Dividing Numbers Parents' Guide

Teaching Mathematics That Makes Sense

Dividing

Division can frequently be a difficult concept for students to learn. Often it is because we are too quick to show students how to divide rather than help them understand what division means. Think about how you learned to divide:

$$6\overline{)267}$$

Were you told things like:

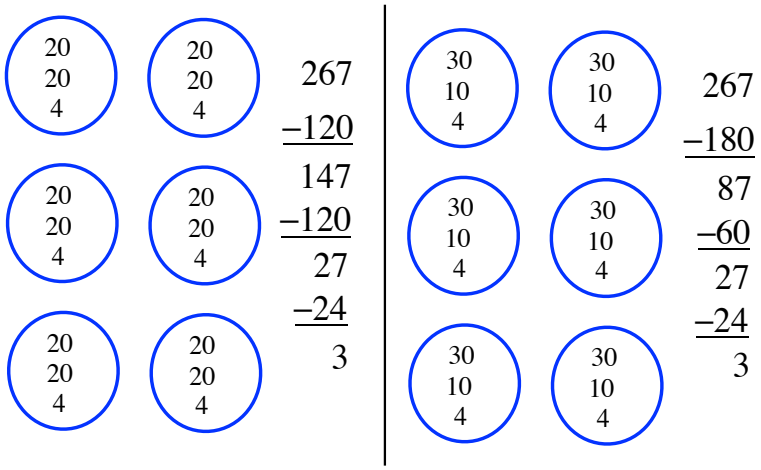
- 6 doesn't "go into" 2 (which is not true on many levels…6 does "go into" 2, just not all of 6, and that is not a "2" – that is 200 and 6 definitely "goes into" 200)
- Then you might have been asked, how many times does 6 go in to 26, and so on …

By doing this process are you learning what division means? If you are like most people, the answer is no.

Understanding Division

What if you have 267 gold coins and you wanted to share them equally among 6 people? How many gold coins would each person get? Would there be any left over?

You could begin by giving one gold coin to each person and doing this until you had no more coins or couldn't share the remaining equally among the 6 people. This might take a while. So you could give the coins out more quickly by first giving each person 20 coins, or 30 coins each, and then keep handing out the coins until you had no more coins or couldn't share the remaining equally. We call this way to think about division the Divvy-Up method – it can also be considered repeated subtraction. Below is a diagram showing two different ways to divvy up the coins – repeated subtraction. The circles represent the 6 people. You can see that no matter how you divvy up the coins each person will get 44 and there will be 3 remaining.



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Many Ways To Divide

There are many ways to divide: $267 \div 6$

Long Division

$$\begin{array}{r} 44 \\ 6\overline{)267} \\ -24 \\ \hline 27 \\ -24 \\ \hline 3 \end{array}$$

"Guess and Check" – Many ways to do this

$$\begin{array}{rr} 6\overline{)267} & \\ -\ 60 & 10 \\ \hline 207 & \\ -\ 60 & 10 \\ \hline 147 & \\ -60 & 10 \\ \hline 87 & \\ -\ 60 & 10 \\ \hline 27 & \\ -24 & 4 \\ \hline 3 & \end{array} \qquad \begin{array}{rr} 6\overline{)267} & \\ -180 & 30 \\ \hline 87 & \\ -\ 60 & 10 \\ \hline 27 & \\ -24 & 4 \\ \hline 3 & \end{array} \qquad \begin{array}{rr} 6\overline{)267} & \\ -240 & 40 \\ \hline 27 & \\ -\ 24 & 4 \\ \hline 3 & \end{array}$$

The quotient (the answer to a division problem) is 44 with a remainder of 3

Fraction Decomposition – There are many ways to decompose:

$$\frac{267}{6} = \frac{200+60+7}{6}$$
$$= \frac{180+20+60+6+1}{6}$$
$$= \frac{180+60+6+21}{6}$$
$$= \frac{180+60+6+18+3}{6}$$
$$= \frac{180}{6}+\frac{60}{6}+\frac{6}{6}+\frac{18}{6}+\frac{3}{6}$$
$$= 30+10+1+3+\frac{3}{6}$$
$$= 44+\frac{3}{6}$$

$$\frac{267}{6} = \frac{240+27}{6}$$
$$= \frac{240+24+3}{6}$$
$$= \frac{180+60+6+18+3}{6}$$
$$= \frac{240}{6}+\frac{24}{6}+\frac{3}{6}$$
$$= 40+4+\frac{3}{6}$$
$$= 44+\frac{3}{6}$$

Since we are talking about gold coins, we have 3 coins left over and can't share them equally among 6 people – thus the fraction $\frac{3}{6}$.

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Another Example

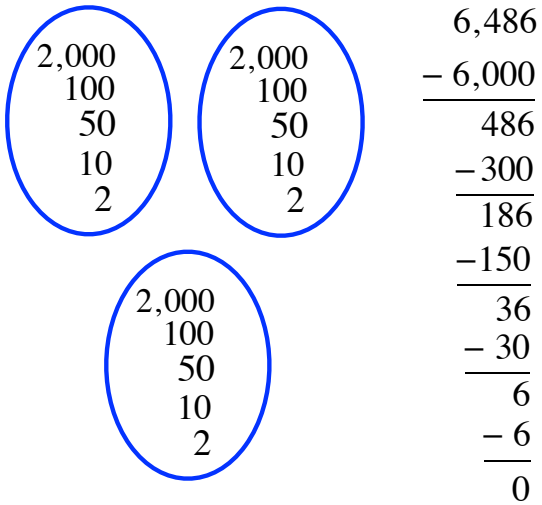
Find the quotient (the answer to a division problem):

$$3\overline{)6{,}486}$$

Long Division

$$\begin{array}{r} 2{,}162 \\ 3\overline{)6{,}486} \\ -\ 6\downarrow\downarrow\downarrow \\ \hline 4\downarrow\downarrow \\ -\ 3\downarrow\downarrow \\ \hline 18\downarrow \\ -\ 18\downarrow \\ \hline 06 \\ -\ 6 \\ \hline 0 \end{array}$$

"Divvy-Up" (Repeated Subtraction)



$$\begin{array}{r} 6{,}486 \\ -\ 6{,}000 \\ \hline 486 \\ -\ 300 \\ \hline 186 \\ -\ 150 \\ \hline 36 \\ -\ 30 \\ \hline 6 \\ -\ 6 \\ \hline 0 \end{array}$$

"Guess and Check"

$$\begin{array}{r|l} 3\overline{)6{,}486} & \\ -\ 6{,}000 & 2{,}000 \\ \hline 486 & \\ -\ 300 & 100 \\ \hline 186 & \\ -\ 150 & 50 \\ \hline 36 & \\ -\ 30 & 10 \\ \hline 6 & \\ -\ 6 & 2 \\ \hline 0 & \end{array}$$

"Fraction Decomposition"

$$\frac{6{,}486}{3}$$

$$= \frac{6{,}000 + 400 + 80 + 6}{3}$$

$$= \frac{6{,}000}{3} + \frac{300 + 150 + 30}{3} + \frac{6}{3}$$

$$= 2{,}000 + \frac{300}{3} + \frac{150}{3} + \frac{30}{3} + 2$$

$$= 2{,}000 + 100 + 50 + 10 + 2$$

$$= 2{,}162$$