

Lesson 6

Subtract Any Which Way Series

Long Subtraction Overview

This is the quick guide to the video. For more complete details watch "Subtract Any Which Way" video 6.

Goal:

To summarize long subtraction so far.

To give an overview of the 4 basic types of subtraction.

To introduce the exception to the rule.

The 2 Basic Subtraction Pairs...

There are fundamentally two different subtraction pairs.

Those that subtract to a result **ABOVE** zero

and those that come to a result **BELOW** zero.

We can refer to them as Type **A** and Type **B**:

| | |
|-------------------------------------------|-------------------------------------------|
| A | B |
| 6 | 4 |
| - 4 | - 6 |
| <hr style="width: 50%; margin: 0 auto;"/> | <hr style="width: 50%; margin: 0 auto;"/> |
| ord | strategy |
| Above zero | Below zero |

When meeting the A type
simply subtract ORDINARILY.

6 - 4 = 2 for example.

When meeting the B type
we don't know the answer
(what does 4 - 6 come to?)

it is also termed "hard"

so

use of our two

subtraction strategies:

Add a Complement

or

Complement of the Difference

covered earlier.

BUT

there is another factor to be taken into account.

The NEIGHBOURS.

Recall if the neighbour subtracts BELOW zero

we need to reduce the answer by one.

The 4 Basic Subtraction Types

Because of the fact we need to look at the neighbours as well

we get 4 basic types:

The 4 Types

| | | | |
|-----------|-----------|-----------------------------------------------------|-----------------------------------------------------|
| AA | AB | $\begin{array}{r} 89 \\ - 21 \\ \hline \end{array}$ | $\begin{array}{r} 81 \\ - 29 \\ \hline \end{array}$ |
| BA | BB | $\begin{array}{r} 39 \\ - 41 \\ \hline \end{array}$ | $\begin{array}{r} 31 \\ - 49 \\ \hline \end{array}$ |

89 - 21 is AA because 8-2 is ABOVE ZERO and 9-1 is also ABOVE ZERO.

39 - 49 is BB because 3-4 is BELOW ZERO and 1-9 is also BELOW ZERO.

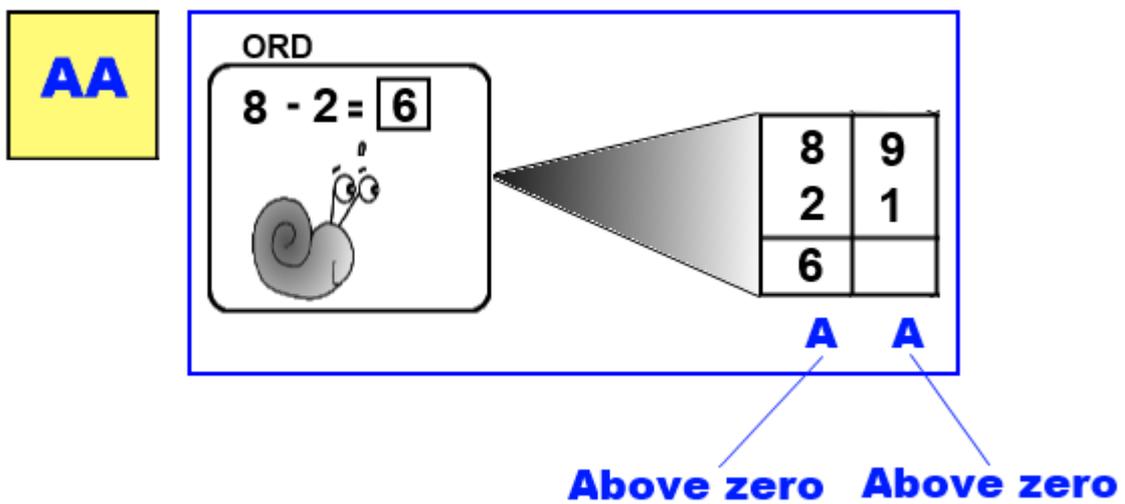
81 - 29 is AB because 8-2 is ABOVE ZERO while 1-9 is BELOW ZERO.

39 - 41 is BA because 3-4 is BELOW ZERO and 9-1 is ABOVE ZERO.

With one notable exception,
these are the only 4 types possible.

We cover how to handle each type immediately below:

AA Type



89 - 21 is Type AA.

The subtraction pair we are trying to evaluate is 8-2 and it is ABOVE ZERO.

Its neighbour, 9-1, is also ABOVE ZERO.

We don't need to know what 9-1 comes to.

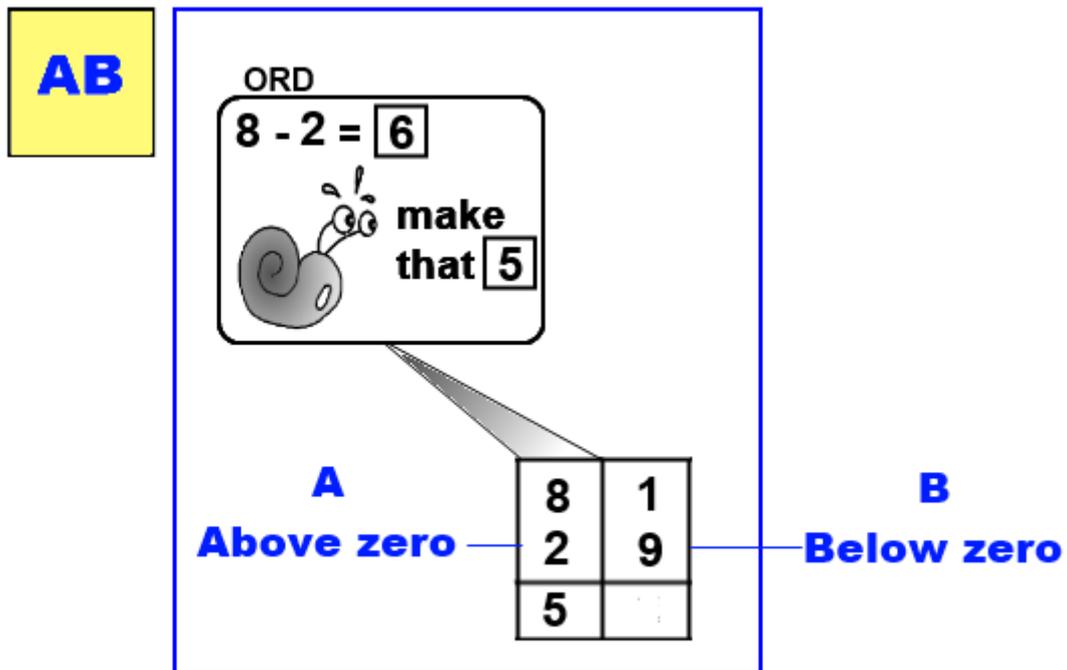
The sum is "ORD"inary.

It is "easy" to work out.

The answer is $8 - 2 = 6$ as expected.

Put it down AS IT IS.

AB Type



81 - 29 is Type AB.

The subtraction pair we are trying to evaluate is 8-2 and it is ABOVE ZERO.

However Its neighbour, 1-9, is BELOW ZERO.

We don't need to know what 1-9 comes to.

"8-2" is "ORD"inary.

It is "easy" to work out.

The answer is $8 - 2 = 6$ as expected.

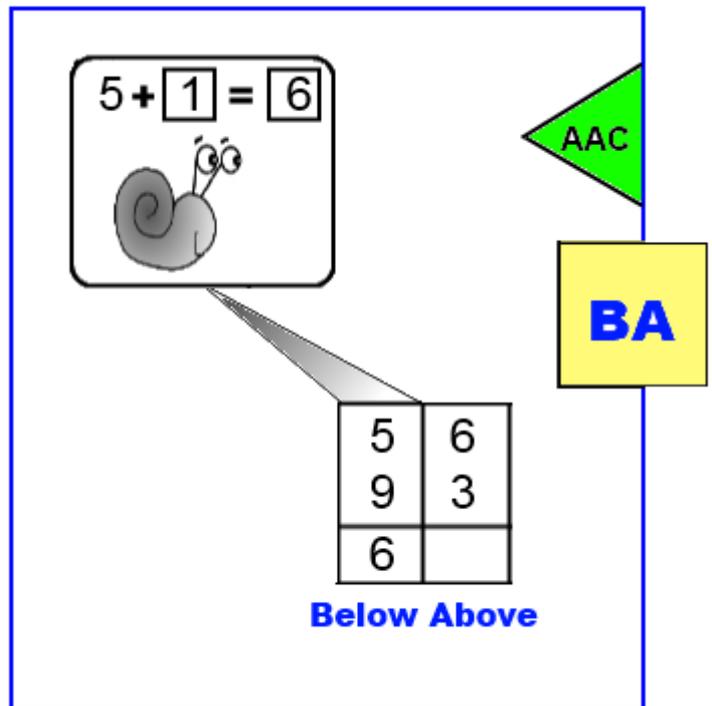
But because its neighbour is "hard" (BELOW zero)

REDUCE THE ANSWER

BY ONE.

The answer goes down not as 6 but as 5.

BA Type



56 - 93 is Type BA.

The subtraction pair we are trying to evaluate is 5-9 and it is BELOW ZERO.

However its neighbour, 6-3, is ABOVE ZERO.

We don't need to know what 6-3 comes to.

"5-9" comes to a result BELOW ZERO.

It is "hard" and we need to use

EITHER ONE

OF OUR TWO

POSSIBLE STRATEGIES.

Immediately above we have shown how to use the

"Add a Complement" Strategy.

The complement of 9 is 1 in 10-circle.

We add the 1 to the 5 to get 6.

(5 - 9 => 5 + 1 = 6 in 10-circle.)

Because the neighbour is ABOVE zero ("easy")

(we don't need to know what it comes to)

we can

PUT THE ANSWER DOWN EXACTLY

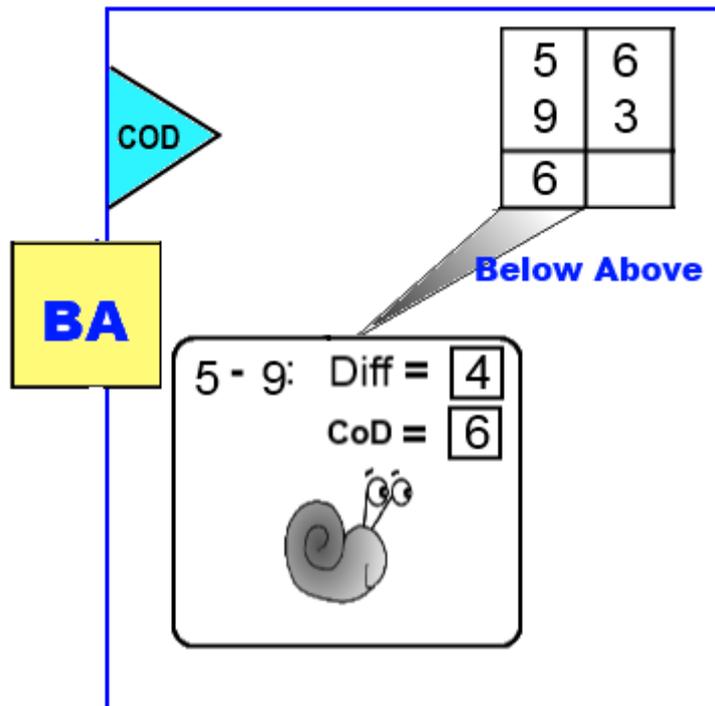
AS IT IS.

The answer is 6.

BUT

THERE ARE TWO POSSIBLE STRATEGIES.

We will show the other strategy also:



In this way of working out the 6

we take the difference between 5 and 9 which is 4

And the complement of that difference is 6 (the answer).

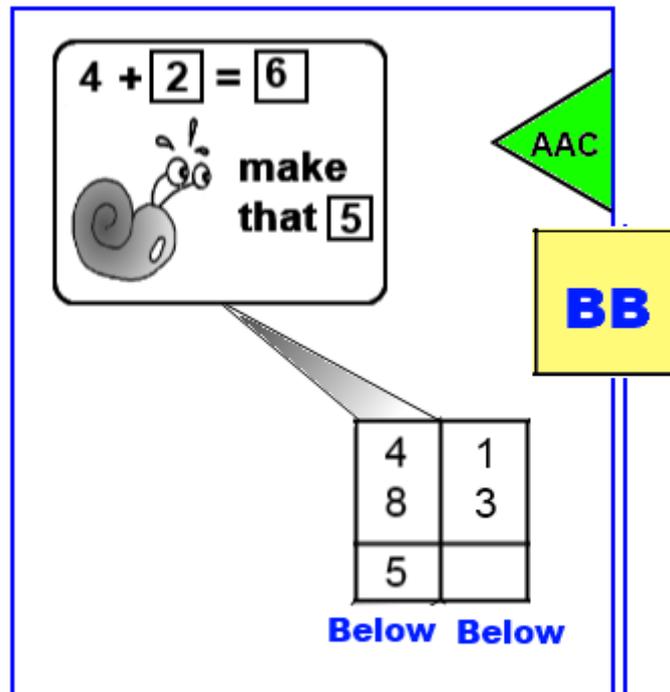
Question: Which strategy do I use?

Answer: That's up to you. Personal choice. Both will work.

I'd go for "Add a Complement" in this case because 9 is a "big" number within the 10-circle.

See earlier videos in this series if you are not sure.

BB Type



41 - 83 is Type BB.

The subtraction pair we are trying to evaluate is 4-8 and it is BELOW ZERO.

Furthermore, its neighbour, 1-3, is also BELOW ZERO.

We don't need to know what 1-3 comes to.

"4-8" comes to a result BELOW ZERO.

It is "hard" and we need to use

EITHER ONE

OF OUR TWO

POSSIBLE STRATEGIES.

Immediately above we have shown how to use the

"Add a Complement" Strategy.

The complement of 8 is 2 in 10-circle.

We add the 2 to the 4 to get 6.

($4 - 8 \Rightarrow 4 + 2 = 6$ in 10-circle.)

Because the neighbour is also BELOW zero ("hard")
(however we don't need to know what it comes to)

we need to

REDUCE THE ANSWER

BY ONE

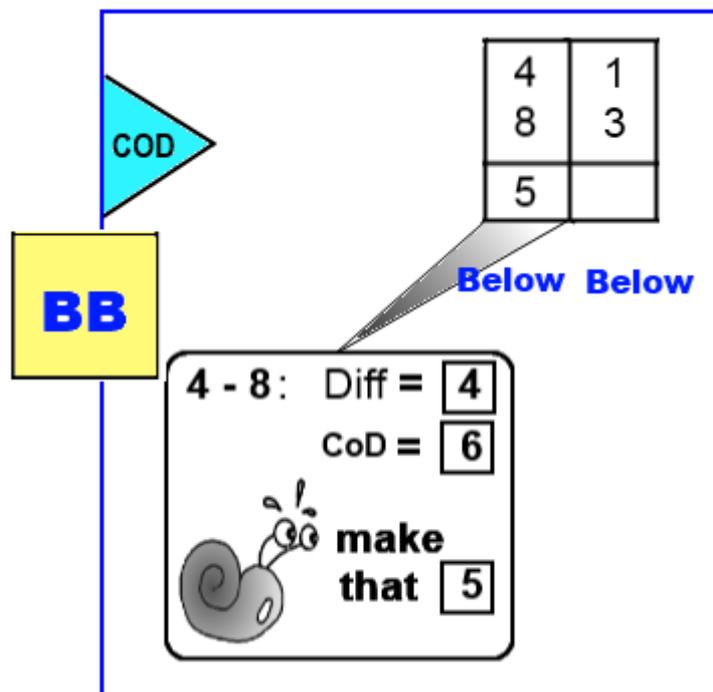
The answer is 6

so it reduces to a final result of 5.

BUT

AS ALWAYS THERE ARE TWO POSSIBLE STRATEGIES.

We will show the other strategy also:



In this way of working out the initial answer of 6
we take the difference between 4 and 8 which is 4
And the complement of that difference is 6 (the answer).

But as before
because the neighbour also goes
BELOW ZERO
we need to
REDUCE THAT ANSWER
BY ONE
to give a final result of 5.

The Exception

$$\begin{array}{r} 7 \quad \boxed{3} \quad 6 \\ 5 \quad \boxed{3} \quad 9 \\ \hline \end{array}$$

In the above subtraction
3 - 3 is not ABOVE ZERO
nor BELOW ZERO.

It is
ZERO
EXACTLY.

We will cover how to handle it
in our final video/webpage of this series
coming up next...

