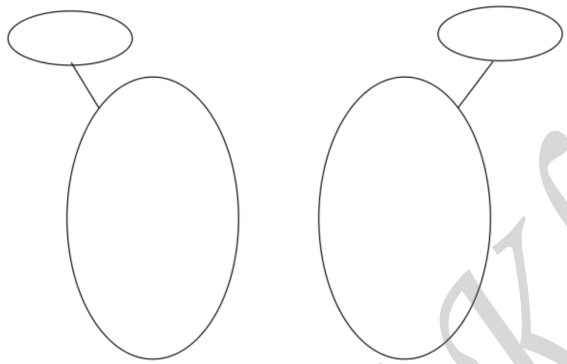
A- Notion about numbers:

I- Sort the following numbers in two sets and assign a name for each set:

$2, -3, 1, 5, 0, -11, -7, 3 \& 6$



II- What is:

a. A natural number? …………………………………………………………………………

b. An integer? ………………………………………………………………………………

Restrictions: In this chapter our only concern is non-zero natural numbers

B- GCD of two or more non-zero natural numbers:

Note: If $a \& b$ are any two non-zero natural numbers, then $GCD(a;b)$, is the short hand for greatest common divisor of $a \& b$.

Part-1: Reviewing GCD:

1- Find the set of natural divisors of:

a. $8 \& 4$: $D_8 = \{.................................\}$ $D_4 = \{.................................\}$

b. $9 \& 27$: $D_9 = \{.................................\}$ $D_{27} = \{.................................\}$

2- Determine:

a. The $GCD(8;4)$……………………………………

b. The $GCD(9;27)$………………………………….

3- What can you say about:

a. $8 \& 4$? ………………………………………………………………

b. $9 \& 27$? ………………………………………..………………….

c. $a \& 3a$? ………………………………………..………………… (condition: $a \neq 0$)

4- Deduce the $GCD(a;3a)$ ……………………………

Complete the following: If a is a …………………... of b, then $GCD(a;b) =$ ………...

Rule-1 **_The GCD of any two non-zero multiples is the greater._**

5- Find the set of divisors of:

a. $6 \& 7$: $D_6 = \{..............................\}$ $D_7 = \{..............................\}$

b. $3 \& 4$: $D_3 = \{..............................\}$ $D_4 = \{..............................\}$

6- Determine:

a. The $GCD(6;7)$……………………………….

b. The $GCD(3;4)$……………………………….

7- What can you say about:

a. $6 \& 7$? ………………………………………………………

b. $3 \& 4$? ………………………………………………………

c. $a \& a+1$? ………………………………………………………

8- Deduce the $GCD(a; a+1)$ ………………………………….. (condition: $a \neq 0$)

What do you conclude? ....

Rule-2 ***The GCD of any two non-zero consecutives is their product.***

9- Find the set of divisors of:

a. $2 \& 7$: $D_2 = \{..............................\}$ $D_7 = \{..............................\}$

b. $11 \& 19$: $D_{11} = \{..............................\}$ $D_{19} = \{..............................\}$

10- Determine:

a. The $GCD(2;7)$……………………………….

b. The $GCD(11;19)$……………………………….

11- What can you say about:

a. $2 \& 7$? ………………………………………………………

b. $11 \& 19$? ………………………………………………………

What do you conclude? ....

Note that:

If the $GCD(a;b)=1$, then $a \& b$ are called relatively prime number or ***coprime***.

Is the converse true? Justify. ……………………………………………………..

Rule-3 ***If GCD of any two non-zero numbers is 1 then they are coprime.***

Part-2: Determination of GCD of two or more non-zero natural number:

12- Determine the GCD of each of the following pairs, using prime factorization:

GCD of	One by one prime factors	At the same time
$90 \& 243$		
$576 \& 420$		
$150, 240 \& 320$		
$490, 252 \& 660$		

C- LCM of two or more non-zero natural numbers:

Note: If $a \& b$ are any two non-zero natural numbers, then $LCM(a;b)$, is the short hand for Least common multiple of $a \& b$.

Part-1: Reviewing LCM:

1) Find the set of multiples of: (list first six multiples only)
   a. $3 \& 6$: $M_3 = \{..................................\}$ $M_6 = \{..................................\}$
   b. $15 \& 60$: $M_9 = \{..................................\}$ $M_{27} = \{..................................\}$

2) Determine:
   c. The $LCM(3;6)$……………………………………
   d. The $LCM(15;60)$………………………………….

3) What can you say about:

i- $3 \& 6$? ………………………………………..……………………

ii- $15 \& 60$? ………………………………………..…………………

iii- $2a \& 6a$? ………………………………………..…………………

4) Deduce the $LCM(2a;6a)$ ……………………………………………

Complete the following conclusion: If a is a ……………of b, then $LCM(a;b) =$ ………..

Rule-4 → ***The LCM of any two non-zero multiples is the least of them.***

5) Find the set of multiples of: (list first seven multiples only)

i- $5 \& 6$: $M_5 = \{$……………………………$\}$ $M_6 = \{$……………………………$\}$

ii- $3 \& 4$: $M_3 = \{$……………………………$\}$ $M_4 = \{$……………………………$\}$

6) Determine:

i- The $LCM(5;6)$…………………………………

ii- The $LCM(3;4)$…………………………………

7) What can you say about:

i- $5 \& 6$? ……………………………………………………………

ii- $3 \& 4$? …………………………………………………………

iii- $a \& a+1$? ………………………………………..…………………

8) Deduce the $LCM(a;a+1)$ ……………………………

What do you conclude? ....

Rule-5 → ***The LCM of any two consecutive numbers is their product.***

9) Find the set of multiples of: (list first eight multiples only)

i- $3 \& 5$: $M_3 = \{$………………………………$\}$ $M_5 = \{$………………………………$\}$

ii- $7 \& 5$: $M_5 = \{$………………………………$\}$ $M_7 = \{$………………………………$\}$

10) Determine:

i- The $LCM(3;5)$…………………………………

ii- The $LCM(7;5)$………………………………

11) What can you say about:

i- $3\&5$? ……………………………………………………

ii- $5\&7$? ……………………………..…………………

What do you conclude? ....

Rule-6

The LCM of any two prime numbers is their product.

Part-2: Determination of LCM of two or more non-zero natural number:

12) Determine using prime factorization the:

LCM of	One by one prime factors	At the same time
$90\&60$		
$150,240\&320$		
$490,252\&660$		