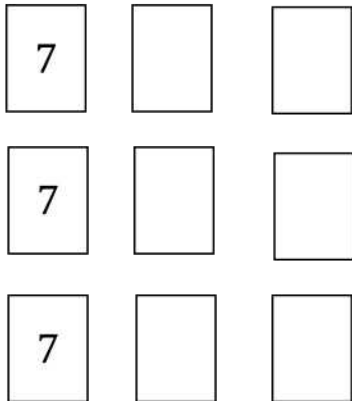


Name \_\_\_\_\_

Date \_\_\_\_\_

## Opposite Quantities Combine to Make Zero

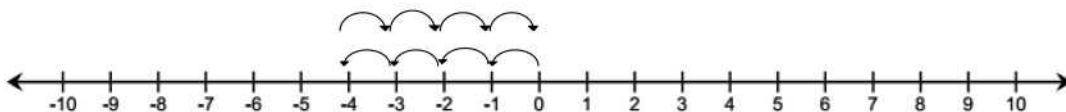
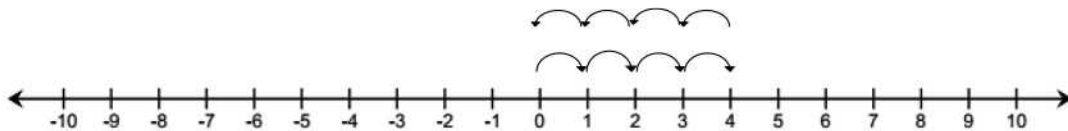
1. Your hand starts with the 7 card. Find three different pairs that would complete your hand and result in a value of zero.



2. Write an equation to model the sum of the situation below.

A hydrogen atom has a zero charge because it has one negatively charged electron and one positively charged proton.

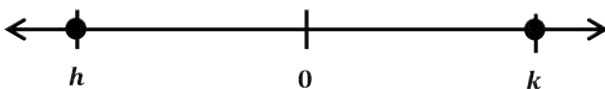
3. Write an equation for each diagram below. How are these equations alike? How are they different? What is it about the diagrams that lead to these similarities and differences?



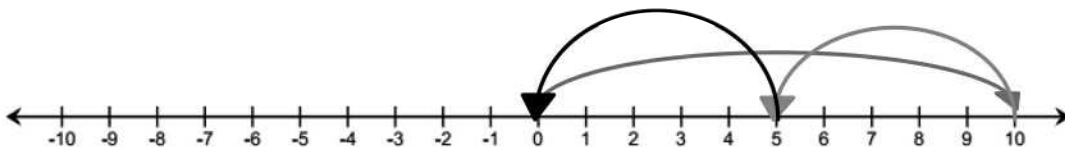
For Problems 1 and 2, refer to the Integer Game.

- You have two cards with a sum of  $(-12)$  in your hand.
  - What two cards could you have?
  - You add two more cards to your hand, but the total sum of the cards remains the same,  $(-12)$ . Give some different examples of two cards you could choose.
- Choose one card value and its additive inverse. Choose from the list below to write a real-world story problem that would model their sum.
  - Elevation: above and below sea level
  - Money: credits and debits, deposits and withdrawals
  - Temperature: above and below 0 degrees
  - Football: loss and gain of yards

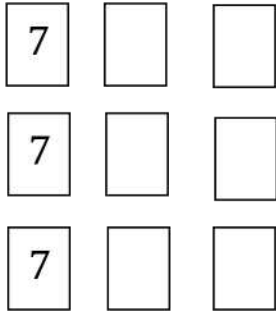
- On the number line below, the numbers  $h$  and  $k$  are the same distance from 0. Write an equation to express the value of  $h + k$ . Explain.



- During a football game, Kevin gained five yards on the first play. Then he lost seven yards on the second play. How many yards does Kevin need on the next play to get the team back to where they were when they started? Show your work.
- Write an addition number sentence that corresponds to the arrows below.



1. Your hand starts with the 7 cards. Find three different pairs that would complete your hand and result in a value of zero.



Answers will vary.  $(-3 \text{ and } -4)$ ,  $(-5 \text{ and } -2)$ ,  $(-10 \text{ and } 3)$

2. Write an equation to model the sum of the situation below.

A hydrogen atom has a zero charge because it has one negatively charged electron and one positively charged proton.

$$(-1) + 1 = 0 \text{ or } 1 + (-1) = 0$$

3. Write an equation for each diagram below. How are these equations alike? How are they different? What is it about the diagrams that lead to these similarities and differences?

Diagram A:

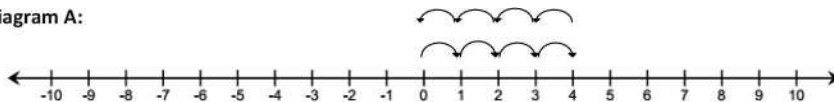
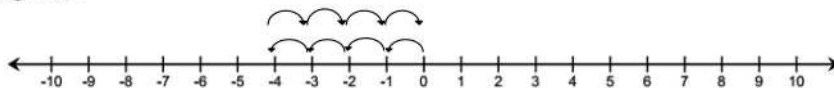


Diagram B:



A:  $4 + (-4) = 0$

B:  $-4 + 4 = 0$

Answers will vary. Both equations are adding 4 and  $-4$ . The order of the numbers is different. The direction of A shows counting up 4, then counting down 4. The direction of B shows counting down 4, then counting up 4.

Students may also mention that both diagrams demonstrate a sum of zero, adding opposites, or adding additive inverses.

The Problem Set will provide practice with real-world situations involving the additive inverse such as temperature and money. Students will also explore more scenarios from the Integer Game to provide a solid foundation for Lesson 2.

For Problems 1 and 2, refer to the Integer Game.

1. You have two cards with a sum of  $(-12)$  in your hand.

a. What two cards could you have?

*Answers will vary.  $(-6$  and  $-6)$*

b. You add two more cards to your hand, but the total sum of the cards remains the same,  $(-12)$ . Give some different examples of two cards you could choose.

*Answers will vary, but numbers must be opposites.  $(-2$  and  $2)$  and  $(4$  and  $-4)$*

2. Choose one card value and its additive inverse. Choose from the list below to write a real-world story problem that would model their sum.

a. Elevation: above and below sea level

*Answers will vary. (A scuba diver is 20 feet below sea level. He had to rise 20 feet in order to get back on the boat.)*

b. Money: credits and debits, deposits and withdrawals

*Answers will vary. (The bank charges a fee of \$5 for replacing a lost debit card. If you make a deposit of \$5, what would be the sum of the fee and the deposit?)*

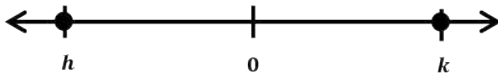
c. Temperature: above and below 0 degrees

*Answers will vary. (The temperature of one room is 5 degrees above 0. The temperature of another room is 5 degrees below zero. What is the sum of both temperatures?)*

d. Football: loss and gain of yards

*Answers will vary. (A football player gained 25 yards on the first play. On the second play, he lost 25 yards. What is his net yardage after both plays?)*

3. On the number line below, the numbers  $h$  and  $k$  are the same distance from 0. Write an equation to express the value of  $h + k$ . Explain.



*$h + k = 0$  because their absolute values are equal, but their directions are opposite.  $k$  is the additive inverse of  $h$ , and  $h$  is the additive inverse of  $k$  because they have a sum of zero.*

4. During a football game, Kevin gained five yards on the first play. Then he lost seven yards on the second play. How many yards does Kevin need on the next play to get the team back to where they were when they started? Show your work.

*He has to gain 2 yards.*

$$5 + (-7) + 2 = 0, \quad 5 + (-7) = -2, \quad \text{and} \quad -2 + 2 = 0.$$

5. Write an addition number sentence that corresponds to the arrows below.

$$10 + (-5) + (-5) = 0.$$

