

## **Title: Integers: Quick, Fun and Easy To Learn**

### **Brief Overview**

Students will identify and understand positive and negative integers. Using this understanding, the students will use the number line, study guides, worksheets, manipulatives and computer technology to perform addition and subtraction of integers. This will give the students the knowledge to extend the whole number system in both directions as well as magnitude.

### **NCTM Content Standard/National Science Education Standard:**

6.0 Knowledge of Number Relationships or Computation  
Apply knowledge of rational numbers and place values.  
Read, write and represent integers from  $-100$  to  $100$ .

### **Grade/Level:**

6th

### **Duration/Length:**

3 days, 45 minute class periods

### **Outcomes:**

Students will:

- Understand the vocabulary as it relates to each activity.
- Understand the number line concept using positive and negative integers with and without counters.
- Order integers using words and symbols to indicate order relations between particular pairs of integers.
- Create real world integer models.
- Be able to perform addition and subtraction of integers using the addition and subtraction of integer rules.

### **Materials and Resources:**

Teacher Resource Sheets  
Student Resource Sheets  
Manipulatives  
Worksheets

## Development/Procedures:

### Lesson 1

**Launch:** Write the word *number line* and display a picture of a number line on the board or overhead projector. Pass out a foldable KWL (see tri-fold book on "How to make a foldable" sheet) chart to be completed by the end of the lesson. Label each column as follows: First column K (what you already know about the number line), second column W (what you want to know about the number line) and L (what you learned about number lines.) Discuss what they already know about a number line and what they want to know after completing the K and W part of the chart.

**Teacher Facilitation:** Teacher will ask students, "How many of you have ever lost money before?" How do you think your loss relates to the number line? Where would you place this information on the number line? How many of you have ever found money? Where do you think you would place this information on a number line? Can you think of other words to show a loss or a gain? Teacher will list the words. Teacher will introduce the objective (understanding positive and negative integers) using the vocabulary words related to the lesson. (number line, integers, positive integers, negative integers, absolute value.) A number line should be drawn on the board to help explain the vocabulary words. Explain that the absolute value is the distance a number is from 0 even if it is a negative number, the absolute value will always be positive. For example, the absolute value of -10 is +10 and the absolute value of +10 is +10.

Present a real world model (see Teacher/Student Resource Sheet). using the idea of the negative direction as heading west and the positive direction as heading east with the student's home at the position 0. For example, if a student walks 3 blocks east to the playground and 6 blocks west to the library, they will be at position -3. Show this on the number line using arrows.

Display a thermometer. See Teacher/Student Resource Sheet. Brainstorm with the students to discuss how a thermometer is similar to a number line.

**Student Application-** Students will complete worksheet #1 to assess knowledge of words indicate positive and negative integers by writing integers with the correct symbols.

**Embedded Assessment-** Teacher will assess student's knowledge by completing the L (learned) part of the KWL chart and analyzing their responses by discussing the KWL chart.

**Reteaching/Extension-** Students who did not master the concept will continue to review a variety of words and symbols that indicate positive and negative numbers using the Reteaching#1 worksheet. Those students, who have mastered the skill, will create real- world integer models with directions, using a number line and a thermometer . Students will then explain in words their understanding of positive and negative integers.

## Lesson 2

**Preassessment:** Review what students have learned about the number line in yesterday's lesson. Students may review the KWL chart that they filled in from the previous lesson.

**Launch-** Today' s lesson will be using the number line and manipulatives to add integers.

**Teacher Facilitation** – Review vocabulary words from yesterday and introduce the new word for today- *zero pairs* using the number line. Teacher will model examples of zero pairs. Hand out positive and negative counters (Student Resource Sheet #1) which you or the students have precut. Teacher will introduce addition of integers using counters. Write the problem  $-11 + (+4)$  on the board. Have the students place 11 negative counters and 4 positive counters on their desks. Tell them to match up the zero pairs and remove them. What is left? (7 negative counters). Now have them add the integers  $-4 + (-3)$ . Put 4 negative counters on their desks and add 3 more negative counters. Now you have 7 negative counters.. Explain the rules of addition.

1. When adding positive and negative integers and the signs are the same, (both positive or both negative) add the absolute values (the distance both integers are from 0) and use that same sign. Ex.  $-3 + -7 = -10$ ,  $+3 + 8 = 11$ . Teacher should model examples of absolute values and show how the absolute value sign is used.  $|5| = 5$   $|-5| = 5$ .
2. When adding integers, and the signs are different, you have a battle between both signs. The sign with the largest number will win. In other words, subtract the absolute values and use the sign of the number with the larger absolute value. Ex.  $-11 + (+4) = -7$   $12 + (-5) = 7$
3. Teacher will introduce addition of integers using a number line. (Teacher draws a number line on board or overhead projector. Give an example of an addition of integers problem Ex.  $4 + (-3)$ . Start at 0. Move in the positive direction of the first number (4 spaces) and put a point on the number line at that spot. Move in the negative

direction of the second number  $-3$ . Put another point at that spot on the number line. Where did you end up?  $+1$ . \*When you are counting, always remember to include the 0.

**Student Application:** Use counters to solve the problems on worksheet #2.

**Embedded Assessment** – Teacher will observe the students as they model the processes.

**Reteaching:** Students will review addition of integers using Reteaching Sheet #2 and receive small group instruction based on individual needs.  
Extension: Students will create their own problems involving addition of integers. (With answers!) See two- tab book foldable.

### Lesson 3

**Preassessment:** Teacher will ask the students what they learned about addition of integers. Give an addition of integers problem. Ask students to solve the problem using numbers and write the rule used to get the answer.

**Launch:** Today we are going to subtract integers using the subtraction rules, the number line, positive and negative counters and zero pairs. Remember, zero pairs are positive and negative integers used as helpers together to assist in the subtraction of integers.

**Teacher Facilitation:** There is a new vocabulary word today- *additive inverse* -What do you think it means? Teachers will then explain that an additive inverse is just the opposite of an integer. Example: The additive inverse of  $+1$  is  $-1$ . The additive inverse of  $-25$  is  $+25$ . If you add the additive inverse, you will always get 0. The rule for subtraction of integers is: To subtract an integer, add it's additive inverse (what is being subtracted), or change the subtraction sign and all other signs after that to it's opposite (additive inverse) and follow the rules for addition of integers because it is now an addition problem.

For example:

Problem:  $+8 - (-3)$  ( positive 8 minus negative three)  
Solution:  $+8 + (+3) = 11$

Problem:  $-17 - (+4)$   
Solution:  $-17 + (-4) = -21$

Teacher will now model subtraction problems on the overhead or board using counters to show the additive inverse.

Example:  $-7-3$

Place 7 negative counters on the table. Remove 3 positive counters. (There are none to remove) Add 3 zero pairs to the set. Now you can remove 3 positive counters. How many are left?  $(-4)$ .

Now practice subtracting integers on the number line  
Labeling the negative and positive directions.

**Student Application:** Teacher will hand out the worksheet for subtraction of integers (Student Worksheet #3 and counters.

**Embedded Assessment:** Teacher will monitor the student's knowledge of subtraction of integers using the additive inverse, as they model the processes presented.

**Reteaching:** Students will review subtracting of integers using Reteaching Worksheet #3 and receive small group instruction based on individual needs.

Extension: Students will create their own problems involving subtraction of integers using a foldable of their choice.  
(With answers!) Students will explain in writing the process of subtraction of integers.

**Summative Assessment:**

Given several examples, students will show their understanding of positive and negative integers by justifying why their answers are correct, in numbers and words.  
(Summative Assessment Worksheet)

**Authors:**

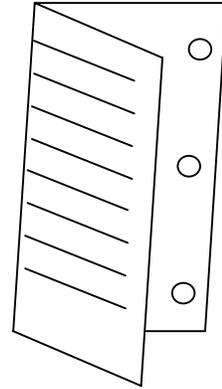
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## HOW TO MAKE A FOLDABLE

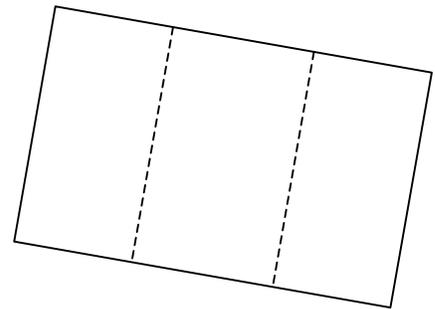
### VOCABULARY BOOK

1. Fold a sheet of notebook paper in half like a hot dog.  
(Lengthwise)
2. On one side, cut every third line. This usually results in 10 tabs.
3. Label the tabs.



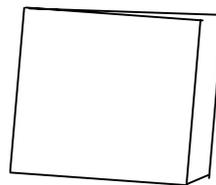
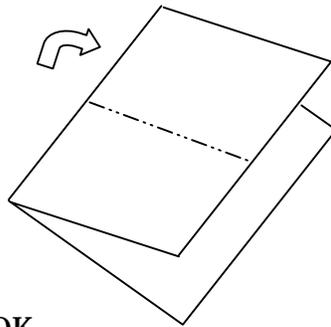
### TRIFOLD BOOK

1. Fold a sheet of  $8\frac{1}{2}$  x 11 inch paper into thirds.
2. Use this book to make charts with 3 columns  
Or rows.



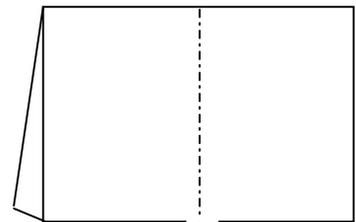
### FOLDED BOOK

1. Make a half book. Fold a sheet of  $8\frac{1}{2}$  x 11 inch paper in half like a hot dog.
2. Fold it in half again, like a hamburger.



### TWO-TAB BOOK

1. Take a folded book and cut up the valley of the inside toward the mountain top. This forms two tabs.



From Dinah Zike's Teaching Mathematics with Foldables, Glencoe McGraw Hill

## RULES FOR ADDITION AND SUBTRACTION OF INTEGERS

### ADDITION

1. When adding integers and the signs are the same, (both positive or both negative) add the absolute values and use the same sign. Ex.  $-4 + -8 = -12$   
 $3 + 9 = 12$
2. When adding integers and the signs are different, subtract the absolute values and use the sign of the number with the larger absolute value. Ex.  
 $-11 + (+4) = -7$       $12 + (-6) = 6$

### SUBTRACTION

1. To subtract an integer, add its opposite.

## VOCABULARY WORDS

Integer - The whole numbers and their opposites.

Ex. .... -5 -4, -3, -2, -1, 0, 1, 2, 3, 4, 5...

negative integers      positive integers

Positive integer- An integer that is greater than zero.

Negative integer -An integer that is less than zero.

Number line – a line that goes into infinity in both directions

Absolute value -The distance a number is from zero on a number line.

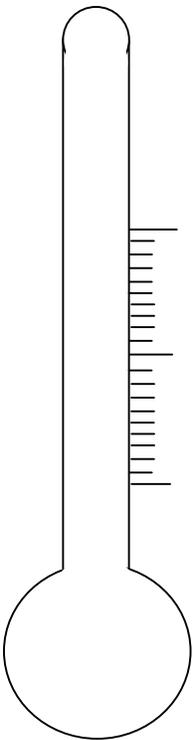
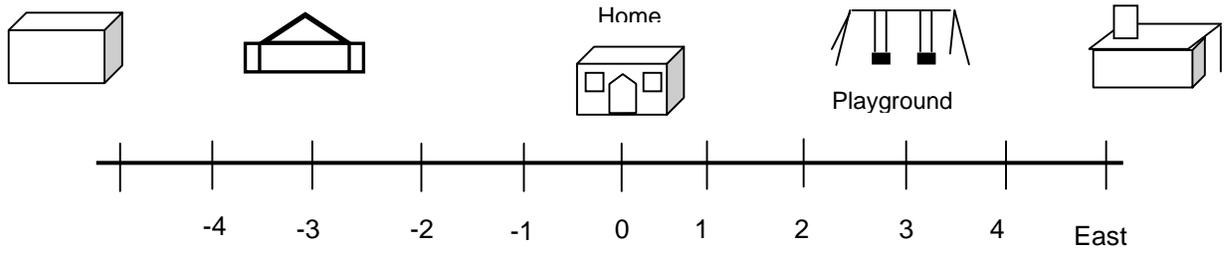
< less than

> greater than

Zero pairs- A positive integer and a negative integer

Graph- The process of placing a point on a number line at its proper location.

Additive inverse- The opposite of an integer. The sum of an integer and its additive inverse is zero. Ex.  $-5 + 5 = 0$



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## WORKSHEET #2

### WORKSHEET FOR ADDITION OF INTEGERS WITH COUNTERS

USE COUNTERS TO FIND EACH SUM. DRAW A PICTURE OF YOUR ANSWER.

1.  $5 + 6$

2.  $-3 + (-5)$

3.  $-6 + 5$

4.  $3 + (-6)$

5.  $-4 + 10$

6.  $-2 + 7$

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WORKSHEET #3

WORKSHEET FOR SUBTRACTION OF INTEGERS

Subtract using your counters. Draw the answers.

1.  $5 - 2$

2.  $6 - (-7)$

3.  $-15 - 6$

4.  $13 - (-12)$

5.  $-16 - 14$

6.  $10 - (-20)$

Subtract using a number line. Draw the number line and show your work.

7.  $-3 - 8$

8.  $8 - 13$

9.  $0 - 12$

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## WORKSHEET #1

### WORKSHEET FOR INTEGERS AND ABSOLUTE VALUE

Write an integer for each situation.

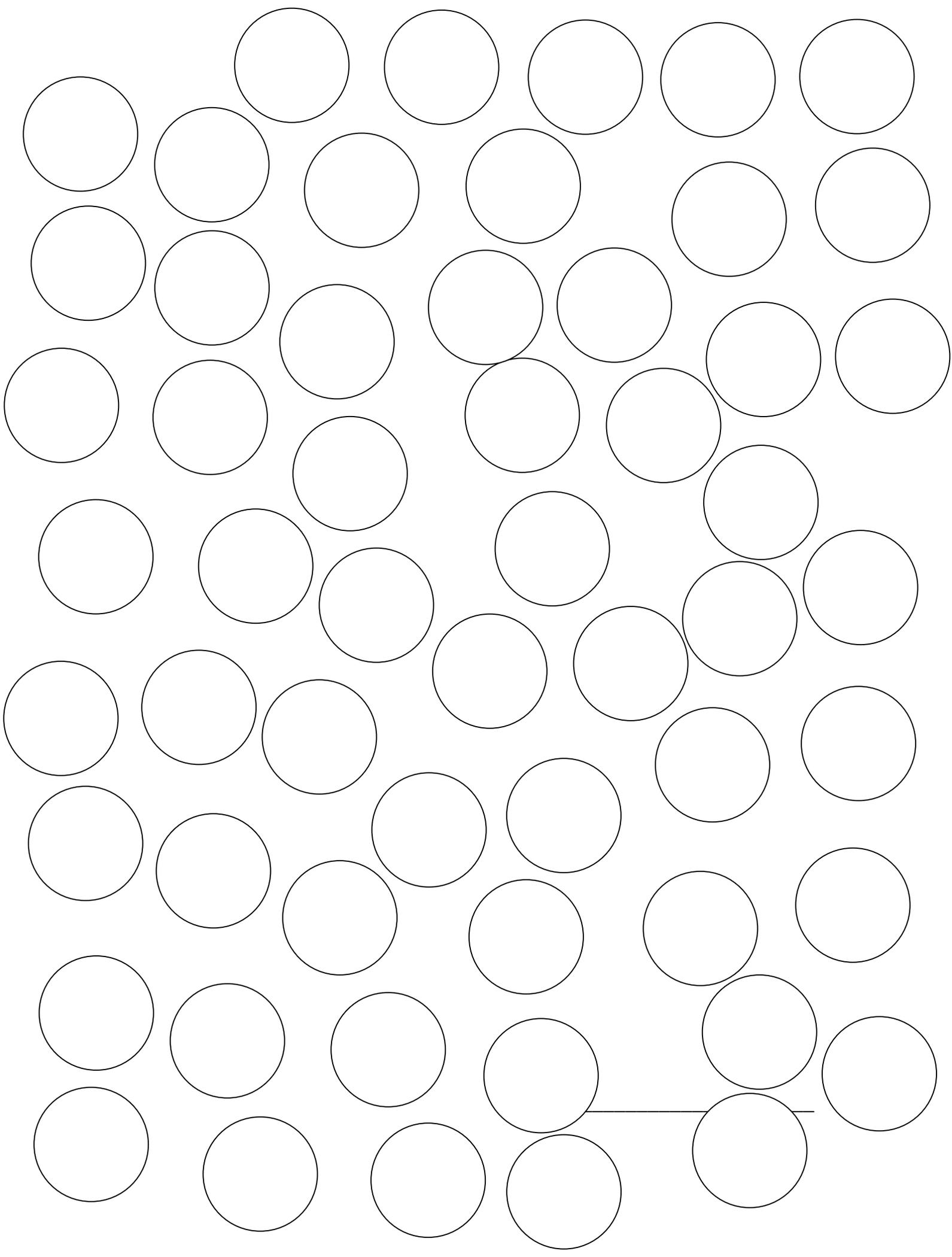
1.  $25^{\circ}$  C below 0      2. a profit of \$27      3. 2043 A. D.

4. 439 feet above sea level      5. a withdrawal of \$368      6. a bonus of \$25

7. 210 B.C.      8. going up 6 stairs      9. loss of 25 pounds

Evaluate each expression.

10.  $|-1|$       11.  $|9|$       12.  $|-107|$       13.  $|-8| + |-2|$       14.  $|0|$



## RETEACHING WORKSHEET #1

### WORKSHEET FOR INTEGERS AND ABSOLUTE VALUE

Write an integer for each situation.

1. loss of 82 pounds                      2. a bonus of \$200                      3. 342 B.C.

4. 630 feet above sea level                      5. 39 degrees Celsius below 0

6. a profit of \$845                      7. 2004 A.D.                      8. going up 12 stairs

9. a withdrawal of \$940

Evaluate each expression.

10.  $|-5|$     11.  $|12|$     12.  $|672|$     13.  $|-12|+|-6|$     14.  $|10|$

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## RETEACHING WORKSHEET #2

### RETEACHING WORKSHEET FOR ADDITION OF INTEGERS WITH COUNTERS

USE COUNTERS TO FIND EACH SUM. DRAW A PICTURE OF YOUR ANSWER.

1.  $8 + 5$

2.  $-6 + (-2)$

3.  $-3 + 7$

4.  $5 + (-9)$

5.  $-8 + 7$

6.  $-4 + 3$

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**RETEACHING WORKSHEET #3**

**RETEACHING WORKSHEET FOR SUBTRACTION OF INTEGERS**

Subtract using your counters. Draw the answers.

1.  $8 - 4$

2.  $9 - (-2)$

3.  $-12 - (-3)$

4.  $14 - (-9)$

5.  $-15 - (-10)$

6.  $12 - (-17)$

Subtract using a number line. Draw the number line and show your work.

7.  $-6 - (-8)$

8.  $12 - 14$

9.  $0 - (-7)$

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### SUMMATIVE ASSESSMENT

1. Draw a number line. Show the problem  $-7 + 2$ . Be sure to label and use arrows for directions.
2. Draw a number line. Show the problem  $-8 - 2$ . Be sure to label and use arrows for directions.

WRITE AN INTEGER FOR EACH SITUATION.

3. A gain of 8 yards
4. 45 feet below sea level
5.  $-3 + 8$
6.  $12 + (-19)$
7.  $-3 - 8$
8.  $-7 - (-20)$
9. What are zero pairs?
10. What is an additive inverse?
11. What are the rules for adding integers?
12. What are the rules for subtracting integers?