

Vertical Progression:

<p>4th Grade</p>	<p>4.NBT.A Generalize place value understanding for multi-digit whole numbers.</p> <ul style="list-style-type: none"> ○ 4.NBT.A.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.
<p>5th Grade</p>	<p>5.NBT.A Understand the place value system.</p> <ul style="list-style-type: none"> ○ 5.NBT.A.3 Read, write, and compare decimals to thousandths. ○ 5.NBT.A.3b Compare two decimals to thousandths based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons. <p>5.G.A Graph points on the coordinate plane to solve real-world and mathematical problems.</p> <ul style="list-style-type: none"> ○ 5.G.A.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, which the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate). ○ 5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret values of points in the context of the situation.
<p>6th Grade</p>	<p>ELG 6.4 Apply and extend previous understandings of numbers to the system of rational numbers.</p> <ul style="list-style-type: none"> ○ 6.NS.C.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. ○ 6.NS.C.6 Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. ○ 6.NS.C.6a Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., $-(-3) = 3$, and that 0 is its own opposite. ○ 6.NS.C.6b Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. ○ 6.NS.C.6c Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane. ○ 6.NS.C.7 Understand ordering and absolute value of rational numbers. ○ 6.NS.C.7a Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. ○ 6.NS.C.7b Write, interpret, and explain statements of order for rational numbers in real-world contexts. ○ 6.NS.C.7c Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. ○ 6.NS.C.7d Distinguish comparisons of absolute value from statements about order.

ELG 6.4: Apply and extend previous understandings of numbers to the system of rational numbers.

	<ul style="list-style-type: none"> ○ 6.NS.C.8 Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.
<p>7th Grade</p>	<p>ELG 7.2 Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.</p> <ul style="list-style-type: none"> ○ 7.NS.A.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. ○ 7.NS.A.1a Describe situations in which opposite quantities combine to make 0. ○ 7.NS.A.1b Understand $p + q$ as the number located a distance q from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. ○ 7.NS.A.1c Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. ○ 7.NS.A.1d Apply properties of operations as strategies to add and subtract rational numbers.

Students will demonstrate command of the ELG by:

- Representing any rational number as a point on the number line and explaining its relationship to its opposite.
- Using positive and negative numbers to represent real-life quantities and explaining a number's relationship to zero in various situations.
- Locating and plotting rational numbers and their opposites on a vertical or horizontal number line.
- Locating and plotting ordered pairs on a coordinate plane and using them to solve real-world problems.
- Calculating the distance between points on a coordinate plane.
- Interpreting an inequality with negative and positive numbers using a number line.
- Interpreting the absolute value as a distance from 0.
- Explaining how absolute values and ordering of rational numbers are used in real life.
- Explaining the difference between the order of negative numbers and the order of the absolute value of negative numbers.

Vocabulary:

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|----------------------------|--------------------|--------------------------|
| • absolute value | • negative numbers | • quadrants |
| • coordinate plane | • number line | • rational numbers |
| • distance | • opposite | • reflection |
| • horizontal axis (x-axis) | • ordered pair | • vertical axis (y-axis) |
| • inequality | • origin | • x-coordinate |
| • integer | • positive numbers | • y-coordinate |

Sample Instructional/Assessment Tasks:

1) Standard(s): 6.NS.C.5

Source: www.illustrativemathematics.org

Item Prompt:

Denver, Colorado is called “The Mile High City” because its elevation is 5280 feet above sea level. Someone tells you that the elevation of Death Valley, California is -282 feet.

- Is Death Valley located above or below sea level? Explain.
- How many feet higher is Denver than Death Valley?
- What would your elevation be if you were standing near the ocean?

Correct Answer:

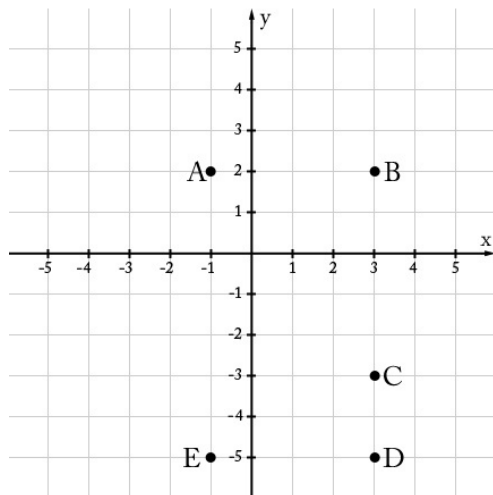
- Death Valley, with an elevation of -282 feet, is located below sea level.
- $282+5280=5562$.
- If you were standing near the ocean, your elevation would be close to zero. Depending on how high or low the tide is and where exactly you are standing, your elevation could be as low as -50 feet (or as high as 50 feet) if you are at the edge of a very low tide (or a very high tide, respectively) at the Bay of Fundy.

2) Standard(s): 6.NS.C.8

Source: www.illustrativemathematics.org

Item Prompt:

Some points are shown in the coordinate plane below.



ELG 6.4: Apply and extend previous understandings of numbers to the system of rational numbers.

- a. What is the distance between points B & C?
- b. What is the distance between points D & B?
- c. What is the distance between points D & E?
- d. Which of the points shown above are 4 units away from $(-1, -3)$ and 2 units away from $(3, -1)$?

Solution:

- a. 5 units
- b. 7 units
- c. 4 units
- d. Point C