

Dimensions Math Grade 4 Chapter 13 Addition and Subtraction of Decimals

Home Connection

In second and third grade, students learned both mental math strategies and algorithms for addition and subtraction. In 4th grade, those skills are further developed by extending those strategies to decimals. Students will use basic mental math strategies for adding and subtracting tenths. First add and subtract tenths with regrouping between place values, then extend these skills to hundredths.

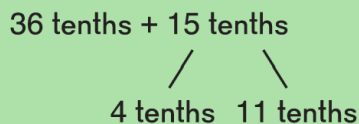
Since decimals are written using the base-ten number system, we can line up decimal numbers vertically when using the standard algorithm for adding or subtracting. And as always, start from the least place value to the greatest place value. When subtracting a decimal with hundredths from a decimal with tenths, students can write a 0 in the hundredths place to help them be sure they are subtracting the correct digits (for example, $3.5 - 1.87 = 3.50 - 1.87$)

Mental Math for Addition and Subtraction

Students will see that the same mental math strategies used for whole numbers can also be used for decimals.

Example: $3.6 + 1.5$ (using mental math strategy of making next tens)

For this strategy, we will decompose 0.15 to 0.4 and 1.1. When we add 0.4 to 0.36, we can make the next tenths for easier mental math.



36 tenths + 15 tenths
 / \
 4 tenths 11 tenths

$$36 \text{ tenths} + 15 \text{ tenths} = 40 \text{ tenths} + 11 \text{ tenths} = 51 \text{ tenths} = 5.1$$

Example: $0.45 - 0.18$ (using mental math strategy of over subtracting)

You'll notice for this strategy we rounded 0.18 to 0.20 then added 0.2 back on to our answer.

$$\begin{aligned} 45 \text{ hundredths} - 18 \text{ hundredths} &= 45 \text{ hundredths} - 20 \text{ hundredths} + 2 \text{ hundredths} = \\ 27 \text{ hundredths} &= 0.27 \end{aligned}$$

Addition Algorithm

The basic addition algorithm applies with decimal numbers.

Remind students that we will line up the numbers based on their place values, NOT the decimal point. There will be problems such as $64 + 3.45$ where there is not a decimal point visible in one of the addends. So, students must line the numbers up based on place value.

$$\begin{array}{r} 64 \\ + \underline{3.45} \end{array}$$

Then students will recognize that writing the decimal point and appending zeroes will not change the value of the top addend, and it will help them visualize the addition algorithm.

$$\begin{array}{r} 64.00 \\ + \underline{3.45} \end{array}$$

Here is how we talk through the above addition problem using place value language.

We will always begin in the lowest place value. In this case it's our hundredths place.

- 0 hundredths and 5 hundredths give us 5 hundredths. Let's record that in our sum.
- 0 tenths and 4 tenths give us 4 tenths. Let's record that in our sum.
- 4 ones and 3 ones give us 7 ones. Record that in our sum.
- 6 tens and 0 tens gives us 6 tens. Record that in our sum.
- Our decimal point will always go between our ones place and our tenths place. Record the decimal in the sum.

$$\begin{array}{r} 64.00 \\ + \underline{3.45} \\ \hline 67.45 \end{array}$$

Subtraction Algorithm

The subtraction algorithm is also the basic algorithm.

Students will line up the numbers by place value.

$$\begin{array}{r} 1.45 \\ - \underline{0.78} \end{array}$$

Here is how we talk through the subtraction algorithm using place value language. We always begin in the lowest place value. In this case it's the hundredths.

- We cannot take away 8 hundredths from 5 hundredths, so we must regroup. Regroup 1 tenth to 10 hundredths. Now we have 15 hundredths take away 8 hundredths. That gives us 7 hundredths. Record that in our difference.
- We can't take away 7 tenths from 3 tenths so we must regroup 1 one to 10 tenths. Now we have 13 tenths and can take away 7 tenths. We have 6 tenths, let's record that in our difference.

$$\begin{array}{r} 1.45 \\ - \underline{0.78} \\ \hline 0.67 \end{array}$$

Money

It is helpful for students to use money to practice decimal computations to the hundredths. When expressing values as dollars, answers will always have two decimal places.

What Can We Do At Home?

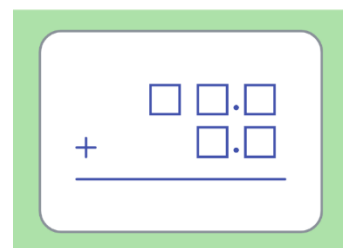
Here are a few ideas to help your student better understand how to add and subtract decimals.

1. Lay out a variety of coins and dollar bills on the dining table. Give them a total, and they must make a money equation to equal that amount.

For example: "I want you to make \$4.12." The student could show $\$1.10 + \3.02 , or they may show $\$4.08 + \0.04 . This helps build number fluency with decimal values.



2. You will need a 10-sided die or number cards 0-9, a game board similar to that at the right, and at least two players. You and your student will take turns drawing a card (or rolling the dice). Record that digit somewhere on your game board. When all the boxes are full, add the two numbers. The player with the highest sum is the winner. The player to receive 5 points is the winner.



*Variation- you can also play using subtraction, and the player with the lowest difference is the winner.



3. Three in a row game; You will need a hundredths chart (included in this newsletter), a deck of cards with the face cards removed, and counters of some kind. (Tens cards count as a zero and Aces will count as one).

In each round, players draw 4 cards. Each player makes two two-digit decimal numbers with those 4 cards. For example, Player 1 draws a 7, 4, 3, and 1. They could make the numbers 0.47, and 0.13.

Then Player 1 adds or subtracts those two numbers to capture the space corresponding to their answer with a counter on the hundredths chart game board. Then it's Player 2's turn. Play continues until a player has three counters in a row, column, or diagonal. This requires strategic thinking as a player will need to add or subtract his/her two numbers together to play near a previously played counter.

Hundredths Chart

0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.1
0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.2
0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3
0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4
0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.5
0.51	0.52	0.53	0.54	0.55	0.56	0.57	0.58	0.59	0.6
0.61	0.62	0.63	0.64	0.65	0.66	0.67	0.68	0.69	0.7
0.71	0.72	0.73	0.74	0.75	0.76	0.77	0.78	0.79	0.8
0.81	0.82	0.83	0.84	0.85	0.86	0.87	0.88	0.89	0.9
0.91	0.92	0.93	0.94	0.95	0.96	0.97	0.98	0.99	1