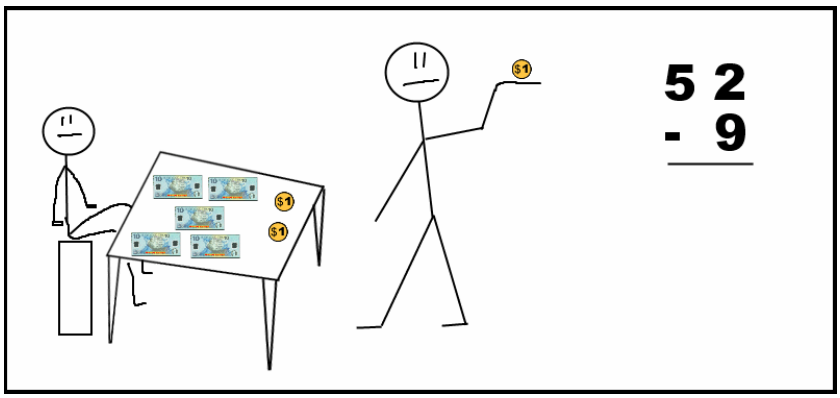
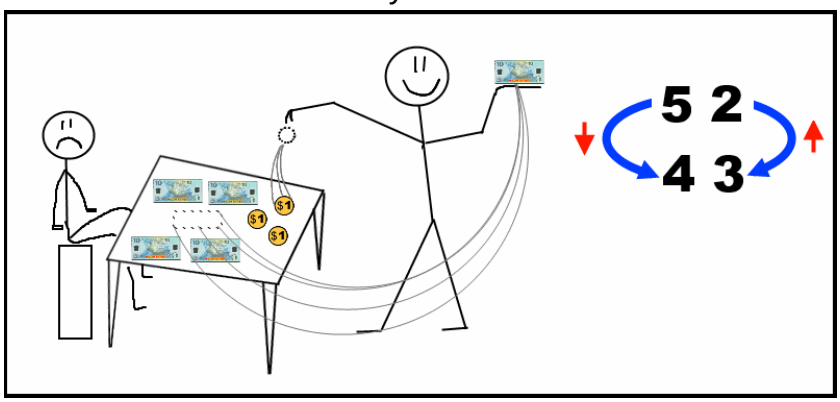
SUBTRACTION
The "Add a Complement"
Strategy

Consider the situation where you need to take $9 off a customer:



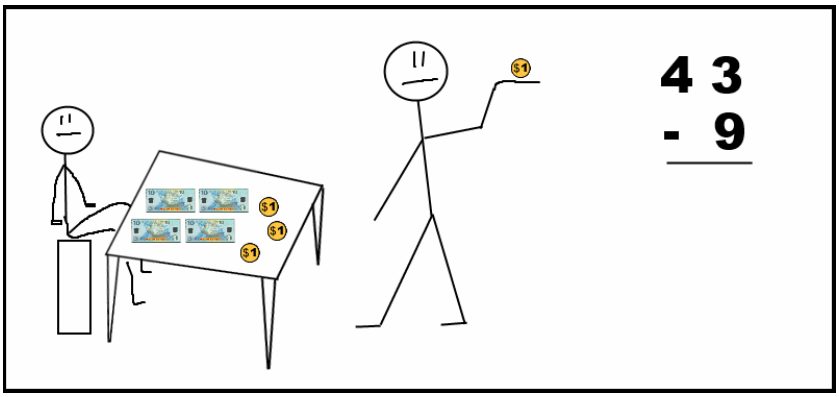
They have $52
You have a dollar change.
The question is:
How can you do it?

The solution is that you take their $10 note
and give them back $1
That's $9 you took in all:

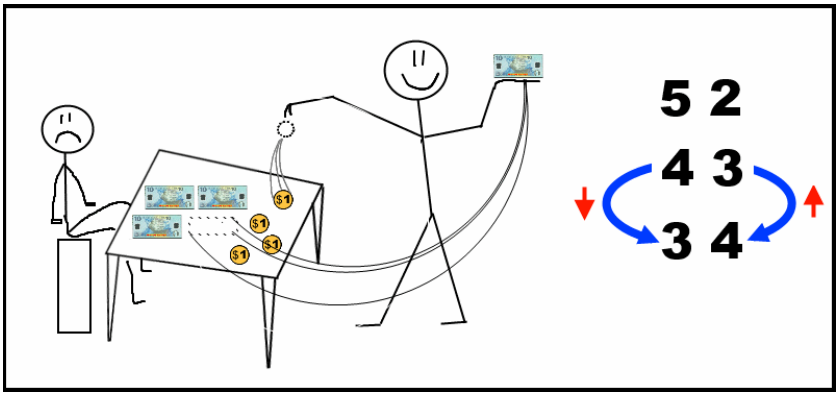


Their TENS went DOWN by one from fifty to forty
Their ONES went UP by one from two to three
52 - 9 = 43
That worked.
You decide to do it again:

This time they are starting from $43
And you are taking $9 off them



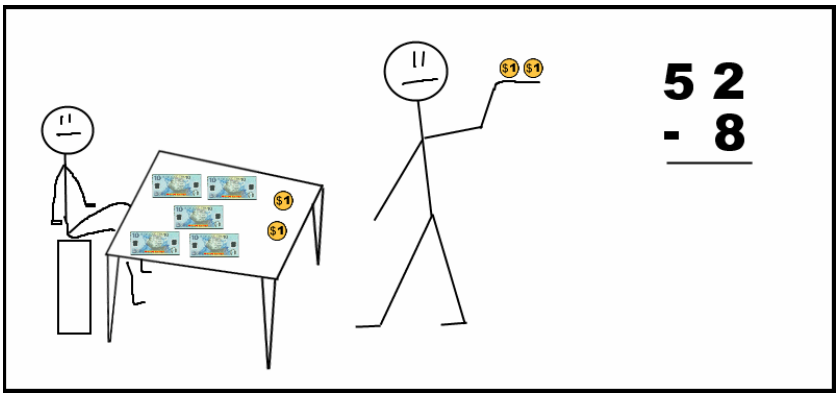
You take another TEN dollar note
And give back another ONE dollar coin:



Their TENS go DOWN by one from forty to thirty
Their ONES go UP by one from three to four
43 - 9 = 34

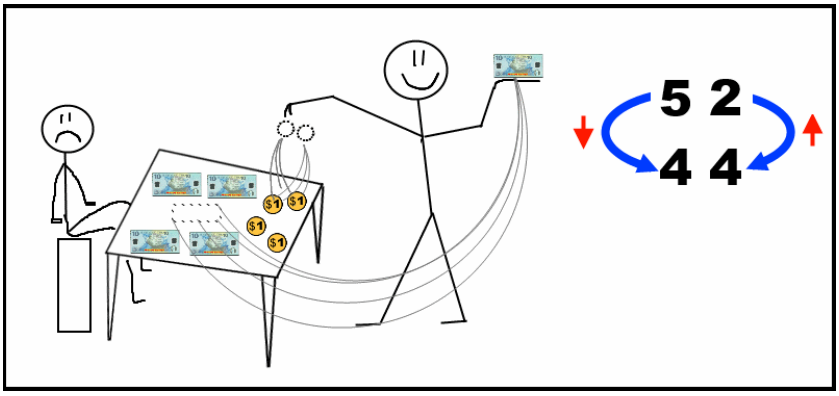
That is very simple to do.
And that is the basis for the
"Add a Complement" strategy for subtraction.

When you want to subtract $8 you give back $2 change:



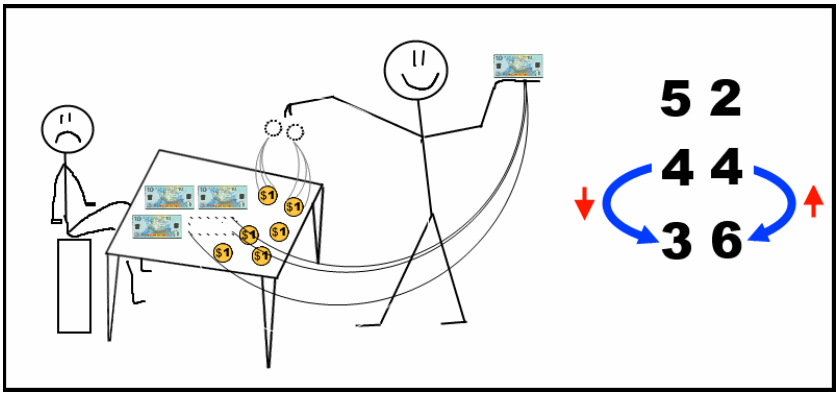
Let's start again with the customer having $52.
You have $2 change available this time.
Lucky you!

To take away $8 you
Take away a $10 note
and give back TWO $1 coins:



Their TENS go DOWN by one from fifty to forty
Their ONES go UP by TWO from two to four
52 - 8 = 44

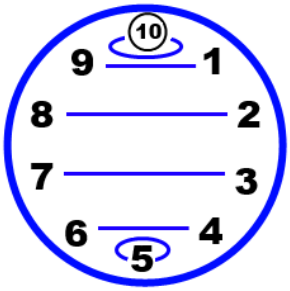
Go another step.
Take away another 8 from the 44.
You take away another $10 note
And give back another TWO $1 coins:



Their TENS go DOWN by one from forty to thirty
Their ONES go UP by TWO from four to six
44 - 8 = 36

To subtract $7 you give back $3
and so on.

We can summarize these amounts you give back
within a 10-circle.
(It's called a 10-circle because it has 10 places in it).



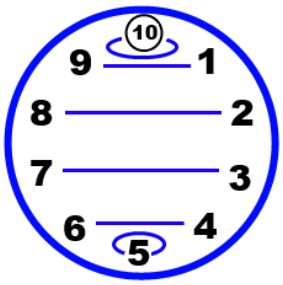
Complements in 10-circle

We call these numbers ***complements***.

9 and 1 are complements
9 is the complement of 1 and 1 is the complement of 9.
8 and 2 are complements
8 is the complement of 2 and 2 is the complement of 8.

All these amounts (9 and 1, 8 and 2 etc.)
add to TEN exactly.

Complements:
are what the other number needs to ***comple***te the circle



Complements in 10-circle

In general:

if a subtraction step "won't go"

REDUCE the tens by one, and ADD the Complement

But Don't Be Fooled!

if a subtraction step "WILL go"

do what a good shop keeper would do and
GRAB THE CHANGE!

Take the one's!
Don't try and "Add a Complement"

5 9	**5 9**
- 9	**- 9**
5 0 **(good)**	**4 "10"** **(oops!)**

or you'll get this!

Question: *What happened on the right?*

Answer: We used the "Add a Complement" Strategy
when we didn't need to.

We took a $10 note
The TENS went DOWN from fifty to forty.
We gave back a $1 coin
The ONES went UP from 9 to **10**

We still have $50
but it is in the form of 4 TEN dollar notes
and
10 ONE dollar coins!
Hence 4 "10".

The correct thing to do is to
grab the change
when it can be taken
as on the left
where we just took
the NINE $1 coins.