Problem Patterns

Grade 3

Activity #324

Relevant Chapters in the *Digi-Block Comprehensive Teacher's Guide:*
   Book III, Unit 2-3: Finding Sums, pages 54 - 58
   Book III, Unit 2-6: Finding Differences, pages 68 - 72

Overview

Students develop a sense of number and operations as they use blocks to identify patterns in sets of problems to name sums.

Objectives

Thinking Skills:	Students describe the relationship of problems in a set and use reasoning to determine sums. They discover properties of addition and develop mental math strategies.
Mastery Skills:	Students learn to predict sums by using patterns identified in related problems. They check predictions with blocks.

Materials

Each pair of students needs:
- Supply of blocks-of-100, blocks-of-10 and single blocks
- "Problem Patterns I" Activity Sheet

Class Introduction   (20 minutes)

Explain to students that they will use blocks to model sets of problems. They will look for patterns in the number sentences to help them develop mental math strategies and to learn about important properties of addition.

Present and discuss the following three sets of problems.

Problem Set #1
- Begin with these problems:
    - 45 + 8 = _____
    - 45 + 18 = _____
- Next, reveal the problems:
    - 45 + 28 = _____
    - 45 + 38 = _____
    - 45 + 48 = _____
- Have students use blocks to show the different sums.
- Ask, **How did you use your blocks to show each problem?** Have students explain that all they needed to do was add a block-of-10 to the second addend as they progressed through the set.
- Ask, **What patterns do you notice in the problems? How are they related? What patterns do you see in the sums? How did the pattern help you find the answer?**
- Help students explain that *as one addend is increased by 10, the sum is increased by 10.* (Record this in students' own words.)
- Ask, **What would be the next problem in the set?** (45 + 48) **Why do you think so?** As a class, extend the pattern and predict each sum. Challenge students to think about larger problems such as:
    - 45 + 58
    - 45 + 68
    - 45 + 78

Problem Set #2
- Have students use their blocks to model:
    - 30 + 58 = _____
- Discuss the sum, 88, or 8 blocks-of-10 and 8 ones.
- Next, show the problems:
    - 29 + 58 = _____
    - 28 + 58 = _____

27 + 58 = _____

- Have students describe the pattern they see in the problems. Record their thinking. For example: *As the first addend decreases by one, the sum decreases by one.*
- Ask students to find the sum of each and explain how they did it.
- Have students describe the pattern in their own words.
- Verify predictions with blocks. Students will notice that they need to regroup as they model the problems in the set. Ask, **Was it easier to use the pattern to name the sum or use the blocks?**
- Have them name the next problem(s) in the set (26 + 58, 25 + 58, . . .) and predict the sum of each.
- Tell students that sometimes a simpler related problem can help them solve a harder one!

Problem Set #3
- Display the final set of problems, beginning with:
    106 + 30 = _____
- Have students determine the sum mentally or with blocks.
- Next, show:
    96 + 40 = _____
    86 + 50 = _____
    76 + 60 = _____
- Have students discuss this problem set. Use questions from the previous examples.
- Students should notice the "taking and giving" a block-of-10 from one addend to the other. They should see that it does not affect the sum! This idea of compensation can be modeled easily with the blocks.
- Have them summarize their ideas. For example: *Taking one block from one addend and putting it with the other addend doesn't change the sum.*
- Have students name the next problem(s) in the set (66 + 70, 56 + 80, . . .) and predict the sum of each.

Activity   **(15 minutes)**

Explain to students that they will continue to identify patterns to help them solve sets of problems. Distribute the "Problem Patterns I" Activity Sheet to pairs of students.

Give students the following directions:
- Look for a pattern in each problem set.
- Use the pattern to predict each sum.
- Extend the pattern for a few more instances.
- Check the problems with blocks.
- Describe the pattern.

Emphasize the following:
- Students need to describe the pattern that they see in the problems.
- They should try to predict the sums first and then use blocks to check their thinking.
- Even though they may solve the problems mentally, the blocks will help them describe what they are doing in their minds, and thus help them describe the pattern!

Early finishers can create and describe a problem set of their own!

Closure   (10 minutes)

Ask students to describe the patterns on the activity sheet. Have them discuss what the patterns are and how they helped predict the sums. As a class, name two or three additional problems to extend each set.

Ask, **Which problems were more difficult/easier to solve? Why?**

If students have written their own sets of problems, allow them to present them to the class.

Assessment

As students are working, observe and note the following. Do they:
- Recognize the pattern in each set?
- Use the pattern to help them name each sum mentally, or do they rely on blocks to determine the answer?
- Describe the pattern accurately?
- Extend the pattern?

Extensions

- Conduct a similar lesson using subtraction problems. Provide students with a copy of the "Problem Patterns II" Activity Sheet.
- For those students who are not ready for the problems presented in this lesson, see the Grade 2 version, Weekly Pack-it #224, and download the related activity sheets.