



# Addition and Subtraction

## Activity Set 5p

### Trainer Guide

# ADDITION AND SUBTRACTION ACTIVITY SET #5P

NGSSS 2.G.5.3  
NGSSS K.A.1.2  
NGSSS K.A.1.3  
NGSSS 1.A.1.3  
NGSSS 1.A.2.1  
NGSSS 1.A.2.3  
NGSSS 2.A.1.3  
NGSSS 2.A.4.1  
NGSSS 3.A.6.1

## Problem Solving

In this activity, participants will add to their knowledge and understanding of students' thinking in solving problems.

### MATERIALS

- *Transparency/Page: Three Problem Types*
- *Transparency/Page: Problem-Solving Strategies*
- *Transparency: Problem-Solving Activity Directions*
- *Transparency/Page: Three Types of Problems*
- *Transparency/Page: Number Concepts*
- *Transparency/Page: Typical Strategies for Addition and Subtraction*
- 6–7 sheets of chart paper (1 per group)

TIME: 25–30 minutes

Three Problem Types

Make a line from each sample question to the corresponding problem type.

There are many teams at the Game Day celebration.  
Eight teams play basketball, and 6 teams play soccer.

How many teams are at the Game Day celebration?	comparison
How many more teams are playing basketball than soccer?	change to less
If 2 teams drop out of basketball, how many teams are still playing basketball?	part-part-whole

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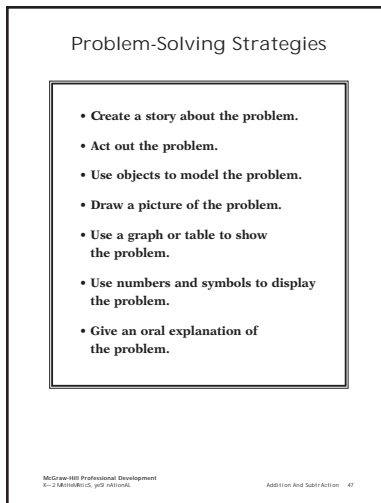
*Transparency: Three Problem Types*

## INTRODUCE

- Display *Transparency: Three Problem Types*.
- Explain that, on the transparency, one situation, the Game Day celebration, is used to present three story problems that represent each of the three addition and subtraction problem types. Point out that the problem type names and the sample questions are mixed up.
- Ask participants to find their *Three Problem Types* page and draw a line from each sample question to its corresponding problem type.
- Give participants a few minutes to draw the lines.

# ADDITION AND SUBTRACTION ACTIVITY SET #5P

- Ask a volunteer to name the problem type for: “How many teams are at the Game Day celebration?” (part–part–whole)
- Ask another volunteer to name the problem type for: “How many more teams are playing basketball than soccer?” (comparison)
- Ask another volunteer to name the problem type for: “If 2 teams drop out of basketball, how many teams are still playing basketball?” (change to less)



Transparency: Problem-Solving Strategies

## DISCUSS AND DO

- Display *Transparency: Problem-Solving Strategies*.
- Explain that the strategy on the transparency can be used by students to help them solve addition and subtraction problems.
- Have participants refer back to their *Three Problem Types* page. Explain that the group will use these sample questions to review each problem-solving strategy, and describe how each one could be used to solve one of the sample questions.
- Point out that creating a story about a mathematics problem can provide a meaning context to help a student more easily solve that problem. The story about the teams at the Game Day Celebration creates a story and provides a meaningful context that may help the student solve the mathematics problems of  $8 + 6$  and  $8 - 6$ .
- Proceed to the next problem-solving strategy: *Act out the problem*. Ask a volunteer to select one sample question and describe how this strategy could be used. A sample response could be:
  - ◆ Have 8 students come up front and stand in a group to represent the 8 basketball teams at Game Day. Next, have 2 students walk to the back of the room to represent 2 basketball teams dropping out of Game Day, leaving 6 students up front to represent the 6 remaining basketball teams.

## ADDITION AND SUBTRACTION

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- Discuss each remaining problem-solving strategy in a similar fashion. Sample responses include:
- *Use objects to model the problem:*
  - ◆ Have students use 2 colors of linker cubes to represent the basketball teams (in 1 color) and the soccer teams (in the second color). Have students use the cubes to show how many more basketball teams are playing than soccer teams (e.g., build 2 towers).
- *Draw a picture of the problem:*
  - ◆ Have students draw a picture of the teams at Game Day to determine how many teams are at the celebration.
- *Use a graph or table to show the problem:*
  - ◆ Have students fill in a simple bar chart that shows the number of basketball teams and soccer teams. Ask students to use the graph to compare the number of basketball teams and the number of soccer teams to determine how many more basketball teams there are.
- *Use numbers and symbols to display the problem:*
  - ◆ Have students write the corresponding number sentence for each sample question (e.g.,  $8 + 6 = 14$ ,  $8 - 6 = 2$ ).
- *Give an oral explanation of the problem:*
  - ◆ Have students explain in their own words how they determined how many more teams are playing basketball than are playing soccer.
- Point out that more than one of the problem-solving strategies can be used to solve a problem. For example, students may draw a picture of the problem and use numbers and symbols to display the problem.
- Explain that students integrate number concepts and addition and subtraction strategies with these problem-solving strategies as they solve addition and subtraction problems.

# ADDITION AND SUBTRACTION ACTIVITY SET #5P

- Explain to participants that they will complete an activity that will call on them to think of these concepts and skills and how students may use them to solve sample addition and subtraction story problems.
- Display *Transparency: Problem-Solving Activity Directions*. Present the following situation to participants:
  - ◆ There are many animals in the park. There are 7 squirrels and 8 rabbits.
- Discuss the activity directions with the group. Explain that participants will form small groups to complete this activity.
- Tell participants that they may refer to *Page: Number Concepts, Page: Three Types of Problems*, and *Page: Typical Strategies for Addition and Subtraction*, along with *Transparency 47: Problem-Solving Strategies* and *Page 46: Three Problem Types* as they complete this activity.
- Ask participants to form small groups (5–6 per group). Give each group 1 sheet of chart paper. Explain that each group will have a representative summarize its list to the whole group.
- Give groups 10–15 minutes to complete the activity.

Problem-Solving Activity  
Directions

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There are many animals in the park.  
There are 7 squirrels and 8 rabbits.

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On a piece of chart paper:

1. Write a story problem for this situation.
2. List the type of addition problem and subtraction problem that your story represents.
3. List some of the number concepts and addition and subtraction strategies that students will need to complete the problem successfully.
4. Select one or two problem-solving strategies and describe an activity that could be used by students to solve the problem.

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*Transparency: Problem-Solving Activity Directions*

# ADDITION AND SUBTRACTION

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### CONCLUDE

- Get the groups' attention.
- Ask a representative from each group to share the group's story problem (and problem type), list of number concepts and addition and subtraction strategies, and activity that use one or more of the sample problem-solving strategies.
- Explain that providing young students with a variety of different tools, strategies, and activities develops resourcefulness, creative problem solving, and strategizing skills in solving challenging problems.

### End of Problem Solving

- **TEACHING TIP:** If time allows, extend the activity by asking participants to write simple addition and subtraction problems. Suggest that participants avoid problems that require regrouping skills.
- Put the written problems into a container and have each group draw someone else's problem from the container.
- Have each group list the strategies that they would use to solve the problem and demonstrate the readiness skills and problem-solving strategies that they recommend through a problem-solving activity.
- Redisplay *Transparency: Problem-Solving Strategies* to remind participants of the various activities.



# Three Problem Types

Make a line from each sample question to the corresponding problem type.

There are many teams at the Game Day celebration.

Eight teams play basketball, and 6 teams play soccer.

***How many teams are at the Game Day celebration?***

***comparison***

***How many more teams are playing basketball than soccer?***

***change to less***

***If 2 teams drop out of basketball, how many teams are still playing basketball?***

***part-part-whole***

# Problem-Solving Strategies

- **Create a story about the problem.**
- **Act out the problem.**
- **Use objects to model the problem.**
- **Draw a picture of the problem.**
- **Use a graph or table to show the problem.**
- **Use numbers and symbols to display the problem.**
- **Give an oral explanation of the problem.**

# Three Types of Problems

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**1**

Change to More,  
Change to Less

**2**

Part-Part-Whole

**3**

Comparison

# Number Concepts

1. Use one-to-one correspondence when counting objects.

2. Use conservation of number.

3. Break a larger number into smaller parts.

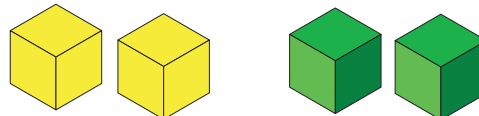
4. Compare for equality, greater than, and less than.

5. Write a number to represent a numerical quantity.

# Typical Strategies for Addition and Subtraction

## Direct Modeling

Use fingers, counters, or base-10 blocks.



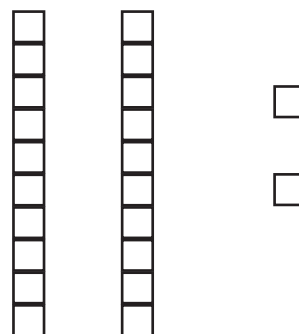
## Counting Strategies

Use counting on, counting back, or use fingers.



## Derived Fact Strategies $4 + 4 = 8$ $4 + 5 = 9$

Use doubles, related facts, or near doubles.



## Grouping Strategies

Combine 10s and 1s, or group friendly numbers.

## Property Strategies $3 + 5 = 5 + 3$

Use commutative, associative, or zero.

$$8 + 4 + 2 = 4 + 8 + 2$$

$$9 + 0 = 9$$

$$12 - 0 = 12$$

## Other Strategies

Use incremental, compensation, student inventions, or combination of strategies.