The Number System (8.NS.A.1&2)

Know that there are numbers that are not rational, and approximate them by rational numbers.

CRASH COURSE!

Rational vs. Irrational Numbers

A **Rational** can be written as the ratio of two integers (a simple fraction).

A rational number **terminates (ends) or repeats** when written in decimal form.

1.5 is rational, because it can be written as the ratio **3/2**

7 is rational, because it can be written as the ratio **7/1**

0.333... (3 repeating) is also rational, because it can be written as the ratio **1/3**

An **Irrational** number cannot be written as the ratio of a simple fraction.

An irrational number **does not terminate or repeat** when written in decimal form.

π = 3.14159265358979323846264433832795 (and more…)
You **cannot** write down a simple fraction, so it is an irrational number.

$\sqrt{50}$ = 7.07106781187…
When the number inside the $\sqrt{}$ is not a perfect square, the number is irrational.

Approximating a Square Root to the Nearest Integer (Whole Number)

Estimate $\sqrt{75}$ to the nearest integer.

1. Find the two perfect squares the number falls between.
2. Decide which is closer to the given number (circle it).
3. Find its square root.

$\sqrt{75}$

$\sqrt{64}$ $\boxed{\sqrt{81}}$

$\sqrt{75} \approx 9$

Approximating a Square Root to the Nearest Tenth

Estimate $\sqrt{75}$ to the nearest tenth.
1. Plot the two perfect squares the given number falls between. ($\sqrt{64}$ and $\sqrt{81}$)
2. Plot the number you are estimating. ($\sqrt{75}$)
3. Using the midpoint of the number line as a guide, estimate to the nearest tenth.

$\sqrt{64}$ $\sqrt{75}$ $\sqrt{81}$
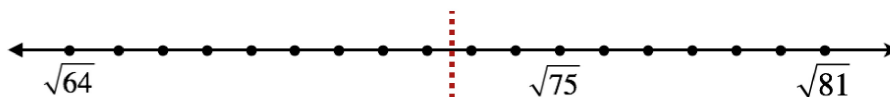
Since $\sqrt{75}$ is to the right of the midpoint, it will be higher than 8.5.
So, a reasonable estimate would be $\sqrt{75} \approx 8.6$ or 8.7

Common Repeating Decimal Equivalents

$\dfrac{1}{3} = 0.\overline{3}$ $\dfrac{2}{3} = 0.\overline{6}$ $\dfrac{1}{9} = 0.\overline{1}$ $\dfrac{2}{9} = 0.\overline{2}$ $\dfrac{8}{9} = 0.\overline{8}$

*Notice the pattern when the denominator is "9".

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$$\sqrt{75}$$
$$\sqrt{64} \quad \boxed{\sqrt{81}}$$
$$\sqrt{75} \approx 9$$

Approximating a Square Root to the Nearest Tenth

Estimate $\sqrt{75}$ to the nearest tenth.

1. Plot the two perfect squares the given number falls between. ($\sqrt{64}$ and $\sqrt{81}$)
2. Find the difference between the lower perfect square and the one you need to find. (75 - 64)
3. Find the difference between the two perfect squares. (81 - 64)
4. Write a ratio. (11/17)
5. Divide and round to the nearest tenth. (11/17 rounds to 0.6)
6. Attach the decimal to the lower perfect square.

$$11 \diagup \sqrt{75}$$
$$\sqrt{64} \qquad \sqrt{81}$$
$$17$$

$$\frac{11}{17} = 0.6470…$$

The square root of 75 will fall between 8 and 9. The decimal 0.6470… will round to 0.6, so the estimate to the nearest tenth is 8.6

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$$\frac{1}{3} = 0.\overline{3} \qquad \frac{2}{3} = 0.\overline{6} \qquad \frac{1}{9} = 0.\overline{1} \qquad \frac{2}{9} = 0.\overline{2} \qquad \frac{8}{9} = 0.\overline{8}$$

*Notice the pattern when the denominator is "9".

The Number System (8.NS.A.1&2)

Solve each problem. You may NOT use a calculator for this set of problems.

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1. The length of the diagonal of a rectangle is $\sqrt{181}$ inches. Which statement describes the length of the diagonal?

   A. The length is between 12 and 13 inches.

   B. The length is between 13 and 14 inches.

   C. The length is between 14 and 15 inches.

   D. The length is between 15 and 16 inches.

2. Which of the following are NOT rational numbers? (Choose all that apply.)

   A. $\sqrt{5}$
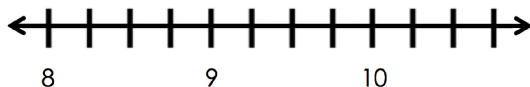
   B. 0.666

   C. $\dfrac{16}{9}$

   D. -30

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3. What is the square of 169?

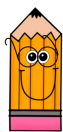   A. 11

   B. 13

   C. 28,561

   D. 28,730

4. Write $0.\overline{4}$ as a fraction in simplest form.

   A. $\dfrac{4}{10}$

   B. $\dfrac{44}{100}$

   C. $\dfrac{4}{9}$

   D. $\dfrac{2}{5}$

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5. Estimate the location of $\sqrt{94}$ on the number line below.

6. Estimate $\sqrt{130}$ to the nearest tenth.

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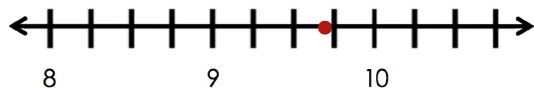
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5. Estimate the location of $\sqrt{94}$ on the number line below.

   $\sqrt{81}$ $\sqrt{100}$

   8   9   10

6. Estimate $\sqrt{130}$ to the nearest tenth.

   11.4