ODM EDUCATIONAL GROUP
Changing your Tomorrow

Period 2

INTEGERS

Properties of Multiplication of Integers

SUBJECT : MATHEMATICS
CHAPTER NUMBER: 01
CHAPTER NAME : INTEGERS

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Learning outcome

Students will be able

- to calculate multiplication involving bigger integers.

- to simplify a series of arithmetic operations on integers quickly

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Previous knowledge test

Rules to be followed while multiplying integers

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Introductory Questions

What is the product of 8 x 53 x (- 125) ?

- 53000

Properties of Multiplication of Integers

https://www.youtube.com/watch?v=ihg3y2jb3Yk (2minutes)

Multiplication by zero

Closure Property

Commutative Property

Associative Property

Distributive Property

Existence of multiplicative identity

Existence of multiplicative inverse

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Properties of integers

Property 1 (Closure property):
The product of two integers is always an integer.

That is, for any two integers m and n, m x n is an integer.

For example:

(i) 4 × 3 = 12, which is an integer.

(ii) 8 × (-5) = -40, which is an integer.

(iii) (-7) × (-5) = 35, which is an integer

Property 2 (Commutativity property):

For any two integer's m and n, we have $m \times n = n \times m$

That is, multiplication of integers is commutative.

For example:

(i) $7 \times (-3) = -(7 \times 3) = -21$ **and** $(-3) \times 7 = -(3 \times 7) = -21$

Therefore, $7 \times (-3) = (-3) \times 7$

(ii) $(-5) \times (-8) = 5 \times 8 = 40$ and $(-8) \times (-5) = 8 \times 5 = 40$

Therefore, $(-5) \times (-8) = (-8) \times (-5)$.

Property 3 (Associative property):
The multiplication of integers is associative, i.e., for any three integers a, b, c, we have

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

For example:

(i) $(-3) \times \{4 \times (-5)\} = (-3) \times (-20) = 3 \times 20 = 60$

and, $\{(-3) \times 4\} \times (-5) = (-12) \times (-5) = 12 \times 5 = 60$

Therefore, $(- 3) \times \{4 \times (-5)\} = \{(-3) \times 4\} \times (-5)$

(ii) $(-2) \times \{(-3) \times (-5)\} = (-2) \times 15 = -(2 \times 15)= -30$

and, $\{(-2) \times (-3)\} \times (-5) = 6 \times (-5) = -(6 \times 5) = -30$

Therefore, $(- 2) \times \{(-3) \times (-5)\} = \{-2) \times (-3)\} \times (-5)$

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Property 4 (Distributivity of multiplication over addition property):

The multiplication of integers is distributive over their addition. That is, for any three integers a, b, c, we have

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

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

For example:

(i) $(-3) \times \{(-5) + 2\} = (-3) \times (-3) = 3 \times 3 = 9$

and, $(-3) \times (-5) + (-3) \times 2 = (3 \times 5) - (3 \times 2) = 15 - 6 = 9$

Therefore, $(-3) \times \{(-5) + 2\} = (-3) \times (-5) + (-3) \times 2$.

Property 5 (Existence of multiplicative identity property):

For every integer a, we have

$a \times 1 = a = 1 \times a$

The integer 1 is called the multiplicative identity for integers.

Property 6 (Existence of multiplicative inverse property):

For any integer a , its multiplicative inverse will be $\frac{1}{a}$ sothat

a × $\frac{1}{a}$ = 1, the multiplicative identity.
Thus the integer x its multiplicative inverse =1, the multiplicative identity

Property 7:
For any integer a, we have

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

Property 8
If x, y, z are integers, such that $x > y$, then

(i) $x \times z > y \times z$, if z is positive

(ii) $x \times z < y \times z$, if z is negative.

These are the properties of multiplication of integers needed to follow while solving the multiplication of integers.

Ex 1 A

1. Evaluate:

(i) 427 × 8 + 2 × 427
Using Distributive property
= 427 × (8 + 2)
By further calculation
= 427 × 10
= 4270

(ii) 394 × 12 + 394 × (-2)
Using Distributive property
= 394 × (12 – 2)
By further calculation
= 394 × 10
= 3940

(iii) 558 × 27 + 3 × 558
Using Distributive property
= 558 × (27 + 3)
By further calculation
= 558 × 30
= 16740

2. Evaluate:

(i) 673 × 9 + 673

(ii) 1925 × 101 – 1925

Solution:

(i) 673 × 9 + 673

Using Distributive property

= 673 × (9 + 1)

By further calculation

= 673 × 10

= 6730

(ii) 1925 × 101 – 1925

Using Distributive property

= 1925 × (101 – 1)

By further calculation

= 1925 × 100

= 192500

EX1D

7. Evaluate:

(i) (-2) × (-3) × (-4) × (-5) × (-6)

(ii) (-3) × (-6) × (-9) × (-12)

(iii) (-11) × (-15) × (-11) × (-25)

(iv) 10 × (-12) + 5 × (-12)

Solution:

(i) (-2) × (-3) × (-4) × (-5) × (-6)
= 6 × 20 × (-6)
= 120 × (-6)
= – 720

(ii) (-3) × (-6) × (-9) × (-12)
= 18 × 108
= 1944

(iii) (-11) × (-15) + (-11) × (-25)
= 165 + 275
By further calculation
= 440

(iv) 10 × (-12) + 5 × (-12)
= – 120 – 60
By further calculation
= – 180

8. (i) If x × (-1) = – 36, is x positive or negative?

(ii) If x × (-1) = 36, is x positive or negative?

Solution:

(i) x × (-1) = – 36

So we get

– x = – 36

By further simplification

x = 36

Hence, it is a positive integer.

(ii) x × (-1) = 36

So we get

– x = 36

By further simplification

x = – 36

Hence, it is a negative integer.

HW

Exercise 1A Q No. 5

AHA

i)25x(-42)+(-42)x(-35)

ii) 25 x (-76) x 4

iii) (-33) × 102 + (-33) × (-2)

THANKING YOU

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