Lesson 3

Subtract Any Which Way Series

Long Subtraction: The Easy Steps

This is the quick guide to the video. For more complete details watch "Subtract Any Which Way" video 3.

Goal:

To introduce Long Subtraction so it can be done in any direction with ease.

To show the first easy steps in long stubtraction.

Easy Steps First

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  8 2 5 6 0 7 3 6 8 5
- 1 9 3 2 4 5 1 9 4 6
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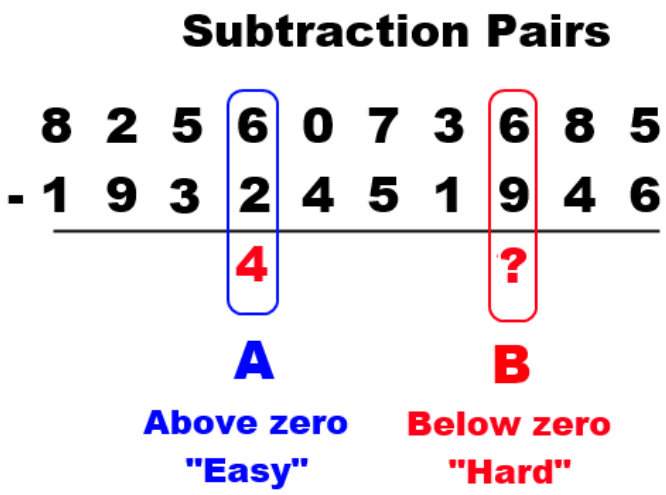
Above is a typical long subtraction sum.

We want to deal with the easy parts we can do.

Long subtractions break into "**subtraction pairs**":



The subtraction pair "6 - 2" has a result Above zero.

We can shorten it to "Type A".

It has an answer we can easily work out (6 - 2 = 4).

So we could also call it "Easy".

In contrast the subtraction pair "6 - 9" has a result which goes Below zero.

You can't take 9 off 6.

we can shorten it to "Type B".

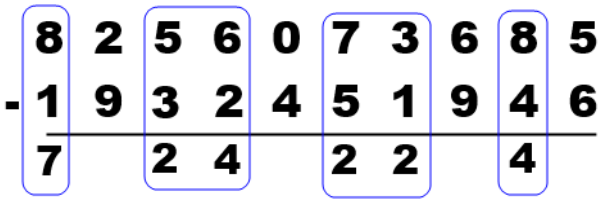
Who knows what it comes to?

We don't know the answer. Our thinking grinds to a halt.

So we could also call it "Hard".

In this video we will learn how to handle the "Easy" subtraction pairs

that come to a result "Above zero".



We've highlighted all the subtraction pairs that come to a result Above zero.

We've even put in the answers as that was EASY to do.

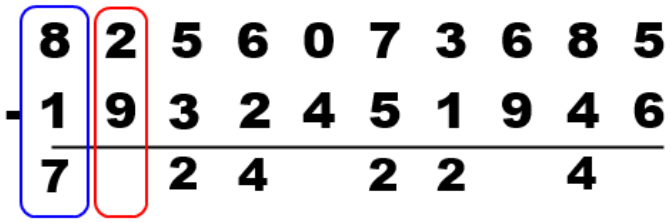
But not all the answers are correct.

We need to adjust.

For example look at the first subtraction pair, "8 - 1 = 7"

Unfortunately its right hand neighbour is "2 - 9 = ?"

and it comes to a result Below zero and is "hard".

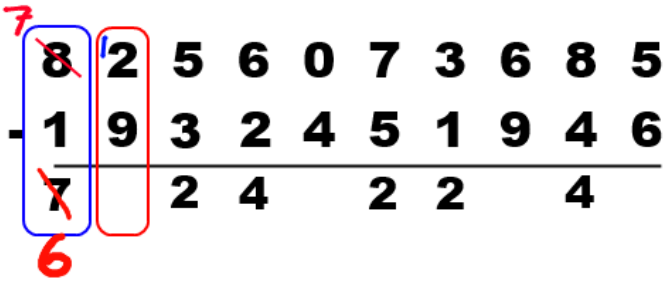


Looking at the hard neighbour (in the red) we say "we can't take 9 off 2"

It won't go. It's hard.

So we will need to borrow from the "8 - 1" subtraction pair.

The 8 will "lend" 1 and become a 7.



Therefore it's result

will REDUCE

by

EXACTLY ONE.

It drops from "8 - 1 = 7" to "7 - 1 = 6".

THIS WILL HAPPEN

WHENEVER A NEIGHBOUR

GOES BELOW ZERO!

Question: Do we need to work out the hard neigbour's answers first then?

Answer: No. Definitely not. That was just by way of explanation.

In practice

We only need to know

if the neighbour is

Above or Below Zero ("Easy" or "Hard")

We DON'T NEED TO KNOW WHAT IT COMES TO!

So we would see the neighbour is "2 - 9"

note "It's hard, I don't know the answer, its Below zero"

and that's all we need know.

We reduce the result of the Easy pair we were looking at.

We don't need to put in all the working.

We know it will happen.

The general result is that we

LOOK AHEAD

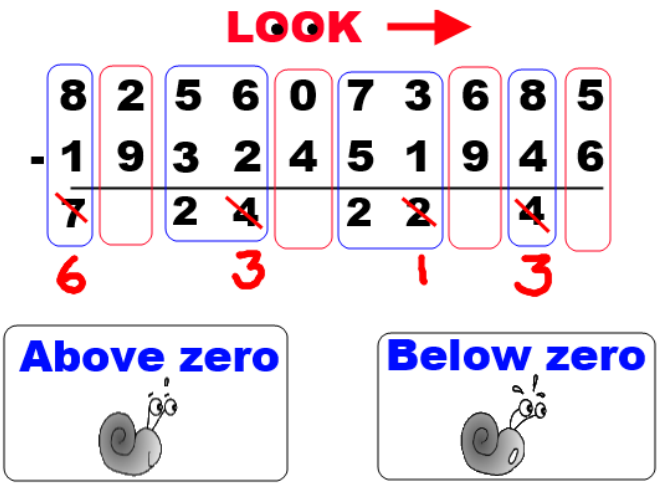
to the RIGHT hand

NEIGHBOUR.

And whenever a neigbour

goes BELOW ZERO

we REDUCE the answer by ONE



I've drawn snails to highlight the two cases (happy and alarmed).

When the neighbour is BELOW ZERO

REDUCE the RESULT by ONE

When the neighbour is ABOVE ZERO

LEAVE IT AS IT IS.

If the neighbour is Above Zero

(as in the case of 5 - 3 = 2 with neighbour 6 - 2)

we leave it as it is

because

the "6 - 2 = 4" can be worked out

without needing to borrow anything.

It has no effect on its left hand neighbour.

Question: Do we have to do our sums in the order of

Above zero Type then Below Zero ?

Answer: No. That's just for this demonstration.

You can do a subtraction in any direction or order you like!

Question: What if the neighbour is EXACTLY zero?

Answer: Good question!

We'll answer that at the very end of this series.