

**Properties of Addition and Subtraction of Integers**

**1. Closure under Addition**

For the closure property the sum of two integers must be an integer then it will be closed under addition.

**Example**

2 + 3 = 5

2+ (-3) = -1

(-2) + 3 = 1

(-2) + (-3) = -5

As you can see that the addition of two integers will always be an integer, hence **integers are closed under addition.**

**If we have two integers p and q, p + q is an integer.**

**2. Closure under Subtraction**

If the difference between two integers is also an integer then it is said to be closed under subtraction.

**Example**

7 – 2 = 5

7 – (- 2) = 9

- 7 – 2 = – 9

- 7 – (- 2) = – 5

As you can see that the subtraction of two integers will always be an integer, hence **integers are closed under subtraction**.

**For any two integers p and q, p - q is an integer**.

**3. Commutative Property**

a. If we change the order of the integers while adding then also the result is the same then it is said that **addition is commutative for integers**.

**For any two integers p and q**

**p + q = q + p**

**Example**

23 + (-30) = – 7

(-30) + 23 = – 7

There is no difference in answer after changing the order of the numbers.

b. If we change the order of the integers while subtracting then the result is not the same so **subtraction is not commutative for integers**.

**For any two integers p and q**

**p – q ≠ q – p will not always equal.**

**Example**

 23 - (-30) = 53

(-30) - 23 = -53

The answer is different after changing the order of the numbers.

**4. Associative Property**

If we change the grouping of the integers while adding in case of more than two integers and the result is same then we will call it that addition is associative for integers.

**For any three integers, p, q and r**

**p + (q + r) = (p + q) + r**

**Example**

If there are three integers 3, 4 and 1 and we change the grouping of numbers, then



The result remains the same. Hence, addition is associative for integers.

**5. Additive Identity**

If we add zero to an integer, we get the same integer as the answer. So **zero is an additive identity for integers.**

**For any integer p,**

**p + 0 = 0 + p =p**

**Example**

2 + 0 = 2

(-7) + 0 = (-7)