty cell, the student types in the correct number.

f. Assessing the <u>Lesson</u>

As the children work in centers, individually observe for the following areas:
- ability to count in correct sequence forwards to 99 and backwards from 10
- use one to one correspondence when counting.

2. Teaching Lesson B: Numeral and Quantity

Teacher Notes
Beginning number concepts encompass much more than rote memorization of words and symbols. Since kindergarten students have generally had experiences with things they can see and feel, developing a concept of number sense requires a new dimension of thinking as numbers are an idea that can't be seen or felt.

To develop these concepts, kindergarten students need repeated exposures to activities with authentic materials and given extensive opportunities to count in meaningful situations, match numbers to their quantities, and explore number decomposition.

a. Indicators with Taxonomy

K-2.2 Translate between numeral and quantity through 31. (B2)
Cognitive Process Dimension: Understand
Knowledge Dimension: Conceptual Knowledge

For this indicator, it is **essential** for students to:
*   Understand that number words refer to a quantity.
*   Recognize numerals through 31.
*   Say the counting words in order and then connect this sequence with a one-to-one match of the items being counted.

For this indicator, it is **not essential** for students to:
*   Recognize three digit numbers, which students will translate in first grade.
*   Add and subtract two digit numbers for this indicator.

b. Introductory Lesson
(Adapted from Anderson 5)

Materials Needed
*   Blank index cards
*   Interlocking Cubes

Suggested Literature Connection *(if any):*

Introductory Lesson B: Numeral and Quantity

In Module 1-1, students represented the numerals 1-10 with cubes.
In Module 2-1, students represented the numerals 0-15 with cubes.
In Module 3-1, students matched numeral and quantities 0-25.

In this module, continue to have students work with the number puzzles used in the third nine weeks.
Advanced preparation: Create individual number puzzles by using pieces of cardboard. Cut out 31 squares. Cut each square in half. On one piece of the puzzle, put one sticker. On the second piece of the puzzle write the number one. Do this for each number up to 31.

During the lesson, have students work with partners to match a numeral with the puzzle half that has the same amount of stickers or dots.

c. Misconceptions/Common Errors

- Students who are able to count forward easily may have difficulty counting on and counting back because these are difficult skills for many.
- Although, many children come to school with the ability to rote count and recognize some numbers, they may not have developed a good sense of number.

d. Additional Instructional Strategies/Differentiation
Teachers should continue to represent numbers in multiple ways: by pictures, objects, or models to help students develop conservation of numbers.

To make connections between counting and patterns, provide students with a set of 20- 31 unifix cubes, pattern blocks, etc. Have them students create a pattern, count the total number of cubes used, and find the number card for that amount of cubes.

Enrichment: To differentiate for students who are able to easily match numeral and quantity, have them arrange the numerals in order. Students may use a number grid or number line to assist them in ordering the numbers.

e. Technology

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http://www.primarygames.com/math/fishycount/index.htm
Students count fish and match to a number (1-10). Use for students who are still miscounting the number of objects in a set.

f. Assessing the Lesson

Formative assessment is embedded within the lesson through questioning and observation. However, other formative assessment strategies should be employed.

As the students are matching numeral and quantity cards, listen to see that they are counting with one-to-one correspondence and are not omitting numbers as they count. If students have difficulty counting stickers or dots, provide cubes or counters and see if they can count the correct amount to represent a number card.

3. Teaching Lesson C: Comparing Sets

Teacher Notes
When comparing sets of objects teachers using the terms *more than, less than, and the same as,* teachers need to provide many opportunities for children to construct sets using concrete items and help them make comparisons of the sets each containing 31 or fewer items.

a.   Indicators with Taxonomy

K-2.3 Compare sets of no more than 31 objects by using the terms *more than, less than*, and *the same as.* (B2)

Cognitive Process Dimension: Understand
Knowledge Dimension: Conceptual Knowledge

For this indicator, it is **essential** for students to:
• Recognize the counting numbers and connect them to the number of objects
• Compare whole number quantities and sets of objects using the comparative vocabulary *more than, less than,* or *the same as*.
• Select which set of objects has more than or less than a number

For this indicator, it is **not essential** for students to:
• Identify how much more or how much less than a number. (Ex. Teacher asks, "Which group has more?" showing a group of 5 objects and a group of 15. The child does not need to say the group of 15 has 10 more than the group of 5.)

b. Introductory Lesson
(Adapted from Developing Number Concepts, Counting, Comparing, and Pattern, Book 1 by Kathy Richardson, 1999, page 161)

Materials Needed
• Interlocking cubes (30-40 per pair of students)

Suggested Literature Connection (if any):
Just Enough Carrots by Stuart Murphy is a fun tale of comparing groups with a trip to the grocery store for rabbit.

Introductory Lesson C: Comparing Sets

In Module 1-1, students compared sets with 5 or fewer objects and identified which sets had more or less.
In Module 2-1, students compared sets with 0-15 objects.
In Module 3-1, students compared sets with 0-25 objects.

In this module, students will compare sets that contain 0-31 objects. Give each pair of students a Ziploc bag of 30-40 interlocking cubes. Each student grabs a handful of cubes to form a train. Ask students to count how many cubes are on their train. Who has fewer cubes?   Have students grab a few more cubes to add to their train. Compare the trains. Who has more?
Now have the students work together to make their trains equal lengths. Observe whether students recognize the need to add or take away cubes from their trains to make them equal lengths.
Next have the students sit facing each other, holding their trains behind their backs. At the same time, the students will break off part of their train. Place the new trains in front of them. Each student tells the other how their train compares to their partners.

c. Misconceptions/Common Errors
- Some children may confuse the terms more, fewer and equal. Reinforce these terms throughout the day by pointing out real life experiences such as that more children are in their chairs than are sitting on the floor.
- Students have more difficulty comparing sets using the term "less than" and may have more difficulty counting back.
- Students may omit numbers when counting objects and struggle to recount them for accuracy.

d. Additional Instructional Strategies/Differentiation

- Teachers need to provide many opportunities for children to construct sets using concrete items and help them make comparisons of the sets each containing 31 or fewer items. This involves counting groups using one-to-one correspondence. It is especially helpful to connect this concept to everyday situations in the lunch room, bathroom breaks, lining up and so forth.

- Students need opportunities to help them develop number concepts. Teachers may pose questions; such as, "How many pencils do we need at this table?" "How many students are in line ahead of you?"
- Students have difficulty selecting a set when asked, "Which is less?". Teachers can help by asking students which is less immediately after which set is more. Ask students why is this set less than the other set? Begin by asking students to compare sets that are obviously different in number, then proceed to closer values.

e. Technology

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http://illuminations.nctm.org/LessonDetail.aspx?id=L42
Students compare data on a bar graph.

f. Assessing the Lesson

Formative assessment is embedded within the lesson through questioning and observation. However, other formative assessment strategies should be employed.

As students are comparing sets, watch for students who are still making errors when counting the objects, either skipping a number or counting an object twice. When students compare the two stacks of cubes, listen to see that students are able to use the terms more, less, fewer, longer correctly. Since students have more difficulty in understanding the concept of "less" ask questions similar to these:
"Which group has less than the other?"
"Which group has fewer objects?"
"What do you need to do to make your trains equal length?"

4. Teaching Lesson D: Ordinal Numbers

Teacher Notes
Ordinal numbers are primarily taught through the tenth place especially when using straws and other objects to represent base ten numerals. The calendar, however, is a great tool for exploring ordinal

numerals beyond ten and through 31 as the students learn to identify the days of the week / month.

a. Indicators with Taxonomy

K-2.8 Identify ordinal positions through 31st. (A1)

Cognitive Process Dimension: Remember
Knowledge Dimension: Factual Knowledge

b. Introductory Lesson
(Adapted from Hands On Standards Grades PreK-K, Learning Resources, 2006, Pages 34-35)

Materials Needed
- Learning links or interlocking cubes (1 red, 1 orange, 1 yellow, 1 green and 1 blue per child)

Introductory Lesson D: Ordinal Numbers

In Module 1-1, students worked with the first through fifth positions.
In Module 2-1, students worked with the first through twelfth positions.
In Module 3-1, students identified the position of objects/people through the twentieth position.

In this module, students will work with ordinals through the 31st position.
This activity is similar to "I Spy." Display a set of pictures, up to 31, in the classroom. The teacher says, "I spy a picture of an orange square." Call on a student to start at the beginning of the line of pictures and count until they reach the picture that was described. (Students may use counting numbers and then say the corresponding ordinal number or count using ordinal numbers. Continue with a few more pictures and have students give the ordinal position.
Teachers may also give directions similar to these: "The fifteenth picture is the blue rectangle. What place is the yellow circle? (This picture should be the next picture to see if students know the ordinal number that comes after fifteenth.)

c. Misconceptions/Common Errors

Children may be confused about where to begin counting to reach a certain ordinal position. Encourage children to work from left to right similar to the way they read a sentence.

d. Additional Instructional Strategies/Differentiation

While additional learning opportunities are needed, no suggestions are included at this time.

e. Technology

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f. Assessing the <u>Lesson</u>

Formative assessment is embedded within the lesson through questioning and observation. However, other formative assessment strategies should be employed.

As the teacher questions the students about ordinal positions of pictures around the room, observe whether students know where to start as they begin to count. Listen to see if students are saying the ordinal numbers in the correct order.

Suggested questions:
Which picture is tenth? Show me how you know that.
What place is the picture of the horse?
Which picture comes after the twentieth picture? What place is that?
If this picture is the ninth, what place is the next picture in?

5. Teaching Lesson E: Place Value

Teacher Notes
Kindergarteners must develop the concept of place value only after they have secured a firm understanding of number. They should not be expected to understand place value until they have mastered the one-to-one correspondence and matching numerals to groups of objects less than 10.

With regard to place value students need to understand that the digit to the left in a two-digit number is representing groups of ten and the digit to the right is representing how many are in the ones place that have not yet made a group of ten. It can take the entire school year for many kindergarten students to grasp this concept. The concept

should be taught everyday and especially taught with manipulatives that the students can use to demonstrate their understanding. For example, a child may show a tower of ten cubes and a tower of three cubes to represent the numeral 13 or 3 towers of ten and a single cube to represent 31. Do not expect students to understand this concept until after mastering the one-to-one correspondence and matching numerals to groups of objects.

To allow time for students to develop a solid understanding of place value, it is recommended that students work with the numerals 0-25 during the first nine weeks, numerals 25-50 during the second nine weeks, numerals 50-75 during the third nine weeks, and **numerals 75-99 during the fourth nine weeks.**

a. Indicators with Taxonomy

K-2.6 Analyze the magnitude of digits through 99 on the basis of their place values. (B4)
Cognitive Process Dimension: Analyze
Knowledge Dimension: Conceptual Knowledge

For this indicator, it is **essential** for students to:
- Develop *meaning* attached to their counting.
- Recognize sets of tens in objects.
- Understand the one to one correspondence of numbers.
- Understand the digit to the left in a two-digit number is representing groups of ten and the digit to the right is representing how many are in the ones place that has not yet made a group of ten.
- Recognize and understand the meaning of "ten-ness".
- Determine how greater numbers in the tens place increase the value of the total number regardless of the numeral in the ones place being of less value.

For this indicator, it is **not essential** for students to:
- Analyze digits beyond 100 because it will later be addressed in first grade.
- Compute the numbers to increase place values (i.e., 34 plus one more ten is equal to 44).

K-2.7 Represent the place value of each digit in a two-digit whole number (B2)
Cognitive Process Dimension: Understand
Knowledge Dimension: Conceptual Knowledge

b. Introductory Lesson

Materials Needed
- Craft sticks (50-99)
- Rubber bands
- A cup labeled "10s" and a cups labeled "1s"
- Hundreds charts

Introductory Lesson E: Place Value

In Module 1-1, students worked with understanding the place value using the number 0-25.
In Module 2-1, students worked with place value using the numbers 25-50.
In Module 3-1, students worked with the numbers 50-75.

In this module, students will use the numbers 0-99 as they explore place value and magnitude of digits.

Have the class sit in a circle. Set out 70-90 craft sticks in the middle of the circle. Ask: "How many craft sticks do you think there are in the pile?" "What could we use as a counting strategy to find out how many there are?" *Some may children may mention tens frames, count one at a time, line them up, etc*.

If no one mentions grouping them, ask the students to think of a way that you could bundle the sticks to make it easier to count. Have students bundle the sticks into groups of ten and place them in the 10s cup. Left over sticks go in the 1s cup. "Who can count our sticks?" If students have difficulty counting by 10s, have them refer to a Hundreds Chart for assistance. Write the number on a chart. Point out that the bundles match the digit on the left, and the number of single sticks matches the number on the right. Say: "Another way to say the number is _____ tens and ____ ones."

Divide the students into small groups. Give a bag of craft sticks to each group and have them bundle and count the sticks. Allow groups to use a hundreds chart to help as they count by 10s. Have them record the number of sticks in their bag. Unbundle the sticks and trade bags with another group. Have groups compare numbers to check for accuracy of counting.

c. Misconceptions/Common Errors

- Students may not understand the concept of place value until after mastering the one-to-one correspondence and matching numerals to groups of objects.
- Students who have not yet developed sense of number might hold the misconception that the number 16 is made up of one and six rather than one ten and six ones.
- When given 5 bars of ten connecting cubes and 3 single cubes, many children will answer "8" when asked how many cubes there are altogether. These children may recognize that the bars are made of more than one cube, but are not ready to use the groupings to help in counting large quantities.

d. Additional Instructional Strategies/Differentiation

- Teachers may use the hundreds mat to show how numbers change in the tens and ones place.
- The concept should be taught daily using the number of days in school with a variety of manipulatives that the students can use to demonstrate their understanding (i.e., a student may show a tower of ten cubes and a tower of three cubes, or sticks and bundles) to represent the numeral 13 or 3 towers of ten and a single cube to represent 31.)
- **Remediation:** Assist students in connecting what they know about numbers and counting with the grouping-by-tens concept. Provide frequent opportunities to count sets of objects in different ways. If a set is counted by ones, then ask the students "What will happen if we count these by groups and singles?' If they have counted a set of objects that has already been grouped, then break apart the groups and have the students count the objects one-by-one. Students need many opportunities to construct this understanding themselves, and not just be told the counts are the same.

e. Technology

Virtual manipulatives should NOT take the place of concrete manipulation of objects/materials. Once conceptual understanding has been reached, you may move to pictorial representations and then virtual manipulatives. Concrete manipulatives should be the focus of learning to build conceptual understanding. Real life situations/representations are critical for conceptual understanding.

http://www.ictgames.com/sharknumbers.html

Interactive game for students to play and practice matching numerals to ten-trains and leftover cubes

f. Assessing the <u>Lesson</u>

Formative assessment is embedded within the lesson through questioning and observation.   However, other formative assessment strategies should be employed.

As students bundle craft sticks and count to determine the number, assess the following skills:
- Counts by 10s
- Counts by 10s and then counts on by 1s
- Understands that the digit in the tens place represents the number of bundles of 10 that are needed

6. Teaching Lesson F: Using a Calendar

Teacher Notes
Kindergarten students should use a calendar to identify dates, days of the week, and months of the year. While students can learn these facts from rote memory, they need to understand the deeper meaning of connections between these larger amounts of time.
Teachers must connect the repetition of the days and months so that students can understand the continual cycle of weeks and years. By doing so, students will be able to understand transitions Saturday to Sunday and December to January.

K-5.7 Use a calendar to identify dates, days of the week, and months of the year.

For this indicator, it is **<u>essential</u>** for students to:
- Understand the order of the months and days of the week.
- Recognize the vocabulary used to indicate positional days (i.e., Today is ____, tomorrow will be _____, and yesterday was _____).
- Recognize a row on the calendar is one week.
- Understand that each box on a calendar represents a day.
- Name and locate the month on a calendar.

For this indicator, it is **<u>not essential</u>** for students to:
- Determine the number of months between to given ones (i.e., "How many months are there before December, if this month is April?")

- Illustrate past dates using the calendar (i.e., "If today is June 2, what day was it three months ago?") In first grade, they will illustrate past and future dates on a calendar.

K-5.8 Recall equivalencies associated with time: 7 days = 1 week and 12 months = 1 year.

For this indicator, it is **essential** for students to:
- Understand what equal means when it applies to time.
- Recognize the vocabulary as it relates to equivalency (i.e., all 12 months equals a year).
- Recognize a row on the calendar is one week.
- Recognize that some calendars begin on different days of the week.

For this indicator, it is **not essential** for students to:
- Recognize the number of days in several weeks or number of months in several years.
- Determine smaller amounts of time (i.e., 1 day = 24 hours, etc.).

a.   Indicators with Taxonomy

K-5.7   Use a calendar to identify dates, days of the week, and months of the year. (A3)
Cognitive Process Dimension: Apply
Knowledge Dimension: Factual Knowledge

K-5.8 Recall equivalencies associated with time: 7 days = 1 week and 12 months = 1 year. (A1)

Cognitive Process Dimension: Remember
Knowledge Dimension: Factual Knowledge

b. Introductory Lesson

Materials Needed: (per student)
- Blank monthly calendar grid
- Set of number cards 1-31
- Individual cards for days of the week
- Individual cards for months of the year
- 2 crayons, different colors
- Zip loc bag to hold calendar parts
- Tape or glue (optional)

Introductory Lesson F: Using a Calendar

In Module 1-1, students went through the process of building a calendar for the month, placing the days of the week in order, identifying and labeling the month, and identifying dates.
In Module 2-1, students dismantled the calendar as they continued to develop an awareness of the calendar.
In Module 3-1, students explored the organization of a 12-month calendar.

In this module, students will continue to develop their awareness of how calendars are organized and practice using a calendar.

Review the months of the year and the days of the week with one of the songs listed in Module 1-1. (Two are provided below.)

Months of the Year
(to the tune of "Ten Little Indians")

January, February, March, and April,
May, June, July, August, and September,
October, November, and December,
These are the months of the year

Days of the Week

(Sung to the tune of Happy Days) Sunday Monday Happy Days Tuesday Wednesday Happy Days Thursday Friday Happy Days Saturday What a Day What a Day to watch cartoons with you…

(On the Happy Days song, the kids clap their hands as they say happy days. Each time they say happy days they clap it out as well as sing it.

Each student should have the materials listed above in a zip loc bag.

Begin by reviewing what students have learned about the calendar throughout the year. Suggested questions:

"What are the different parts of a calendar?"
"What are some ways we use a calendar?"
"How are all calendars alike?"

Tell students that they are going to build a calendar for the current month. But, this calendar may look a little different.

Have students color each row of their calendar with their crayons in an AB pattern. Row 1 is red, row 2 is blue, row 1 is red, what will you color row 2? Explain that each row on a calendar shows one week. Have students count the number of boxes in one row. How many days are in one week?

Next have students find the name of the month and place it at the top of the calendar. (*Students may tape or glue in place, but it is not essential for this lesson*)

Let's build our calendar with Monday as the first day of the week.   Explain to students that in some cultures, calendars begin with Monday as the first day of the week.*(see essential learning for K-5.8)* Place the rest of the days in the correct order.

The first day of this month was on _____. Place the number 1 on the first (Thursday) on your calendar. Observe whether students are able to find the correct box on the grid to place the first day. Now place the rest of your numbers on the calendar in order. Note which students need prompting to sequence the numbers.

Once the calendar is built, ask questions similar to the following:

- Who can name all the numbers on the second week of the month? (refer students to look at the way they colored the rows to find the second week)
- What is a date in the fourth week?
- What is the second Monday of the month? (Observe whether students are confused with where Monday is located on the calendar.)
- How many Fridays are in this month?
- What month comes next?
- Point to a date in the second column (under Tuesday). What day of the week is _____? (Listen to see if students are confused since the days are not in their usual sequence.)

c. Misconceptions/Common Errors

- Students may have difficulty adjusting to a calendar that begins on Monday instead of Sunday.
- Students may have difficulty understanding the concept of week, month or year.
- Students may have difficulty associating whole numbers with ordinal numbers. For example, the number 1 is dated on a calendar as the 1st.

d. Additional Instructional Strategies/Differentiation

- Teachers must connect the repetition of the days and months so that students can understand the continual cycle of weeks, months and years. By doing so, students will be able to understand transitions Saturday to Sunday and December to January.
- Refer to Module 1-1 for a songs and poems related to the days of the week and months of the year
- **Remediation:** Continue to use calendars with the rows color-coded to help students understand the concept of a week.
- **Enrichment:** Provide students with calendars for two different months. Have them compare the months. Questions to have them explore include: How are they alike? How are they different? Why don't they begin on the same day of the week?
- To differentiate for more advanced students: Allow the children to create story problems centered on a month of the year. For example, "Today is December 5, how many more days until Christmas?"

e. Technology

"Virtual manipulatives should NOT take the place of concrete manipulation of objects/materials. Once conceptual understanding has been reached, you may move to pictorial representations and then virtual manipulatives. Concrete manipulatives should be the focus of learning to build conceptual understanding. Real life situations/representations are critical for conceptual understanding."

These are suggestions for resources:
http://www.drjean.org/html/monthly_act/act_2009/06_Jun/index.html
Dr. Jean's website has Monthly Activities with lyrics to songs and poems that support the calendar and other math skills.

f. Assessing the lesson:

Formative assessment is embedded within the lesson through questioning and observation. However, other formative assessment strategies should be employed

As students explore 12-month calendars, record observations about their responses to questions that are asked. Particularly note the following:
Can students easily locate a month near the end or beginning of the year? Which students think the first day of the month is the same as the first day of the week?
Which students do not understand how a 12-month calendar is organized?

III. Assessing the <u>Module</u>

At the end of this module, summative assessment is necessary to determine student understanding of the connections among and between the indicators addressed in this module.

Assessment Guidelines

K-2.1   Recall numbers, counting forward through 99 and backward from 10.

The objective of this indicator is <u>recall,</u> which is in the "remember factual" knowledge cell of the Revised Taxonomy table. Remember requires students to retrieve relevant knowledge from long-term memory. Factual knowledge is having the knowledge of specific details and elements. Students should <u>recall</u> numbers, counting forward through 99 and backward from 10. The learning progression to **recall** requires students to <u>recognize</u> the counting numbers and <u>recall </u>their order in the sequence. Students should <u>analyze</u> (K-1.4) patterns by reasoning and <u>use</u> (K-1.8) multiple informal representations as they <u>apply</u> (K-1.1) substantive mathematical problem-solving strategies to explore hands-on activities.

K-2.2   Translate between numeral and quantity through 31.

The objective of this indicator is <u>translate,</u> which is in the "understand conceptual" knowledge cell of the Revised Taxonomy table. Understand requires students to construct meaning from instructional messages. Conceptual knowledge is having the knowledge of classifications and categories. The learning progression to **translate** requires students to <u>recall</u> counting numbers through 31, <u>recognize</u> the one-to-one correspondence as they count and <u>determine</u> the numeral and quantity of the objects given. They <u>use</u> these multiple informal representations (K-1.8) as they <u>apply</u> mathematical problem-solving strategies (K-1.1).   Students should <u>use</u> a variety of forms of mathematical communication (K-1.6) as they <u>explain</u> and <u>justify</u> their answers (K-1.3)to their classmates and their teacher..

K-2.3   Compare sets of no more than 31 objects by using the terms *more than, less than*, and *the same as.*

The objective of this indicator is <u>compare</u>, which is in the "understand conceptual" knowledge cell of the Revised Taxonomy table. Understand requires students to construct meaning from instructional messages, including oral, written, and graphic communication. Conceptual knowledge is having the knowledge of theories, models,

and structures. The learning progression to **compare** requires students to <u>recognize</u> the counting numbers and <u>recall</u> their order in the sequence. Students should <u>understand</u> sets and <u>categorize</u> groups by quantity. Students should <u>use</u> multiple informal representations (K-1.8) as they <u>apply</u> (K-1.1) mathematical problem-solving strategies to compare objects.

K-2.6   Analyze the magnitude of digits through 99 on the basis of their place values.

The objective of this indicator is to <u>analyze,</u> which is in the "analyze conceptual" knowledge cell of the Revised Taxonomy table. Analyze requires students to break material into its constituent parts and determine how the parts relate to one another and to the overall structure. Conceptual knowledge is having the knowledge of finding the interrelationships among the basic elements within a larger structure that enable them to function together. The learning progression to **analyze** requires students to <u>remember</u> the counting numbers and <u>differentiate</u> between the larger and smaller numbers. Students <u>analyze</u> patterns (K-1.4) in the place value of the number and <u>generalize</u> (K-1.7) connections about the size of digit in the tens place versus digits in the ones place.

K-2.7* Represent the place value of each digit in a two-digit whole number.
          No assessment guidelines are available at this time.

K-2.8   Identify ordinal positions through 31st.
          No assessment guidelines are available at this time.

The following examples of possible assessment strategies may be modified as necessary to meet student/teacher needs. These examples are not derived from nor associated with any standardized testing.

At the end of the module, use this checklist to assess students' progress toward mastery of the indicators.   For the fourth 9 weeks, teachers need to assess students on all 4 sections.

For Numbers 0-5, the student is able to:		For Numbers 11-20, the student is able to:	
recall numbers forward and backward		recall numbers (forward only)	
Translate between numeral and quantity		Translate between numeral and quantity	
Compare sets of no more than 5 objects		Compare sets of no more than 20 objects	
Identify ordinal numbers through 5th		Identify ordinal numbers through 20th	

For Numbers 6-10, the student is able to:		For Numbers 21-99, the student is able to:	
recall numbers forward and backward		recall numbers (forward only)	
Translate between numeral and quantity		Translate between numeral and quantity (through 31)	
Compare sets of no more than 10 objects		Compare sets of no more than 31 objects	
Identify ordinal numbers through 10th		Identify ordinal numbers through 31th	

Calendar Checklist

Use the checklist below to assess a student's understanding of the organization of a calendar and ability to use a calendar to locate information. Insert notes or a rating in each of the 9 weeks columns to indicate progress towards mastery.

TASK	1st 9 Weeks	2nd 9 Weeks	3rd 9 Weeks	4th 9 Weeks
Names Days of Week in Order				
Correctly uses the vocabulary: "Today is ____, Yesterday was _____, Tomorrow will be _____."				
Names Months of Year in Order				
Identifies a week on a calendar				
Uses a calendar to locate a date				
Finds the name of the month on a calendar				
Answers questions about the monthly calendar: **How many Fridays? How many days during the month? What day is (*name a date*)? What is the date for the third Monday?**				

MODULE

4-2

Operations – Addition and Subtraction

This module addresses the following indicators:

K-2.4   Represent simple joining and separating situations through 10. (B2)
K-2.5   Understand that addition results in increase and subtraction results
         in decrease. (B2)

This module contains 2 lessons. These lessons are **INTRODUCTORY ONLY**.
Lessons in S^3 begin to build the conceptual foundation students need.
ADDITIONAL LESSONS will be required to fully develop the concepts.

I. Planning the Module

The first bullet under the Continuum of Knowledge represents student's prior knowledge and/or skills related to this standard. It is recommended that students are pre-assessed on this prior knowledge.

Continuum of Knowledge

K-2.4   Represent simple joining and separating situations through 10. (B2)

- Pre-kindergarten students have experience separating objects and putting them back together (i.e., several blocks stacked and taken apart and stacked again in a different way, using the interlocking chains to make a necklace, etc.), but may not have the understanding of breaking apart a set in different ways to make the same number.
- In First grade, students will represent quantities through 100 (1-2.3)and recall basic addition facts through 9 +9 and corresponding subtraction facts. (1-2.6)

K-2.5 Understand that addition results in increase and subtraction results in decrease. (B2)

- Pre-kindergarten students begin to rote count and are introduced to one-to-one correspondence.
- In First grade, students are comparing (1-2.5) whole-number quantities through 100 by using the terms *is greater than, is less than,* and *is equal to* and summarizing the inverse relationship between addition and subtraction (1-2.7).

Key Concepts/Key Terms

More	less	same as
Add (+)	increase	subtract (-)
Decrease	how many are left?	Join
how many in all?	Separate	Equal (=)
More than	Less than	

II. Teaching the Lesson(s)

1. Teaching Lesson A: Joining and Separating

Teacher Notes
Students should be given an abundance of opportunities to manipulate objects as they join and separate sets through ten. Students should also <u>represent</u> the joining and separating of sets in pictorial form. In addition, a story board may be made by copying a picture from a coloring book for each student. The picture might be a fall scene. Orange and red spray painted beans might represent leaves. The teacher would say place two orange leaves under the tree. Now place three red leaves under the tree. How many leaves are under the tree? (Students respond – When I combine or add the leaves there is a total of 5). Next, the students should represent the concrete experience pictorially. Students should also experience the reverse – start with a pictorial model and demonstrate it with concrete objects. All experiences should not go beyond ten. Students should NOT be required to write addition and subtraction in symbolic form (2+3 = 5). The goal in kindergarten is that students have a conceptual understanding that addition results in increase and subtraction results in decrease and can represent that understanding in concrete and pictorial models through 10.

Student experiences should not be limited to the story board example cited above but should also include using such tools as ten frames, Part-Part-Whole mats, and number stories with objects to manipulate.

a. Indicators with Taxonomy

K-2.4 Represent simple joining and separating situations through 10. (B2)

> *Cognitive Process Dimension: Understand*
> *Knowledge Dimension: Conceptual Knowledge*

For this indicator, it is **essential** for students to:
- Understand the terminology joining and separating and communicate it in a given situation.
- Say the counting words in order and then connect this sequence with a one-to-one match of the items being counted.
- Recognize the quantity as being the same as a variety of combinations of objects(i.e., 5 marbles + 5 marbles is equal to 2 marbles + 8 marbles).
- Understand that a number can be made up of two or more parts (i.e., 10 can be thought of as a set of 6 and a set of 4 or a set of 3 and a set of 7).

- Use objects to demonstrate sets, and connect eh sets to numeral quantities

For this indicator, it is **not essential** for students to:
- Compute the numbers in the set using numerals and symbols.

b. *Introductory Lesson :* *(Adapted from the Creating Excellence in Elementary and Middle Mathematics document)*

Materials Needed :
- Plastic bowl (per two students)
- 10 Counting Bears (per two students) in a paper bag
- Unifix Cubes
- Paper/Pencil

Suggested Literature Connection

Ten Little Fish by Audrey Wood is a creative counting book featuring a school of colorful fish as they gradually disappear from the reader's view.

12 Ways to Get to 11 by Eve Merriam uses a whimsical exploration of numeration on each colorful combination of objects totaling 11: "Out of the magician's hat: four banners, five rabbits, a pitcher of water, and a bouquet of flowers".

Quack and Count by Keith Baker has ducklings slide, chase bees, and play as they illustrate ways to add up to their sum.

Introductory Lesson A: Joining and Separating

Distribute bags of counting bears and bowls to each pair of students. Tell the students that they are going to "act out" parts of a story using the small counting bears and pretending the bowl is a cave. Begin the story, "Five mother bears all decided to go on a picnic and take their cubs along. They were having a wonderful time until it started to rain. The cubs had never experienced rain and were frightened. The mothers tried to comfort them but the storm grew worse. Suddenly, lightning struck and all five cubs ran in five different directions." (*10 total bears, five ran away*) How many bears are left? (*5*) The mother bears started to cry out for their cubs and they all ran in different directions. How many are left? (*0*). After some time had passed the mother cubs all found their cubs safely inside a cave. How many bears do we have now?" (*10*) Ask the children what happened to the number of bears when the cubs ran

away? (*We took them away; we subtracted*) Ask the children what happened when the bears came together? (*We put them together*; *we added*) Instruct the students to put all of the bears under the cave (*bowl*). Continue the story by stating that the bears wanted to play hide-and seek. Ask one child to cover their eyes, while the other child lifts the bowl and removes some bears. The child should place the bears on top of the bowl. The partner uncovers their eyes and should try to figure out how many bears are still in the cave. (*example: there are 3 on top, so 7 in the cave*.) Afterwards, tell the children to switch and the other child will cover his/her eyes. While the children are playing the game, the teacher should walk around the room observing the students. What strategies are the children using to decide how many bears are under the cave?

Afterwards, encourage the children to create/illustrate their own stories using simple joining and separating situations with manipulatives or paper/pencil. Example: Ten little ants were walking up the hill, two stopped for a snack. Now, ask the students how many ants are walking up the hill, ask the children who many ants are left. The children can use unifix cubes, beans or other manipulatives to illustrate the ants. Continue the story, "The ants came to a puddle and three ants decided not to cross or go around the puddle." Ask the students, "How many ants are left and or how many in all?" The students will continue to illustrate/represent the ant activity. Continue the story, "Now the remaining ants decided to sit down and rest, and two of the previous ants caught up with them. How many ants are there now? Continue the story by allowing the children to add events to the story. As the children add events to the story, record the events on chart paper. Walk around and observe the children's illustrations and ask the children to explain their reasoning. For example, why are there only 8 ants left, what would happen if two more joined the group? Afterwards, give the children a story problem where the students need to illustrate joining and separating and ask them to draw out the story problem. For example, five birds were flying south for the winter, during the journey; they met two more birds who wanted to join them. During their continued journey, three birds decided to fly in another direction. How many birds are there in all? Instruct the children to represent the story problem pictorially using paper and pencils. Encourage them to use arrows or lines to show the birds joining the group and leaving the group.

c. Misconceptions/Common Errors:

- Although, many children come to school with the ability to rote count and recognize some numbers, they may not have developed a good sense of number.
- Students may omit numbers when counting objects and struggle to recount them for accuracy.
- Students may think one set of values represents a number.

d. Additional Instructional Strategies/Differentiation

- It is important for the teacher to just focus on joining and separating. The number sentence should not be introduced at this time. It is important for the students to develop a number sense and learn conceptually before introducing abstract ideas.
- Teachers should encourage reflective thinking about number combinations so that the relationships of numbers be developed using real world examples (i.e., students learn to recognize the dot arrangements on dice and quantities up to 10 can be quickly known and named).
- Teachers may use work mats (i.e., dot plates, tens mat, etc.) for pattern recognition and learning combinations of numbers.
- **Remediation:** Pose problems to the students that they can act out in a variety of ways. One suggestion is to use the song "Five Green and Speckled Frogs." (*see Technology links below*) Select 5 students to act as the frogs. Set the scene by using a blue blanket for the pond and cover some chairs with a brown sheet for the log. The class sings the song while the five frogs act out the actions in the song. The students who are not frogs may use green counters to act out the song. [idea from Anderson 5]
Use other poems and songs or make up some stories for students to act out.
- **Enrichment:** There may be some students who are ready to work with sets greater than 10. Provide these students with stories involving larger numbers. Students who are more advanced should also be given more complex stories to solve with manipulatives. Instead of simple joining or separating, some students may be ready for stories with missing parts or comparative stories.
Examples:
  - *Mary had 8 sheep. Some ran away. Now she has 5 sheep. How many ran away?*

> o *Jack found 8 rocks. Jill found 5 rocks. How many more rocks did Jack find?*

e. Technology

"Virtual manipulatives should NOT take the place of concrete manipulation of objects/materials. Once conceptual understanding has been reached, you may move to pictorial representations and then virtual manipulatives. Concrete manipulatives should be the focus of learning to build conceptual understanding. Real life situations/representations are critical for conceptual understanding."

http://bussongs.com/songs/five_green_and_speckled_frogs.php
"Five Green and Speckled Frogs" song

http://illuminations.nctm.org/ActivityDetail.aspx?ID=74
Illuminations: Five Frame Activity. Interactive activity using frames of 5 to develop counting and addition skills.

http://illuminations.nctm.org/ActivityDetail.aspx?ID=75
Interactive Ten Frame to practice counting and thinking of numbers in relation to 10.

http://www.factmonster.com/math/knowledgebox/player.html?movie=sfw42183
Interactive game that can be used for counting or joining sets.

f. Assessing the Lesson:
Formative assessment is embedded within the lesson through questions and observation.   However, other formative assessment strategies should be used.

Work with the children in small groups and give them the following problems to solve. Observe students solving the problems. Ask the students to explain their reasoning.

- *Mom bought 6 brownies, however, she ate 2 on the way home from the store. How many brownies did she bring home?*

- *Margaret saved 8 pennies. Dana gave her 2 more pennies. How many pennies does Margaret have now?*

- As you think about the ants and their activities today, what do you think it means to join items together? What does it mean when we separate items?

When you think about joining/separating items, how can we represent adding or subtracting the items?

2. Teaching Lesson B: *Increase and Decrease with Subtraction and Addition*

Teacher Notes

It is important to help children construct their own meanings of how addition results in increase and subtraction results in decrease. This concept is best taught by using story problems; however, using generic story problems encourages children to simply solve problems to obtain correct answers. Using contextual problems will encourage students to solve everyday problems which focus on their school/and or lives. Students should use pictorial representations using manipulatives or number lines to solve story problems. Students should be given opportunities daily to solve contextual problems.

a. Indicators with Taxonomy

K-2.5   Understand that addition results in increase and subtraction results in decrease. (B2)
   Cognitive Process Dimension: Understand
   Knowledge Dimension: Conceptual Knowledge

For this indicator, it is **essential** for students to:
- Rote count.
- Have manipulatives.
- Translate between number and quantity, i.e. students need to know that 3 is less than 7, 9 is more than 4, which represents the size of numbers.
- Conserve numbers.

For this indicator, it is **not essential** for students to:
- To count on from a certain number.
- Have instant recognition of amounts (subitizing).

b. Introductory Lesson

   Materials Needed:
   Unifix cubes or beans
   Laminated number lines
   Paper/pencil
   Chart Paper/Marker

Suggested Literature Connection

Monster Musical Chairs by Stuart Murphy introduces the beginning concepts of subtracting one by one until there is just one winner left in the game.
The Mission of Addition by Brian Cleary explains the concepts of addition along with introducing the symbols.

Introductory Lesson B: Increase and Decrease with Subtraction and Addition

Begin the lesson by asking this question, "If Steven bought 6 pencils from the school store and gave 4 pencils away, how many pencils does Steven have now? Please illustrate this problem using your manipulatives.(provide the children with a variety of manipulatives from which to chose) What happened to Steven's number of pencils? What if Steven decided to buy 3 more pencils the next day; how has the number of pencils that Steven has changed? Listen to the responses, do not validate them. Allow the children time to think about the problem. Now ask, "When Steven buys pencils, what happens to the total number of pencils? When he gives them away, what happens to the total number of pencils? Allow the children to construct their own meaning of addition and subtraction, by asking, "What are the mathematical terms for increasing and decreasing?" The students will discuss with a partner or table group to answer the question. Ask the students for their responses and record them on chart paper. Next story problem: "If Christy has 7 marbles in her pocket and she has 3 marbles in her purse; how many marbles does she have all together?" Students will work with partners or groups to solve problem. Instruct the students to discuss whether the number of marbles increased or decreased. Remember to encourage the children to use the correct terminology: increase means addition and decrease means subtraction. Afterwards, ask the children to provide their own story problems. Record the story problems on chart paper. The students will work in pairs or table groups to solve the problems. Continue this process remembering to ask the children to explain their reasoning. To wrap up the lesson, ask the children to illustrate pictorially what is addition and subtraction.

Additional Contextual Story Problems:
- Steven and Rosa had 10 Airheads. They ate 6 of them. How many airheads are left?
- Micah has 7 pennies. He loses two pennies while playing at recess. How many pennies does he have now?

- Rita had 9 library books. She took four of them back. Now how many books does she have?
- 4 children were playing at the park Then 5 more came to play. How many children were at the park?
- Tia had 5 fish in a tank. She bought 3 more fish. How many fish does she have now?
- 8 children were on the bus. At the next stop, 2 more children got on. How many children were on the bus?

c. *Misconceptions/Common Errors*:

- Students are learning to add and subtract conceptually. Please do not introduce algorithms at this time; focus on developing a number sense and conceptual understanding.
- Students who continue to struggle with conservation numbers may need continued practice with one–to-one correspondence.

d. *Additional Instructional Strategies/Differentiation*

Students should represent concrete experiences pictorially. Students should also experience the reverse – start with a pictorial model and demonstrate it with concrete objects. All experiences should not go beyond ten. Although students are not required to write addition and subtraction in symbolic form (2+3 = 5), it should be taught in context. The goal in kindergarten is that students have a conceptual understanding that addition results in increase (composing) and subtraction results in decrease (decomposing) and can represent that understanding in concrete and pictorial models through 10. As children learn about integers, adding doesn't always make things bigger and subtraction doesn't always make things smaller.

Remediation: Teachers can use a primary balance scale to show the unbalance of objects in a visual and kinesthetic way for students to see the concept of more than and less than.

Enrichment: Encourage the children to create their own story problems in pairs or individually; use Photo Story (software program) to record the students' problems excluding the answers. Afterwards, play the stories for the children on a smart board or on the computers. The children will solve the problems.

Resources that may be helpful:
Tools-Work mats, part–part-whole mats, number stories designed by teacher

Manipulatives- cubes, crayons, plastic toys, bean counters, bears, paper clips, etc…

e. Technology

"Virtual manipulatives should NOT take the place of concrete manipulation of objects/materials. Once conceptual understanding has been reached, you may move to pictorial representations and then virtual manipulatives. Concrete manipulatives should be the focus of learning to build conceptual understanding. Real life situations/representations are critical for conceptual understanding."

http://www.kellyskindergarten.com/math/math_activities.htm has math activities and games. Scroll down for the Addition Mission game mats and directions.

f. Assessing the Lesson

Remember to use effective questioning to assess the students' conceptual understanding during the lessons. Observe the students while they solve the following problems. Record the data that you observed.

1. Seven children were playing tag at recess. Three children were jumping rope. How many children were on the playground?
2. Ten frogs were swimming in the pond. Three frogs decided to go home. How many frogs are left in the pond?
3. As you think about the story problems we created, what happens when the total number of objects decreases?

The following questions may be asked by the teacher to assess students' understanding:
"What is happening in this problem?"
"Is the size of your set increasing or decreasing?" "What does increasing/decreasing mean?"
"What is another word we can use to mean increasing?"

III. Assessing the <u>Module</u>

At the end of this module summative assessment is necessary to determine student understanding of the connections among and between the indicators addressed in this module.

Assessment Guidelines

K-2.4   Represent simple joining and separating situations through 10.

The objective of this indicator is to <u>represent</u> simple joining and separating situations through 10 which is in the "understand conceptual" knowledge cell of the Revised Taxonomy table. Understand requires students to construct meaning from instructional messages. Conceptual knowledge is having the knowledge of theories, models, and structures. The learning progression to represent simple joining and separating situations through 10 requires students to <u>recall</u> counting numbers <u>recognize</u> the one-to-one correspondence as they count and <u>classify </u>the objects given as different ways to construct 10. Students should <u>analyze</u> (K-1.4) patterns and <u>generalize </u>connections (K-1.7) among the different forms of 10 as they <u>apply</u> (K-1.1) mathematical problem-solving strategies to represent simple joining and separating situations through 10.

K-2.5 Understand that addition results in increase and subtraction results in decrease.

The objective of this indicator is <u>understand,</u> which is in the "understand conceptual" knowledge cell of the Revised Taxonomy table. <u>Understand</u> requires students to find a specific example or illustration of a concept or principle. Conceptual knowledge is having the knowledge of classifications and categories. Students should <u>understand </u>that addition results in increase and subtraction results in decrease. The learning progression to **understand** requires students to <u>remember</u> the value of each number and how to represent those numbers using concrete models. Students <u>use</u> these multiple informal representations (K-1.8) to explore what happens to the set of objects when they add or subtract objects. They <u>generate</u> conjectures (K-1.2) and <u>explain</u> and <u>justify</u> (K-1.3) their answers to simple problems.

The following examples of possible assessment strategies may be modified as necessary to meet student/teacher needs. The examples are not derived from nor associated with any standardized testing.

Please administer these assessments orally; and take antidotal records. The summative assessments are more effective when administered in small groups where the teacher can observe the students and make notes of strengths and weaknesses. Provide manipulatives for the students to use as they solve the problems.

K-2.4

Matthew scored 6 points during his basketball game on Monday. He scored 3 points during his game on Tuesday. **How points did Matthew score altogether?** (*Show how you solved this problem using pictures, numbers, words, or manipulatives*.)

Pam had 10 dolls. She left three dolls at her friend's house. **How many dolls does Pam have now?** (*Show how you solved this problem using pictures, numbers, words, or manipulatives*) **Did the number of dolls Pam has decrease or increase? How do you know?**

K-2.5

Katie is making bracelets. She has already made 4 bracelets. She decides to buy 5 more bracelets. **How many bracelets does she now have?** (Show how you solved this problem using pictures, numbers, words, or manipulatives .) **What happened to her number of bracelets?**

Danny has 7 baseball cards. He gives 3 baseball cards to a friend. **How many baseball cards does Danny have now**? (*Show how you solved this problem using pictures, numbers, words, or manipulatives.)* **What happened to the number of baseball cards that Danny has?**