Integers

- The set of natural numbers, zero and the negatives of natural numbers form the set of Integers (I or Z).
- There is no smallest integer.
- 1 is the smallest positive integer and -1 is the largest negative integer
- The sum of two positive integers results in a positive integer
- The sum of two negative integers results in a negative integer
- The sum of a positive and a negative integer is the difference of the numbers with the sign of the larger
- On the number line when we:
  (i) add a positive integer, we move to the right
  (ii) add a negative integer, we move to the left
  (iii) subtract a positive integer, we move to the left
  (iv) subtract a negative integer, we move to the right
- The additive identity for integers is 0
- If a is an integer , –a is the additive inverse of a and a is additive inverse of -a; a+ (-a) = (-a) + a = 0
- Subtraction is the opposite of addition, Therefore, to subtract two integers, we add the additive inverse of the integer that is being subtracted to the other integer
  Ex: 23 – 43 = 23 + (Additive inverse of 43) = 23 + (– 43) = – 20
- The multiplicative identity for integers is 1 ; for any integer a, 1 × a = a × 1 = a.
- Product of two positive integers is a positive integer : (+) x (+) = (+)
- Product of two negative integers is a negative integer: (-) x (-) = (+)
- Product of a positive and a negative integer is a negative integer:
  (+) x (-) = (-) or (-) x (+) = (-)
- Product of even number of negative integers is positive
- Product of odd number of negative integers is negative
- When an integer is multiplied by –1, we get the additive inverse of the integer

- is the multiplicative inverse or reciprocal of a where a ≠ 0 , also a

  is the multiplicative inverse of ; a x = x a = 1

- Multiplicative inverse of 1 =1 and Multiplicative inverse of -1 =-1
- The division of a positive integer by a positive integer results in a positive integer :
- The division of a negative integer by a positive integer results in a negative integer or the division of a positive integer by a negative integer results in a negative integer: or
- The division of a negative integer by a negative integer results in a positive integer :

For any integer a, the below properties hold :	
a × 0 = 0 × a = 0	
a ÷ 0 is not defined 0 ÷ a = 0, a ≠ 0	Where, a ≠ 0
and a x 1 = 1 x a = a	• •

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Properties of Integers	Basic operations			
	Addition	Subtraction	Multiplication	Division
Closure property (for any 2 integers a and b)	a + b is an integer; integers are closed under addition	a – b is an integer ; integers are closed under subtraction	a x b is an integer ; integers are closed under multiplication	Integers are not closed under division. ,but
Commutative property (for any 2 integers a and b)	a + b = b + a ;addition is commutative	a – b ≠ b – a ; subtraction is not commutative	a x b = b x a ;multiplication is commutative	; division is not commutative
Associative property: (For any 3 integers a, b and c)	a +(b + c) = (a + b) + c ;addition is associative	Subtraction is not associative	a x (b x c)= (a x b) x c ; multiplicative Is associative	Division is not associative

Distributive property of multiplication over addition:	Distributive property of multiplication over subtraction:
For any three integers a, b and c: $a \times (b + c) = (a \times b) + (a \times c)$ Ex: $– 2 (4 + 3) = –2 (7) = –14$ $= (– 2 \times 4) + (– 2 \times 3)$ $= (– 8) + (– 6)$	For any three integers, a, b and c : $a \times (b - c) = (a \times b) – (a \times c)$ Ex: $– 2 (4 – 3) = – 2 (1) = – 2$ $= (–2 \times 4) – (– 2 \times 3)$ $= (– 8) – (– 6)$

= – 14.	= – 2.

Commutative, Associative and Distributive properties help in making calculations easier