

Today's Date

6A

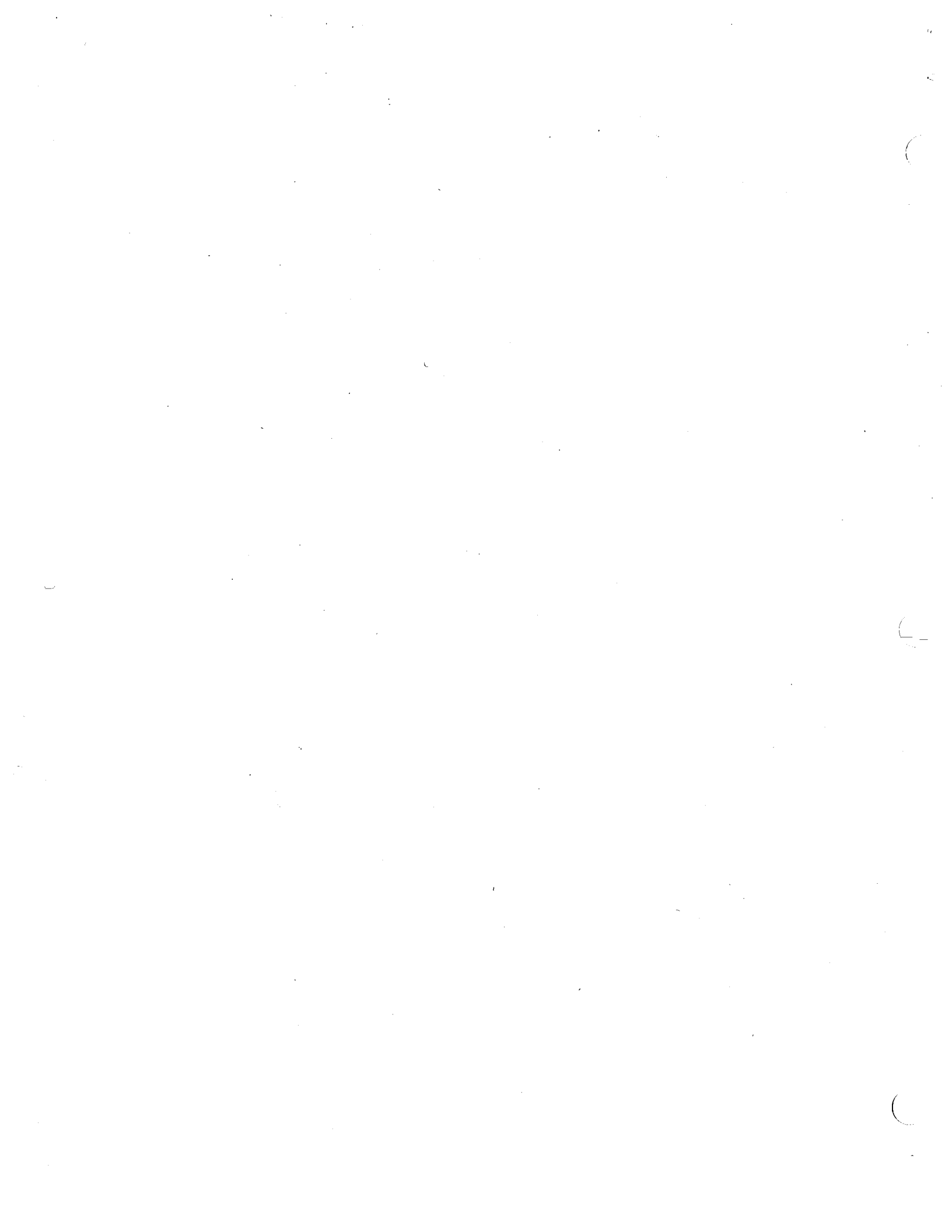
NO

6B

DO

6C

AW



# Inquiry Lab

## Integers



**HOW** can positive and negative values be represented?



**Content Standards**  
6.NS.5, 6.NS.6,  
6.NS.6c



**Mathematical Practices**  
1, 3, 4

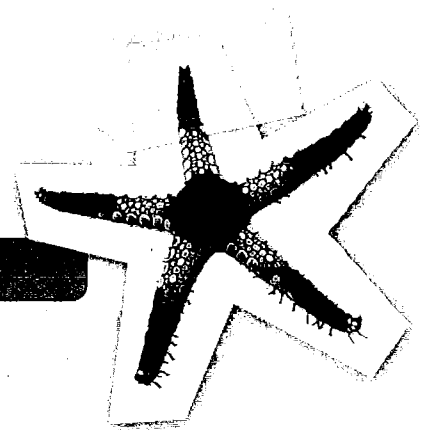
In coastal regions, some animals live above sea level and other animals live in the ocean. A sea star can be found at an ocean depth of two feet. How can you represent an ocean depth of two feet?

What do you know? \_\_\_\_\_

\_\_\_\_\_

What do you need to find? \_\_\_\_\_

\_\_\_\_\_

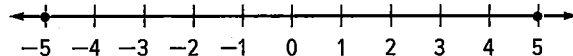


### Hands-On Activity

Sea level can be represented with the number 0.

To represent a location above sea level, use a positive number. A positive number can be written with or without a positive sign, such as 5 or +5.

To represent a location below sea level, use a negative number. A negative number is written with a negative sign, such as -5.



**Write a number to represent an ocean depth of two feet.**

#### Step 1

Determine if a positive sign or a negative sign should be used.

Since the location is below, or less than, sea level, use a

\_\_\_\_\_ sign.

#### Step 2

Determine which number to use.

Use the number  to represent two feet.

So, the number  represents an ocean depth of two feet.



## Investigate

Work with a partner. Write the correct number to represent each location in relationship to sea level. The first one is done for you. Then draw a number line to represent each number.

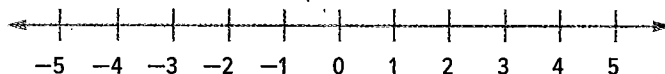
Show your work.

|    | Animal       | Elevation (ft) | Above or Below Sea Level | Number |
|----|--------------|----------------|--------------------------|--------|
|    | Fiddler Crab | 3              | above sea level          | +3     |
| 1. | Eagle's Nest | 75             | above sea level          |        |
| 2. | Dolphin      | 10             | below sea level          |        |
| 3. | Spider Crab  | 375            | below sea level          |        |
| 4. | Blue Heron   | 4              | above sea level          |        |



## Analyze and Reflect

5. **MP Reason Inductively** What negative number is the same distance from 0 as the number +4? Explain. Graph both numbers on the number line below.




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## Create

6. **MP Model with Mathematics** Write about a real-world situation that can be described using the number  $-6$ . Describe what the number 0 would represent in the situation. What would the number 6 represent?

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7. **HOW** can positive and negative values be represented?

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# Lesson 1

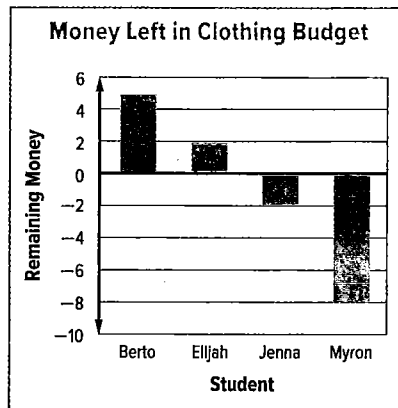
# Integers and Graphing



## Real-World Link



**Money** The bar graph shows the amount of money remaining in the clothing budgets of four students at the end of one month. A value of  $-\$2$  means that someone overspent the budget and owes his or her parents 2 dollars.



### Essential Question

HOW are integers and absolute value used in real-world situations?

Vocab



### Vocabulary

integer  
negative integer  
positive integer



### Common Core State Standards

**Content Standards**  
6.NS.5, 6.NS.6, 6.NS.6a,  
6.NS.6c

**MP Mathematical Practices**  
1, 3, 4, 5, 7

1. What number represents owing 8 dollars?
2. What number represents having 5 dollars left?
3. Who has the most money left? Who owes the most? Explain.

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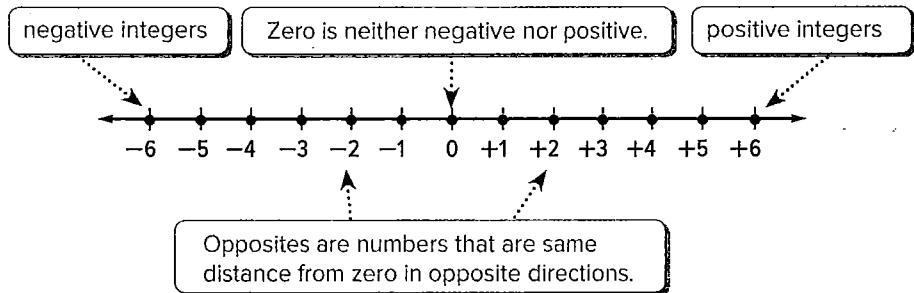
Which **MP** Mathematical Practices did you use?  
Shade the circle(s) that applies.

- |  |   |
|--|---|
| <input type="checkbox"/> ① Persevere with Problems | <input type="checkbox"/> ⑤ Use Math Tools         |
| <input type="checkbox"/> ② Reason Abstractly       | <input type="checkbox"/> ⑥ Attend to Precision    |
| <input type="checkbox"/> ③ Construct an Argument   | <input type="checkbox"/> ⑦ Make Use of Structure  |
| <input type="checkbox"/> ④ Model with Mathematics  | <input type="checkbox"/> ⑧ Use Repeated Reasoning |



# Use Integers to Represent Data

Positive whole numbers, their opposites, and zero are called **integers**. To represent data that are less than a 0, you can use **negative integers**. A negative integer is written with a  $-$  sign. Data that are greater than zero are represented by **positive integers**.



## Examples



Write an integer for each situation. Explain the meaning of zero in each situation.

- 1. a 10-yard loss**

Because it represents a loss, the integer is  $-10$ . In football, the integer 0 represents no yards lost or no yards gained.

- 2. 4 inches of rain above normal**

Because it represents above, the integer is 4. In this situation, the integer 0 represents the normal amount of rain.

- 3. a \$48 deposit into a savings account**

Because it represents an increase, the integer is .

In this situation, the integer 0 represents \_\_\_\_\_

Show your work.

### Got it? Do these problems to find out.

Write an integer for each situation. Explain the meaning of zero in each situation.

- a. a gain of \$2 a share

- b. 10 degrees below zero

### Zero

The number zero can have different meanings based on real-world context. Sometimes zero represents an amount that does not change. Zero can also be used to represent real-world ideas, such as sea level.

a. \_\_\_\_\_

b. \_\_\_\_\_

# Graph Integers

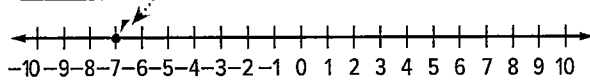
Integers and sets of integers can be graphed on a horizontal or vertical number line. To graph a point on the number line, draw a point on the number line at its location. A set of integers is written using braces, such as  $\{2, -9, 0\}$ .

## Examples

Tutor

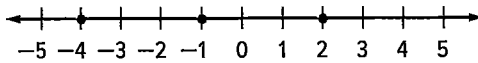
### 4. Graph $-7$ on a number line.

Draw a number line. Then draw a dot at the location that represents  $-7$ .



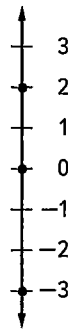
### 5. Graph the set of integers $\{-4, 2, -1\}$ on a number line.

Draw a number line. Then draw a dot at the location of each integer.



### 6. Graph the set of integers $\{0, 2, -3\}$ on a number line.

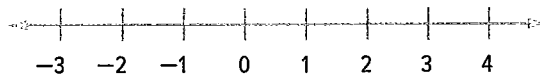
Draw a number line. Then draw a dot at the location of each integer.



### Got it? Do these problems to find out.

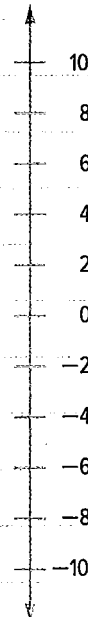
Graph each set of integers on a number line.

c.  $\{-3, 0, -2, 4\}$



d.  $\{8, -6, -9, 5\}$

Show your work.



d.



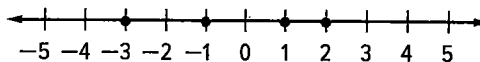
### Example

Tutor



7. Alaina and her dad played golf on four different days. The data set  $\{-1, +1, -3, +2\}$  shows Alaina's scores in relation to par. Graph the scores. Explain the meaning of zero in this situation.

Draw a number line. Then draw a dot at the location of each golf score.



The integer 0 represents par.

## Guided Practice

Check



Write an integer for each situation. Explain the meaning of zero in each situation. (Examples 1–3)

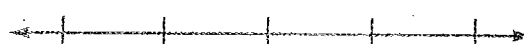
- 15-yard gain \_\_\_\_\_
- loss of 2 hours \_\_\_\_\_

Graph each integer or set of integers on a number line. (Examples 4–6)

3.  $-2$



4.  $\{-1, 1, 0\}$



5. The data set  $\{+5, 0, -15, +20\}$  shows the number of points Delaney scored on each hand of a card game. Graph the scores. Explain the meaning of zero in this situation. (Example 7)



6.  **Building on the Essential Question** How can you use integers to represent data?

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### Rate Yourself!

How confident are you about integers and graphing? Check the box that applies.



For more help, go online to access a Personal Tutor.

Tutor





# Independent Practice

Go online for Step-by-Step Solutions



Write an integer for each situation. Explain the meaning of zero in each situation. (Examples 1–3)

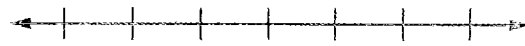
1. 3 miles below sea level \_\_\_\_\_
2. earning \$45 \_\_\_\_\_
3. moving back 5 spaces on a game board \_\_\_\_\_

Graph each integer or set of integers on a number line. (Examples 4–6)

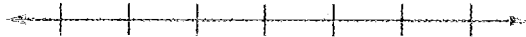
4.  $-5$



5.  $\{2, -3, 0, 1\}$



6. The data set  $\{+4, -1, -2, 0\}$  shows a change in number of state representatives for four states after the last census. Graph the change in number of representatives. Explain the meaning of zero in this situation. (Example 7)

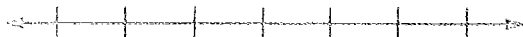


7. **MP Use Math Tools** The table shows the record low temperatures for several states. Graph the temperatures on a number line.



| Record Low Temperature by State (°F) |     |     |     |     |
|--------------------------------------|-----|-----|-----|-----|
| AL                                   | AK  | CT  | NJ  | VA  |
| -27                                  | -29 | -32 | -34 | -30 |

8. **MP Use Math Tools** The table shows the number of points earned for each action in a video game. While playing the video game, Kevin fell in water, jumped over a rock, touched a cactus and climbed a mountain. Graph the number of points he earned for each action on the number line.



| Action                 | Points |
|------------------------|--------|
| fall in water          | -10    |
| walk over a bridge     | +5     |
| climb mountain         | +10    |
| jump over rock         | +5     |
| walk through quicksand | -15    |
| touch cactus           | -15    |

9. **MP Model with Mathematics** Complete the graphic organizer by writing words or symbols used to represent positive and negative integers.

| Positive Integer | Negative Integer |
|------------------|------------------|
| <br><br><br><br> | <br><br><br><br> |



### H.O.T. Problems Higher Order Thinking

10. **MP Persevere with Problems** A football team receives the ball on their own 10 yard line.

a. They make a gain of 15 yards in the first play. What yard line is the ball on?

\_\_\_\_\_

b. What represents zero in this situation? Explain.

\_\_\_\_\_

11. **MP Justify Conclusions** The temperature outside is  $15^{\circ}\text{F}$ . If the temperature drops  $20^{\circ}$ , will the outside temperature be represented by a positive or negative integer? Explain your reasoning.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

12. **MP Identify Structure** Describe the characteristics of each set of numbers that make up the set of integers.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

13. **MP Reason Inductively** Explain how to find the distance between  $-2$  and  $3$  on a number line.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# CREATE A NUMBER LINE

Step 1: Cut out 5 blue squares and label them negative 1-5.

Step 2: Cut out 5 red squares and label them 1-5.

Step 3: Take 1 yellow square and label it 0

Step 4: Glue each square on the number line in the correct order starting at -5 and ending with 5

Step 5: Now cut out 2 blue stars. Glue each on 2 different numbers that are both 3 units from zero.

Step 6: Now cut out 2 red stars. Glue each on 2 different numbers that are both 5 units from zero.

Step 7: Cut out and glue a silver star on the number that is neither negative nor positive.

Step 8: Mark one more set of opposite numbers with the 2 green stars.





