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Experiential Experimental Edutaining

MATHS

SAMPLE BOOK

7 GRADE

MATHS

I'm the

Intelli Kid

.....

and

I'm becoming the

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GRADE-7

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I AM PROGRESSING

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MATHS

SAMPLE THEORY

CHAPTER 1

INTEGERS

INTEGERS

The collection of whole numbers and the negatives of whole numbers together are called the Integers.

Numbers, $Z = \{...,-4,-3,-2,-1,0,1,2,3,4,...\}$ are integers.

OPERATIONS ON INTEGERS

Addition of Integers using basic operations

Rule 1: To add two integers of like signs, find the sum of their absolute values (numerical values without taking the sign) and place the common sign before the sum.

Example : $-2-5=-(2+5)=-7$

Rule 2: To add two integers of unlike signs, find the difference of their absolute values (numerical value without taking the sign) and place the sign of the integer which has the larger absolute value before this difference.

Example : $(-2+5)=3$

Subtraction of Integers using basic operations

If a and b are two integers then a–b is equal to a + (–b), i.e., to subtract b from a, change the sign of b and add it to a.

Rule: (i) Change the sign of the subtrahend. (ii) Add by the rules for adding integers.

Example : Subtract –8 from 5.

Solution : $5-(-8)=5+8=13$

MULTIPLICATION OF INTEGERS

Rule 1 : To find the product of two integers with unlike signs, we find the product of their values regardless of their signs and give a minus sign to the product.

Rule 2 : To find the product of two integers with the same sign, we find the product of their values regardless of their signs and give a plus sign to the product.

Example : **(i)** $35\times(-18)$ **(ii)** $(-70)\times(-31)$

Solution : **(i)** $35\times(-18)=-(35\times18)=-630$ **(ii)** $(-70)\times(-31)=(70\times31)=2170$

DIVISION OF INTEGERS

Rule 1: For dividing one integer by the other having unlike signs, we divide their values regardless of their signs and give a minus sign to the quotient.

Rule 2: For dividing one integer by the other having like signs, we divide their values regardless of their signs and give a plus sign to the quotient.

Example: (i) $-125 \div 19$ (ii) $-136 \div (-8)$

Solution: (i) $-125 \div 19 = -\frac{125}{19} = -7$ (ii) $\frac{-136}{-8} = 17$

PROPERTIES OF INTEGERS

Properties of Addition of Integers

Closure property: If a and b are any two integers, then $a + b$ is always integers.

Commutative property: For any two integers a and b, we have $a + b = b + a$.

Associative property: For any three integers a, b and c, we have $(a + b) + c = a + (b + c)$.

Additive Identity: Additive identity is 0, because adding 0 to a number leaves it unchanged.

$a + 0 = 0 + a = a$

Existence of additive inverse: For any integer a, we have $a + (-a) = (-a) + a = 0$.

So, additive inverse of a is $-a$ and vice-versa.

Properties of Multiplication of Integers

Closure property: If a and b are any integers, then $a \times b$ is always integers.

Commutative property: For any two integers a and b, we have $a \times b = b \times a$.

Associative property: For any three integers a, b and c, we have $(a \times b) \times c = a \times (b \times c)$.

Multiplicative identity: 1 is the multiplicative identity, because

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

Existence of multiplicative inverse: For any integer a, $a \times \frac{1}{a} = \frac{1}{a} \times a = 1$

So, multiplicative inverse of a is $\frac{1}{a}$ and vice-versa.

Properties of Subtraction of Integers

- **Closure property of subtraction:** If a and b are any integers, then $a - b$ is always integer.
- Subtraction of integers does not follow commutative property as $(a - b) \neq (b - a)$
- Subtraction of integers does not follow associative property as

$(a - b) - c \neq a - (b - c)$

Properties of Division of Integers

- For any integer a, $a \div 0$ is not defined and for any two integers a and b, $a \div b$ is not always integer. So, integers are not closed under division.
- Division of integers does not follow commutative and associative property.

Distributive Property for Multiplication over Addition

Under Addition and Multiplication, integers show the distributive property.

For any three integers a, b and c, we have $a \times (b + c) = a \times b + a \times c$.

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SAMPLE EXERCISE

Directions: Solve the following multiple choice questions by choosing the most appropriate option.

1. $a \times (b + c) = a \times b + a \times c$ is called _____.

(1) commutative property (2) associative property
(3) distributive property (4) closure property

2. Find the value of the expression $10000 \div \{(80 + 100 \div 5) \times 100\}$.

(1) 0 (2) 1 (3) 10 (4) 100

3. The difference in temperatures $+50°C$ and $-50°C$ is _____.

(1) 1°C (2) 0°C (3) 50°C (4) 100°C

4. Simplify : $19 + \frac{1}{5}[\{-20 \times (55 - \overline{13 - 3})\} \div (-5)]$.

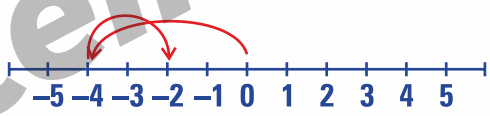
(1) 50 (2) 55 (3) 60 (4) 65

5. Simplify :

$38 - 2(5 - \overline{8 - 3})[2\{7 + (-3) \times (-4)\}]$

(1) 35 (2) 37 (3) 38 (4) 39

6. Which of the following number sentence below best describes the problem shown on the number line ?



(1) $-2 + (-4)$ (2) $-5 + 3$ (3) $5 + (-3)$ (4) $-4 + 2$

7. Calculate the value of $[(-4) \times (-9) \times (-25)] \div [(-2) \times (-3) \times (-5)]$.

(1) 10 (2) 20 (3) 30 (4) 40

8. Calculate the value of $12 - [7 - \{16 - (18 - \overline{6 + 3 - 12})\}]$.

(1) 3 (2) 2 (3) 1 (4) 0

9. Simplify : $222 - \left[\frac{1}{3}\{42 + (56 - \overline{8 + 9})\} + 108\right]$.

(1) 87 (2) 88 (3) 89 (4) 90

10. If an expression involves only addition and subtraction, we cannot _____.

(1) work them from left to right as it comes

(2) group the positive and negative integers separately

(3) do all the additions first, followed by subtraction

(4) ignore all the signs and add

11. Find the value of $|7| + |5| - |-3| - |2|$, where $|\ |$ is absolute value of an integer.

(1) 0 (2) 1 (3) 9 (4) 3

12. An elevator descends into a mine shaft at the rate of 5 m per min. If the descent starts from 20 m above the ground level, how long will it take to reach −250 m?

(1) 25 min (2) 30 min (3) 35 min (4) 40 min

13. An insect crawls up 5 cm every second on a 60 cm vertical rod and then falls down 3 cm over the next second. How many seconds will it take to climb the rod?

(1) 28 seconds (2) 29 seconds (3) 60 seconds (4) 30 seconds

14. A tanker contains 500 litres of water. Due to a small hole in the tanker, the quantity of water is decreasing at the rate of 10 litres every hour. What will be the quantity of water in the tanker after 10 hours?

(1) 410 litres (2) 490 litres (3) 400 litres (4) litres

15. A plane is 40 m above the sea level and another plane is 25 m below the sea level. What is the difference of the level between the two planes?

(1) 15 m (2) 20 m (3) m (4) −20 m

16. Which of the following sentences is true under subtraction?

(1) N (2) Q (3) R

17. Which of the following is not the additive inverse of x?

(1) $x + 1 - 1$ (2) $x - x$ (3) $-x$ (4) $x + 1 - 1$

18. On the following number line, result of $(-4) + 1$ is represented by which point?

(1) G (2) D (3) C (4) F

19. If $x + (-23) + 32 + (-23) + 23$ ..... (40 terms) and $y = 11 + (-10) + 11 + (-10) +$ ..... (20 terms), then $y - x$ is _____.

(1) 40 (2) 10 (3) 20 (4) 30