Lesson 4

Course 2- Teacher Notes

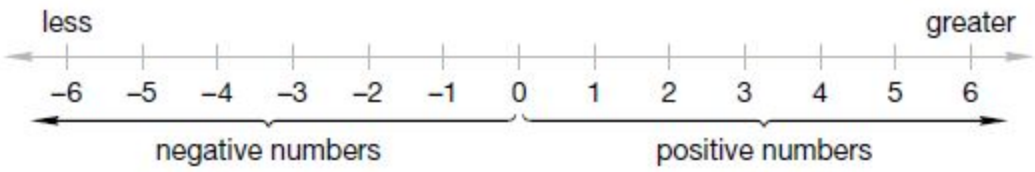
Objective: TSW compare and order numbers. TSW use comparison symbols to compare numbers. TSW add and subtract integers on a number line. TSW determine a pattern or rule for a sequence and then apply it.

<u>Number Line:</u> Can be used to help us arrange numbers in order. Each number corresponds to a unique point on the number line.

<u>Origin:</u> The <u>zero point</u>.

<u>Positive Numbers:</u> Numbers that are to the <u>right</u> of zero. These numbers are <u>greater than</u> zero.

<u>Negative Numbers:</u> Numbers that are to the <u>left</u> of zero. These numbers are <u>less than</u> zero.



On this number line the tick marks indicate the location of <u>integers.</u> Integers include all of the counting numbers and their opposites, and the number zero.

Integers DO NOT include fractions

Integers

$\{\ldots, -3, -2, -1, 0, 1, 2, 3, \ldots\}$

The <u>ellipses</u> to the left and the right indicate that the number of negative and positive integers are <u>infinite.</u>

*****As we move right on the number line, the numbers get larger. As you move left on the number line, the numbers get smaller.**

QUESTION: What will always be true when you compare a positive and negative number? The positive number will always be greater than the negative number.

Comparing Numbers: We compare numbers to determine whether one is greater than the other or if they are equal.

Comparison Symbols:

- $\leq$ **Less than or equal to**
- $\geq$ **Greater than or equal to**
- $=$ **Equal to**
- $>$ **Less than**

< **Less than**

Example 1

Arrange these numbers in order from least to greatest:

$0,\ 1,\ -2$

Solution:

−2, 0, 1

Example 2

Rewrite the expression below by replacing the circle with the correct comparison symbol. Then use words to write the comparison.

−5 ◯ 3

Solution:

$-5 < 3$

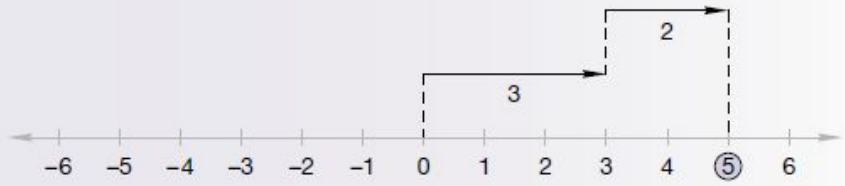
Negative five is less than three.

Example 3

Show this addition problem on a number line: $3 + 2$

Solution:

We start at the origin (at zero) and draw an arrow 3 units long that points to the right. From this arrowhead we draw a second arrow 2 units long that points to the right.



The second arrow ends at 5; 3 + 2 = **5.**

Example 4.

Show this subtraction problem on a number line: $5 - 3$

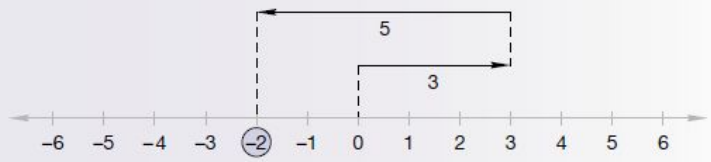
Solution:

Starting at the origin, we draw an arrow 5 units long that points to the right. To subtract, we draw a second arrow 3 units long that points to the left. Remember to draw the second arrow from the first arrowhead.

The second arrow ends at 2. This shows that $5 - 3 = \mathbf{2}$.

Example 5
Show this subtraction problem on a number line: $3 - 5$

Solution:



The second arrow ends at −2. This shows that $3 - 5 = \mathbf{-2}$.

Examples 4 and 5 show graphically that subtraction is not commutative.
QUESTION: What does not commutative mean? You can't change the order of the subtraction problem and get same answer.

Notice, reversing the order of the subtraction results in opposite differences:

$$5 - 3 = 2$$

$$3 - 5 = -2$$

We can use this characteristic of subtraction to help us with subtraction problems like the next example.

Example 6
Simplify: $376 - 840$

Solution:

We see that the result will be negative. We reverse the order of the numbers to perform the subtraction.

$$\begin{array}{r} 840 \\ -\ 376 \\ \hline 464 \end{array}$$

The answer to the original problem is the opposite of 464, which is **−464.**

SEQUENCES

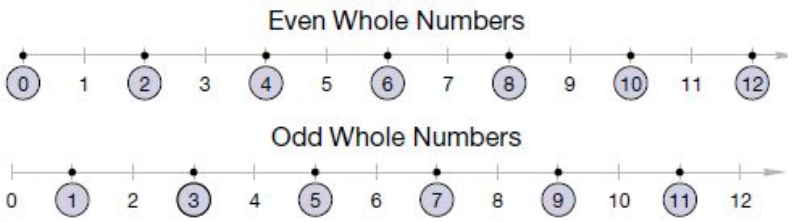
<u>Sequence:</u> an ordered list of terms (numbers) that follows a certain patter or rule.
Examples of sequences.

0, 1, 2, 3, 4, . . .

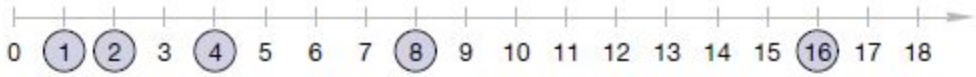
Evens: 0, 2, 4, 6, 8, . . .

Odds: 1, 3, 5, 7, 9, . . .

<u>Arithmetic Sequence:</u> When the same number is <u>added</u> to each term to find the next term.
Example would be even numbers or odd numbers



<u>Geometric Sequence:</u> When each term is <u>multiplied</u> by the same number to find the next term.



Example 7.
The first four terms of a sequence are shown below. Find the next three terms in the sequence.

1, 4, 9, 16, . . .

Solution:

+3 +5 +7
1, 4, 9, 16, . . .

QUESTION: Is there another sequence for this pattern? Perfect Squares/Add Odd
QUESTION: Is this an arithmetic, geometric, or neither sequence? Neither

Example 8.
The rule of a certain sequence is $k = 2n$. Find the first four terms of the sequence.

Solution:

We substitute 1, 2, 3, and 4 for *n* to find the first four terms.

First term	Second term	Third term	Fourth term
$k = 2(1)$	$k = 2(2)$	$k = 2(3)$	$k = 2(4)$
$= 2$	$= 4$	$= 6$	$= 8$

The first four terms of the sequence are **2, 4, 6,** and **8.**

CW: 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17,30
HW: 1, 4, 18-29