Complements

- Complements are used in digital computers for simplifying the subtraction process and for logical manipulation.
- There are two types of complements for each base r system. r's complement and the (r-1)'s compliment.
- When the value of r is 10, it is termed as 10's and 9's complement.
- When the value of r is 2, it is termed as 2's and 1's complement.



9's Complement

In general, the 9's complement of the unsigned numbers 546700
 & 12389 are

999999	99999
- 546700	- 12389
453299	87610



10's Complement

In general, the 10's complement of the unsigned numbers 546700
 & 12389 are

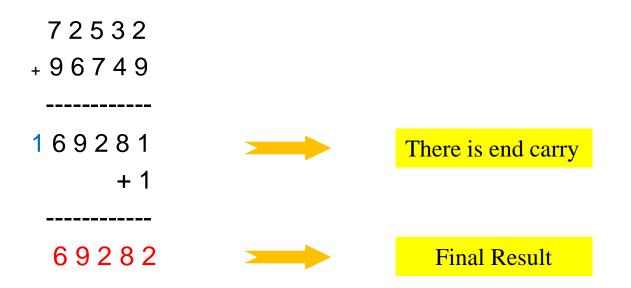
999999	99999
- 546700	-12389
453299	87610
+ 1	+ 1
453300	87611



Subtraction of Unsigned number - 9's Complement

Example 1 : Using 9's complement, subtract 7 2 5 3 2 - 3 2 5 0 (M > N)

9's Complement of 3 2 5 0 is 9 9 9 9 9 - 0 3 2 5 0 = 9 6 7 4 9



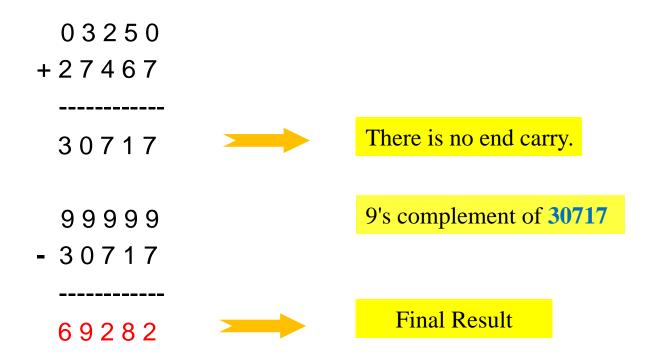
End carry indicates that result is Positive. Carry need to be added to the obtained value to get final result.



Subtraction of Unsigned number - 9's Complement

Example 2 : Using 9's complement, subtract 3 2 5 0 - 7 2 5 3 2 (M < N)

9's Complement of 72532 is 99999-72532=27467



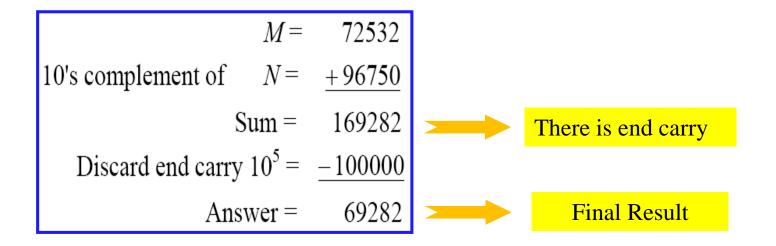
No end carry indicates that result is Negative. Do 9's complement of the obtained value to get final result.



Subtraction of Unsigned number - 10's Complement

Example 1 : Using 10's complement, subtract 72532 - 3250 (M > N)

10's Complement of 3 2 5 0 is 9 9 9 9 9 - 0 3 2 5 0 = 9 6 7 4 9 + 1 = 9 6 7 5 0



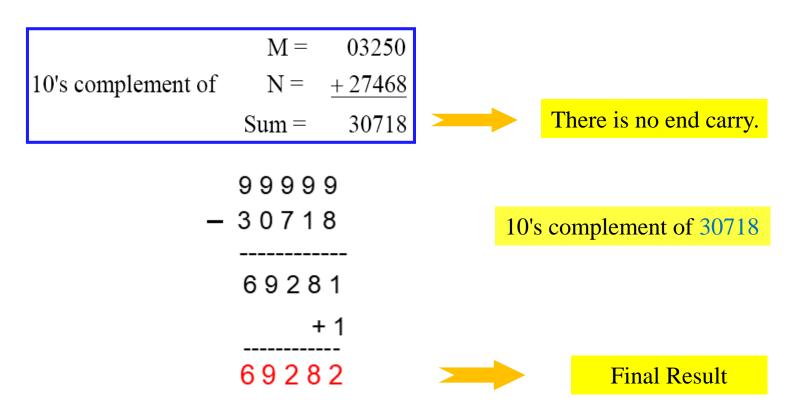
End carry indicates that final result is Positive. Ignore end carry.



Subtraction of Unsigned number - 10's Complement

Example 2 : Using 10's complement, subtract 3 2 5 0 - 7 2 5 3 2 (M < N)

10's Complement of 7 2 5 3 2 is 9 9 9 9 9 - 7 2 5 3 2 = 2 7 4 6 7 + 1 = 2 7 4 6 8



No end carry indicates the end result is Negative. Do 10's complement of the obtained value to get final result.



Questions

Q 1: Using 9's complement, subtract 6 4 3 2 – 1 9 1 0

Q 2: Using 9's complement, subtract 1 9 1 0 – 6 4 3 2

Ans: 9's Complement of 1 9 1 0 is 8 0 8 9 9's Complement of 6 4 3 2 is 3 5 6 7

9's complement of 5 4 7 7 is 4 5 2 2



Questions

Q 1: Using 10's complement, subtract 6 4 3 2 – 1 9 1 0

Q 2: Using 10's complement, subtract 1 9 1 0 – 6 4 3 2

Ans: 10's Complement of 1 9 1 0 is 8 0 8 9 + 1 = 8 0 9 0 10's Complement of 6 4 3 2 is 3 5 6 7 + 1 = 3 5 6 8

6 4 3 2 + 8 0 9 0 + 3 5 6 8

1 4 5 2 2 (End Carry – Re +ve) 5 4 7 8 (No End carry Re –ve)
(Ignore carry) (10's Complement of result)

4522 4522

10's complement of 5 4 7 8 is 4 5 2 1 + 1 = 4 5 2 2