UNIT 1

Number Sense

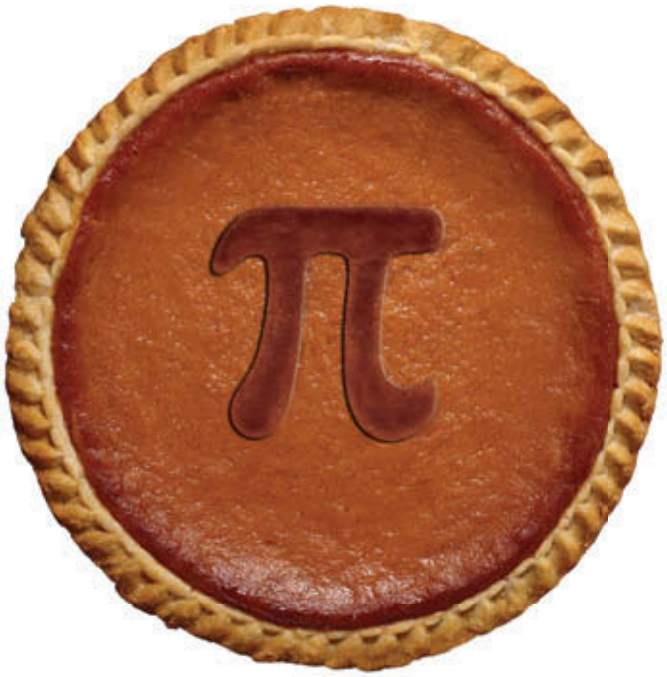
Level J

Mc Graw Hill Education

Lesson 1

Find the Math

Mathematical symbols can be used in everyday language and slogans.



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1. What do you know about the number π?

2. On March 14 at 1:59, people celebrate Pi Day by eating pie. Why do you think people celebrate on this day at this time?

3. Why do you think they eat pie to celebrate Pi Day?

4. *Pi* is defined as the ratio of a circle's circumference to its diameter $\left(\frac{\text{circumference}}{\text{diameter}}\right)$, both of which are also real numbers. Do you think *pi* is a real number? Why?

Lesson 1

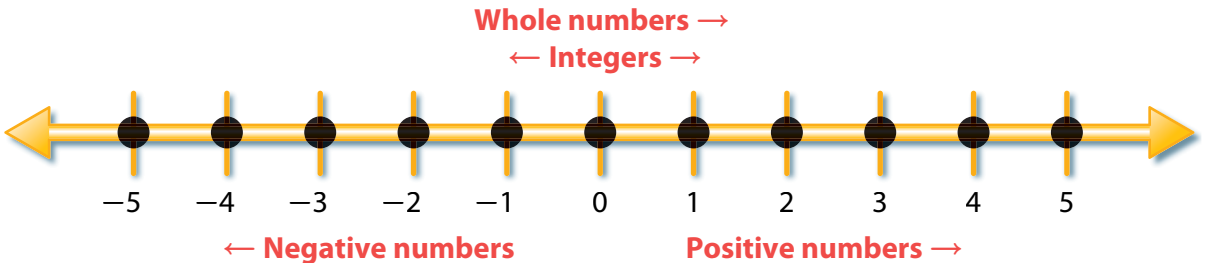
Key Idea

A **whole number** is "a number that tells how many complete things there are." The set of whole numbers is 0, 1, 2, 3, 4, 5, ….

Integers are "whole numbers and their opposites." The set of integers is … −5, −4, −3, −2, −1, 0, 1, 2, 3, 4, 5, ….

Positive numbers are "numbers greater than zero," and **negative numbers** are "numbers less than zero."

This number line shows the location of integers, whole numbers, zero, positive numbers, and negative numbers.



Try This

Draw a circle around each whole number in the sets of numbers below.

1. −10, −9.2, −7, −4, −3.1, 0, 2, 2.4, 5, 10

2. −71, −13, −4.6, 10, 13.4, 25, 42, 49.12, 58, 93

Draw a circle around the integers in each set.

3. −10.5, −9, −4, −3.9, 0, 1, 2.6, 3, 4, 7.9

4. −91, −70.07, −33, −3, −1.2, 1, 2, 7.5, 40, 92

Practice

Sort the numbers in each set. Numbers may be used more than once.

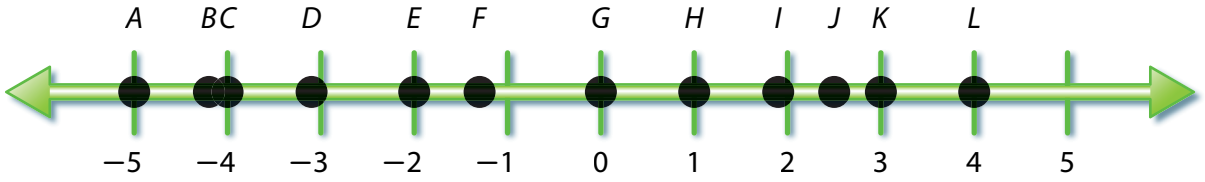
5. $-10.2, -8, -6\frac{1}{3}, -3, -2, 0, 2.5, 6, 7, 9$

Integers	Whole Numbers	Both Integers and Whole Numbers	Neither Integers nor Whole Numbers
_____	_____	_____	_____

6. $-9, -3.8, -1, 0, 1.2, 3, 4\frac{1}{2}, 5, 6, 7$

Integers	Whole Numbers	Both Integers and Whole Numbers	Neither Integers nor Whole Numbers
_____	_____	_____	_____

Use the number line to answer the following questions.



7. Which points show numbers that are whole numbers? _____

8. Which points show numbers that are integers? _____

9. Which points show numbers that are not integers or whole numbers?

_____

Reflect

Can a whole number be negative? Explain your reasoning.

_____

Lesson 2

Key Idea

A **fraction** is "a number in the form $\frac{a}{b}$, where a and b are integers and b is not 0."

Each number in the set of whole numbers 0, 1, 2, 3, 4, …can be written as a fraction with a denominator of 1: $\frac{0}{1}, \frac{1}{1}, \frac{2}{1}, \frac{3}{1}, \frac{4}{1}, \ldots$.

Each number in the set of integers …, −4, −3, −2, −1, 0, 1, 2, 3, 4,… can be written as a fraction with a denominator of 1: …, $-\frac{4}{1}, -\frac{3}{1}, -\frac{2}{1}, -\frac{1}{1}, \frac{0}{1}, \frac{1}{1}, \frac{2}{1}, \frac{3}{1}, \frac{4}{1}, \ldots$.

Equivalent fractions are fractions that have different numerators and denominators but name the same number.

For example, the whole number 2 can be written as a fraction in many different ways: $2 = \frac{2}{1} = \frac{4}{2} = \frac{6}{3} = \frac{8}{4} = \frac{52}{26} = \frac{200}{100}$

For example, the integer −11 can be written as a fraction in many different ways: $-11 = -\frac{11}{1} = -\frac{22}{2} = -\frac{44}{4} = -\frac{99}{9}$

Try This

Write each whole number or integer as a fraction with a denominator of 1.

1. 5 = _____

2. −7 = _____

Write each whole number or integer as a fraction with a denominator of 3.

3. 5 = _____

4. −7 = _____

Practice

Write each whole number or integer as a fraction with a denominator of 1.

5. $389 =$ _____

6. $-1{,}078 =$ _____

Write each whole number or integer as a fraction with a denominator of 4.

7. $-24 =$ _____

8. $100 =$ _____

9. $7 =$ _____

10. $-53 =$ _____

Write each whole number or integer as three equivalent fractions using three different denominators.

11. $9 =$ _____

12. $-15 =$ _____

13. $-2 =$ _____

14. $48 =$ _____

Write the whole number or integer that each fraction represents.

15. $-\frac{176}{1} =$ _____

16. $\frac{33}{3} =$ _____

17. $-\frac{2{,}003}{1} =$ _____

18. $\frac{80}{10} =$ _____

Reflect

Explain why an integer or a whole number can be turned into a fraction with a denominator of 1.

Lesson 3

Key Idea

A **rational number** is "any number that can be written as a fraction." The set of rational numbers includes whole numbers, integers, decimals, and fractions. Decimals that repeat or terminate are rational numbers.

Decimals that do not repeat or terminate are irrational numbers. An **irrational number** is a real number that cannot be written as a fraction.

$\sqrt{2} = 1.414213562373\ldots$

$\sqrt{2}$ is an irrational number, because it does not terminate and it does not repeat.

$\pi = 3.141592653589\ldots$

π is an irrational number, because it does not terminate and it does not repeat.

3.1416 is not an irrational number, because it terminates and can be written as a fraction, $\frac{3{,}927}{1{,}250}$.

$0.\overline{714285}$ is not an irrational number, because it repeats and can be written as a fraction, $\frac{5}{7}$.

Try This

Draw a circle around each irrational number in the sets of numbers below.

1. $-3.6\overline{7}, \sqrt{5}\ \pi$

2. $\sqrt{8}, \sqrt{9}, \sqrt{10}$

3. $\sqrt{16}$, 4.1827382871…, $4.\overline{8}$

List the rational and irrational numbers from each set.

4. 7.2708721038…, 7.3, 9

Rational: _____

Irrational: _____

5. $10.\overline{5}$, 10.5973291…, π

Rational: _____

Irrational: _____

6. $\sqrt{49}$, 22.82, 22.8168738…

Rational: _____

Irrational: _____

Practice

Draw a circle around each irrational number in the sets of numbers below.

7. $-5.45454545\ldots, -5, -4.831982019\ldots$

8. $\sqrt{12}, \sqrt{14}, \sqrt{16}$

9. $9.873823712\ldots, 9.999\ldots, 10$

10. $-16.18, \sqrt{20}, 100.98392837\ldots$

List the rational and irrational numbers from each set.

11. $6.3, \pi, -8.8462719\ldots$

Rational: _____

Irrational: _____

12. $-125, 9.179820193\ldots, \sqrt{2}$

Rational: _____

Irrational: _____

13. $-5.\overline{2}, 7.01, -5.2346492\ldots$

Rational: _____

Irrational: _____

14. $\frac{1}{2}, -8.8, 4.24808312\ldots$

Rational: _____

Irrational: _____

Complete each statement with one of the following terms: whole number, integer, rational number, or irrational number. Terms may be used more than once.

15. A/An _____ can be written as a fraction.

16. A/An _____ cannot be written as a fraction.

17. The number -5 is an example of a/an _____.

18. The number $7.89736291\ldots$ is an example of a/an _____.

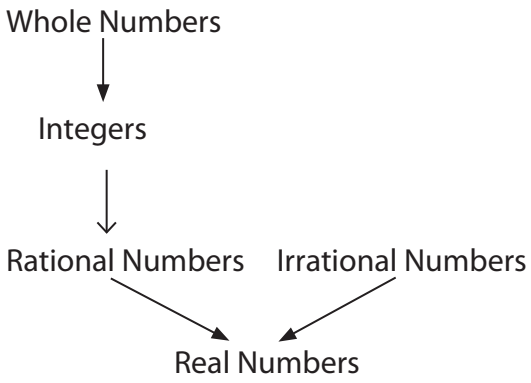
Reflect

Riley says all square roots are irrational numbers. Do you agree with Riley? Explain your reasoning.

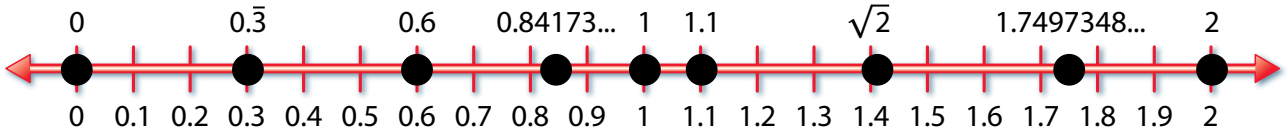
Lesson 4

Key Idea

Real numbers are all rational and irrational numbers and can be classified as the following:

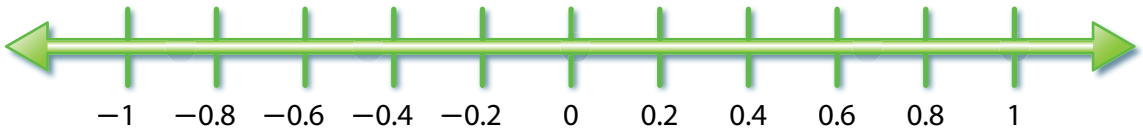


Every real number can be located on a number line. This number line shows whole numbers and integers (0, 1, 2), rational numbers ($0.\overline{3}$, 0.6, and 1.1), and irrational numbers (0.84173…, $\sqrt{2}$, and 1.7497348…).



Try This

Draw and label a point on the number line to show the location of each real number.



1. 0.01

2. $-0.\overline{8}$

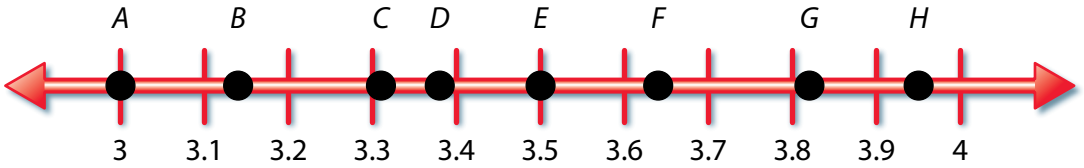
3. 1

4. −0.458190…

5. 0.67

Practice

Match each real number to a point on the number line. Note that not every point marked on the number line will be matched to an item below.



6. 3.6471… _____ **7.** 3.38 _____ **8.** π _____

9. $\sqrt{11}$ _____ **10.** 3.5 _____

Order each set of real numbers from greatest to least.

11. 5.125, $\sqrt{25}$, $-5\frac{1}{2}$, $5.\overline{8}$ _____

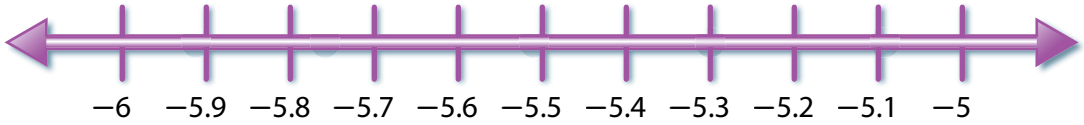
12. $-1.\overline{7}$, -2, 2.458023…, $\sqrt{2}$ _____

13. $\frac{3}{4}$, -7.2, $\sqrt{7}$, $3.\overline{9}$ _____

14. 10.4, 100.04, $-1.4897\ldots$, $10.\overline{3}$ _____

15. 3.208, -8.44, -3.9, 8.12832… _____

Draw and label a point on the number line to show the location of each real number.



16. -5.3

17. -5.7585

18. -5.51

19. $-5.0\overline{9}$

20. $-5.921783\ldots$

Reflect

Explain why it is always possible to find a rational number between any two numbers on a number line, including decimals. Provide an example with your explanation.

Lesson 5 Review

This week you learned about real numbers, including whole numbers, integers, rational numbers, and irrational numbers. All rational numbers can be written as fractions, but irrational numbers cannot be written as fractions. You can also locate real numbers on a number line.

Lesson 1

Sort the numbers in each set. Numbers may be used more than once.

1. −9, −8.7, −5.6, −4, −2, 1, 3.1, 6, 7.2, 9

Integers	Whole Numbers	Both Integers and Whole Numbers	Neither Integers nor Whole Numbers

2. −232, −49.9, −31, −15, −1.6, 11, 28.1, 79, 82, 90.99

Integers	Whole Numbers	Both Integers and Whole Numbers	Neither Integers nor Whole Numbers

3. −8, −5.8, −5, −2.4, 2, 10, 18.5, 42, 82.5, 180

Integers	Whole Numbers	Both Integers and Whole Numbers	Neither Integers nor Whole Numbers

Lesson 2

Write each whole number or integer as a fraction with a denominator of 1

4. −18 = _____

5. 1,098 = _____

Write each whole number or integer as three equivalent fractions using three different denominators.

6. −12 = _____

7. 90 = _____

8. −4 = _____

Lesson 3

Draw a circle around each irrational number in the sets of numbers below.

9. $-11, 1.89821\ldots, 12.\overline{3}$

10. $\sqrt{6}, 5.\overline{58}, 5.839108\ldots$

11. $1.41, 1.41213\ldots, 1.\overline{1}$

12. $3.26, 3.\overline{3}, \sqrt{32}$

List the rational and irrational numbers from each set.

13. $22.7127893\ldots, -1.6, \frac{4}{5}$

Rational: _____

Irrational: _____

14. $22.8, \sqrt{25}, 11.982918\ldots$

Rational: _____

Irrational: _____

15. $0, 1.367901\ldots, -0.75, 2.5$

Rational: _____

Irrational: _____

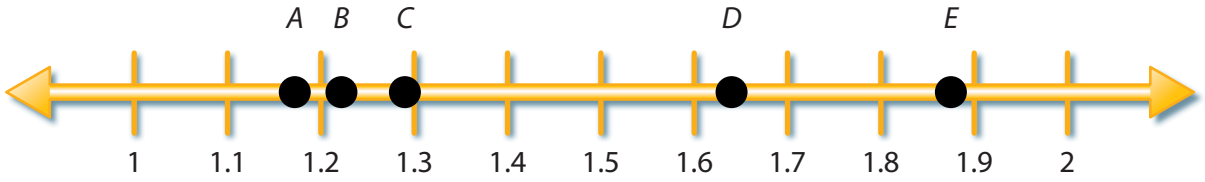
16. $\pi, -1.515371\ldots, 7.\overline{6}$

Rational: _____

Irrational: _____

Lesson 4

Match each real number to a point on the number line. Note that not every point marked on the number line will be matched to an item below.



17. 1.64 _____

18. 1.172493… _____

19. 1.875 _____

20. $1.\overline{2}$ _____

Order each set of real numbers from greatest to least.

21. $6\frac{1}{2}, 6.\overline{1}, 6.92, 6.07912\ldots$ _____

22. $-2.17, -4.3, 0.25, -3.0381\ldots$ _____

Reflect

What kind of real number is 6.357357357…? Explain your reasoning.

_____

_____

Project-Based Learning

Project
Numbers All Around

Create a slogan or play on words using a real number you wrote in the previous weeks. Your slogan can appear on a T-shirt, sign, mug, or comic drawing.

Reflect

Explain how you used real numbers to create your slogan and what makes your slogan funny or clever.

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