7.1 Decimals

Place value:

10^5	10^4	10^3	10^2	10^1	10^0	.	10^{-1}	10^{-2}	10^{-3}	10^{-4}	10^{-5}	10^{-6}
		1000	100	10	1	.	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$	$\frac{1}{10^4}$	$\frac{1}{10^5}$	$\frac{1}{10^6}$

Example: Let one "flat" represent one unit. Then, what does a long represent? What does one square represent?

↳ $\frac{1}{10}$ of a unit ↳ $\frac{1}{100}$ of a unit

Write these numbers in expanded form.

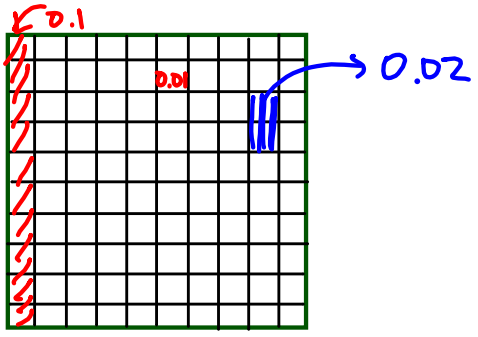
(a) 3476.981 $= 3(1000) + 4(100) + 7(10) + 6(1) + 9\left(\frac{1}{10}\right) + 8\left(\frac{1}{100}\right) + 1\left(\frac{1}{1000}\right)$

(b) 8002.0045

$= 8(1000) + 2(1) + 4\left(\frac{1}{1000}\right) + 5\left(\frac{1}{10000}\right)$

ex $0.0089 = \frac{89}{10,000}$ ex $0.001003 = \frac{1003}{1,000,000}$

We can also use a "hundreds square" to help us convert between decimals and fractions.



Ex 1. Write these fractions as decimals.

(a) $5\frac{3}{8} = 5.375$

$\frac{3}{8} = \frac{3}{2^3}\left(\frac{5^3}{5^3}\right) = \frac{3\cdot(125)}{10^3} = \frac{375}{1000} = 0.375$

$$\begin{array}{r} .375 \\ 8\overline{)3.000000} \\ -24 \\ \hline 60 \\ -56 \\ \hline 40 \\ -40 \\ \hline 0 \end{array}$$

(b) $\frac{3}{2^2\cdot 5^4}\left(\frac{2^2}{2^2}\right) = \frac{3\cdot 4}{2^4 5^4} = \frac{12}{10^4} = 0.0012$

(c) $\frac{21}{2^3\cdot 5\cdot 3}\left(\frac{5^2}{5^2}\right) = \frac{7\cdot 3(25)}{(2^3\cdot 5^3)3} = \frac{175}{10^3} = 0.175$

Ex 2. Write these decimals as fractions.

(a) 69.07

(a) $69\frac{7}{100} = \frac{6907}{100}$

(b) -135.000084

$= -135\frac{84}{10^6} = -135\frac{21}{250{,}000}$

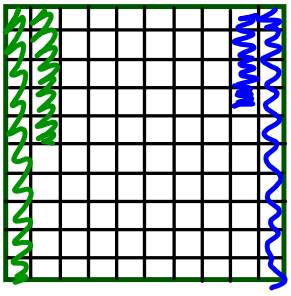
$= -135\frac{21}{250{,}000}$

Ordering Decimals

Methods:

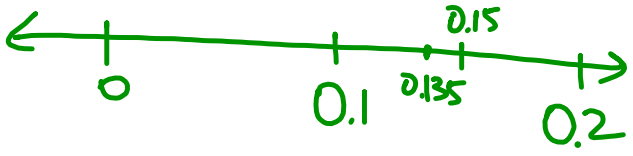
(1) hundreds square

0.15 > 0.135



(2) Number line

0.15 , 0.135 0.15 = 0.150



(3) Convert to fractions 0.15, 0.135

$0.15 = \frac{15}{100}\left(\frac{10}{10}\right) = \frac{150}{1000}$ $0.135 = \frac{135}{1000}$

(4) place value

$0.15 > 0.135$

because $5 > 3$

Under what conditions does a fraction covert to a terminating decimal?

$\frac{1}{25} = \frac{4}{100} = 0.04$ $\frac{1}{24} = 0.0416$

Look at these examples:

$\frac{7}{8} = 0.875$ $\frac{3}{35} = 0.\overline{085714}$ $\frac{13}{250}\left(\frac{4}{4}\right) = 0.052$ $\frac{21}{2^3 \cdot 5 \cdot 3} = \frac{7}{2^3 \cdot 5} = 0.175$

$$
\begin{array}{r}
.085714285714285714\ldots \\
35\overline{)3.000} \\
-280 \\
\hline
200 \\
-175 \\
\hline
250 \\
-245 \\
\hline
50 \\
-35 \\
\hline
150 \\
-140 \\
\hline
100 \\
\vdots
\end{array}
$$

Fact: Any rational number, in simplest form, converts to a terminating decimal iff

the denominator has only 2s & 5s as its prime factors.

7.1 HW

MC #16

0.1, 0.01, 0.001, . . . is geom. seq.

So is 1.1, 1.01, 1.001, . . .

$1.1 \cdot ? = 1.01$

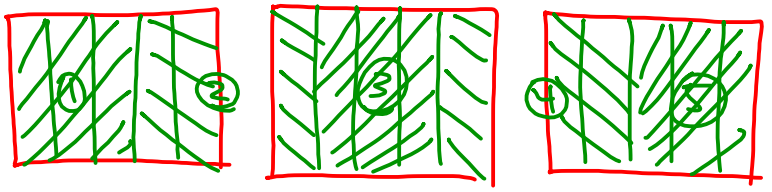
$? = \frac{1.01}{1.1} = 0.91818\overline{1}$

$\frac{1.001}{1.01} = 0.991\ldots$

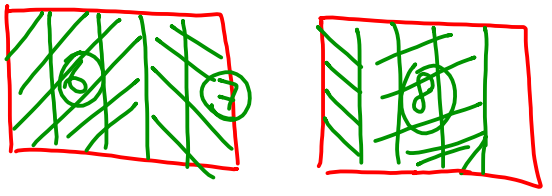
$\neq 0.91\overline{81}$

Fractns WS (story problems) how many portions?

6)



$8\frac{1}{3}$ Portions



$5 \div \frac{3}{5} = 5 \cdot \frac{5}{3} = \frac{25}{3} = 8\frac{1}{3}$

9) $\frac{1}{2} + \frac{1}{3} = \frac{1}{t}$ t = time together (to finish)

$6t\left(\frac{1}{2} + \frac{1}{3}\right) = \frac{1}{t}(6t)$

$3t + 2t = 6$

$5t = 6$

$t = \frac{6}{5}$ hrs. $= 1\frac{1}{5}$ hrs.

10)

used	has left
$\frac{2}{3}$	$\frac{1}{3}$
$\frac{5}{7}\left(\frac{1}{3}\right) = \frac{5}{21}$	$\frac{1}{3} - \frac{5}{21} = \frac{2}{21}$
$\frac{2}{7}\left(\frac{5}{21}\right) = \frac{1}{14}$	$\frac{2}{21} - \frac{1}{14} = \frac{2}{21}\left(\frac{2}{2}\right) - \frac{1}{14}\left(\frac{3}{3}\right) = \frac{1}{42}$

$\frac{1}{42}$ of original supply