

Goal: I will be able to **determine if a number is rational or irrational.**

Tool Bag
Formulas, equations, Vocabulary, etc.

Here's How...Notes & Examples

In Science we classify animals based on characteristics.

Animals

Reptile

Lizard

Snake

Irrational Numbers has an infinite number of non-repeating digits to the right of the decimal

1.01001000100001...

1.123456789101112...

$\sqrt{18}$ π

$\frac{2}{3} =$

In math, we do the same thing to classify numbers

REAL

Rational
 $\frac{2}{3}$ $\frac{4}{8} = \frac{1}{2}$
 $\frac{3}{4}$ $\frac{1}{2}$
 $2\frac{6}{9} = 2\frac{2}{3}$
 $5\frac{1}{2}$

Integers
..., -3, -2, -1, 0, 1, 2, 3, ...

Whole

Irrational
 $\sqrt{19}$ 1.276510124
 $\sqrt{3}$ π $-\sqrt{22}$

Estimating Irrational Numbers

$\sqrt{18} = ?$

- Look at what perfect squares it is between
 $16 < 18 < 25$
- Square root of everything
 $\sqrt{16} < \sqrt{18} < \sqrt{25}$
 $4 < \sqrt{18} < 5$
- Since 18 is closer to 16, $\sqrt{18}$ is closer to 4.

guess 4.2

$\frac{4.2}{4.2}$
 $\frac{84}{1680}$
 $\frac{17.64}{17.64}$

Square Roots

$\sqrt{x^2} = x$ $\sqrt{49} = \sqrt{7^2} = 7$

Perfect Squares
11 22 33 44
1, 4, 9, 16, 25, 36, ...

$\sqrt{9} = \sqrt{3 \cdot 3} = \sqrt{3^2} = 3$

18 $\sqrt{18}$

What if it's not perfect?

The square root of a non-perfect is irrational

TRY

Estimate

a) $\sqrt{60}$ b) $\sqrt{98}$ c) $\sqrt{5200}$

$\sqrt{60}$

$49 < 60 < 64$ $81 < 98 < 100$
 $\sqrt{49} < \sqrt{60} < \sqrt{64}$ $\sqrt{81} < \sqrt{98} < \sqrt{100}$
 $7 < \sqrt{60} < 8$ $9 < \sqrt{98} < 10$

c) $\sqrt{5200}$ $49 < 52 < 64$
 $\sqrt{100 \cdot 52}$ $7 < \sqrt{52} < 8$
 $\sqrt{100} \cdot \sqrt{52}$
 $10 \cdot \sqrt{52} \approx 10(7.2) \approx 72$