Math 10 Lecture Videos

Section 1.3:
The Real Numbers

PAUL ANDREW GORGONIO

OBJECTIVES:

1. Define the sets that make up the set of real numbers.
2. Graph numbers on a number line.
3. Express rational numbers as decimals.
4. Understand and use inequality symbols.
5. Find the absolute value of a real number.

Objective 1: Define the sets that make up the set of real numbers.

$$\{1,\ 2,\ 3,\ 4,\ 5,\ldots\}$$

- This represents the set of numbers used for counting.
- Braces, { }, indicate that we are representing a set.
- The numbers 1 through 5 are the elements of the set, separated by the commas.

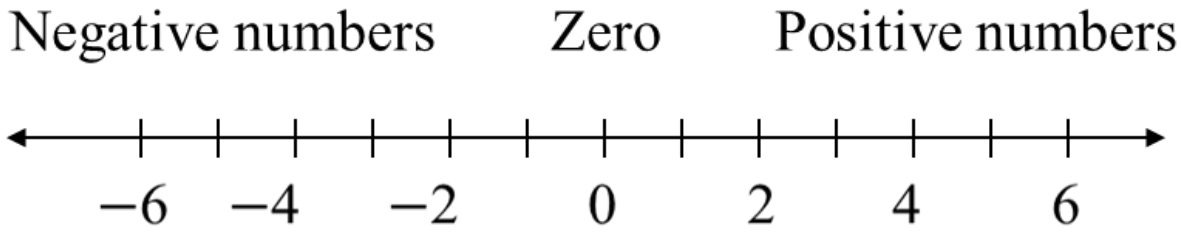
Objective 1: Define the sets that make up the set of real numbers.

Sets of Numbers	Definition
Natural Numbers	All numbers in the set $\{1, 2, 3, 4, \ldots\}$
Whole Numbers	All numbers in the set $\{0, 1, 2, 3, 4, \ldots\}$
Integers	All numbers in the set $\{\ldots -3, -2, -1, 0, 1, 2, 3, \ldots\}$

Objective 1: Define the sets that make up the set of real numbers.

Sets of Numbers	Definition
Rational Numbers	All numbers $\frac{a}{b}$ such that a and b are integers
Irrational Numbers	All numbers whose decimal representation neither terminate nor repeat $\pi,\ \sqrt{3},\ -\sqrt{2}$
Real Numbers	All numbers that are rational or irrational

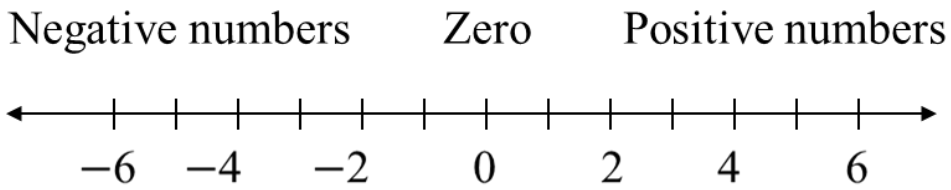
Objective 2:
Graph numbers on a number line



Number Line

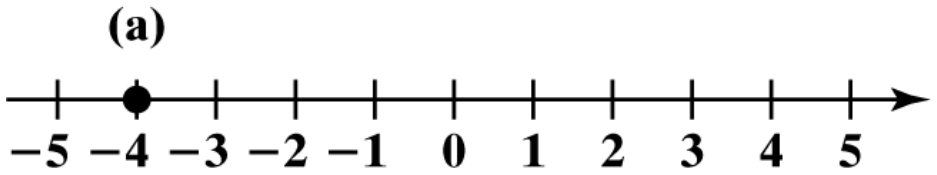
- Graph used to visualize the set of integers and other sets of numbers
- Line extends indefinitely in both directions.
- Zero separates the positive numbers from the negative numbers on the number line.
- *Zero is neither positive nor negative.*

Objective 2:
Graph numbers on a number line

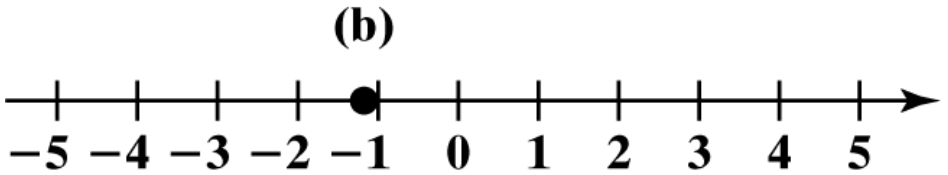


Example:

1. Graph: -4



2. Graph: -1.2



Objective 3: Express rational numbers as decimals.

Express the rational number as a decimal: $\frac{3}{8}$

$$
\begin{array}{r}
0.375 \\
8\overline{)3.000} \\
\underline{24} \\
60 \\
\underline{56} \\
40 \\
\underline{40} \\
0
\end{array}
$$

$$\frac{3}{8} = 0.375$$

Express the rational number as a decimal: $\frac{5}{11}$

$$
\begin{array}{r}
0.454\ldots \\
11\overline{)5.000\ldots} \\
\underline{44} \\
60 \\
\underline{55} \\
50 \\
\underline{44} \\
60
\end{array}
$$

$$\frac{5}{11} = 0.\overline{45}$$

Objective 4:
Understand and use inequality symbols.

Inequalities	Meanings	Examples
$<$	is less than	$10 < 32$ $-5 < 3$ $-7 < -2$
$>$	is greater than	$6 > -4$ $11 > 8$ $-6 > -12$

Objective 4:
Understand and use inequality symbols.

Inequalities	Meanings	Examples
$\leq$	is less than or is equal to	$3.4 \leq 4.5$ $-2 \leq -2$
$\geq$	is greater than or is equal to	$5 \geq 5$ $0 \geq -3$

Objective 5: Find the absolute value of a real number.

The ***absolute value*** of a real number *a,* denoted $|a|$, is the distance from 0 to *a* on the number line. This distance is always nonnegative.

$|-5| = +5$ The absolute value of -5 is 5 because -5 is 5 units from 0 on the number line.

$|3| = +3$ The absolute value of 3 is $+3$ because 3 is 3 units from 0 on the number line.

OBJECTIVES:

1. Define the sets that make up the set of real numbers. ✓
2. Graph numbers on a number line. ✓
3. Express rational numbers as decimals. ✓
4. Understand and use inequality symbols. ✓
5. Find the absolute value of a real number. ✓