Integers

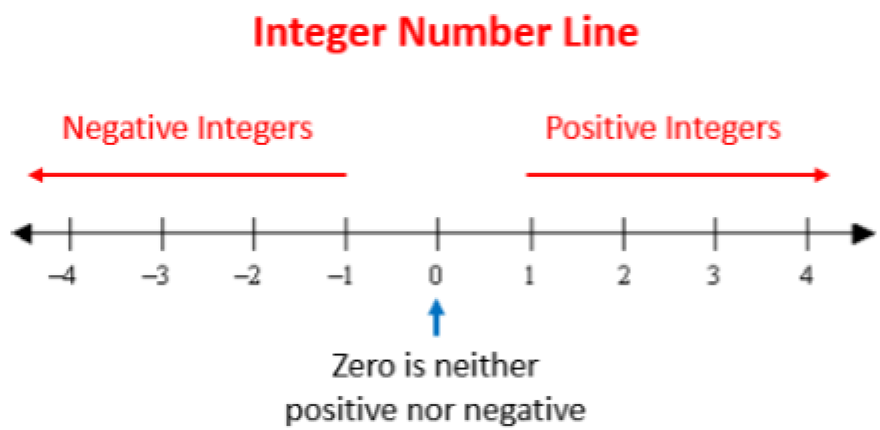
Introduction to Integers

A whole number, from zero to positive or negative infinity is called **Integers**. I.e. it is a set of numbers which include zero, positive natural numbers and negative natural numbers. It is denoted by letter Z.

Z = {…,-2,-1, 0, 1, 2…}

Integers on Number Line

On the number line, for positive integers we move to the right from zero and for negative integers move to the left of zero.



Introduction to Numbers

Natural Numbers : The collection of all the counting numbers is called set of natural numbers. It is denoted by **N = {1,2,3,4….}**

Whole Numbers: The collection of natural numbers along with zero is called a set of whole numbers. It is denoted by **W = { 0, 1, 2, 3, 4, 5, … }**

Properties of Addition and Subtraction of Integers

Closure under Addition and subtraction
For every integer a and b, a+b and a–b are integers.

Commutativity Property for addition
for every integer a and b, a+b=b+a

Associativity Property for addition
for every integer a,b and c, (a+b)+c=a+(b+c)

Additive Identity & Additive Inverse

Additive Identity
For every integer a, a+0=0+a=a here **0** is Additive Identity, since adding 0 to a number leaves it unchanged.
Example : For an integer 2, 2+0 = 0+2 = 2.

Additive inverse
For every integer a, a+(−a)=0 Here, −a is additive inverse of a and a is the additive inverse of-a.
Example : For an integer 2, (– 2) is additive inverse and for (– 2), additive inverse is 2. [Since + 2 – 2 = 0]

Properties of Multiplication of Integers

Closure under Multiplication
For every integer a and b, a×b=Integer

Commutative Property of Multiplication
For every integer a and b, a×b=b×a

Multiplication by Zero
For every integer a, a×0=0×a=0

Multiplicative Identity
For every integer a, a×1=1×a=a. Here 1 is the multiplicative identity for integers.

Associative property of Multiplication
For every integer a, b and c, (a×b)×c=a×(b×c)

Distributive Property of Integers
Under addition and multiplication, integers show the distributive property.
i.e., For every integer a, b and c, a×(b+c)=a×b+a×c

These properties make calculations easier.

Division of Integers

When a **positive integer** is divided by a **positive integer**, the quotient obtained is a **positive integer**.
Example: (+6) ÷ (+3) = +2

When a **negative integer** is divided by a **negative integer**, the quotient obtained is a **positive integer.**
Example: (-6) ÷ (-3) = +2

When a **positive integer** is divided by a **negative integer** or **negative integer** is divided by a **positive integer**, the quotient obtained is a **negative integer.**
Example: (-6) ÷ (+3) =−2 and Example: (+6) ÷ (-3) = −2

(i) add a positive integer for a given integer, we move to the right.
Example : When we add +2 to +3, move 2 places from +3 towards right to get +5

(ii) add a negative integer for a given integer, we move to the left.
Example : When we add -2 to +3, move 2 places from +3 towards left to get +1

(iii) subtract a positive integer from a given integer, we move to the left.
Example: When we subtract +2 from -3, move 2 places from -3 towards left to get -5

(iv) subtract a negative integer from a given integer, we move to the right
Example: When we subtract -2 from -3, move 2 places from -3 towards right to get 1

Addition and Subtraction of Integers

The absolute value of +7 (a positive integer) is 7
The absolute value of -7 (negative integer) is 7 (its corresponding positive integer)

Addition of two **positive integers** gives a **positive** integer.
Example: (+3)+(+4) = +7

Addition of two **negative integers** gives a **negative** integer.
Example: (−3)+(−4) = −3−4=−7

When **one positive** and **one negative** integers are **added,** we take their **difference** and place the sign of the **bigger integer**.
Example: (−7)+(2) = −5

For **subtraction**, we add the **additive inverse** of the integer that is being subtracted, to the other integer.
Example: 56–(–73) = 56+73 = 129

Introduction to Zero

Integers

Integers are the collection of numbers which is formed by **whole numbers** and **their negatives.**
The set of Integers is denoted by **Z** or **I. I =** { …, -4, -3, -2, -1, 0, 1, 2, 3, 4,… }

Properties of Division of Integers

For every integer a,
(a) a÷0 is not defined

(b) a÷1 = a

Note: Integers are **not** closed under division
Example: (– 9) ÷ (– 3) = 2. Result is an integer.
and (−3)÷(−9)= 1/3. Result is not an integer.

Multiplication of Integers

Product of **two positive** integers is a **positive integer.**
Example: (+2)×(+3) = +6

Product of **two negative** integers is a **positive integer.**
Example:(−2)×(−3) = +6

Product of a **positive** and a **negative** integer is a **negative integer.**
Example:(+2)×(−3) = −6 and (−2)×(+3) = −6

Product of **even number** of **negative** integers is **positive** and **product** of **odd number** of **negative** integers is **negative.**
These properties make calculations easier.

What is 'Closure' property?

Closure property of whole numbers under addition: The sum of any two whole numbers will always be a whole number, i.e. if a and b are any two whole numbers, a + b will be a whole number.

What are the properties of 'Zero'?

1. Zero is even 2. Zero is neither positive nor negative 3. Zero is an integer

What is the defintion of 'Inverse'?

A term is said to be in inverse proportion to another term if it increases (or decreases) as the other decreases (or increases). of or relating to an inverse function.