Number and Operations in Base Ten

In second grade, children extend their base ten learning to hundreds. They understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones and that 100 is the same amount as 10 groups of ten as well as 100 ones.

Children explore and discuss number patterns as they count within 1,000 by "counting on" from any number and skip-counting by 5s, 10s, and 100s. They read and write numbers to 1,000 using base ten numerals, number names, and expanded form. They compare two three-digit numbers based on the meanings of the hundreds, tens, and ones digits and use >, <, and = symbols to record the results of comparisons after having sufficient experience communicating about the comparisons with words.

In second grade, children fluently add and subtract within 100 by using strategies that make sense to them involving place value, properties of operations, and/or the relationship between addition and subtraction. They begin working with concrete models, drawings, and additional strategies to add and subtract within 1,000. Children understand that when adding or subtracting three-digit numbers it is sometimes necessary to compose or decompose tens and/or hundreds, but the standard algorithm of carrying or borrowing is not an expectation in second grade.

The Grade 2 Common Core State Standards for Number and Operations in Base Ten specify that children should–

- Understand place value.
- Use place value understanding and properties of operations to add and subtract.

The following hands-on activities provide opportunities for children to use manipulatives and picture representations to make connections in the base ten number system. Children are called to explain why addition and subtraction strategies work, and use place value and the properties of operations. Children may use drawings or objects to support their explanations. The experiences with manipulatives will lead toward proficiency applying strategies to solve addition and subtraction problems.

Number and Operations in Base Ten

Contents

LESSON 1

Number and Operations in Base Ten

Three-Digit Numbers

Objective

Understand a 3-digit number in terms of hundreds, tens, and ones.

Common Core State Standards

- **2.NBT.1a** Understand that 100 can be thought of as a bundle of ten tens — called a "hundred."
- **2.NBT.1b** Understand that the numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).

To work with three-digit numbers and to find three-digit sums, children need to extend their understanding of place value to the hundreds place. They must understand the idea that 10 tens make one hundred, and they should learn to think flexibly about a hundred as either a single entity or ten separate tens, depending on the situation. With this understanding, children are prepared to learn further that a three-digit number can have one, two, three, four, five, six, seven, eight, or nine hundreds.

Try It! *Perform the Try It! activity on the next page.*

Talk About It

Discuss the Try It! activity.

- **Ask:** *How many rods are equal to one flat? How many tens are equal to one hundred?* **Say:** *100 can be thought of as a bundle of 10 tens.* Write the number *106* and point to the three digits. Discuss how the digits represent the place values on the place-value chart and how the zero in 106 shows that there are no tens.
- **Ask:** *If Nate bought a second pack of 10 cards, how many cards would he have? Discuss how another 10 cards would make a total of 116 cards.*
- **Ask:** *If Nate bought 10 more packs of cards, how many cards would he have?* Discuss how another 10 tens would make another hundred, for a total of 216 cards.

Solve It

With children, reread the problem. Have children draw the Base Ten Blocks for 96, for another 10, and for the total, exchanging 10 rods for a flat. Have children write the number sentence for the problem, 96 + 10 = 106.

More Ideas

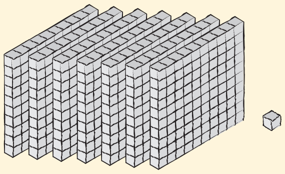
For other ways to teach place value in three-digit numbers—

- Have pairs use a spinner to spin 3 numerals. Have them write the three numerals as a three-digit number and build the number using Base Ten Blocks. Have them identify the value of each digit.
- Have children use Base Ten Blocks to build the numbers 100, 200, 300, 400, 500, 600, 700, 800, and 900. Have them explain these numbers as different amounts of hundreds.

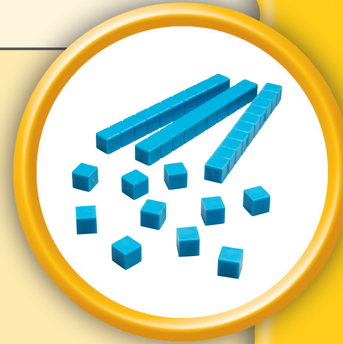
Formative Assessment

Have children try the following problem.

Which number is shown with the blocks?



A. 710 **B.** 701 **C.** 170



Try It! 20 minutes | Pairs

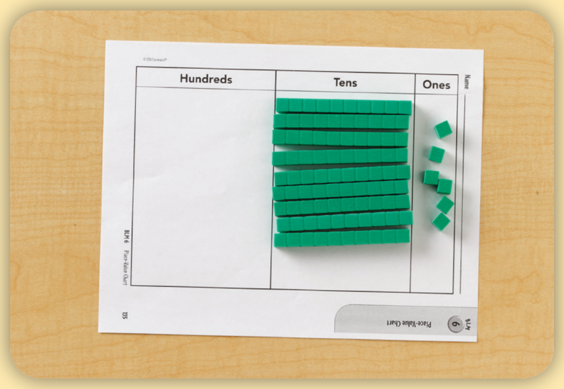
Here is a problem about place value in three-digit numbers.

Nate collects trading cards. He had 96 trading cards. Then he bought another pack of 10 cards. How many trading cards does Nate have now?

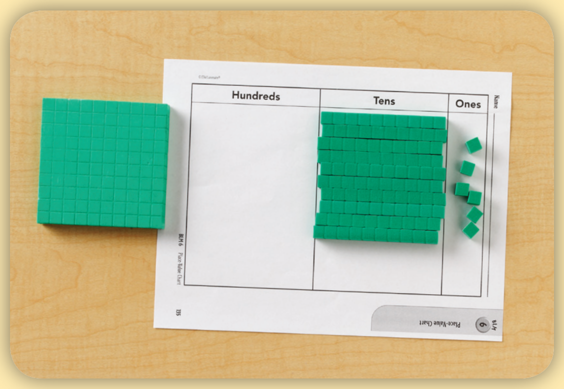
Introduce the problem. Then have children do the activity to solve the problem. Distribute Base Ten Blocks and a Place-Value Chart (BLM 6) to children.

Materials

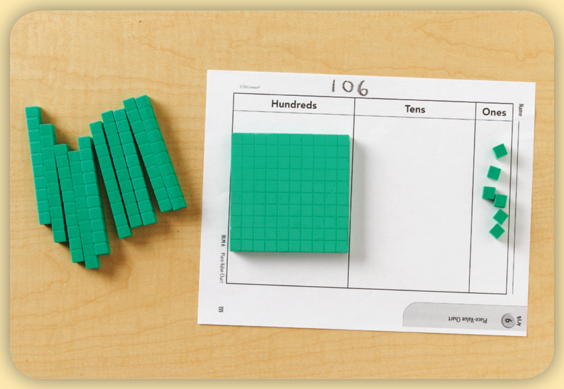
- Base Ten Blocks (5 flats, 20 rods, and 10 units per pair)
- Place-Value Chart (BLM 6; 1 per pair
- pencils (1 per pair)



1. Say: *Nate had 96 trading cards.* **Ask:** *How can you show 96 using Base Ten Blocks? How many tens are in 96? How many ones are in 96?* Have children count out 9 rods and 6 units and place them in the Tens and Ones columns on their charts.



2. Say: *Nate bought another pack of 10 cards.* **Ask:** *What should you add to your blocks to show the new pack of 10? How many rods do you have now?* **Say:** *Push your 10 rods together and compare them to a hundred flat.* Elicit that the 10 rods are the same as a flat.



3. Have children exchange 10 rods for one flat and place the flat in the Hundreds column of their chart. **Ask:** *How many flats do you have? How many rods do you have? How many units do you have?* **Say:** *We can write this number as 1 hundred, 0 tens, 6 ones.*

Look Out!

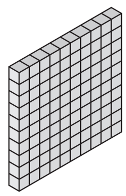
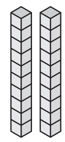
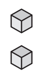
Watch for children who aren't making the connection between the sizes of the Base Ten Blocks and the place-value positions in the numbers. Remind them that the bigger blocks go on the left and that the blocks get smaller going to the right, just like the numbers when we read them.

Answer Key

Use Base Ten Blocks. Build each number. Write the number.

(Check students' work.)

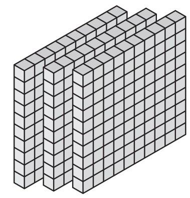
1.

Hundreds	Tens	Ones
		

__1__ hundreds __2__ tens

__2__ ones

2.

Hundreds	Tens	Ones
		

__3__ hundreds __0__ tens

__0__ ones

Use Base Ten Blocks. Build each number. Draw the model. Write the number.

3. 235

Hundreds	Tens	Ones

__2__ hundreds __3__ tens

__5__ ones

4. 203

Hundreds	Tens	Ones

__2__ hundreds __0__ tens

__3__ ones

Write the number.

5. 7 hundreds 8 tens 4 ones __784__

Answer Key

Challenge! The library had 850 books. They bought 100 more books. How many books does the library have now? Use Base Ten Blocks. Build the numbers. Draw the blocks. Write how many in all.

Challenge: Drawing should show 8 flats and 5 rods for 850 and 1 flat for 100; 950 books.

LESSON 2

Objective

Use number patterns to skip-count by 5s on a hundred chart.

Common Core State Standards

- **2.NBT.2** Count within 1000; skip-count by 5s, 10s, and 100s.

Number and Operations in Base Ten

Skip-Counting by 5s

It is important for teachers to offer children opportunities to make generalizations about observations they make while exploring mathematical situations. Using a hundred chart allows children to organize information in an easy-to-follow visual model. As children explore skip-counting, they begin to see a relationship between number patterns and operations. As they begin connecting the two, they form the basis of algebraic thinking.

Try It! *Perform the Try It! activity on the next page.*

Talk About It

Discuss the Try It! activity.

- **Ask:** *What do you notice about the numbers in each column you marked with a 2-cm Color Cube?* Guide children to conclude that they all end in 0 or 5.
- **Ask:** *When might we use skip-counting by 5s?*
- **Ask:** *How is skip-counting by 5s the same as skip-counting by 2s? How is it different? How is skip-counting by 10 different from skip-counting by 5? How is it the same? Can you rewrite the problem so that it uses skip-counting by 10? by 2?*

Solve It

With children, reread the problem. Have them explain in writing how Terra can use skip-counting by 5s on a Hundred Chart to find the total number of chairs.

More Ideas

For other ways to teach about skip-counting by 5s—

- Have children use Snap Cubes® to make 10 trains of 5 cubes each. Have them touch each train as they skip-count by 5s and say the numbers aloud.
- Have children use 2-cm Color Cubes and a Hundred Chart (BLM 2) to skip-count by 10s and mark those with a green cube. Then skip-count by 5s and mark those with a yellow cube. Have children put a yellow cube on top of a green cube where both numbers occur together. Have children compare the two patterns.
- Have children use Two-Color Counters and a Hundred Chart to count by 5s, but start on 12. **Ask:** *What happened to the number pattern we saw when we started at 1?*

Formative Assessment

Have children try the following problem.

Complete the pattern.

0, 5, 10, 15, ________, ________, ________.

Try It! 20 minutes | Groups of 3

Here is a problem about skip-counting by 5s.

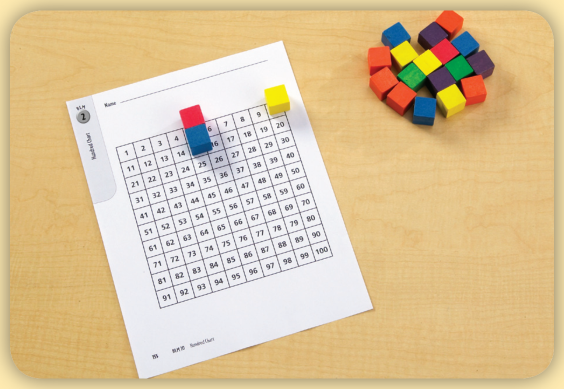
In Terra's classroom, there are 4 tables. Each table has 5 chairs. How could Terra find the total number of chairs without counting each chair one by one?

Introduce the problem. Then have the children do the activity to solve the problem.

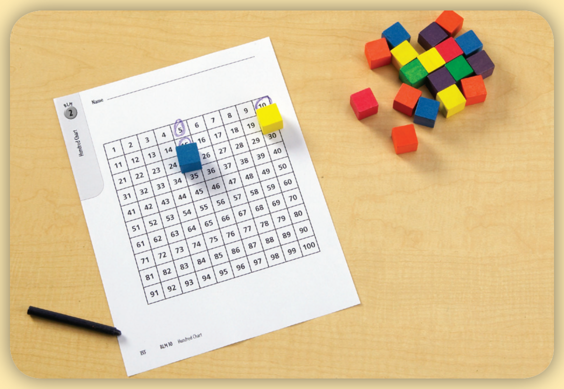
Give 2-cm Color Cubes, a Hundred Chart (BLM 2), and a crayon to each group.

Materials

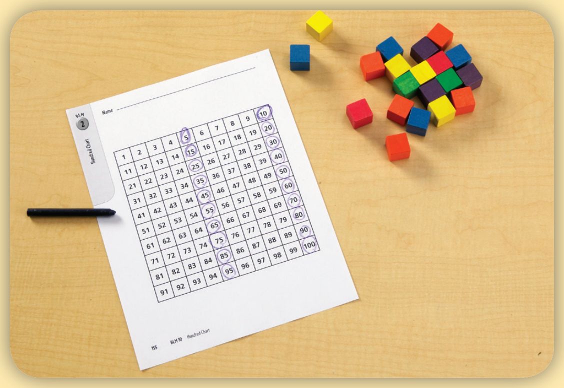
- 2-cm Color Cubes (20 per group)
- Hundred Chart (BLM 2; 1 per group)
- crayons (1 per group)



1. Have children count by 1s to 5, then place a color cube on the number 5 on the Hundred Chart. **Ask:** *If we count 5 more, what number would we land on?* Children should count 5 more on the Hundred Chart and then place a cube on the 10. Have children continue to count 5 more and place a cube on every fifth number until they reach 20.



2. Have one group member recount by touching the marked numbers and saying just the fifth numbers aloud. Have another group member remove the cubes one at a time and use the crayon to circle those numbers on the Hundred Chart.



3. Ask children to describe the pattern they see in the numbers. Have children work in groups to place the rest of the cubes on the chart, completing the number pattern to skip-count by 5s to 100. Then have two groups race. One group counts to 20 by 1s, and the other group counts by 5s. **Ask:** *Which group reached 20 first?*

⚠ Look Out!

For children who need more help understanding skip-counting, draw a number line with 20 numbers. Circle the 5s and mark Xs through the other numbers. Explain that when you skip-count, you "skip" over certain numbers.

Answer Key

Use 2-cm Color Cubes and a Hundred Chart. Make the chart shown. Write the numbers of the skip-counting.

(Check students' work.)

1.

1	2	3	4		6	7	8	9	
11	12	13	14		16	17	18	19	
21	22	23	24		26	27	28	29	
31	32	33	34		36	37	38	39	

5, 10, 15, 20, 25, 30, 35, 40

Model skip-counting by 5. The starting number is given. Write numbers in the blanks.

2. 25, 30, 35, 40, 45, 50

3. 5, 10, 15, 20, 25, 30

4. 50, 55, 60, 65, 70, 75

5. 20, 25, 30, 35, 40, 45

6. 75, 80, 85, 90, 95, 100

Answer Key

Challenge! When you skip-count by 5, what digits are in the ones place of the numbers you say? Draw a picture to help.

Challenge: (Sample) 0 and 5

LESSON 3

Objective

Represent numbers 1 to 12 in different forms.

Common Core State Standards

- **2.NBT.3** Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.

Number and Operations in Base Ten

Represent Numbers

Representing numbers in multiple and flexible ways helps children gain number sense. Often children will understand one representation of a number, such as a numeral, but not a physical representation, such as with Base Ten Blocks. Using multiple representations of a number in the classroom reinforces the concept of a number. Understanding multiple representations sets the stage for algebraic thinking in which children will be able to identify a variable as a representation of a number.

Try It! *Perform the Try It! activity on the next page.*

Talk About It

Discuss the Try It! activity.

- Have children discuss how they know that different representations of the same number are equal.
- **Ask:** *How could you show the number 11? What are two ways to show this number? What if we changed to the number 9? What are two ways you could show that number?*

Solve It

With children, reread the problem. Invite them to use crayons and paper to make a poster that shows Steven's age four different ways. Tell children that they can draw a picture of a model for one of the ways.

More Ideas

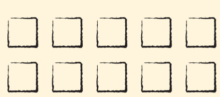
For other ways to teach about representing the numbers 1 to 12 in different forms—

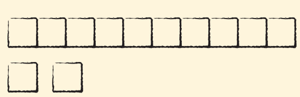
- Have children grab handfuls of Color Tiles. Then have children count the tiles, write the number, and show the number in two other ways.
- Have children write a number and word name and represent the number using Snap Cubes®.

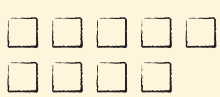
Formative Assessment

Have children try the following problem.

Which picture shows 12? Draw a circle around the picture.

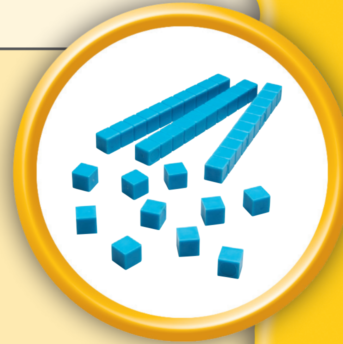
A.


B.


C.


Try It!

15 minutes | Groups of 4



Here is a problem about representing the numbers 1 to 12 in different forms.

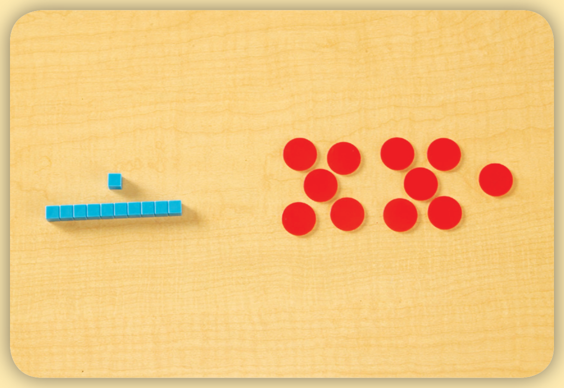
Steven is Jim's older brother. He just turned 11 years old. Mr. Anton, Jim's teacher, asked the class to make a birthday poster for Steven to show his age in four different ways. How can the class show Steven's age in four different ways?

Introduce the problem. Then have children do the activity to solve the problem.

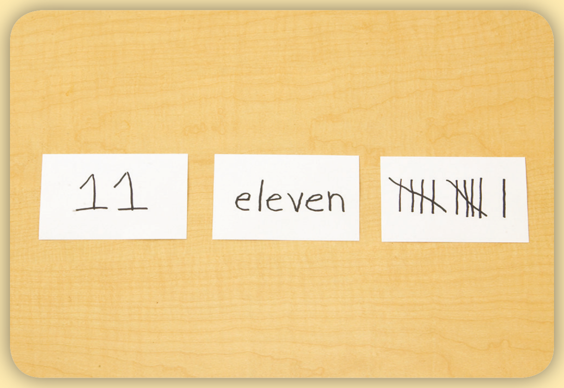
Before children do the activity, ask them to give examples of ways in which they might want to show an amount by using a word, a number, a tally mark, or a model (such as Base Ten Blocks). Give out blocks, counters, index cards, and crayons. **Say:** *Let's show the same number in different ways.*

Materials

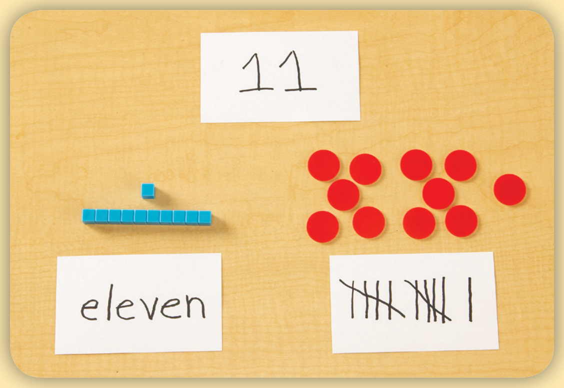
- Base Ten Blocks (1 rod and 12 units per group)
- Two-Color Counters (11 per group)
- index cards (3 per group)
- crayons (3 per group)



1. To begin, say the number 11 out loud. Give the blocks to one child in each group and the counters to another. Give index cards and crayons to the other children. Ask the two children to use the blocks and counters to model two ways to show 11.



2. Ask the children with the index cards to work together to show 11 in three other ways. For example, children can make 11 tally marks, write the number 11, and write the word *eleven.*



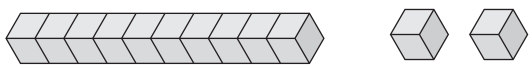
3. Ask groups to check that all representations show the same number.

Look Out!

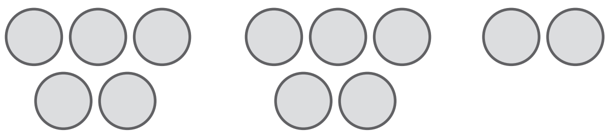
Check that children have created multiple representations of the same number. Children need to realize that the Base Ten rod equals and can be exchanged for 10 units.

Use Two-Color Counters and Base Ten Blocks. Build the sets shown. Complete each sentence.

(Check students' work.)

1. 

This set shows 12.



This set shows 12.

This set shows 12.

Use Two-Color Counters and Base Ten Blocks. Draw a picture for each number.

Check students' drawings.

2. 9

Two-Color Counters:

Base Ten Blocks:

Tally Marks:

3. 10

Two-Color Counters:

Base Ten Blocks:

Tally Marks:

Answer Key

Challenge! Besides using Two-Color Counters, Base Ten Blocks, and Tally Marks, what are other ways to show a number?

Challenge: (Sample) Digits, words, sets of other objects

LESSON 4

Numbers in Different Forms

Objective

Write numbers in different forms.

Common Core State Standards

- **2.NBT.3** Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.

For children to have confidence about numbers and their meanings, it is important that they understand different representations of numbers, including base ten numerals, number names, and expanded forms. The ability to represent and recognize numbers in different forms enables children to exercise a deeper understanding of number, and this serves as a strong foundation for children when they add and subtract two- and three-digit numbers.

Try It! *Perform the Try It! activity on the next page.*

Talk About It

Discuss the Try It! activity.

- **Ask:** *How does understanding place value help you show numbers in different ways?* Discuss how knowing place value makes building numbers with Base Ten Blocks easier, how it makes breaking numbers apart for expanded form easier, and how it makes writing numbers in word form easier.
- **Ask:** *How did you write 642 in expanded form? How did you know how to separate the different parts of 642 when you wrote it in expanded form and in word form?*
- **Say:** *There are many ways to represent numbers. Each way is useful in certain situations.*

Solve It

With children, reread the problem. Have children review their recording sheet for 642. **Say:** *Let's say Amy's brother wanted to show the number 769 in four ways.* Have children complete a new copy of the Number Forms Recording Sheet (BLM 7) for 769.

More Ideas

For other ways to teach writing numbers in different forms—

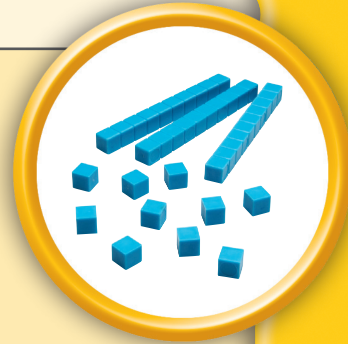
- Have pairs of children play a number game. One child says a number and the other child shows that number using Base Ten Blocks, expanded form, or word form. Have children check each other's work, and then switch roles.
- Have children spin a 0–9 spinner three times and write the digits on their paper in any order. Have them write the expanded form and word form of the number.

Formative Assessment

Have children try the following problem.

Which shows the expanded form of 769?

A. 70 + 60 + 9 **B.** 700 + 60 + 90 **C.** 700 + 60 + 9



Try It!

30 minutes | Groups of 4

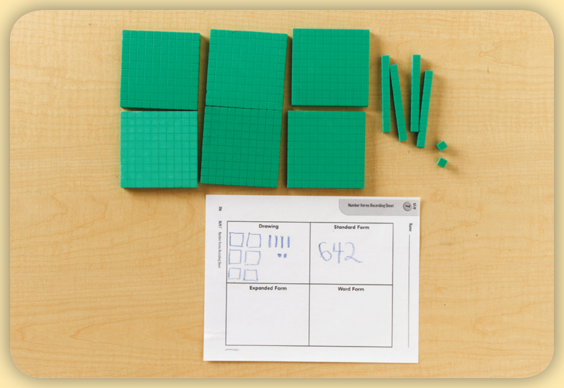
Here is a problem about writing numbers in different forms.

Amy and her younger brother were talking about numbers. Her brother thought the only way to show 642 was to write it as a numeral. Amy told her brother there are other ways to show the number. What are 3 other ways to show 642?

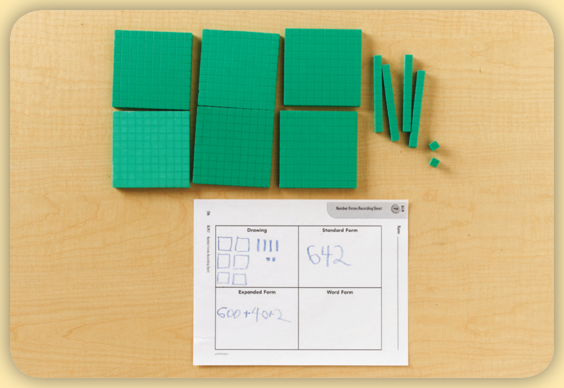
Introduce the problem. Then have children do the activity to solve the problem. Distribute Base Ten Blocks, recording sheets, and pencils to children.

Materials

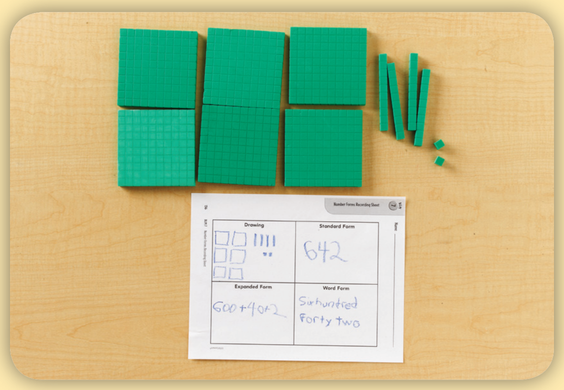
- Base Ten Blocks (10 flats, 10 rods, and 10 units per group)
- Number Forms Recording Sheet (BLM 7; 1 per child)
- pencils (1 per child)



1. Say: *You can use the blocks to build a model of the number.* **Ask:** *Which blocks would you use?* Discuss how to show the number using Base Ten Blocks. Have children draw the blocks they used to model the number and write the number in standard form on their recording sheets.



2. Say: *The blocks help us show 642 another way. Think about what each digit means.* Elicit that the 6 flats represent 600, the 4 rods represent 40, and the 2 units represent 2. Write *600 + 40 + 2* on the board, have children write it on their recording sheets, and tell children that it is the expanded form of 642.



3. Ask: *How would we write 642 using words?* Discuss the place values of the digits and write *six hundred forty-two* on the board. **Say:** *This is the word form of the number. Write it on your sheet.*

Look Out!

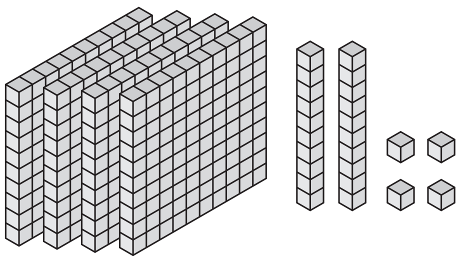
Watch for children who aren't going from blocks to expanded form easily. Have them look at each type of block separately and write what those blocks total. Remind them to use plus signs between the numbers to indicate that the parts are put together.

Answer Key

Use Base Ten Blocks. Build each number. Write the number in expanded form and standard form.

(Check students' work.)

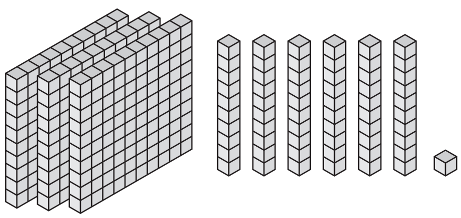
1.



400 + 20 + 4

424

2.



300 + 60 + 1

361

Use Base Ten Blocks. Build the number. Draw the model. Write the number in standard form.

3. two hundred fifty-seven

2 flats, 5 rods, 7 units; 257

Write each number.

4. 778 in expanded form 700 + 70 + 8

5. 581 in word form five hundred eighty-one

Answer Key

Challenge! Sarah saw *three hundred five* written on a paper. She wrote the number as 305. Her brother George said that since there is no zero in the number name, there should not be one in the number. Who is right, Sarah or George? Use words and drawings to explain.

Challenge: (Sample) Sarah is correct because the zero is needed to hold the tens place, even though there are no tens.

LESSON

5

Objective

Compare 3-digit numbers.

Common Core State Standards

- **2.NBT.4** Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.

Comparing Three-Digit Numbers

Comparing quantities helps children develop number sense, and the ability to compare is essential in problem solving. Children need opportunities to connect quantities with the numerals that represent them. Hands-on learning experiences, such as using Base Ten Blocks, provide these opportunities and help children gain proficiency in comparing, both visually and mentally. Applying the symbols >, <, and = allows children to practice using symbols to represent mathematical ideas.

Try It! *Perform the Try It! activity on the next page.*

Talk About It

Discuss the Try It! activity.

- Write the numbers *748* and *673* on the board. **Ask:** *Where do I look first to find out which number is greater? Which number is greater? How can you tell?*
- Write the numbers *561* and *556* on the board. **Say:** *These numbers have the same number in the hundreds place.* **Ask:** *Where should I look to find out which number is greater?*
- Write *561 > 556*. **Ask:** *Can you write another statement about these numbers using the < sign?*

Solve It

With children, reread the problem. Have children write the numbers for each boy's pile of blocks and complete the number sentence. Then have children write a sentence comparing the two numbers.

More Ideas

For other ways to teach comparing three-digit numbers—

- Have pairs use a spinner to spin 3 numbers, and have each child create a three-digit number using the 3 numbers spun. Have children use the numbers they created and write two number sentences using < or >. Children can use Base Ten Blocks to model and check the answers to their sentences.
- Have children pick 3 digits out of a bag. Have one child make the greatest number and the other child make the least number that can be made from the three digits. Then have pairs use > or < to write two sentences comparing the numbers. Children can use Base Ten Blocks to model and check the answers to their sentences.

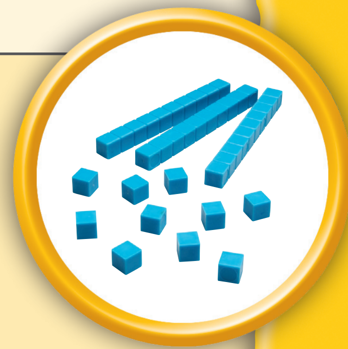
Formative Assessment

Have children try the following problem.

Which number makes this true?

_______ < 407

A. 704 **B.** 470 **C.** 401



Try It! 20 minutes | Pairs

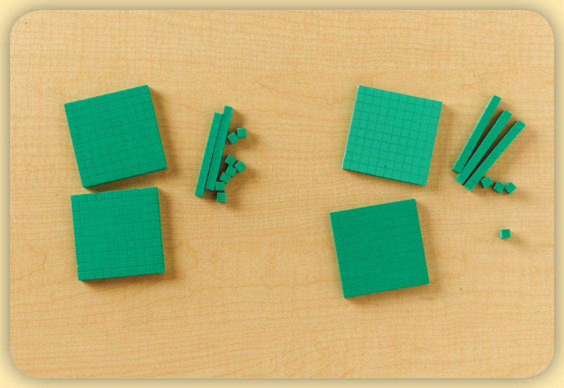
Here is a problem about comparing three-digit numbers.

Ali and Jafar each have a pile of Base Ten Blocks. Ali says his blocks make a greater number than Jafar's blocks. Jafar says his blocks make a greater number. Ali has 8 units, 2 flats, and 2 rods. Jafar has 4 units, 2 flats, and 3 rods. Use Ali's and Jafar's numbers to make this number sentence true: _____ > _____.

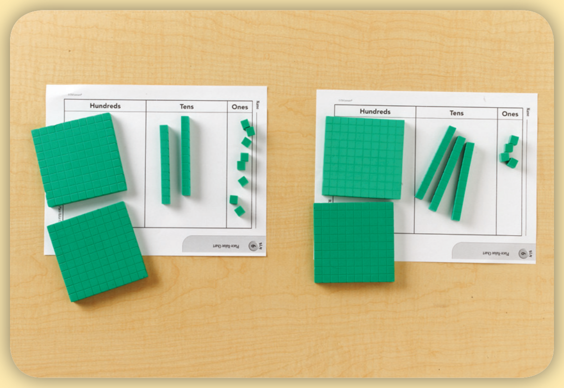
Introduce the problem. Then have children do the activity to solve the problem. Distribute Base Ten Blocks, charts, index cards, and pencils to children.

Materials

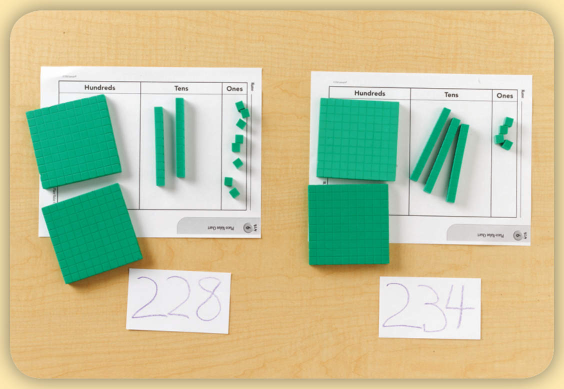
- Base Ten Blocks (10 flats, 10 rods, and 20 units per pair)
- Place-Value Chart (BLM 6; 2 per pair)
- index cards (2 per pair)
- pencils (2 per pair)



1. Say: *Let's make the two piles of blocks first.* **Ask:** *How many flats does each boy have? How many rods? How many units?* Have one child be Jafar and the other be Ali. Have each child build his or her pile of blocks.



2. Have each child place his or her blocks on a chart to model the number the blocks represent. **Say:** *Let's compare the numbers.* Elicit that the hundreds place is compared first because it is the greatest. Explain that since the models have the same number of hundreds, the comparison has to move to the tens.



3. Ask: *Which number has more tens? Which number is greater?* Write _____ > _____ on the board. **Say:** *Use the numbers to make this number sentence true.* Discuss the meanings of > and <, have each child write his or her number on an index card, and have pairs complete the number sentence.

⚠ Look Out!

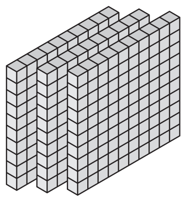
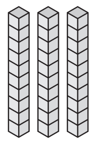
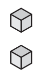
Watch for children who aren't comparing each place value correctly. Make sure they are looking at each value position separately to make a valid comparison. Some pairs might benefit from putting the place-value charts one under the other and lining up the columns to make a better comparison.

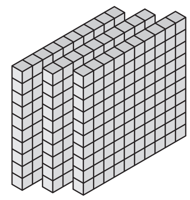
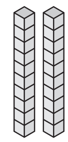
Answer Key

Use Base Ten Blocks. Build each number. Compare the numbers. Write the numbers with < or > between them.

(Check students' work.)

1.

Hundreds	Tens	Ones
		

Hundreds	Tens	Ones
		

332 > 323

Build each number. Draw the models. Write the numbers with < or > between them.

2. 235 330

Hundreds	Tens	Ones

Hundreds	Tens	Ones

235 < 330

Write < or > between the numbers.

3. 636 < 663

4. 178 > 175

Answer Key

Challenge! Rosa has 5 flats, 7 rods, and 4 units on her desk. Irene says her blocks show the same number, but Irene has 5 flats and 6 rods. How many units would Irene have to have to equal Rosa's blocks? Draw the models of Rosa's and Irene's blocks. Write a sentence to explain.

Challenge: Irene would have to have 14 units.

LESSON 6

Objective

Add 2-digit numbers.

Common Core State Standards

- 2.NBT.6 Add up to four two-digit numbers using strategies based on place value and properties of operations.

Adding Two-Digit Numbers

To facilitate adding more than 2 two-digit numbers, children need to use the various properties of addition. For example, understanding that changing the order of the numbers added does not change the sum will help children regroup the numbers to find easy sums. Using concrete objects to add helps children internalize the necessary concepts.

Try It! *Perform the Try It! activity on the next page.*

Talk About It

Discuss the Try It! activity.

- **Say:** *You also can begin by adding 70 + 72. You can add the ones: 2 + 0, and then the tens: 7 + 7.* **Ask:** *How many ones do you have? (2) What is the total of your tens? (140)* **Say:** *Now you can add 140 + 2 to get 142.*
- **Say:** *Now you add 142 + 68. This also has easy numbers to group together. You can add the ones: 2 + 8, and then the tens: 140 + 60.* **Ask:** *What is 2 + 8? (10) What is 140 + 60? (200)* **Say:** *You can now add 200 + 10 to get 210 people.*

Solve It

With children, reread the problem. Have children write the number of people from each night as an addition problem: 68 + 70 + 72 = ___. Have children circle the numbers they grouped together, connect with a line, and write the total underneath the line. Then have them add the remaining number and write the total number of people at the soccer games.

More Ideas

For other ways to teach adding 3 or 4 two-digit numbers—

- Write several addition problems with 3 or 4 two-digit numbers on note cards and allow children to select cards at random. Have children rewrite the addition problems vertically on paper, grouping the numbers that are easily added, and model them with Base Ten Blocks. Remind children to look for easy numbers to add—those that equal ten or involve adding zero. Have them write the total.
- Have children pick 3 or 4 two-digit numbers from a bag. Ask them to group the numbers into easy ways to add. Have children use Base Ten Blocks to help them visualize how the groupings can help them solve the problems.

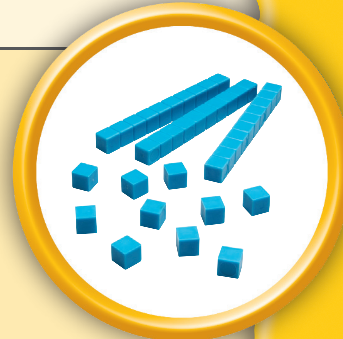
Formative Assessment

Have children try the following problem.

Which numbers can be grouped to add more easily?

82 + 19 + 31 + 47

A. 82 + 47 **B.** 82 + 19 **C.** 19 + 31



Try It! 25 minutes | Groups of 3

Here is a problem about adding more than 2 two-digit numbers.

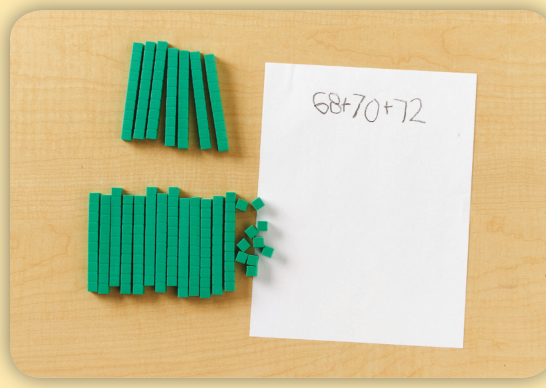
Marisol wanted to know how many people came to the soccer games over three nights. On Monday night, there were 68 people. On Tuesday night, there were 70 people. On Thursday night, there were 72 people. How can Marisol easily add these three numbers to find the total number of people?

Introduce the problem. Then have children do the activity to solve the problem. Distribute Base Ten Blocks, paper, and pencils to children.

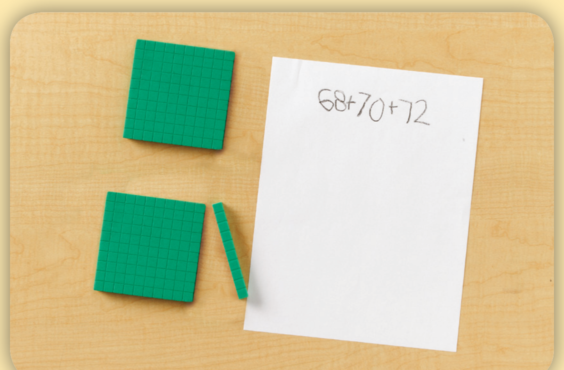
Materials

- Base Ten Blocks (5 flats, 25 rods, and 20 units per group)
- paper (1 sheet per group)
- pencils (1 per group)

1. Say: *Let's write the numbers we need to add.* Write 68 + 70 + 72. Have children build each number using Base Ten Blocks. **Ask:** *Do you notice any numbers that might be easier to add?* Generate a discussion about adding 68 + 72 (since 8 + 2 = 10) or 70 + 72 (since 7 + 7 = 14).



2. Say: *We can group 68 and 72 to add the ones easily. Use your blocks to add the ones.* **Ask:** *How many ones do you have? How can you regroup those ones into tens?* **Say:** *Place all the tens together.*



3. Say: *Now let's add these tens to the remaining number of people.* **Ask:** *How many tens do you have? How many hundred flats can you trade for? How many people came to the soccer games?*

⚠ Look Out!

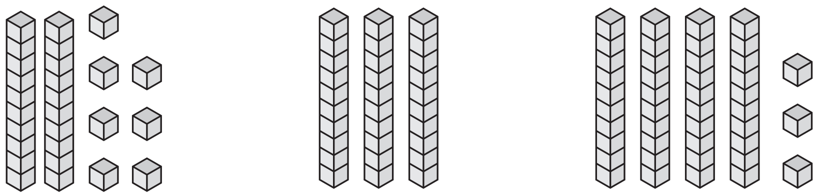
Watch for children who aren't grouping numbers for easier addition. Help them focus just on the ones or the tens to find numbers that are easiest to add. Adding any number to zero is always easy, and finding numbers that will have a sum of 10 also makes adding easier.

Answer Key

Use Base Ten Blocks. Build the numbers. Group the numbers. Add.

(Check students' work.)

1. 27 + 30 + 43 = 27 + 43 = 70, 70 + 30 = 100



Use Base Ten Blocks. Build the numbers. Group the numbers. Draw the groups. Add.

2. 17 + 49 + 23 + 11 = 17 + 23 = 40, 49 + 11 = 60, 40 + 60 = 100

Add.

3. 55 + 60 + 15 + 20 = 55 + 15 = 70, 60 + 20 = 80, 80 + 70 = 150

4. 54 + 76 + 40 = 54 + 76 = 130, 130 + 40 = 170

5. 16 + 22 + 80 + 52 = 16 + 22 = 38, 38 + 52 = 90, 90 + 80 = 170

Challenge! Alex and Anthony added the points the basketball team scored in four games. The team scored 48 points, 43 points, 52 points, and 37 points. Alex wants to add 43 + 37 and then 48 + 52. Anthony wants to add 48 + 43 and then 52 + 37. Which boy is adding the points in the easier way? Explain why, and then show the sum.

Challenge: (Sample) Answers will vary, but most children will say Alex is grouping the numbers to make easier addends: 3 + 7 = 10 and 8 + 2 = 10. Then all he has to do is add the tens. The sum is 180.

LESSON 7

Objective

Add and subtract within 1,000.

Common Core State Standards

- **2.NBT.7** Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.

Number and Operations in Base Ten

Adding and Subtracting Within 1,000

Adding and subtracting multi-digit numbers is an important skill in everyday life. Addition and subtraction require children to represent numbers and understand their values. Children will use their prior knowledge in place value, comparing three-digit numbers, and properties of operations to add and subtract numbers within 1,000, with and without regrouping.

Try It! *Perform the Try It! activity on the next page.*

Talk About It

Discuss the Try It! activity.

- Write *253* and *324* on the board. **Ask:** *What is the best way to write these numbers as an addition problem?* Help children set up the addition vertically and realize they must align the place-value columns.
- **Say:** *Remember that when you add, you sometimes need to regroup.* **Ask:** *How do you know when you need to regroup? Are there any numbers you need to regroup in this problem? How do you show regrouping using your blocks?* Add the numbers together as a class.
- **Say:** *You may need to regroup when you are subtracting, too.* **Ask:** *Do you need to regroup any numbers when you are subtracting in this problem? What do you need to do with your blocks when you regroup to subtract? How is regrouping different for adding than it is for subtracting?*

Solve It

With children, reread the problem. Have children draw blocks and write two number sentences to find the total number of problems that Dawn and Lina solved and how many problems David and Zac solved.

More Ideas

For another way to teach adding and subtracting within 1,000—

- Have pairs pick 6 numbers out of a bag to make 2 three-digit numbers. Have one child add them and the other child subtract the smaller number from the larger number.

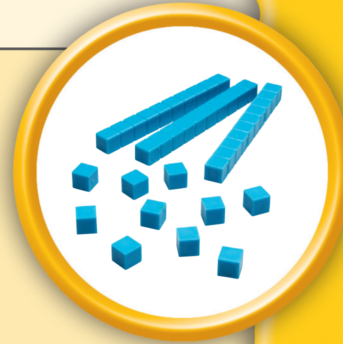
Formative Assessment

Have children try the following problem.

$$\begin{array}{r} 245 \\ +\ 127 \\ \hline \end{array}$$

A. 122 **B.** 362 **C.** 372

Try It! 30 minutes | Groups of 3



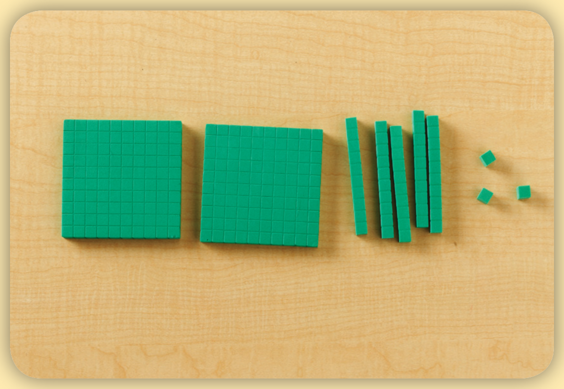
Here is a problem about adding and subtracting within 1,000.

Dawn, Lina, David, and Zac are keeping track of the number of math problems they solve. So far, Dawn has solved 253 problems and Lina has solved 354 problems. David and Zac have solved 89 fewer problems than Dawn and Lina. How many problems have David and Zac solved?

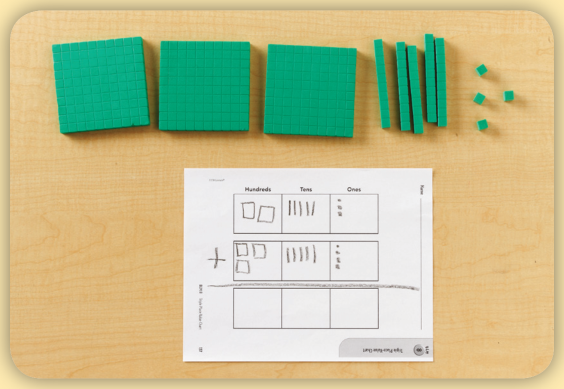
Introduce the problem. Then have children do the activity to solve the problem. Distribute Base Ten Blocks, charts, and pencils to children.

Materials

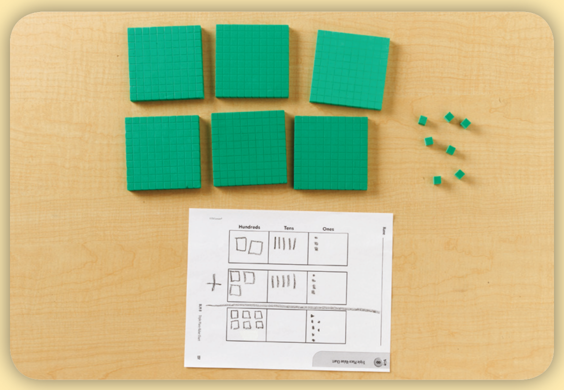
- Base Ten Blocks (10 flats, 20 rods, and 20 units per group)
- Triple Place-Value Chart (BLM 8; 2 per child)
- pencils (1 per child)



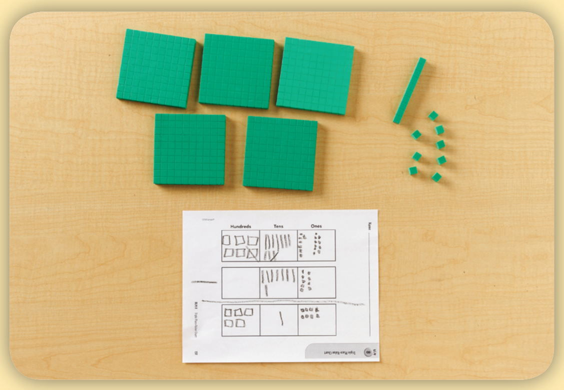
1. Say: *First we will add together 253 and 354. Show 253 with blocks. Draw the blocks you used on the chart and draw a plus sign below them.* Have children set the blocks they used to the side.



2. Say: *Now we will use new blocks to show 354.* Have children build the number and then draw the blocks they used in the second row on the chart.



3. Say: *Next put the groups of blocks together to find the sum.* **Ask:** *Do you need to regroup? Do you have 10 units to exchange for a rod? Do you have 10 rods to exchange for a flat?* **Say:** *Now draw the new blocks you have all together on the chart.*



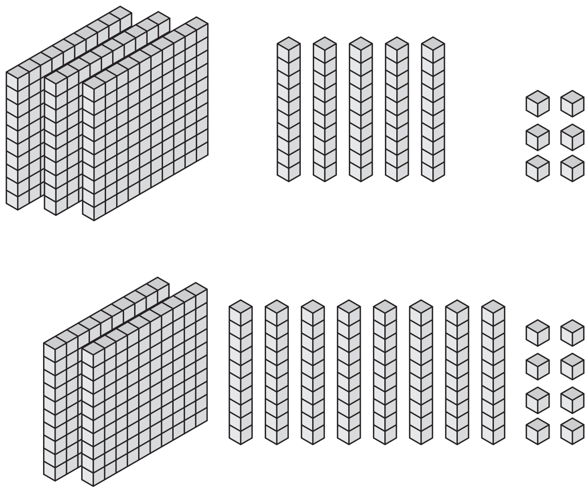
4. Say: *Take the sum from the first two numbers and draw it on the second chart. Now you need to subtract 89. Place a minus sign under the first row. Draw the blocks you have to subtract in the second row.* Guide children in exchanging blocks to regroup and subtract.

Answer Key

Use Base Ten Blocks. Build the numbers. Find the sum or difference.

(Check students' work.)

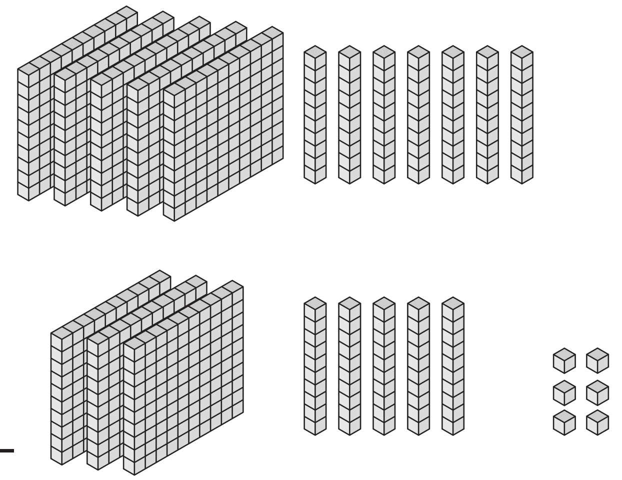
1.



\+

Sum: 356 + 288 = 644

2.



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Difference: 570 - 356 = 214

Use Base Ten Blocks. Build each number and draw the blocks. Find the sum or difference.

3. 489
 + 246

735

4. 638
 – 157

481

Find each sum or difference.

5. 335 – 254 = 81

6. 316 + 278 = 594

Answer Key

Challenge! Leah built the number 568 with Base Ten Blocks. She gave some of these blocks to her friend. Then she had 350 blocks left. How many blocks did she give away? Use drawings or numbers to show your answer.

Challenge: 218; drawing should show 568 in blocks with 350 crossed out; number sentence 568 – 350 = 218.

LESSON

8

Objective

Add 10 or 100.

Common Core State Standards

- **2.NBT.8** Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.

Number and Operations in Base Ten

Adding 10 or 100

With a thorough understanding of place value, children can use mental math to add 10 or 100 to a given number. With practice, children realize that adding 10 affects the tens place and adding 100 affects the hundreds place without changing the ones place. They know also that if 10 is added to 190, 290, 390, 490, 590, 690, 790, or 890, then the hundreds place is affected. Manipulatives such as Base Ten Blocks can help children understand the place value changes involved in adding 10 or 100.

Try It! *Perform the Try It! activity on the next page.*

Talk About It

Discuss the Try It! activity.

- Write *148 + 100* in vertical format on the board. **Ask:** *Do we need to change the ones? Do we need to change the tens? Do we need to change the hundreds?* **Say:** *When we add 100, we only need to increase the hundreds by 1, since zeros are added in the tens and ones places.*
- Write *148 + 10* in vertical format on the board. **Ask:** *Do we need to change the ones? Do we need to change the tens? Do we need to change the hundreds?* **Say:** *When we add 10, we only need to increase the tens by 1, since zero is added in the ones place.*
- **Ask:** *Why would it be easy to add 10 or 100 in your head without writing the problem down?*

Solve It

With children, reread the problem. Have children write the number sentences that solve the parts of the problem. Then have them write a sentence telling why it is easy to add 10.

More Ideas

For other ways to teach adding 10 or 100—

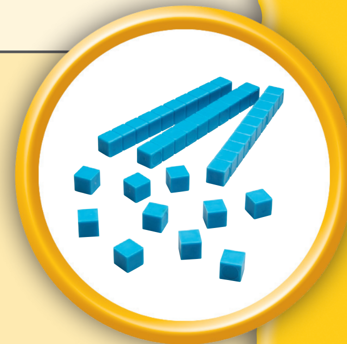
- Have children pick 3 digits from a bag and create a three-digit number. Have them build the number with Base Ten Blocks. Next have children add 10 and then add 100 to the original number.
- Have children work in pairs. Have one child write a three-digit number. Have the second child build the number with Base Ten Blocks and add either 10 or 100 to the number. Have the first child decide if 10 or 100 were added and write the new number. Switch roles and repeat.

Formative Assessment

Have children try the following problem.

Which digit in 723 changes if 100 is added?

A. 2 **B.** 3 **C.** 7



Try It! 25 minutes | Pairs

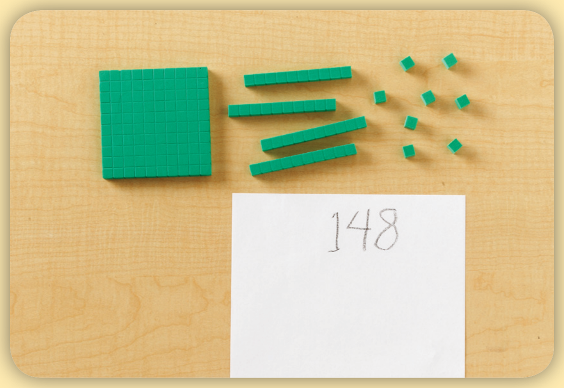
Here is a problem about adding 10 or 100.

The gym teacher tracks how many sit-ups the children have done in class. So far, Giana has done 148 sit-ups. Her fiend Baillie has done 100 sit-ups. How many sit-ups have both girls done in all? How many sit-ups will each girl have if she does 10 more in the next class?

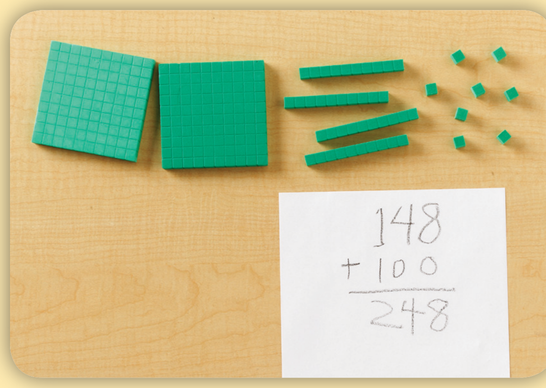
Introduce the problem. Then have children do the activity to solve the problem. Distribute Base Ten Blocks, paper, and pencils to children.

Materials

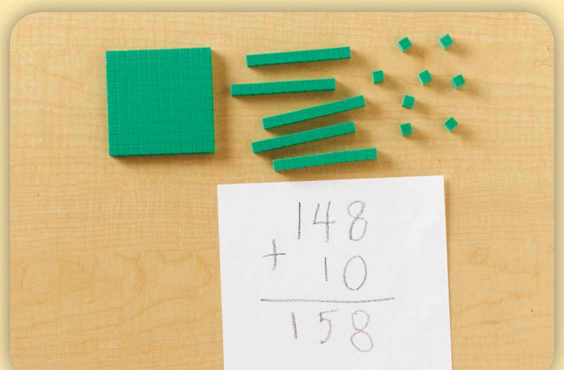
- Base Ten Blocks (5 flats, 10 rods, and 20 units per pair)
- paper (1 sheet per pair)
- pencils (1 per pair)



1. Say: *Let's use blocks to show the number of sit-ups Giana has done.* **Ask:** *How many hundreds do we need? How many tens do we need? How many ones do we need?*



2. Say: *Now let's show how many sit-ups Baillie has done.* Have children model 100. **Say:** *Put the blocks together to add the numbers.* Write *148 + 100* in vertical format on the board. **Ask:** *When you combined the blocks, did you change the ones? Did you change the tens? Did you change the hundreds?* **Say:** *Write the sum on your paper.*



3. Say: *Let's find how many sit-ups each girl will have if she does 10 more in the next class.* **Ask:** *What do we need to add to each group of blocks? Does adding a ten change the ones? Does adding a ten change the hundreds?*

⚠ Look Out!

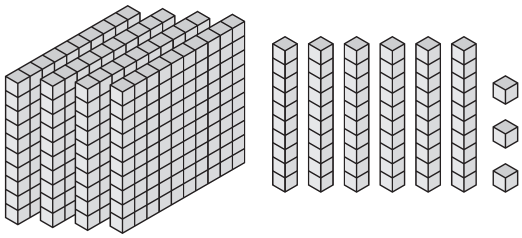
Watch for children who want to regroup every time they add 100. Explain that they only need to regroup if they have 10 or more rods or flats. Any other time, they just increase the tens or hundreds place without regrouping.

Answer Key

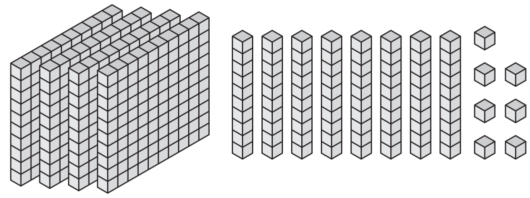
Look at the number. Then look at the blocks. Build the model. Decide if 10 or 100 were added. Write 10 or 100.

(Check students' work.)

1. 453 + 10



2. 387 + 100



Look at the first number. Draw a model. Look at the sum. Decide if 10 or 100 need to be added. Write 10 or 100.

3. 264 + 100 = 364

4. 528 + 100 = 628

Look at each number. Add 10. Then add 100. Write both sums.

5. 489 + 10 = 499 489 + 100 = 589

6. 837 + 10 = 847 837 + 100 = 937

7. 648 + 10 = 658 648 + 100 = 748

8. 129 + 10 = 139 129 + 100 = 229

Answer Key

Challenge! When we add 10 to a number, we usually only need to increase the tens by one. Is there a time when adding 10, that you need to change the number in the hundreds place? Use drawings or words to show your answer.

Challenge: (Sample) Yes; If I add 10 to 90, then I have to add 1 to the hundreds and make the tens a zero.

LESSON 9

Objective

Subtract 10 or 100.

Common Core State Standards

- **2.NBT.8** Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.

Subtracting 10 or 100

With a thorough understanding of place value, children can use mental math to subtract 10 or 100 from a given number. With practice, children realize that subtracting 10 affects the tens place and subtracting 100 affects the hundreds place without changing the ones place. They know also that if 10 is subtracted from 100, 200, 300, 400, 500, 600, 700, 800, or 900, then the hundreds place is affected. Manipulatives such as Base Ten Blocks can help children understand the place value changes involved in subtracting 10 or 100.

Try It! *Perform the Try It! activity on the next page.*

Talk About It

Discuss the Try It! activity.

- Write *327 – 10* in vertical format on the board. **Ask:** *When we subtract, do we need to change the ones? Do we need to change the tens?* **Say:** *When we subtract 10, we decrease the tens by one. We do not change the ones, since zero is subtracted in the ones place.*
- Write *327 – 100* in vertical format on the board. **Ask:** *Do we need to change the ones? Do we need to change the tens? Do we need to change the hundreds?* **Say:** *We only need to change the hundreds, because zero is subtracted in the tens and ones places. We decrease the hundreds by 1.*
- **Ask:** *Why would it be easy to subtract 10 or 100 in your head without writing the problem down?*

Solve It

With children, reread the problem. Have children write the number sentences that solve the parts of the problem. Then have them write a sentence telling why it is easy to subtract 10 or 100.

More Ideas

For other ways to teach subtracting 10 or 100—

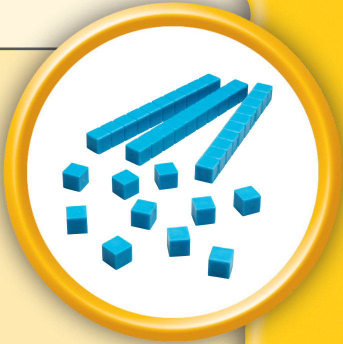
- Have children pick 3 digits from a bag and create a three-digit number. Have them build the number with Base Ten Blocks. Next have children subtract 10 and then subtract 100 from the original number.
- Have children work in pairs. Have one child write a three-digit number. Have the second child build the number with Base Ten Blocks and subtract either 10 or 100 from the number. Have the first child decide if 10 or 100 were subtracted and write the new number. Switch roles and repeat.

Formative Assessment

Have children try the following problem.

Which digit in 319 changes if 10 is subtracted?

A. 1 **B.** 3 **C.** 9



Try It! 25 minutes | Pairs

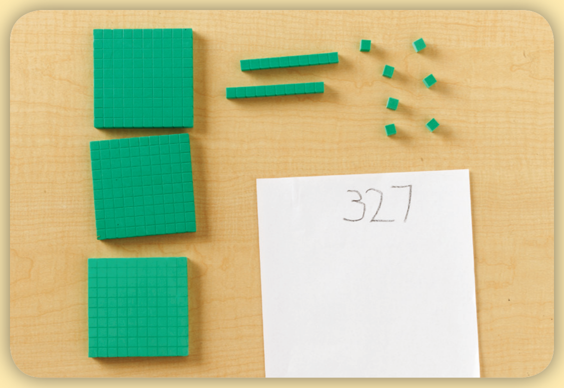
Here is a problem about subtracting 10 or 100.

The second grade classes collected canned goods for the local food bank. Mrs. Dell's class collected 327 canned goods. Mr. Larson's class collected 10 less than Mrs. Dell's class. Miss Johnson's class collected 100 less than Mrs. Dell's class. How many canned goods did Mr. Larson's and Miss Johnson's classes collect?

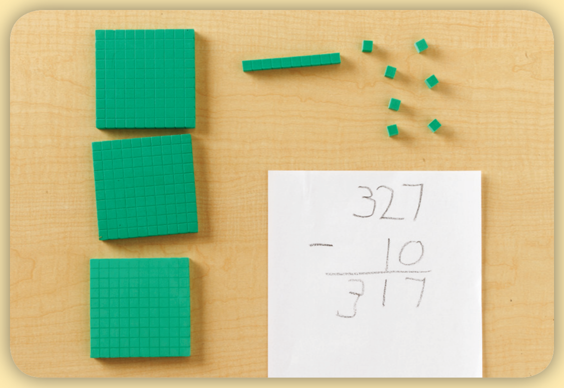
Introduce the problem. Then have children do the activity to solve the problem. Distribute Base Ten Blocks, paper, and pencils to children.

Materials

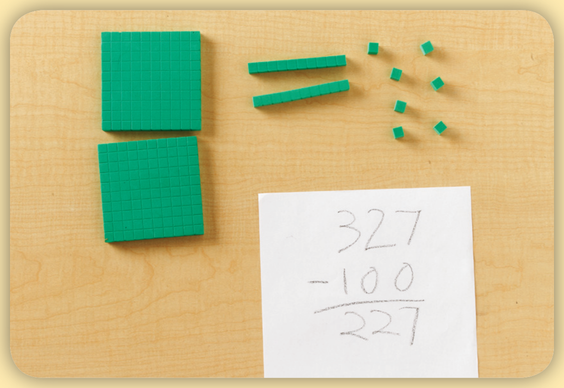
- Base Ten Blocks (10 flats, 10 rods, and 15 units per pair)
- paper (1 sheet per pair)
- pencils (1 per pair)



1. Say: *Let's use blocks to show the number of canned goods Mrs. Dell's class collected.* **Ask:** *How many hundreds do we need? How many tens do we need? How many ones do we need?*



2. Say: *Now let's find the number of canned goods Mr. Larson's class collected. They collected 10 less.* **Ask:** *Do we need to change the ones? Do we need to change the tens? Do we need to change the hundreds?* **Say:** *We subtract 1 ten from the 2 tens, to give us 1 ten. Write the difference on your paper.*



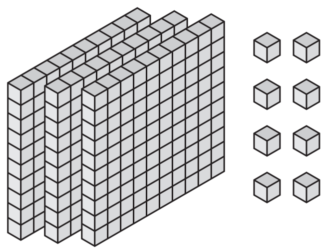
3. Say: *Let's find the number of canned goods Miss Johnson's class collected. They collected 100 less than Mrs. Dell's class.* **Ask:** *Do we need to change the ones? Do we need to change the tens? Do we need to change the hundreds?* **Say:** *We subtract 1 hundred from the 3 hundreds. Write the difference on your paper.*

⚠ Look Out!

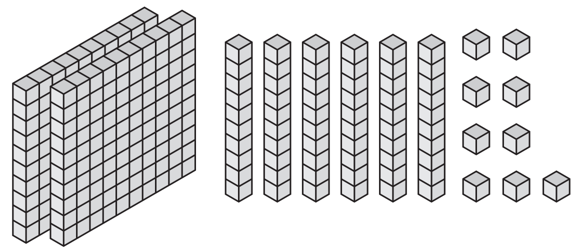
Watch for children who are not lining up their numbers correctly. If the place values aren't aligned, the children will not subtract properly and will not get the correct answer. If children repeatedly have difficulties, have them use grid or graph paper to keep their digits aligned

Look at the number. Then look at the blocks. Build the model. Decide if 10 or 100 were subtracted. Write 10 or 100. (Check students' work.)

1. 408 – 100



2. 279 – 10



Look at the first number. Draw a model. Look at the difference. Decide if 10 or 100 need to be subtracted. Write 10 or 100.

3. 189 – 10 = 179

4. 528 – 100 = 428

Look at each number. Subtract 10. Then subtract 100. Write both differences.

5.

327	327
– 10	– 100
317	227

6.

999	999
– 10	– 100
989	899

7.

459	459
– 10	– 100
449	359

8.

221	221
– 10	– 100
211	121

Answer Key

Challenge! When we subtract 10 from a number, we usually only need to decrease the tens by one. Is there a time when subtracting 10, that you need to change the number in the hundreds place? Use drawings or words to show your answer.

Challenge: (Sample) Yes; If I subtract 10 from 0 tens, then I will need to borrow from the hundreds and change the number in the hundreds place.