7.4

APPROXIMATING SQUARE ROOTS

Today's Learning Goals:

- **Provide geometric proof of the Pythagorean Theorem.**
- **Use the Pythagorean Theorem to find missing side lengths of right triangles.**
- **Solve real-life problems.**

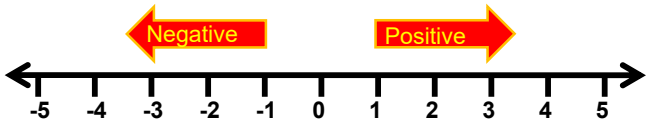
Kinds of Numbers

Natural Numbers

Whole Numbers

Integers

positive or negative whole number, including zero.



Rational Number

a number that can be written as a _____.

Rational Numbers

- You CAN change the number into a fraction
- It is a terminating decimal
- It is a nonterminating AND repeating decimal
- You CAN find the PERFECT square root of it

Rational

Irrational

Example 1

Identify all sets to which each of the following numbers belong:

a) $\frac{1}{9}$

b) 0

c) -18

Example 2

Terminating Decimal - When the division stops.

Repeating Decimal - When the last digit of the division repeats over and over, we use repeating decimal bars...

Both terminating and repeating decimals are RATIONAL

Write the decimal as a fraction. Simplify the fraction if possible.

a) 0.02 b) 0.105 c) -2.048

Example 3

If a decimal does not terminate and it doesn't repeat, it is IRRATIONAL.

Which is NOT a rational number?

a) $-\sqrt{32.8}$

b) -0.48

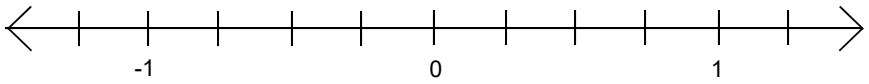
c) $1\frac{1}{4}$

d) $-\frac{2}{3}$

Example 5

Order these numbers from least to greatest:

$$-\frac{1}{2}, \frac{3}{4}, -0.05, 0.83$$



On Your Own

Classify the real number.

1. $0.121221222\ldots$ **2.** $-\sqrt{196}$ **3.** $\sqrt[3]{2}$

Roots Review

Perfect Roots that you should memorize

$\sqrt{1}$	$\sqrt{49}$	$\sqrt{169}$
$\sqrt{4}$	$\sqrt{64}$	$\sqrt{196}$
$\sqrt{9}$	$\sqrt{81}$	$\sqrt{225}$
$\sqrt{16}$	$\sqrt{100}$	$\sqrt{256}$
$\sqrt{25}$	$\sqrt{121}$	$\sqrt{400}$
$\sqrt{36}$	$\sqrt{144}$	$\sqrt{625}$

Approximating Square Roots

Example 1

Estimate $\sqrt{71}$ to the nearest (a) integer and (b) tenth.

Approximating Square Roots

Example 2

Estimate $\sqrt{23}$ to the nearest (a) integer and (b) tenth.

Approximating Square Roots

Example 3

Estimate the square root to the nearest (a) integer and (b) tenth.

4. $\sqrt{8}$ **5.** $-\sqrt{13}$ **6.** $-\sqrt{24}$ **7.** $\sqrt{110}$

Approximating Square Roots

Example 3

Estimate the square root to the nearest (a) integer and (b) tenth.

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Approximating Square Roots

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Approximating Square Roots

Example 3

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Approximating Square Roots

Example 4

Which is greater, $\sqrt{5}$ or $2\frac{2}{3}$?

Approximating Square Roots

Example 5

Which is greater, $\sqrt{0.49}$ or 0.71?