

July 6, 2015

Converting a Proper fraction to a Decimal
(Base 10)

*Note: A fraction has one of the following decimal representations

- Terminating decimal
0.5, -0.75, 0.45
- Non-Terminating (Repeating)
 $0.\overline{33} = 0.333\dots$
 $\frac{1}{3} \approx 0.34$
approximately $\approx 0.36\overline{36}$

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Convert to a Decimal

$$\frac{5}{6} = 6 \overline{) 5.0000}$$

$\begin{array}{r} 0.83\overline{3} \\ 6 \overline{) 5.0000} \\ \underline{-48} \\ 20 \\ \underline{-18} \\ 20 \\ \underline{-20} \\ 0 \end{array}$

$$\frac{5}{11} = 11 \overline{) 5.0000}$$

$\begin{array}{r} 0.45\overline{45} \\ 11 \overline{) 5.0000} \\ \underline{-44} \\ 60 \\ \underline{-55} \\ 50 \\ \underline{-44} \\ 60 \\ \underline{-55} \\ 50 \\ \underline{-44} \\ 60 \end{array}$

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$$\frac{11}{36} = 36 \overline{) 11.00000}$$

$\begin{array}{r} 0.305\overline{5} \\ 36 \overline{) 11.00000} \\ \underline{-108} \\ 200 \\ \underline{-180} \\ 200 \\ \underline{-180} \\ 200 \end{array}$

$0.305\overline{5} \approx 0.31$
100th place

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Converting Decimals to fractions.

0.75
ones, 10th, 100th

$\frac{75}{100}$ Drop decimal Point & write over 100.

Always Reduce!

$$\frac{15}{20} = \frac{3}{4}$$

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$$0.825$$

↑
1000th

$$\frac{825}{1000} = \frac{165}{200} = \frac{33}{40}$$

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$0.36\overline{36}$ what place value do we divide by?

- Let $x = 0.36\overline{36}$ "one" x
- Multiply both sides by 100
 $100x = 100(0.36\overline{36})$
 $100x = 36.363636\dots$
- Subtract "one" x from both sides
 $100x = 36.363636\dots$
 $- x = 0.363636\dots$

 $99x = 36$
 $\frac{99x}{99} = \frac{36}{99}$
 $x = \frac{36}{99} = \frac{4}{11}$

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0.45 $\overline{45}$

① Let $x = 0.4545\dots$

② $100x = 45.4545\dots$

③

$$\begin{array}{r} 100x = 45.4545\dots \\ - x = 0.4545\dots \\ \hline 99x = 45 \\ x = \frac{45}{99} = \frac{5}{11} \end{array}$$

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106
② $\cdot 53$

333
③ $\cdot 111$

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0.31 $\overline{8}$
one place $\rightarrow 10$

① Let $x = 0.3181818\dots$

② $1000x = 1000(0.3181818\dots)$
 $1000x = 318.3181818\dots$

③

$$\begin{array}{r} 1000x = 318.3181818\dots \\ - x = 0.3181818\dots \\ \hline 999x = 318 \\ \frac{999x}{999} = \frac{318}{999} \\ x = \frac{318}{999} = \frac{106}{333} \end{array}$$

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$x = 0.31\overline{8}$
 $= 0.3181818\dots$

$100x = 31.8181818\dots$
 $- x = 0.3181818\dots$

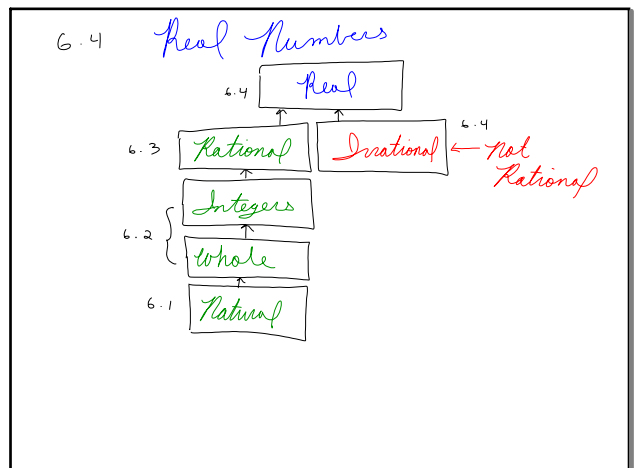
$99x = 31$

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1, 4, 6, 10, 11, 12, 18, 21,
28, 30, 34, 37, 40, 43,
47, 52, 55, 63, 70

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Irrational Numbers

* All numbers that are not rational.

↓
Recall that a rational number can be written as
① a terminating or
② non-terminating decimal.

So, a irrational number has non-terminating or non-terminating decimal representation.

as example

$$\pi = 3.1415926\dots$$

$$e, \sqrt{2}, \sqrt{3}, \sqrt{5}, \sqrt{6}$$

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$$0.6 = \frac{6}{10} = \frac{3}{5}$$

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