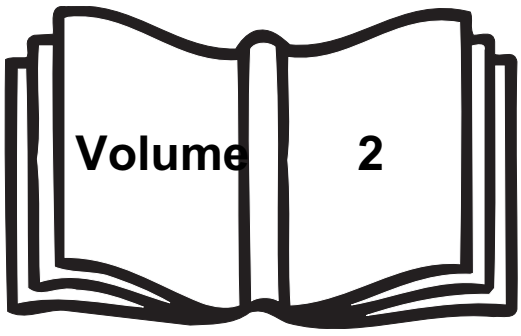
Grade One

Classroom

Strategies



Notes and textbook references

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The learner will read, write, and model whole numbers through 99 and compute with whole numbers.

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Notes and textbook references

1.01 Develop number sense for whole numbers through 99.

Many children are inconsistent in counting objects accurately. Early pre-number experiences use one to one correspondence for comparing without counting. Because accurate counting is necessary for many tasks, teachers and students may model strategies to help other students master the task. A divided workmat or a container into which objects may be counted are examples of ways to help organize the counting.

a) Connect the model, number word, and number using a variety of representations.

In learning to create sets and make appropriate connections with the oral names and symbols, students need opportunities to experience the relationships in several important ways. The goal of this objective is for students to be successful with all variations of the task:
a. Shown a set, the student can tell how many.
b. Shown a set, the student can identify the appropriate numeral.
c. Shown a numeral, the student can state its name.
d. Shown a numeral, the student can create a set.
e. Given an oral name, the student can identify the numeral.
f. Given an oral name, the student can create a set.

A. Ask student to give you five (or another number) crayons; ask child to show you the numeral five. Show a student six crayons; ask child how many; ask child to match the correct numeral with the set.

B. Play "Huddle in groups of..." Leader calls out a number or shows the number on a large card. Students arrange themselves into appropriate groups. Repeat the activity with different numbers. Ask individual students to check whether the groups have the correct number.

Notes and textbook references

C. Put four objects on the overhead and flash it on for two seconds. The children should have the same objects at their seats. They should place the same number of objects on their desk that they saw on the overhead. The teacher then leads a discussion as to how many they think they saw. They check by turning the overhead on. Repeat with the different numbers. Children can show number tiles or cards to represent the numeral.

D. Ask students to use pattern blocks in making a design. Direct children to find a number card to show how many blocks were used.

E. On a worksheet with pictures of objects, have students match or write the proper numerals. Fold to divide a sheet of newsprint into four parts and ask students to draw a given number of objects in each section. See Blackline Masters I - 2, I - 3, I - 4.

F. Play Number Word Concentration. Print number words zero through ten on index cards (make two sets). Shuffle cards and place face down in front of players. Each player turns over a card, reads the card aloud, then selects another card and does the same. If the number words match, the player keeps the cards and takes another turn. If the cards do not match, the cards are returned (face down) and the turn is over. The winner is the player with the most matches.

Blackline Masters I - 5 through I -10 will assist teachers in making game cards for these activities.

G. Quick Flash! Teacher prepares index cards with a number word (zero through ten) on one side and the corresponding numeral on the other. Students play in teams of three. Students draw one card and lowest number is the dealer. The dealer holds the flash card up with the number word facing the other two players. The player who correctly identifies the number first gets the card. Each answer can be checked by showing the numeral on the back side of the card. The winner of the round is the player with the most cards. Cards are then shuffled and dealer position rotates among the players until all have had a chance to be dealer.

H. Show Me! Each student has a set of number word cards. As the teacher holds up or calls out a number students hold up the appropriate number word card.

I. Prepare a set of cards with number words and a set of cards with numerals or sets. Shuffle the sets together and play “Go Fish!”. See Blackline Masters I -13 through I - 30.

J. Teacher makes cubes or spinners with the number words one through six written on them. These may be used to play games rather than dice with dots. Later in the year, use two cubes or spinners with number

words through ten. See Blackline Masters I - 21 through I - 29.

Notes and textbook references

b) Use effective strategies to count the number of objects in a set.

Dot patterns, dominoes, coins, and ten frames are effective tools for helping students develop an early number sense in counting. Games that reinforce recognition of standard groupings are very useful for young children.

A. Do the Dot! Give students sets of manipulatives for counters (beans, connecting cubes, bingo disks, color tiles etc.) show a ten frame for two or three seconds and ask students to put the same number of counters on the mat as shown in the ten frame. See Blackline Masters I - 5 through I - 10.

B. Tell Tall Towers! Prepare towers of snap cubes in a box or container out of student's view. Show one tower and have students count the number of cubes in the tower. Take out a second tower and place it next to the first. Ask students to tell how many cubes are in the second tower. Thumbs up when you have the number! Ask students to tell you how they arrived at their number. Repeat with a variety of towers, establishing the count for each successive tower.

C. Play domino addition. Give students one domino apiece and ask them group themselves according to domino sums. Start with ten and ask students with ten total dots join hands. When all the pairs are made count by tens to see how large the total is. Next number is 15. After pairs are made count by fives three times per group to check for the total. Each time you play the game choose a multiple of five or three to model counting by fives or threes.

D. How many? Students play in teams of three. Prepare bags of connecting cubes with 10 to 25 cubes in assorted colors. A target number (greater then any bag's contents) is announced. Each team has a bag, and on the signal opens the bag and counts their cubes. One member goes to a central spot and counts out the number needed to reach the target. Each team is then asked to "prove" they have the correct number of cubes. Everyone listens to the proofs observes the different strategies for counting the cubes.

Notes and textbook references

c) Read and write numbers.

Because recognition and correct formation of numerals are important for recording mathematics, children need many tactile experiences to internalize the left-right, up-down configurations which form the ten digits used on our number system. If students consistently reverse digits, you will want to remember that this is not unusual. You may also provide some strategies which will help children learn the standard configuration. For example, have them trace numbers instead of practicing writing them incorrectly. Presenting word forms with numerals and pictures of sets encourages learning of word names. Reading number words should come as a part of games and in real-world contexts rather than through flash card-type lessons.

A. Have student form numerals with playdough, yarn, or on a geoboard. In beginning lessons, some students may need a form to follow. Ask student to read numerals that others have made as a part of the lesson.

B. In playing math drill games, encourage students to name numerals correctly when drawing cards or rolling a die.

C. In reading for pleasure or other contexts or in playing math drill games, watch to see whether students read word names correctly. This type of assessment takes no extra time or planning.

D. Teacher shows students a numeral or a number word and names an action. Child repeats the action the appropriate number of times. You might have picture cards with actions so that students can play with partners. See Blackline Masters I -11, I - 12.

E. Students use a hundreds board to cover with Unifix cubes or color in the numerals as they are called. These numbers will make a word:

33	53	73	54	37	48	79
35	65	77	58	43	45	38
78	39	63	55	75	68	

Earlier in the year, this activity could be completed by the teacher holding up number cards and having the children find the numbers on the board to cover.

F. Child reads numbers on calendar, page numbers in books, or numbers in pictures. Student is able to locate the proper page when asked to find a specific number.

Notes and textbook references

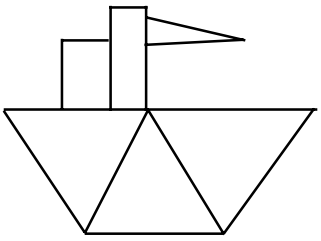
G. Student writes estimate of "how many in the jar", or correctly writes other numbers needed in daily work. In on-going observations, note whether children write numbers in standard form correctly when they are given orally.

d) Compare and order sets and numbers.

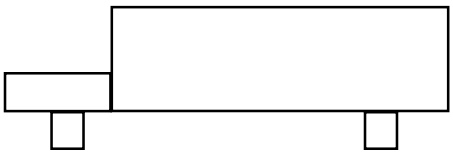
More than and less than are difficult ideas because, like other comparative words, they are relative. Six is more than four, but is less than eight. Because "less" (fewer) is more difficult for most students than ideas of "more", children need additional opportunities to explore relationships that focus on less.

A. Play a happy handful game: Students work in pairs, each getting a handful of counters. They count their sets and write the numbers. Repeat the activity and then order the four sets. Many sets will be the same. Ask students how they know that the groups are the same.

B. Child uses blocks to complete puzzles and tells which puzzle has more (or less, or fewer, or the same).



"This picture has more blocks"



"This one has fewer blocks"

C. Two or three students draw number cards and build towers of Unifix cubes. They compare to see who has more or less (fewer) or whether they have the same. Students order towers from least to greatest.

D. Teacher makes a set using two-color counters and directs the student to make another set with more (less, more, or the same) than the teacher's. *For a more challenging task, give the child a number and ask him to make a set that has more or less. This is difficult for many children.*

Notes and textbook references

E. Given containers (workmats) with objects, student orders them from least to greatest, according to the number of objects in each. Explain how you decided the correct order,

F. Child is shown pictures of objects and asked to tell which groups have more (less, the same). Child can order pictures from least to greatest. See Blackline Masters I - 2, I - 3, I - 4.

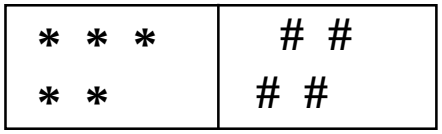
G. Children are given a set of Cuisenaire rods and are asked to order them from least to greatest. Teacher then asks them to show a rod greater than the white rod but less than the brown rod, etc. Then show me a rod greater than two but less than five, etc. They can measure with the white rod.

H. Given two numbers, ask children to tell which number is greater, or ask children to circle the larger (greater) number. Ask children to tell which number is less or ask children to circle the smaller number.

I. Play comparison games where children draw cards from a deck and compare. Student with highest number wins all cards.

J. On the overhead draw a line dividing the screen into two sections. Tell the students that you are going to put some objects on both sides of the line and they should give a "thumbs up" if the sets are equal or a "thumbs down" if the sets are unequal. Vary objects and numbers as you assess for understanding.

K. Prepare cards on which two sets of shapes or objects have been drawn. (Stickers work well for this activity.) Prepare signs labelled **Equal** and **Unequal**. In pairs, students take turns drawing a card, stating whether the sets are equal or unequal, and placing the card under the appropriate sign.



Variation: Prepare cards with a set on one side and a numeral on the other side.

L. Teacher makes a set. Note that if the objects are available to the student, the activity is at a concrete level. If they are placed on the overhead, they are pictures to the students. Ask child to make a set with one more, or one less, or the same. Ask student to explain how to know that the answer is

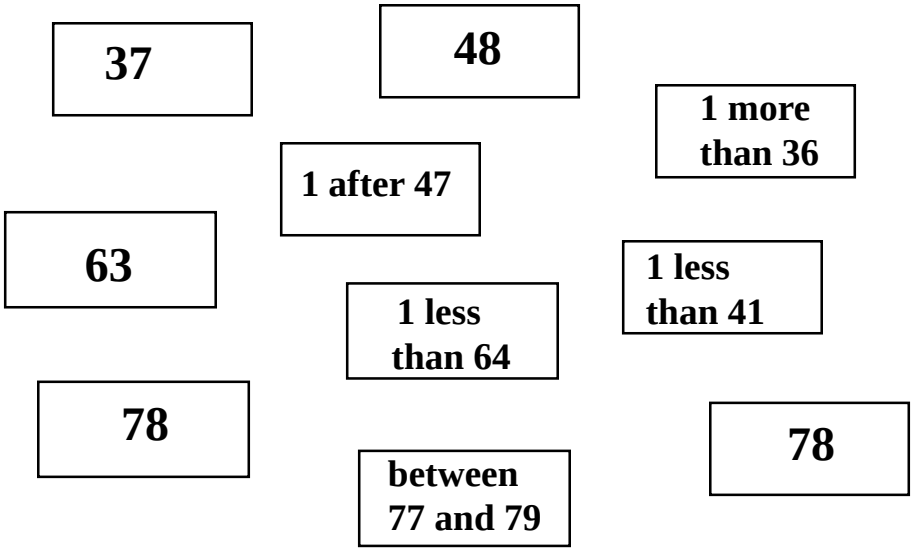
correct. Interchange, as appropriate, vocabulary words less and fewer, more and greater, etc. so that students build a richer vocabulary of mathematics-related words.

Notes and textbook references

M. Teacher or a student places objects in a group on a table. Other children tell how many would be in a set with one less or in a set with one more. The students should be able to draw a set with one more or less. A more advanced level would be to give the students a number card and ask them to make graphs with one less or one more. Ask children to verify (explain) the answers.

N. A series of numbers is written on the board. One number is erased from the middle of the series and a line is drawn in its place while student's eyes are closed. The children open their eyes and name the missing number that is between those showing.

O. Have students play a Concentration or Memory Game where they match cards like these:



Play "Concentration", Game of the Week, Week 17

P. Students cover numbers on a hundred board at teacher's direction. For example: "Cover 28. Cover the number that is one less than 12. Cover the number between 23 and 25. Cover the number that is one more than 45. Cover the number that comes just before 7. Cover the number that comes just after 81. Tell the numbers that are covered. Explain how you were able to figure out what was covered."

Notes and textbook references

Q. Cover these numbers to make a surprise on the hundreds board (this is a good activity for the 100th Day of School Celebration).

1 more than 31

between 33 and 35

1 more than 34

1 less than 37

after 37

before 40

between 39 and 41

1 more than 69

between 78 and 80

1 less than 53

before 43

after 57

1 more than 75

after 77

before 49

1 less than 63

before 51

between 59 and 61

1 more than 55

after 63

1 less than 76

after 71

before 55

between 67 and 69

after 73

1 less than 47

between 65 and 67

1 less than 45

after 79

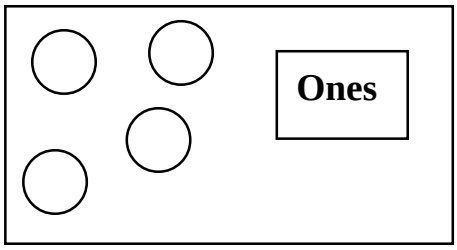
e) Build understanding of place value (ones and tens).

Because 10 is the number upon which our place value system is based, children must have daily experiences which lead to understanding of 10s and 1's. They need a variety of place value models which can easily be put together and taken apart, showing that one ten and ten ones have the same

value. They need experiences with making ten, counting from ten, and counting to the next ten. They need help in understanding that the symbols they once used for collections of individual objects can now be used for groups of ten objects if you write digits together in a special order. Teachers must help students relate, for example, the 6 tens and 2 ones that the child models to the standard numeral 62. The pattern of writing the digit which represents the "loose ones" on the right and the digit which represents the groups of ten on the left is one which should be developed simultaneously with concrete experiences. Since many first grade children confuse left and right, a place value mat will be helpful. Two sets of 0 to 9 cards used to name the number that is being built is a way to relate sequences of numbers with models when a child adds or removes counters and adjusts the number cards appropriately.

Notes and textbook references

A. Child makes sets of 10 (and identifies any extra ones). String 10 pieces of macaroni. String 10 Cheerios. Bundle 10 straws. Put 10 beans in a cup. Hook 10 paper clips together. Make paper chains with 10 loops.



B. Given objects, have the students group them into tens and ones. Ask student to count the groups and tell the number of 10's and 1's. Have student cover an area with cubes, organize them into 10's and 1's, and count the groups and loose ones to tell how many. Write the number of 10's and 1's.

C. Combine estimating and finding 10's and 1's by repeating the same lessons several days in a row, changing the number of objects and observing whether the child improves the estimates after the third and fourth experience. Place lima beans (less than 100) in a jar. Ask child to estimate how many and then organize the beans into 10's and 1's. Record the tens and ones.

D. Shown a picture of objects, the student circles tens and tells number of 10's and 1's. Students should also give the standard form of the number.

Notes and textbook references

E. Play regrouping games with a partner(s) such as **"Count the Sheep."** Each student has a gameboard and a die. At each turn, the student rolls a die and collects that many stones (Unifix cubes). When a student has 10 stones, they may be put together to make a stick. The object of the game is to be the first farmer to get 5 sticks or have 50 sheep. See Blackline Master I - 30.

Count the Sheep	
Sticks	***Stones***

F. Students tell how many 10's and 1's when shown pictures of objects already grouped into sets of tens and ones. The students also name the number in standard form. (It is important that students recognize the groups of 10 rather than counting all objects within each group, 1 to 1.) When given an illustration of 10's and 1's, the students write the correct numeral.

G. Cereal is a fun and inexpensive material to group tens and ones. Have children use a sorting mat to show groups of tens. Then put the leftovers in the ones box. How much cereal did you have? Make a class graph comparing amounts of cereal.

H. Students build a number on a place value mat. They tell how many 10's and 1's. The teacher or a partner builds a different number and the student tells how many. "Whose number is greater? How could you show one more than the number? Could you show one less?" Writing the number in standard form is an extension of telling the number of 10's and 1's.

I. Give students a number and ask them to model the number using cubes, tongue depressors, beads, etc. Use loose objects or those that can be bundled and unbundled easily rather than models such as bean sticks or base 10 material for early developmental lessons.

J. Teacher builds a number on the overhead. Students model the same number with materials on a place value mat. Students name the number as tens and ones and also as a standard numeral.

Notes and textbook references

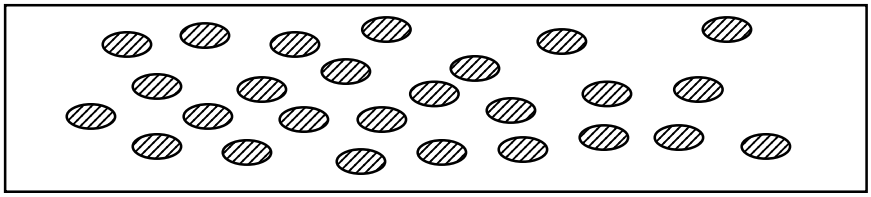
K. Two students each build a number less than 70. One student rolls a die. If either student (or both) have made a number with that many tens, a point is earned. Build new numbers and continue. Play ends when one player has 10 points.

f) Estimate quantities fewer than or equal to 100.

Estimation is developed through activities which build on the students' experiences. Since reasonable estimates are the purpose rather than exact answers, lessons should focus on possible solutions, not on one solution. The goal is for the student continually to improve estimation skills; lessons with similar objects should be repeated to encourage student to "build" upon their experiences, moving from guessing to giving responses that have reasons (experiences) to back them up.

A. Show students a group of counters. Hide them to avoid the students' counting or recognizing the set if there are fewer than 8. Ask the children ***about*** how many there are.

"Do you think there are closer to 10 seeds or 25 seeds?"



B. How many steps are there from your desk to the door? From the door to the water fountain? From our classroom to the cafeteria? Would it take you more steps to go to the reading table or more steps to go to the teacher's desk?

C. Show students a clear bag with objects. Tell them how many there are. Show them a larger bag with the same type of objects. Ask "How many do you think are in here?"

D. Show student a group of objects. Ask, "Do you think there are enough for each student in the class to have one?" (Or to have two?)

Notes and textbook references

E. Make flash cards with stars, shapes, large dots, etc. Ask student to estimate whether the number of objects is closer to one number or another number. Cards should picture an increasing number of objects as student demonstrates good estimation skills with fewer objects.

F. Place a yellow Cuisenaire rod on the left edge of the desk. Ask student how many rods it will take to go to the end. Add four more rods. Point out to the student how far the five rods go. Ask, "Would you like to change your estimate?"

G. For assessment records, have children keep a log of their estimations by recording the estimates and the actual number of items in classroom estimations. Children should use a crayon to record so the estimates cannot be changed. This type of recording should show progress. For estimation logs see Blackline Masters I - 31 and I - 32.

Estimations			
Date	Item	Estimate	Actual
11-5-03	lollipops	30	36

My guess	How many

H. Have children bring in items to be estimated. Send home a jar for the children to fill and return. Let the child who brings in the jar be responsible for collecting estimates, counting the items with the class, and distributing the items if appropriate.

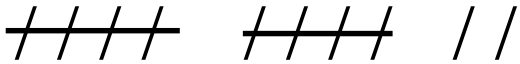
g) Recognize equivalence in sets and numbers 1 - 99.

Tallying is a tool used to keep records of events or objects. Before students are asked to tally, they must be taught the process. One strategy is to use a xylophone to help children learn when to make straight marks and when to cross with a slash. "Ding (make a mark), ding (make a mark), ding (make a mark), ding (make a mark), ZIP across all the notes (make the cross slash)."

Notes and textbook references

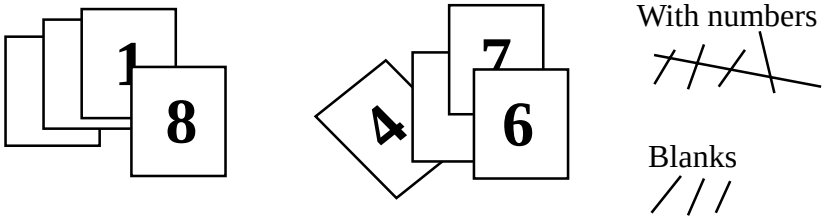
A. When beginning to tally, have students use craft sticks so they begin at a concrete level.

B. Go on a hunt for specific objects (door knobs, hub caps, plants in windows, doors in classroom). Have children tally to determine how many you saw.



C. Use tally marks to keep score in a game or to count how many children want to order certain lunch choices. Have student explain the recording.

D. Use tallying to record results of experiments or to determine how many.



"How many times did you draw a blank card?"

E. Show a child tally marks that teacher has made. Have the student tell how many they represent.

F. Add a tally section to your morning calendar activities. Tally to keep a count of how many days we have been in school this year.

G. Assign homework for children to tally the color of cars that pass by their house. Write a summary of the findings. If children live where there is no traffic, then do this at school or have them tally the color of cars in the teachers' parking lot.

H. Have pairs of students "inventory" the contents of the classroom and report to the class. Tally to keep records..

Notes and textbook references

Conservation of Number

Conservation is the ability to mentally hold some property of a substance constant while other properties change. For example, conservation of number is the understanding that the number of counters does not change if the same counters are rearranged, stacked or grouped in some manner. There are three basic elements in the journey to conservation of number.

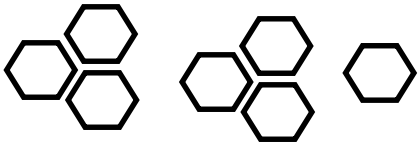
- *The student demonstrates (explains) why two sets are equivalent;*
- *The student observes a rearrangement of a set previously counted, and reaffirms that the number has not changed;*
- *The student is able to confirm (justify or explain) the conclusion that the number is the same.*

Since conservation of number is dependent upon maturity these activities should be repeated throughout the year.

Because conservation of number continues to develop throughout the primary grades, internalization of "eightness" does not necessarily imply conservation of two-digit numbers.

I. Teacher has student place a number of counters on a work mat. Student counts to confirm how many there are. Teacher rearranges counters as student observes. "How many are there now? Can you prove it?" "Please put seven counters on your mat."

"How many are there now?"



J. Student places a number of counters in teacher's hand. The teacher asks, "How many?" The teacher then divides the objects placing some in each hand and asks, "How many do have now?"

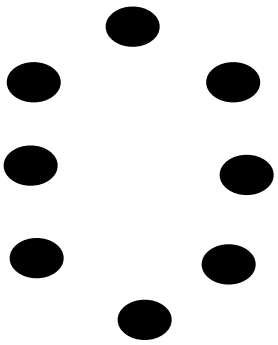
Where's The Math?

Take students on a walk around the school and playground. Have students list or draw the math they see illustrated. Take photographs of the things they identify. When the pictures are developed, revisit "Where's The Math" by displaying photographs with identifying labels.

Notes and textbook references

K. Student is asked to make two rows of counters with the same number in each row. Teacher asks the student to verify that there are the same in each row. While student watches, teacher the extends one row by spacing the counter farther apart and asks again, "Is there the same number in each row?"

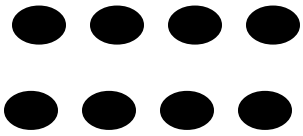
L. Show a configuration of numbers on the overhead projector:



Have students tell how many with cards or tiles. Change the configuration.

Ask, "How many?"

Change again.



Ask, "How many?"

Play "1 Up" Game of the Week, Week 10.

Discuss how they are all the same. Repeat with different numbers on different days to help increase and develop the student's awareness of conservation of number.

M. Teacher places nine red cubes on the table. Have student count the cubes. Ask student to snap a different colored cube on top of each one of the teacher's cubes. The teacher then unsnaps the cubes and rearranges them in sets by color. The physical arrangement of each set should be different. Ask student which set has more.

An understanding of number is essential for all children. Numbers are used to describe quantities and to show relationships between the quantities. Number is a concept; numerals and other symbols are labels for ideas and quantities. Rote counting helps children learn number names and sequences, but experiences with real objects are necessary to develop meaningful concepts of number that eventually allow children to think of groups as if they were individual items. Patterns which form the basis of our place value system allow us to deal with large numbers using the same 0 to 9 digits that first labeled how many in a set. If children are not yet conserving large numbers,

Notes and textbook references

the relationship, for example, of thirty-two loose objects, three tens and two extra cubes, and 32 may not be obvious. Children who memorize rules and parrot responses without understanding lack a foundation upon which to build other complex concepts. While rote counting and other drills have important places in the classroom, primary teachers must give their students the gift of experiencing mathematics. Number sense develops over time; it involves relationships, comparisons, magnitude, order, estimation and patterns.

1.02 Use groupings of 2's, 5's, and 10's with models and pictures to count collections of objects.

Note how well each child can rote count by 1's, 10's, 5's and 2's as well as record the use of the skill as the student counts objects that have been grouped in these ways. Rote counting will be developed through memorization but is much less important than activities that give the sequences meaning. Later, writing the counting sequence by 5's or 2's in columns rather than horizontally helps students to see patterns in both the ones and tens places.

A. Child counts while stepping forward (1,2,3,4) and counts back (4,3,2,1) when returning to place. Have child clap when counting forward and snap fingers when counting backwards. Have students form a circle and toss a bean bag or yarn ball, counting as each child catches the ball.

B. Ask child to count by 1's. Note how far the child counts accurately. Later ask him/her to count again, checking for consistency. Repeat request when appropriate for 10's, 5's, and 2's.

C. If student is counting beyond 30 consistently, help the child enter the counting sequence with a number in the 20's or at another appropriate point in the middle of the decade and continue counting. Ask student to count down from a given number.

D. Given a number, the child continues the counting sequence when playing "Abracadabra". For example, the teacher says a number and students begin counting from that number. They continue to count until the teacher says "Abracadabra" and names a new number. For example, the teacher says, "Abracadabra 8". The children continue, "9, 10, 11, etc."

Notes and textbook references

E. Sing "Ringo Rango" to practice counting by 2's, 5's, and 10's. See Blackline Master I -1.

F. Student counts sets of ten from pictures or by showing the pattern on a hundred board.

G. Place 5 children in jump ropes or hula hoops or 5 objects in cups. Child counts by 5's. Student may record on the board.

H. Play "Give me five". Students line up, holding out one hand. Child walks down the line, slapping hands and counting by 5's.

I. Make towers of 2 cubes, stacks of 2 blocks, groups of two crayons, etc.. Child counts how many by 2's. Student records the counting sequence. Count sets which normally come in 2's. For example, eyes, shoes, knees.

J. Group and count items used in estimation activities on a daily or weekly basis. The overhead may be appropriate for small items. Use clear muffin containers on the overhead to count groups of ten. Count objects by 2 as they are dropped back into the container. Have small groups of children count objects by 5's.

See Blackline Masters I - 33 to I - 36 for computation workmats.

K. A great way to provide continuous review is to add this activity to the daily calendar. It will also help in counting money. Make a chart similar to illustration. If we have been in school 37 days, the calendar helper would show this by adding - clap, clap, clap, snap, stomp, stomp-

Challenge: Show other ways to show 37 such as - clap, clap, snap, snap, snap, stomp, stomp.

L. Student counts sets of tens. For example, containers with ten objects, sticks made of ten Unifix cubes, bundles of ten popsicle sticks, clear sandwich bags of ten candies, stacks of ten pennies.

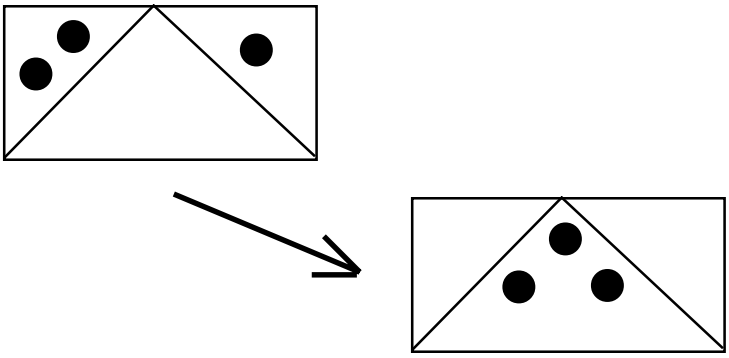
Notes and textbook references

1.03 Develop fluency with single-digit addition and corresponding differences using strategies such as modeling, composing and decomposing quantities, using doubles and making tens.

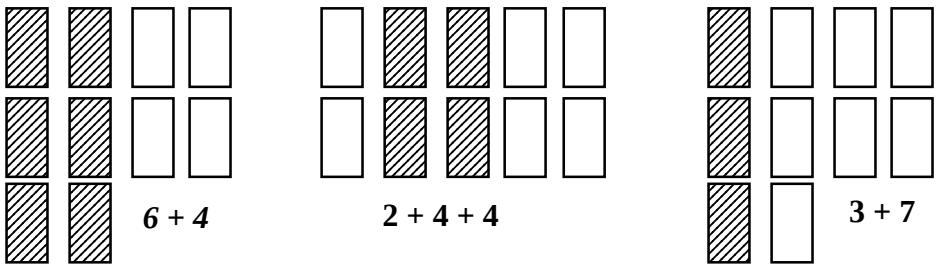
A. Use and encourage the use of terms such as add, total, sum, and equals in mathematical conversations.

B. Model the use of manipulatives (models) to solve addition problems.

C. Have children use mats to model combining two sets. Place counters on two sections of the mat, then combine the counters for a sum.



D. Give students ten counters. Ask child to show three different ways to put them into two sets. "What number sentences are you showing? Are there any other ways to arrange them?"



Notes and textbook references

E. Ask student to show all of the ways to make 10. Have the child arrange the models in some organized fashion and explain what has been done. *The activity should be repeated many times as a math lesson using many different materials. For example, use two colors of pattern blocks or Unifix cubes, use toothpicks (position would determine addends), glue paper squares in two colors or two colors of cereal, etc.*

F. Ask student to answer the questions using counters if needed. "If you have eight counters, you would need how many more to make 10?" "If you have five counters, how many more would you need to have 10?"

G. Ask student to write all number sentences whose sum is 10.

H. Use two color counters to find different combinations for each number. Give each child 5 counters to find all the combinations for 5. Drop the counters and record - if 2 red and 3 yellow, record by writing 2 + 3 = 5. Repeat to find all combinations.

I. Have objects on the table. Ask the student to explain what it means to add and to show you what might happen to these things if some were added. *If a student understands the concept of addition, the size of the sets or the number of groups should not matter. The purpose is to observe whether a child understands the concept of addition, not the recording of the process. Many children understand the concept of adding three groups of things together, for example, but cannot write a correct answer 4 + 3 + 2 when written vertically. What the student may not understand is how the symbols relate to the groups and what has happened to them.*

J. Give student ten counters. Ask child to remove some and tell how many are left. Repeat with other numbers. Have child tell a story about what is taking place.

K. Ask student to model with counters stories such as this: "I have seven and you take three away. How many will I have left?"

L. Have two sets of Cuisenaire rods available. Give student a brown Cuisenaire rod and a yellow rod. Place the yellow rod on top of the brown. Ask the child what rod would fill the space so that there is a "two-car train" the same length as the brown rod. Have the child explain. Repeat with other rods.

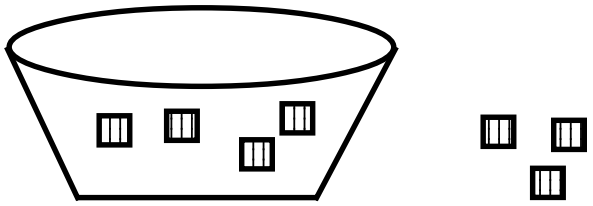
Notes and textbook references

M. Show student a counting mat with ten cats. Cover six cats with a card. Ask student how many more cats are needed to make ten. Repeat, covering different numbers of cats. See Blackline Master I - 37.

E. Ask student to use counters to model the story you are telling. "Sam has 6 cans and Joe has 9. How many more does Joe have than Sam?" or "Jewel has 8 clowns and you have 5 monkeys. How many more do you need so that you will have the same number?" *Note that these are two different ideas. Children need to experience both kinds of comparative subtraction with active lessons and the teacher writing the number sentences which relate to the situations before students are asked to deal with them in independent problems situations.*

F. Show student that you have seven Unifix cubes in the bag. Ask the child to continue counting as you add two more cubes. Repeat.

G. Show student pictures which encourage counting on as an efficient method of finding the sum. Ask student to explain the pictures and tell how many. *"Four ...five, six, seven."*



H. Show student a number sentence and ask the child to solve it. Have counters available. Observe whether student makes sets and recounts both sets or counts on (either using objects or the symbols alone).

Because counting on is a difficult skill for some young children, they will need many experiences before they use counting on consistently as a strategy to determine "how many." Teachers can model the strategy and assist students in using this counting strategy in real-life situations. Before determining that a child has "mastered" the skill, teachers will want to observe a student in many situations over a long period of time. Remember that learning activities and assessment activities are frequently the same tasks.

I.. Ask student to continue counting objects, telling the child that you have counted some of the group. For example, "We want to know how many library books our class is turning in today. Here are six. Please finish

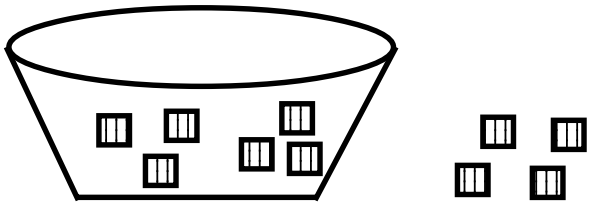
counting for me." Or, "Susan, Joe, and Tony want pizza. That is three people. Raise your hands if you want pizza for lunch. How many should we order?"

Notes and textbook references

J. Students select a number card and count on from that number. Writing the numbers, starting with numbers other than 1, is a more complex skill that students should work with throughout the year. Give the students a two-digit number (for example, 34) and ask the children to name (write) the next 5-10 numbers.

K. In determining "how many", child may first count a part of the objects and cover them with hand or a cup. After telling how many are covered, the child counts on additional objects. Play "Under the Dome" on the overhead by first placing small objects on the overhead for all to count. Cover these with a small plastic bowl and add other objects on top. How many in all?

L. Leader makes group of blocks (cubes, children) and tells how many there are. Student counts on as additional blocks are added to the group.



"There are six cubes in the bowl. Count on as I put more in."

M. Student is shown a container with objects, additional "loose" objects, and a number sentence to complete. Ask student to tell how the number sentence and the objects are related. Ask student to find how many in all. Observe whether student counts on rather than recounts all objects.

N. Play "Abracadabra" with objects. The teacher says "Abracadabra" to begin counting on. Students count together orally. After students count 6-10 numbers in sequence, teacher interrupts with a new sequence. For example, "I am holding six cubes. Abracadabra, count starting with 6."

Notes and textbook references

O. Give children a hundred board with some of the numbers missing. Have them fill in the missing numbers. Observe whether the children must begin at one or whether they can count on from the number before the blank.

1	**2**	**3**	**4**			**7**	**8**	**9**	**10**
			14	**15**	**16**	**17**			
21	**22**	**23**	**24**			**27**	**28**	**29**	**30**
			34	**35**	**36**	**37**			

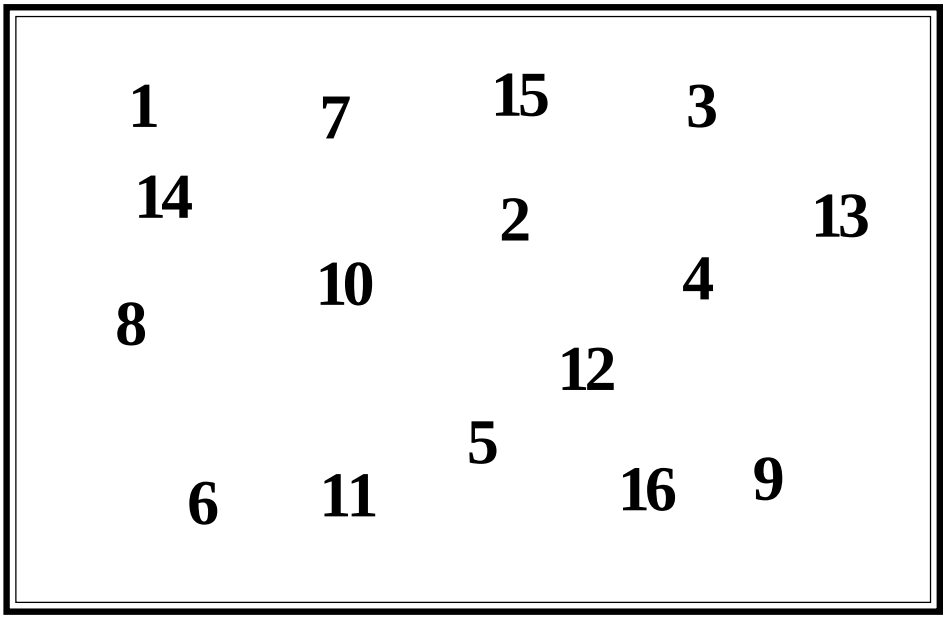
The focus on memorizing addition and subtraction facts and giving up counters (and fingers) early in the year and the great amount of time spent with pencil and paper drills has brought about two major concerns for mathematics educators. First, both teachers and students are frustrated by the apparent lack of long term retention resulting from this memory work. Secondly, because of the amount of time devoted to these drills, mathematics in primary grades tends to be narrow in scope. There does not seem to be time for exploratory lessons, problem-solving activities, and "hands-on" experiences in other strands of mathematics. While it has traditionally been the primary goal of first and second grade mathematics classes that children memorize the number facts for addition and subtraction, this task continues to prove difficult for students. Teachers have responded by beginning very early in the year with flash cards and games for drill and practice. Yet third, fourth, and fifth grade teachers report that a large percentage of their students do not know these facts nor are they able to use the facts to solve problems. The ultimate goal of memorizing addition and subtraction facts will remain an appropriate one, but only when educators acknowledge and attend to the influence of each individual's maturation and each child's concept of number and the symbols which represent these amounts. This means that children must spend a great deal of time comparing groups, putting objects together and taking them apart, and talking about these processes as they occur in their daily lives. The symbols must be used to record what is happening and not be a world apart from objects and processes. In the book Developing Number Concepts Using Unifix Cubes, Kathy Richardson compares learning about chocolate with the manner in which we expect children to learn number concepts. "No one believes that learning to read, write, and spell the word chocolate is synonymous with 3 + 4 = 7 is synonymous with understanding the number concepts represented by these symbols." (p.77) Attending to a child's level of maturity also means that different students will master memorizing number

facts at different rates. Students should not be rushed into drills with symbols until they begin to demonstrate a knowledge of facts through a concept of the quantities the numbers represent. Efficient use of strategies (such as doubles, counting on, commutative and double plus 1) are appropriate goals for hands-on experiences and lead to memorization based on understanding.

Notes and textbook references

P. Ask child to respond to "easy" addition and subtraction facts when they are called out to a student. "Memorize" means that student does not need to use counter or fingers and can respond quickly. Rather than penalize a student for facts the child does not know, keep a list of the facts a student has memorized. The chart on the following page shows easier addition facts. "Easy" facts are those which most children learn first because of counting strategies (a number plus one, or a number plus 2) or rote phrases (doubles). Easy is a relative term, however, and should not limit nor dictate exactly what a student learns. Some teachers will emphasize "fact families", especially those to 10. See Blackline Master I - 38.

Q. Play "Fly Swatter Facts" by making a poster with sums or differences on it. Divide the class into two teams and give each team a fly swatter with a hole cut in it. One member from each team comes up to the poster and swats an answer when the problem is called out. The first person to swat the answer is the winner.



R. Ask a student to respond orally to the facts when shown in a written form such as flash cards.

Notes and textbook references

S. Ask student to write answers to number facts when presented on a worksheet. (Time limits penalize students whose motor skills are not conducive to rapid writing. The best evaluation of memorization is oral.)

T. Given real-life situations involving addition or subtraction of easy facts, student will respond without counting.

Where's The Math?

Ask student to tell (write) what math is found in these topics:

in your front yard	in games	along the street
in the library	in your room	in our classroom
at the grocery store	in the kitchen	in the car or bus

Students can illustrate their lists. Use the topics one at a time to encourage students to talk about their lists.

1.04 Create, model, and solve problems that use addition, subtraction, and fair shares (between two or three).

A. Using connecting cubes (or another manipulative) demonstrate how a set of two, three or four objects can be divided equally. Discuss the fact that an odd number of objects cannot be divided into an even number of equal parts; however some odd numbers can be divided into equal sets, ex. nine objects can be divided into three equal sets.

B. Direct students to draw eight objects on their papers. Have them circle the correct number of objects to divide the set into two (or four) equal parts. Ask students to explain how they got their answers. Explanations can be shown with pictures, words or numbers. Continue with sets of different size and different divisions.

Notes and textbook references

C. Give students 12 items and three small cups. Direct them to place the items in the cups so each has an equal amount. Have students state how many items they have and how many are in each cup. Repeat the activity using different numbers of items and cups(use only 2, 3, or 4 cups).

D. Using a story board and counters, ask student to tell a story and use the counters to explain.

E. Give student two numbers. Ask child to make up a story using the numbers and tell the solution. (The student does not need to be able to solve the problem abstractly.)

F. Given a number expression such as 4 + 3 or 7 - 2, ask student to tell a story and the solution.

G. Give the student a cartoon picture or one from a magazine. Have the child write (tell) a story that has a problem which could be solved by adding or subtracting.

H. Ask student whether there would be enough pieces of candy in a bag to give all first graders in the room three pieces. How will he/she know?

I. Tell students you want six children to use the pattern blocks in one box. Ask children to show you approximately how many each person would have.

J. Ask child to suggest how many name tags you might need to cut out for a "Back to School Night" or a "Family-Problem Solving Night". If the name tags are a certain size (show sample), how many could be cut from a piece of construction paper (show the paper).

K. State a simple problem. Ask student to act it out as part of the group. Give student manipulatives and ask student to model the story.

L. Using a workmat (storymat), teacher (or another student) tells stories and asks student to model them. Observe whether student can model problems accurately. Ask students to make up a story for others to model..

Notes and textbook references

M. Ask student to solve problems, directing other students or using objects to act out the solutions. For example: "There were some teddy bears in line for honey. The first one was sitting on a stump. The next two were telling stories to each other. The last one was reading a book. How many pots of honey does Mr. Bear need so that each teddy bear will have one?"

N. Have materials available. Ask student to solve a problem such as this: "Holly has three nickels. At the gum machine she discovers that she can get four small pieces of gum for one nickel. How many pieces of gum could she buy with her money?"

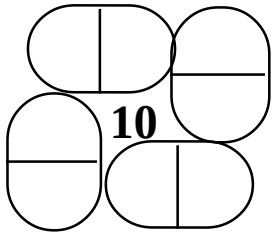
O. Ask student to interpret several sentences (paragraph) with a drawing. Students need to be able to visualize what is being described and to record the information in some manner. Illustrating stories that are read to the class (stories which have no pictures) encourages creativity, spatial visualization, and the use of drawings to clarify situations.

P. Tell child that there are three flavors of ice cream available. How many different two-scoop cones can be made? Allow student to justify whether chocolate on top of vanilla is the same (or is different) as vanilla on top of chocolate.

Q. Have students play Nim-type games and challenge them to find a way always to win. For example, there are nine red apples (red Unifix cubes) and one green apple (a green Unifix cube). The object of the game is to collect one or two apples at a time, but not to be the person who gets the green apple. The person getting the green apple loses.

R. Give students problems in which the answer could be several combinations. Show student six toys with imaginary weights indicated. Judy packed three toys into a box. The package weighed 15 pounds. Which three toys did she pack?

S. Place dominoes on the donut so that all sides equal ten or come other target number.



Organizing for Mathematics Instruction

Model 1
Large group instruction - 15 minutes
3 rotations - 15 minutes each
• teacher - extension, reteach, assess
• assistant - review, practice
• independent - explorations, computers, drill
Fridays - flexible schedule, catch-up, projects

Model 2
Large group instruction - 30 minutes
Class in two parts - 20 minutes
• teacher - with 5 - 8 students for additional instruction, assessment - flexible groups
• assistant - with larger group exploring or review; supervising independent work
Fridays - special activities - two groups

Model 3
Large group instruction - 30 minutes
Two groups - 20-25 minutes
• teacher has each group for two days for additional instruction and assessment
• assistant has other groups for drill, review and explorations
Fridays - flexible schedule

Model 4
Two groups instruction - 20-30 minutes each; rotate daily
• teacher has students for instruction and assessment
• assistant works with alternate group for drill, review and projects

Model 5
Large group instruction - 15 minutes
Classroom set up with 6-10 centers.
Students move through centers by choice and must complete all centers by the end of the week.
Children have recording sheets for comments.

Model 6
Total class instruction - 40-45 minutes
small group assessment in finish-up time before lunch or recess break - 15-20 minutes
• teacher with different group each day
• assistant supervises others

Notes and textbook references

T. Make three domino rows with the same sums on each.

U. Ask student to read the digits on the calculator display. Ask child to make the calculator display given numbers. Have student clear display. Tell student number sentence to solve. Note whether student can correctly input addition and subtraction problems.

V. Show child containers with 34 objects in one and 28 objects in the other. (The exact numbers do not matter.) *The activity is to evaluate whether student uses the calculator to solve addition and subtraction problems, correctly inputting the information.* Ask child to tell how many in all using the calculator. When student has the correct solution, put all counters together to model what child has done on the calculator. Have student clear the display. Review the total number of objects and then remove 12. Ask student to use the calculator to determine how many are left.

W. Ask student to use the calculator to solve word problems in the textbook. Be certain to use problems where the calculator is beneficial. *Some problems are easier to solve in your head, and students should recognize this from the beginning. Problems with two-digit numbers and several addends are appropriate since the calculator becomes a tool for making the work easier.*

X. Use calculator to find sums/differences in classroom situations and compiling class data. For example, if students count the number of M & M's in their individual bags (or cubes or beans, etc.), how many are there in the entire class?

Y. Play a calculator Nim game by selecting a target number such as 17. Partners take turns adding 1 or 2. The person to push the equal sign and get 17 on the calculator is the winner.