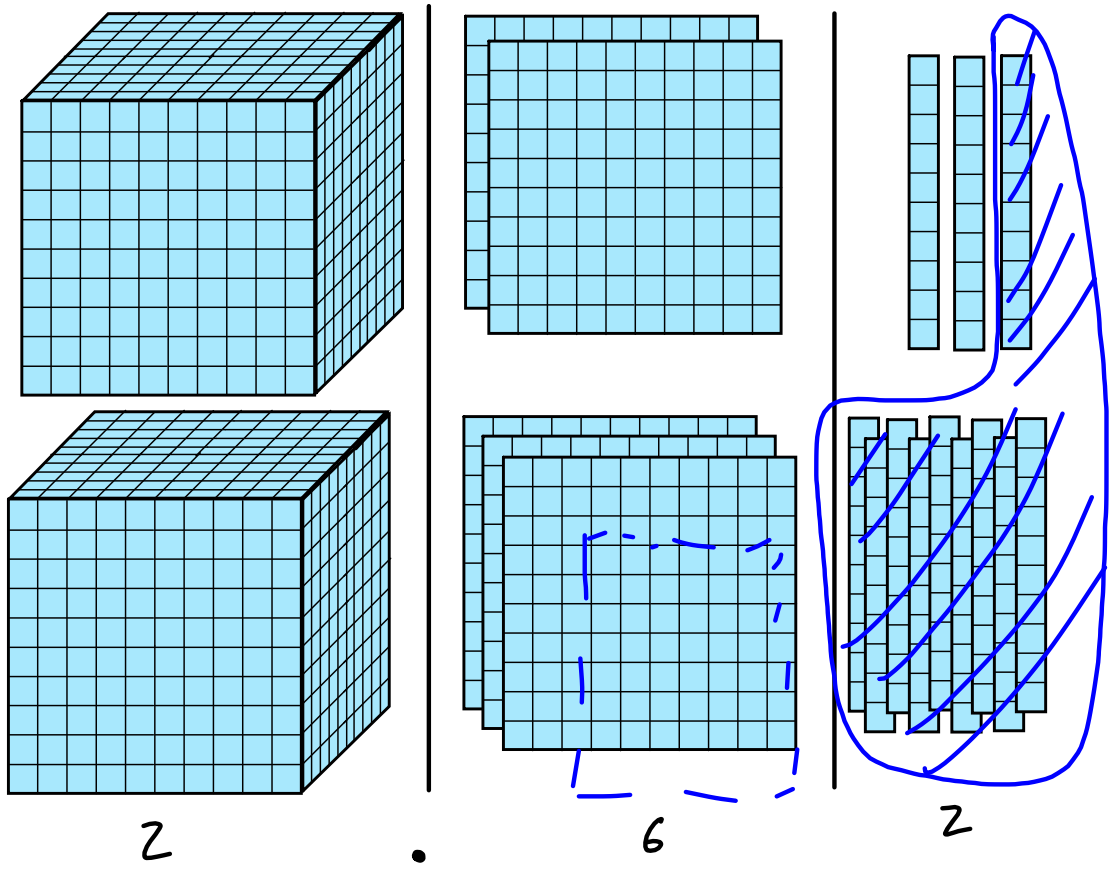
7.2: Operations on Decimals

Example: (Addition of Decimals) Compute 1.23 + 1.39.

$$\begin{array}{r} {\scriptstyle 1} \\ 1.23 \\ +1.39 \\ \hline 2.62 \end{array}$$

Example: Compute 1.23 + 1.39 by using Base 10 Blocks.



Example: Compute 1.2 + 2.104.

$$\begin{array}{r} 1.200 \\ +2.104 \\ \hline 3.304 \end{array}$$

Example: Compute 1.52 - 1.334.

$$\begin{array}{r} {\scriptstyle 4\ \ 11\ \ 10} \\ 1.5\cancel{2}\cancel{0} \\ -\ 1.334 \\ \hline 0.186 \end{array}$$

Summary: To add or subtract decimals:

1. Line up at decimal point.
2. Add zeroes in blank place values.
3. Standard Algorithm.
4. Put decimal point in same place as where it was lined up.

Why does this work?

Compare tenths to tenths, hundredths to hundredths, etc.

Example: Compute 1.2×1.63.

$$
\begin{array}{r}
1.63 \\
\times \quad 1.2 \\
\hline
326 \\
+1630 \\
\hline
1.956
\end{array}
$$

7.2 Completed Notes

To multiply decimals:

1. Use the standard algorithm, ignoring the decimals. Note: You do not need to align at the decimal point.
2. Move the decimal place to the left the same number of decimal places as the total of the number of decimal places in the two numbers.

Why does this work? $1.63 \times 1.2 = \frac{163}{10^2} \times \frac{12}{10^1} =$

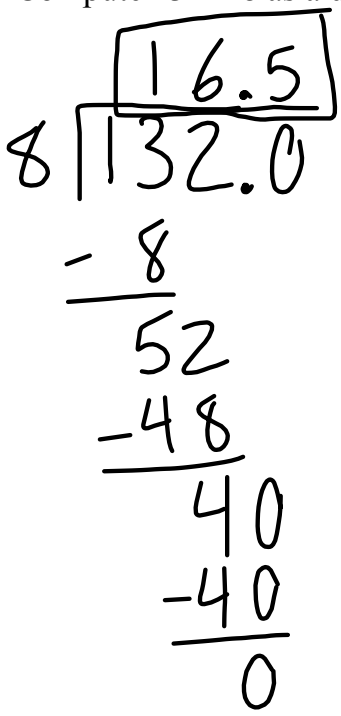
$\frac{1956}{10^{2+1}} = \frac{1956}{10^3} = 1.956$

The decimal places for each number represent a power of ten in the denominator. We use the standard algorithm to multiply the numerators, and the denominator is simply adding the exponents on the powers.

Example: Compute 1.53×0.74.

$$\begin{array}{r} {\scriptstyle 3}\quad {\scriptstyle 2} \\ 1.53 \\ \times\ 0.74 \\ \hline 1612 \\ +\ 10710 \\ \hline 1.1322 \end{array}$$

Example: Compute 132 ÷ 8 as a decimal.



Summary: To divide to integers as a decimal, we divide as normal, but when we run out of numbers to bring down, we write a .0 (and a decimal point right above it) and bring down the 0. We then add additional zeroes as needed.

(Note: If the dividend is a decimal and the divisor is an integer, we put the decimal place above the dividend's decimal place and just add additional zeroes as needed.)

Why does this work?

We are dividing numbers into groups as before, but we now break units into tenths, tenths into hundredths, etc.

Rounding Decimals: To round a decimal, we consider the number in the given place. If the digit after it is 5 or higher, we raise this number by 1 and remove the remaining digits. If the digit after it is 4 or less, we just remove the remaining digits.

Example: Round 1.3546 to the nearest thousandth.

Round up: 1.355

Example: Round 1.922 to the nearest hundredth.

1.92

Example: Round 1.95 to the nearest tenth.

$$\begin{array}{r} 1.9 \\ +\ .1 \\ \hline 2.0 \end{array}$$

2.0 (keep number of decimal places as the rounding)

Example: Compute $22.57 \div 1.1$. Round to the nearest hundredth.

$$\begin{array}{r} 20.518 \\ 11\overline{)225.700} \\ -22 \\ \hline 05 \\ -\ 0 \\ \hline 57 \\ -55 \\ \hline 20 \\ -11 \\ \hline 90 \end{array}$$

20.52

Summary: To divide by a decimal, move the decimal place of the divisor to the right until it is an integer, and then move the decimal place of the dividend the same number of places. Then divide as normal.

Why does this work?

$$\frac{22.57}{1.1} \cdot \frac{10^1}{10^1} = \frac{225.7}{11}$$

As long as you move both decimal places the same way, you are multiply by the same power of ten in the num. and denom.

Example: Compute 9.160 ÷ .365. Round to the nearest hundredth.

$$
\begin{array}{r}
25.095 \\
365\overline{)9160.00} \\
-730\downarrow \\
\hline
1860 \\
-1825 \\
\hline
350 \\
-\ \ 0 \\
\hline
3500 \\
-3285 \\
\hline
2150 \\
-1825 \\
\hline
325
\end{array}
$$

$$
\begin{array}{r}
54 \\
365 \\
\times\ \ 9 \\
\hline
3285
\end{array}
$$

$$\boxed{25.10}$$