Adding and Subtracting Decimals with Many Non-Zero Digits

Let's practice adding and subtracting decimals.

4.1 The Cost of a Photo Print

1. Clare bought a photo for 17 cents and paid with a $5 bill. Which of these three ways of writing the numbers could Clare use to find the change she should receive? Be prepared to explain your reasoning.

$$\begin{array}{r} 5 \\ -\ 0.17 \\ \hline \end{array} \qquad \begin{array}{r} 5 \\ -\ 0.17 \\ \hline \end{array} \qquad \begin{array}{r} 5 \\ -\ 0.17 \\ \hline \end{array}$$

2. Find the amount of change that Clare should receive. Explain or show your reasoning.

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4.2 Decimals All Around

1. Find the value of each expression. Show your reasoning.

   a. $318.8 - 94.63$

   b. $0.02 - 0.0116$

2. Lin's grandmother ordered a set of screws that were 0.3125 inches long to fix a shelf, but the store sent her screws that were 0.6875 inches long. How much longer were these screws than the ones she ordered? Show your reasoning.

3. There is 0.162 liter of water in a 1-liter bottle. How much more water should be put in the bottle so it contains exactly 1 liter? Show your reasoning.

Are you ready for more?

One micrometer is 1 millionth of a meter. A red blood cell is about 7.5 micrometers in diameter. A coarse grain of sand is about 70 micrometers in diameter. Find the difference between the two diameters in meters. Show your reasoning.

4.3 Unknown Numbers

Write the missing digits in each calculation so that the value of each sum or difference is correct. Be prepared to explain your reasoning.

1.

$$\begin{array}{r} 0.4\,0\,4\square \\ +\ \square\square\square\square \\ \hline 1 \end{array}$$

2.

$$\begin{array}{r} 9.8\,7\,6\,5 \\ +\ \square\square\square\square\square\square \\ \hline 1\,0 \end{array}$$

3.

$$\begin{array}{r} 0.7 \\ -\ \square\square\square\square \\ \hline 0.0\,1\,2 \end{array}$$

4.

$$\begin{array}{r} 7 \\ -\ \square\square\square\square\square \\ \hline 3.4\,5\,6\,7 \end{array}$$

5.

$$\begin{array}{r} 7\,0 \\ -\ \square\square\square\square\square\square \\ \hline 0.0\,0\,8\,9 \end{array}$$

Are you ready for more?

In a cryptarithmetic puzzle, the digits 0-9 are represented using the first 10 letters of the alphabet. Use your understanding of decimal addition to determine which digits go with the letters A, B, C, D, E, F, G, H, I, and J. How many possibilities can you find?

$$\begin{array}{r} \text{I H F . I J} \\ +\ \text{J I I . F I} \\ \hline \text{E J I . I E} \end{array}$$

Lesson 4 Summary

Base-ten diagrams work best for representing subtraction of numbers with few non-zero digits, such as $0.16 - 0.09$. For numbers with many non-zero digits, such as $0.25103 - 0.04671$, it would take a long time to draw the base-ten diagram. With vertical calculations, we can find this difference efficiently.

Thinking about base-ten diagrams can help us make sense of this calculation.

$$\begin{array}{r} \overset{10}{} \\ \overset{4}{\cancel{5}}\overset{\cancel{0}}{\cancel{1}}\overset{10}{\cancel{0}} \\ 0.2\cancel{5}\cancel{1}\cancel{0}3 \\ -\ 0.04671 \\ \hline 0.20432 \end{array}$$

The thousandth in 0.25103 is decomposed to make 10 ten-thousandths so that we can subtract 7 ten-thousandths. Similarly, one of the hundredths in 0.25103 is decomposed to make 10 thousandths.

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