Decimals: Add, Subtract, Compare, Place Value

Each digit in a number has a place value and we will look at place values in decimals to better understand the meaning of the decimal.

To compare decimals, write equivalent decimals with the same number of decimal places, then compare. Also, to put decimals in order, we first look at all the decimals we are ordering and then express them in the same number of decimal places.

To add or subtract decimals, we need to line up the decimal places? Why? That question is answered in the explanation of adding and subtracting decimals.

Writing equations and inequalities for word problems help us to understand the structure of a word problem. We'll see how equations and inequalities can help us solve problems.

Place Value and Expanded Notation

Comparing Decimals

Add and Subtract Decimals

Adding and Subtracting Decimals – Why do we line up the decimal point?

Creating and Interpreting Equations and Inequalities

Place Value and Expanded Notation

Each digit in a number has a place value. Let's look at the decimal number.

The number is read **4,235 and 897 thousandths**

It means $4{,}235\frac{897}{1000}$

Now, let's look at the number in a place value chart.

Thousands	Hundreds	Tens	Ones	•	Tenths	Hundredths	Thousandths
4	2	3	5	•	8	9	7

Expanded form: 4000 + 200 + 30 + 5 + 0.8 + 0.09 + 0.007

Comparing Decimals

Example 1:

To compare decimals, write equivalent decimals with the same number of decimal places, then compare.

Compare 0.6 with 0.52

First write **0.6** as its equivalent decimal in hundredths, **0.60**, then compare to 0.52.

0.6 is greater than 0.52
0.6 > 0.52

Example 2:

Here is another example of ordering decimals.

Put these decimals in order from least to greatest.

0.8, 0.25, 0.149

Since 0.149 is in thousandths and has **three decimal places**, rewrite the other two decimals in thousands also, filling in with zeros.

0.8 = 0.800 and **0.25 = 0.250**

Now arrange them in order from least to greatest.

0.149 is less than 0.250 is less than 0.800

Now write the comparison using the original decimals.

0.149 < 0.25 < 0.8

Add and Subtract Decimals

To add and subtract decimals, be sure to line up the decimal points so that the place values will also line up – tenths with tenths, hundredths with hundredths, and so on. Decimals may be expressed in equivalent fractions which help write the word name.

Example 1: 7.2 = 7 2/10 = 7 and 2 tenths

Example 2: 3.13 = 3 13/100 = 3 and 13 hundredths

Example 3: 52.844 = 52 844/1000 = 52 and 844 thousandths

Add 8.3 + 17.82

$$\begin{array}{r} {\scriptstyle 1} \\ 8.3 \\ +17.82 \\ \hline 26.12 \end{array}$$

Other ways to express this answer are:

$26\frac{12}{100}$ or

26 and 12 hundredths

Subtract 5.3 – 3.74

$$\begin{array}{r} {\scriptstyle 4\ 12\ 10} \\ 5.\cancel{3}\cancel{0} \\ -\ 3.74 \\ \hline 1.56 \end{array}$$

Other ways to express this answer are:

$1\frac{56}{100}$ or

1 and 56 hundredths

Subtract 12 -5.35

$$\begin{array}{r} {\scriptstyle 0\ 11\ 9\ 10} \\ \cancel{12}.\cancel{00} \\ -\ 5.35 \\ \hline 6.65 \end{array}$$

Other ways to express this answer are:

$6\frac{65}{100}$ or

6 and 65 hundredths

Check through estimation.

1. 8 + 18 = 26	Actual Answer is 26.12.	Estimate is very close.
2. 5 – 4 = 1	Actual Answer is 1.56.	Estimate is close.
3. 12 – 5 = 7	Actual Answer is 6.65.	Estimate is close.

Adding and Subtracting Decimals

Why do you line up the decimal points?

13.6 + 7.5 = ?

Write both as mixed numbers.

$13\ \frac{6}{10}$

$+\ 7\ \frac{5}{10}$

$20\ \frac{11}{10} = 21\ \frac{1}{10} = 21.1$

$$\begin{array}{r} {\scriptstyle 1\ 1\ \ } \\ 13.6 \\ +\ 7.5 \\ \hline 21.1 \end{array}$$

Tenths must be added to tenths, ones to ones and tens to tens to get the same as the fraction answer. Lining up the decimal point puts all the place values in line.

Look at another decimal problem through decimal fractions.

18.33 + 9.2 = ?

$18\ \frac{33}{100} = 18\ \frac{33}{100}$

$+\ 9\ \frac{2}{10} = 9\ \frac{20}{100}$

$27\ \frac{53}{100}$

$$\begin{array}{r} {\scriptstyle 1\ \ } \\ 18.33 \\ +\ 9.20 \\ \hline 27.53 \end{array}$$

Lining up the decimal points keeps the place values in line. 7.5 equals 7.50, however the 0 isn't necessary if you keep the decimal points in line.

Look at subtraction.

25. 2 – 6.5 = ?

$25\ \frac{2}{10} = 24\ \frac{12}{10}$

$-\ 6\ \frac{5}{10} = 6\ \frac{5}{10}$

$18\ \frac{7}{10}$

$$\begin{array}{r} {\scriptstyle 1^{1}4\ \ } \\ \cancel{25}.{}^{1}2 \\ 6.\ 5 \\ \hline 18.7 \end{array}$$

Lining up the decimal points keeps the place values lined up and borrowing is applied.

Creating and Interpreting Equations and Inequalities

The school store is having a sale. If you buy one pencil, you can buy a second pencil (*of equal or less value*) for $.05. The pencils vary in prices due to the large selection that the store has. Write an expression that represents the cost of two pencils. Use **C** for Cost and **P** for Pencil.

Cost equals price of one pencil plus a nickel for the second pencil.

Simplifying, the expression would be:

C = P + $0.05

Suppose the pencil that you chose cost $0.89 and you wanted a second one that was the same type. What would you pay for the two pencils on sale?

C = P + 0.05
C = 0.89 + 0.05
C= $0.94 *for both pencils*

If you gave the clerk $5.00 and there was no tax, write an expression that would represent the amount of change you would receive. Use **G** for change.

Write out the main points of the problem in words.

$0.94 plus the change would add up to $5.00

Simplifying, the expression would be:

$0.94 + G = $5.00

To find G, subtract.
G = 5.00 - $0.94
G = $4.06

Let's look at another type of math statement, an inequality.

The price of the pencils in the store starts at $0.59. Which is the best description of the prices of the pencils?

a. Cost is less than $0.59
b. Cost is more than $0.59
c. Cost is greater than or equal to $0.59

Since the starting price is $0.59 and from there goes higher, the best description is
c. Cost is greater than or equal to $0.59