

$$9 - 8 \rightarrow \text{sub} = 1$$

$+, -, \times, \div$  are operation

$$7 + 5 \rightarrow \text{add} = 12$$

These are symbols that indicate what operation are to be performed on numbers

These are numbers

$$6 \div 3 \rightarrow \text{divi} = 2$$

$$4 \times 2 \rightarrow \text{multi} = 8$$

→ only one operation in each.

when we have operations like these

$$5 + 4 \times 2$$

↓      ↓  
add    multiplication

if we solve

$$\begin{aligned} 5 + 4 \times 2 \\ = 9 \times 2 \\ = 18 \end{aligned}$$

$$\begin{aligned} 5 + 4 \times 2 \\ = 5 + 8 \\ = 13 \end{aligned}$$

represent as decimal  
not represent in  $\frac{m}{n}$  form

Real number may be classified

$$N = \text{natural} = \{1, 2, 3, 4, \dots\}$$

$$W = \text{whole} = \{0, 1, 2, 3, 4, \dots\}$$

$$Z = \text{integer} = \{0, \pm 1, \pm 2, \pm 3, \dots\}$$

$$E = \text{Even} = \{0, \pm 2, \pm 4, \dots\}$$

$$O = \text{odd} = \{\pm 1, \pm 3, \pm 5, \dots\}$$

$$P = \text{Prime} = \{2, 3, 5, 7, 11, 13, 17, \dots\}$$

$$Q = \text{rational} = \left\{ x \mid x = \frac{m}{n}, \text{ where } m, n \in Z, \text{ \& } n \neq 0 \right\}$$

$$Q' = \text{irrational} = \left\{ x \mid x \neq \frac{m}{n}, \text{ where } m, n \in Z, \text{ \& } n \neq 0 \right\}$$

$$R = \text{set of all real numbers} = Q \cup Q'$$

The problem she did in operations

→ How we know what operation comes first well we use order of operations

exp

$$\begin{aligned} 4 \times 6 \div (7 - 5) - 3^2 + 8 \times 2 \\ = 4 \times 6 \div 2 - 3^2 + 8 \times 2 \\ = 4 \times 6 \div 2 - 9 + 8 \times 2 \\ = 24 \div 2 - 9 + 8 \times 2 \\ = 12 - 9 + 8 \times 2 \\ = 12 - 9 + 16 \\ = 3 + 16 \\ = 19 \end{aligned}$$

for this order of operation we go from left to right

- firstly we use
- Bracket or Parentheses
  - of or exponent
  - Division or multiplication
  - Addition or subtraction

# TOPIC: Algebra As Generalized

These are four types of operations

- Addition
- Subtraction
- Multiplication
- Division

## Addition rule

$$+ , + = +$$

If two values have plus then answer is in plus

## Subtraction

$$+ , - = -$$

$$- , + = -$$

$$- , - = +$$

If we have two values one is small number & other is larger then we use the symbol of larger value

ex  $-4 - 5 = -9$

Addi

$$3 + 4 = 7$$

$$5 + 3 = 8$$

$$7 + 0 = 15$$

sub

$$10 - 5 = 5$$

$$8 - 5 = 3$$

$$7 - 3 = 4$$

$$-5 - 4 = -9$$

$$-4 - 4 = -8$$

$$5 - 8 = -3$$

Multi

$$21 \times 7 = 147$$

$$10 \times 7 \times 3 = 210$$

$$30 \times 20 = 600$$

$$12 \times 5 \times 6 = 360$$

$$-5 \times 3 = -15$$

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

Division

$$2x^2 = 0$$

$x^2$  ki sath  $a$  hai  
 $a \neq 0$

$$2x^2 - 7x = 0$$

Quadratic

$$2x^2 - 9 = 0$$

$$2x^2 - 7x + 9 = 0$$

Quadratic eqn

→ main condition is  $x^2$

Cubic eqn

$$x^3 = 9$$

$x$  ki power is cube

Generalised Arithmetic:-

An algebraic expression which shows the steps required, regardless of what number are used.

ex

write expression for

→ the sum of  $m$  &  $p$  =  $m+p$

→ the avg of  $a, b, c$  =  $\frac{a+b+c}{3}$

→ the cost of 8 books at  $y$  cents each =  $8y$  cents

Relation b/w arithmetic & Algebra:-

As we know the natural numbers  $1, 2, 3, \dots$  and use of the basic operations ( $+, -, \times, \div$ ) in arithmetic, In Algebra we use  $a, b, c, \dots, z$  in addition of number to generalize the arithmetic which helps us to protect express the quantity without

## Shape Patteren

one,  $\Delta \Delta \Delta$

many.  $\Delta \square \bigcirc \Delta \square \bigcirc$

### Growing Patteren:-

- A Patteren that increases every sequence
  - something is added to the Patteren
- can occur anywhere

nature

classroom

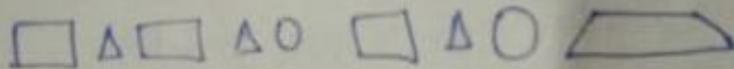
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### Growing Patteren:-

- A number is added every sequence
  - it can start with one number
- 1, 1, 2, 1, 2, 3, 1, 2, 3, 4, 1, 2, 3, 4, 5

### Shapes Patteren:-

- A shape is added to every Patteren sequence



A color added to every sequence.

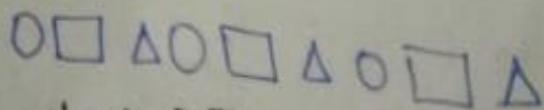
Diff b/w repeating & Growing Patteren.

#### Repeating

- sequence repeat & remain the same
- Never add anything to the Patteren

#### Growing

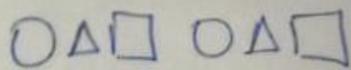
- sequence changes every time it repeat
- Adding something to the sequence



what Patteren is this?

repeating

create your own repeating pattern using



create your own grow pattern using numbers.

1 1 2 1 2 3 1 2 3 4

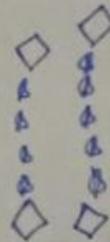
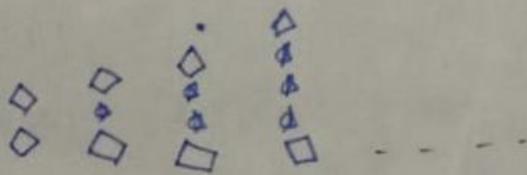
→ A growing pattern has a important parts  
the term & the rule

Term  
3, 6, 9, 12, 15, 18

+3, +3                      +3 → rule

add

look at the pattern



Find eight term of this sequence

5, 10, 15, 20, 25, —, —, —  
the rule of the pattern is  
Add 5

5, 10, 15, 20, 25, 30, 35, 40

→ 4, 25, 46, 67, ... 89, 110

→ 3, 6, 12, 24, ...

→ 3, 6, 9, 12, ...

$9ab^2$  and  $3ab^2$

unlike -

$7c$  &  $4$

$7b$  &  $2b^2$

$\rightarrow b$  have one power &  $b^2$  have 2 power So this is unlike term, on the bases of power the terms are diff

$7c$  &  $2a$

$7ab^2$  &  $7a^2b$

$b$  is square or  $a$  is square  
 $b^2$  &  $a^2$

$\rightarrow$  Polynomial:

$\rightarrow$  is a expression consisting of variable & coefficient that involve only the operation of addition, subtraction multiplication & non-negative integer exponents of variable.   
  $\rightarrow$  ex of single polynomial indeterminate  $x$ , is  $x^2 - 4x + 7$

OR

An algebraic expression in which variables have powers only from set of whole number is called polynomial

monomial      Binomial      trinomial

one term

Two diff term

Three terms involve

$4ab + 5 + 7c$

$4ab$

$4ab + 7c$

$\rightarrow$  constant:-

constant have no variable

$3$ ,  $3/11$ ,  $3 \cdot 5$

eg  $x^3 + 2x + 1$  polynomial

$x^4 + x^{-2} + 1$  not poly

$x^2 + x^{1/2} + 4x - 1$  not polynomial

$\rightarrow$  Types of eqn

linear eqn

$ax + by + c = 0$

$\rightarrow$  the graph of linear is always straight line

$7x + 5y = 0$

$a$  &  $b$  are coefficient of  $x, y$  &  $c$  is constant  
 $x$  &  $y$  have one power.

Quadratic eqn

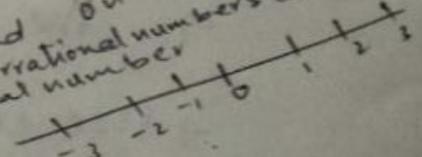
standard form

$ax^2 + bx + c = 0$

there  $a, b, c$  are real numbers &  $a \neq 0$

when equal sign comes an expression change into eqn

$\rightarrow$  The number found on number line & the rational or irrational numbers combined form the real number



$5x^2 - 7x + 9 = 0$

$\rightarrow$  for equation the condition of equal is necessary without equal there is no eqn make

$\rightarrow$   $x$  ki power define kar rahi hoti hai quadratic eqn

To make easy steps we use short form  
BODMAS and ~~PEDMAS~~ PEMDAS

$$\textcircled{1} \quad 30 \div -5 + 4 \times -2 + 14 = ?$$

$$= -6 + 4 \times -2 + 14$$

$$= -6 - 8 + 14$$

$$= -14 + 14$$

$$= 0$$

$$\textcircled{2} \quad 6 + 54 \div 2 - 4 \times 5$$

$$= 6 + 27 - 4 \times 5$$

$$= 6 + 27 - 20$$

left to right  
which operation come  
first it is  
multiply or division

knowing its numerical value.

ex 1

$$1 + 2 = 3$$

$$2 + 3 = 5$$

$$3 + 4 = 7$$

$$\dots$$

$$x + y = z$$

$$\begin{aligned} \text{if } x=1, y=2 \text{ then } z=3 \\ x=2, y=3 \text{ " } z=5 \\ x=3, y=4 \text{ " } z=7 \end{aligned}$$

$x + y = z$  is giving us a general form which is representing all the given arithmetical statements. Thus, Algebra is a general form of arithmetic.

What is Pattern:

a series or sequence that repeats, classroom nature  
ent/math Pattern:-

sequence that repeat according to a rule  
or a rules  
rule

a set way to calculate or solve problem

Repeating Pattern:-

The same grouping over & over

The pattern never changes

It can be long/short sequences

Can include any items

Ex numbers, shapes, colors

repeating pattern have number

Can have as one number

1, 1, 1, 1

Can have many number

1, 2, 3, 4, 5, 1, 2, 3, 4, 5

## Algebra :-

Algebra is branch of mathematics in which symbols usually letter are used to which represent quantities that can be replace by a number of expression :-

### Term :-

A term is a name giving to a number or a variable or a combination both

term  
 $2, a, 2a, 4a^2, 4ab, 5a^2$

→ Two terms make an expression

$2 + 4ab$  → expression banjor  $4a$

Algebraic term :- four ditb name  
 → Power, exponent, index, indice

Coefficient ←  $4n$  → this is a term  
 ↓  
 Variable

$$\begin{array}{r} 2 \overline{) 72} \\ \underline{4} \phantom{0} \\ 2 \phantom{0} \\ \underline{2} \phantom{0} \\ 0 \phantom{0} \\ \underline{0} \phantom{0} \\ 0 \phantom{0} \\ \underline{0} \phantom{0} \\ 0 \phantom{0} \end{array}$$

$$\begin{array}{r} \sqrt{3^2 \times 2^3} \quad 5^{\frac{1}{2}} \times 12^{\frac{1}{2}} \\ 3 \quad \quad 3 \cdot 2\sqrt{2} \\ 6 \end{array}$$

### Algebraic expression :-

Coeff ←  $5n^3 - 3$  → constant  
 $3/11$   
 $3 \cdot 5$

= it is not necessarily the constant is real number or whole number it will be in fraction, decimal

### 5 major concepts in algebra :-

→ exponent, Power, index, indice  
 $7n^3$

→ main badt constant ky sath variable nai hota

→ Expression :- is the combination of two ditb terms.

$$4ab + 5$$

→ like & unlike

$$7a + 5a$$

when we have same variable but coefficient ditb so it is like term