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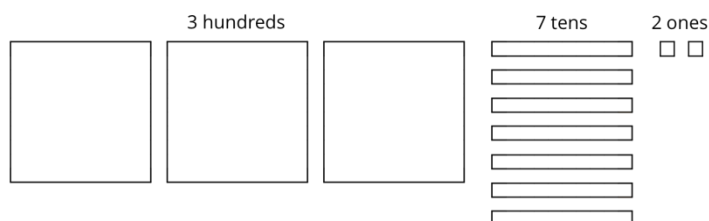
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Student Task Statements

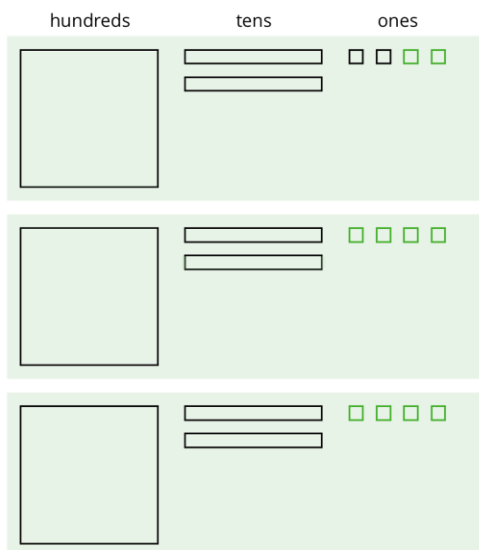
Lesson 9: Using the Partial Quotients Method

9.1: Using Base-Ten Diagrams to Calculate Quotients

Elena used base-ten diagrams to find $372 \div 3$. She started by representing 372.



She made 3 groups, each with 1 hundred. Then, she put the tens and ones in each of the 3 groups. Here is her diagram for $372 \div 3$.



Discuss with a partner:

- Elena's diagram for 372 has 7 tens. The one for $372 \div 3$ has only 6 tens. Why?
- Where did the extra ones (small squares) come from?

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9.2: Using the Partial Quotients Method to Calculate Quotients

1. Andre calculated $657 \div 3$ using a method that was different from Elena's.

He started by writing the dividend (657) and the divisor (3).

$$3 \overline{) 657}$$

He then subtracted 3 groups of different amounts from 657, starting with 3 groups of 200...

$$\begin{array}{r} 200 \\ 3 \overline{) 657} \\ - 600 \\ \hline 57 \end{array}$$

... then 3 groups of 10, and then 3 groups of 9.

$$\begin{array}{r} 9 \\ 10 \\ 200 \\ 3 \overline{) 657} \\ - 600 \\ \hline 57 \\ - 30 \\ \hline 27 \\ - 27 \\ \hline 0 \end{array}$$

Andre calculated $200 + 10 + 9$ and then wrote 219.

$$\begin{array}{r} \boxed{219} \\ 9 \\ 10 \\ 200 \\ 3 \overline{) 657} \\ - 600 \\ \hline 57 \\ - 30 \\ \hline 27 \\ - 27 \\ \hline 0 \end{array}$$

- Andre subtracted 600 from 657. What does the 600 represent?
 - Andre wrote 10 above the 200, and then subtracted 30 from 57. How is the 30 related to the 10?
 - What do the numbers 200, 10, and 9 represent?
 - What is the meaning of the 0 at the bottom of Andre's work?
2. How might Andre calculate $896 \div 4$? Explain or show your reasoning.

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9.3: What's the Quotient?

1. Find the quotient of $1,332 \div 9$ using one of the methods you have seen so far. Show your reasoning.

 2. Find each quotient and show your reasoning. Use the partial quotients method at least once.
 - a. $1,115 \div 5$

 - b. $665 \div 7$

 - c. $432 \div 16$
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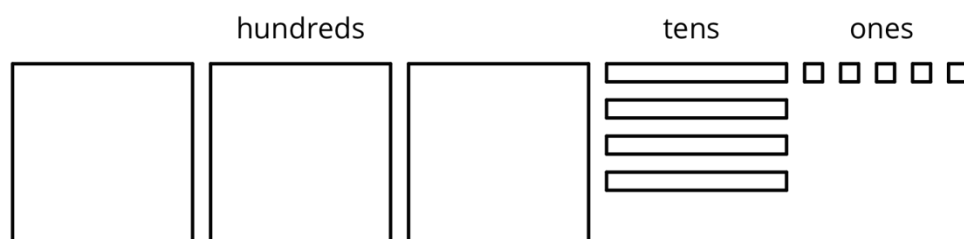
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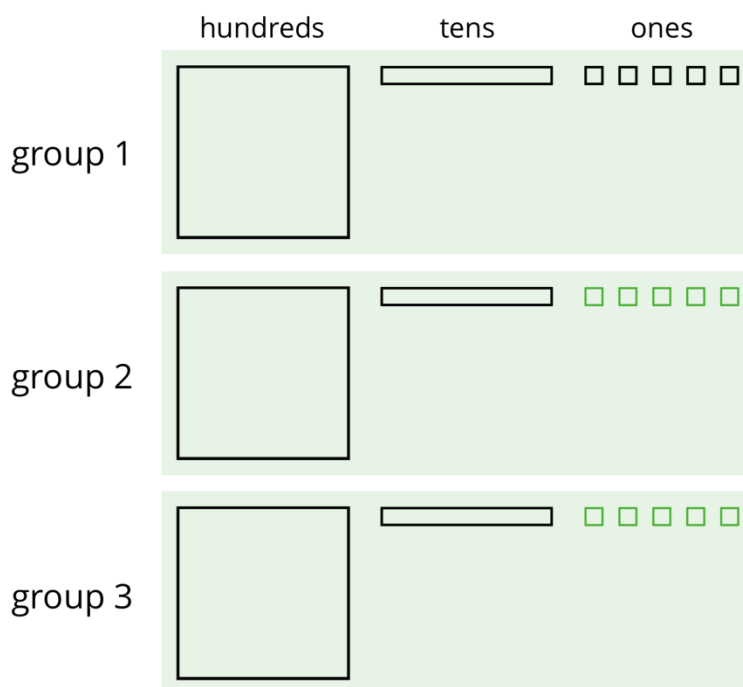
Lesson 9 Summary

We can find the quotient $345 \div 3$ in different ways.

One way is to use a base-ten diagram to represent the hundreds, tens, and ones and to create equal-sized groups.



We can think of the division by 3 as splitting up 345 into 3 equal groups.



Each group has 1 hundred, 1 ten, and 5 ones, so $345 \div 3 = 115$. Notice that in order to split 345 into 3 equal groups, one of the tens had to be unbundled or decomposed into 10 ones.

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Another way to divide 345 by 3 is by using the partial quotients method, in which we keep subtracting 3 groups of some amount from 345.

$$\begin{array}{r}
 \boxed{1 \ 1 \ 5} \\
 5 \\
 1 \ 0 \\
 1 \ 0 \ 0 \\
 3 \overline{) 3 \ 4 \ 5} \\
 \underline{- 3 \ 0 \ 0} \leftarrow 3 \text{ groups of } 100 \\
 4 \ 5 \\
 \underline{- 3 \ 0} \leftarrow 3 \text{ groups of } 10 \\
 1 \ 5 \\
 \underline{- 1 \ 5} \leftarrow 3 \text{ groups of } 5 \\
 0
 \end{array}$$

$$\begin{array}{r}
 \boxed{1 \ 1 \ 5} \\
 5 \ 0 \\
 5 \ 0 \\
 1 \ 5 \\
 3 \overline{) 3 \ 4 \ 5} \\
 \underline{- 4 \ 5} \leftarrow 3 \text{ groups of } 15 \\
 3 \ 0 \ 0 \\
 \underline{- 1 \ 5 \ 0} \leftarrow 3 \text{ groups of } 50 \\
 1 \ 5 \ 0 \\
 \underline{- 1 \ 5 \ 0} \leftarrow 3 \text{ groups of } 50 \\
 0
 \end{array}$$

- In the calculation on the left, first we subtract 3 groups of 100, then 3 groups of 10, and then 3 groups of 5. Adding up the partial quotients ($100 + 10 + 5$) gives us 115.
- The calculation on the right shows a different amount per group subtracted each time (3 groups of 15, 3 groups of 50, and 3 more groups of 50), but the total amount in each of the 3 groups is still 115. There are other ways of calculating $345 \div 3$ using the partial quotients method.

Both the base-ten diagrams and partial quotients methods are effective. If, however, the dividend and divisor are large, as in $1,248 \div 26$, then the base-ten diagrams will be time-consuming.

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