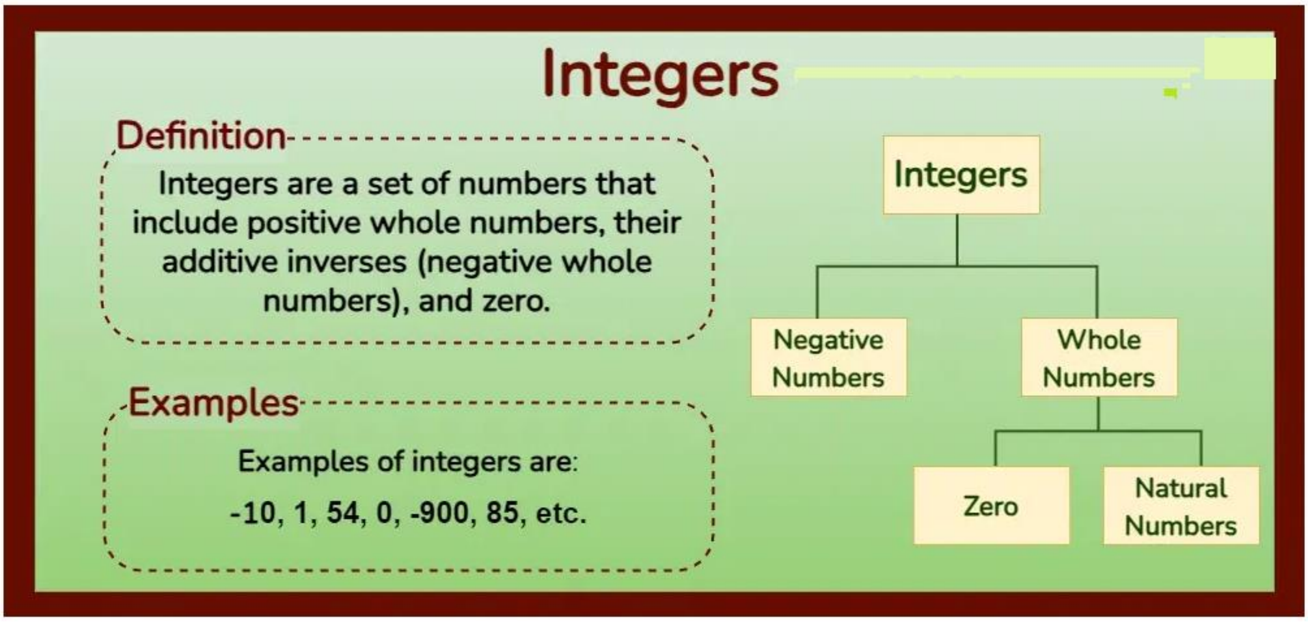
1- INTEGERS



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

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, $a \times b = b \times a$

Multiplication by Zero
For every integer a, $a \times 0 = 0 \times a = 0$

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

Associative property of Multiplication
For every integer a, b and c, $(a \times b) \times c = a \times (b \times c)$

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

These properties make calculations easier.

Division of Integers

Division of Integers

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

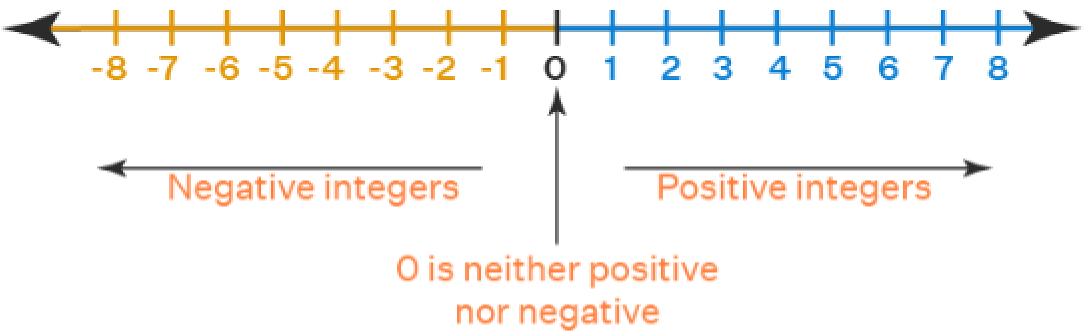
When a **negative integer** is divided by a **negative integer**, the quotient obtained is a **positive integer.**
Example: (-6) ÷ (-3) = +2

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.

PROPERTIES OF INTEGERS				
Property	**Operations**			
Name	**Addition**	**Subtraction**	**Multiplication**	**Division**
Closure	a + b ∈ Z	a - b ∈ Z	a x b ∈ Z	a ÷ b ∉ Z
Commutative	a + b = b + a	a - b ≠ b - a	a x b = b x a	a ÷ b ≠ b ÷ a
Associative	(a + b) + c = a + (b + c)	(a - b) - c ≠ a - (b - c)	(a x b) x c = a x (b x c)	(a ÷ b) ÷ c ≠ a ÷ (b ÷ c)
Identity	a + o = 0 0 + a = a	Not applicable	a x 1 = a 1 x a = a	Not applicable
Distributive	a x (b + c) = ab + ac	a x (b - c) = ab - ac	Not applicable	Not applicable
where a, b, c ∈ Z			*b is a non-zero integer	

Number Line

Representation of integers on a number line



On a number line when we

(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