

# Operations with Signed Integers - Addition

## Collecting Data

DIRECTIONS: Complete Experiments 1–5 using the small yellow and red squares in the algebra tile set.

By addition we mean we are start with a certain amount and add additional tiles to the table. Remember that every pair of a red square tile and a yellow square tile the pair it is called a zero pair. You may remove the pair from the table without affecting the value of the table number. For each problem, record both the number and the color of the tile. You may use a Y for yellow and a R for red.

### Experiment 1:

How many tiles, and what color will the tiles be altogether, if you combined...

1. 3 red square tiles and 5 red square tiles? \_\_\_\_\_
2. 9 red square tiles and 2 red square tiles? \_\_\_\_\_
3. 4 red square tiles and 6 red square tiles? \_\_\_\_\_
4. 8 red square tiles and 5 red square tiles? \_\_\_\_\_

### Experiment 2

How many tiles, and what color will the tiles be altogether, if you combined...

5. 5 yellow square tiles and 5 yellow square tiles? \_\_\_\_\_
6. 6 yellow square tiles and 3 yellow square tiles? \_\_\_\_\_
7. 9 yellow square tiles and 6 yellow square tiles? \_\_\_\_\_
8. 8 yellow square tiles and 4 yellow square tiles? \_\_\_\_\_

### Experiment 3

How many tiles, and what color will the tiles be altogether, if you combined...

9. 7 yellow square tiles and 3 red square tiles? \_\_\_\_\_
10. 7 red square tiles and 9 yellow square tiles? \_\_\_\_\_
11. 6 red square tiles and 10 yellow square tiles? \_\_\_\_\_
12. 4 yellow square tiles and 1 red square tile? \_\_\_\_\_

### Experiment 4

How many tiles, and what color will the tiles be altogether, if you combined...

13. 5 yellow square tiles and 6 red square tiles? \_\_\_\_\_
14. 7 red square tiles and 2 yellow square tiles? \_\_\_\_\_
15. 9 yellow square tiles and 6 red square tiles? \_\_\_\_\_
16. 8 red square tiles and 5 yellow square tiles? \_\_\_\_\_

## Experiment 5

How many tiles, and what color will the tiles be altogether, if you combined...

17. 5 yellow square tiles and 5 red square tiles? \_\_\_\_\_
18. 6 red square tiles and 6 yellow square tiles? \_\_\_\_\_
19. 9 yellow square tiles and 9 red square tiles? \_\_\_\_\_
20. 8 red square tiles and 8 yellow square tiles? \_\_\_\_\_

### Analyzing the Data

DIRECTIONS: Answer each question your journal.

1. What do you notice about the colors used in the problems in Experiment 1? What do you notice about the colors found in the answers?
2. What do you notice about the colors used in the problems in Experiment 2? What do you notice about the colors found in the answers?
3. What do you notice about the colors used in the problems in Experiment 3? What do you notice about the colors found in the answers?
4. What do you notice about the colors used in the problems in Experiment 4? What do you notice about the colors found in the answers?
5. What do you notice about the colors used in the problems in Experiment 5? What do you notice about the colors found in the answers?
6. How do the problems in Experiments 1 and 2 differ from those in Experiments 3, 4, and 5?
7. Describe a pattern that exists between the problems and the answers in Experiments 1 and 2.
8. Describe a pattern that exists between the problems and the answers in Experiments 3 and 4.
9. Why do you think there are no tiles in any of the answers for the problems in Experiment 5?
10. Create a set of rules that would help someone find the total number of tiles for each problem in Experiments 1–5.

### Using Symbols to Replace the Tiles

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

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 that we are beginning with a certain number of tiles and then placing additional tiles on the table, we will use the plus (+) sign between the two different sets of tiles. Use an equals (=) 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: Nine red square tiles and two red square tiles would be recorded as  $(-9) + (-2) = -11$ .

## Applying What You Know

DIRECTIONS: Think about the tiles to find answers for each of the following.

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

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

3.  $(-12) + (8) = \underline{\hspace{2cm}}$

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

5. Based on your knowledge of red and yellow square tiles, create a set of rules that might help you to find sums of integers that would be too large to complete easily with actual tiles. Write the rules you create in your journal.

6. Using only what you know about collecting tiles, determine ONLY THE SIGN of the answer for each of the following. Be able to connect the concept of the tiles to how you determined the sign of the answer.

a.  $4234 + 987 = \underline{\hspace{2cm}}$

c.  $(-1562) + (-222) = \underline{\hspace{2cm}}$

b.  $-981 + (599) = \underline{\hspace{2cm}}$

d.  $96 + (-873) = \underline{\hspace{2cm}}$

7. Based on your knowledge of red and yellow square tiles, determine ONLY THE SIGN for each of the following. Then use a fraction capable calculator to compute each of the problems below. Verify the sign you predicted for the answer.

Problem	Sign You Predict	Sign Shown on Calculator
a. $(-0.4) + (-0.05)$		
b. $3.032 + (-8.123)$		
c. $-12.030 + 16.003$		
d. $0.121 + 2.1021$		
e. $\left(\frac{1}{4}\right) + \left(\frac{5}{6}\right)$		
f. $\left(-\frac{3}{4}\right) + \left(\frac{1}{8}\right)$		
g. $\left(-1\frac{3}{5}\right) + \left(-\frac{3}{4}\right)$		
h. $\left(-\frac{5}{8}\right) + \left(\frac{13}{16}\right)$		

8. Based on your knowledge of red and yellow square tiles, predict ONLY THE SIGN of the answers for each of the problems below.

Problem	Sign You Predict
a. $-9 + 17 + (-18)$	
b. $-10 + (-11) + (-3)$	
c. $14 + 18 + 25$	
d. $-10 + 15 + (10) + (-17)$	
e. $12 + (-16) + (-32) + 4$	
f. $12 + (-4) + 18 + (-8)$	