Rational Numbers

What makes a number rational?

Rational

What word do we notice?

A number is **rational** if it can be written as the **ratio** of two integers.

(Integers: Positive and negative whole numbers)

YES.

a fraction!!!

Examples of rational numbers:

Whole Numbers

$10 = \frac{10}{1}$ $\quad \frac{13}{1}$ $\quad 25 = \frac{25}{1}$

$7 = \frac{7}{1}$ $\quad -125 = \frac{-125}{1} = \frac{250}{-2}$

Terminating Decimals

$2.5 = \frac{5}{2} = \frac{10}{4} = \frac{25}{10}$

$751.6 \quad \frac{7516}{10}$

$.04 = \frac{4}{100}$

$3.271 \quad \frac{3271}{1000}$

Repeating Decimals

$.\overline{44} = \frac{4}{9}$ $.\overline{66} = \frac{2}{3} = \frac{6}{9}$ $.\overline{81} = \frac{9}{11}$

$.\overline{36} = \frac{4}{11}$ $.\overline{125} = \frac{125}{999}$

$.\overline{33} = \frac{1}{3} = \frac{3}{9}$ $.125125\overline{125}$

Irrational Numbers

π $\sqrt{2}$ $\sqrt{3}$

$\sqrt[3]{15}$ $\sqrt{39}$ $\sqrt{5}$

The square root of any number that is not a perfect square is IRRATIONAL.

The cube root of any number that is not a perfect cube is IRRATIONAL.

Rational or not?

$\frac{2}{7}$ ✓

3π ✗

$\sqrt{20}$ ✗

$\sqrt{20 + 5}$ ✓

$\frac{5}{1}$

$-\sqrt{144}$ ✓

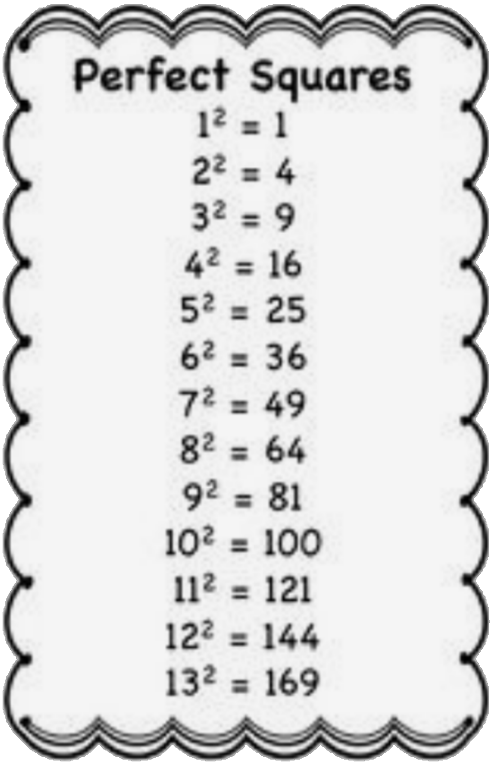
$-\frac{12}{1}$

-5.65 ✓

$-\frac{565}{100}$

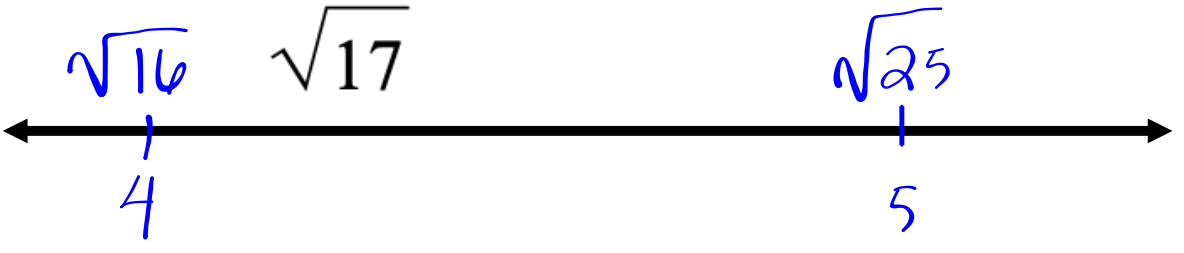
How to estimate the square root of a number.

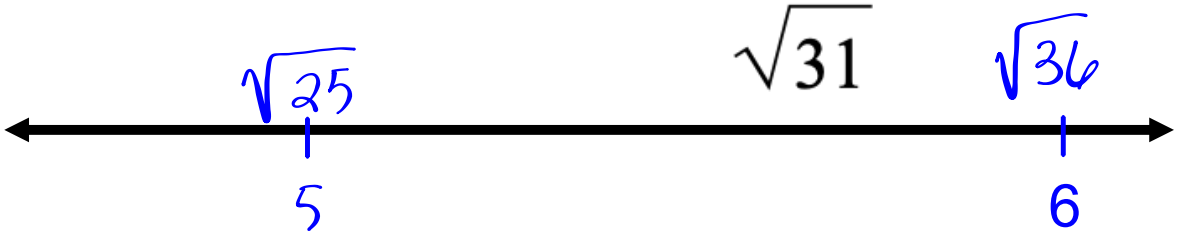
It helps to know perfect squares:

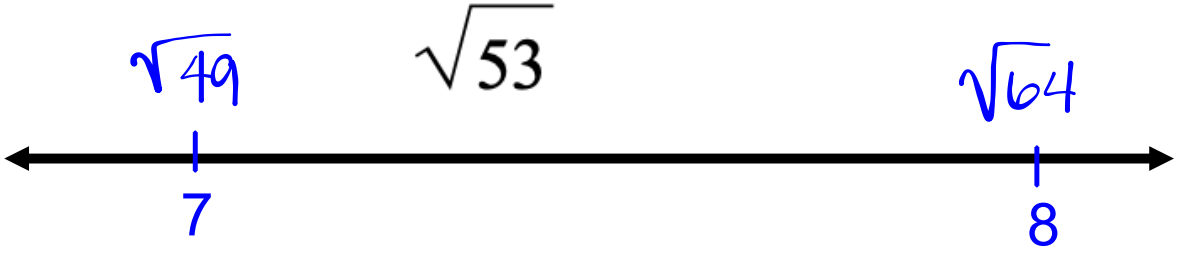


$15^2 = 225$

The square roots of which perfect squares do the following numbers fall between?







Irrational Numbers

$\sqrt{11}$ $\sqrt{2}$ $\sqrt{17}$

$\sqrt{13}$ $\sqrt{111}$

Rational or not?

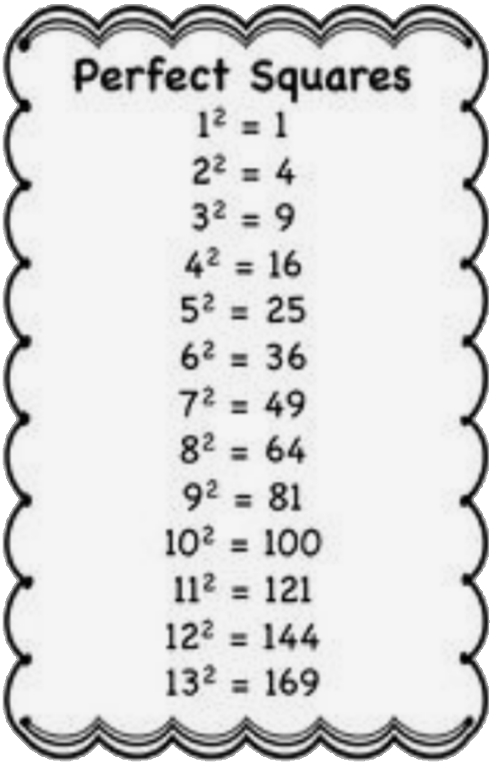
$\frac{2}{7}$ ✓ 3π ✗ $\sqrt{20}$ ✓

$\sqrt{20+5}$ ✓ $-\sqrt{144}$ ✓ -5.65 ✓

$\sqrt{25} = \frac{5}{1}$ $\frac{-12}{1}$ $\frac{-565}{100}$

How to estimate the square root of a number.

It helps to know perfect squares:



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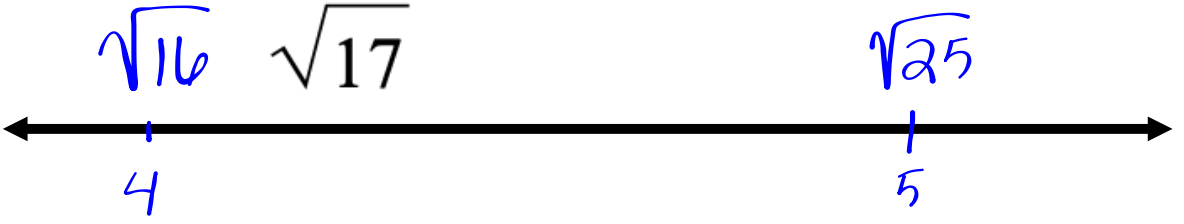
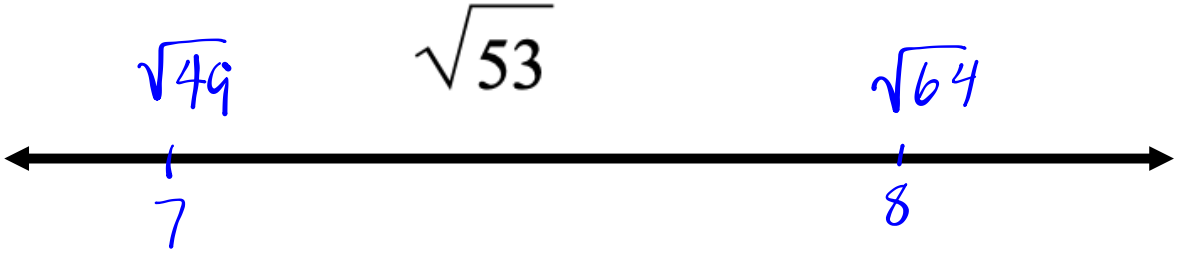
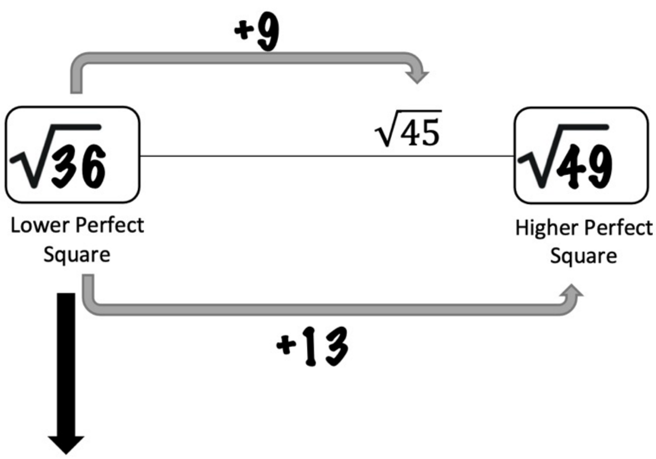




Approximate $\sqrt{45}$ to the nearest tenth.



$$6 + \frac{9}{13}$$

0.69
13) 9.0
78
120
117
3

6.69

~ 6.7

1. Find the perfect squares above and below your target number.
2. Place your target number on the number line between the perfect squares.
3. Calculate the distance between the lower perfect square and your target number.
4. Calculate the distance between the lower perfect square and the higher perfect square.
5. Find the ratio of the distance the target number is between the two perfect squares.
6. Do the division to make the ratio a decimal.
7. Add the decimal to the square root of the lower perfect square.