This supplement modifies the Base Ten Bank instructions from the Number Corner Teachers Guide. It is recommended that you follow the January modified instructions adding to the bank, then in February subtract from the bank rather than continue to add. For March-June follow modified instructions as written in supplement.

Set A5 ★ Activity 4

ACTIVITY

Modifying the Base Ten Bank

Overview

The Base Ten Bank is a Number Corner component introduced in January to help second graders develop place value understandings, as well as generate strategies for adding and subtracting 2- and 3-digit numbers. This component is revisited in the Number Corner each month through April. The text below suggests modifications you can make to the Base Ten Bank starting in March to teach a regrouping strategy for multi-digit addition and subtraction.

Skills & Concepts

★ add and subtract two-digit numbers efficiently and accurately using a procedure that works with all two-digit numbers and explain why the procedure works

You'll need

★ the Base Ten Bank pocket chart

★ base ten pieces (mats, strips, and units)

★ Base Ten Bank Ten Strips (page A5.29, see Advance Preparation)

★ Base Ten Bank Addition blacklines (pages A5.30 and A5.31, run as needed

★ 5 dice, one marked 1–6, two marked 4–9 and two marked 10, 10, 20, 20, 30, 40

Advance Preparation Prepare this component by posting the Base Ten Bank pocket chart where all the students can see it. In addition, run 10 copies of Blackline A5.29. Cut these sheets in half lengthwise. Staple the 20 half-sheets together to form a pad of ten-strips. If you don't already have 2 dice numbered 4–9 and 5–10, label 2 of your wooden cubes with the appropriate numbers. Keep your collection of base ten pieces close at hand.

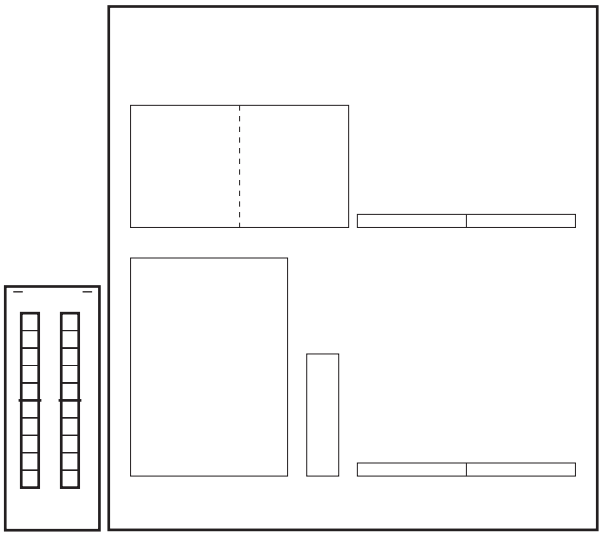
January Base Ten Bank Overview

The Base Ten Bank is a specially-designed pocket chart that holds a growing collection of base ten pieces. While it has nothing to do with the day's date or the number of school days that have passed, it provides important opportunities for children to develop place value understandings. Each time this component is featured, the students roll 2 dice, total the numbers, and add that many base ten pieces to the collection in the "bank." After the first day, they are asked to add the new deposit to the standing collection. Some do so by mentally combining the pieces. Others use mental arithmetic, usually adding the 10s first and then the 1s. Still others use base ten pieces from the class supply or make sketches to arrive at the total. Solutions and strategies are shared, all the pieces are moved to the top row of pockets, and the new total is posted.

Introducing the Base Ten Bank in January

When you first introduce this component, the Base Ten Bank will be empty, as shown on the next page:

Activity 4 Modifying the Base Ten Bank (cont.)

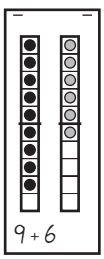


Take a minute for student observations, and then explain that this is a wall bank. Each time you do the Number Corner this month and next, you'll make a deposit of base ten pieces. The amount deposited will be determined by rolling the dice and adding the 2 numbers, and will have nothing to do with the day's date or the number of days you've been in school. Today you'll have a student volunteer roll the 2 dice. The children will work together to determine the total, using dots on the ten-strips to help, and you'll place that many base ten pieces in the top row of pockets.

> ***Teacher*** *Anna, you're the Helping Hand for today. Would you please roll the 2 dice to determine our first deposit?*
>
> ***Anna*** *Sure! The 2 numbers are 9 and 6.*
>
> ***Hayden*** *That's 15!*

(Some of your students will probably be able to total any combination that comes up on the dice instantly. Others will need a minute to figure the answer. In order to encourage children to use strategies other than counting on (or counting from 1 in some cases), we recommend that you show the combination with dots on a pair of ten-strips. The fact that the ten-strips are placed side-by-side and subdivided into fives tends to help students think in chunks and mentally move dots around to form easier combinations.)

> ***Teacher*** *Even though some of you already know the total, let's have a look at 9 + 6 on our ten-strips here. I'm going to stick 9 dots on one strip and 6 dots on the other. Will you help me count as I go?*
>
> ***Children*** *1, 2, 3, 4, 5, 6, 7, 8, 9—1, 2, 3, 4, 5, 6!*



Activity 4 Modifying the Base Ten Bank (cont.)

Teacher *If you didn't already know the total, how could you use the dots on these 2 ten-strips to help?*

Nicholas *I'd count on: 9—10, 11, 12, 13, 14, 15.*

Teacher *Well sure—counting on always works, but it can take a little time. Can anyone think of a different way?*

(While we want to acknowledge the idea of counting on, we also want to nudge children in the direction of applying more efficient strategies.)

Caroline *You could pretend to move a dot over from the 6 to the 9. That would make it 10 plus 5, and that's 15.*

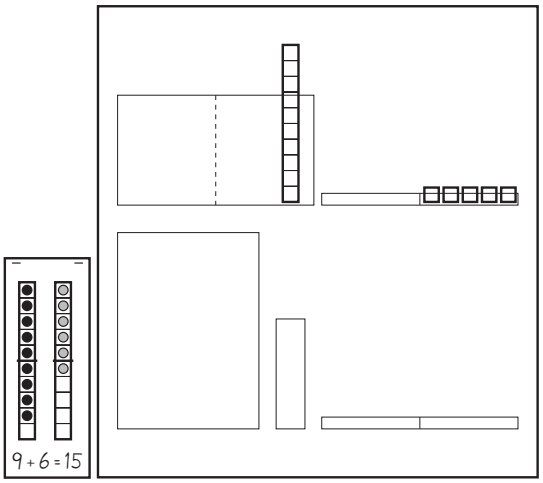
Teacher *Any other methods?*

Jensen *I'd count the 5s above the lines, and then see that there were 5 more below the lines—5, 10, 15.*

Teacher *Do we all agree that the total is 15?*

Children *Yes!*

Teacher *Let's record the answer using base ten pieces and post 15 in the top row of our bank then.*



Continuing Through January and February with the Base Ten Bank

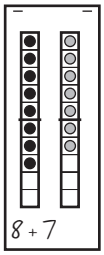
Each time you conduct a Number Corner session for the rest of this month and the next, your class will make a deposit to the Base Ten Bank. Just as they did for the first deposit, children will roll the 2 dice, calculate the sum using dots on the ten-strips as a visual aid, deposit that number of base ten pieces in the bank, and figure the new bank total. Your focus will be on helping children develop a variety of strategies for adding 2- and 3-digit numbers. Although you could certainly use the Base Ten Bank as a way to teach "carrying," we strongly urge you to let children develop their own methods right now. You can introduce the traditional method later, as one of several options, but if you hold off for now, you'll find that your students' place value understandings will be greatly enhanced.

Activity 4 Modifying the Base Ten Bank (cont.)

Teacher *Taylor, you're the helper for today. Will you please roll the 2 dice and report the numbers that come up?*

Taylor *I got 8 and 7.*

Teacher *Let's have a look at that by putting dots on the ten-strips.*



Natalie *It's 15 because 7 plus 7 makes 14, and 1 more is 15.*

Laura *8 + 7 is a neighbor because the 2 numbers live next door.*

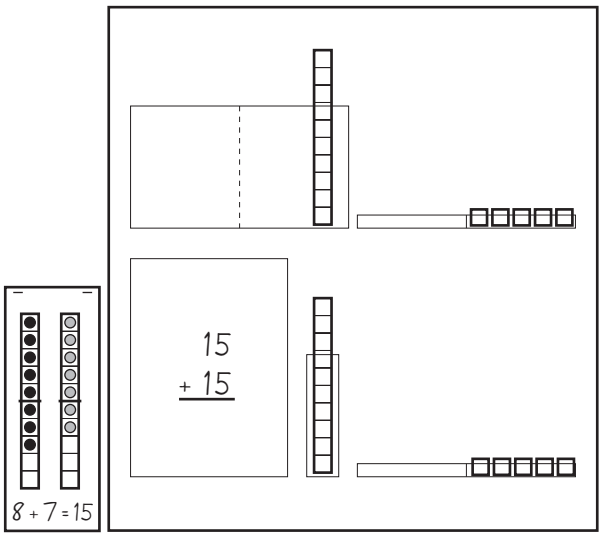
Teacher *That's right, and Natalie used the strategy of figuring the double and adding 1 more. Can anyone think of a different way?*

Brittany *You can look at the 5s. There are two 5s above the line, and if you add the 3 and the 2 below the line, that's another 5. Three 5s is 15.*

Vincent *Look! You can move 2 dots over from the 7 to the 8. Then it's like 10 plus 5—15!*

Teacher *Wow! There certainly are lots of ways to add 8 and 7! So we're going to make a deposit of 15 base ten pieces to our bank today? Let's go ahead and put those pieces in the second row of pockets. I'm also going to write a number sentence to show what we're adding. What should I write?*

Nicholas *15 + 15, 'cause you have 15 on top and you're adding 15.*



Activity 4 Modifying the Base Ten Bank (cont.)

Teacher *Now the question is, when we add today's deposit to the amount we already have in the bank, how much will we have in all? I'm going to ask you to take a minute to look at the base ten pieces, look at the numbers, and figure out the total.*

Megan *I already know what it is!*

Teacher *That's great! Let's take a minute for other people to think about it. I see kids really thinking hard about this one.*

(We generally ask children to think about the problem quietly for a minute and raise their hands when they have an idea. After having students share their solutions, we go back and ask several of them to explain their strategies.)

Teacher *Is anyone willing to share their solution to this problem?*

Ele Tasia *It's 30.*

Zachary *I got 30 too.*

Teacher *Did anyone get a different solution? No? Who would like to share how they got 30?*

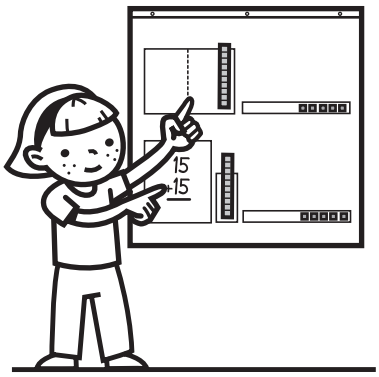
Zaavosh *I already knew it. I just know that 15 and 15 is 30.*

Hayden *Me too.*

Sarah *Can I show?*

Teacher *Sure!*

Sarah *I looked and saw 10 and 10 was 20. Then I just counted on the little ones.*



Anna *I kind of did it like Sarah. I looked at the sticks and saw 2 tens. Then I knew that 5 plus 5 is 10, so I knew the whole thing was 30.*

Things may not always go as smoothly as in the discussion above. There will be days when students arrive at several different solutions. In a way, this makes things far more interesting in that children have more reason to listen to one another, and more reason to present their thinking as clearly as possible. There will be days when nearly everyone seems to be able to calculate a total in his or her head and other days when some of your students may choose to get out base ten kits and work with the pieces directly.

Activity 4 Modifying the Base Ten Bank (cont.)

It won't be more than about 7 or 8 sessions until you've reached 100. At that point, you'll need to trade the ten strips in for a mat and pin the mat up beside the Base Ten Bank. In the space of 2 months, we usually reach 300 to 400. No matter how far we have or haven't gotten, though, we start "withdrawing" base ten pieces from the bank at the beginning of March. (This process will be described in the March Number Corner.)

One of the reasons we like the Base Ten Bank so well as a method of introducing double- and triple-digit addition is that it necessitates regrouping some days and not others. Children are very quick to distinguish the 2 situations: 53 + 15 brings cries of "Oh, easy!" while 69 + 18 produces thoughtful silence as some children reach for scratch paper or base ten pieces. *Allowing children to invent and share their own solution methods is central to this activity.* Even students who are still one-by-one counters at heart quickly see the wisdom of working in 10s and 1s and learn readily from one another. Those who aren't ready to think about adding double digits in the abstract are usually able to do so using base ten pieces. These students are literally able to *see* the strategies described by your more abstract thinkers.

> ***Justin*** *When I do 69 + 18, I just think 60 plus 10 is 70. Then I know that 9 plus 8 is 17 and 70 plus 17 is 87.*
>
> ***Laura*** *I see what you mean. 60 plus 10 is 70. Then I have 9 more. That's 79, 8 more would be* 79—*80, 81, 82, 83, 84, 85, 86, 87.*

If no one proposes the traditional method of carrying, you might want to offer it as another possibility toward the end of the month. You'll find that if you present it as the "real" or "best" method, though, you may shut down some of the mathematical thinking your students have been doing. If you remain open to the children's inventions, you'll find that as a group, they'll head in the direction of efficiency while demonstrating some great number sense and math power.

Base Ten Bank Addition

There may come a point this month when you'd like to have students work a couple of the Base Ten Bank problems on their own. After several weeks of group work, it can be useful to know how individual students in your class are handling these problems. Although most may appear to follow the strategies proposed by classmates during group discussion, it's entirely possible that some don't really understand what's going on, or haven't yet moved beyond counting by 1s. On the other hand, you may have some very quiet students who haven't really demonstrated what they can do in front of the group. Finally, there are children who just do better when they're able to work through problems using paper and pencil to track their work with manipulatives or numbers. For some of these children, it's harder to think and work in the pressure cooker of a whole-group discussion, and easier to share their ideas once they've had a little time to think things through on their own.

The Base Ten Bank Addition blacklines simply give students a place to record and work the problem of the day on paper. Children are encouraged to use Unifix cubes, base ten pieces, pictures, or numbers, and to show as much of their thinking and work on the page as possible using words, pictures, and/or numbers. You will almost certainly have to nudge some of them into showing more than the answer, especially if they've used Unifix cubes or base ten pieces to solve the problem. Sketches labeled with numbers, written descriptions, or number sentences, no matter how rough, will be instrumental in helping you understand their methods.

Activity 4 Modifying the Base Ten Bank (cont.)

It's important for students to understand that there's no one right way to do these problems, and that what you're most interested in is their current thinking. It's important for you to accept all levels of work, understanding that even children who need to solve the problem by drawing two sets of tally marks, and then counting them all one by one (or do the equivalent in Unifix cubes) will grow and change over the next few months.

Once children have solved the problem in their books, be sure to take a minute to discuss their solutions and post the new base ten pieces in the pocket chart.

February Base Ten Bank

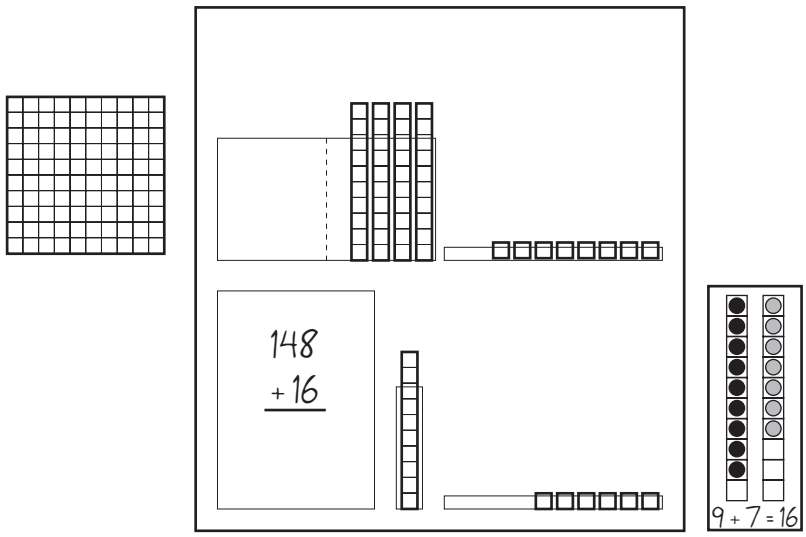
Each time you conduct a Number Corner session this month, your class will make a deposit to the Base Ten Bank. Just as they did for their January deposits, children will roll the two dice, calculate the sum using dots on the ten-strips as a visual aid, deposit that number of base ten pieces to the bank, and figure the new bank total. Your focus will be on helping children continue to develop a variety of strategies for adding 2- and 3-digit numbers.

> ***Teacher*** *Justin, you're the helper for today. Will you please roll the 2 dice and report the numbers that come up?*
>
> ***Justin*** *I got 9 and 7.*
>
> ***Children*** *It's 16!*
>
> ***Teacher*** *How do you know?*
>
> ***Children*** *I've been practicing. I just know that one now.*
> ***It's*** *like 10 and 7, but it's 1 less. That's 16.*
> ***If*** *you level off the 2 numbers, it's like 8 and 8—16!*

By now, you'll probably find that you don't need to post the combination on the ten-strips with adhesive dots every day.

> ***Teacher*** *Now the question is, when we add today's deposit to the amount we already have in the bank, how much will we have in all? I'm going to ask you to take a minute to look at the base ten pieces, look at the numbers, and figure out the total.*

Activity 4 Modifying the Base Ten Bank (cont.)



Once the problem has been posted, ask children to think about the problem quietly for a minute and raise their hands when they have an idea. After having students share their solutions, go back and ask several of them to explain their strategies.

Teacher *Is anyone willing to share their solution to this problem?*

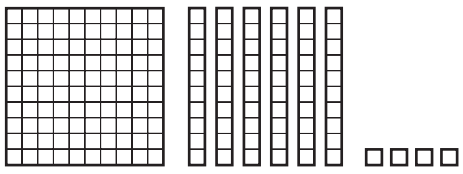
Brittany *It's 164.*

Sarah *That's what I got too.*

Laura *Not me. I got 166.*

Teacher *It sounds like we have two different ideas. Would anyone be willing to share their strategy with us? Perhaps we'll understand your answers better if we see what you were thinking.*

Ian *I got 164. What I did is I knew there was 100 already. Then I saw that 40 and 10 more would be 50. Then I added the 1s. I moved 2 up to the 8 to make 10 and traded it in for a ten-strip. Then I had 60 with 4 more left over, like this:*



Teacher *What do you think of Ian's method? Do you understand what he did here?*

Children *Yes!*
That's *what I thought—164!*
I *see what I did wrong. I thought 8 plus 6 was 16 instead of 14.*

Teacher *Did anyone have a different method?*

Activity 4 Modifying the Base Ten Bank (cont.)

Hayden *I did. I worked with the numbers. I looked and saw 8 plus 6 was 14. I carried the 10 over to the 10s like my mom showed me, so I had 10 plus 40 plus 10, and that was 60. And then I had the 100.*

$$\begin{array}{r} {\scriptstyle 1} \\ 148 \\ +\ 16 \\ \hline 164 \end{array}$$

Teacher *Anyone else?*

Zachary *I did it the other way from Hayden. I started with the hundred. Then I added the 10s. That was 50. Then the 1s were 14, and I knew that 50 plus 14 was 64. So I had 164.*

Teacher *If I write Zachary's method out in numbers, it could look like this:*

$$\begin{array}{r} 148 \\ +\ 16 \\ \hline 100 \\ 50 \\ 14 \\ \hline 164 \end{array}$$

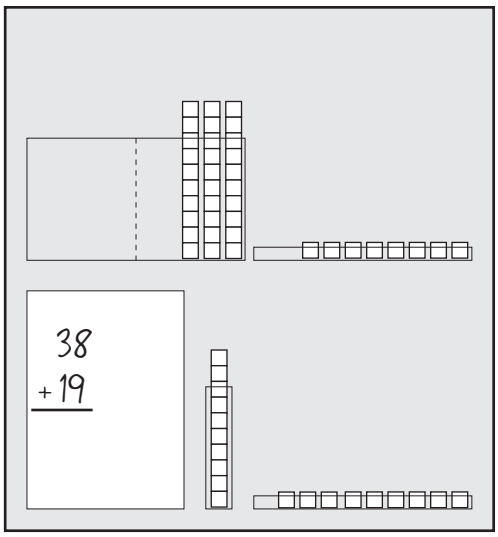
By the end of this month, you will probably have collected somewhere between 200 to 300 units. Children will have had many opportunities to explore strategies for adding 2- and 3-digit numbers. Starting in March, you will formally introduce the standard algorithm for adding multi-digit numbers. In April, you'll introduce the standard algorithm for subtracting multi-digit numbers.

March Base Ten Bank

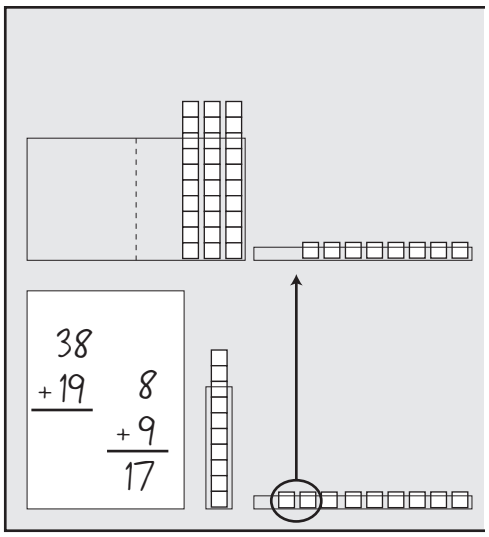
Instead of starting from the total number of base 10 pieces you have accumulated by the end of February and going backwards in March as described in the Number Corner guide (pages 197–201), clear all the pieces out of the Base 10 Bank pocket chart. Then roll two dice, one numbered 4–9 and the other 10, 10, 20, 20, 30, 40 once, and then once again to generate problems such as 38 + 19. Work with students to model and solve a couple of double-digit problems each day during Number Corner using the Base Ten Bank pocket chart and base ten pieces. Clear out the pieces after each problem rather than keeping a cumulative collection. You may want to use dice or find other ways to make up 3-digit, as well as 2-digit addition problems.

Invite many different strategies the first few days. If a student volunteers a regrouping strategy, work with the class to model it with the base ten pieces. If not, introduce it yourself, adding the units first, and regrouping as necessary. Record the process with numbers and symbols on the pocket chart, whiteboard, or a piece of chart paper. One way of handling this on the Base Ten Bank pocket chart is shown below.

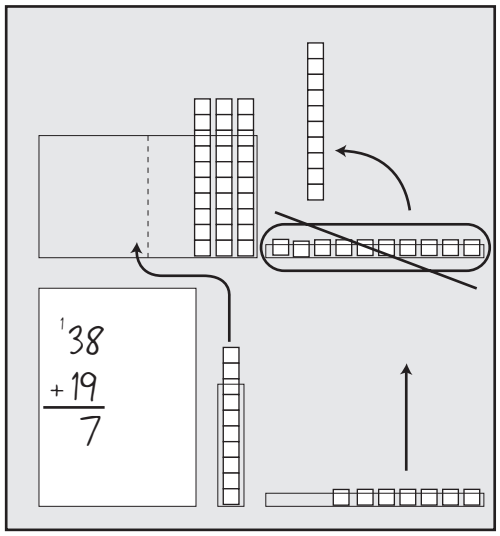
Activity 4 Modifying the Base Ten Bank (cont.)



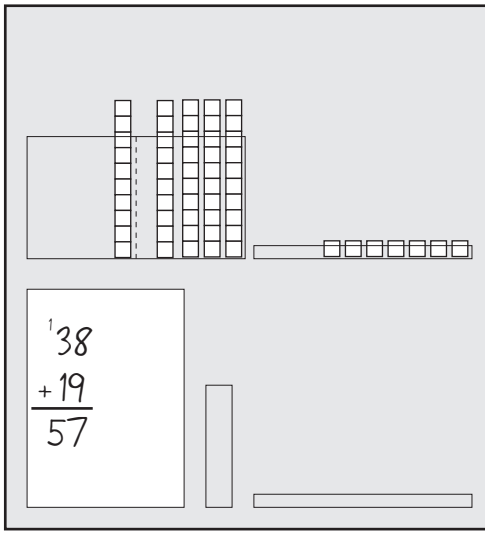
Step 1: Set up the problem



Step 2: Add the 1's



Step 3: Regroup if necessary



Step 4: Find the total

Over the course of the month, have students use their own base 10 pieces, sketches, and numbers to practice the regrouping strategy.

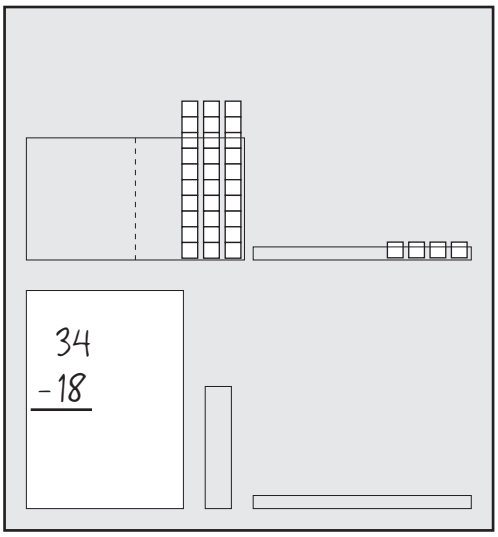
Do your students need to be completely proficient with the regrouping strategy for addition by the end of the school year, or do they just need to understand it and be able to explain how it works? If the goal is complete proficiency, you will need to provide practice several times a week during Number Corner, as well as giving students short problem sets during seatwork and/or homework throughout the entire spring.

April Base Ten Bank

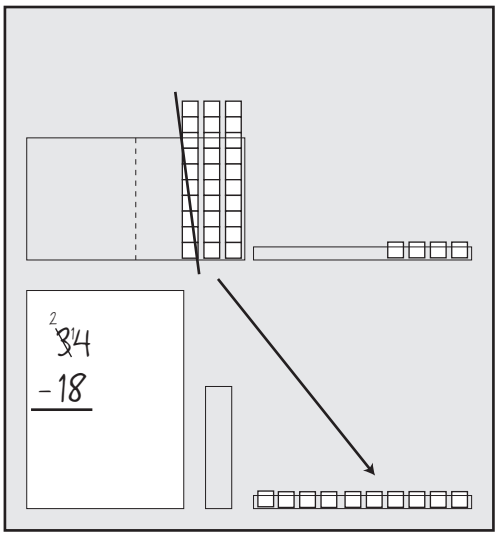
Begin with an empty Base Ten Bank pocket chart. Roll two dice numbered 10, 10, 20, 20, 30, 40, along with one die numbered 1–6. Set up that quantity with base 10 pieces in the Bank Ten Bank pocket chart. Then roll two dice numbered 4–9, or some other combination of dice that seems reasonable to generate a subtrahend. Do a couple of subtraction problems generated in this way each day, clearing out the pocket chart between each problem. Solicit students' invented strategies for the first several days of the

Activity 4 Modifying the Base Ten Bank (cont.)

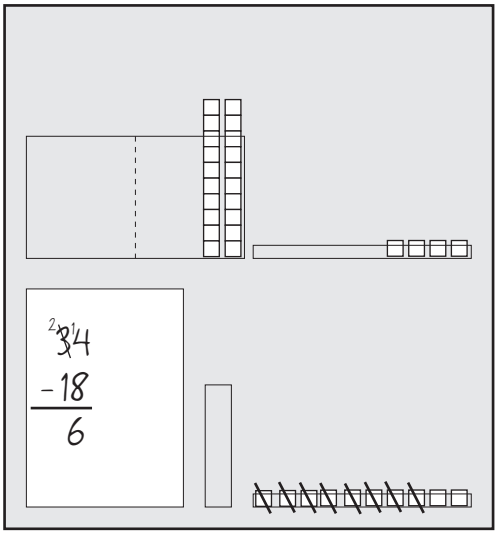
month, and then either model a regrouping strategy for subtraction as described by a student, or volunteer it yourself, as another option. One way of handling this on the Base Ten Bank pocket chart is shown below.



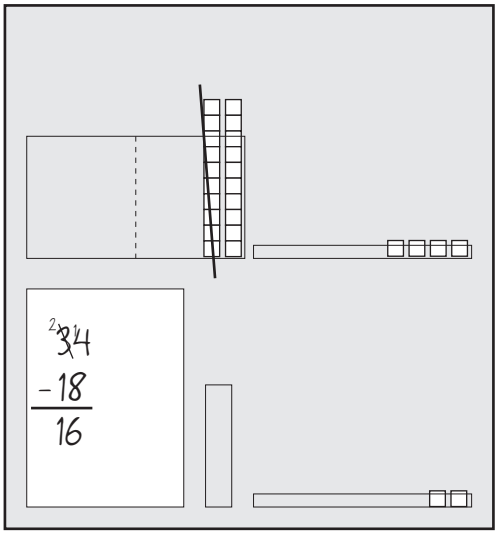
Step 1: Set up the problem



Step 2: Regroup if necessary



Step 3: Subtract the 1's



Step 4: Subtract the 10's

Over the course of the month, have students use their own base 10 pieces, sketches, and numbers to practice this strategy. It is important that students understand how and why the strategy works, and that you allow the children to continue using the base 10 pieces to perform the regrouping or "trading" for as long as they're needed. We find that unless students model the process of regrouping, using this strategy may compromise their sense of place value because they tend to think about the digits in isolation instead of thinking about tens and ones.

May Base Ten Bank

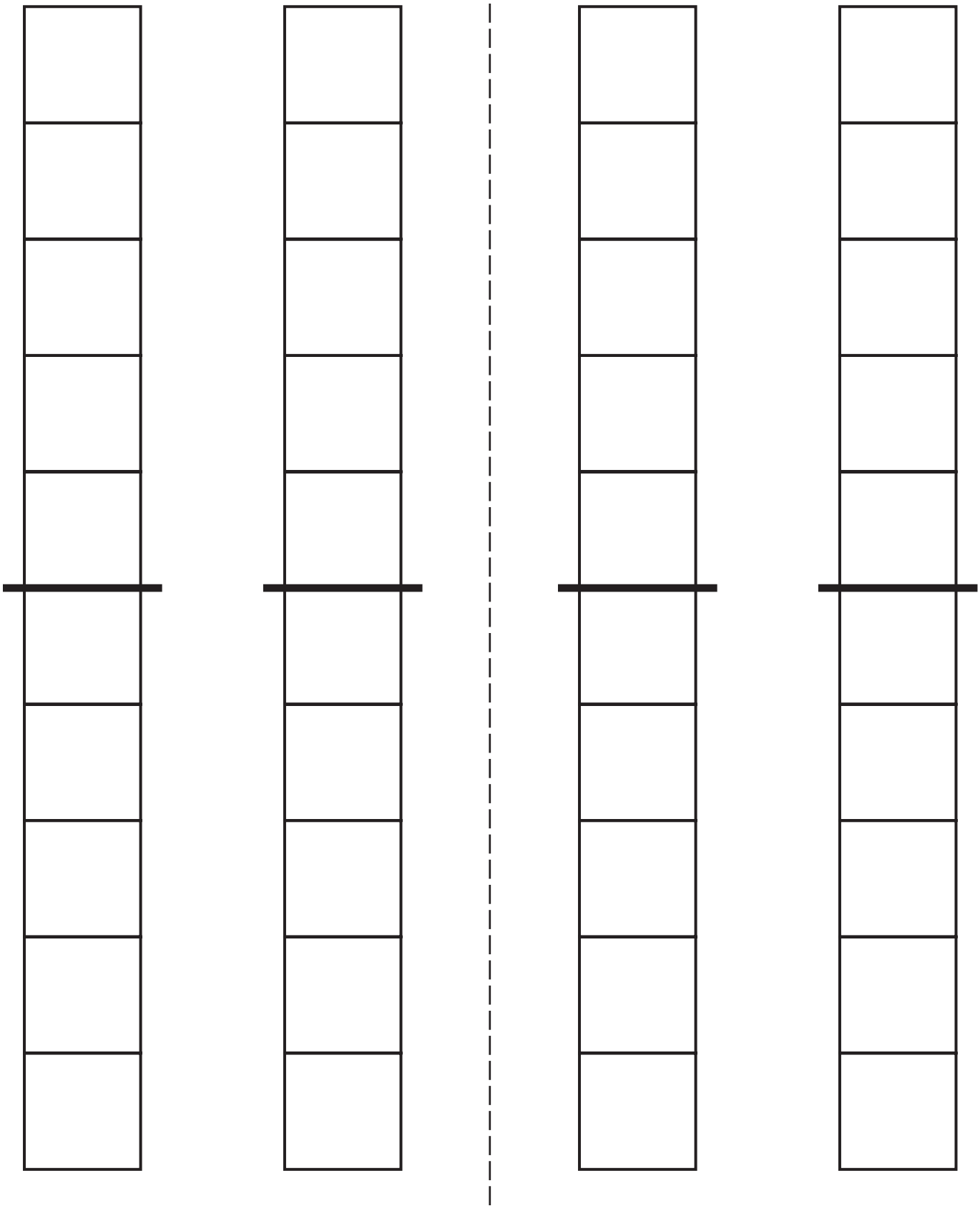
Use the Base Ten Bank pocket chart to pose and solve several 3-digit addition and subtraction problems each week. Solicit student-invented strategies, but use the opportunity to keep working on the regroup-

Activity 4 Modifying the Base Ten Bank (cont.)

ing strategies you have introduced as well. You may want to have your class develop a list of multi-digit addition strategies and another of multi-digit subtraction strategies, including the regrouping strategies. Students can then be asked every so often to evaluate which strategies are most effective to handle the numbers involved in a particular problem. For instance, they might decide that starting with the 1s and regrouping is best for a problem like 589 + 327 but adding the tens and then the ones is more efficient for a problem like 53 + 29.

> ***Dontrelle*** *On 53 + 29, I like to go 3 + 9 is 12, move the ten over so it's 50 + 20 + 10. That makes 82 in all.*
>
> ***Sara*** *I think it's easier to just go 50 + 20 is 70 and 3 + 9 is 12. 70 + 12 makes 82. It's the same answer, but I like doing the tens first.*

Base Ten Bank Ten Strips



NAME _____ **DATE** _____

Base Ten Bank Addition

The problem on our Base Ten Bank today is:

	10's	1's
+		

You can use Unifix cubes, base ten pieces, pictures, or numbers to figure out what the answer is. Please show all your work in this box:

NAME _____ **DATE** _____

Base Ten Bank Addition

The problem on our Base Ten Bank today is:

100's	10's	1's
+		

You can use Unifix cubes, base ten pieces, pictures, or numbers to figure out what the answer is. Please show all your work in this box: