Section 7-2 Operations on Decimals

Addition / Subtraction

1. Base ten blocks (like in Ch 3)

2. Standard algorithm

When using the standard algorithm to add/sub decimals, we must line up the decimal points. Why?

$$\begin{array}{r} 4.67 \\ +\ 2.8 \\ \hline \end{array} \qquad \begin{array}{r} 4.67 \\ +\ 2.8 \\ \hline \end{array}$$

Lining up the decimal points automatically lines up the place values.

Multiplication of Decimals

1. Repeated addition (only if one factor is a whole number)
2. Standard algorithm
3. Convert to fractions
4. Area model (Decimal Square)
5. Powers of 10 (only if one factor is 10^n)

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1. Repeated addition

ex: $3 \times 0.2 = 0.2 + 0.2 + 0.2$

2. Standard algorithm

ex: $3.16 \times 0.4 \Rightarrow 316 \times 4 = 1264$

2 dec places + 1 dec place = 3 dec places

WHY??

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3. Fractions

$$3.16 \times 0.4 = \frac{316}{100} \times \frac{4}{10} = \frac{316 \times 4}{1000}$$

$$10^2 \cdot 10^1 = 10^3$$

*exponent law $a^n \cdot a^m = a^{n+m}$ explains why you add decimal places.

* You can also explain it with place value. Each power of 10 adds another place value.

You can also use fractions for decimals like:

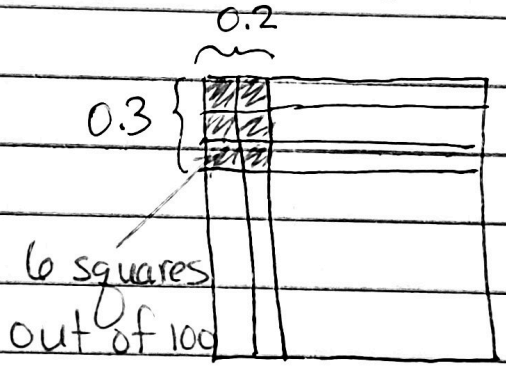
$$0.25 \times 0.5 = \frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$$

4. Area model (Decimal Square)

This is similar to what we did with multiplying fractions. Only, our square will always be partitioned into 100 pieces (why? decimals!)

ex 1 Draw the area model (decimal square) for the following.

a) 0.2×0.3

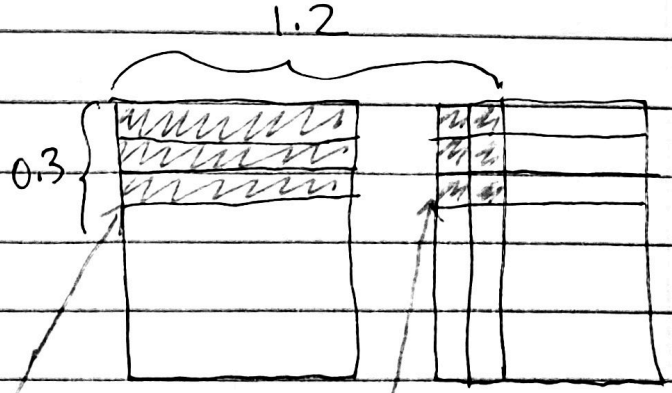


b) 1.2×0.3

$1.2 \leftarrow 1$ dec pl

$\times 0.3 \leftarrow 1$ dec pl

$.36$ 2



5. Multiply by Powers of 10

We learned back in Ch 3 that mult by powers of 10 moves the decimal to the right by adding 0s to the number.

$4 \times 100 = 400$

$36 \times 1000 = 36{,}000$

$15 \times 10 = 150$

For decimals, it's the same thing

$0.4 \times 100 = 0.40 = 40.$

↓

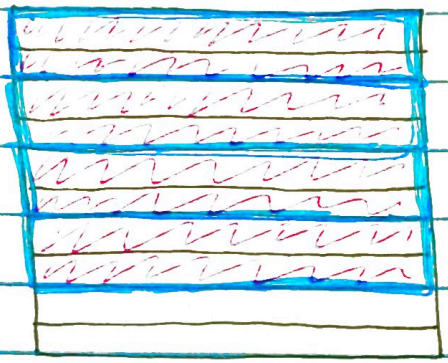
10^2 so 2 place values

* In general, multiplying a number by 10^n moves the decimal to the right n places.

Division

1. Partitive (only if divisor is a whole #)

ex: $0.8 \div 4 = 0.2$



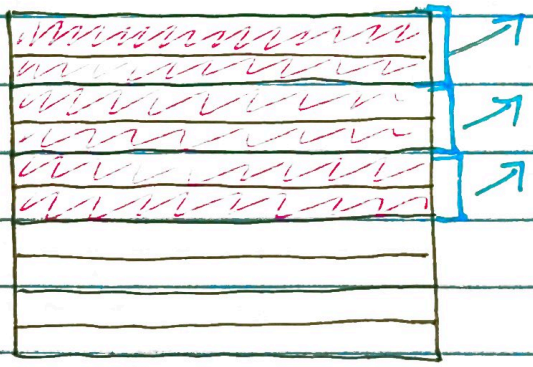
8 longs split into 4 equal groups.

How many are in each group?

2 longs = 0.2

2. Repeated Subtraction (only if the quotient is a whole #)

ex: $0.6 \div 0.2 = 3$



How many times can you take 2 longs from 6 longs? 3

3. Standard algorithm

ex: $34.56 \div 0.2$

$0.2\overline{)34.56} \Rightarrow 2\overline{)345.6}$

$$\begin{array}{r} 172.8 \\ 2\overline{)345.6} \\ -2\downarrow \\ \hline 14 \\ -14\downarrow \\ \hline 05 \\ -4\downarrow \\ \hline 16 \\ -16 \\ \hline 0 \end{array}$$

You have to move the decimal point the same # of places.

Why can we do this?

$$34.56 \div 0.2 = \frac{34.56 \cdot 10}{0.2 \quad 10} = \frac{345.6}{2}$$

one !!

* Briefly look at Mental Computation techniques in the book.

end 7-2