

# Operations with Signed Integers - Subtraction

## Collecting Data

DIRECTIONS: In this activity, you will be using manipulatives to discover rules for subtracting signed numbers. Often, in order to subtract, you must use an equivalent representation of the number. For example, the number six can be represented as...

$6$

$6 + 3 + (-3)$

$7 + (-1)$

$6 + (-4) + 4$

$-4+10$

Each of these expressions represent 6, but some are in simpler forms than others. Which expressions in this example incorporate the use of the zero rule of addition? Circle them.

In these exercises we will be subtracting. You will notice that the questions ask you to remove certain tiles from the table. This is subtraction.

For each problem in Experiments 1-6, record the results of the problem in the space provided. Your answer should include the number of tiles remaining after the operation is performed, along with the color of the tiles. You may use a Y for yellow and R for red.

### Experiment 1

1. Remove 2 yellow square tiles from 5 yellow square tiles. \_\_\_\_\_
2. Remove 1 yellow square tile from 2 yellow square tiles. \_\_\_\_\_
3. Remove 4 yellow square tiles from 6 yellow square tiles. \_\_\_\_\_
4. Remove 10 yellow square tiles from 15 yellow square tiles. \_\_\_\_\_

### Experiment 2

5. Remove 5 red square tiles from 10 red square tiles. \_\_\_\_\_
6. Remove 3 red square tiles from 9 red square tiles. \_\_\_\_\_
7. Remove 9 red square tiles from 16 red square tiles. \_\_\_\_\_
8. Remove 7 red square tiles from 11 red square tiles. \_\_\_\_\_

### Experiment 3

9. Remove 5 yellow square tiles from 2 yellow square tiles. \_\_\_\_\_
10. Remove 6 yellow square tiles from 2 yellow square tiles. \_\_\_\_\_
11. Remove 4 yellow square tiles from 1 yellow tile. \_\_\_\_\_
12. Remove 10 yellow square tiles from 9 yellow square tiles. \_\_\_\_\_

### Experiment 4

13. Remove 10 red square tiles from 5 red square tiles. \_\_\_\_\_
14. Remove 9 red square tiles from 7 red square tiles. \_\_\_\_\_
15. Remove 6 red square tiles from 3 red square tiles. \_\_\_\_\_
16. Remove 7 red square tiles from 1 red tile. \_\_\_\_\_

## Experiment 5

17. Remove 7 red square tiles from 3 yellow square tiles. \_\_\_\_\_
18. Remove 5 red square tiles from 9 yellow square tiles. \_\_\_\_\_
19. Remove 6 red square tiles from 10 yellow square tiles. \_\_\_\_\_
20. Remove 4 red square tiles from 1 yellow tile. \_\_\_\_\_

## Experiment 6

21. Remove 6 yellow square tiles from 5 red square tiles. \_\_\_\_\_
22. Remove 7 yellow square tiles from 8 red square tiles. \_\_\_\_\_
23. Remove 10 yellow square tiles from 5 red square tiles. \_\_\_\_\_
24. Remove 8 yellow square tiles from 4 red square tiles. \_\_\_\_\_

## Analyzing Data

**DIRECTIONS:** Compare your results with those of the other members of your group. Discuss any problems for which your answers differ. Make sure all the members of your group agree on the answer to each problem and on the process of finding the answer. Then respond to the following questions in your journal.

1. Describe general strategies that were employed to solve the problems in Experiments 3–6.
2. How did the solutions in Experiments 3-6 differ from those in Experiments 1 and 2?
3. How are the problems in Experiments 1–6 similar to the addition problems you solved in Operations with Signed Numbers - Addition?
4. What rule could you create that would help you subtract signed numbers easily?

## Using Symbols to Replace the Tiles

**DIRECTIONS:** Because writing the words "yellow" and "red" is time consuming, symbols for the colors can be used. So that all students in your class will use the same symbols, a red tile will be represented by placing a negative (–) sign in front of a number. The symbol for yellow square tiles will be a positive (+) sign or no sign at all.

Example 1: Three red square tiles will be recorded as (-3).

Example 2: Four yellow square tiles will be recorded as (+4) or (4).

To show different sets of tiles being subtracted, a minus (–) sign is placed between the two numbers representing the tiles. Use an equal (=) sign to separate a problem from its answer.

In the space to the right of each problem in Experiments 1–5, use symbols (+, –, =) to represent each problem and its answer.

Example 3: Remove 2 red square tiles from 5 red square tiles.  $(-5) - (-2) = -3$

## Applying What You Know

DIRECTIONS: Use the rule you created for subtraction in Part 2 to complete the problems below.

1.  $(7 - ) - (+3) = \underline{\hspace{2cm}}$

2.  $(+3) - (-7) = \underline{\hspace{2cm}}$

3.  $(+4) - (+5) = \underline{\hspace{2cm}}$

4.  $(+5) - (+4) = \underline{\hspace{2cm}}$

5.  $(-9) - (-3) = \underline{\hspace{2cm}}$

6.  $(1 - 0) - (1 - 1) = \underline{\hspace{2cm}}$

7.  $(+4) - (-2) = \underline{\hspace{2cm}}$

8.  $(-3) - (+5) = \underline{\hspace{2cm}}$

9.  $(1 - 3) - (+10) = \underline{\hspace{2cm}}$

10.  $(+9) - (-6) = \underline{\hspace{2cm}}$

11. Use a calculator to check your answers to problems 1–10. Discuss errors with other members of your group to discover strategies that will yield correct answers. Record your answers to the following questions in your journal: If you made any errors, what kind did you make? What strategies can you use to avoid making the same kind of mistake in the future?