

Add and Subtract Decimals

Use What You Know

You've learned what decimals are and how to add and subtract them to tenths and hundredths. Take a look at this problem.

Zee wants to make 2 liters of pink lemonade for a party. She squeezed the eight lemons she had and got 0.375 liters of lemon juice. She had 0.35 liters of cranberry juice, and 1.2 liters of water.

How much lemonade can she make? How much more or less than 2 liters will she have?

Use the math you know to answer the question.

a. How can you estimate the amount of lemonade Zee can make? _____

b. How can you read the amount of each ingredient in words? _____

c. How can you convert these different amounts to thousandths? _____

d. How can you write an addition expression to make sure the place values line up?

e. Write the sum that represents the total amount of lemonade. _____

f. How can you find the difference between that number and 2 liters? _____

Find Out More

You can see that what you know about adding and subtracting whole numbers can help you add and subtract decimals to the thousandths.

The important thing is that you have to make sure you are adding the same place values. You can use a place-value chart to help you keep your columns lined up.

Ones	.	Tenths $\frac{1}{10}$	Hundredths $\frac{1}{100}$	Thousandths $\frac{1}{1,000}$
0	.	3	7	5
+0	.	3	5	0
+1	.	2	0	0
1	.	9	2	5

When you see the addends in a place-value chart, you can see that you can add 0s before the first digit in a decimal or after the last digit after a decimal to help you keep the place values straight. You would get a completely different answer if you ignored the decimals and added $375 + 35 + 12$.

The same is true for subtraction.

Ones	.	Tenths $\frac{1}{10}$	Hundredths $\frac{1}{100}$	Thousandths $\frac{1}{1,000}$
2	.	0	0	0
-1	.	9	2	5
0	.	0	7	5

Reflect

1 What is the difference between adding whole numbers and adding decimals?

Learn About

Adding Decimals to Thousandths

Read the problem below. Then explore how to add more than two addends that have decimals to the thousandths with different numbers of digits.

Maura is going on a plane. She can't have a carry-on backpack that weighs more than 10 pounds. She weighed the items she wants to pack on a sensitive scale: book: 5.142 pounds, jacket: 3.6 pounds, backpack: 1.28 pounds. What is the total weight of these items?

Estimate It You can round each decimal fraction up or down and then add them together in your head. For example, 5.142 is close to 5, 3.6 is close to 4, and 1.28 is close to 1.

Picture It

Ones	.	Tenths $\frac{1}{10}$	Hundredths $\frac{1}{100}$	Thousandths $\frac{1}{1,000}$
5	.	1	4	2
3	.	6		
1	.	2	8	
	.			

Model It Use the place-value chart to line up the decimal points.

$$\begin{array}{r} 5.142 \\ 3.600 \\ + 1.280 \\ \hline \end{array}$$

Connect It Now solve the problem.

- 2 Look at *Estimate It* on the previous page. What is an estimate of the total weight?

_____ Explain your reasoning. _____

- 3 How does the place-value chart help you add decimals? _____

- 4 How can you add decimals without a place-value chart to make sure you are adding the same place values? _____

- 5 Find the sum. Explain how you know that your answer is reasonable.

$$\begin{array}{r} 5.142 \\ 3.600 \\ + 1.280 \\ \hline \end{array}$$

- 6 Does Maura's backpack weigh less than 10 pounds? _____

- 7 Explain how to add decimals to the thousandths. _____

Try It Use what you just learned to solve these problems. Show your work on a separate sheet of paper.

- 8 Aaron's family has several gold items they want to melt down to make a gold bar. There is a spoon that weighs 124.414 grams, a broken necklace that weighs 108.86 grams, and an earring that weighs 15.5 grams. How much is the total weight of the gold? _____

- 9 Nicky is trying to drink 2.5 liters of water a day. She drank 0.878 liters after breakfast, 1.2 liters after lunch, and 0.75 liters before dinner. How much did she drink all together? _____

Learn About**Subtracting Decimals to Thousandths**

Read the problem below. Then explore how to subtract decimals to the thousandths with different numbers of digits.

Walter wanted to compare the great pitcher Walter Johnson's earned run average (ERA) to other great pitchers to find out how much lower it was. A lower ERA is better than a higher ERA. He found these pitchers' lifetime ERA statistics.

Walter Johnson 2.167

Sandy Koufax 2.76

How much better was Walter Johnson's ERA than Sandy Koufax's?

► **Estimate It** You can round each decimal fraction up or down and then compare them in your head. For example, 2.167 is close to 2.2 and 2.76 is close to 2.8.

► **Picture It**

Ones	.	Tenths $\frac{1}{10}$	Hundredths $\frac{1}{100}$	Thousandths $\frac{1}{1,000}$
2	.	7	6	
2	.	1	6	7
	.			

► **Model It** Use the place-value chart to line up the decimal points.

$$\begin{array}{r} 2.760 \\ - 2.167 \\ \hline \end{array}$$

 Connect It Now solve the problem.

- 10** Look at *Estimate It* on the previous page. What is an estimate of the difference?
_____ Explain your reasoning. _____
- 11** How is subtracting decimals similar to adding decimals? _____

- 12** Why is it important to pay attention to 0 in the subtraction problem? _____

- 13** How much better was Walter Johnson's ERA than Sandy Koufax's? Find the difference in *Model It* on the previous page. Explain how you know that your answer is reasonable. _____

- 14** What is a way to check your answer? _____

- 15** Compare subtracting decimals and subtracting whole numbers. _____

- 16** Explain how to subtract decimals to the thousandths. _____

 Try It Use what you just learned to solve these problems. Show your work on another sheet of paper.

- 17** Sandy Koufax had a 0.655 win/loss percentage; Walter Johnson's was 0.599. How much higher was Koufax's win/loss percentage than Johnson's? _____
- 18** Tyrone needs to take 4.5 milliliters of cough syrup but only has 2.745 milliliters. How much more does he need for a full dose? _____

Practice **Adding and Subtracting Decimals**

Study the example below. Then solve problems 19–21.

Example

Alex's family went on a hike at Mt. Rainier National Park in Washington.

The Silver Falls Trail is a total of 3.1 miles. They hiked 1.534 miles and reached Silver Falls. How much farther do they have to hike to complete the trail?

Look at how you could set up this equation, aligning the decimals.

$$\begin{array}{r} ^{\text{2 10 9 10}}\cancel{3.}\cancel{1}\cancel{0}\cancel{0} \\ - 1.534 \\ \hline 1.566 \end{array}$$

Solution 1.566 miles



In this problem you have to line up the decimals and express the minuend in a way to make it easier to subtract.

**Pair/Share**

What would happen if we did not align the decimal points?

- 19** A cheetah can run 112.654 kilometers per hour. A pronghorn antelope can run 98.17 kilometers per hour. How much faster is the cheetah than the antelope?

Show your work.



What do you do when you have addends with different numbers of digits before and after the decimal?

**Pair/Share**

Does putting a 0 for the first digit before the decimal and the last digit after the decimal help you align the decimals?

Solution _____

- 20** Becky wanted to grow out her hair. She measured the growth each month. The first month her hair grew 1.775 centimeters. The next month it grew 1.45 centimeters. The third month it grew 1.2 centimeters. How many centimeters did her hair grow in the three months?

Show your work.



How can you align decimal points when you have more than one addend?

Solution _____

- 21** On a field trip, a 6th grade class traveled 19.955 kilometers by train, 7 kilometers by bus, and 2.3 kilometers by car. How far did they travel altogether?

- A** 19,985 kilometers
- B** 22.955 kilometers
- C** 29.255 kilometers
- D** 1.12955 kilometers



How can the position of the decimal point change the value of tens and ones?

Evan chose **A** as the correct answer. How did he get that answer?



Pair/Share

Talk about the problem and then write your answer together.

Practice **Adding and Subtracting Decimals****Solve the problems.**

- 1** Alice has three boxes to carry. One is 1.453 kilograms. One is 3.8 kilograms. One is 11.39 kilograms. What is the total mass?
- A** 2,630 kilograms
B 16.643 kilograms
C 15.1643 kilograms
D 0.6392 kilograms
- 2** Seth had a 1.5-liter bottle of tomato juice. He drank some. There was 0.895 liter left when his sister, Beth, came to get a snack. How much did Seth drink?
- A** 2.395 liters
B 0.88 liter
C 0.745 liter
D 0.605 liter
- 3** Ally needs 30 meters of wood to build a large wooden frame. She bought three different lengths of wood measuring 12.5, 11.43, and 7.244 meters. Choose *True* or *False* for each statement.
- a.** Ally has, in total, 30.564 meters of wood to use for the frame. ☐ True ☐ False
- b.** After she builds the frame, Ally will have 1.154 meters of wood left. ☐ True ☐ False
- c.** Ally bought more wood than she needed in order to build the frame. ☐ True ☐ False
- d.** The total length of wood Ally bought is 1.154 meters less than the amount needed for the frame. ☐ True ☐ False

4 Sammy, Teddy, and Ursula ran a 100-meter race. Sammy's time was 15.03 seconds. Teddy's and Ursula's times were 14.7 seconds and 15.003 seconds, respectively. Which statements are true? Circle all that apply.

- A** Teddy ran 0.04 second faster than Ursula.
- B** Teddy came in 3rd place.
- C** Ursula ran 0.027 second faster than Sammy.
- D** The time between the slowest and fastest run was 0.33 second.

5 Kay was trying to triple a salsa recipe. Her recipe for one batch called for 1.232 milliliters of red hot pepper sauce. She thought she added three of that amount for three batches. When people dipped into the salsa, it was too spicy to eat. What could she have done wrong?

6 Stacey answered the problem below incorrectly.

$$16.007 - 0.55 = 10.507$$

Describe what she might have done wrong, explain why her answer doesn't make sense, and then solve the problem correctly.

Show your work.

✓ Self Check Go back and see what you can check off on the Self Check on page 51.