

Grade 6 Target D

Domain, Target, Standards, DOK, Vertical Alignments, Achievement Levels, Evidence Required, Vocabulary, Response Types, Materials, Attributes, Question Types, and Question Banks (Examples)

[Content Domain: The Number System](#)

[Target D \[m\]: 6.NS.C Apply and extend previous understandings of numbers to the system of rational numbers.](#)

[Standards included in Target D: 6.NS.C, 6.NS.C.5, 6.NS.C.6, 6.NS.C.7, 6.NS.C.8](#)

[Vertical Alignment](#)

[Achievement Level Descriptors](#)

[Evidence Required](#)

[Vocabulary](#)

[Response Types](#)

[Materials](#)

[Attributes](#)

[Claim 1: Concepts and Procedures \(DOK 1, 2\) Question Banks](#)

[Claim 3 Communicating Reasoning Question Banks](#)

Content Domain: The Number System

Target D [m]: 6.NS.C Apply and extend previous understandings of numbers to the system of rational numbers.

Standards included in Target D: 6.NS.C, 6.NS.C.5, 6.NS.C.6, 6.NS.C.7, 6.NS.C.8

6.NS.C Apply and extend previous understandings of numbers to the system of rational numbers.

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.

a. 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.

b. 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.

c. 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.

a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. For example, interpret $-3 > -7$ as a statement that -3 is located to the right of -7 on a number line oriented from left to right.

b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. For example, write $-3^{\circ}\text{C} > -7^{\circ}\text{C}$ to express the fact that -3°C is warmer than -7°C .

c. 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. For example, for an account balance of -30 dollars, write $|-30| = 30$ to describe the size of the debt in dollars.

d. Distinguish comparisons of absolute value from statements about order. For example, recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars.

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.

Vertical Alignment

Related Grade 5 standards

5.G.A Graph points on the coordinate plane to solve real-world and mathematical problems.

5.G.A.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with 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 coordinate values of points in the context of the situation.

Related Grade 7 Standards

7.NS.A Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

7.NS.A.2 Apply and extend previous understandings of multiplication and division of fractions to multiply and divide rational numbers.

- a. Understand that multiplication is extended from fractions to rational numbers by requiring the operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
- b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p \div q) = (-p) \div q = p \div (-q)$. Interpret quotients of rational numbers by describing real-world contexts.
- c. Apply properties of operations as strategies to multiply and divide rational numbers.
- d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.

7.NS.A.3 Solve real-world and mathematical problems involving the four operations with rational numbers.

Achievement Level Descriptors

Level 1 Students should be able to place all integers on a number line and integer pairs on a coordinate plane with one-unit increments on both axes.

Level 2 Students should be able to apply and extend previous understandings of whole numbers to order rational numbers and interpret statements of their order in the context of a situation. They should be able to place all rational numbers on a number line and integer pairs on a coordinate plane with various axis increments. They should be able to relate changes in sign to placements on opposite sides of the number line and understand the absolute value of a number as its distance from zero on a number line.

Level 3 Students should be able to apply and extend previous understandings of numbers to relate statements of inequality to relative positions on a number line, place points with rational coordinates on a coordinate plane, and solve problems involving the distance between points when they share a coordinate. They should be able to understand absolute value and ordering by using number lines and models and relate reflection across axes to changes in sign.

Level 4: No descriptor

Evidence Required

1. The student uses positive and negative numbers to represent quantities in real-world contexts.
2. The student can identify the location of ordered pairs on the coordinate plane based on the signs of the numbers in an ordered pair.
3. The student locates and positions integers and other rational numbers on a number line.

4. The student positions ordered pairs of integers and other rational numbers on a coordinate plane.
5. [Evidence Required statement retired]
6. The student writes and interprets statements about the order of rational numbers in real-world contexts.
7. The student represents the absolute value of a rational number as the distance from zero on a number line.
8. The student can make comparisons of absolute value from statements about order.
9. The student solves real-world and mathematical problems by graphing ordered pairs on a coordinate plane and using coordinates and absolute value to find the distances between points with same first coordinate or same second coordinate.

Vocabulary

positive, negative, integer, absolute value, coordinate, ordered pair, coordinate grid/plane, quadrant, number line, relative position, magnitude

Response Types

Multiple Choice, single correct response; Multiple Choice, multiple correct response; Equation/Numeric; Matching Tables; Drag and Drop; Graphing; Hot Spot

Materials

horizontal and vertical number lines, coordinate planes

Attributes

none

Claim 1: Concepts and Procedures (DOK 1, 2) Question Banks

Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.

Claim 1 6.NS.C.5 DOK Level 1

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.

Evidence Required

The student uses positive and negative numbers to represent quantities in real-world contexts.

Question Type 1: The student is presented with a context that can be unambiguously represented by a negative number or zero.

1. A Fahrenheit thermometer shows that the temperature is 15 degrees below zero.

Enter the integer that represents the temperature in degrees Fahrenheit.

Rubric: (1 point) The student enters the correct number (e.g., -15).

Response Type: Equation/Numeric

Claim 1 6.NS.C.6b DOK Level 1

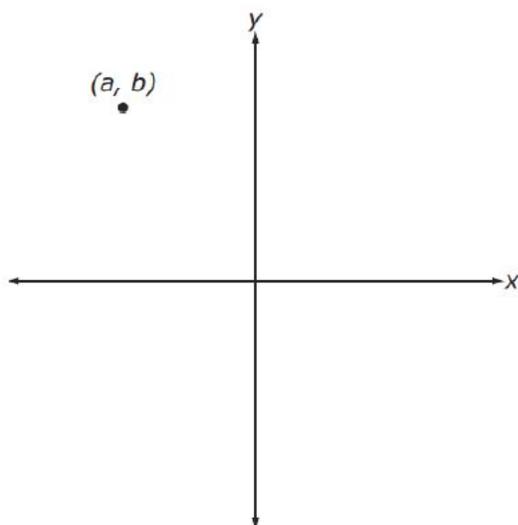
The student can identify the location of ordered pairs on the coordinate plane based on the signs of the numbers in an ordered pair.

Evidence Required

The student can identify the location of ordered pairs on the coordinate plane based on the signs of the numbers in an ordered pair.

Question Type 1: The student is presented with coordinate axes and a point labeled (a, b) in one of the quadrants.

1. The point that corresponds to (a, b) is shown in the coordinate plane. Use the Add Point tool to graph $(-a, b)$.



Rubric: (1 point) The student places a point in the correct location with some tolerance.

Response Type: Graphing

Claim 1 6.NS.C.6c DOK Level 1

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.

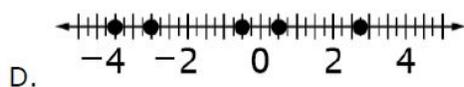
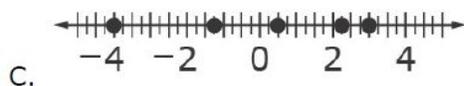
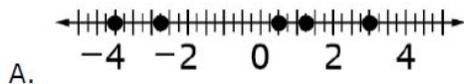
Evidence Required

The student locates and positions integers and other rational numbers on a number line.

Question Type 1: The student is presented with a list of rational numbers.

1. Which number line shows the correct positions of all the values shown?

$$\frac{1}{2}, -4, -2\frac{3}{4}, 3, 1\frac{1}{4}$$



Answer Choices: Answer choices will be number lines with points plotted. Distractors will include incorrect placement of one or more numbers on a number line based on signs and/or positions of rational numbers.

Rubric: (1 point) Student selects the correct number line (e.g., A).

Response Type: Multiple Choice, single correct response

Claim 1 6.NS.C.6c DOK Level 1

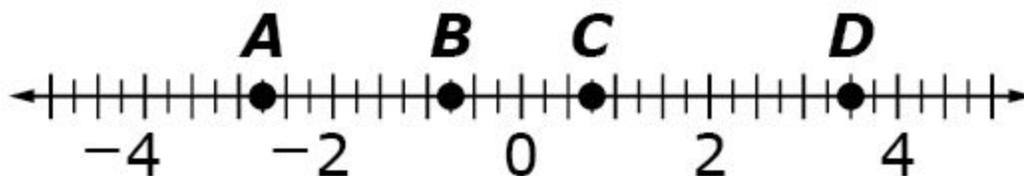
Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

Evidence Required

The student locates and positions integers and other rational numbers on a number line.

Question Type 1: The student is presented with a number line with labeled tick marks that contains 3–5 labeled points.

1. Consider the points plotted on the number line shown.



Select True or False for each statement about the number line.

Statement	True	False
The value of Point A is less than -3.		
The value of Point B is greater than the value of Point A.		
The value of Point D is $3\frac{1}{2}$.		

Rubric: (1 point) The student identifies all three statements correctly as true or false (e.g., F, T, T). Statements will include the opposite of the given number, failure to correctly plot fractions on a number line, etc.

These pages were adapted from open source documents available on the Smarter Balanced Website: <http://www.smarterbalanced.org/assessments/development/> August 2016

Response Type: Matching Tables

Claim 1 6.NS.C.6c & 6.NS.7c

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.

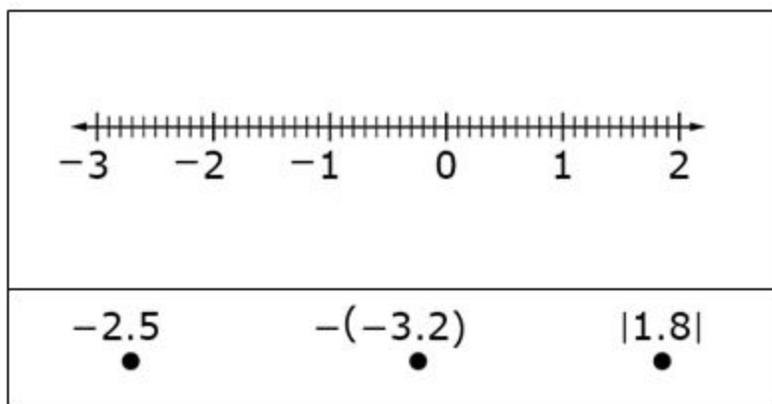
Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. For example, for an account balance of -30 dollars, write $|-30| = 30$ to describe the size of the debt in dollars.

Evidence Required

The student locates and positions integers and other rational numbers on a number line.

Question Type 1: The student is presented with three rational numbers and an incomplete number line.

1. Drag each number to its correct location on the number line.



Interaction: The student uses a preplaced drag-and-drop tool. The points are labeled with a rational number value which students can drag to the number line. Use the snap-to feature for each tick mark.

Rubric: (1 point) Student plots all numbers correctly on the number line.

Response Type: Drag and Drop

Claim 1 6.NS.C.6c DOK Level 1

These pages were adapted from open source documents available on the Smarter Balanced Website: <http://www.smarterbalanced.org/assessments/development/> August 2016

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.

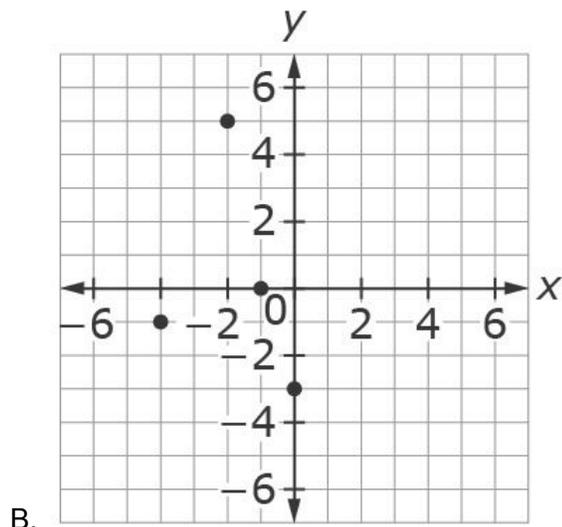
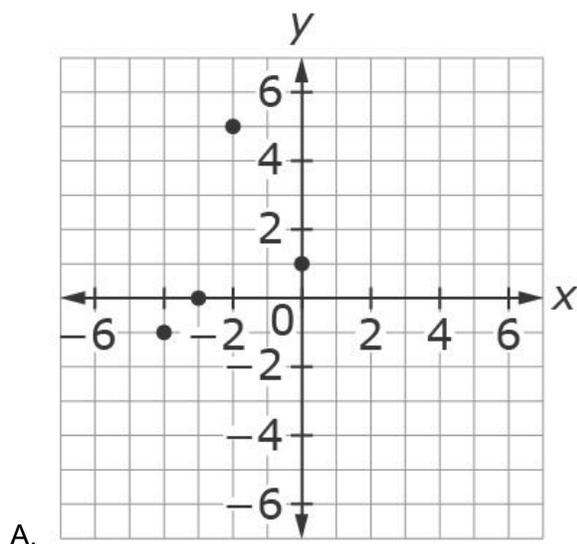
Evidence Required

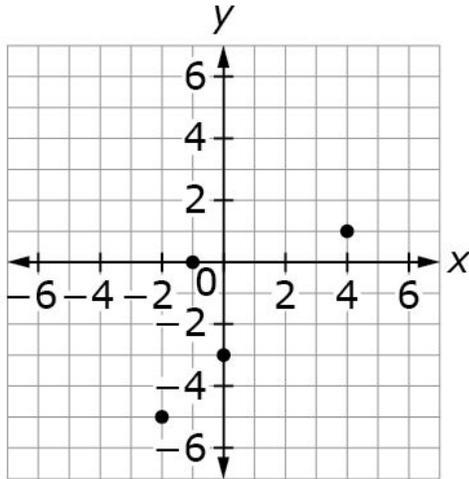
The student positions ordered pairs of integers and other rational numbers on a coordinate plane.

Question Type 1: The student is presented with coordinates of ordered pairs and a coordinate plane with the ordered pairs plotted.

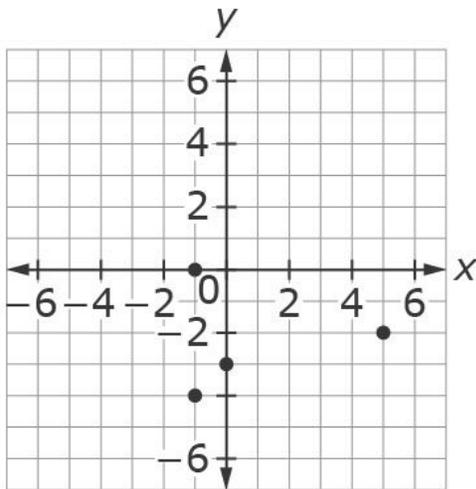
1. Which coordinate plane best represents the graph of these ordered pairs?

$(-1, 0)$, $(0, -3)$, $(-4, -1)$, $(-2, 5)$





C.



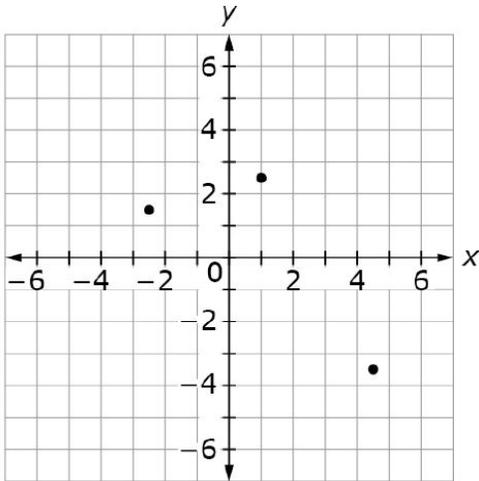
D.

Rubric: (1 point) The student identifies the correct graph (e.g., B).

Answer Choices: Answer choices will be coordinate planes with three to five ordered pairs plotted. Distractors will include errors in signs of numbers and/or confusing x- and y-axis or coordinates.

Response Type: Multiple Choice, single correct response

2. Consider the coordinate plane.



Which list of ordered pairs corresponds to the points on the coordinate plane?

- A. $(-4 \frac{1}{2}, -3 \frac{1}{2}), (-1, 2 \frac{1}{4}), (-2 \frac{1}{2}, -1 \frac{1}{2})$
- B. $(-2 \frac{1}{2}, 1 \frac{1}{2}), (4 \frac{1}{2}, -3 \frac{1}{2}), (1, 2 \frac{1}{4})$
- C. $(-3 \frac{1}{2}, -4 \frac{1}{2}), (1, -2 \frac{1}{4}), (2 \frac{1}{2}, 1 \frac{1}{2})$
- D. $(2 \frac{1}{2}, -1 \frac{1}{2}), (4 \frac{1}{2}, 3 \frac{1}{2}), (1, -2 \frac{1}{4})$

Rubric: (1 point) Student selects the correct set of ordered pairs (e.g., B).

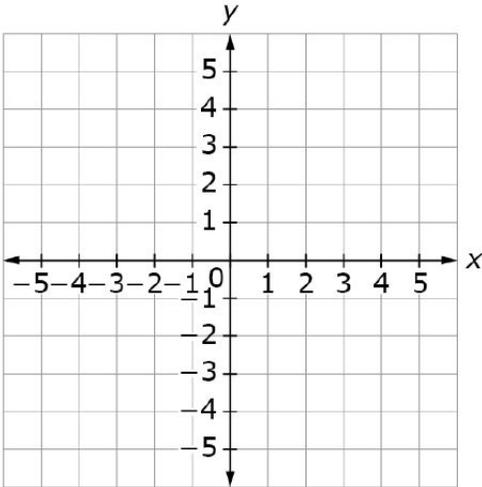
Answer Choices: Answer choices will be lists of ordered pairs. Distractors will include errors in signs of numbers and/or confusing x- and y-axis or coordinates.

Response Type: Multiple Choice, single correct response

Question Type 2: The student is presented with three ordered pairs and a graphic of a coordinate plane.

Example Stem: Use the Add Point tool to plot these three ordered pairs on the coordinate grid:

$(-2, 3)$ $(0, 3)$ $(-4, -2)$



Interaction: The student uses the Add Point and Delete tools to graph the ordered pairs. Use the snap-to feature for each intersection of the grid.

Rubric: (1 point) Student plots all three points correctly on the coordinate plane.

Response Type: Graphing

Claim 1 6.NS.C.7b DOK Level 2

Write, interpret, and explain statements of order for rational numbers in realworld contexts. For example, write $-3^{\circ}\text{C} > -7^{\circ}\text{C}$ to express the fact that -3°C is warmer than -7°C .

Evidence Required

The student writes and interprets statements about the order of rational numbers in real-world contexts.

Question Type 1: The student is presented with a real-world context involving rational numbers.

1. Sea level is defined as being at an elevation of 0 feet. The elevation of land is defined to be its height above or below sea level. The table shows the lowest elevations in some states.

Drag the numbers to each empty box to place the elevations in order from least to greatest.

State	Elevation
Arizona	72 ft
California	-282 ft
Louisiana	-68 ft
Tennessee	178 ft

Least
Greatest

72 ft	-282 ft	-68 ft	178 ft
-------	---------	--------	--------

Interaction: The student is given four empty boxes below the table and a palette at the bottom. The palette should contain the four numbers preplaced from the table (i.e., 72 ft, -282 ft, -68 ft, and 178 ft). Students use the drag-and-drop feature to place numbers in the boxes. Numbers may be used only once.

Rubric: (1 point) The student drags all four rational numbers in order from least to greatest.

Response Type: Drag and Drop

Question Type 2: The student is presented with a real-world context involving rational numbers.

1. Sea level is defined as being at an elevation of 0 feet. The elevation of land is defined to be its height above or below sea level. This table shows the lowest elevations in some states.

State	Elevation
Arizona	72 ft
California	-282 ft
Louisiana	-68 ft
Tennessee	178 ft

Determine whether each statement about the elevations is correct. Select True or False for each statement.

Statement	True	False
California has a higher elevation than Louisiana because -282 is greater than -68 .		
Tennessee's elevation is farther from 0 than Louisiana's elevation.		
Louisiana has a higher elevation than California because -68 is closer to zero than -282 .		

Rubric: (1 point) The student identifies all three statements correctly as true or false (e.g., F, T, T). Statements should deal with the order of the numbers.

Response Type: Matching Tables

Question Type 3: The student is presented with a real-world context involving rational numbers.

Example Stem: Sea level is defined as being at an elevation of 0 feet.

- The lowest elevation in Arizona is 72 feet.
- The lowest elevation in Louisiana is -68 feet.

Enter an inequality that compares these two elevations.

Rubric: (1 point) The student enters a correct inequality statement. Students are allowed credit for putting either " $-68 < 72$ " or " $72 > -68$."

Response Type: Equation/Numeric

Claim 1 6.NS.C.7c DOK Level 2

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

Evidence Required

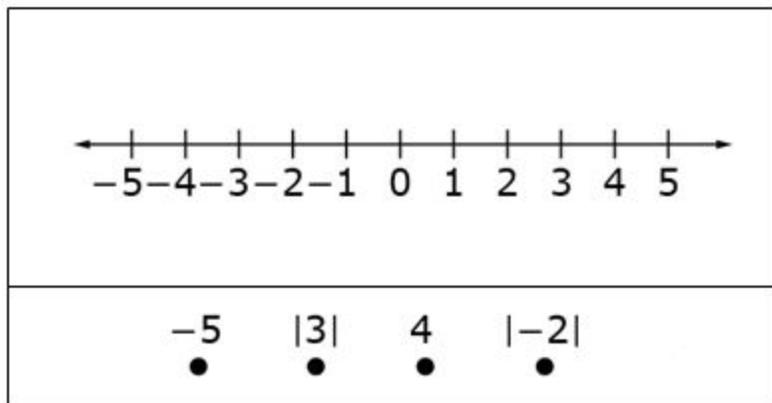
The student represents the absolute value of a rational number as the distance from zero on a number line.

Question Type 1: The student is presented with a set of four or five rational numbers and a number line.

Example Stem: Consider this set of numbers.

$$-5, |3|, 4, |-2|$$

Drag the four values to their correct locations on the number line.



Interaction: The points are pre-labeled with the given rational number values and placed in a palette below the number line in which students can drag the points to the number line. Use the snap-to feature for each tick mark.

Rubric: (1 point) Student plots all four numbers correctly on the number line.

Response Type: Drag and Drop

Question Type 2: The student is presented with statements about the absolute value of numbers in relation to a number line.

1. Consider the statements in the table shown. Select True or False for each statement.

Statement	True	False
The distance from -3 to 0 is the same as the distance from 3 to 0 on the number line.		
The distance between -21 and 0 on a number line is $ -21 $ units.		
On a number line, $ 4 $ and -4 are the same point.		

Rubric: (1 point) The student identifies all three statements correctly as true or false (e.g., T, T, F). Statements will be about the location of numbers with absolute values. False statements include statements that ignore absolute value signs and suggest an absolute value sign means “the opposite of” the number.

Response Type: Matching Tables

Claim 16.NS.C.7d DOK Level 1

Distinguish comparisons of absolute value from statements about order. For example, recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars.

Evidence Required

The student can make comparisons of absolute value from statements about order.

Question Type 1: The student is presented with statements involving absolute value in a real-world context.

1. Sea level is defined as being at an elevation of 0 feet. Objects can be above or below sea level.

- Submarine J is 35.6 feet below sea level.
- Submarine Q is 21.5 feet below sea level.
- Submarine Z is 43.8 feet below sea level.

Determine whether each statement comparing the submarines is true. Select True or False for each statement.

Statement	True	False
Submarine J is deeper than Submarine Q because $ -35.6 > -21.5 $.		
Submarine Q is deeper than Submarine Z because $ -21.5 > -43.8 $.		
Submarine J is deeper than Submarine Z because $ -35.6 > -43.8 $.		

Rubric: (1 point) The student correctly identifies all three statements as true or false (e.g., T, F, F).

Response Type: Matching Tables

Claim 1 6.NS.C.8 DOK Level 2

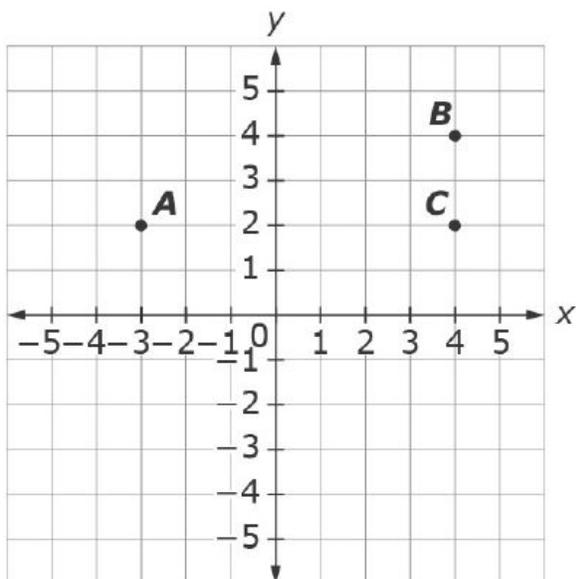
Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

Evidence Required

The student solves real-world and mathematical problems by graphing ordered pairs on a coordinate plane and using coordinates and absolute value to find the distances between points with same first coordinate or same second coordinate.

Question Type 1: The student is presented with a real-world or mathematical context and a graph of ordered pairs.

1. This grid shows the location of three points.



Enter the distance, in units, between point A and point C.

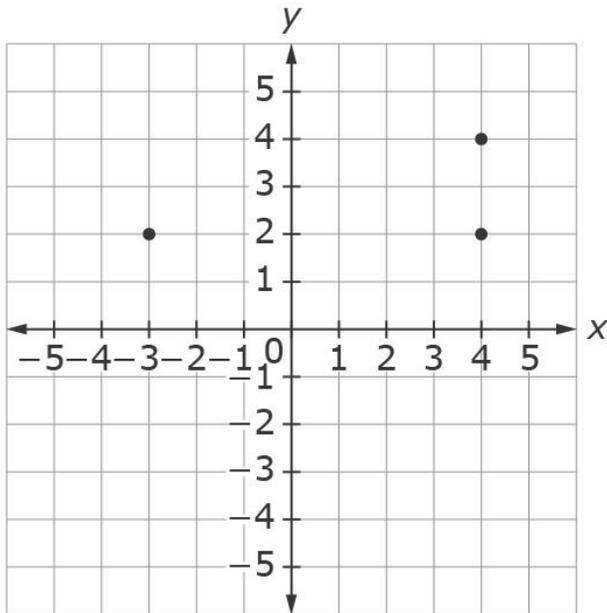
Rubric: (1 point) Student enters the correct numeric value for the distance (e.g., 7). Units of measure should be assumed from the stem.

Response Type: Equation/Numeric

Question Type 2: The unit on the grid represents 1 square mile.

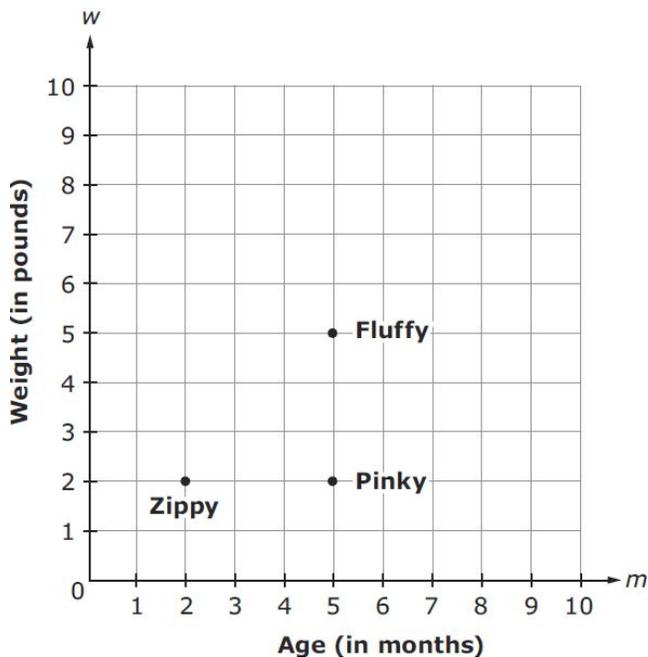
Each unit on the grid represents 1 square mile.

- Tom's house is located at (4, 2)
- A store is located at (-3, 2)
- Tom's neighbors are located at (4, 4).



What is the distance, in miles, from Tom's house to the store?

Question Type 3: Barry raises rabbits. The age, in months, and the weight, in pounds, of three of his rabbits are shown.



How many more pounds does Fluffy weigh than Pinky?

Rubric: (1 point) Student enters the correct numeric value for the distance (e.g., 7; 3). Units of measure should be assumed from the stem.

These pages were adapted from open source documents available on the Smarter Balanced Website: <http://www.smarterbalanced.org/assessments/development/> August 2016

Response Type: Equation/Numeric

Claim 3 Communicating Reasoning Question Banks

[Claim Descriptors and Targets](#)

Students can clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others.

Example 1

Linh said, “The opposite of 5 is -5 . The opposite of $\frac{2}{3}$ is $-\frac{2}{3}$. I think the opposite of a number is always negative.”

Linh’s claim is not true. Give an example of a number whose opposite is not a negative number.

Enter your answer in the response box.

Rubric: (1 point) The student enters a negative number or 0 in the response box.

Response Type: Equation/Numeric

Example 2

Lola said, “If n is a positive number, then the points $P = (n, n)$, $Q = (-n, n)$, $R = (-n, -n)$, and $S = (n, -n)$ are the vertices of a square in the coordinate plane.”

Select all of the statements that support Lola’s claim that the figure is a square.

- A. The number n is a whole number.
- B. The angles at P , Q , R and S , are all 90 degrees.
- C. The distances between P and Q , Q and R , R and S , and S and P are n units.
- D. The distances between P and Q , Q and R , R and S , and S and P are $2n$ units.

Rubric: (1 point) The student selects all of the statements that support Lola’s claim (B and D).

Response Type: Multiple Choice, multiple select response