Seeing Addition in Two Ways

Grade 3

Activity 314

Relevant Chapters in the *Digi-Block Comprehensive Teacher's Guide:*
Book III: 2-1, Adding with the Number Line, pp.43–48
2-2, Adding with Base Ten Representations, pp.49-53

Overview

Student pairs solve addition problems (sums to 400) in two different ways – using the number line and packing blacks. They compare answers and determine that they get the same results.

Objectives

Thinking Skills:	Students reflect on the process of addition as they solve problems using two different models. They explore the connection between the two views of number (counting and place value) as they represent addends and sums on the number line and with packed blocks.
Mastery Skills:	Students learn to combine addends to make sums < 400. Students compare models for addition and determine that they will result in the same sum.

Materials

Each group of 4 students needs:

- 1 "Number Line" blackline master (copy on heavy paper, if possible)
- Tape and scissors
- Colored markers or pencils
- 1 place value mat with digit cards
- 4 blocks-of-100
- 1 "Seeing Addition" Activity Sheet 1

For closure, each students needs

- 1 "Seeing Addition" Activity Sheet 2

Class Introduction (20 minutes)

Give students experiences using the number line to model sums as described in the Teacher's Guide (pages 45 – 48). Show the problem:

145 + 34

- Ask, Can we use this (0-100) number line to solve the problem? Why not? How do you know the sum will be more than 100?

Tell students they will work together to construct their own longer number line so they will be able to show the sum.

- Organize students in groups of 2 or 4, giving each some tape, scissors, colored pencils, and the Number Line master.
- Have students study the number line master and assemble it.
    - Be sure they note the shaded-unshaded pattern of the tens.
    - Show the 0-50 number line and explain how the hash marks help to know where tens are, just like the shaded parts of their number line.
    - Explain that the shading is really a shortcut so that they don't have to count every single block to find 72. Have students explain this.
    - When taping the line together, they need to be careful to piece some tens together, continuing the pattern.

Have teams determine the final length and discuss how they counted.

- Say, **The shading shows tens. What other important numbers can we identify on the number line?**
- Students will likely count out ten tens to make 100, then 200, 300 and 400. Have them decide how they want to mark the hundreds. They

may use a colored marker or pencil to show each hundred by making an extra long or bold hash mark.

- Students may also suggest folding their number line to approximate where 200 is (by folding it in halves) and where 100 and 300 are (by folding it into fourths).

Say, **Now let's look back at our problem, 145 + 34. How can we use our number line to show the sum?**

- Have students discuss their ideas together and model the problem. Share strategies. Some students may:
    - Count out 1 hundred 4 tens, then 5 ones to locate 145. They may then count 34 (by ones) beyond 145, to reach 179.
    - Choose a more sophisticated "shortcut" such as, count out 1 hundred, 4 tens, then 5 ones. Then count 3 more tens (145 . . . 155, 165, 175) and then add 4 more (175 . . . 176, 177, 178, 179)
    - Count out 1 hundred, 4 tens, then 3 more tens, to find 170, then add 5 ones and 4 more ones with smaller jumps. (140 + 30) + (5 + 4), or 17 tens and 9 ones.
- Have students express their strategies with number sentences or algorithms if they are ready to do so. This activity offers great potential for mathematical discussion of the properties of addition and place value. Students will find that they can add the numbers in a variety of ways and the sum remains the same.

Ask, **What will happen if we use packed blocks instead of a number line to model the problem?** Using the place value mat and digit cards, have students model the same problem.

- Student can see the sum as they combine the blocks. In fact, it feels like a shortcut after having solved the same problem with a number line - and indeed it is!
- Relate the strategies used with the number line to the strategies using a base ten model.

Ask, **What do you notice about the sums? Is it a coincidence that we got the same answer using two different models? Why is it the same?**

Have students model a second problem first using the number line then with the blocks. Discuss students' preferences and advantages/disadvantages of each model.

Student Small Group Activity (20 minutes)

Tell students that they will be doing the problem using one method and then checking their answer using another method.

- Organize the students in teams of 4. Within the team, students work in pairs. Explain the activity, "Seeing Addition in Two Ways:"
- One team member spins the spinner two times to determine the addends of the problem. Pairs record the numbers on their activity sheets.
- One pair of students solves the problem using the number line while the second pair of students solves the same problem by packing blocks. Agree ahead of time which partners will use the number line and which will pack blocks. Have them check the appropriate box on their sheet.
- After modeling the problem, pairs of students within each team compare and discuss their answers.
- Teams repeat the activity one more time, modeling the new problem as they did the first.

Pairs switch materials and model the last 2 problems. Again, have pairs within each team compare answers after each problem is modeled.

Closure (20 minutes)

Have students study their activity sheets. Ask questions, such as:

- **Which model worked better for you? Why?**
- **Did both pairs in your team get the same answer? Why? Did any team get different answers to the same problem? What did you do then?**
- **Which problem was hardest? Easiest? Why?**

After this experience, students begin to appreciate the simplicity of the base ten model, yet also gain some excellent mental math strategies and deepen their understanding of addition as they add hundreds, tens, and ones on the number line.

Assessment

As students are working, observe and note, do they:

- Know how to represent each addend using the number line or packed blocks?
- Combine addends and find the sum with accuracy?
- Shift from model to model with ease and understanding?
- Explain how and why they get the same answers using different models for addition?
- Understand when a base ten model may be easier to use than a number line model and vice versa?

For those students who are ready, have them record their thinking with numbers.

Have students respond to the questions on "Seeing Addition in Two Ways" Activity Sheet 2.

Extension

- Have students identify and label more numbers on their number lines. If they fold their line in half (to show 200), fourths (100, 300), and then again into 8 parts, they will see the 50s. Have students decide how they will mark the 50s. Name a number between 0 and 400 and have students identify it on their number lines as quickly as possible. Ask, **How did the numbers you marked help you find the answer?**

Seeing Addition in Two Ways

Partners:

_____ & _____

Which way will you add?

- ❑ Number Line
- ❑ Packing

1. _____ + _____ = _____

2. _____ + _____ = _____

Which way will you add now?

- ❑ Number Line
- ❑ Packing

3. _____ + _____ = _____

4. _____ + _____ = _____

Seeing Addition in Two Ways

Partners:

_____ & _____

Which way will you add?

- ❑ Number Line
- ❑ Packing

1. _____ + _____ = _____

2. _____ + _____ = _____

Which way will you add now?

- ❑ Number Line
- ❑ Packing

3. _____ + _____ = _____

4. _____ + _____ = _____

Name _____

Seeing Addition In Two Ways

1. Which way of showing addition works better for you?
   - ❑ Number line (Counting Up)
   - ❑ Packing Blocks (Base Ten)

   Why do you prefer it?

   _____

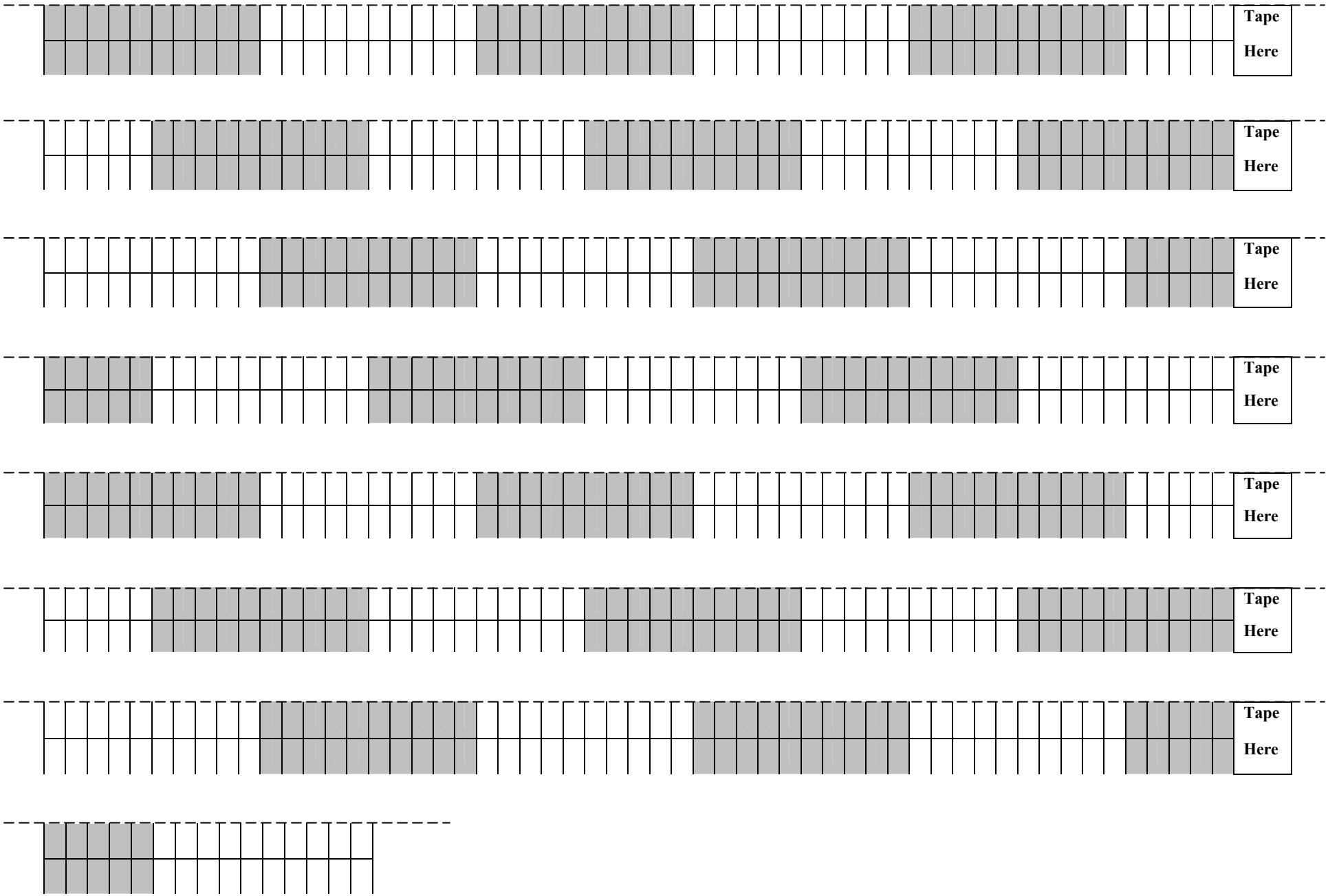
   _____

2. Write a problem that your team solved:

   _____ + _____ = _____

   Show how you solved it in two ways. Use pictures, words, and/or numbers to tell what you did.
   Number Line

   Packing Blocks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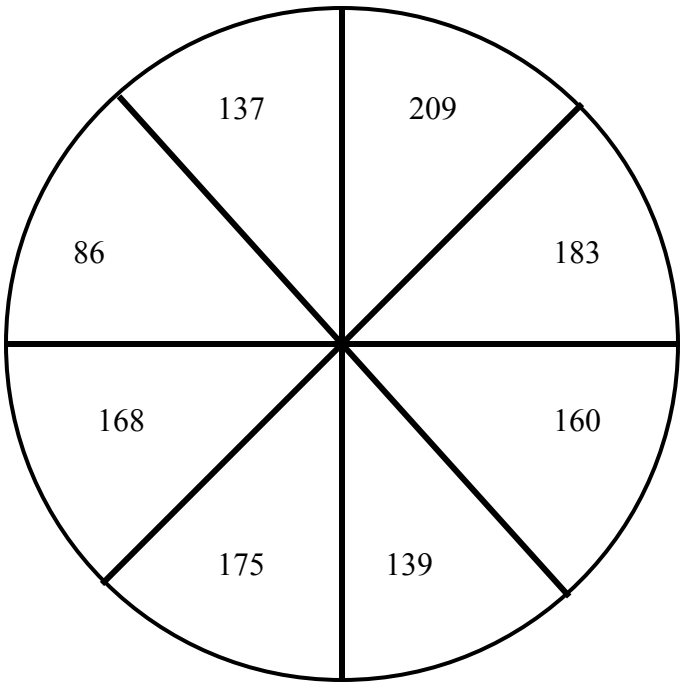
Spinner: Use a paper clip and pencil to make a spinner.



Write Your Own Spinner: Use lines to divide the circle into sections.
Write a number in each section. Use a paper clip and pencil to make a spinner.