

Teacher Notes.

Lesson 13: Statements of Order in the Real World

Classwork

Opening Exercise

A radio disc jockey reports that the temperature outside his studio has changed 10 degrees since he came on the air this morning. Discuss with your group what listeners can conclude from this report.

10 degrees change could mean positive or negative. (increase/decrease in temp.)

Example 1: Ordering Numbers in the Real World

A \$25 credit and a \$25 charge appear similar, yet they are very different.

Describe what is similar about the two transactions.

Similar: They both have the same number.
Both have same absolute value.

$$|25| = 25 \quad |-25| = 25$$

How do the two transactions differ?

Credit = positive (increase) +25

Charge = negative (decrease) -25.

Exercises

- Scientists are studying temperatures and weather patterns in the Northern Hemisphere. They recorded temperatures (in degrees Celsius) in the table below as reported in emails from various participants. Represent each reported temperature using a rational number. Order the rational numbers from least to greatest. Explain why the rational numbers that you chose appropriately represent the given temperatures.

Temperatures as Reported	8 below zero	12	-4	13 below zero	0	2 above zero	6 below zero	-5
Temperature (°C)	-8	12	-4	-13	0	2	-6	-5

$$-13 < -8 < -6 < -5 < -4 < 0 < 2 < 12$$

The words "below zero" refer to negative numbers because they are located below zero on a vertical numberline.

2. Jami's bank account statement shows the transactions below. Represent each transaction as a rational number describing how it changes Jami's account balance. Then, order the rational numbers from greatest to least. Explain why the rational numbers that you chose appropriately reflect the given transactions.

Listed Transactions	Debit \$12.20	Credit \$4.08	Charge \$1.50	Withdrawal \$20.00	Deposit \$5.50	Debit \$3.95	Charge \$3.00
Change to Jami's Account	-12.2	\$4.08	-1.5	-20	5.5	-3.95	-3

$$5.5 > 4.08 > -1.5 > -3 > -3.95 > -12.2 > -20$$

debit, charge, & withdrawal = negative numbers.

Credit, deposit = positive numbers.

3. During the summer, Madison monitors the water level in her parents' swimming pool to make sure it is not too far above or below normal. The table below shows the numbers she recorded in July and August to represent how the water levels compare to normal. Order the rational numbers from least to greatest. Explain why the rational numbers that you chose appropriately reflect the given water levels.

Madison's Readings	$\frac{1}{2}$ inch above normal	$\frac{1}{4}$ inch above normal	$\frac{1}{2}$ inch below normal	$\frac{1}{8}$ inch above normal	$1\frac{1}{4}$ inches below normal	$\frac{3}{8}$ inch below normal	$\frac{3}{4}$ inch below normal
Compared to Normal	$\frac{1}{2}$	$\frac{1}{4}$	$-\frac{1}{2}$	$\frac{1}{8}$	$-1\frac{1}{4}$	$-\frac{3}{8}$	$-\frac{3}{4}$

$$-1\frac{1}{4} < -\frac{3}{4} < -\frac{1}{2} < -\frac{3}{8} < \frac{1}{8} < \frac{1}{4} < \frac{1}{2}$$

4. Changes in the weather can be predicted by changes in the barometric pressure. Over several weeks, Stephanie recorded changes in barometric pressure seen on her barometer to compare to local weather forecasts. Her observations are recorded in the table below. Use rational numbers to record the indicated changes in the pressure in the second row of the table. Order the rational numbers from least to greatest. Explain why the rational numbers that you chose appropriately represent the given pressure changes.

Barometric Pressure Change (Inches of Mercury)	Rise 0.04	Fall 0.21	Rise 0.2	Fall 0.03	Rise 0.1	Fall 0.09	Fall 0.14
Barometric Pressure Change (Inches of Mercury)	0.04	-0.21	0.2	-0.03	0.1	-0.09	-0.14

$$-0.21, -0.14, -0.09, -0.03, 0.04, 0.1, 0.2$$

Example 2: Using Absolute Value to Solve Real-World Problems

The captain of a fishing vessel is standing on the deck at 23 feet above sea level. He holds a rope tied to his fishing net that is below him underwater at a depth of 38 feet.

Draw a diagram using a number line, and then use absolute value to compare the lengths of rope in and out of the water.

$$|23| = 23$$

$$|-38| = 38$$

There is more rope underwater than above.

$$38 - 23 = 15$$

The length of the rope below the water's surface is 15 ft. longer than the rope above water.

Example 3: Making Sense of Absolute Value and Statements of Inequality

A recent television commercial asked viewers, "Do you have over \$10,000 in credit card debt?"

What types of numbers are associated with the word *debt*, and why? Write a number that represents the value from the television commercial.

Negative Numbers; debt describes money that is owed; $-10,000$

Give one example of "over \$10,000 in credit card debt." Then, write a rational number that represents your example.

(Vary) Credit Card debt of \$11,000
-11,000

How do the debts compare, and how do the rational numbers that describe them compare? Explain.

The example \$11,000 is greater than 10,000 from the commercial. B/c they are debt values have opposite order because they are negative numbers.

$$-11,000 < -10,000$$