

Lesson 1

ADDING WHOLE NUMBERS AND DECIMALS

Addition with Regrouping

In this Lesson, we will answer the following:

1. HOW DO WE ADD WHOLE NUMBERS IN WRITING?
2. HOW DO WE ADD DECIMALS?

1. How do we add whole numbers in writing?

$$\begin{array}{r} 4,674 \\ 8,422 \\ 5,533 \\ \underline{3,840} \end{array}$$

Write the numbers in a column and align the same units; that is, align the ones, the tens, etc. Then, starting with the ones on the right, add each column. When the sum of a column is 9 or less, write that sum. But when that sum is more than 9, write the *ones* of that sum and regroup the *tens* onto the next column. For, 10 of a lower unit may be composed into 1 of the next higher unit.

$$\begin{array}{r} 4 \text{ thousands} + 6 \text{ hundreds} + 7 \text{ tens} + 4 \text{ ones} \\ 8 \text{ thousands} + 4 \text{ hundreds} + 2 \text{ tens} + 2 \text{ ones} \\ 5 \text{ thousands} + 5 \text{ hundreds} + 3 \text{ tens} + 3 \text{ ones} \\ 3 \text{ thousands} + 8 \text{ hundreds} + 4 \text{ tens} + 0 \text{ ones} \\ \hline 22 \text{ thousands} + 4 \text{ hundreds} + 6 \text{ tens} + 9 \text{ ones} \end{array}$$

On adding the ones column, we get 9. But on adding the tens column, we get 16. Now, 16 tens = 10 tens + 6 tens. Write 6, and regroup 10 tens onto the hundreds column -- because 10 tens are equal to 1 hundred. Therefore when we add the hundreds, we have $1 + 6 + 4 + 5 + 8 = 24$

Again,

24 hundreds = 20 hundreds + 4 hundreds

Write 4, and regroup 20 hundreds onto the thousands column because 20 hundreds are equal to 2 thousands. When we add the thousands, then, we get $2 + 4 + 8 + 5 + 3 = 22$.

The sum of those numbers is 22,469.

Example.	9545
	<u>+ 8982</u>
	18527

"5 + 2 is 7." Write 7.

"4 + 8 is 12." Write 2 -- carry 1 *mentally*.

"5 + 9 is 14, plus 1 is 15." Write 5 -- carry 1 *mentally*.

"9 + 8 is 17, plus 1 is 18." Write 18.

2. How do we add decimals?

Add decimals in the same way as whole numbers, taking care to align the same units. Specifically, align the *ones*, because every number has ones.

Example 1. Write in a column and add: $4,785 + 9 + 2.307$

Solution. The ones are shown:

$$4,785 + 9 + 2.307$$

Therefore, align as follows:

$$\begin{array}{r} 4,785 \\ 9 \\ + \underline{2.307} \\ 4,796.307 \end{array}$$

Example 2. Write in a column and add: $.58 + 5.8 + 58$

Solution. Here are the ones:

$$.58 + 5.8 + 58$$

As for $.58$, the ones are at the first place to the *left* of the decimal point.

Therefore, align as follows:

$$\begin{array}{r} .58 \\ 5.8 \\ + \underline{58} \\ 64.38 \end{array}$$

When there are decimal points, align them. The decimal point in the answer will fall in the same place. (But this is true only in addition and subtraction, not in multiplication.)

As for a whole number such as 58, to help with alignment we may imagine a decimal point after the 8. Example: $58 = 58.$

Whole numbers, however, are normally written without a decimal point because the decimal point means "and" -- here come the fractions!

Example 3. $.5 + .5 + .5$

Choose the correct answer:

- a) 15 b) .15 c) 1.5 d) .015

Answer. c) 1.5

For, if we aligned them and wrote .5 as 0.5 :

$$\begin{array}{r} 1 \\ 0.5 \\ 0.5 \\ + 0.5 \\ \hline 1.5 \end{array}$$

we would see that the 1 (of 15 tenths) carries over into the next column.

The point is:

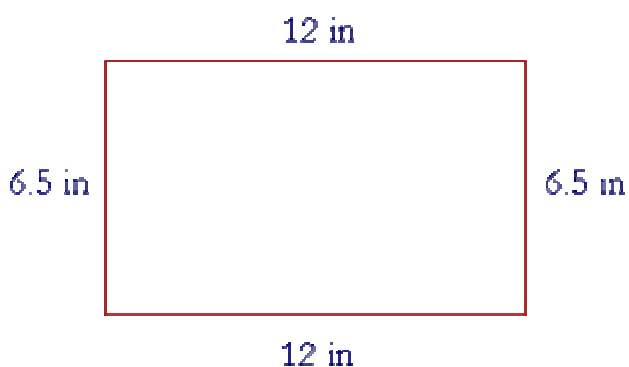
In addition and subtraction, the answer will have the same number of decimal places as the numbers themselves.

Example 4. $.007 + .003 + .004$

Answer. .014

The numbers being added have three decimal places. Therefore the answer also will have three decimal places.

Example 5. Perimeters. The perimeter of a plane (flat) figure is its boundary.



This figure is a rectangle, which is a four-sided figure in which all the angles are right angles. In a rectangle, the opposite sides are equal. Therefore the perimeter of that rectangle is:

$$12 + 12 + 6.5 + 6.5 = 24 + 13 = 37 \text{ in}$$

Example 6. Add:

$$\begin{array}{r} 2.83 \\ 7.49 \\ 6.26 \\ + 8.58 \\ \hline \end{array}$$

Technique. Do not break this up into separate pieces. Add each entire column, starting on the right.

To add the first column on the right, let your eye go down that column and say -- do not write -- each partial sum. Say

$$\begin{array}{r} 2.83 \\ 7.49 \text{ "12"} \\ 6.26 \text{ "18"} \\ + 8.58 \text{ "26"} \\ \hline 6 \end{array}$$

Write 6, carry 2. To add the middle column, say

$$\begin{array}{r} 2 \\ 2.83 \text{ "10"} \\ 7.49 \text{ "14"} \\ 6.26 \text{ "16"} \\ + 8.58 \text{ "21"} \\ \hline .16 \end{array}$$

Write 1, carry 2. To add the last column, say

$$\begin{array}{r} 2 \ 2 \\ \text{"4"} \ 2.83 \\ \text{"11"} \ 7.49 \\ \text{"17"} \ 6.26 \\ \text{"25"} \ \underline{8.58} \\ 25.16 \end{array}$$

Write 25.

The decimal point in the answer is aligned with the decimal points above.

(This is true only in addition and subtraction, not in multiplication) We may write the decimal point in the answer when we come to it; that is, upon adding the middle column.

Exercises:

1- Search your dictionary and find out the following key-words:

-figure = lower = upper = onto = inch =

align (to) = fall (to) = mean (to) = four-sided =

true = middle = figure out (to) = spell (to) =

2- figure these additions out saying all the steps needed in a loud voice:

$$371 + 834 =$$

$$0.71 + .5 + .042 =$$