Grade Level/Course: Grade 6

Lesson/Unit Plan Name: Understanding Integers and Rational Numbers, and their purpose in real life situations

Rationale/Lesson Abstract: The students will be able to place integers on a number line and state what zero represents.

Timeframe: 1 hour

Common Core Standard(s):

➢ 6.NS.5 – Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g. temperature above/below zero, elevation above/below sea level, credits and debits, positive and negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.

➢ 6.NS.6a – Recognize opposite signs of a numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g. –(-3) = 3, and 0 is its own opposite.

Instructional Resources/Materials:
- Math Notebooks
- Pencils
- Paper

Activity/Lesson:

Ask the students what is an integer? Give them a couple of minutes to discuss in their groups what they think integers are. Write down their responses and then show or tell them the definition of an integer.

What is an integer? An **integer** is a whole number (not a fractional number) that can be positive, negative, or zero.

Am I an integer?

1) 5 (yes)
2) -15 (yes)
3) 2.5 (no)
4) -95 (yes)
5) -4.75 (no)
6) $\frac{2}{5}$ (no)

For each problem ask the students why it is or is not an integer? Also, ask what they think the most common mistake people make about integers.

Then ask students what they think a rational number is.

Rational numbers sound like they should be very sensible numbers. In fact, they are. Rational numbers are simply numbers that can be written as fractions or ratios (this tells you where the term <u>ratio</u>nal comes from).

Am I a Rational Number?

7) 5 (yes)
8) -15 (yes)
9) 2.5 (yes)
10) -95 (yes)
11) -4.75 (yes)
12) $\frac{2}{5}$ (yes)

What is the difference between a rational number and an integer?

An integer is only whole numbers (positive and negative), where a rational number can contain fractions and decimals (positive and negative)

Then ask why do we need to study integers and rational numbers? Why are they important?

Besides the obvious, that it is a standard and the state says we need to learn about them, integers and rational numbers are used in everyday life. What are some examples in everyday life that we use integers and rational numbers, both positive and negative?

Responses may vary, but should include: *temperature, money in the bank (debit and credit), elevation.*

People use integers and rational numbers every day when talking about the weather, bank accounts or budgets, and elevation. Before we can study about these daily occurrences we need to talk about what integers and rational numbers looks like.

Let's start with opposites.

We started learning about opposites when we were in preschool. The opposite of big is small, rough is smooth, winner is loser. The list goes on forever. What is the opposite of 5? Most students will say negative 5, but how does that look? How can we represent that number?

It can be represented with a negative sign as in -5 or –(5). In both cases, you have the opposite of 5 which is negative 5. Using a number line we can graph 5 by starting at 0 and going five spaces to the right. The opposite of this would be starting at 0 and moving 5 spaces to the left or -5.
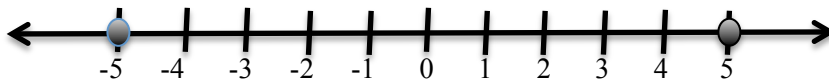
You Try:

Write the opposite of each of the following numbers.

1)   6
2)   -10.5
3)   –(15)
4)   –(-20)

Solutions:

1) -6
2) 10.5
3) -15
4) 20 *with this problem the problem is asking for the opposite of -20, which is 20.*

It is important for students to recognize that $-(-x)$ means the opposite of a negative number *x*.

I Do

Let's say we are watching a National Weather Station in January, and they are talking about temperatures in California and Wisconsin. It is a cold day for both locations. In California the temperature is 45 degrees, and Wisconsin the temperature is -5 degrees. Graph these temperatures on a number line and explain what 0 represents.
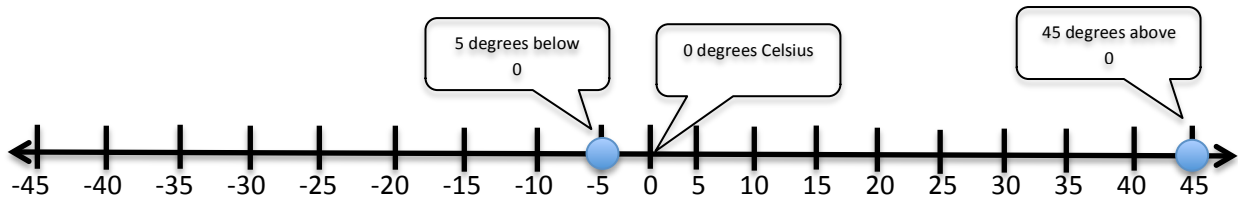
On this graph 0 degrees is the freezing point of water in Celsius.

We Do

At the beginning of the month Lisa had $450 in her bank account. At the end of the month, she realized she over spent and had -$50 in her account. Graph the money that Lisa had in her account on a number line, and explain what 0 represents.
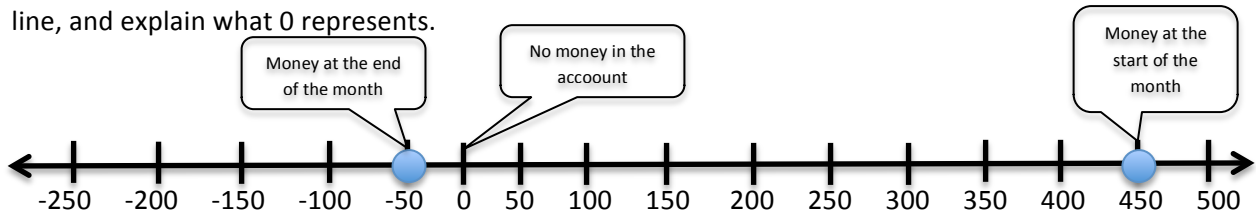
On this graph 0 represents the point where Lisa didn't have any money in her account.

You Do

A bird was on a cliff 50 feet above sea level. He dove 20 feet into the ocean to get a fish for dinner. Graph the bird's flight on a number line, and explain what 0 represents.
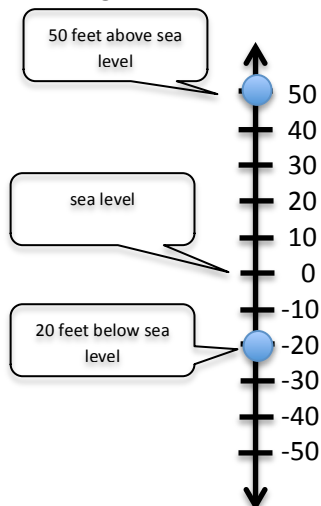
On this graph 0 represents sea level.

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Activity/Lesson continued:

Extra Practice:

State if each number listed is an integer, and explain your thinking:

1) 15 _____

2) 25.5 _____

3) 0 _____

4) 175 _____

5) 0.55 _____

Write the opposite of each number. Graph both numbers.

6) 9 _____

7) $-(12)$ _____

8) 0 _____

9) $-(-6)$ _____

10) 5 _____

Graph each situation and state what 0 represents. (Draw the graphs on the back)

11) At 10:00 it was 20 degrees, by 3:00 the temperature had dropped to -5 degrees.

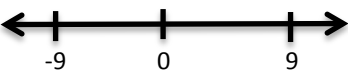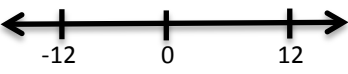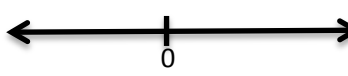12) A bird sat on a cliff 40 feet above sea level. He dove 10 feet below sea level to catch a fish.
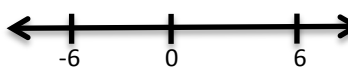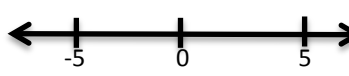
13) Marcy's bank account was $-15. She deposited $40.

Extra Practice Answers:

State if each number listed is an integer, and explain your thinking:

14) 15   Yes, because it is a whole number.

15) 25.5   No, because it is not a whole number, it is a decimal.

16) 0   Yes, because 0 is a whole number.

17) 175   Yes, because it is a whole number.

18) 0.55   No, because it is not a whole number, it is a decimal.

Write the opposite of each number. Graph both numbers.

19) 9   -9
                   -9   0   9

20) – (12)   -12
                   -12 0   12

21)   0   0   (0 is its own opposite)
                   0

22) – (-6)   6
                   -6   0   6
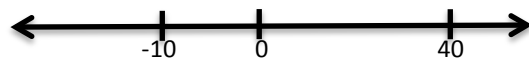
23) 5   -5
                   -5   0   5

Graph each situation and state what 0 represents. (Draw the graphs on the back)

24) At 10:00 it was 20 degrees, by 3:00 the temperature had dropped to -5 degrees.

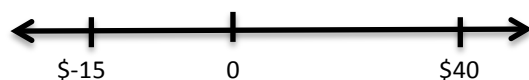   -5   0   20
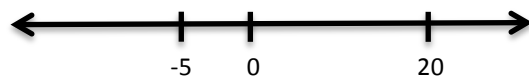
Zero is 0 degrees Celsius.

25) A bird sat on a cliff 40 feet above sea level. He dove 10 feet below sea level to catch a fish.

       -10   0   40

Zero represents sea level.

26) Marcy's bank account was $-15. She deposited $40.

     $-15   0 $40

Zero represents $0 in her bank account.

Warm-up

Claims: 6.RP.3a

The table shows a relationship between the number of tennis balls that fit into a given number of cans.

Cans	Balls
1	
4	12
13	
15	45

Fill in the missing values to complete the table.

Review: 6.NS.1

$$\frac{1}{4} \div \frac{1}{8}$$

Solve using at least two different methods.

x

Review: 6.NS.2

Divide: $16{,}536 \div 24$

6.NS.5

Write the opposite of each number.

1) 15

2) -25

3) -2.5

4) 750

Warm-up

Claims: 6.RP.3a

The table shows a relationship between the number of tennis balls that fit into a given number of cans.

Cans	Balls
1	*3*
4	12
13	*39*
15	45

Fill in the missing values to complete the table.

Review: 6.NS.1

$$\frac{1}{4} \div \frac{1}{8}$$

Solve using at least two different methods.

Traditional	Divide Across	Common Denominator
$\frac{1}{4} \div \frac{1}{8}$	$\frac{1}{4} \div \frac{1}{8}$	$= \frac{1}{4} \div \frac{1}{8}$
$= \frac{1}{4} \cdot \frac{8}{1}$	$= \frac{1 \div 1}{4 \div 8}$	$= \frac{1}{4}\left(\frac{2}{2}\right) \div \frac{1}{8}$
$= \frac{8}{4}$	$= \frac{1}{\frac{4}{8}}$	$= \frac{2}{8} \div \frac{1}{8}$
$= 2$	$= \frac{1}{\frac{4}{8}}\left(\frac{\frac{8}{4}}{\frac{8}{4}}\right)$	$= \frac{2}{1}$
	$= \frac{\frac{8}{4}}{1}$	$= 2$
	$= \frac{8}{4}$	
	$= 2$	

Review: 6.NS.2

Divide: 16,536 ÷ 24

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        6 8 9
   24 ⟌16536
     - 144
       213
     - 192
       216
      -216
         0
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6.NS.5

Write the opposite of each number.

1)   15   *-15*

2)   -25   *25*

3)   -2.5   *2.5*

4)   250   *-250*

Exit Ticket

The weather in Juno Alaska was 16 degrees at 1:00 in the afternoon. By 6:00 it had dropped to -15 degrees. Plot these points on a number line, and state what 0 represents.

Exit Ticket

The weather in Juno Alaska was 16 degrees at 1:00 in the afternoon. By 6:00 it had dropped to -15 degrees. Plot these points on a number line, and state what 0 represents.
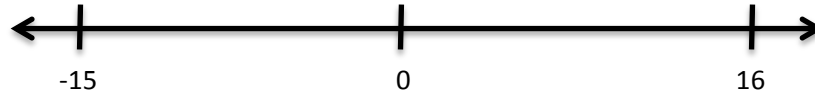
Exit Ticket Answer

The weather in Juno Alaska was 16 degrees at 1:00 in the afternoon. By 6:00 it had dropped to -15 degrees. Plot these points on a number line, and state what 0 represents.

Zero represents 0 degrees Celsius.