2.3 The "+/ –" Connection

Addition and subtraction are related to each other in ways that can help you solve problems.

- If you know that $5 + {}^{-}8 = {}^{-}3$, how can this help you find the answer to $5 - 8$?

Examine these two expressions and think about how they are alike and how they are different.

$$A + {}^{-}B \text{ and } A - B$$

Substitute numbers for A and B and carry out the computations.

- What do your computations tell you about the two expressions: $A + {}^{-}B$ and $A - B$?

Think about points in a game like Math Fever. Write a story problem that could be represented by either expression.

As you work on Problem 2.3, look for ways that addition and subtraction are related.

Problem 2.3

Use your ideas about addition and subtraction of integers to explore the relationship between these two operations.

A The chip board in the picture below shows a value of $^{+}5$.

1. There are two possible moves, one addition and one subtraction, that would change the value on the board to $^{+}2$.

a. How would you complete the number sentences to represent each move?

$$^{+}5 + \square = {}^{+}2 \text{ and } {}^{+}5 - \square = {}^{+}2$$

b. Describe how these moves are different on the chip board.

2. **a.** How would you complete the number sentences below to change the value on the board to $^{+}8$?

$$^{+}5 + \square = {}^{+}8 \text{ and } {}^{+}5 - \square = {}^{+}8$$

b. Describe how these moves are different on the chip board.

B **1.** Complete each number sentence.

a. $^{+}5 + {}^{-}4 = {}^{+}5 - \square$

b. $^{+}5 + {}^{+}4 = {}^{+}5 - \square$

c. $^{-}7 + {}^{-}2 = {}^{-}7 - \square$

d. $^{-}7 + {}^{+}2 = {}^{-}7 - \square$

2. What patterns do you see from part (1) that can help you restate any addition problem as an equivalent subtraction problem?

Problem 2.3 continued

C 1. Think about how you can restate a subtraction problem as an addition problem. For example, how can you complete the number sentences below so that each subtraction problem is restated as an addition problem?

   a. $^{+}8 - {}^{+}5 = {}^{+}8 + \square$

   b. $^{+}8 - {}^{-}5 = {}^{+}8 + \square$

   c. $^{-}4 - {}^{+}6 = {}^{-}4 + \square$

   d. $^{-}4 - {}^{-}6 = {}^{-}4 + \square$

2. What patterns do you see from part (1) that can help you restate any subtraction problem as an equivalent addition problem?

D For parts (1)–(8), write an equivalent expression. Then choose one expression from each part, evaluate it, and explain why you chose to use that expression for the calculation.

1. $^{-}5 + {}^{-}5$
2. $^{-}5 - {}^{-}5$
3. $^{+}396 - {}^{-}400$
4. $^{-}75.8 - {}^{-}35.2$
5. $^{-}25.6 + {}^{-}4.4$
6. $^{+}\frac{3}{2} - {}^{+}\frac{1}{4}$
7. $^{+}\frac{5}{8} + {}^{-}\frac{3}{4}$
8. $^{-}3\frac{1}{2} - {}^{+}5$

ACE Homework starts on page 44.