

## Lesson 12: The Relationship Between Absolute Value and Order

### Classwork

#### Opening Exercise

Record your integer values in order from least to greatest in the space below.

$-12, -9, -5, -2, -1, 0, 2, 5, 7, 8$

#### Example 1: Comparing Order of Integers to the Order of Their Absolute Values

Write an inequality statement relating the ordered integers from the Opening Exercise. Below each integer, write its absolute value.

$-12 < -9 < -5 < -2 < -1 < 0 < 2 < 5 < 7 < 8$

Absolute V: 12 9 5 2 1 0 2 5 7 8

Circle the absolute values that are in increasing numerical order and their corresponding integers. Describe the circled values.

The circled integers are all positive values except zero.

The positive integers & absolute values have the same order.

Rewrite the integers that are not circled in the space below. How do these integers differ from the ones you circled?

$-12, -9, -5, -2, -1$

They are all negative integers.

Rewrite the negative integers in ascending order and their absolute values in ascending order below them.

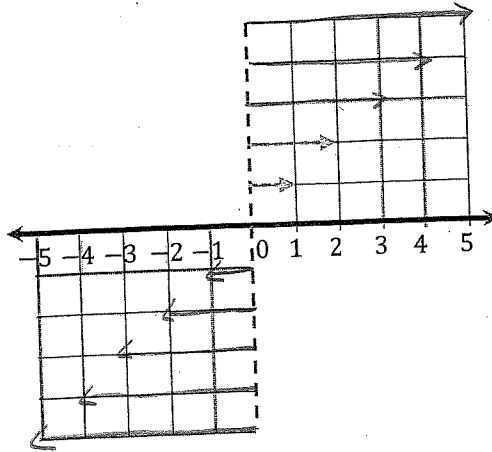
$-12 < -9 < -5 < -2 < -1$   
1 2 5 9 12

Describe how the order of the absolute values compares to the order of the negative integers.

The order of the negative integers and their corresponding absolute values are opposite.

**Example 2: The Order of Negative Integers and Their Absolute Values**

Draw arrows starting at the dashed line (zero) to represent each of the integers shown on the number line below. The arrows that correspond with 1 and 2 have been modeled for you.



As you approach zero from the left on the number line, the integers increase, but the absolute values of those integers decrease. This means that the order of negative integers is opposite the order of their absolute values.

**Exercise 1**

Complete the steps below to order these numbers:

$$\left\{ 2.1, -4\frac{1}{2}, -6, 0.25, -1.5, 0, 3.9, -6.3, -4, 2\frac{3}{4}, 3.99, -9\frac{1}{4} \right\}$$

- Separate the set of numbers into positive rational numbers, negative rational numbers, and zero in the top cells below (order does not matter).
- Write the absolute values of the rational numbers (order does not matter) in the bottom cells below.

**Negative Rational Numbers**

$-4\frac{1}{2}$	$-4$	$-6.3$
$-4$	$-9\frac{1}{4}$	$-1.5$

Zero  
0

**Positive Rational Numbers**

2.1	0.25	3.9
$2\frac{3}{4}$	3.99	

**Absolute Values**

$4\frac{1}{2}$	6	6.3
4	$9\frac{1}{4}$	1.5

**Absolute Values**

2.1	0.25	3.9
$2\frac{3}{4}$	3.99	

- c. Order each subset of absolute values from least to greatest.

 $1.5, 4, 4\frac{1}{2}, 6, 6.3, 9\frac{1}{4}$ 

○

 $0.25, 2.1, 2\frac{3}{4}, 3.9, 3.99$ 

- d. Order each subset of rational numbers from least to greatest.

 $-9\frac{1}{4}, -6.3, -6, -4\frac{1}{2}, -4, -1.5$ 

○

 $0.25, 2.1, 2\frac{3}{4}, 3.9, 3.99$ 

- e. Order the whole given set of rational numbers from least to greatest.

 $-9\frac{1}{4}, -6.3, -6, -4\frac{1}{2}, -4, -1.5, 0, 0.25, 2.1, 2\frac{3}{4}, 3.9, 3.99$ 

### Exercise 2

- a. Find a set of four integers such that their order and the order of their absolute values are the same.

VARY:  $4, 6, 8, 10$

- b. Find a set of four integers such that their order and the order of their absolute values are opposite.

VARY:  $-10, -8, -6, -4$

- c. Find a set of four non-integer rational numbers such that their order and the order of their absolute values are the same.

VARY:  $2\frac{1}{2}, 3\frac{1}{2}, 4\frac{1}{2}, 5\frac{1}{2}$

- d. Find a set of four non-integer rational numbers such that their order and the order of their absolute values are opposite.

VARY:  $-5\frac{1}{2}, -4\frac{1}{2}, -3\frac{1}{2}, -2\frac{1}{2}$

- e. Order all of your numbers from parts (a)–(d) in the space below. This means you should be ordering 16 numbers from least to greatest.

VARY:  $-10, -8, -6, -5\frac{1}{2}, -4\frac{1}{2}, -4, -3\frac{1}{2}, -2\frac{1}{2}, 3\frac{1}{2}, 4, 4\frac{1}{2}, 5\frac{1}{2}, 6, 8, 10$