

## Lesson 10.1 Assignment

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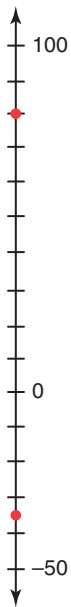
### What, Me Negative? Introduction to Negative Integers

Use the scenario to answer each question.

Roller coasters have a rich history in the United States, and engineers are constantly working to make the next “best” ride. Although technology, such as steel, has allowed coasters to become higher and faster, many riders still appreciate the experience of a wooden coaster. One newer trend is a hybrid coaster that uses both steel and wood. One such hybrid coaster, the Ravine Flyer II, also takes advantage of terrain to make the ride more exciting. Although the Ravine Flyer II is only 80 feet high, it follows the line of a cliff in order to drop to  $-35$  feet (0 represents ground level).

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1. Plot the highest and lowest points of the roller coaster on the number line shown.



- a. Explain why a vertical number line better represents the problem context than a horizontal number line.

**A vertical number line better represents the problem context than a horizontal number line because the problem deals with height above and below ground level.**

- b. How many total feet does the roller coaster drop?

**The roller coaster drops a total of 115 feet.**

2. The Monster is a roller coaster that uses a similar design to the Ravine Flyer II. The Ravine Flyer II has a height of 80 feet and drops to  $-35$  feet. The Monster reaches a height of 120 feet, but then drops to  $-25$  feet. Order the highest and lowest points of the two roller coasters from least to greatest.

$-35, -25, 80, 120$

3. An amusement park wants a company to design a coaster that rises 60 feet above ground then drops the same distance below ground through a tunnel. Represent the underground depth with an integer, and explain its relationship with the above ground height.

The depth underground would be represented by  $-60$ . This integer is the opposite of 60, the above ground height.

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## Lesson 10.2 Assignment

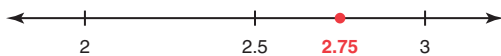
NAME \_\_\_\_\_ DATE \_\_\_\_\_

### Number Sets Number Systems

Nadine is doing research on the tundra for her science class. She collects facts about the region for her report.

- Write all the sets of numbers to which each value belongs.
  - The tundra covers about  $\frac{1}{5}$  of Earth's surface.  
**rational numbers**
  - The average annual temperature is  $-18^\circ$  Fahrenheit.  
**rational numbers, integers**
  - There are 48 varieties of land mammals found in the tundra region.  
**rational numbers, integers, whole numbers, natural numbers**
  - The permafrost is a layer of frozen soil that is located below Earth's surface at  $-1476$  feet.  
**rational numbers, integers**
  - During the summer months, the low temperature averages about  $37.4^\circ\text{F}$ .  
**rational numbers**
- Nadine collects data about some of the animals that live in the tundra. Determine a rational number between each pair of rational numbers.

- Adult male polar bears measure 2.5 to 3 meters tall.



**Answers will vary.**

- Newborn polar bear cubs' weights range from  $\frac{3}{8}$  to  $\frac{1}{2}$  kilograms.



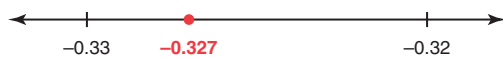
**Answers will vary.**

- c. The polar bear mother's milk is very rich in calories; anywhere from 0.31 to 0.32 of the milk is composed of fat.



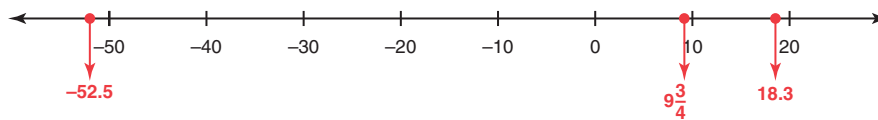
Answers will vary.

- d. The percent of change of the Alaskan polar bear population in the past year was between  $-0.33$  and  $-0.32$ .



Answers will vary.

3. Nadine discovered the following information about the climate. Place each value on the number line.



- The lowest temperature recorded was  $-52.5^\circ$  Celsius.
- The highest temperature recorded was  $+18.3^\circ$  Celsius.
- The amount of precipitation, mostly in the form of snow, averages about  $9\frac{3}{4}$  inches per year.

## Lesson 10.3 Assignment

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### Ordering and Absolute Value Ordering the Rational Numbers

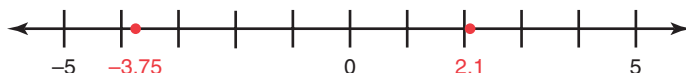
Use the scenario to answer each question.

1. Julio is a wrestler for his high school wrestling team in the winter. Although he does not wrestle in the 12 weeks of summer, his coach would like him to stay around 140 pounds so that he doesn't have to work so hard during the season to stay in his weight class. Julio charted his weight over the summer by listing the differences his weight was from 140 pounds. He uses negative numbers when his weight was under 140 pounds and positive numbers when his weight was above 140 pounds. The chart shows his results.

| Week                | 1    | 2    | 3    | 4    | 5    | 6    | 7     | 8    | 9 | 10   | 11   | 12 |
|---------------------|------|------|------|------|------|------|-------|------|---|------|------|----|
| Weight Differential | +4.5 | +2.1 | -1.5 | -0.5 | -2.5 | +1.5 | -3.75 | -2.8 | 0 | +1.3 | -1.5 | -5 |

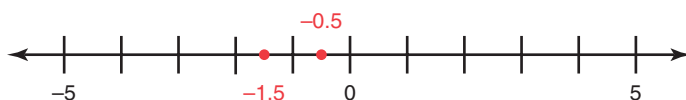
- a. Plot the weight differences from Week 2 and Week 7 on the number line. Then, insert a  $>$ ,  $<$ , or  $=$  symbol to make the number sentence true.

$$2.1 \quad > \quad -3.75$$



- b. Plot the weight difference from week 3 and week 4 on the number line. Then, insert a  $>$ ,  $<$ , or  $=$  symbol to make the number sentence true.

$$-1.5 \quad < \quad -0.5$$



- c. Order all of the weight differences from least to greatest.

$-5, -3.75, -2.8, -2.5, -1.5, -1.5, -0.5, 0, 1.3, 1.5, 2.1, 4.5$

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- d. Was the amount of weight change in week 4 more or less than the amount of weight change in week 8? Insert a  $>$ ,  $<$ , or  $=$  symbol to make the statement true. Explain your answer.

$$|-0.5| \quad \textcircled{<} \quad |-2.8|$$

The amount of weight change in week 4 was less than the amount of weight change in week 8. In week 4 the amount of change was 0.5 pounds, while in week 8 the amount of change was 2.8 pounds.

- e. Was the amount of weight change in week 6 more or less than the amount of weight change in week 11? Insert a  $>$ ,  $<$ , or  $=$  symbol to make the statement true.

$$|+1.5| \quad \textcircled{=} \quad |-1.5|$$

The amount of weight change in week 6 was equal to the amount of weight change in week 11. In week 6 the amount of change was 1.5 pounds, while in week 11 the amount of change was also 1.5 pounds.

- f. Determine the difference between the weight changes from week 7 to week 10. Use absolute values to determine the difference.

$$|1.3| + |-3.75| = 5.05$$

- g. Determine the difference between the weight changes from week 8 to week 12. Use absolute values to determine the difference.

$$|-5| - |-2.8| = 2.2$$

2. The table shown tracks Julio's weight changes that he reports to his coach for the first 4 weeks of school. Complete the table to explain the changes.

| Situation  | Absolute Value Statement          | Rational Number |
|--|-----------------------------------|-----------------|
| His weight went from 140 to 135 pounds.          | His weight fell by 5 pounds.      | -5 lb           |
| His weight went from 135 pounds to 141 pounds.   | His weight increased by 6 pounds. | 6 lb            |
| His weight went from 141 pounds to 140.5 pounds. | His weight fell by 0.5 pounds.    | -0.5 lb         |
| His weight went from 140.5 pounds to 139 pounds. | His weight fell by 1.5 pounds.    | -1.5 lb         |

## Lesson 10.4 Assignment

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### Elevators, Making Money Redux, and Water Level Solving Problems with Rational Numbers

Use the scenario to answer each question.

1. Weather experts collect many types of data to study and analyze. One area of interest to many meteorologists is extreme temperature changes. The interior West of North America experiences great temperature changes due to Chinook Winds. The table shows extreme temperature rises in three cities as well as the date and time period.

| Place              | Granville, ND                                      | Fort Assiniboine, MT                              | Spearfish, SD                                     |
|--------------------|--|---|---|
| Date               | Feb. 21, 1918                                      | Jan. 19, 1892                                     | Jan. 22, 1943                                     |
| Time Period        | 12 hours   | 15 minutes  | 2 minutes   |
| Temperature Change | From $-33^{\circ}\text{F}$ to $50^{\circ}\text{F}$ | From $-5^{\circ}\text{F}$ to $37^{\circ}\text{F}$ | From $-4^{\circ}\text{F}$ to $45^{\circ}\text{F}$ |

Source: Infoplease. © 2000-2007

- a. How much did the temperature rise in Granville, ND? Write an equation for this situation and calculate the change.

$$\begin{aligned}|-33| + |50| &= 33 + 50 \\ &= 83\end{aligned}$$

The temperature rose 83 degrees.

- b. How much did the temperature rise in Fort Assiniboine, MT? Write an equation for this situation and calculate the change.

$$\begin{aligned}|-5| + |37| &= 5 + 37 \\ &= 42\end{aligned}$$

The temperature rose 42 degrees.

- c. How much did the temperature rise in Spearfish, SD? Write an equation for this situation and calculate the change.

$$\begin{aligned}|-4| + |45| &= 4 + 45 \\ &= 49\end{aligned}$$

The temperature rose 49 degrees.

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2. An interesting day of temperature changes occurred in Rapid City, South Dakota on January 22, 1943. The table shows the temperature changes that happened throughout the day.

| Time     | Temperature (°C) |
|----------|------------------|
| 10:30 AM | -6.7             |
| 10:35 AM | 13.3             |
| 12:00 PM | 15.6             |
| 12:05 PM | -10.6            |
| 12:35 PM | -9.4             |
| 12:40 PM | 10               |
| 2:20 PM  | 14.4             |
| 2:25 PM  | -8.3             |

Source: <http://www.blackhillsweather.com/chinook.html>

- a. Between which two times did the temperature change the most? Write an equation for this situation and calculate the change.

The most change happened between 12:00 PM and 12:05 PM.

$$\begin{aligned} |15.6| + |-10.6| &= 15.6 + 10.6 \\ &= 26.2 \end{aligned}$$

- b. Between which two times did the temperature change the least? Write an equation for this situation and calculate the change.

The least change happened between 12:05 PM and 12:35 PM

$$\begin{aligned} |-10.6| - |-9.4| &= 10.6 - 9.4 \\ &= 1.2 \end{aligned}$$



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- c. How much did the temperature change between 12:35 PM and 12:40 PM? Write an equation for this situation and calculate the change.

$$\begin{aligned} |-9.4| + |10| &= 9.4 + 10 \\ &= 19.4 \end{aligned}$$

The temperature rose by 19.4°C.

- d. How much did the temperature change between 2:20 PM and 2:25 PM? Write an equation for this situation and calculate the change.

$$\begin{aligned} |14.4| + |-8.3| &= 14.4 + 8.3 \\ &= 22.7 \end{aligned}$$

The temperature dropped by 22.7°C.

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