Roots + Number Classifications

Tuesday, January 28, 2020 8:36 AM

Square root ~~of~~ 25? 5

$\sqrt{25} = 5$ because $5^2 = 25$

$\sqrt[3]{8} = 2$ because $2^3 = 8$

The root of a number can be expressed as $\sqrt[n]{x}$

n is the <u>index</u> - represents what root we are finding

x is the <u>radicand</u>

$\sqrt[n]{}$ is called the <u>radical sign</u>

$\sqrt[n]{x}$ is called a <u>radical</u>

$\sqrt{36} = 6$ because $6^2 = 36$

$(-6)^2 = 36$

Every number has 2 square roots a positive one and a negative one.

$\sqrt{36} = 6$ $\sqrt{}$ the radical signs is defined as the <u>positive</u> root of a number. We call the positive root the <u>principal</u> <u>root</u>.

$-\sqrt{36} = -6$ is how to get the negative root.

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

$5^3 = 125$ $\qquad$ $(-5)^3 = -125$

For all even roots (eg $\sqrt{\ }$, $\sqrt[4]{\ }$, $\sqrt[6]{\ }$ ...) there is a positive + negative root

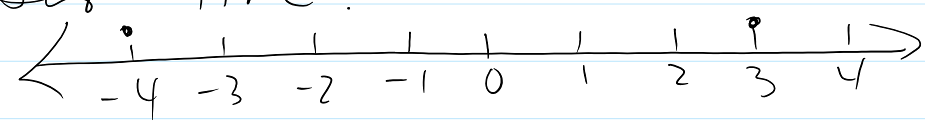
For all odd roots (eg $\sqrt[3]{\ }$ $\sqrt[5]{\ }$ $\sqrt[7]{\ }$ ....) there is only 1 root (has the same sign as the radicand.)

$\sqrt{-25}$ $\qquad$ 5. -5

you can't take the even root of a negative number.

$\sqrt{x^2} = |x|$ $\qquad$ $\sqrt{(-3)^2} = \sqrt{9} = \underline{\underline{3}}$

<u>Absolute Value</u> - is the distance a number is from zero on the number line.



Since distance is always positive, so is absolute value

The symbol for absolute value is $|\ |$

$|3| = 3$ $\qquad$ $|-4| = 4$

$\sqrt{30} \sim 5.5$ $\qquad$ $\sqrt[3]{30} \sim 3.1$

$\sqrt{25}$ $\qquad$ $\sqrt{36}$ $\qquad$ $\sqrt[3]{27}$ $\qquad$ $\sqrt[3]{64}$

5 $\qquad$ 6 $\qquad$ 3 $\qquad$ 4

$\sqrt{25}$ $\quad$ $\sqrt{36}$ $\quad$ $\sqrt[3]{27}$ $\quad$ $\sqrt[3]{64}$

5 $\quad$ 6 $\quad$ 3 $\quad$ 4

$$\sqrt{\frac{4}{25}} = \frac{2}{5} \qquad \frac{2}{5} \cdot \frac{2}{5} = \frac{4}{25}$$

A perfect square is any number whose square root is a rational number.

Perfect Squares: 4, 9, 16, 25, 36, 49, 64, 81, 100
$2^2, 3^2, 4^2, 5^2, 6^2, 7^2, 8^2, 9^2, 10^2$

121, 144, 169, 196, 225, 256
$11^2, 12^2, 13^2, 14^2, 15^2, 16^2$

Perfect Cubes: 8, 27, 64, 125, 216,
$2^3, 3^3, 4^3, 5^3, 6^3,$

Perfet Fourths: 16, 81, 256, 625
$2^4, 3^4, 4^4, 5^4$

$$\sqrt{\frac{98}{242}} = \sqrt{\frac{49}{121}} = \frac{\sqrt{49}}{\sqrt{121}} = \frac{7}{11}$$

important to reduce fractions first.

Natural Numbers (N): 1, 2, 3, 4 . . .

Whole Numbers (W): 0, 1, 2, 3, 4 . . .

Integers (I): . . . −3, −2, −1, 0, 1, 2, 3 . . .

Rational Numbers: any number that can be written as fraction (includes all the number sets above plus terminating + repeating decimals, fractions + mixed numbers.)

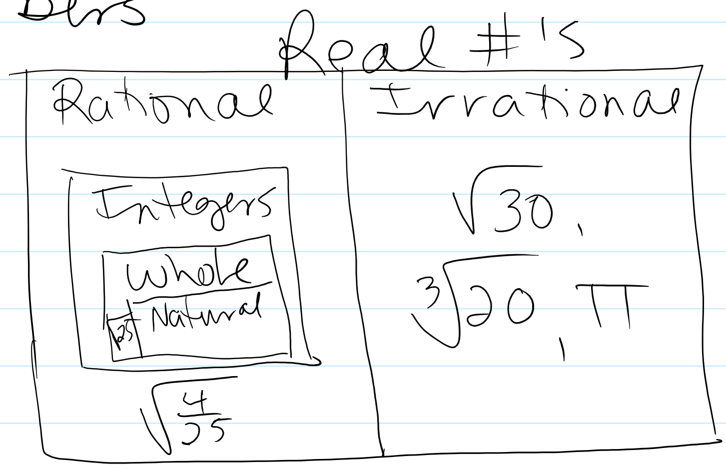
Q

Irrational Numbers: ($\bar{Q}$) any number that can't be written as a fraction.

eg π, $\sqrt{2}$ → as decimals they never repeat or end.

$0.121121112\ldots$

Real Numbers: Rational + Irrational numbers



$\sqrt{\text{perfect square}} = \text{rational}$

$\sqrt{\text{non-perfect square}} = \text{irrational}$

$.4 \quad Q \quad \left(\frac{2}{5}\right) \qquad \sqrt{144} \quad Q \qquad \sqrt{144} = 12.$

$.\overline{6} \quad Q \quad \left(\frac{2}{3}\right) \qquad \sqrt{62} \quad \overline{Q}$

$\sqrt[3]{.125} = \sqrt[3]{\frac{125}{1000}} = \sqrt[3]{\frac{5}{40}} \quad \sqrt[3]{\frac{1}{8}} \quad Q$

Page 6-9 # 4-10 (odd letters)

Page 17-19 # 4-5, 7-9, 11-14