From Blocks to Drawings to Numbers

Grade 2

Activity #218

Relevant Chapters in the *Digi-Block Comprehensive Teacher's Guides:*

Book I, 3-3: Exploring Addition with the Larger Blocks, pages 72 - 76
Book II, 3-4: Finding Sums, pages 71 – 75

Overview

Students review modeling addition with blocks. They reflect on the process and develop recording methods by drawing the blocks and writing number sentences and/or an algorithm.

Objectives

Thinking Skills: Students model a problem with blocks then transfer the model to a drawing. They represent the process with numbers by writing number sentences (showing partial sums) as they move towards developing an algorithm.

Mastery Skills: Students learn how to record an addition problem with drawings of blocks and numbers.

Materials

Each group of students needs:

- 9 blocks-of 10 and up to 18 single blocks
- 1 place value mat
- 1 activity sheet

Class Introduction **(20 minutes)**

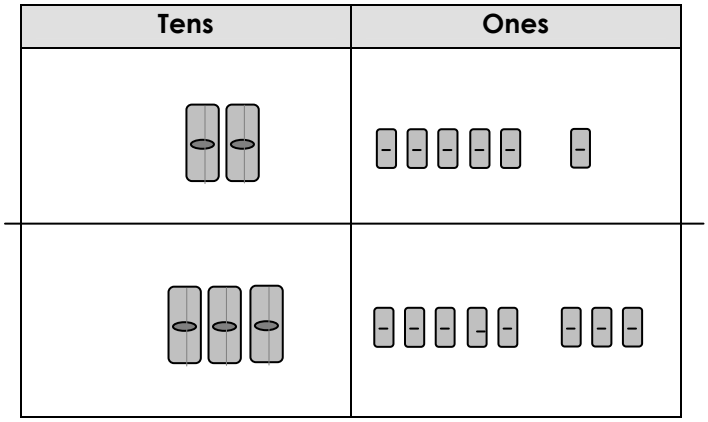
Display a problem, such as:

26 + 38

Explain to the students that they will be thinking about how they can show this problem with blocks, then drawings, and then numbers. Say, **You may not always have the blocks available, so today we will think about ways to record and solve the problem *without* them.**

Have students think about, model, and draw the two addends:

- First, have students think about what the two addends would "look like" before they actually build them. Ask, **How can I show each addend using blocks that are packed as much as possible?** If students correctly name the blocks needed, then they are ready to continue.
- Students may suggest using 26 single blocks and 38 single blocks. This is also a correct way to show the addends, although the blocks are not packed as much as possible. Depending on time and the flexibility of the teacher, consider this counting or linear view as well.
- Have the students model the addends on a place value mat, using a string or dry erase marker line to separate the addends.



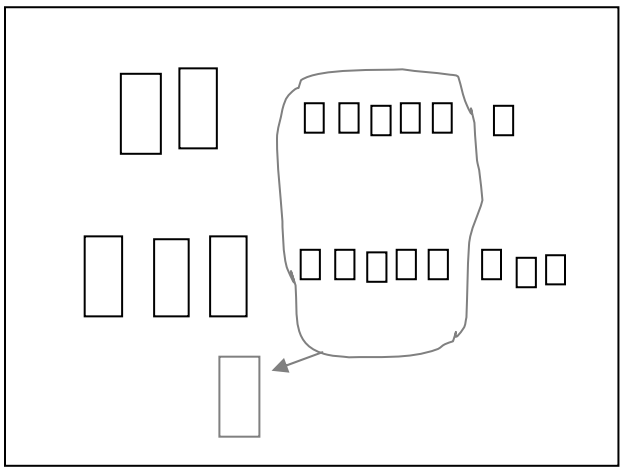
- Ask, **How can we record what we've done with the blocks?** It is likely that students will suggest drawing the blocks.
- Have volunteers demonstrate how they can sketch each addend. Remind students that drawings do not need to be works of art. Their purpose is to represent the problem. The most important feature of their drawing is simply to make the blocks-of-10 larger than the single blocks, so they can be easily distinguished.

Have students **predict** the sum of the two addends and tell how they predicted. Then have students combine their blocks, check their prediction, and record the sum in drawings.

Encourage students to show how they combined 26 and 38. Let them "invent" their own notation (i.e., arrows, loops, etc.) and have them share their drawings.

- Students may loop 10 singles from the addends and draw an arrow to show the "new" block-of-10 in the sum.

Sample Drawing:



Say, **We showed the 26 + 38 by drawing the blocks. Now let's show what we did, our thinking, and how we solved the problem using numbers only.**

- Have students "revisit" the problem and describe how they solved it, step by step. As students describe their thinking, ask, **How can we show *that part* with numbers?** Among many different strategies, students may:
    - Add the blocks-of-10 together first. Write: 20 + 30 = 50. Then they may combine the singles. Write 6 + 8 = 14. They may describe packing the 14 singles to make a ten and 4 singles.

They may add the ten to 50: 50 + 10 = 60, then explain that they have 4 "left:" 60 + 4 = 64

- Add the ones first, as in the traditional model, making a ten and 4 ones. Then they may combine the tens (20 + 30 + 10) to make 60 and add the remaining 4 to make 64.

[NOTE: This is one of the most challenging points in a student's development of a paper/pencil algorithm. It is vital that students see the connection between the blocks, drawings, and numbers. If they do not, then they are not ready to continue without blocks. It is important for students to describe how **they** see the addition process and to be allowed to record it in their own way. Later, when the traditional algorithm is introduced, it will make sense to them because they will have been exposed to different ways that **all** work but may not be as efficient. They will understand what the "1" comes from when they regroup if they have had to wrestle with how to record it themselves!]

When students are ready, present another problem, such as:

38 + 25

Say, **This time, I am going to ask you to solve this problem *without* using the blocks! Draw to show how you would use the blocks to solve this problem. As a special challenge, translate your drawing into numbers.**

- Observe students as they draw each addend, then use their drawing to figure out the sum. Be sure that they somehow represent the regrouping idea. If students get "stuck" and are not sure how to proceed, have them use the blocks to help them.
- Share drawings of the blocks and number recordings (algorithms) to determine the solution to the problem.

Activity **(20 minutes)**

Have students work individually or in pairs. Have them choose 2 or more problems to solve using drawings of the blocks and numbers (or an algorithm).

As students are working, have them describe what they are doing. As they draw the blocks, ask:

- **Can you show me the ___** (addend) **in your drawing?**
- **How did you show that you are combining them?**
- **What does this (point to a part of the picture) show?**
- **What was your answer?**

Some students may not be ready to use a formal algorithm. The objective of this lesson is to give students experiences connecting the addition process with numbers. Ask questions, such as:

- **Tell me how the numbers you wrote match the drawing of the blocks?**
- **What did you do first? Show me how you recorded that with numbers.**
- **What did you do next? How did you show this with numbers?**
- **How did you decide on your answer? Is there a way to check it?**

Closure **(20-30 minutes)**

Display a problem from the activity sheet. Ask, **Who solved this problem?** Have students share and compare their drawings and number sentences or algorithms. This presents a great opportunity for students to learn from one another! Encourage students to ask questions of one other in order to help them clarify their explanations.

- Continue until all problems are discussed.
- If time permits, it may be helpful to make transparencies of several papers so students can more easily see their classmates' work.

Assessment

As students are solving problems, observe and note:
Do they –

- Rely on the blocks to solve the problem or can they use their drawing?
- Represent the problem with drawings?
- Distinguish between problems that need regrouping and those that do not?
- Show the regrouping process?
- Record number sentences that are related to the process?
- Understand the connection between the blocks, their drawing of the blocks, and the numbers they write?

- Rely more on the blocks, their drawing of their blocks, or their numbers for a solution?

The answers to the questions above will indicate next steps for instruction. Provide opportunities for students to practice adding without the blocks and help them move on to an efficient and accurate algorithm when they are ready.

Extension

- Repeat the activity presenting subtraction problems, some involving regrouping and some not.

Name _____

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Directions:

1. Pick two problems from the box to solve.
2. Use blocks to solve each.
3. Draw the blocks to show what you did.
4. Write numbers that show how you got your answer.

25 + 38	42 + 36	54 + 29	34 + 46

Problem: _____

Draw what you did	Use numbers:

Problem: _____

Draw what you did	Use numbers: