Dear Family,

Your child will be learning about numbers throughout the school year. The math unit your child is beginning to study now introduces rational numbers. A rational number can be positive, negative, or zero. Examples of rational numbers include integers, fractions, and decimals.

Examples of Rational Numbers

Some of the lessons and activities in the unit will involve number lines. An example of a number line is shown below.
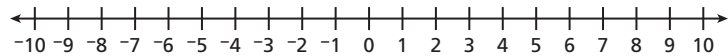
Integers

$^-8$ 0 $^+3$

Your child will learn to plot and locate points on a number line, and use a number line to compare and order numbers.
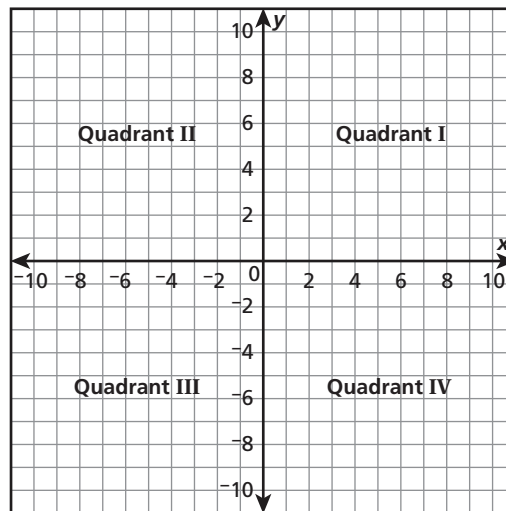
Fractions

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

This unit will also introduce your child to a four-quadrant coordinate plane, shown below. The plane is formed by the intersection of two number lines.

Decimals

$^-0.5$ 6.29

Examples of Ordered Pairs in the Coordinate Plane

(2, 1) (x, y) $(^-7, ^-4)$

In previous units, your child has plotted and located points for ordered pairs in Quadrant I of the coordinate plane. In this unit, your child will be working in all four quadrants of the plane.

If you have any questions or comments, please call or write to me.

Sincerely,
Your child's teacher

CA CC

Un vistazo general al contenido

Ejemplos de números racionales

Números enteros

$^-8$ 0 $^+3$

Fracciones

$^-\dfrac{1}{2}$ $\dfrac{3}{4}$

Decimales

$^-0.5$ 6.29

Ejemplos de pares ordenados en el plano de coordenadas

$(2, 1)$ (x, y) $(^-7, ^-4)$

Estimada familia,

Su hijo aprenderá diferentes conceptos relacionados con los números durante el año escolar. La unidad de matemáticas que estamos comenzando a estudiar presenta los números racionales. Un número racional puede ser positivo, negativo o puede ser cero. Ejemplos de números racionales incluyen enteros, fracciones, y decimales.

Algunas de las lecciones y actividades tendrán rectas numéricas. Abajo se muestra un ejemplo de una recta numérica.
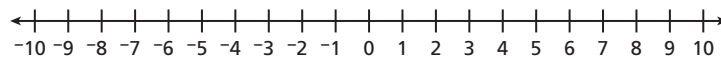
Su hijo aprenderá a localizar y marcar puntos en rectas numéricas. También aprenderá a usarlas para comparar y ordenar números.

En esta unidad también se introduce un plano de coordenadas dividido en cuatro cuadrantes, como el que se muestra abajo. El plano se forma por la intersección de dos rectas numéricas.
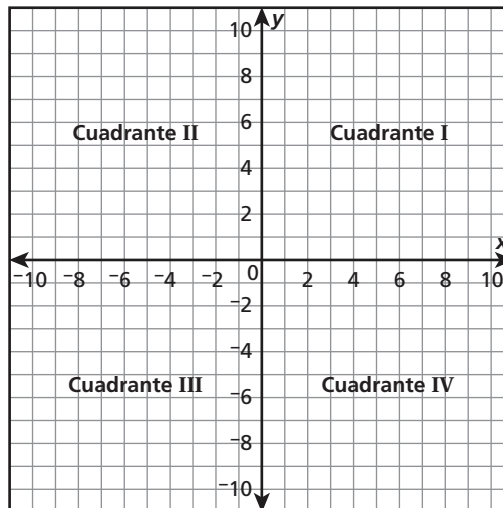
En unidades anteriores, su hijo ha localizado y marcado puntos para pares ordenados en el Cuadrante I del plano de coordenadas. En esta unidad trabajará en los cuatro cuadrantes del plano de coordenadas.

Si tiene preguntas o comentarios, por favor comuníquese conmigo.

Atentamente,
El maestro de su hijo

CA CC

En la Unidad 8 se aplican los siguientes estándares auxiliares, contenidos en los *Estándares estatales comunes de matemáticas con adiciones para California*: **6.NS.5, 6.NS.6, 6.NS.6a, 6.NS.6b, 6.NS.6c, 6.NS.7, 6.NS.7a, 6.NS.7b, 6.NS.7c, 6.NS.7d, 6.NS.8, 6.G.3,** y todos los de prácticas matemáticas.

▶ Discuss Real World Situations

Discuss each situation and diagram.

1. The cliff diver below is poised to dive from the top of a cliff that is 60 feet above sea level.

If the distance she travels underwater is about $\frac{1}{4}$ of the distance she travels above water, how would you describe her location at the deepest part of the dive?

_____

2. Protons and electrons are parts of an atom. A proton has a positive (+) electrical charge, and an electron has a negative (−) electrical charge.
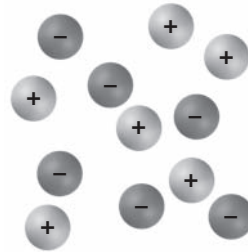
In this illustration, is there a positive electrical charge for every negative electrical charge? Explain.

_____

_____

3. A checking account has a balance of $80.

Check Number	Amount	Balance
		$80.00

Suppose a check is written for $100.

Check Number	Amount	Balance
		$80.00
409	$100.00	−$100.00

Using words, describe the new balance.

_____

_____

▶ Identify and Write Opposite Temperatures

Two numbers are **opposites** if they are the same distance from zero on a number line, but in opposite directions. If two temperatures are opposites, they are the same distance from zero on a thermometer. If one temperature is above zero, the other will be below zero. The opposite of zero is zero.

Each arrow on the Fahrenheit thermometer points to a temperature. Write the temperature.

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

Each arrow on the Celsius thermometer points to a temperature. Write the *opposite* temperature.
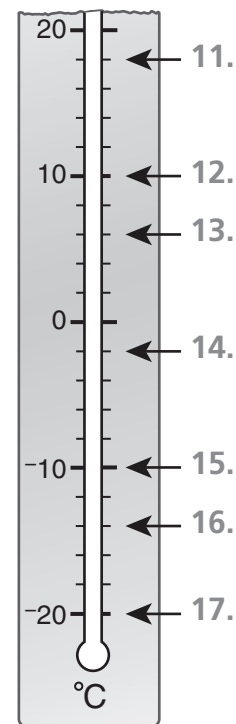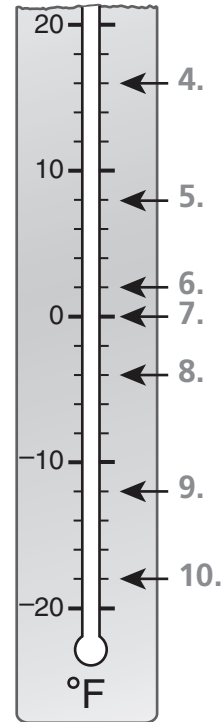
11. _____

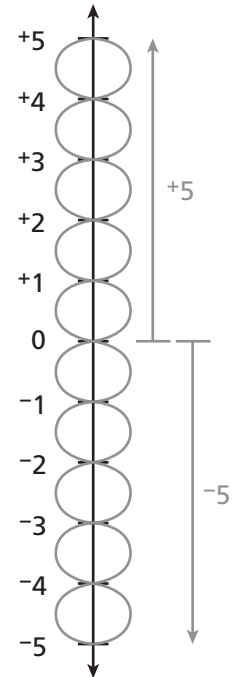12. _____
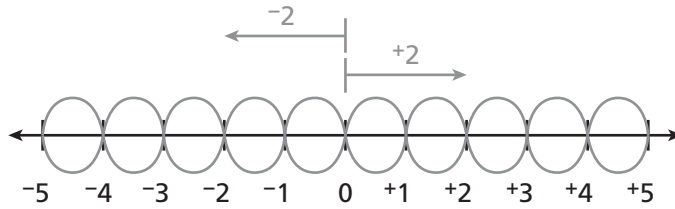
13. _____

14. _____

15. _____

16. _____

17. _____

Negative Numbers in the Real World

CA CC Content Standards **6.NS.6, 6.NS.6a, 6.NS.6c**
Mathematical Practices **MP.3, MP.4, MP.6**

▶ Understand Number Lines

The **origin** of a number line is the point at 0.
Positive numbers are to the right of, or above,
the origin. **Negative numbers** are to the left of,
or below, the origin.

The set of **integers** includes whole numbers,
their opposites, and zero. Integers represent both
distance measured in unit lengths (shown by the
numeral), and *direction* (shown by + or −).

1. What do the loops on each number line show?

   _____

2. On the horizontal number line, how do the arrows for
   $^+2$ and $^-2$ show both *direction* and *distance*?

   _____

   _____

3. On the vertical number line, how do the arrows for
   $^+5$ and $^-5$ show both *direction* and *distance*?

   _____

   _____

4. Are $^+2$ and $^-2$, and $^+5$ and $^-5$ opposite integers? Explain.

   _____

   _____

5. What do the arrows at the end of each number line mean?

   _____

6. Write a 3-digit number and its opposite. _____

► Distance and Points on a Number Line

One way to represent distance on a number line is to circle unit lengths. Another way is to mark points. The number lines on this page use tick marks and points to show the origin and unit lengths.

7. One point on each number line is not labeled. Label each point with an integer, and explain why you chose that integer.

_____

_____

8. On each number line, draw a point at each tick mark. Label each point.
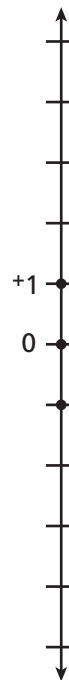
► What's the Error?

Dear Math Students,

Today I drew two number lines to show the integers from +2 to −2.

Number Line A   Number Line B

+2   +1   0   −1   −2
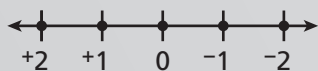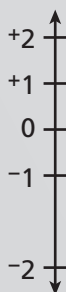
My friends say that I did not draw either number line correctly.

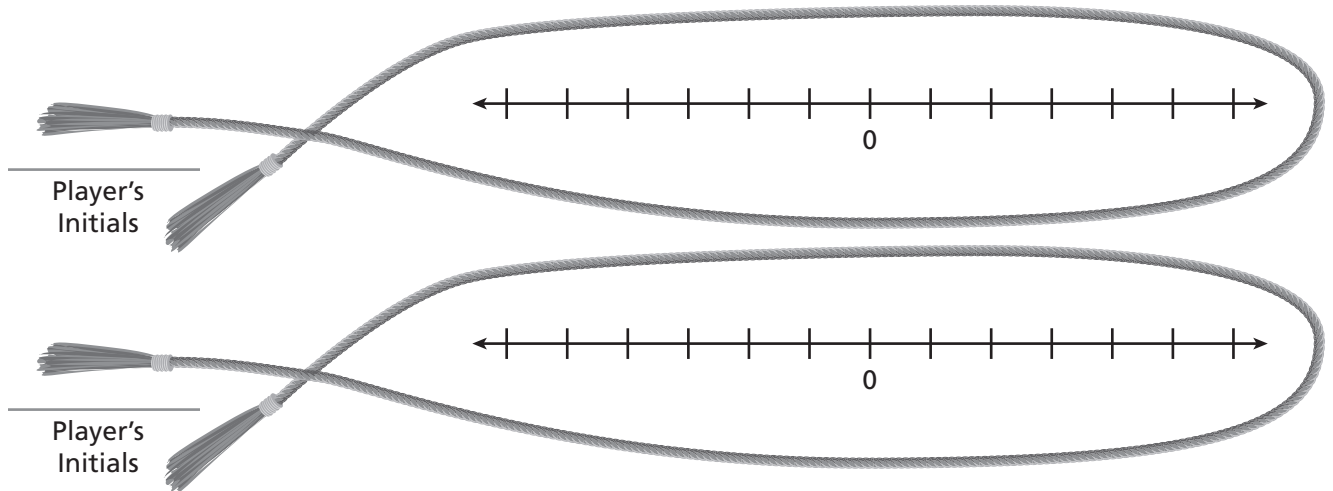Can you tell me what I did wrong?

Your friend,

Puzzled Penguin

9. For each number line, write a response to Puzzled Penguin.

Number Line A: _____

_____

Number Line B: _____

_____

▶ Integer Number Line Game

Player's
Initials

0

Player's
Initials

0

Instructions for Each Pair

Using stickers, label one blank number cube with the integers from 1 to 6, and label the other cube with three + signs and three − signs.

Each player labels one horizontal number line with the integers from ⁻6 to ⁺6.

With your partner, take turns rolling both cubes and plotting a point on your number line to show the outcome. Say:

- *I am plotting a point at* (say your integer).

- *My integer is* (say *positive* or *negative*), *so it is to the* (say *right* or *left) of zero*.

- *It is* (say the number) *unit lengths from zero.*

If the outcome is a point you already plotted, roll the +/− cube if you need the opposite outcome, and say:

- *I want a negative sign so that* (say your integer) *changes to its opposite, which is* (say the opposite integer).

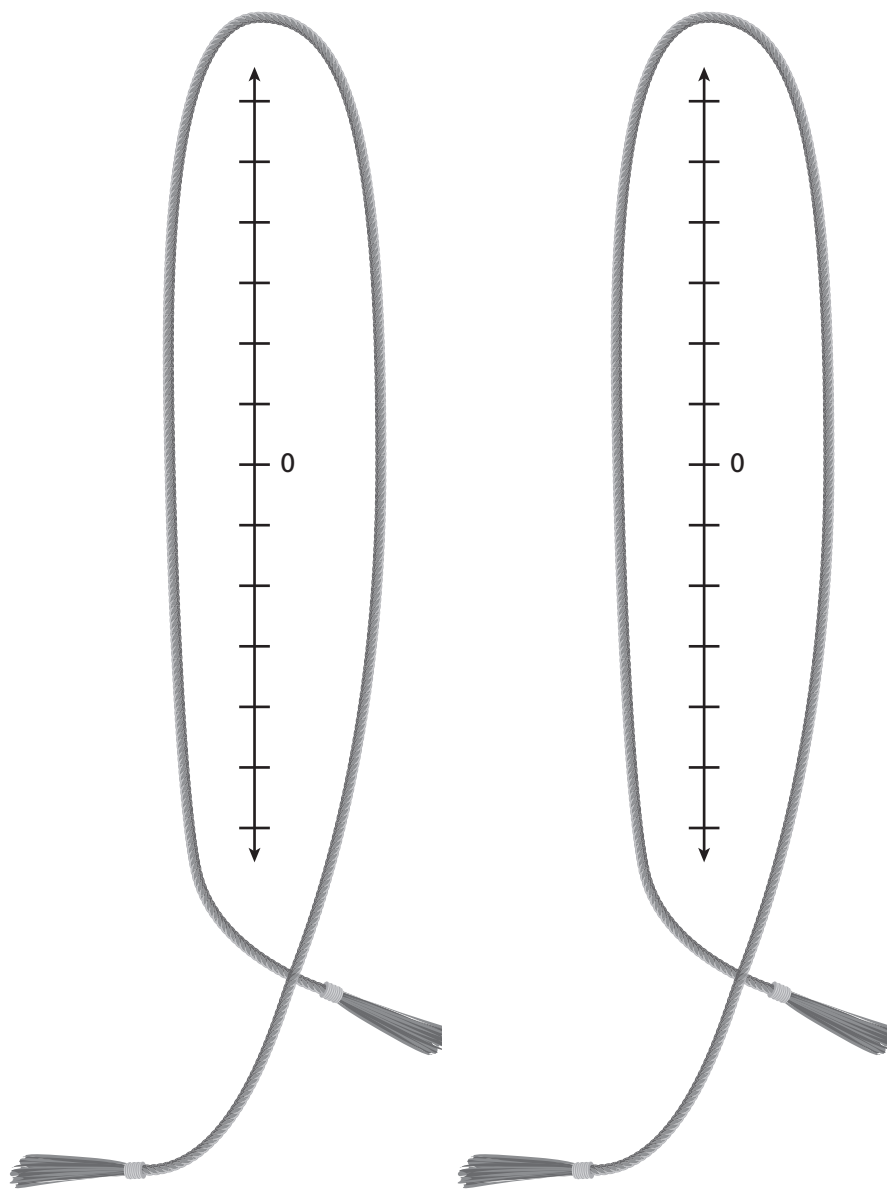If you roll a negative sign, draw a point at the opposite of your original integer.

The first player to draw a point at every positive and negative integer on the number line wins the game.

► Integer Number Line Game (continued)

Repeat the game using the vertical number lines.
This time say *above* or *below zero* instead of *to
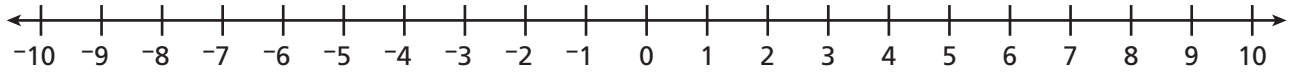the right* or *to the left of zero*.

0

0

Player's Initials

Player's Initials

CA CC Content Standards **6.NS.5**, **6.NS.6a**, **6.NS.6c**, **6.NS.7**, **6.NS.7a**, **6.NS.7b**, **6.NS.7c**, **6.NS.7d**
Mathematical Practices **MP.1**, **MP.3**, **MP.6**, **MP.8**

► Compare and Order Integers

Use the number line below for Exercises 1–22.

$$\overset{\longleftrightarrow}{\underset{\text{−10 −9 −8 −7 −6 −5 −4 −3 −2 −1 0 1 2 3 4 5 6 7 8 9 10}}{\rule{0pt}{0pt}}}$$

This number line has two directions—left and right.

1. As you move to the right on the number line, do the numbers increase or decrease? _____

2. As you move to the left on the number line, do the numbers increase or decrease? _____

3. If two numbers are placed on a number line, is the number farther to the right the *greater* number, or the *lesser* number? _____

4. If two numbers are placed on a number line, is the number farther to the left the *greater* number, or the *lesser* number? _____

Compare. Write <, >, or =.

5. $^-1 \bigcirc ^-4$ 6. $2 \bigcirc ^-2$ 7. $4 \bigcirc 5$ 8. $^-5 \bigcirc 5$

9. $0 \bigcirc ^-7$ 10. $^-3 \bigcirc ^-2$ 11. $^-2 \bigcirc ^-6$ 12. $^-4 \bigcirc 0$

13. $^-3 \bigcirc 1$ 14. $^-8 \bigcirc ^-8$ 15. $9 \bigcirc 7$ 16. $^-1 \bigcirc ^-7$

Write the numbers in order from *least* to *greatest*.

17. $^-2, 0, ^-1$ 18. $6, ^-3, 7$ 19. $^-9, ^-1, ^-6$

_____   _____   _____

Write the numbers in order from *greatest* to *least*.

20. $^-3, 0, 5, ^-1$ 21. $^-10, ^-7, ^-5, 6$ 22. $^-1, ^-9, 0, ^-2$

_____   _____   _____

▶ Absolute Value

The symbol | | is used to indicate absolute value.
Absolute value is a measure of the distance a
number is from zero on a number line.

This number line shows that 4 is a distance of
4 unit lengths from zero.

Because 4 is 4 unit lengths from zero, the absolute value
of 4 is 4, and we record that fact by writing $|4| = 4$.

Since absolute value is a measure of distance, and the
distance between two points can never be a negative
number, absolute value is never a negative number.

This number line shows that ⁻3 is 3 unit lengths from zero.

Because ⁻3 is 3 unit lengths from zero, the absolute value
of ⁻3 is 3, and we record that fact by writing $|{-3}| = 3$.

Absolute value is a measure of the distance a number is from
zero on a number line. So, the absolute value of zero is zero.

Write the absolute value of each number.

23. $|5| = $ _____   **24.** $|{-1}| = $ _____   **25.** $|2| = $ _____   **26.** $|{-4}| = $ _____

27. $|{-2}| = $ _____   **28.** $|3| = $ _____   **29.** $|0| = $ _____   **30.** $|{-5}| = $ _____

Rewrite each sentence using only integers and symbols.

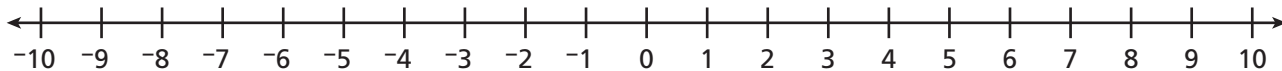**31.** The absolute value of positive ten equals ten. _____

32. The absolute value of negative eighteen equals eighteen. _____

33. The absolute value of twenty-five equals twenty-five. _____

34. The absolute value of negative thirty is thirty. _____

► Absolute Value and Opposites

Use the number line below for Exercises 35–37.

$$\overset{+\ \ +}{-10\ \ -9\ \ -8\ \ -7\ \ -6\ \ -5\ \ -4\ \ -3\ \ -2\ \ -1\ \ 0\ \ 1\ \ 2\ \ 3\ \ 4\ \ 5\ \ 6\ \ 7\ \ 8\ \ 9\ \ 10}$$

35. Plot a point at 8 and plot a point at $^-8$.
What is the absolute value of each number? $|8| = $ _____ $|{}^-8| = $ _____

36. Are 8 and $^-8$ opposite integers? Explain why or why not.

_____

37. Write a generalization about the absolute values of opposite integers.

_____

► Use Absolute Value to Compare

Use absolute value to compare the numbers. Then write <, >, or =.

38. $^-5$ ◯ $^-4$ **39.** $^-1$ ◯ $^-3$ **40.** $^-2$ ◯ $^-5$ **41.** $^-6$ ◯ $^-6$

► What's the Error?

Dear Math Students,

I was asked to use absolute value to compare two positive integers and two negative integers. The positive integers were 10 and 5, and the negative integers were $^-10$ and $^-5$.
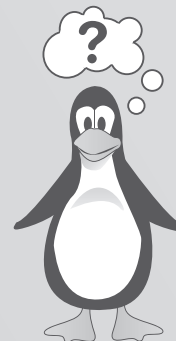
I know that 10 is the absolute value of both 10 and $^-10$, and I know that 5 is the absolute value of both 5 and $^-5$.

I decided that the greater absolute value is the greater number. So I wrote 10 > 5 and $^-10$ > $^-5$.

Can you explain to me what I did wrong?

Your friend,

Puzzled Penguin

42. Write a response to Puzzled Penguin.

_____

▶ **Compare and Order Integers in Real World Situations**

Solve. Use the situation below for Exercises 43 and 44.

A thermometer shows a temperature of ⁻10°F. A nearby thermometer shows a temperature of ⁻12°F.

43. Explain how a number line can be used to find the *warmer* temperature. Then name the warmer temperature.

_____

_____

_____

44. Explain how absolute value can be used to find the *cooler* temperature. Then name the cooler temperature.

_____

_____

_____

Solve. Use the situation below and the table for Exercises 45–47.

In a game played by five friends, points can be added to a score, or points can be taken away. The table shows the points earned by each player halfway through the game. The game ends when a player earns 50 points.

Player	Score
A	⁻15
B	30
C	0
D	15
E	⁻35

45. The scores of which two players are opposite integers? _____

46. Which player needs to earn the least number of points to win the game? Explain how a number line can be used to find the answer.

_____

_____

47. Write the scores in order from least to greatest.

_____

CA CC Content Standards **6.NS.6, 6.NS.6b, 6.NS.6c, 6.NS.8**
Mathematical Practices **MP.1, MP.3, MP.4, MP.6, MP.8**

Vocabulary

coordinate plane

▶ Graph in the Coordinate Plane

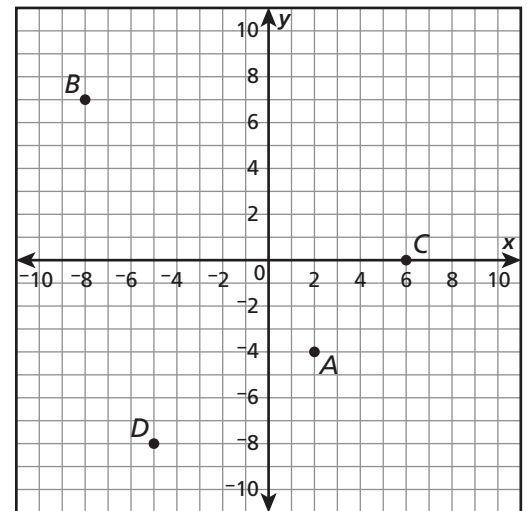A **coordinate plane** is formed by two perpendicular number lines that intersect at the origin, 0.

Use the coordinate plane at the right for Exercises 1–8.

Write the location of each point.

1. Point *A* _____

2. Point *B* _____

3. Point *C* _____

4. Point *D* _____

Plot and label each point.

5. Point *E* at (0, 4)

6. Point *F* at (⁻9, ⁻2)

7. Point *G* at (7, 9)

8. Point *H* at (9, ⁻6)
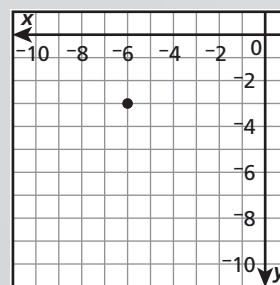
▶ What's the Error?

Dear Math Students,

I was asked to graph a point at (⁻3, ⁻6) in the coordinate plane. My work is shown at the right.

I was told that I did not plot the point in the correct location. Can you explain to me what I did wrong, and explain how to plot the point correctly?

Your friend,

Puzzled Penguin

9. Write a response to Puzzled Penguin.

_____

_____

_____

▶ Quadrants of the Coordinate Plane

The two perpendicular number lines (the *x*- and *y*-axes) divide the coordinate plane into four regions called **quadrants**. Beginning in the upper right quadrant and moving in a counterclockwise direction, the quadrants are numbered using the Roman numerals I, II, III, and IV.
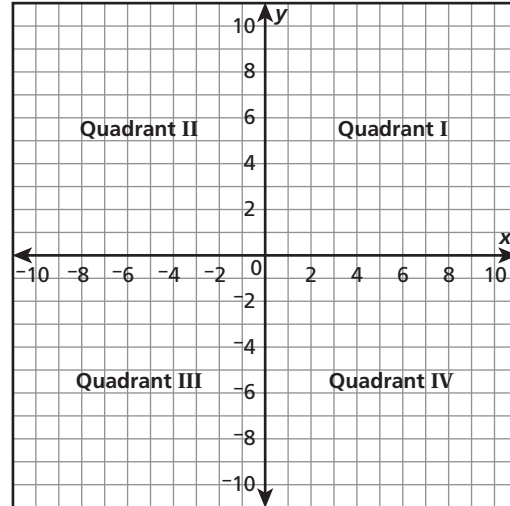
In which quadrant is each point located?

10. (5, 4) _____

11. (⁻5, ⁻4) _____

12. (5, ⁻4) _____

13. (⁻5, 4) _____

A coordinate is a number that determines the horizontal or vertical position of a point in the coordinate plane. An ordered pair consists of two coordinates.

14. The signs of the coordinates of an ordered pair are (−, +). In which quadrant is the point located? Explain your answer.

_____

_____

_____

15. The signs of the coordinates of an ordered pair are (+, −). In which quadrant is the point located? _____

16. The signs of the coordinates of an ordered pair are (−, −). In which quadrant is the point located? _____

17. The signs of the coordinates of an ordered pair are (+, +). In which quadrant is the point located? _____

18. On the coordinate plane above, plot Point *T* at (0, 0).

Integers and the Coordinate Plane

▶ The Coordinate Plane and a Cross-Section

A research team is studying cave crickets. A drawing of a cross-section of one passage of the cave is shown on the coordinate plane at the right. Points *A*, *B*, *C*, *D*, and *E* represent locations in the passage where research is being performed.
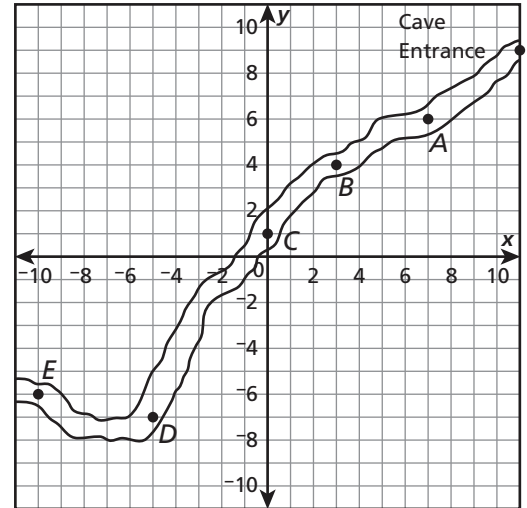
19. Write an ordered pair to represent each research location, and the location of the cave entrance.

_____

_____

20. The researchers are thinking about performing research in a new location. Does a location that has no sign for its *x*-coordinate and a negative *y*-coordinate represent a possible research location? Why or why not?
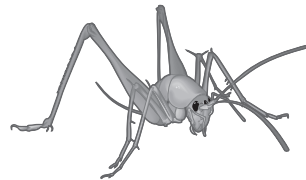
A typical cave cricket has up to a 2-inch-long body and 4-inch-long hind legs.

_____

_____

Suppose the side of each unit square in the coordinate plane represents 10 feet. The elevation of the cave entrance is 640 feet above sea level. The five research locations in the cave each represent an elevation that is less than 640 feet above sea level.

21. What is the location of Point *A*, and how far below the cave entrance is its elevation?

_____

22. Which research location has an elevation of 560 feet above sea level? What ordered pair describes its location?

_____

23. Which research location shown is at the lowest elevation? What ordered pair describes its location, and what is its elevation?
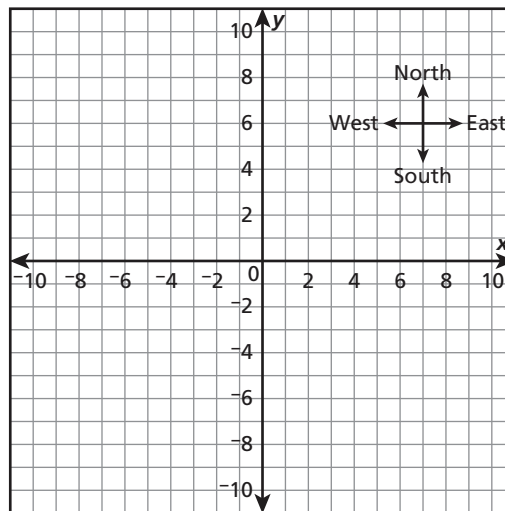
_____

▶ The Coordinate Plane and a Map

The coordinate plane below represents a map. Use the map to solve these problems.

24. A family's home is located at (4, ⁻5). Draw a point at that location, and write "Home" next to the point.

25. The family begins their vacation by leaving home and driving to a restaurant at (⁻7, ⁻5). Draw a point at that location, and write "Restaurant" next to the point. In what direction did the family drive?

_____

26. From the restaurant, the family drove to a campground at (⁻7, 1). Draw a point at that location, and write "Campground" next to the point. In what direction did the family drive?

_____

27. From the campground, the family drove to a rest area at (⁻3, 1). Draw a point at that location, and write "Rest Area" next to the point. In what direction did the family drive?

_____

28. From the rest area, the family drove to (⁻3, 9), to (2, 9), and then to their destination at (2, 10). Plot points at each location, and write "Destination" next to the point at (2, 10). During this portion of the trip, in which directions did the family *not* drive?
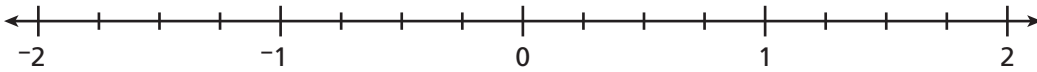
_____

29. Starting from home, draw line segments to show the path the family traveled. Suppose that each side of every unit square represents 25 miles. What is a reasonable estimate of the number of miles the family traveled from home to their destination?

_____

Class Activity

CA CC Content Standards **6.NS.6, 6.NS.6a, 6.NS.6c**
Mathematical Practices **MP.2, MP.3, MP.4, MP.6, MP.8**

Vocabulary

rational number

▶ Fractions on a Number Line

Use the number line below for Exercises 1–8.

1. How many equal lengths are between 0 and 1? _____

2. What fractional unit does the number line show? _____

3. Label each tick mark of the number line with a fraction
   or mixed number in simplest form.

4. Draw a point at $^-\frac{1}{4}$. Label it A.

5. Draw a point at $\frac{3}{4}$. Label it B.

6. Draw a point at $^-1\frac{1}{2}$. Label it C.

7. Draw a point at $\frac{6}{4}$. Label it D.

A **rational number** is any number that can be expressed as a
fraction $\frac{a}{b}$, where a and b are integers and $b \neq 0$.

8. Do Points C and D represent *opposite* rational numbers? Explain.
   Draw arrows above the number line to justify your answer.

_____

_____

Write the opposite rational number.

9. $^-\frac{2}{3}$ _____

10. $\frac{7}{10}$ _____

11. $^-\frac{11}{12}$ _____

12. $\frac{1}{6}$ _____

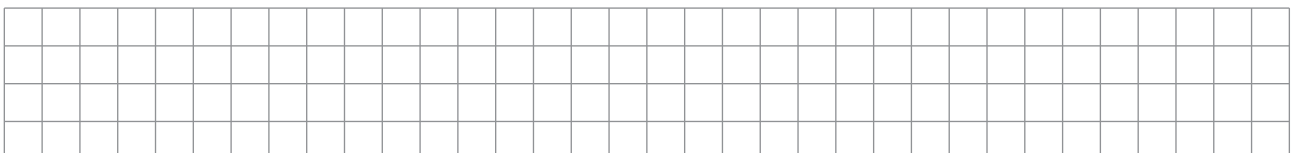**Simplify.**

13. $^-\left(^-\frac{3}{5}\right)$ _____

14. $^-\left(1\frac{3}{4}\right)$ _____

15. $^-\left(^-1\frac{2}{5}\right)$ _____

16. $^-\left(\frac{4}{7}\right)$ _____

Draw and label a number line from $^-2$ to 2 by thirds.
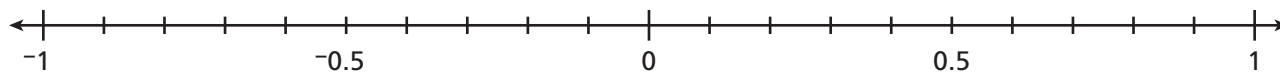**Then use it to plot and label each point.**

17. Point E at $^-1\frac{2}{3}$

18. Point F at $1\frac{1}{3}$

19. Point G at $\frac{2}{3}$

20. Point H at $^-\frac{1}{3}$

► **Decimals on a Number Line**

Use the number line below for Exercises 21–26.

21. How many equal lengths are between 0 and 1? _____

22. What decimal place does the number line show? _____

23. Label each tick mark on the number line with a decimal.

24. Draw a point at ⁻0.3. Label it *B*.   **25.** Draw a point at 0.7. Label it *C*.

26. Draw a point at 0.2 and label it *M*. Draw a point at its opposite and label it *N*. Draw arrows above the number line to show that the numbers are opposites.

► **What's the Error?**

Dear Students:

I was asked to write a sentence about opposite numbers. Here's what I wrote:

A number and its opposite are the same number.

I wrote the sentence because I know that the opposite of zero is zero. Since the opposite of zero is zero, I thought it made sense for me to say that a number and its opposite are the same number. Can you help correct my thinking?
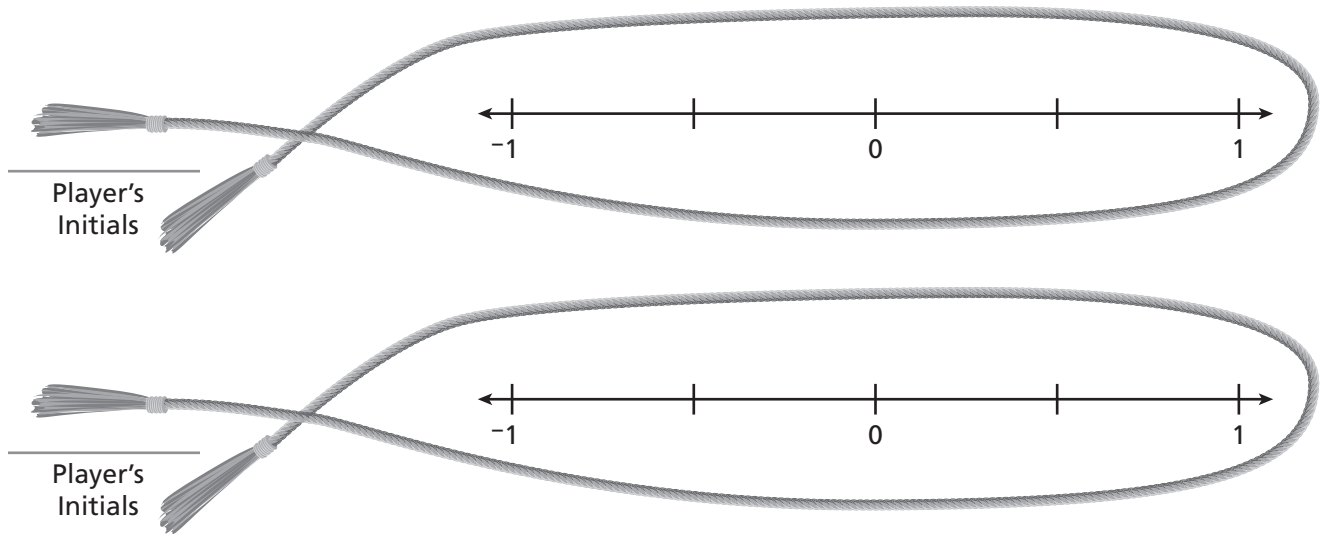
Your friend,

Puzzled Penguin

27. Write a response to Puzzled Penguin.

_____

_____

► Rational Numbers Number Line Game

Player's
Initials

Player's
Initials

Instructions for Each Pair

Label a blank number cube with these stickers: $^-1$; $^-0.5$; 0; $\frac{1}{2}$; 1; Roll Again.

Each player labels the tick marks on one horizontal number line with a decimal and a fraction in simplest form.

With your partner, take turns rolling the cube and plotting a point on your number line to show the outcome. Say:

- *I am plotting a point at* (say your rational number).

- *My rational number is* (say *positive* or *negative*), *so it is to the* (say *right* or *left*) *of zero.*

- *It is* (say the number) *unit length(s) from zero.*

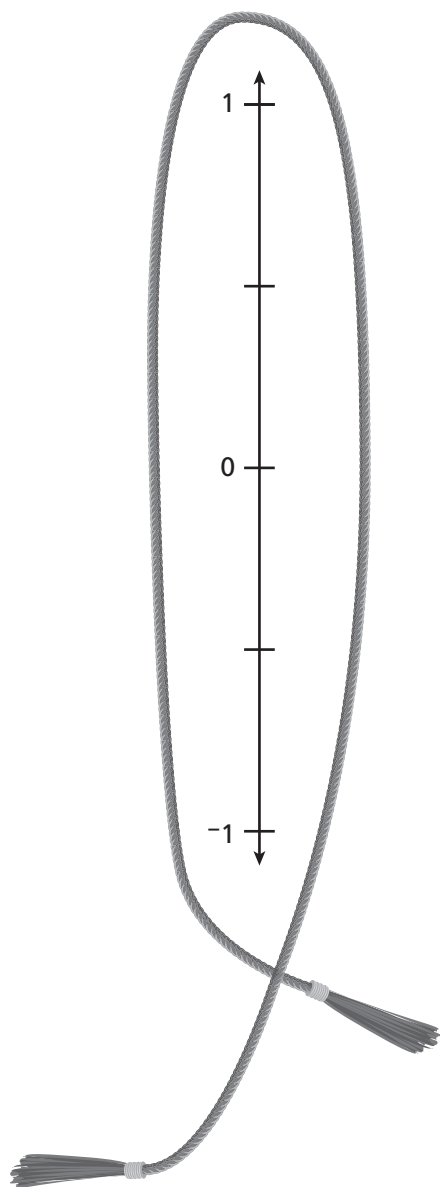If you roll 0, draw a point at 0. *Roll Again* gives you another turn.

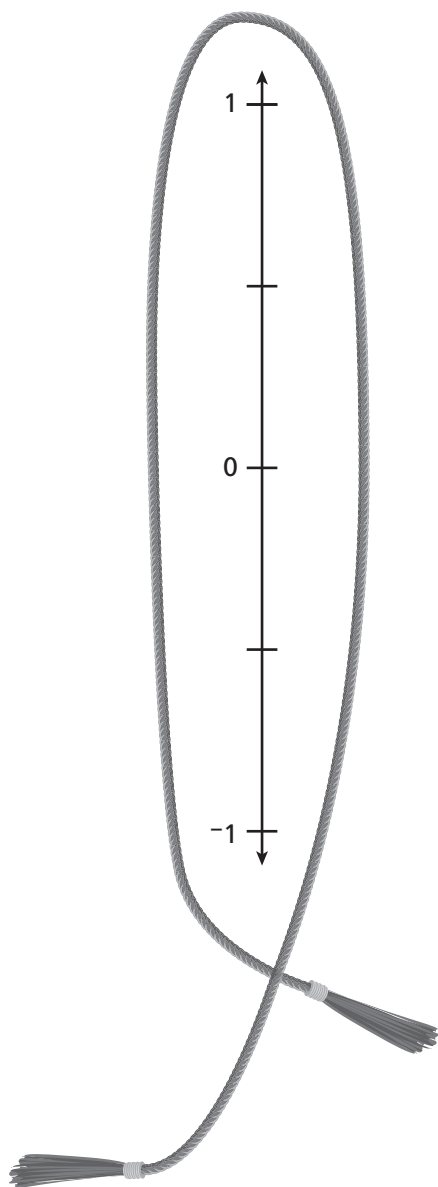The first player to draw a point at every tick mark on the number line wins the game.

► Rational Numbers Number Line Game (continued)

Repeat the game using the vertical number lines.
This time say *above* or *below zero* instead of *to
the right* or *to the left of zero*.

Player's
Initials

Player's
Initials

CA CC Content Standards **6.NS.6, 6.NS.7, 6.NS.7a, 6.NS.7b, 6.NS.7c, 6.NS.7d**
Mathematical Practices **MP.1, MP.3, MP.6, MP.8**

▶ Compare and Order Rational Numbers

A horizontal number line has two directions—left and right.
A vertical number line has two directions—above and below.

1. Suppose two rational numbers are plotted on a
   horizontal number line. Is the number farther to the
   left the greater number, or the lesser number? _____

2. Suppose two rational numbers are plotted on a
   vertical number line. Is the number that is above the
   other number the greater number, or the lesser number? _____

Use the number line below for Exercises 3–20.
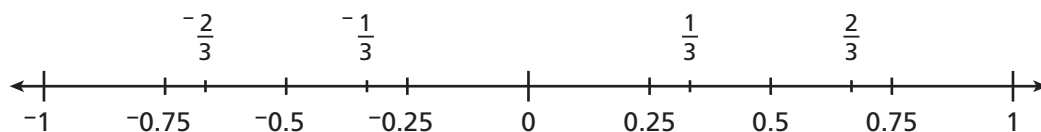
Compare. Write <, >, or =.

3. $^-0.5$ ◯ $^-1$

4. $\frac{2}{3}$ ◯ 0.75

5. 0 ◯ $^-\frac{1}{3}$

6. $^-0.5$ ◯ $^-0.25$

7. $\frac{1}{3}$ ◯ $^-\frac{1}{3}$

8. $\left|^-0.5\right|$ ◯ $\left|^-0.75\right|$

9. $^-1$ ◯ 1

10. $\left|^-\frac{2}{3}\right|$ ◯ $\left|^-0.5\right|$

11. $^-\frac{1}{3}$ ◯ $^-(^-0.5)$

12. $\frac{2}{3}$ ◯ $^-\left|^-\frac{2}{3}\right|$

13. $\frac{1}{3}$ ◯ $^-(^-0.75)$

14. $\frac{1}{4}$ ◯ $^-(^-0.25)$

Write the numbers in order from *greatest* to *least*.

15. $^-0.25, ^-1, ^-0.75$

16. $\frac{1}{3}, ^-\frac{2}{3}, ^-\frac{1}{3}$

17. $0, \frac{2}{3}, ^-0.5$

_____   _____   _____

Write the numbers in order from *least* to *greatest*.

18. $\frac{1}{3}, 0, ^-0.5, ^-\frac{1}{3}$

19. $^-\frac{2}{3}, 0, ^-1, ^-0.5$

20. $^-0.75, \frac{2}{3}, 0.5, ^-0.25$

_____   _____   _____

▶ Compare and Order Rational Numbers in the Real World

Solve. Use the situation below for Exercises 21–23.

At the beginning of a science experiment, the temperature of a liquid was ⁻19.4°F. Five minutes later, the temperature was ⁻8.7°F.

21. Suppose you plot ⁻19.4 on a horizontal number line. Explain how knowing the location of ⁻8.7 can help you decide if the temperature increased or decreased.

_____

_____

_____

22. Explain how a number line can be used to find the cooler temperature. Then name the cooler temperature.

_____

_____

_____

23. Explain how absolute value can be used to find the *warmer* temperature. Then name the warmer temperature.

_____

_____

_____

Solve. Use the situation below and the table for Exercise 24.

Five classmates are playing a game that involves rational numbers.

Whenever possible, the scores are recorded in terminating decimals. If the decimals are repeating, the scores are recorded in fractions.

The table at the right shows the points earned by each player halfway through the game.

Player	Score
A	0.5
B	$-\frac{1}{3}$
C	1.25
D	$-\frac{5}{6}$
E	⁻0.6

24. Write the scores in order from greatest to least. _____

CA CC Content Standards **6.NS.5, 6.NS.6b, 6.NS.6c, 6.NS.8, 6.G.3**
Mathematical Practices **MP.1, MP.3, MP.6, MP.7, MP.8**

Vocabulary

reflected point

▶ Distance in the Coordinate Plane

On the coordinate grid, an airport is located at Point A.
Points B and C are airplanes. Use the grid for Exercises 1–4.
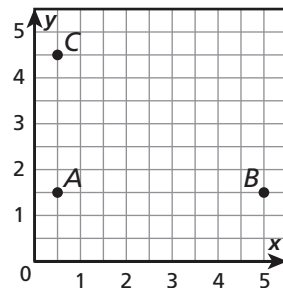
1. Write the location of each point.

   Point A _____   Point B _____   Point C _____

2. Explain how subtraction can be used to find the number
   of unit lengths the plane at Point B is from the airport.
   Then write the distance.

   _____

   _____

3. Explain how subtraction can be used to find the number
   of unit lengths the plane at Point C is from the airport.
   Then write the distance.

   _____

   _____

4. Plane B is 225 miles east of the airport. How many
   miles north of the airport is plane C?   _____

▶ Reflections in the Coordinate Plane

A given point and its **reflected point** are mirror images across the
x-axis, the y-axis, or both axes of the coordinate plane.

5. Suppose a point at $(-1\frac{3}{4}, -2\frac{1}{4})$ is reflected across the x-axis. Explain how
   to find the location of the reflected point, and then write its location.

   _____

   _____

6. Suppose a point at $(1\frac{1}{2}, -1\frac{1}{4})$ is reflected across the y-axis. Explain how
   to find the location of the reflected point, and then write its location.

   _____

   _____

▶ Graph Real World Situations

Victor's checking account has a balance of $10 and is assessed a $2 service charge at the end of each month.

7. Suppose Victor never uses the account. Complete the table below to show the balance in the account each month for 6 months. Then use the data to plot points on the coordinate plane to show the decreasing balance over time.

Month	Balance (in dollars)
0	10
1	8
2	6
3	
4	
5	
6	
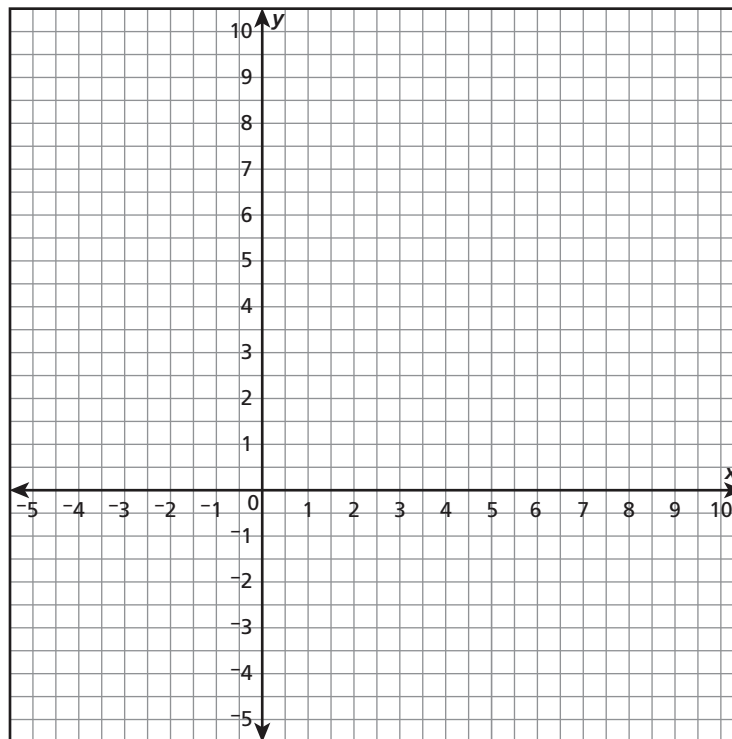
8. Add points to the graph showing what Victor's balance would be each month if the service charge was $2.50, instead of $2.00.

9. How do the graphs for the $2.00 service charge and the $2.50 service charge compare?

_____

_____

_____

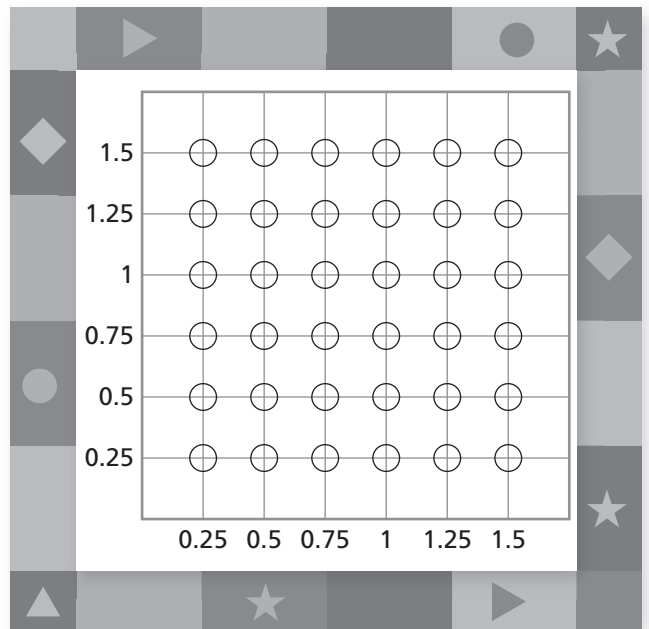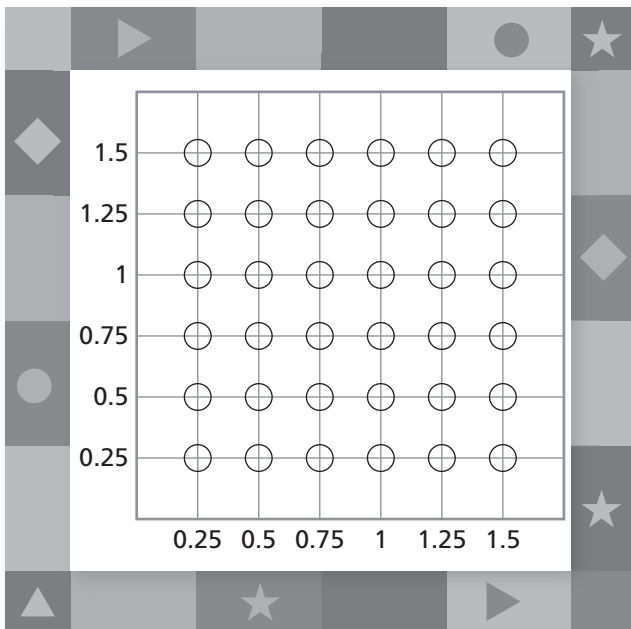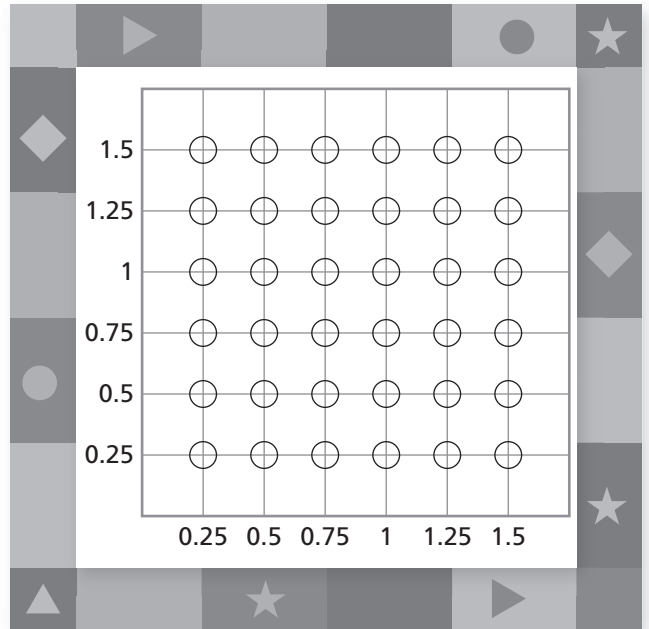# ► Coordinate Plane Game

Instructions for Each Pair

Using stickers, label each of two blank number cubes 0.25, 0.5, 0.75, 1, 1.25, and 1.5.

With your partner, take turns rolling both cubes and shading a circle or circles on your grid to show the result. For example, if you roll 0.25 and 1.5, shade the circle at (0.25, 1.5) and the circle at (1.5, 0.25).

The first player to shade all of the circles on his or her grid wins the game.

Use the grids below to play the game two more times.

Rational Numbers and the Coordinate Plane

CA CC Content Standards **6.NS.5, 6.NS.6b, 6.NS.6c, 6.NS.8**
Mathematical Practices **MP.1, MP.2, MP.7**

▶ Math and Global Positioning

On Earth, latitude is measured north and south of the Equator. Longitude is measured east and west of the Prime Meridian. Latitude and longitude is a coordinate system that enables every location on Earth to be identified by an ordered pair of numbers. A Global Positioning System (GPS) uses this coordinate system.
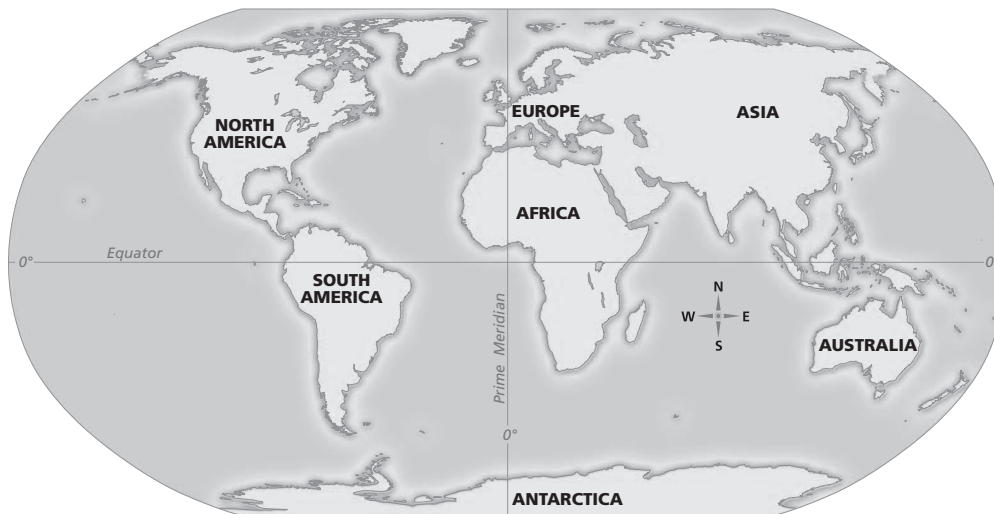
The first coordinate in an ordered pair is a measure of latitude. If a location is north of the Equator, the sign of the coordinate is +. If a location is south of the Equator, the sign of the coordinate is −.

The second coordinate in an ordered pair is a measure of longitude. If a location is east of the Prime Meridian, the sign of the coordinate is +. If a location is west of the Prime Meridian, the sign of the coordinate is −.

For example, the signs of the coordinates that identify the location of Chicago, Illinois, are (+, −). The first coordinate is + because Chicago is north of the Equator. The second coordinate is − because Chicago is west of the Prime Meridian.

Write the signs of the coordinates that identify the location of each country.
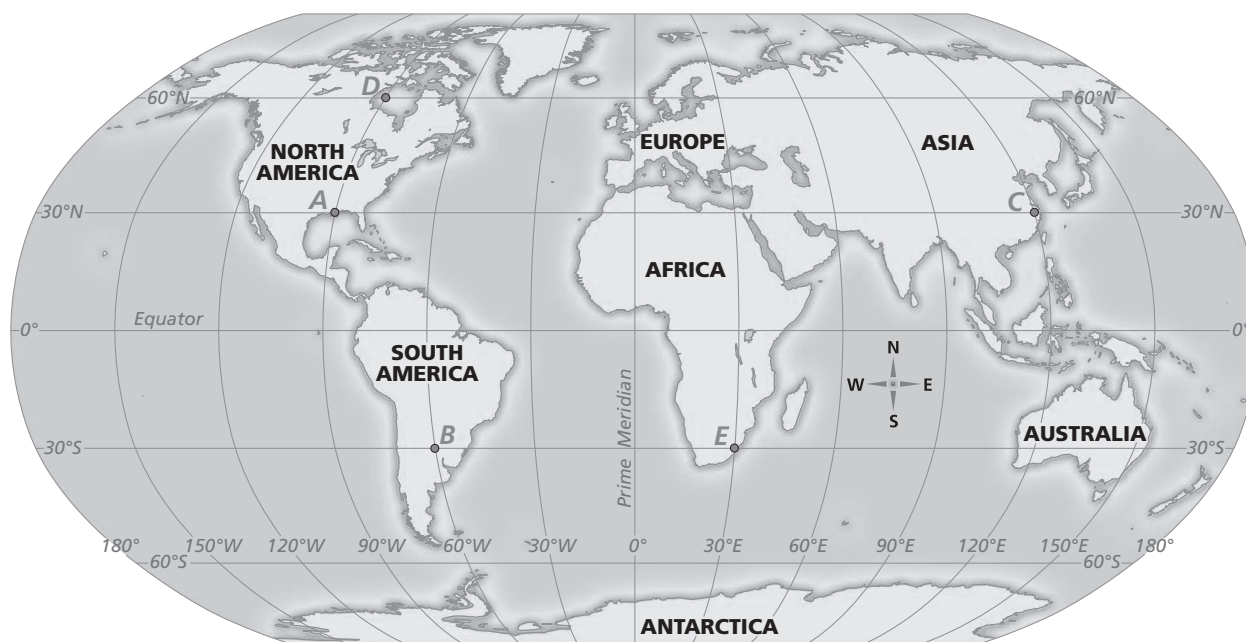
1. Canada _____

2. Australia _____

3. Argentina _____

4. India _____

▶ Locations and Ordered Pairs

In addition to a + or − sign, each coordinate of an ordered pair also identifies a number of degrees. The maximum number of degrees for the first coordinate, or measure of latitude, is 90°. The maximum number of degrees for the second coordinate, or measure of longitude, is 180°.

On the map above, the city of New Orleans, Louisiana is located near Point *A*. Since Point *A* is 30° north of the Equator, and 90° west of the Prime Meridian, the ordered pair ($^+$30°, $^-$90°) identifies the location of New Orleans.

Write an ordered pair to identify each location. Be sure to include a sign and a number of degrees for each coordinate you write.

5. The city of Goya, Argentina, located near Point *B*: _____

6. The city of Shanghai, China, located near Point *C*: _____

7. A ship in Hudson Bay, Ontario, located near Point *D*: _____

8. The city of Durban, South Africa, located near Point *E*: _____

1. Write each number on the tiles in the box below the term that describes it.

⁻3	0
0.3	⁻3.5
$\frac{1}{3}$	3

Integer	Non-Integer

2. Which expressions simplify to 6? Select all that apply.

(A) ⁻(6)

(B) ⁻(⁻6)

(C) ⁺6

(D) ⁻|⁻6|

3. Rene identified the numbers in each number pair as opposites.

| 1.5 and ⁻1.5 | | 4.1 and 1.4 |

Is Rene correct? Explain your answer in terms of a number line.

4. Circle the numbers that are less than ⁻3.

| ⁻7 | 0 | ⁻1 | 1 | ⁻2 | ⁻3.5 | 2 | ⁻5½ |

5. Suppose two points in the coordinate plane have the same x-coordinate but different positive y-coordinates. Explain how subtraction can be used to find the distance between the points.
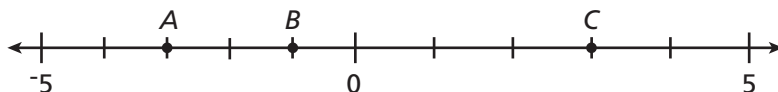
6. How will the x- and y-coordinates of a point in Quadrant I of the coordinate plane change if the point is reflected across the x-axis?
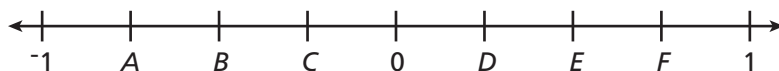
7. For numbers 7a–7c, select True or False for each statement.

a. Point *A* is located at 7. ○ True ○ False

b. Point *B* is located at ⁻1. ○ True ○ False

c. Point *C* is located at 2. ○ True ○ False

8. Where is each number located on the number line? Write the letter.

0.25 _____ $-\dfrac{1}{2}$ _____

0.75 _____ $-\dfrac{3}{4}$ _____

$-\dfrac{1}{4}$ _____   0.5 _____

For numbers 9–12, select Yes or No for each question.

9. Is ⁻3.1 > ⁻6.8? ○ Yes ○ No

10. Is 2 > ⁻2? ○ Yes ○ No

11. Is ⁻10 > 114? ○ Yes ○ No

12. Is − (⁻5) > ⁻5? ○ Yes ○ No

13. A thermometer shows a temperature of ⁻8.5°F. A nearby thermometer shows a temperature of ⁻7.5°F. Explain how absolute value can be used to find the *warmer* temperature.
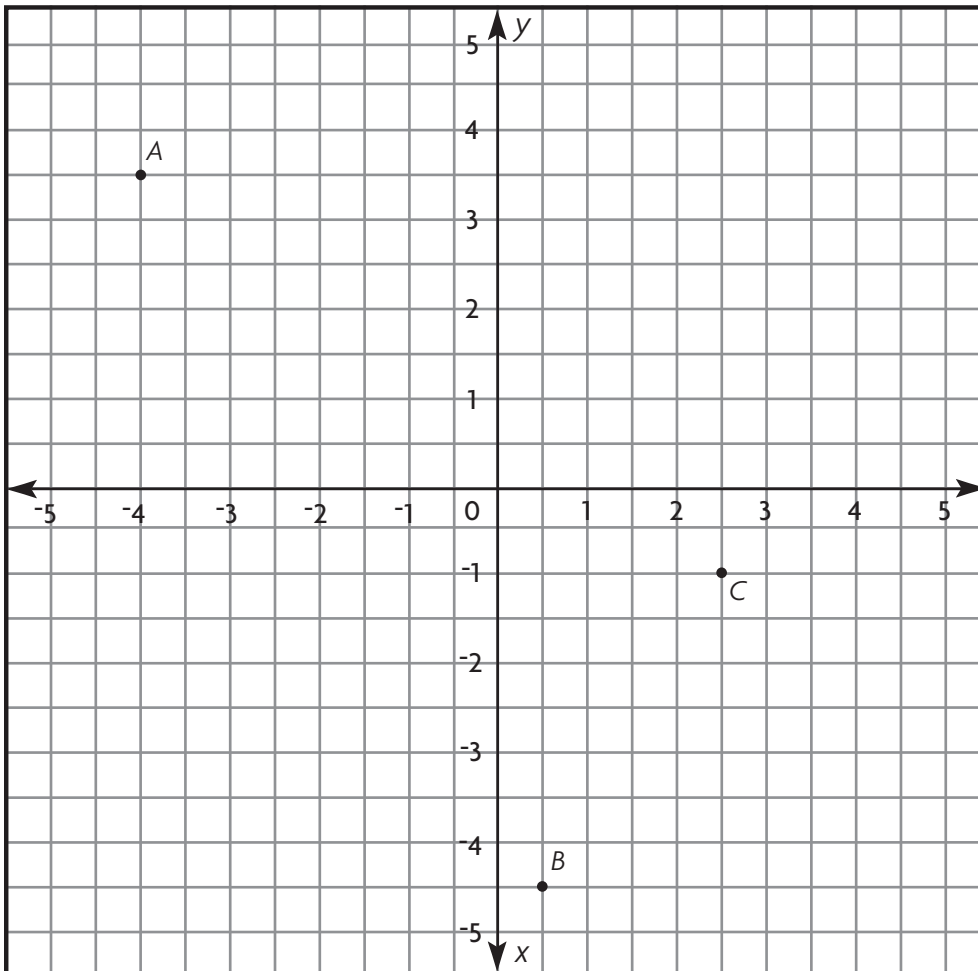
14. Suppose that the ordered pairs (*p*, *q*) and (*r*, *q*) represent two points in the coordinate plane, and *p*, *q*, and *r* represent positive integers. If *p* < *r* and *q* = 2, what expression represents the distance between the two points? Explain your answer.

Use the coordinate plane. Write the ordered pairs for numbers 15–17.

15. Point *A*

16. Point *B*

17. Point *C*

18. Reflect Point *A* across the *x*-axis.
Label it Point *X*. Name its location.

19. Reflect Point *A* across the *y*-axis.
Label it Point *Y*. Name its location.

20. Look back at the coordinate plane for numbers 15–19. Use absolute value to find the distance from Point *A* to Point *X*. Show your work in the space below.

[   ]

Use the table for numbers 21–23.

Becca recorded the high temperature each day for five days. The table shows her data.

Day	Temperature (°C)
Mon	$^-1$
Tue	4
Wed	8
Thur	0
Fri	$^-3$

21. What is the opposite of the temperature recorded on Monday?

Ⓐ $^-1$

Ⓑ 1

Ⓒ $^-4$

Ⓓ 4

22. How can you use a number line to order the temperatures from greatest to least?

[   ]

23. Which lists the days from coldest to warmest?

Ⓐ Thur, Mon, Fri, Tue, Wed

Ⓑ Mon, Fri, Thur, Tue, Wed

Ⓒ Fri, Mon, Thur, Tue, Wed

Ⓓ Thur, Fri, Mon, Tue, Wed