INTRODUCTION To Sets.

Set:-

A set is a collection of well-defined and distinct objects.

Example:-

- A = set of vowels.

  A = {a, e, i, o, u}

- B = set of flowers.

  B = {Rose, sunflower, lily}.

Member or Elements of a set:-

The objects in a set are called member or element of a set.

The symbol 'ε' is used to denote belongs to or is an element of or is a member of set.

Similarly '∉' is used to mean not belong to.

Example:-

A = set of five letters of english alphabets.

A = {a, b, c, d, e}

a ε A , c ε A , but 7 ∉ A

h ∉ A and so on.

Ex # 1a

⟹ Book Work.

Q#3:- List the elements of the following sets . ⟹

Also name the set A,B,c etc.

i) Counting numbers less than 10 .

$A = \{1,2,3,4,5,6,7,8,9\}$

ii) vowel in the word IMAGES.

$B = \{I, A, E\}$

iii) Letters of the word MANGO.

$C = \{M, A, N, G, O\}$

iv) Colours of the national flag.

$D = \{GREEN, White\}$

v) Number less than 25 and divisible by 5.

$E = \{5, 10, 15, 20\}$

vi) Colours in the Rainbow.

$F = \{Red, blue, yellow, orange, voilet, indigo, green\}$

vii) Multiple of 3 less than 15.

$G = \{3, 6, 9, 12\}$.

Set Notation:-

The set may be written in three different form called notations.

Descriptive Notation:-

The set is described by a statement and is not placed within curly brackets.

Example:-
i) A = set of first five natural numbers
ii) B = set of odd numbers less than 7.

Tabular Notation:-

Listing all the elements of a set, separated by commas and enclosed within curly brackets.

Example:-
i) A = {1, 2, 3, 4, 5}
ii) B = {1, 3, 5}.

Set builder Notation:-

In set builder notation the elements of a set are described in the form of a rule.

Example:-

i) $A = \{x : x$ is a natural number less than $6\}$

ii) $B = \{x : x$ is a odd number less than $7\}$.

Ex # 1b.

Q#1:- write the following sets in tabular form.

i) $M = \{x/x$ is the name of president of pakistan$\}$

 $M = \{$ iskander Mirza, Ayub khan, Yahya khan, Gen. Ziaul Haq, R Pervez Musharaf, Asif ali zardari, Mamnoon Hussain$\}$

ii) $N = \{x/x$ is a counting number less than $6\}$

 $N = \{1, 2, 3, 4, 5\}$

iii) $A = \{y : y$ is a multiple of $3\}$

 $A = \{2, 4, 6, 8\} \{3, 6, 9, 12, 15, ...\}$

iv) $B = \{n : n$ is an even number less than $10\}$

 $B = \{2, 4, 6, 8\}$

v) $C = \{x/x$ is a number divisible by 3 less than $20\}$

 $C = \{3, 6, 9, 12, 15, 18\}$

vi) $D = \{x/x$ is a planet in solar system$\}$

 $D = \{$ Mercury, venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune$\}$.

vii) $F = \{x/x$ is a day of week$\}$

 $F = \{$ Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday$\}$.

viii)   Q = {x | x is the name of three countries beginning with B}

        Q = {Bhutan, Bangladesh, Belgium}.

Q#2.   Write the following sets in the set builder form.

i)   P = {a, b, c, ... z}.

    P = {x : x is a letter of english alphabets}.

ii)   Q = {2, 4, 6, ...}

    Q = {x : x is an even number}.

iii)   R = {1, 3, 5, ... 9}

    R = {x : x is an odd number less than 10}

iv)   S = {Jasmine, carnation, Sunflower, ...}

    S = {x | x is the name of a flower}

v)   T = {January, June, July}.

    T = {x : x is the name of a month beginning with J}.

vi)   M = {2}

    M = {x : x is the smallest even number}.

vii)   V = {cat, tiger, lion}.

    V = {x : x is three animals belonging to feline family}.

viii) $X = \{$ cake, biscuit, pastry $\}$

       $X = \{ x : x$ is three types of baked sweets $\}$

ix) $A = \{4, 8, 12, 16, \ldots\}$

       $A = \{ x : x$ is multiple of $4\}$

x) $C = \{3, 6, 9, \ldots\}$

       $C = \{ x : x$ is multiple of $3\}$

xi) $E = \{21, 28, 35, 42, 49\}$

       $E = \{ x : x$ is multiple of 7 between 20 and $50\}$

xii) $N = \{6, 12, 18\}$.

       $N = \{ x : x$ is first 3 multiples of $6\}$

Q # 3. Write the following set in Tabular form.

i)   set of days in a week.

       $\{$ Monday, Tuesday, Wednesday, Thursday,

          Friday, Saturday, Sunday $\}$

ii)   set of one-digit natural numbers.

       $\{1, 2, 3, 4, 5, 6, 7, 8, 9\}$

iii)   set of even numbers between 12 and 21

       $\{14, 16, 18, 20\}$

iv) set of odd numbers between 10 and 20.

{11, 13, 15, 17, 19}

v) set of first five planets.

{Mercury, venus, Earth, Mars, Jupiter}

⇒ Definitions from book page 7, 8.

Ex # 1d.

book work.

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Natural and Whole Numbers.

Ch # 2:-

Natural Numbers:-

The Numbers used for counting objects around us are called natural Numbers or counting Numbers.

for example ⇒ 1, 2, 3, ...

The set of natural numbers is denoted by N. N = {1, 2, 3, ...}

Whole Numbers:-

The numbers consisting of zero and all the natural numbers are

called whole Numbers.

The set of whole numbers is denoted by W.

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

Ex # 2(a)

book Work.

Ex # 2(b)

book Work.

Q#6:- Find the value of.

i) $542 \times 92 + 8 \times 542$.

$= 49864 + 4336$

$= 54200$

ii) $365 \times 99 + 365$

$= 36135 + 365$

$= 36500$

iii) $6 \times 612 + 4 \times 612$

$= 3672 + 2448$

$= 6120$

FACTORS AND MULTIPLES.

Factors:-

A number that divides another number completely without leaving a remainder is a factor of that number.

For ea example:-

3 and 6 are factors of 12.

because $12 \div 3 = 4$ exactly and $12 \div 6 = 2$

The factors of 12 are 1, 2, 4.

Multiple:-

A multiple is of a number is a number obtained by multiplying that number by any natural number.

For example:-

multiples of 5 includes

$5 \times 0 = 0$

$5 \times 1 = 5$

$5 \times 2 = 10$

$5 \times 3 = 15$

$\vdots$

$\vdots$

So the multiples of 5 are 5, 10, 15, ---

Prime numbers:-

A natural number that has only two distinct factors namely 1 and the number itself is a prime number.

Example:-

The first few prime numbers are 2, 3, 5, 7, 11, 13, 17 etc.

Composite Numbers:-

A number which has more than two factors is a composite number.

Example:-

The number 4 has three factors 1, 2, 4. So it is a composite number.

Natural Numbers.

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              Natural Numbers.
                   /\
                  /  \
                 /    \
    Prime numbers        Composite numbers
 e.g:- 2,3,5,7,11,13,....    e.g:- 4,6,8,9,10,12,....
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Ex # 3(a)

Q #1,2

on book.

Q#3:- Write the first five multiples.

i) 17.

$17 \times 1 = 17$

$17 \times 2 = 34$

$17 \times 3 = 51$

$17 \times 4 = 68$

$17 \times 5 = 85$

so first five multiples of 17 are: 17, 34, 51, 68, 85.

ii) 23.

$23 \times 1 = 23$

$23 \times 2 = 46$

$23 \times 3 = 69$

$23 \times 4 = 92$

$23 \times 5 = 115$

first five multiples of 23 = 23, 46, 69, 92, 115.

Q#4:- List multiples of 7 between 10 and 40.

multiples of 7 b/w 10 and 40 = 14, 21, 28, 35

Q #5.

same as above.

Q#6:- List all the numbers less than 50 which are multiples of both 2 and 3.

Multiples of 2:-

2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48.

Multiples of 3:-

3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48

Common multiples of both:-

6, 12, 18, 24, 30, 36, 42, 48.

Divisibility Rules:-

Divisible by	if
2.	The digit in the unit's place of the number is 0, 2, 4, 6, or 8.
3.	The sum of the digits of number is divisible by 3.
4.	The number formed by last two digits of the number is a multiple of 4.
5.	The number ends with either 0 or 5.
6.	The number is divisible by 2 and sum of digit of number is a multiple of 3.
8.	The number formed by last three digits is a multiple of 8.
9.	The sum of digits of number is a multiple of 9.
10.	The digits in unit's place of number is 0.
11.	The difference between sums of alternate digits of number is 0 or a multiple of 11.
25	The number formed by last two digits of number is divisible by 25.

Q# 7, 9, 11, 12.

Learn divisibility rules & solve these
Questions on book.

Ex # 3(b).

Q#3:- List prime numbers between 50 and 75. (learn defi
of prime
numbers)

Prime numbers between 50 and 75 are

53, 57, 61, 67, 71, 73.

Twin prime Numbers:-

A Twin prime is a prime
Number that is either 2 less or 2 more
than another prime number.

Example:-

11, 13.

11 → prime number.

11 + 2 = 13.

11 — 13
↙   ↘
Twin prime   Twin prime.

11 — 13
↓
Pair of Twin
Prime.

Q#4:- Find the pair of twin primes between 50 and 80.

Twin primes between 50 and 80

$(59, 61)$, $(71, 73)$

Q#5:- Express each of the following odd numbers as the sum of three odd prime numbers.

i) 19.

→ Sum

→ three numbers

→ prime numbers.

$19 = 3 + 5 + 11$.

ii) 35.

$35 = 7 + 11 + 17$

iii) 91

$91 = 23 + 31 + 37$.

Q#6:- Write each of the following numbers as the sum of Twin primes.

i) 24.

→ Sum

→ Twin prime numbers.

ii) 120

$$120 = 59 + 61$$

iii) 144

$$144 = 71 + 73.$$

Q#7:- Write Five consecutive composite numbers below 30.

24, 25, 26, 27, 28.   (consecutive →

                                                    back to back or

                                                    one after another),

Q#8:- Write seven consecutive composite numbers below 100.

Same as above.