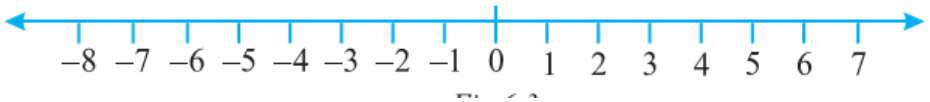
Negative Numbers and Integers

- Negative numbers find applications in different scenarios : temperature scale, water level in a lake or river, level of oil in a tank, loss in a transaction, debit account or outstanding dues etc
- The collection of numbers..., – 4, – 3, – 2, – 1, 0, 1, 2, 3, 4, ... is called integers.
- So, – 1, – 2, – 3, – 4, ... called negative integers and 1, 2, 3, 4,… are the positive integers. Zero (0) is neither positive nor negative
- All the positive integers lie to the right of 0 and the negative integers to the left of 0 on the number line.



Comparison

- To compare two integers on the number line, we locate their positions on the number line and the integer lying to the right of the other is always greater.
- Every positive integer is greater than 0.
- Every negative integer is less than zero

Representation of integers on a number line

In order to mark + 2 on the number line, we move 2 points to the right of zero

integer	Successor	Predecessor
13	14	12
-7	-6	-8

- All non-negative integers are the same as whole numbers and hence all the operations on them are done as in the case of whole numbers.
- Adding 1 to an integer gives its successor and subtracting 1 from the integer, gives its predecessor

Additive identity and additive inverse

- The additive identity for integers is 0 (zero)
  If a is an integer, then a + 0 = 0 + a = a
- Addition of integers is commutative
  If a and b are any two integers, a + b = b + a
- Two integers whose sum is zero are called additive inverses or negatives of each other.
- Additive inverse of an integer is obtained by changing the sign of the integer. For example, the additive inverse of +5 is –5 and the additive inverse of –3 is +3.

Addition

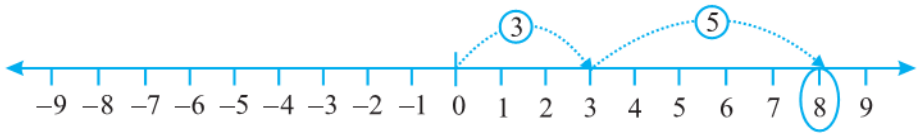
- When we have the same sign, add and put the same sign.

  When two positive integers are added, we get a positive integer
  [e.g. (+ 3) + (+ 5) = + 8]

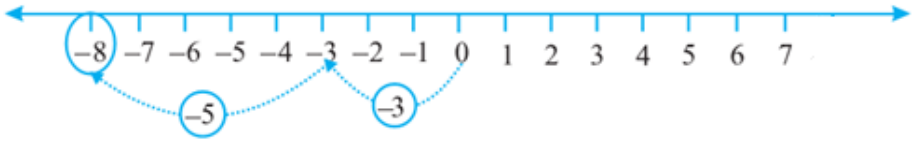
  When two negative integers are added, we get a negative integer
  [e.g. (–3) + (– 5) = – 8]
- When one positive and one negative integers are added, we subtract them as whole numbers by considering the numbers without their sign and then put the sign of the bigger number with the subtraction obtained. The bigger integer is decided by ignoring the signs of the integers
  [e.g. (-5) + (+3) = -2 and (4) +(- 3) = +1].

Addition of integers on the number line:

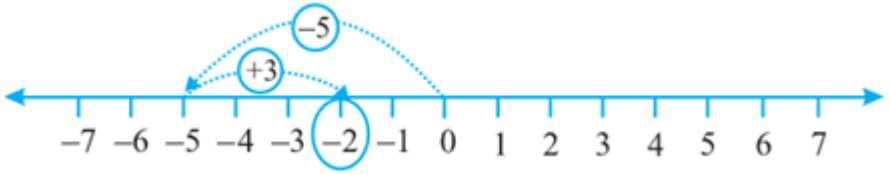
(+ 3) + (+ 5) = + 8



(–3) + (– 5) = – 8



(– 5) + (+3) = – 2



Subtraction:

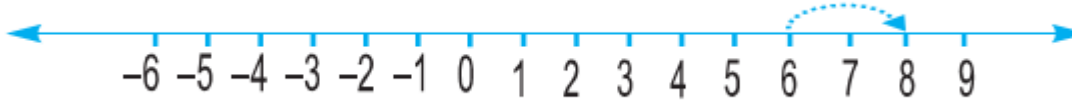
- The subtraction of an integer is the same as the addition of its additive inverse
- To subtract an integer from a given integer, we add the additive inverse of the integer that is being subtracted to the given integer.
- To subtract 2 from –3 ,we write -3 – (2) = -3 + (-2) = -5

Subtraction of Integers with the help of a Number Line

To subtract 2 from –3 ,we move 2 steps to the left of
– 3 on the number line and reach –5

To subtract -2 form 6 , we start from 6 and go 2 steps to the right side. We reach at 8.

i.e. 6 – (–2) = +8



Hence, to subtract an integer from another integer it is enough to add the additive inverse of the integer that is being subtracted, to the other integer