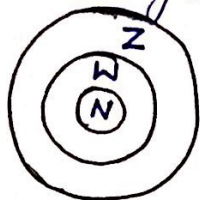


CH-1 INTEGERS

N → Natural Numbers (1, 2, 3, 4, ----)

W → Whole Numbers (0, 1, 2, 3, ----)

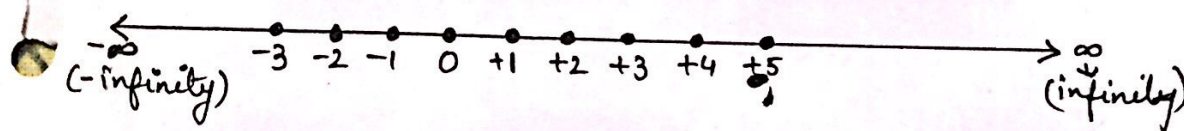
Z → Integers (----, -3, -2, -1, 0, 1, 2, 3, 4, ----)



* Every natural number is an integer but converse is not true.

* Every whole number is an integer but converse is not true.

INTEGERS ON THE NUMBER LINE



HOW TO COMPARE TWO INTEGERS ?

Integer on the right side of number line is greater than the integer which lies on its left.

Positive integer > negative integer

Eg:- $+9 > -3$

Zero has no sign and is greater than all the negative integers

If both the integers are negative, then the integer with smaller whole number value is greater. Eg:- $(-3) > (-10)$
Eg:- $(-5) > (-7)$

ADDITION OF INTEGERS

RULES:-

S → Same sign
S → find sum
S → Put back same sign

Eg:- $+2 + 3 = +5$
 $-2 - 3 = -5$

D → Different signs

D → find Difference

G → Put the sign of the integer with greater whole number value in the answer

Eg:- $-2 + 3 = +1$
 $-5 + 7 = +2$
 $-5 + 2 = -3$

SUBTRACTION OF INTEGERS

STEPS:- 1) Put the integers to be subtracted in brackets with '-' sign in between. $() - ()$

2) Change the sign of the integer in the second bracket

3) Solve using rules of addition

Eg:- Subtract (-3) from (-7)
 $= () - ()$
 $= (-7) - (-3) = -7 + 3 = -4$

MULTIPLICATION OF INTEGERS

- STEPS:-
- 1) Multiply the integers as whole numbers
 - 2) Then, in answer, put '+' sign if there are even number of '-' signs in given integers and put '-' sign if there are odd number of '-' signs in the given integers.

Eg:- $(+2) \times (+3) = +6$; $(-2) \times (-3) = +6$ ($\because$ there are two even negative signs)

$(-2) \times (3) = -6$
one negative sign

$(-2) \times (-3) \times (-5) \times (4) = -120$

There are three '-' signs i.e. odd no. of '-' signs so answer is '-'ve

$(-1)^{\text{even no.}} = +1$ Eg:- $(-1)^{10} = +1$
 $(-1)^{\text{odd no.}} = -1$ Eg:- $(-1)^{99} = -1$
 $(+1)^{\text{even/odd}} = +1$ Eg:- $(+1)^{100} = +1$
 $(+1)^{99} = +1$

Eg:- $(-1) \times (-1) = +1$
 $(-1) \times (-1) \times (-1) = -1$
 $(-1) \times (-1) \times (-1) \times (-1) = +1$
 and so on.

DIVISION OF INTEGERS

- STEPS:-
- 1) Divide the integers as whole numbers & reduce them to lowest forms.
 - 2) Follow the rules of multiplication to decide the sign of the answer.

Eg:- $(-30) \div (2) = \frac{-30}{2} = -15$

Eg:- $(-30) \div (-2) = \frac{-30}{-2} = +15$

Let 'a' be an integer
 then
 $a \div 0$ is not defined
 $a \div 1 = a$

PROPERTIES OF INTEGERS

Page: 3

CLOSURE

If a and b are integers then,

- $a+b$ is an integer.

Eg:- $-2+1=-1$
integer

- $a-b$ is also an integer

Eg:- $(-2)-(-1)=-2+1=-1$
integer

- $a \times b$ is also an integer.

Eg:- $(-2) \times (-1)=+2$
integer

- $a \div b$ may or may not be an integer.

Eg:- $(-4) \div 2 = -2$
integer

Eg:- $(-4) \div 0 = \text{not defined}$

Eg:- $(-4) \div (-8) = \frac{-4}{-8} = \frac{1}{2}$
not an integer

COMMUTATIVE

(seat change)

If a & b are integers, then

• $a+b = b+a$
Eg:- $-2+1 = 1+(-2) = -1$

• $a-b \neq b-a$

Eg:- $1-2 = -1$
but $2-1 = 1$

• $a \times b = b \times a$

Eg:- $(-2) \times 3 = 6$
and $3 \times (-2) = -6$

• $a \div b \neq b \div a$

Eg:- $-4 \div 2 = -2$
but $2 \div (-4) = -\frac{1}{2}$

$= \frac{2}{-4} = -\frac{1}{2}$

ASSOCIATIVE

(brackets change)

If a, b & c are three integers then,

• $(a+b)+c = a+(b+c)$

• $(a-b)-c \neq a-(b-c)$

• $(a \times b) \times c = a \times (b \times c)$

• $(a \div b) \div c \neq a \div (b \div c)$

Try yourself by taking a, b & c as three different integers

DISTRIBUTIVE

If a, b & c are three integers then

• $a \times (b+c) = (a \times b) + (a \times c)$

• $a \times (b-c) = (a \times b) - (a \times c)$

Eg:-

$2 \times (-3+5)$

$= 2 \times (-3) + 2 \times 5$

$= -6 + 10$

$= +4$

Eg:-

$-2 \times (8-5)$

$= (-2 \times 8) - (-2 \times 5)$

$= -16 - (-10)$

$= -16 + 10$

$= -6$

IDENTITY

- Additive identity is 0, because

any integer + 0 = same integer

Eg:- $-2+0 = -2$

or, $0+(-2) = -2$

- Multiplicative identity is 1 because

(any integer) $\times 1$ = same integer

Eg:- $(-3) \times 1 = -3$

or, $1 \times (-3) = -3$

INVERSE

- Additive INVERSE:- It is the negative of an integer (or)

just change the sign of the integer to get its additive inverse.

Eg:- Add. Inverse of $+2$

-2

Add. Inverse of -3

$+3$

• Multiplicative INVERSE:-

It is the reciprocal of an integer

Eg:- Reciprocal of $\frac{1}{2}$

2

Reciprocal of 1

1

Reciprocal of -1

-1

Reciprocal of $\frac{3}{2}$

$\frac{2}{3}$

IMPORTANT

RECIPOCAL OF

0 IS $\frac{1}{0}$

THAT IS

NOT DEFINED/DOES NOT EXIST