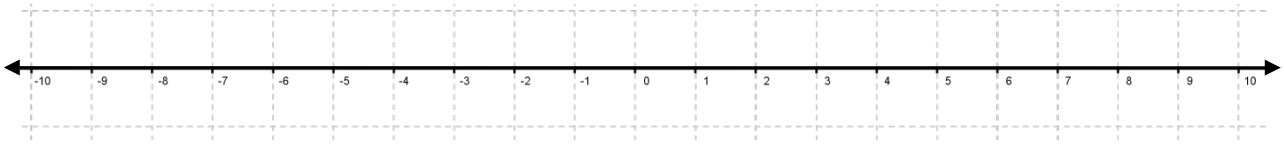
INTEGERS.

To understand addition and subtraction operations on Integers consider the number line:



Numbers to the left of the zero are called NEGATIVE NUMBERS : (examples :-1,-2,-5. -10, -2.3, -10…)

Numbers to the right of the zero are POSITIVE NUMBERS (examples: 2, 3.7, 15, 20,…)

Integers are WHOLE positive and negative numbers.

Mathematical Facts to know:

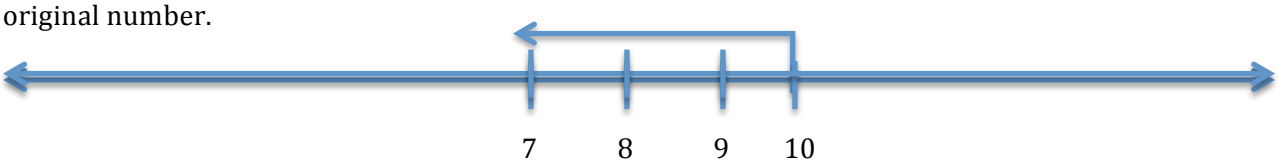
1. Numbers increase when we move to the right. Numbers decrease when you move to the left.

2. Recall that addition increases an original number while subtraction reduces it.

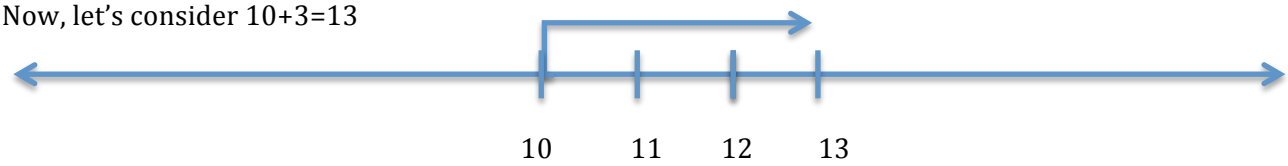
Combining these two facts we conclude that when we subtract we move along the number line to the left, and when we add we move to the right. Stop reading and think about my last statement. Read it one more time.

To understand the above statement let's consider the following two operations and the corresponding diagram.

10 – 3 = 7
In this case we start with 10 and move 3 spaces to the left of 10, since subtraction reduces the original number.



Now, let's consider 10+3=13

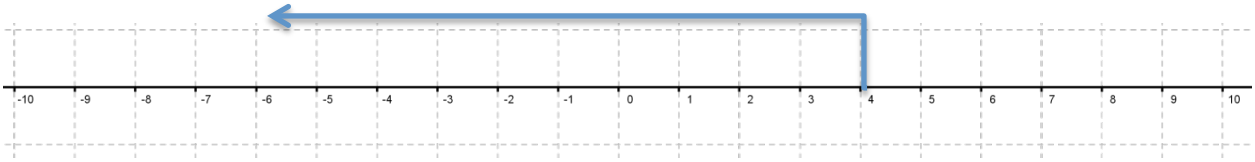


In this case we start with 10 and move 3 spaces to the right of 10 since we reduce the original number.

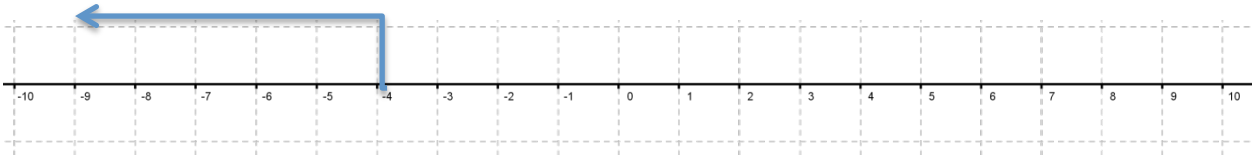
Thinking absolutely the same way you can add and subtract negative integers as well.
Just keep in mind: when subtracting we are moving to the left, when adding we are moving to the right.

Slowly examine the following diagrams and the corresponding operations.

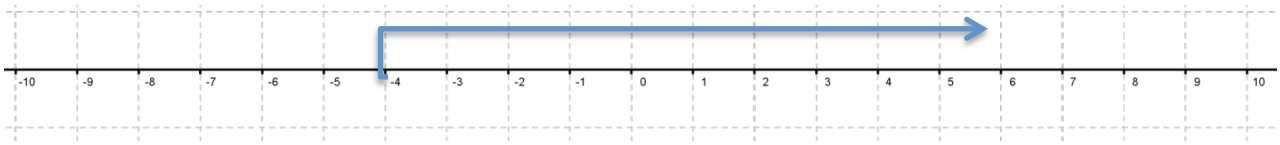
$4 - 10 = -6$



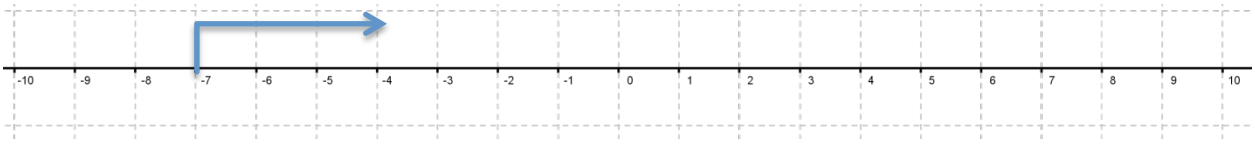
$-4 - 5 = -9$



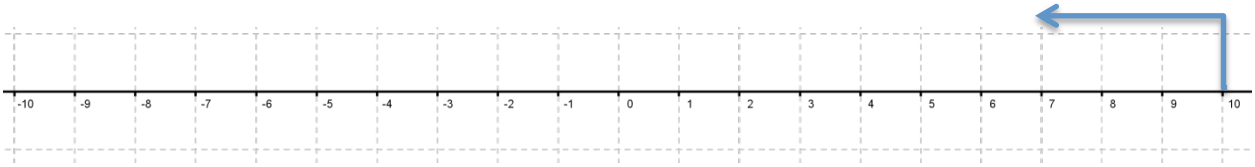
$-4 + 10 = 6$



$-7 + 3 = -4$



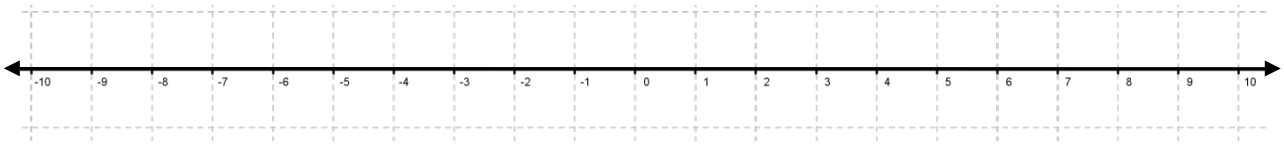
$10 - 3 = 7$



To add and subtract integers you have to answer to three questions:

1. What is my "start" number?
2. Do I move to the left or to the right? (left when subtract, right when add)
3. By how many spaces do I move?

Now practice. Use the same logic as mentioned before and use the number line, if you need.



Exercise 1.

$a.\ -7+\ 10=$

$b.\ -9\ +\ 5=$

$c.\ -12+\ 10=$

$d.\ -9+2=$

$e.\ 10-\ 3=$

$f.\ 5-9=$

$g.\ -5+5=$

$h.\ 6\ -\ 6=$

$i.\ 10\ -13=$

Check the answers. If you did mistakes, rethink and redo the questions that were wrong using the number line.

If everything is correct think about the following:

1. Is there any pattern?
2. When do we subtract the actual values, when do we add?

Answers to Exercise 1:

$a.\ -7+\ 10=3$ $b.\ -9\ +\ 5=\ -4$ $c.\ -12+\ 10=-2$

$d.\ -9+2=\ -2$ $e.\ 10-\ 3=7$ $f.\ 5-9=-4$

$g.\ -5+5=0$ $h.\ 6\ -\ 6=0$ $i.\ 10\ -13=-3$

PART 2. Multiplication and Division of Integers.

The good news about these two operations on integers is that the rules are simple.
No thinking is required!

When Multiplying or Dividing integers of the same sign (both positive or both negative) the result is positive.

Examples:

$$-2\times(-3) = +6$$

$$-10 \div (-2) = +5$$

$$15 \div 5 = 3$$

When Multiplying or Dividing integers of different signs (one is positive another is negative) the result is negative.

Examples:

$$2\times(-3) = -6$$

$$-10 \div (2) = -5$$

$$15 \div (-5) = -3$$

$$-4\times3 = -12$$

Practice:

Exercise 2.
Evaluate without calculator:

a) $-3\times(-4) =$
b) $5\times(-3) =$
c) $-3\times4 =$
d) $-12 \div 4 =$
e) $-15 \div (-3) =$
f) $-20 \div 5 =$

Answers to Exercise 2:

a) $-3\times(-4) = 12$ b) $5\times(-3) = -15$ c) $-3\times4 = -12$ d) $-12 \div 4 = -3$

e) $-15 \div (-3) = 5$ f) $-20 \div 5 = -4$