

Bellwork

A. Describe the best classification.

B. What other subsets does it fall under?

1. The number -9
a. Integers
b. Rational, Real, Complex
2. The number $1.258268\dots$
a. Irrational
b. Real + Complex
3. The number 14.1
a. Rational
b. Real + Complex
4. The number π
a. Irrational
b. Real + Complex
5. The number $324,212$
a. Natural
b. Whole, Integers, Rational, Real, + Complex

Rational #'s VS. Irrational #'s

Things to be thinking of when distinguishing between the two:

1. The key characteristics of each subset.
2. Recall that the larger of the two is Rational, IF you must guess which is a safer bet?

Rational #'s

Key Characteristics:

1. Can be written as a fraction.

Recall any number, like 3, can be written as a fraction by putting it over 1.

2. The number is a decimal that:

2A. The decimal TERMINATES

2B. The decimal has a REPEATING PATTERN

3. The number is a radical (square root, cube root, etc) that can be simplified to an integer.

Examples of Rational Numbers

1.222

$$\sqrt[3]{125} = 5$$

$\frac{3}{4}$

$$\sqrt{900} = 30$$

$\frac{1}{1,562,145}$

$\frac{1}{2}$

Perfect Squares

If any of the numbers in red are under the square root, then the number is rational.

$$1^2 = 1$$

$$2^2 = 4$$

$$3^2 = 9$$

$$4^2 = 16$$

$$5^2 = 25$$

$$6^2 = 36$$

$$7^2 = 49$$

$$8^2 = 64$$

$$9^2 = 81$$

$$10^2 = 100$$

$$11^2 = 121$$

$$12^2 = 144$$

$$13^2 = 169$$

$$14^2 = 196$$

$$15^2 = 225$$

$$16^2 = 256$$

$$17^2 = 289$$

$$18^2 = 324$$

$$19^2 = 361$$

$$20^2 = 400$$

Perfect Cubes

If any of the numbers in red are under the cube root, then the number is rational.

$$1^3 = 1$$

$$2^3 = 8$$

$$3^3 = 27$$

$$4^3 = 64$$

$$5^3 = 125$$

$$6^3 = 216$$

$$7^3 = 343$$

$$8^3 = 512$$

$$9^3 = 729$$

$$10^3 = 1000$$

Irrational #'s

Key Characteristics:

1. **CANNOT** be written as a fraction!
2. The number is a decimal that:
 - 2A. Does not **REPEAT** or **TERMINATE**
3. The number is a radical (square root, cube root, etc) that **DOES NOT** simplify to be an integer.
4. The number given is pi or e.

Examples of Irrational Numbers

e

$$\sqrt{8}$$

π

$$\sqrt[3]{5}$$

3.5642178...