1 INTEGERS

Brahmagupta: The Indian mathematician Brahmagupta, who lived in the 7th century CE, is often referred to as the "father of integers." He introduced the concept of zero and negative numbers and developed rules for their operations. His work on integers laid the foundation for modern algebraic concepts. He also approximated the value of Pi (which is 3.162...) almost accurately.

Brahmagupta calculated the length of a year as 365 days 6 hours 12 minutes 9 seconds.

CONCEPT MAP

Integers consist of whole numbers and negative numbers.
Z = {....., -3, -2, -1, 0, 1, 2, 3, ...}

Property	Operations on Integers			
Name	**Addition**	**Subtraction**	**Multiplication**	**Division***
Closure	$a + b \in Z$	$a - b \in Z$	$a \times b \in Z$	$a \div b \notin Z$
Commutative	$a + b = b + a$	$a + b \neq b + a$	$a \times b = b \times a$	$a \div b \neq b \div a$
Associative	$(a+b) + c = a+(b+c)$	$(a-b) - c \neq a-(b-c)$	$(a\times b) \times c = a\times(b\times c)$	$(a\div b) \div c \neq a\div(b\div c)$
Identity	$a + 0 = 0$ $0 + a = a$	Not applicable	$a \times 1 = a$ $1 \times a = a$	Not applicable
Distributive	$a \times (b + c) = ab + ac$	$a \times (b - c) = ab - ac$	Not applicable	Not applicable
where $a, b, c \in Z$			*b is a non-zero integer	

Concept 1

Integers:

The collection consisting of natural numbers, zero and negatives of natural numbers are called **integers.** $I = [\ldots, -4, -3, -2, -1, 0, 1, 2, 3, 4, \ldots]$.

Note 1: – 1, – 2, – 3, – 4, ... are **negative integers** and 1, 2, 3, 4, ... are **positive integers.**

Note 2: '0' is neither positive nor negative.

Note 3: Integers are denoted by I or Z.

Non-Negative Integers:

The collection: 0, 1, 2, 3, ... is called the collection of **non-negative integers**.

Representation of Integers on a Number Line:

Integers can be represented on a number line. Any two integers can be added or subtracted.

Properties of Integers Under Addition:

Closure Property:

The sum of integers is always an integer. i.e if a and b are any two integers.

Then a+b is also an integer.

Ex: 15 + 12 = 27, which is an integer

5+(– 8) = –3, which is an integer

Commutative Property:

If a and b are integers, then a + b = b + a

Ex: (i) (–14) + 5 = –9 and 5 + (–14) = –9 $\Rightarrow$ (–14)+5 = 5+(–4)

Associative Property:

If a, b and c are any three integers, then (a+b)+c = a+(b+c)

Ex: [(–4) + (–7)] + 15 = –11+15 = 4 and (–4) + [–7+15] = –4+8 = 4

Additive Property:

If a is any integer then a + 0 = 0 + a = a

so '0' is the additive identity for all integers.

Ex: 8+0 = 0+8 = 8 And –5+0 = 0+(–5) = –5

Additive Inverse:

If a is any integer then a + (–a) = 0 so '–a' is the additive inverse of 'a' and a is the additive inverse of '–a'

For example 15+(–15) = –15+15 = 0

Properties of Integers under Subtraction:

Closure Property:

If a and b are any two integers, then a–b is always an integer

i,e The difference of any two integers is always an integer.

Ex: (i) 2–9 = 2 +(–9) = –7 which is an integer

(ii) (–9)–18 = (–9) + (–18) = –27 which is an integer

Fun Facts

Zero is like the lazy sibling of integers—it neither goes positive nor negative!

Commutative Property:

If a and b are integers then a–b ≠ b–a always

Ex: Consider 3 and 8, we have 3–8 = 3+(–8) = –5 and 8–3 = 8+(3) = 5

$\therefore 3-8 \neq 8-3$

So commutative property does not hold in subtraction of integers.

Associative Property:

If a , b and c are integers, then (a–b) – c ≠ a–(b–c)

Ex: (3–8)–2 = –5–2 = –7

3–(8–2) = 3–6 = –3

Hence (3–8)–2 ≠ 3–(8–2)

∴ Associative property does not hold in subtraction of integers.

Properties of Integers Under Multiplication:

Closure Property:

If a and b are any two integers then a×b is always an integer

i,e product of two integers is always an integer.

Ex: $5 \times 9 = 45$, which is an integer

$(-4) \times 9 = -36$, which is an integer

Commutative Property:

If a and b are any two integers Then a × b = b × a.

Ex: (i) $3\times(-17)=-51$ and $(-17)\times 3=-51\Rightarrow 3\times(-17)=(-17)\times 3$

Associative Property:

If a, b and c are integers, then $a\times(b\times c)=(a\times b)\times c$

Ex: (i) $2\times(5\times 7)=2\times 35=70$

$(2\times 5)\times 7=10\times 7=70$

$\Rightarrow 2\times(5\times 7)=(2\times 5)\times 7$

Multiplication By Zero:

If a is any integer, then $a\times 0=0\times a=0$

Ex: $2\times 0=0\times 2=0,-15\times 0=0\times -15=0$

Multiplicative Identity:

If a is any integer, then $a\times 1=1\times a=a$

So 1 is called multiplicative identity

Ex: $13\times 1=1\times 13=13$

$-25\times 1=1\times -25=-25$

Distributive Property of Multiplication Over Addition:

If a, b and c are integers, then $a\times(b+c)=(a\times b)+(a\times c)$

Ex: $5\times(4+3)=5\times 7=35$ and $(5\times 4)+(5\times 3)=20+15=35$

$\therefore 5\times(4+3)=(5\times 4)+(5\times 3)$

Distributive Property of Multiplication Over Subtraction:

If a , b, and c are integers then $a\times(b-c)=(a\times b)-(a\times c)$

Ex: $5\times(7-3)=5\times 4=20$

$(5\times 7)-(5\times 3)=35-15=20\Rightarrow 5\times(7-3)=(5\times 7)-(5\times 3)$

Multiplicative Inverse:

Multiplicative inverse of non zero integer a is $\frac{1}{a}$

$\therefore \quad a\times\frac{1}{a}=\frac{1}{a}\times a=1.$

CLASSROOM DISCUSSION QUESTIONS CDQ 01

1. **What is the collection consisting of natural numbers, zero, and negatives of natural numbers called?**
   (A) Rational numbers
   (B) Real numbers
   (C) Integers
   (D) Whole numbers
2. **Which of the following is NOT a property of the integer 0?**
   (A) It is neither positive nor negative
   (B) It is the additive identity
   (C) It is closed under division
   (D) It has an additive inverse
3. **What is the additive inverse of –5?**
   (A) 0
   (B) 5
   (C) –5
   (D) –10
4. **Which of the following properties is NOT true for the subtraction of integers?**
   (A) Subtraction is commutative
   (B) Subtraction is associative
   (C) Subtraction has an identity
   (D) All the above
5. **What is the result of multiplying two negative integers?**
   (A) Negative
   (B) Positive
   (C) Zero
   (D) Undefined
6. **Which of the following property does NOT apply to multiplication of integers?**
   (A) Commutative
   (B) Associative
   (C) Distributive over addition
   (D) Closed under division
7. **What is the result of dividing a positive integer by a negative integer?**
   (A) Positive integer
   (B) Negative integer
   (C) Zero
   (D) Undefined
8. **For any integer a, what is the result of a÷0?**
   (A) a
   (B) 0
   (C) 1
   (D) Not defined

MARK YOUR ANSWERS WITH PEN ONLY. Time Taken ☐ Minutes

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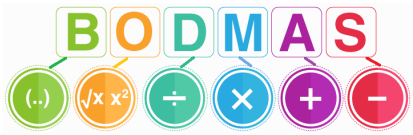
6 Ⓐ Ⓑ Ⓒ Ⓓ	7 Ⓐ Ⓑ Ⓒ Ⓓ	8 Ⓐ Ⓑ Ⓒ Ⓓ	9 Ⓐ Ⓑ Ⓒ Ⓓ	10 Ⓐ Ⓑ Ⓒ Ⓓ

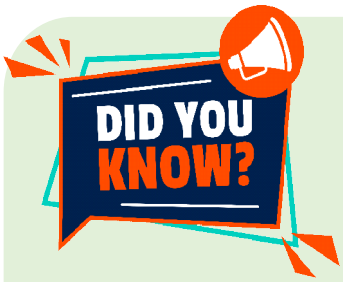
Concept 2

Simplification of Integers:

When simplifying mathematical expressions which involve different operations in which they are performed is important to avoid confusions. A standard rule called the 'BODMAS' is observed in simplifying these operations.

B	O	D	M	A	S
Brackets	"Of' which means 'X'	Division	Multiplication	Addition	Subtraction





Achilles Reselfelt is a mathematician who invented BODMAS. It is a mnemonic that helps us remember how to evaluate mathematical operators in a mathematical statement involving more than one mathematical operation.

Rule 1: Addition and subtraction are performed from right to left, whichever appears first.

Examples:

1. $18-4+6 = 18+6-4 = 24-4 = 20$
2. $29.3+3.5-1.2 = 32.8-1.2 = 31.6$

Rule 2: Multiplication takes precedence over addition and subtraction

Examples: 1. $12\times2+4-9 = 24+4-9 = 28-9 = 19$

2. $7.2-1.5\times2+1.8 = 7.2-3+1.8 = 4.2+1.8 = 6$

3. $\frac{1}{2}+\frac{1}{3}\times\frac{3}{10}=\frac{1}{2}+\frac{1}{10}=\frac{5}{10}+\frac{1}{10}=\frac{6}{10}=\frac{3}{5}$

Rule 3: Division and multiplication are performed from left to right, whichever comes first.

Examples: $10-8\div4+2\times6 = 10-2+12 = 8+12 = 20$

Rule 4: When there are brackets, the operations within the brackets are worked out first to get one number within the bracket.

- Brackets are removed by multiplying the number within the bracket by the sign and number outside.
- The sign rule for multiplication is:

Product of like signs is '+'.	Product of unlike signs is '-'.
$+\times+=+$	$-\times+=-$
$-\times-=+$	$+\times-=-$

Use of Brackets:

Brackets are grouping symbols which are used to separate various parts of an expression. There are four kinds of brackets.

Bracket Symbol	Name of the bracket
_____	Vinculum (or) bar bracket (or) line bracket
( )	Parenthesis (or) circular brackets (or) small brackets (or) common brackets
{ }	Curly brackets (or) flower brackets (or) braces
[ ]	Rectangular brackets (or) square brackets (or) big brackets

Order to Remove The Brackets:

While simplifying expressions, the terms in brackets are considered as independent units and brackets are removed in following order.

i) first → _____ ii) second → ( )

iii) Third → { } iv) Fourth → [ ]

ORDER: $\overset{4\ 3\ 2\ 1\ 2\ 3\ 4}{\left[\{(-)\}\right]}$

Note:

1. If there is no sign $(+,-,\times,\div)$ between a number and a bracket, it means multiplication.

   Ex: $2(3+4)=2\times(3+4)=2\times 7=14$

2. If there is '+' sign before a bracket, then the terms in the bracket can be written directly after removing the bracket.

   Ex: $2+(5+7)$ is same as $2+5+7$

3. If there is '-' (minus) sign before a bracket, then the terms in the bracket change their sign. i.e., from '+' to '-' and '-' to '+' after removing brackets.

   Ex: $2-(3+7-8)$ is same as $2-3-7+8$

Ex: Simplify $18-\left[2\ of\ (-3)-\left\{16\div 8-\overline{10-4}\right\}\right]$

Sol: Given problem is $18-\left[2\ of\ (-3)-\left\{16\div 8-\overline{10-4}\right\}\right]$

$=18-\left[2\ of\ (-3)-\left\{16\div 8-\overline{10-4}\right\}\right]=18-\left[-6-\{16\div 2\}\right]$

$=18-[-6-8]=18-[-14]=18+14=32$

CLASSROOM DISCUSSION QUESTIONS CDQ 02

1. According to the BODMAS rule, which operation is performed first?

(A) Subtraction

(B) Division

(C) Addition

(D) Multiplication

2. What is the result of the expression: 18–4+6?

(A) 24

(B) 20

(C) 16

(D) 22

3. What is the purpose of using brackets in mathematical expressions?

(A) To indicate multiplication

(B) To group operations and prioritize calculations

(C) To represent division

(D) To signify addition

4. Which type of bracket is most commonly used in mathematical expressions?

(A) { }

(B) [ ]

(C) ( )

(D) ____

5. What is the result of 4+8×(9-7)?

(A) 16

(B) 24

(C) 20

(D) 12

6. What is the purpose of using a line bracket or vinculum in mathematical expressions?

(A) To calculate first

(B) To indicate addition

(C) To group numbers together

(D) To represent multiplication

MARK YOUR ANSWERS WITH PEN ONLY. Time Taken ☐ Minutes

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6 Ⓐ Ⓑ Ⓒ Ⓓ	7 Ⓐ Ⓑ Ⓒ Ⓓ	8 Ⓐ Ⓑ Ⓒ Ⓓ	9 Ⓐ Ⓑ Ⓒ Ⓓ	10 Ⓐ Ⓑ Ⓒ Ⓓ

Concept 3

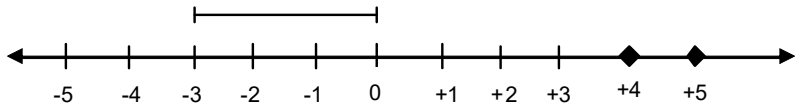
Absolute Value of an Integer:

The absolute value of an integer is the distance of the integer from zero on the number line. The absolute value symbol is written as a pair of vertical bars | |.

Absolute Value of a Negative Integer:

Ex.1: Find the absolute value of –3?

Step 1: Represent -3 on a number line.



Step 2: Count the number of distance

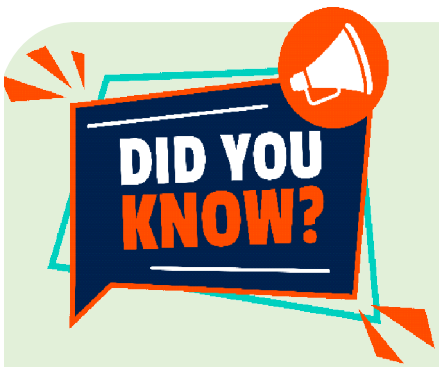
= 3 units

Units from 0 to – 3.

Step 3: Write the absolute value of negative three.

$|-3| = 3$

The absolute value of any negative integer is always equal to the numerical value of the number without the sign.



The symbol for absolute value |x| looks like goalposts in football because it shows how far the ball (number) is from the center (zero)!

Ex.2: Find the sum of $|-2| + |-5|$

Step 1: Find the absolute value of each addend.

$|-2| = 2$

$|-5| = 5$

Step 2: Find the sum. 2 + 5 = 7

So, $|-2| + |-5| = 7$

Absolute value is always a positive number, It is the distance of the number from zero on the number line.

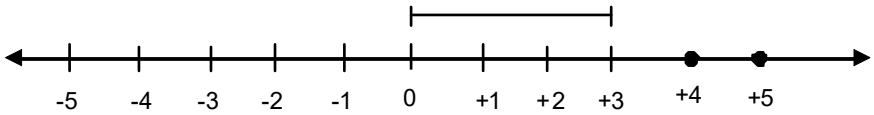
For any value 0: $|0| = 0$

$|-0| = 0$

Absolute Value of a Positive Integer:

Ex.3: Find the absolute value of +3?

Step 1: Represent +3 on a number line.



Step 2: Count the number of distance = 3 units

Units from 0 to +3.

Step 3: Write the absolute value of 3?

$|+3| = 3$

The absolute value of positive three represents 3 units above zero. The absolute value of any positive integer is always equal to positive integer.

Knowledge Box

The concept of absolute value dates back to 1806 when "Jean-Robert Argand" coined the term module to represent the complicated absolute value.

Ex.4: Find the sum of $|+2| + |+5|$

Step 1: Find the absolute value of each addend.

$|+2| = 2$

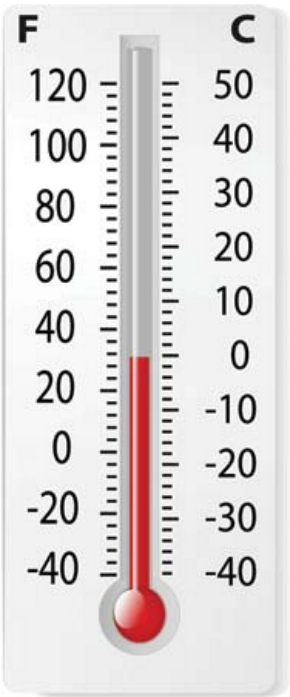
The addends are the $|+5|$

= 5 numbers being added.

Step 2: Find the sum.

2 + 5 = 7

The absolute value of any positive or negative integer is the number write without the positive or negative sign.



Integers describe certain everyday situations, For example, temperatures can be above or below zero.

CLASSROOM DISCUSSION QUESTIONS

CDQ 03

1. What is the absolute value of –3?

(A) –3

(B) 3

(C) 0

(D) -5

2. How is the absolute value of a negative integer calculated?

(A) By adding 1

(B) By subtracting from 10

(C) By reversing the number

(D) By taking the numerical value with opposite sign

3. What is the sum of –2 and –5?

(A) 7

(B) –7

(C) 3

(D) –3

4. What is the absolute value of +3?

(A) –3

(B) 0

(C) 3

(D) +5

5. What is the sum of +2 and +5?

(A) 7

(B) –7

(C) 3

(D) –3

6. What is the absolute value of zero?

(A) –1

(B) 0

(C) 1

(D) Infinity

MARK YOUR ANSWERS WITH PEN ONLY. Time Taken ☐ Minutes

1 Ⓐ Ⓑ Ⓒ Ⓓ	2 Ⓐ Ⓑ Ⓒ Ⓓ	3 Ⓐ Ⓑ Ⓒ Ⓓ	4 Ⓐ Ⓑ Ⓒ Ⓓ	5 Ⓐ Ⓑ Ⓒ Ⓓ
6 Ⓐ Ⓑ Ⓒ Ⓓ	7 Ⓐ Ⓑ Ⓒ Ⓓ	8 Ⓐ Ⓑ Ⓒ Ⓓ	9 Ⓐ Ⓑ Ⓒ Ⓓ	10 Ⓐ Ⓑ Ⓒ Ⓓ

Concept 4

Powers of Integers:

The power of a natural exponent of an integer is another integer. The absolute value of the result is the absolute value of the base multiplied by itself as specified by the exponent. The sign of the result can be determined by the following rule:

$a \times a \times a \times a \ldots\ldots\ldots \times a$

$\leftarrow\cdots\cdots$ n times $\cdots\cdots\rightarrow$

$-5^4 = -5 \times -5 \times -5 \times -5 = 625$

a^n → Power

Base

$a^0 = 1$

$a^1 = a$

where 'a' is a non-zero rational number

Negative Exponents

$1/a^n$ is the reciprocal of a^n

$a^{-n} = \frac{1}{a^n}; \left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n$

Standard Form

$a \times 10^b$

where $1 \leq a < 10$; b integer power of 10

$79,345 = 7.9345 \times 10^4$ (shift decimal point 4 places to the left and $\times 10000 = 10^4$)

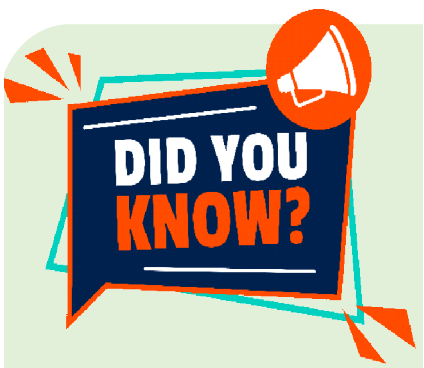
$0.000054 = 5.4 \times 10^{-5}$ (shift decimal point 5 places to the right and $\div 100000 = 10^{-5}$)

1. The power of an even exponent are always positive.

$$(+)^{even} = +$$
$$(-)^{even} = +$$

2. The power of an odd exponent have the same sign of the base.

$$(+)^{odd} = +$$
$$(-)^{odd} = -$$



Ancient Egyptians used powers to calculate areas and volumes of pyramids.

Properties:

1. $a^0 = 1$
2. $a^1 = a$

3. Multiplication of Powers with the Same Base:

It is another power with the same base and the exponent is the sum of the exponents.

$$a^m \cdot a^n = a^{m+n}$$

$$(-2)^5 \cdot (-2)^2 = (-2)^{5+2} = (-2)^7 = -128$$

4. Division of Powers with the Same Base:

It is another power with the same base and the exponent is the difference of the exponents.

$$a^m : a^n = a^{m-n}$$

$$(-2)^5 \div (-2)^2 = (-2)^{5-2} = (-2)^3 = -8$$

Fun Facts

Powers are like integers on steroids—they grow super fast!

5. Power of a Power:

It is another power with the same base and the exponent is the product of the exponents.

$$(a^m)^n = a^{m \cdot n}$$

$$[(-2)^3]^2 = (-2)^6 = 64$$

6. Multiplication of Powers with the Same Exponent:

It is another power with the same exponent, whose base is the product of the bases.

$$a^n \cdot b^n = (a \cdot b)^n$$

$$(-2)^3 \cdot (3)^3 = (-6)^3 = -216$$

7. Division of Powers with the Same Exponent:

It is another power with the same exponent, whose base is the quotient of the bases.

$$a^n \div b^n = (a \div b)^n$$

$$(-6)^3 \div 3^3 = (-2)^3 = -8$$

First Law	Second Law
$a^m \times a^n \times a^p = a^{m+n+p}$	$a^m \div a^n = a^{m-n}$
Third Law	**Fourth Law**
$(a^m)^n = a^{m \times n} = (a^n)^m$	$a^n \times b^n \times c^n = (abc)^n$
Fifth Law	**Note :**
$\frac{a^n}{b^n} = \left(\frac{a}{b}\right)^n$	$(a+b)^n \neq a^n + b^n$ $(a-b)^n \neq a^n - b^n$
where 'a', 'b', 'c' are any non-zero rational numbers, 'm', 'n', 'p' $\in$N	

CLASSROOM DISCUSSION QUESTIONS CDQ 04

1. What is the result of $(-5)^4$?

(A) 625

(B) –625

(C) –20

(D) 20

2. What is the value of a^0, where 'a' is a non-zero rational number?

(A) 0

(B) 1

(C) a

(D) –1

3. How is the reciprocal of a^{-n} expressed?

(A) $a^{(-n)}$

(B) $a^{(n)}$

(C) $\frac{1}{a^n}$

(D) a

4. In standard form, what does 7.9×10^4 represent?

(A) 79,000

(B) 7,900

(C) 79,345

(D) 7,934,500

5. What is the product of $(-2)^5$ and $(-2)^2$?

(A) $(-2)^7$

(B) $(-2)^3$

(C) $(-2)^{10}$

(D) $(-2)^9$

6. What is the value of $[(-2)^3]^2$?

(A) $(-2)^6$

(B) $(-2)^5$

(C) $(-2)^9$

(D) $(-2)^7$

7. What is the product of $(-2)^3$ and $(3)^3$?

(A) $(-6)^3$

(B) $(-23)^3$

(C) $(-6)^6$

(D) $(-23)^6$

8. According to the first law of powers, what is the result of $a^m \times a^n \times a^p$?

(A) $a^{(m+n+p)}$

(B) $a^{(m-n+p)}$

(C) $a^{(m+n-p)}$

(D) $a^{(m-n-p)}$

MARK YOUR ANSWERS WITH PEN ONLY. Time Taken ☐ Minutes

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C.D.F. (Concepts, Definitions and Formulae)

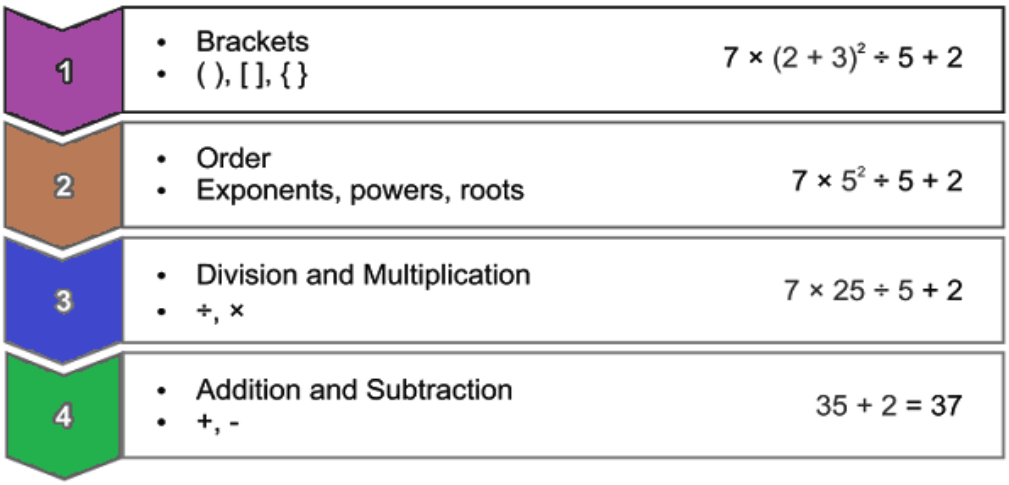
1. Order of Operations in Numeric expressions:

B – Brackets first (parenthesis)

O – Of (orders i.e. Powers and Square Roots, Cube Roots, etc.)

DM – Division and Multiplication (start from left to right)

AS – Addition and Subtraction (start from left to right)



2. Absolute Value of Integers:

The absolute value of an integer is the numerical value without regard to whether the sign is negative or positive. On a number line it is the distance between the number and zero.

3. Powers of Integers:

A power is just the product that you get when you repeatedly multiply a number by itself, like 2×2, or 3×3×3. Repeated multiplication of expression can be very long. So there's a special system you can use for writing out powers in a shorter way.

Laws of Exponents

I.	Multiplication	$b^n.b^m = b^{n+m}$	add exponents
II.	Power of a power	$(b^n)^m = b^{nm}$	multiply exponents
III.	Power of a product	$(bc)^n = b^n c^n$	multiply exponents
IV.	Power of a fraction	$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$	multiply exponents
V.	Division	$\frac{b^m}{b^n} = b^{m-n} [m > n]$ Or, alternatively, $= \frac{1}{b^{n-m}} [n > m]$	subtract exponents

Advanced Worksheet

LEVEL 1

Single Correct Answer Type (S.C.A.T.):

1. The difference between the largest and smallest integer in the set {–9, –7, 0, 4, –3, 8, –6} is:

(A) 15

(B) 16

(C) 17

(D) 18

2. The sum of first five negative integers is:

(A) –5

(B) –10

(C) –15

(D) –25

3. The value of $(-3)^4+(-3)^2$ is:

(A) 90

(B) 81

(C) 90

(D) 90

4. If x and y are integers such that x+y=0, then which of the following is always true?

(A) x = y

(B) x = –y

(C) x > y

(D) y = 0

5. If a and b are negative integers, then which of the following is always positive?

(A) a + b

(B) a × b

(C) a – b

(D) –(a + b)

6. Which of the following represents the Distributive Property of integers?

(A) a + b = b + a

(B) a × (b + c) = ab + ac

(C) (a × b) × c = a × (b × c)

(D) a + 0 = a

7. Simplify $(-1)^{24}+(-1)^{25}$.

(A) 2

(B) –2

(C) 0

(D) 1

8. (–1) × (–1) × (–1) × (–1) × (–1) =__.

(A) $(-1)^5$

(B) $(-1)^4$

(C) $(-1)^3$

(D) $(-1)^2$

9. Which of the following orders is used while evaluating an expression?

(A) [],(),{}

(B) {},(),[]

(C) (),{},[]

(D) (),[],{}

10. Which of the following is true with respect to –28 and –32?

(A) –28 < –32

(B) –28 = –32

(C) –32 > –28

(D) –28 > –32

11. The sum of two integers is 62. If one of the integers is –48 what is the other?

(A) 14

(B) –14

(C) –110

(D) 110

12. A man walked 3 km towards North then 8 km towards South. What is his final position with respect to his initial position?

(A) 5 km towards North

(B) 3 km towards South

(C) 8 km towards North

(D) 5 km towards South

13. In a quiz, positive marks were given for correct answers and negative marks for incorrect answers. If Guru's scores in five successive rounds were 35, –10, –15, 20 and 5, what is his total score at the end?

(A) 25

(B) 35

(C) 45

(D) 55

14. What should be multiplied by (–12) in order to get 180?

(A) 15

(B) –15

(C) 16

(D) –16

15. The quotient of two numbers is (–17). If one of the numbers is (–340), what is the other number?

(A) 20

(B) 17

(C) –20

(D) –30

16. A gain of Rs.5 followed by a loss of Rs.18 is same as of Rs _____.

(A) Gain of Rs.13

(B) Loss of Rs. 13

(C) Gain of Rs.23

(D) Loss of Rs.23

17. The next term of the pattern –1, 2, –4, 8, –16, ___is:

(A) 32

(B) 16

(C) –32

(D) 64

18. Which of the following pairs of integers does not have –6 as their sum?

(A) 6, –12

(B) –4, –3

(C) –7, 1

(D) –8, 2

19. Which of the following pairs of integers have -8 as their difference, when second integer is subtracted from the first?

(A) –6, 14

(B) 8, 0

(C) –4, 4

(D) 3, –11

20. A deep well has steps inside it. A monkey is sitting on the topmost step (i.e., the first step). The water level is at the ninth step. If the monkey jumps 3 steps down and then jumps back 2 steps up, how many jumps does it have to make to reach the water level?

(A) 11

(B) 9

(C) 7

(D) 5

21. In a class test containing 10 questions, 3 marks are awarded for every correct answer and (–1) mark is awarded for every incorrect answer and 0 for the questions not attempted. Srinu gets two correct and six incorrect answers out of eight questions he attempts. What is his total score?

(A) 0

(B) 2

(C) –2

(D) 6

22. The quotient of (–1728) ÷ 12 =_____.

(A) –144

(B) 144

(C) –121

(D) 120

23. The value of [32 + 2 x 17 + (–6)] ÷ 15 = _____.

(A) 2

(B) 3

(C) 4

(D) 5

24. {36 ÷ (-9)} ÷ {(-24) ÷ 6} = _____.

(A) 0

(B) 1

(C) 2

(D) 3

25. The value of 3+3 of 3÷3 of 3×3 = _____.

(A) 5

(B) 6

(C) 7

(D) 9

26. [72–12÷3–2]+ (18–6)÷4= ___.

(A) 67

(B) 68

(C) 69

(D) 79

27. |-7| + |+5| + |0|= _____.

(A) 12

(B) 10

(C) 11

(D) 13

28. $|-8| - |17| + |-12| =$ _____.

(A) 3 (B) 2

(C) 4 (D) 5

29. The temperature at 12 noon was 10^0C above zero. If it decreases at the rate of 2^0C per hour until midnight, what would be the temperature at 9 p.m.?

(A) -8^0C (B) -6^0C

(C) 8^0C (D) 6^0C

30. A lift descends into an underground floor at the rate of 6 metres per minute. If the descent starts from 10 metres above the ground level, how much time will it take to descend 350 metres?

(A) 30 minutes

(B) 50 minutes

(C) 1 hour

(D) 90 minutes

LEVEL 2

Multi Correct Answer Type (M.C.A.T.):

31. Which of the following statements is/are correct about integers?

(A) For every integer a, we have a+1=a

(B) For all positve integers a and b, $a \times b$ is always greater than either a or b.

(C) The greater the positive integer, the lesser is its negative

(D) Every integer is a natural number

32. Which of the following statements are correct?

(A) Division by zero is not defined.

(B) –3 is greater than zero.

(C) Any number multiplied by zero will give zero.

(D) 0 is an integer.

33. Addition of integers satisfies which of the following property?

(A) Commutative

(B) Associative

(C) Closure

(D) None of the above

34. The value of –6758 –(–5432) is:

(A) 1326

(B) Positive value

(C) –1326

(D) Negative value

35. The sum of additive inverse of –(–171) and –171 is:

(A) 342

(B) –342

(C) Additive inverse of 342

(D) 0

36. Which of the following statement(s) is (are) incorrect ?

(A) $(-59) \div (-1) = -59$

(B) $(-25) \div 0 = 0$

(C) $(-54) \div (-9) = -6$

(D) $19 \div (-1) = -19$

37. Which of the following statement(s) is / are false ?

(A) Of the two integers, if one is negative, then their product must be negative

(B) The product of three negative integers is a negative integer

(C) The product of a negative and a positive integer may be zero

(D) If a > 1, then there is no integer b such that $a \times b = b \times a = b$

38. Which of the following expressions are equal to –20 ?

(A) -4×5

(B) $-32+10-(-2)$

(C) $-6 \times 2-[-2 \times -4]$

(D) $5 \times (-2)+(-3) \times 4$

39. Which of the following properties apply to the operation of multiplication on integers?

(A) Closure

(B) Commutative

(C) Associative

(D) Distributive over addition

40. A boy earns Rs.10 per day for the first 3 days and loses Rs.10 per day for the next 3 days. His total balance can be represented as:

(A) 3 × 10 + 3 × (–10)

(B) 6 × 10

(C) 3 × (10 – 10)

(D) 0

Comprehension Passage Type (C.P.T.):

PASSAGE - I

All integers lie equidistant on either side of zero '0' thus all whole no's are integers but all integers are not whole numbers.

41. The sum of three different integers can never be zero.

(A) True

(B) False

(C) Depends on numericals of integer

(D) None of these

42. The difference between an integer and its additive inverse is always even integer:

(A) True

(B) False

(C) Depends on numericals of integer

(D) None of these

43. If we are at number 8 on the number line, in which direction should we move to reach -5.

(A) Right

(B) Left

(C) Sometimes left the right

(D) None of these

PASSAGE - II

We first solve on numerical expression, by removing vinculum first, then parenthesis, then braces and finally square brackets.

44. Write the mathematical expression for "Two multiplied by one less than difference of nineteen and six."

(A) $[(2\times19)-(6-1)]$

(B) $2\times[(19-6)-1]$

(C) $\{2\times1-(19-6)\}$

(D) $2\times\{1-(19-6)\}$

45. Solve:

$$23-\left[23-\left\{23-\left(23-\overline{23-23}\right)\right\}\right]$$

(A) 0 (B) 2

(C) 3 (D) 9

46. Simplify:

$$63-(-3)\left\{-2-\overline{8-3}\right\}\div3\left\{5+(-2)(-1)\right\}:$$

(A) 26 (B) 48

(C) 62 (D) 96

Matrix Matching Type (M.M.T.):

SET-I

I. Column - I

47. The division of –63 by –21

48. The division of –55 by 11

49. The division of –42 by 14

50. The division of –20 by –4

Column - II

(A) –3

(B) +3

(C) –5

(D) +5

SET-II

Column-I

51. $80+[20+\{175\div5-(28-16\div4)\div6\}]=$

52. The simplified value of $7+2\times6\div4-12\div6$ is

53. The value of $64\div8\div4\div2=$

54. The value of $\dfrac{4+4\times4-4}{2+2\times2-2}=$

Column-II

(A) 1

(B) 131

(C) 8

(D) 4

Assertion Reason Type (A.R.T.):

(A) Both Assertion and Reason are Correct and reason is the correct explanation of assertion.

(B) Both Assertion and Reason are correct but reason is not the correct explanation of assertion.

(C) Assertion is correct but Reason is incorrect.

(D) Assertion is incorrect but Reason is correct.

55. Assertion: $-12\times2=-24$

Reason: The sign of the product of the negative and positive number is negative.

56. Assertion: Division by zero is not defined.

Reason: Zero is neither negative nor positive integer.

57. Assertion (A): The additive inverse of an integer is the same as its negative.

Reason (R): The sum of a number and its additive inverse is zero.

58. Assertion (A): If the product of two integers is zero, at least one of them must be zero.

Reason (R): Zero has no reciprocal.

Statement Type (S.T.):

(A) Both statements are correct

(B) Both statements are incorrect

(C) Statement I is correct statement II is incorrect

(D) Statement I is incorrect Statement II is correct

59. Statement I: Multiplicative Identity in integers is the integer one.

Statement II: One is Identity element for division.

60. Statement I: The addition of –20 and –25 is –45.

Statement II: The addition of two negative integers is always a negative integer.

61. Statement I: Zero is greater than all negative integers.

Statement II: The sum of all the integers between –5 and –1 is –6.

62. Statement I: The opposite of the opposite of an integer is the integer itself.

Statement II: If a is an integer, then –(–a) = a.

Integer Type Questions (I.T.Q.):

63. The value of $\frac{45+\{8-(-2\times5+3)\}}{20}$ = _____.

64. Which is the positive integer closes to zero on the number line?

65. The sum of two integer is –12. If one of them is –35, find the sum of digits of other.

66. $[(-32)\times(-4)\times(-3)\times0\times(-6)] + 7$ = _____.