

Addition

When integers are of
(a) like sign

(i) $27 + 3 = 30$

(ii) $-27 + (-3) = -(27 + 3) = -30$

(b) unlike sign

(i) $-27 + (3) = -24$ (sign of bigger absolute value)

(ii) $27 + (-3) = 24$

Subtraction

$b - (a) = b + (-a)$

$b - (-a) = b + (+a)$

eg : (i) $27 - 3 = 24$

(ii) $-27 - (-3) = -27 + 3 = -24$

(iii) $27 - (-3) = 27 + 3 = 30$

(iv) $-3 - (-27) = -3 + 27 = 24$

(v) $-27 - (-3) = -27 + 3 = -24$

Properties of addition and subtraction of Integers

(i) **Closer property** : a and b are two integers :-
then $(a + b)$ and $(a - b)$ are also integers

(ii) **Commutative property**

(a) $a + b = b + a$ eg : $3 + 4 = 4 + 3 = 7$; $-3 + 4 = 4 + (-3) = 1$

(b) $a - b = b - a$ eg : $-3 - (-4) = -7$; $4 - (-3) = 4 + 3 = 7$

(iii) **Associative property**

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

eg : $[(-3) + (-9)] + 17 = (-12) + 17 = 5$

$(-3) + [(-9) + 17] = (-3) + 8 = 5$

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

eg : $[(-3) - (-9)] - 17 = 6 - 17 = -11$

$(-3) - [(-9) - (-17)] = -3 - [-26] = -3 + 26 = 23$

(iv) **Additive identity**

$a + 0 = 0 + a = a$ [0 is additive identity]

eg : $3 + 0 = 0 + 3 = 3$

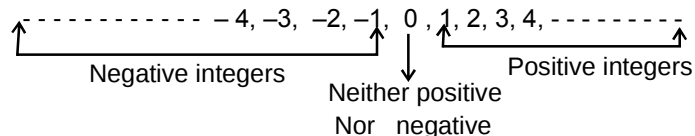
(v) **Additive inverse**

$a + (-a) = (-a) + a = 0$ [a additive inverse $(-a)$]

eg : $3 + (-3) = (-3) + 3 = 0$

Integers

[All natural numbers + 0 + negative of counting numbers]



Multiplication

When integers are

(a) **of unlike sign**: product is negative

$a \times (-b) = -(a \times b)$ eg . $2 \times (-6) = -12$

$(-a) \times (b) = -(a \times b)$ eg . $(-2) \times (6) = -12$

(b) **of like sign**: product is positive

$a \times b = a \times b$ eg : $2 \times 5 = 10$

$(-a) \times (-b) = a \times b$ $(-2) \times (-5) = 10$

Properties : If a, b and c are integers

(i) **Closure property**

$a \times b = \text{integer}$ eg : $(-3) \times 10 = -30$

(ii) **Commutative**

$a \times b = b \times a$

eg : $(-50) \times 2 = 2 \times (-50) = 100$

(iii) **Associative**

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

eg : $-1 \times (3 \times 2) = -6$ $(-1 \times 3) \times 2 = -6$

(iv) **1 is multiplicative identity** ie $1 \times a = a \times a$

$1 \times a = a \times 1 = a$: eg : $6 \times 1 = 1 \times 6 = 6$

(v) **for integer a** : $a \times 0 = 0 \times a = 0$ eg : $500 \times 0 = 0$

(vi) $a \times -1 = (-1) \times a = -a$ eg : $(-3) \times 1 = (-3) = 3$

(vi) **Distributive property**

$a \times (b \times c) = a \times b + a \times c$; $a \times (b - c) = a \times b - a \times c$
 $3 \times [4 + 5] = 3 \times 4 + 3 \times 5$; $3 \times [4 - 5] = 3 \times 4 - 3 \times 5$

Division

When the dividend and divisor are of unlike signs , the quotient is negative other wise positive , If a and b are (+ ve) then

(i) $(-a) \div b = -(a \div b)$

$(-6) \div 3 = -(6 \div 3) = -2$

(ii) $a \div (-b) = -(a \div b)$

$15 \div (-5) = -(15 \div 5) = -3$

(iii) $(-a) \div (-b) = (a \div b)$

$(-4) \div (-2) = (4 \div 2) = 2$

(iv) $8 \div 4 = 2$

Properties :

(i) $a \div 0 = \text{not integer}$ [Not closed]

(ii) If $a \neq 0$ then $a \div a = 1$; $3 \div 3 = 1$

$a \div 1 = a$; $3 \div 1 = 3$

$a \div (-a) = (-a) \div a = -1$

$a \div (-1) = -a$

$a \div a = 0$

Operation precedence [BODMAS]

I. - B $\rightarrow$ Brackets

II. - O $\rightarrow$ Of

III. - D $\rightarrow$ Division

IV. - M $\rightarrow$ Multiplication

V. - A $\rightarrow$ Addition

VI. - S $\rightarrow$ Subtract

done simultaneously

I. $\overline{\quad}$ (bar)

II. () (small)

III. { } (curly)

VI [] (big)