WEEK 2:

TOPIC: MULTIPLICATION OF INTEGERS

IMPORTANT POINTS:

MULTIPLICATION OF TWO POSITIVE INTEGERS WILL BE POSITIVE

MULTIPLICATION OF TWO NEGATIVE INTEGERS WILL BE POSITIVE

MULTIPLICATION OF A POSITIVE AND A NEGATIVE INTEGER WILL BE NEGATIVE

PROPERTIES OF MULTIPLICATION

Closure under Multiplication:

Integers are closure under multiplication.

Eg 3x (-5) = -15

Commutativity of Multiplication: In multiplication integers are commutative a x b = b x a

Multiplication by zero : Any integer multiplied by 0 gives a zero and zero is an integer. a x 0 = 0 x a = 0

Multiplicative Identity : 1 is a multiplicative identity of integers a x 1 = 1 x a = a

Associativity for Multiplication : The product of three integers does not depend upon the grouping of integers and this is called the associative property for multiplication of integers. (a x b) x c = a x (b x c)

Distributive Property : The distributivity of multiplication over addition is true for integers.

So a x (b + c) = a x b + a x c

STUDENTS NOW YOU ARE GOING TO WRITE ALL THESE POINTS IN YOUR OLD COPY OR ON ANY SHEETS THAT ARE AVAILABLE WITH YOU.

HERE WITH EACH PROPERTY YOU ARE GOING TO CHECK WITH 5 EXAMPLES OF YOUR OWN.

Now start with exercise 1.3

1. Find each of the following products:

(a) 3 × (–1)

Solution:-

By the rule of Multiplication of integers,

= 3 × (-1)

= -3 … [∵ (+ × – = -)]

(b) (–1) × 225

Solution:-

By the rule of Multiplication of integers,

= (-1) × 225

= -225 … [∵ (- × + = -)]

(c) (–21) × (–30)

Solution:-

By the rule of Multiplication of integers,

= (-21) × (-30)

= 630 … [∵ (- × – = +)]

(d) (–316) × (–1)

Solution:-

By the rule of Multiplication of integers,

= (-316) × (-1)

= 316 … [∵ (- × – = +)]

(e) (–15) × 0 × (–18)

Solution:-

By the rule of Multiplication of integers,

= (–15) × 0 × (–18)

= 0

∵Any integer is multiplied with zero and the answer is zero itself.

(f) (–12) × (–11) × (10)

Solution:-

By the rule of Multiplication of integers,

= (–12) × (-11) × (10)

First multiply the two numbers having same sign,

= 132 × 10 … [∵ (- × – = +)]

= 1320

(g) 9 × (–3) × (– 6)

Solution:-

By the rule of Multiplication of integers,

= 9 × (-3) × (-6)

First multiply the two numbers having same sign,

= 9 × 18 … [∵ (- × – = +)]

= 162

(h) (–18) × (–5) × (– 4)

Solution:-

By the rule of Multiplication of integers,

= (-18) × (-5) × (-4)

First multiply the two numbers having same sign,

= 90 × -4 … [∵ (- × – = +)]

= – 360 … [∵ (+ × – = -)]

(i) (–1) × (–2) × (–3) × 4

Solution:-

By the rule of Multiplication of integers,

= [(–1) × (–2)] × [(–3) × 4]

= 2 × (-12) … [∵ (- × – = +), (- × + = -)]

= – 24

(j) (–3) × (–6) × (–2) × (–1)

Solution:-

By the rule of Multiplication of integers,

= [(–3) × (–6)] × [(–2) × (–1)]

First multiply the two numbers having same sign,

= 18 × 2 … [∵ (- × – = +)

= 36

2. Verify the following:

(a) 18 × [7 + (–3)] = [18 × 7] + [18 × (–3)]

Solution:-

From the given equation,

Let us consider the Left Hand Side (LHS) first = 18 × [7 + (–3)]

= 18 × [7 – 3]

= 18 × 4

= 72

Now, consider the Right Hand Side (RHS) = [18 × 7] + [18 × (–3)]

= [126] + [-54]

= 126 – 54

= 72

By comparing LHS and RHS,

72 = 72

LHS = RHS

Hence, the given equation is verified.

(b) (–21) × [(– 4) + (– 6)] = [(–21) × (– 4)] + [(–21) × (– 6)]

Solution:-

From the given equation,

Let us consider the Left Hand Side (LHS) first = (–21) × [(– 4) + (– 6)]

= (-21) × [-4 – 6]

= (-21) × [-10]

= 210

Now, consider the Right Hand Side (RHS) = [(–21) × (– 4)] + [(–21) × (– 6)]

= [84] + [126]

= 210

By comparing LHS and RHS,

210 = 210

LHS = RHS

Hence, the given equation is verified.

3. (i) For any integer a, what is (–1) × a equal to?

Solution:-

= (-1) × a = -a

Because, when we multiplied any integer a with -1, then we get additive inverse of that integer.

(ii). Determine the integer whose product with (–1) is

(a) –22

Solution:-

Now, multiply -22 with (-1), we get

= -22 × (-1)

= 22

Because, when we multiplied integer -22 with -1, then we get additive inverse of that integer.

(b) 37

Solution:-

Now, multiply 37 with (-1), we get

= 37 × (-1)

= -37

Because, when we multiplied integer 37 with -1, then we get additive inverse of that integer.

(c) 0

Solution:-

Now, multiply 0 with (-1), we get

= 0 × (-1)

= 0

Because, the product of negative integers and zero give zero only.

4. Starting from (–1) × 5, write various products showing some pattern to show

(–1) × (–1) = 1.

Solution:-

The various products are,

= -1 × 5 = -5

= -1 × 4 = -4

= -1 × 3 = -3

= -1 × 2 = -2

= -1 × 1 = -1

= -1 × 0 = 0

= -1 × -1 = 1

We concluded that the product of one negative integer and one positive integer is negative integer. Then, the product of two negative integers is a positive integer.

5. Find the product, using suitable properties:

(a) 26 × (– 48) + (– 48) × (–36)

Solution:-

The given equation is in the form of Distributive law of Multiplication over Addition.

= a × (b + c) = (a × b) + (a × c)

Let, a = -48, b = 26, c = -36

Now,

= 26 × (– 48) + (– 48) × (–36)

= -48 × (26 + (-36)

= -48 × (26 – 36)

= -48 × (-10)

= 480 … [∵ (- × – = +)

(b) 8 × 53 × (–125)

Solution:-

The given equation is in the form of Commutative law of Multiplication.

= a × b = b × a

Then,

= 8 × [53 × (-125)]

= 8 × [(-125) × 53]

= [8 × (-125)] × 53

= [-1000] × 53

= – 53000

(c) 15 × (–25) × (– 4) × (–10)

Solution:-

The given equation is in the form of Commutative law of Multiplication.

= a × b = b × a

Then,

= 15 × [(–25) × (– 4)] × (–10)

= 15 × [100] × (–10)

= 15 × [-1000]

= – 15000

(d) (– 41) × 102

Solution:-

The given equation is in the form of Distributive law of Multiplication over Addition.

= a × (b + c) = (a × b) + (a × c)

= (-41) × (100 + 2)

= (-41) × 100 + (-41) × 2

= – 4100 – 82

= – 4182

(e) 625 × (–35) + (– 625) × 65

Solution:-

The given equation is in the form of Distributive law of Multiplication over Addition.

= a × (b + c) = (a × b) + (a × c)

= 625 × [(-35) + (-65)]

= 625 × [-100]

= – 62500

(f) 7 × (50 – 2)

Solution:-

The given equation is in the form of Distributive law of Multiplication over Subtraction.

= a × (b – c) = (a × b) – (a × c)

= (7 × 50) – (7 × 2)

= 350 – 14

= 336

(g) (–17) × (–29)

Solution:-

The given equation is in the form of Distributive law of Multiplication over Addition.

= a × (b + c) = (a × b) + (a × c)

= (-17) × [-30 + 1]

= [(-17) × (-30)] + [(-17) × 1]

= [510] + [-17]

= 493

(h) (–57) × (–19) + 57

Solution:-

The given equation is in the form of Distributive law of Multiplication over Addition.

= a × (b + c) = (a × b) + (a × c)

= (57 × 19) + (57 × 1)

= 57 [19 + 1]

= 57 × 20

= 1140

6. A certain freezing process requires that room temperature be lowered from 40°C at the rate of 5°C every hour. What will be the room temperature 10 hours after the process begins?

Solution:-

From the question, it is given that

Let us take the lowered temperature as negative,

Initial temperature = $40^{o}C$

Change in temperature per hour = $-5^{o}C$

Change in temperature after 10 hours = (-5) × 10 = $-50^{o}C$

∴The final room temperature after 10 hours of freezing process = $40^{o}C + (-50^{o}C)$

= $-10^{o}C$

7. In a class test containing 10 questions, 5 marks are awarded for every correct answer and (–2) marks are awarded for every incorrect answer and 0 for questions not attempted.

(i) Mohan gets four correct and six incorrect answers. What is his score?

Solution:-

From the question,

Marks awarded for 1 correct answer = 5

Then,

Total marks awarded for 4 correct answer = 4 × 5 = 20

Marks awarded for 1 wrong answer = -2

Then,

Total marks awarded for 6 wrong answer = 6 × -2 = -12

∴Total score obtained by Mohan = 20 + (-12)

= 20 – 12

= 8

(ii) Reshma gets five correct answers and five incorrect answers, what is her score?

Solution:-

From the question,

Marks awarded for 1 correct answer = 5

Then,

Total marks awarded for 5 correct answer = 5 × 5 = 25

Marks awarded for 1 wrong answer = -2

Then,

Total marks awarded for 5 wrong answer = 5 × -2 = -10

∴Total score obtained by Reshma = 25 + (-10)

= 25 – 10

= 15

(iii) Heena gets two correct and five incorrect answers out of seven questions she attempts. What is her score?

Solution:-

From the question,

Marks awarded for 1 correct answer = 5

Then,

Total marks awarded for 2 correct answer = 2 × 5 = 10

Marks awarded for 1 wrong answer = -2

Then,

Total marks awarded for 5 wrong answer = 5 × -2 = -10

Marks awarded for questions not attempted is = 0

∴Total score obtained by Heena = 10 + (-10)

= 10 – 10

= 0

8. A cement company earns a profit of ₹ 8 per bag of white cement sold and a loss of ₹ 5 per bag of grey cement sold.

(a) The company sells 3,000 bags of white cement and 5,000 bags of grey cement in a month. What is its profit or loss?

Solution:-

We denote profit in positive integer and loss in negative integer,

From the question,

Cement company earns a profit on selling 1 bag of white cement = ₹ 8 per bag

Then,

Cement company earns a profit on selling 3000 bags of white cement = 3000 × ₹ 8

= ₹ 24000

Loss on selling 1 bag of grey cement = – ₹ 5 per bag

Then,

Loss on selling 5000 bags of grey cement = 5000 × – ₹ 5

= – ₹ 25000

Total loss or profit earned by the cement company = profit + loss

= 24000 + (-25000)

= – ₹1000

Thus, a loss of ₹ 1000 will be incurred by the company.

(b) What is the number of white cement bags it must sell to have neither profit nor loss, if the number of grey bags sold is 6,400 bags.

Solution:-

We denote profit in positive integer and loss in negative integer,

From the question,

Cement company earns a profit on selling 1 bag of white cement = ₹ 8 per bag

Let the number of white cement bags be x.

Then,

Cement company earns a profit on selling x bags of white cement = (x) × ₹ 8

= ₹ 8x

Loss on selling 1 bag of grey cement = – ₹ 5 per bag

Then,

Loss on selling 6400 bags of grey cement = 6400 × – ₹ 5

= – ₹ 32000

According to the question,

Company must sell to have neither profit nor loss.

= Profit + loss = 0

= 8x + (-32000) =0

By sending -32000 from LHS to RHS it becomes 32000

= 8x = 32000

= x = 32000/8

= x = 4000

Hence, the 4000 bags of white cement have neither profit nor loss.

9. Replace the blank with an integer to make it a true statement.

(a) (–3) × _____ = 27

Solution:-

Let us assume the missing integer be x,

Then,

= (–3) × (x) = 27

= x = – (27/3)

= x = -9

Let us substitute the value of x in the place of blank,

= (–3) × (-9) = 27 … [∵ (- × – = +)]

(b) 5 × _____ = –35

Solution:-

Let us assume the missing integer be x,

Then,

= (5) × (x) = -35

= x = – (-35/5)

= x = -7

Let us substitute the value of x in the place of blank,

= (5) × (-7) = -35 … [∵ (+ × – = -)]

(c) _____ × (– 8) = –56

Solution:-

Let us assume the missing integer be x,

Then,

= (x) × (-8) = -56

= x = (-56/-8)

= x = 7

Let us substitute the value of x in the place of blank,

= (7) × (-8) = -56 … [∵ (+ × – = -)]

(d) _____ × (–12) = 132

Solution:-

Let us assume the missing integer be x,

Then,

= (x) × (-12) = 132

= x = – (132/12)

= x = – 11

Let us substitute the value of x in the place of blank,

= (–11) × (-12) = 132 … [∵ (- × – = +)]

THAT'S ALL FOR THIS WEEK PROPERTIES OF DIVISION WILL BE GIVEN NEXT WEEK. STAY HOME AND STAY SAFE. GOD BLESS YOU ALL.