The Real Number System

Rational Numbers Any # that can be expressed as a Ratio (fraction) between 2 integers

* INTEGERS * FRACTIONS * PERFECT SQUARE ROOTS
* TERMINATING DECIMALS * REPEATING Decimals

Integers All whole numbers and all negative whole numbers

Whole Numbers All Natural Numbers with 0 added

Natural Numbers Counting Numbers (start with 1)
Ex: 1, 2, 3, 4, 5, ...

EX: 0, 1, 2, 3, 4, 5, 6, ...

EX: ..., -4, -3, -2, -1, 0, 1, 2, 3, 4, ...

EX: $-5, 0, 7, \frac{3}{2}, \frac{1}{4}, .25, 4.125, .\overline{33}, \sqrt{25}$

Irrational Numbers
Numbers that CANNOT be written as a Ratio (fraction)

* NON-TERMINATING DECIMALS (...)
* NON PERFECT SQUARE ROOTS (ugly square roots)
* Pi (π)

EX: $\sqrt{7}, 8\pi, 8\sqrt{3}, 4.1852...$

Rational and Irrational Numbers Notes

Today's Question: What is the result of the product of a rational and irrational number? (MCC9-12.N.RN.3)

Rational Numbers:

Can be expressed as the quotient of two integers (i.e. a fraction) with a denominator that is not zero. Many people are surprised to know that a repeating decimal is a rational number.

Examples: -5, 0, 7, 3/2, $0.\overline{26}$

- $\sqrt{9}$ is rational - you can simplify the square root to 3 which is the quotient of the integers 3 and 1.

Irrational Numbers:

Can't be expressed as the quotient of two integers (i.e. a fraction) such that the denominator is not zero.

Examples: $\sqrt{7}, \sqrt{5}, \pi$

R I

Decide whether the following numbers are rational or irrational?

- $\sqrt{37}$ I
- $\frac{3}{7}$ R
- $7.\overline{23}$ R
- -6.2124 R
- 3^5 (243) R
- $\sqrt{25}$ 5 R
- 4π I
- $1.524\ldots$ I
- $\sqrt{36}$ R
- $\sqrt{2}+5$ I
- $\frac{15}{3}-8 = 5-8 = -3$ R
- $\sqrt{8}\cdot\sqrt{2} = \sqrt{16} = 4$ R
- $-\sqrt{5}+\sqrt{5} = 0$ R
- $3\sqrt{3}+\sqrt{27}$ $3\sqrt{3}+3\sqrt{3} = 6\sqrt{3}$ I
- $6\pi-\pi = 5\pi$ I