

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

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

These are numbers \leftarrow

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

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

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

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

\rightarrow only one operation in each

when we have operations like these

$$5 + 4 \times 2$$

\downarrow add \downarrow multiplication

if we solve

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

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

The Problem she did in operations

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

exp

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

Real number may be classified

- $N = \text{natural} = \{1, 2, 3, 4, \dots\}$
- $W = \text{whole} = \{0, 1, 2, 3, 4, \dots\}$
- $Z = \text{integer} = \{0, 1, 1, \pm 2, \pm 3, \dots\}$
- $E = \text{Even} = \{0, \pm 2, \pm 4, \dots\}$
- $O = \text{odd} = \{\pm 1, \pm 3, \pm 5, \dots\}$
- $P = \text{Prime} = \{2, 3, 5, 7, 11, 13, 17\}$
- $Q = \text{rational} = \{x \mid x = \frac{m}{n}, \text{ where } m, n \in Z, \text{ \& } n \neq 0\}$
- $Q' = \text{irrational} = \{x \mid x \neq \frac{m}{n}, \text{ where } m, n \in Z, \text{ \& } n \neq 0\}$
- $R = \text{set of all real numbers} = Q \cup Q'$

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

For this order of operation we go from left to right

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

TOPIC: Algebra As Generalized arithmetic

There 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

Sub

$$3 + 4 = 7$$

$$10 - 5 = 5$$

$$5 + 3 = 8$$

$$8 - 5 = 3$$

$$7 + 8 = 15$$

$$7 - 3 = 4$$

$$-5 - 4 = -9$$

$$-4 - 4 = -8$$

$$5 - 8 = -3$$

Multi

Division

$$21 \times 7 = 147$$

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

$$30 \times 20 = 600$$

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

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

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

$$2x^2 = 0$$

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 generalized the arithmetic which helps us to protect express the quantity without

Shape Pattern

one, $\Delta \Delta \Delta$

many, $\Delta \square \bigcirc \Delta \square \bigcirc$

Growing Pattern:-

- A pattern that increases every sequence
- Something is added to the pattern
- Can occur anywhere

nature

classroom

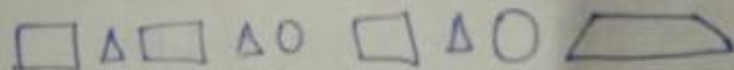
Art

Growing Pattern:-

- 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 pattern:-

- A shape is added to every pattern sequence

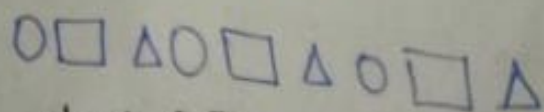


A color added to every sequence.

Diff b/w repeating & Growing Pattern.

Repeating

- Sequence repeat & remain the same
- Never add anything to the pattern



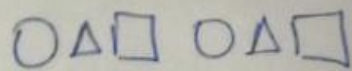
what pattern is this?

repeating

Growing

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

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 2 important parts
the term & the rule

Term

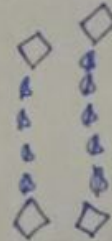
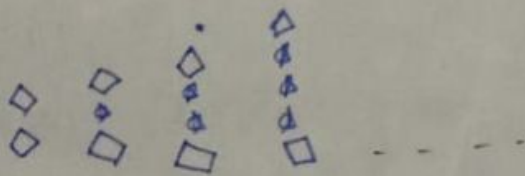
3, 6, 9, 12, 15, 18

+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: 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 $x^2 - 4x + 7$

monomial binomial trinomial

one term
 $4ab$

Two diff term &
 $4ab + 7c$

Three terms involve
 $4ab + 5 + 7c$

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

\rightarrow constant:-

constant have no variable

3 , $3/11$, 3.5

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

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

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

\rightarrow Types of eqn

linear eqn

$$7x + 5y = 0$$

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

Quadratic eqn

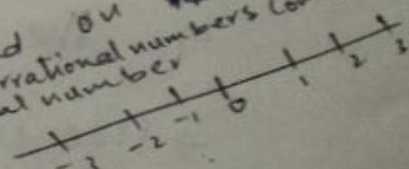
standard form

$$ax^2 + bx + c = 0$$

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 ki Quadratic eqn ka hai

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

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

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

$$= -6 - 8 + 14$$

$$= -14 + 14$$

$$= 0$$

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

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

$$= 6 + 27 - 20$$

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

knowing its numerical value.

ex

$$1 + 2 = 3$$

$$2 + 3 = 5$$

$$3 + 4 = 7$$

$$\dots$$

$$x + y = z$$

if $x=1, y=2$ then $z=3$
 $x=2, y=3$ " $z=5$
 $x=3, y=4$ " $z=7$

$x+y=z$ is giving us 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, 4a², 4ab, 5a²

→ Two terms make an expression

2 + 4ab → expression banega

Algebraic term: - four different names
→ power, exponent, index, indice

Coefficient ← 4n this is a term
↓
Variable

$$\begin{array}{r} 2 \overline{) 72} \\ \underline{2} 36 \\ 2 \underline{) 36} \\ 18 \\ \underline{) 18} \\ 9 \\ \underline{) 9} \\ 1 \\ \underline{) 1} \\ 0 \end{array}$$

Algebraic expression:-

coeff ← 5n³ - 3 → constant
3/11
3.5

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

5 major concepts in algebra:-

→ exponent, power, index, indice

→ main baad constant ke saath variable nahi hota

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

$$4ab + 5$$

→ like & unlike

$$7a + 5a$$

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

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