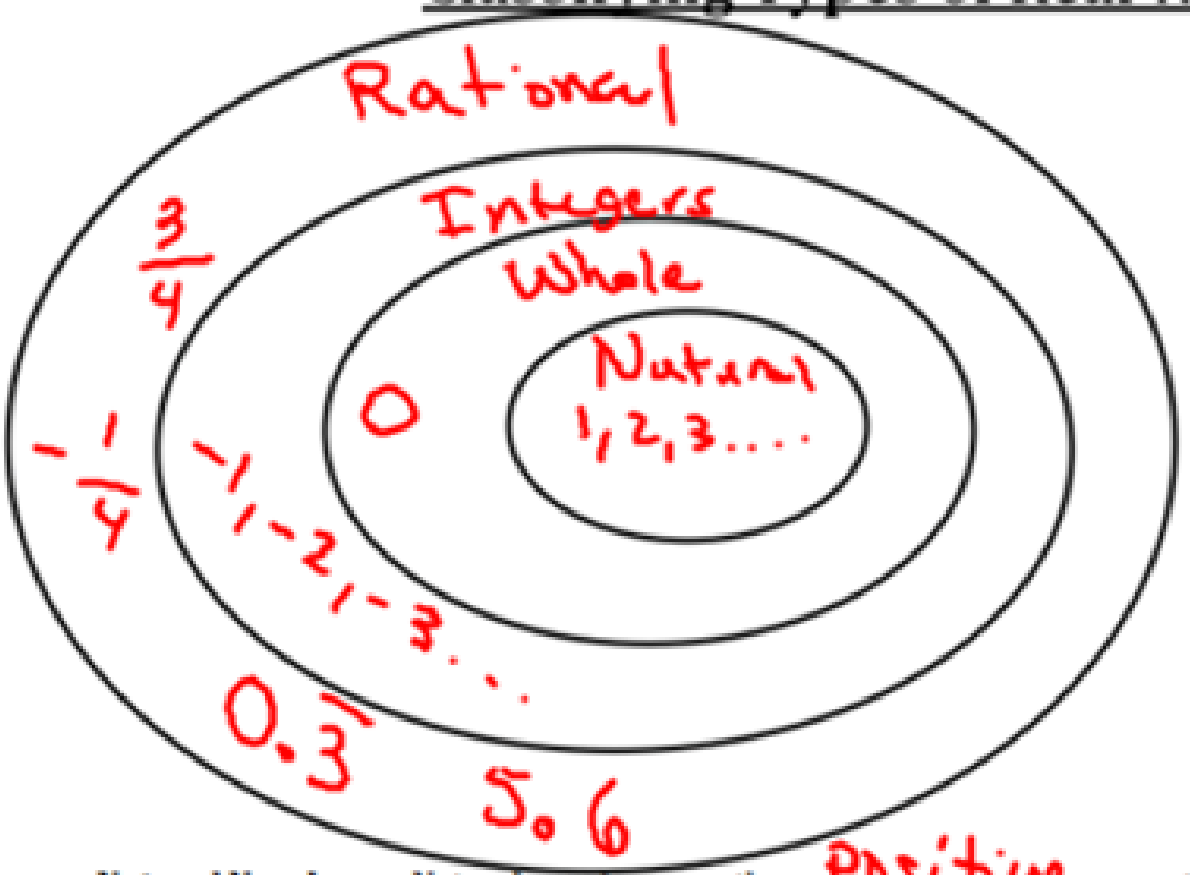
Classifying Types of Real Numbers



Irrational

$\sqrt{12}$

$\sqrt{35}$

Decimal
- Never ends
- Never repeats

Natural Numbers – Natural numbers are the positive counting numbers you learned when you were young.

Whole Numbers - Whole numbers include all the natural numbers and 0.

Integers- Are whole numbers and the opposites of those numbers.

Rational Numbers- A rational number can always be written as a ratio, or fraction. A rational number in decimal form is either terminating or repeating.

Name ALL the set(s) of numbers to which each number belongs.

Sets: Natural, Whole, Integers, Rational, and Irrational

1) -5 I, R

2) $8.\overline{3}$ R

3) $\frac{3}{4}$ R

4) 0 W, I, R

5) $\sqrt{4}$ = 2 N, W, R, I

6) -3.125 R

7) $\frac{12}{6}$ = 2 R, W, I, N

8) 19 W, N, I, R

9) $\sqrt{7}$ Irrational

10) $-1.\overline{54}$ R

Answer the following questions with either True or False.

11) All integers are rational numbers. True

12) All integers are whole numbers. False Ex: -1

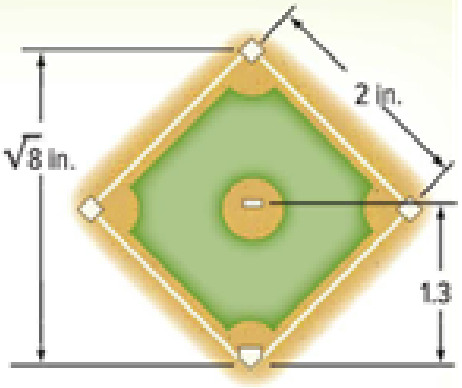
13) All negative numbers are integers. False Ex: -1.5

14) All fractions are integers. False

15) If a decimal never ends it is an rational number. False

Real-World Link

Sports Major League baseball has rules for the dimensions of the baseball diamond. A model of the diamond is shown.



1. On the model, the distance from the pitching mound to home plate is 1.3 inches. Is 1.3 a rational number? Explain.

2. On the model, the distance from first base to second base is 2 inches. Is 2 a rational number? Explain.

3. The distance from home plate to second base is $\sqrt{8}$ inches. Using a calculator, find $\sqrt{8}$. Does it appear to terminate or repeat?

4. To determine if the number terminates, on your calculator, multiply your answer to $\sqrt{8}$ by itself. Do not use the x^2 button.

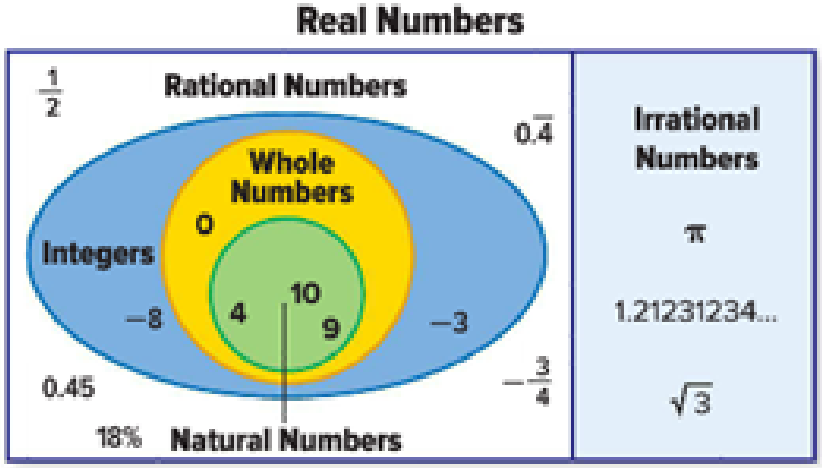
   Is the answer 8? _____

5. Based on your results, can you classify $\sqrt{8}$ as a rational number? Explain.

Real Numbers

p 90

	Rational Number	Irrational Number
Words	A rational number is a number that can be expressed as the ratio $\frac{a}{b}$, where a and b are integers and $b \neq 0$.	An **irrational number** is a number that *cannot* be expressed as the ratio $\frac{a}{b}$, where a and b are integers and $b \neq 0$.
Examples	$-2,\ 5,\ 3.\overline{76},\ -12\frac{7}{8}$	$\sqrt{2} \approx 1.414213562...$



Numbers that are not rational are called irrational numbers. The square root of any number that is not a perfect square number is irrational. The set of rational numbers and the set of irrational numbers together make up the set of **real numbers**. Study the Venn diagram below.

Examples

Tutor

Name all sets of numbers to which each real number belongs.

1. **0.2525...** The decimal ends in a repeating pattern. It is a rational number because it is equivalent to $\frac{25}{99}$.

2. $\sqrt{36}$ Since $\sqrt{36} = 6$, it is a natural number, a whole number, an integer, and a rational number.

3. $-\sqrt{7}$ $-\sqrt{7} \approx -2.645751311...$ The decimal does not terminate nor repeat, so it is an irrational number.

Got it? Do these problems to find out.

a. $\sqrt{10}$ | b. $-2\frac{2}{5}$ | c. $\sqrt{100} = 10$

Irrational | Rational | Whole, Natural, Integer, Rational

Compare and Order Real Numbers

You can compare and order real numbers by writing them in the same notation. Write the numbers in decimal notation before comparing or ordering them.

Examples

Tutor

Fill in each ◯ with <, >, or = to make a true statement.

4. $\sqrt{7}$ ◯ $2\frac{2}{3}$

$\sqrt{7} \approx 2.645751311...$

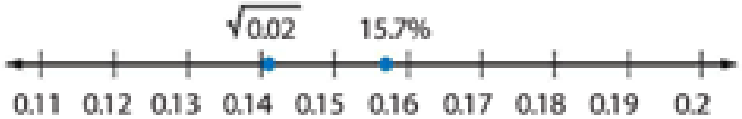
$2\frac{2}{3} = 2.666666666...$

Since 2.645751311... is less than 2.66666666..., $\sqrt{7} < 2\frac{2}{3}$.

5. 15.7% ◯ $\sqrt{0.02}$

$15.7\% = 0.157$

$\sqrt{0.02} \approx 0.141$



Since 0.157 is greater than 0.141, $15.7\% > \sqrt{0.02}$.

6. **Order the set $\left\{\sqrt{30}, 6, 5\frac{4}{5}, 5.3\overline{6}\right\}$ from least to greatest. Verify your answer by graphing on a number line.**

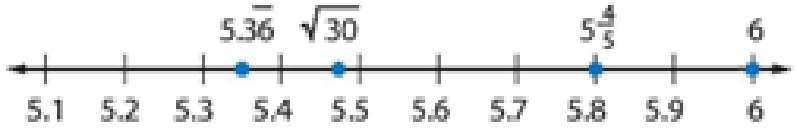
Write each number as a decimal. Then order the decimals.

$\sqrt{30} \approx 5.48$

$6 = 6.00$

$5\frac{4}{5} = 5.80$

$5.3\overline{6} \approx 5.37$ 5.36 ~ 5.3666



From least to greatest, the order is $5.3\overline{6}$, $\sqrt{30}$, $5\frac{4}{5}$, and 6.

Got it? **Do these problems to find out.**

d. $\sqrt{11}$ < $3\frac{1}{3}$ 3.3166 3.3333...

e. $\sqrt{17}$ > 4.03 4.123 > 4.03

f. $\sqrt{6.25}$ = 250% 2.5 = 2.5

2.5 = 2.5

g. Order the set $\left\{-7, -\sqrt{60}, -7\frac{7}{10}, -\frac{66}{9}\right\}$ from least to greatest. Verify your answer by graphing on the number line below.