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Topic: Properties of addition and subtraction of Integers

1. Closure under addition

When we add two integers the result should be an integer. Let us check it with few examples:

$$5 + 2 = 7 \text{ (integer)}$$

$$-7 + 5 = -2 \text{ (integer)}$$

see in both these cases we get our result as an integer.

So for any two integers a and b , $a + b$ is an integer.

2. Closure under subtraction

Let us check whether subtraction is closure

we will understand this with some examples

$$17 - 4 = 13 \text{ (integer)}$$

$$-5 - 9 = -14 \text{ (integer)}$$

These results show that for any two integers a and b , $a - b$ is an integer.

3. Commutative Property

Addition

If the result of the addition of two integers remains same if the order is reversed then it is said to be commutative.

Let us understand with eg:

$$4 + 5 = 9$$

$$5 + 4 = 9$$

so addition is commutative for integers

$$a + b = b + a$$

Subtraction

Now for the case of subtraction the result varies

$$\text{eg: } 7 - 5 = 2$$

$$5 - 7 = -2$$

so we conclude that subtraction is not commutative for integers.

4. Associative Property

Let us take three integers $a = -3$, $b = -9$ and $c = -4$

$$\text{lets group in different ways } (-3 + (-9)) + (-4) = -16$$

$$-3 + (-9 + (-4)) = -16$$

so we conclude that addition is associative but in subtraction the answer will not be the same

here students will check by doing it themselves.

so subtraction is not associative in integers.

$$a + (b + c) = (a + b) + c$$

5. Additive Identity

If we add 0 to any integer we will get an integer

$$\text{eg: } 7 + 0 = 7$$

$$-9 + 0 = -9$$

$$a + 0 = a = 0 + a$$

**Note: Students will write and practice all the properties by taking different examples.
(Mrs Sunanda Pathak)**