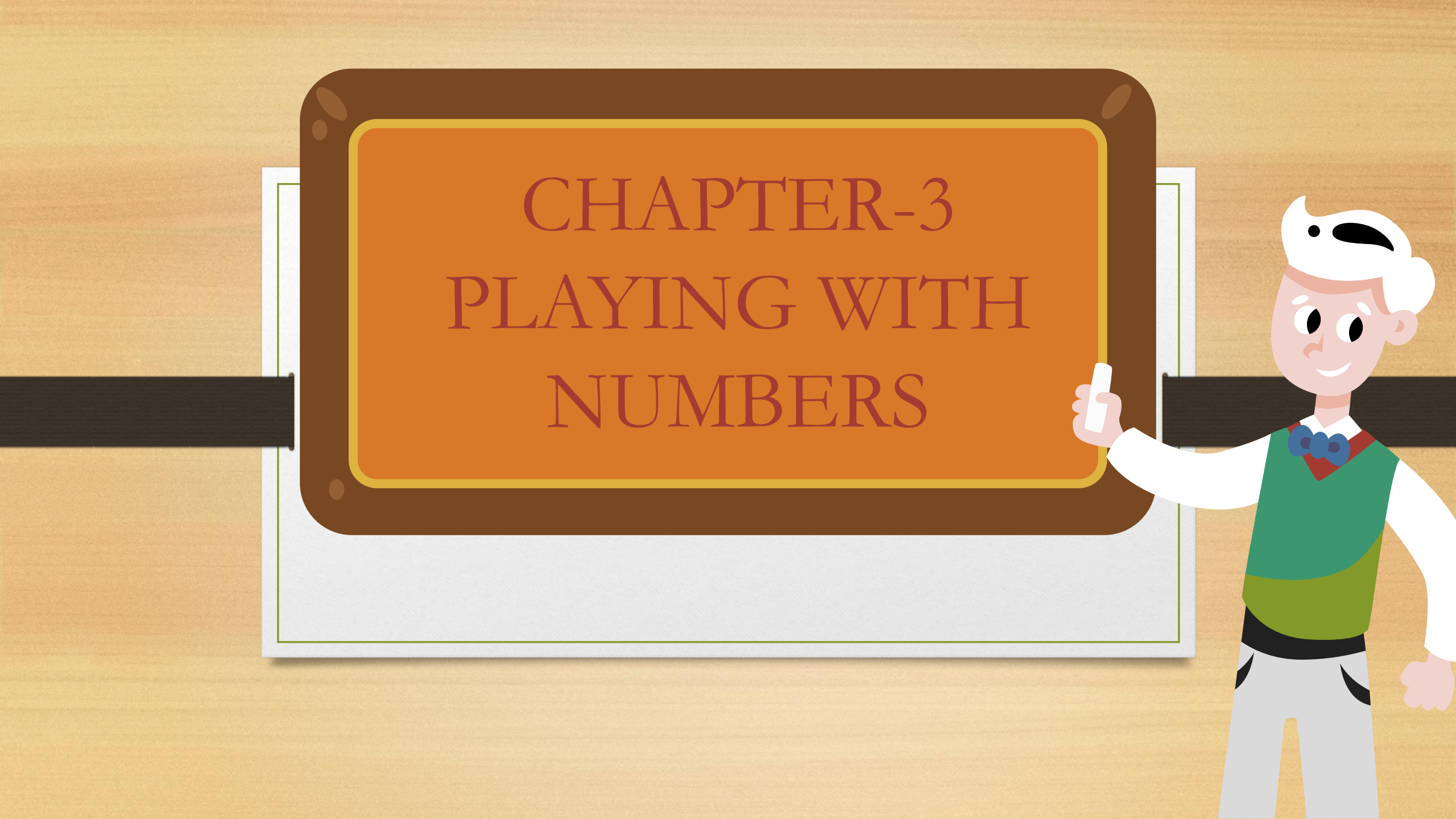

RABINDRANATH WORLD SCHOOL
GURGAON
विवेक और ज्ञान

CHAPTER-3
PLAYING WITH NUMBERS



Factors

A **factor** of a number is an exact divisor of that number. Example: 1, 2, 3, and 6 are the factors of 6.

Properties of factors

Properties of factors of a number:

- 1 is a factor of every number.
- Every number is a factor of itself.
- Every factor of a number is an exact divisor of that number.
- Every factor is less than or equal to the given number.
- Number of factors of a given number are finite.

Multiples

Multiples of a number are those numbers which we get on multiplying the number by any integer.
Example: Multiples of 3 are 6, 9, 12, 15, 18 etc.

Properties of multiples

Properties of multiples of a number:

- Every multiple of a number is greater than or equal to that number.
- Number of multiples of a given number is infinite.
- Every number is a multiple of itself.

Prime Numbers

Numbers other than 1 whose only factors are 1 and the number itself are called **Prime numbers**.

Example: 2, 3, 5, 7 etc.

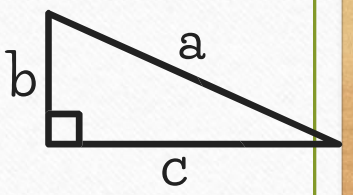
Composite Numbers

Numbers having more than two factors are called **Composite numbers.**

Example: 4, 6, 8 etc

2+2=4

x



Even Numbers

The numbers which are multiple of 2 are called even numbers

Example

2,4,6,8,10,12,14

Even numbers have 0,2,4,6,8 in it one's place.

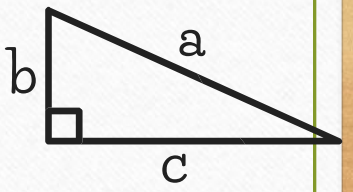
$\sqrt[n]{X}$

42:9

x/2y

2+2=4

x



Odd Numbers

The numbers which are not multiple of 2 are called odd numbers.

Example

1,3, 5,7,9,11.....

42:9

$\sqrt[n]{X}$

x/2y

DIVISIBILITY TESTS

A **divisibility rule** is a method of determining whether a given integer is divisible by a fixed divisor without performing division, usually by examining its digits. We have divisibility rules for 2, 3, 4, 5, 6, 7, 8, 9, 10 and 11.

Divisibility tests for 2

If one's digit of a number is 0,2,4,6 or 8, then the number is divisible by 2.

Example: 12, 34, 56 and 78.

Divisibility tests for 4

A number with 3 or more digits is divisible by 4 if the number formed by its last two digits (i.e. ones and tens) is divisible by 4.

Example: 1396 is divisible by 4 since its last two digits i.e. 36 is divisible by 4.

Divisibility tests for 3

A number is divisible by 3, if sum of its digits is divisible by 3.

Example: Take 27.

Sum of its digits = 2+7= 9, which is divisible by 3.

Therefore, 27 is divisible by 3.

Divisibility tests for 5

If the one's digit of a number is either 5 or 0, then it is divisible by 5.

Example: 75, 90, 100 and 125.

Divisibility tests for 8

A number with 4 or more digits is divisible by 8, if the number formed by its last three digits is divisible by 8.

Example: 73512 is divisible by 8 since its last three digits i.e. 512 is divisible by 8.

Divisibility tests for 6

If a number is divisible by 2 and 3 both, then it is divisible by 6 also.

Example: 120 is divisible by 2 and 3. Therefore, it is divisible by 6 also.

Divisibility tests for 7

Double the last digit and subtract it from the remaining leading cut number. If result is divisible by 7, then the original number is divisible by 7. Example: 826 is divisible by 7 since, $82 - (6 \times 2) = 82 - 12 = 70$, which is divisible by 7.

Divisibility tests for 9

A number is divisible by 9 if sum of its digits is divisible by 9.
Example: Consider 126.
Sum of its digits = 1+2+6 = 9, which is divisible by 9.
Therefore, 126 is divisible by 9.

Divisibility tests for 10

If one's digit of a number is 0, then the number is divisible by 10.
Example: 10, 20, 30 and 40.

Divisibility tests for 11

Find difference between sum of digits at odd places (from the right) and sum of digits at even places (from the right) of a number. If the difference is either 0 or divisible by 11, then the number is divisible by 11.
Example: 1234321 is divisible by 11 since, (1+3+3+1) – (2+4+2) = 8 – 8 = 0, which is divisible by 11.

Common Factors

The factors which are the factors of each of the given numbers are called their common factors.

For example:

Factors of 20 are 1, 2, 4, 5, 10 and 20.

Factors of 48 are 1, 2, 3, 4, 6, 8, 12, 16, 24 and 48.

Clearly, the factors common to the factors of 20 and 48 are 1, 2, 4.

These are called common factors of 20 and 48.

Note: Common factors are finite in number.

Common Multiples

The multiples which are the multiples of each of the given numbers are called their common multiples.

For example:

Multiples of 2 are 2, 4, 6, 8, 10, 12,

Multiples of 3 are 3, 6, 9, 12, 15, 18,

Clearly, the multiples common to the multiples of 2 and 3 are 6, 12, These are called common multiples of 2 and 3.

Note: Common multiples are infinite in number.

Prime Factorisation

Prime Factorisation is the process of finding all the prime factors of a number.

There are **two methods** to find the prime factors of a number-

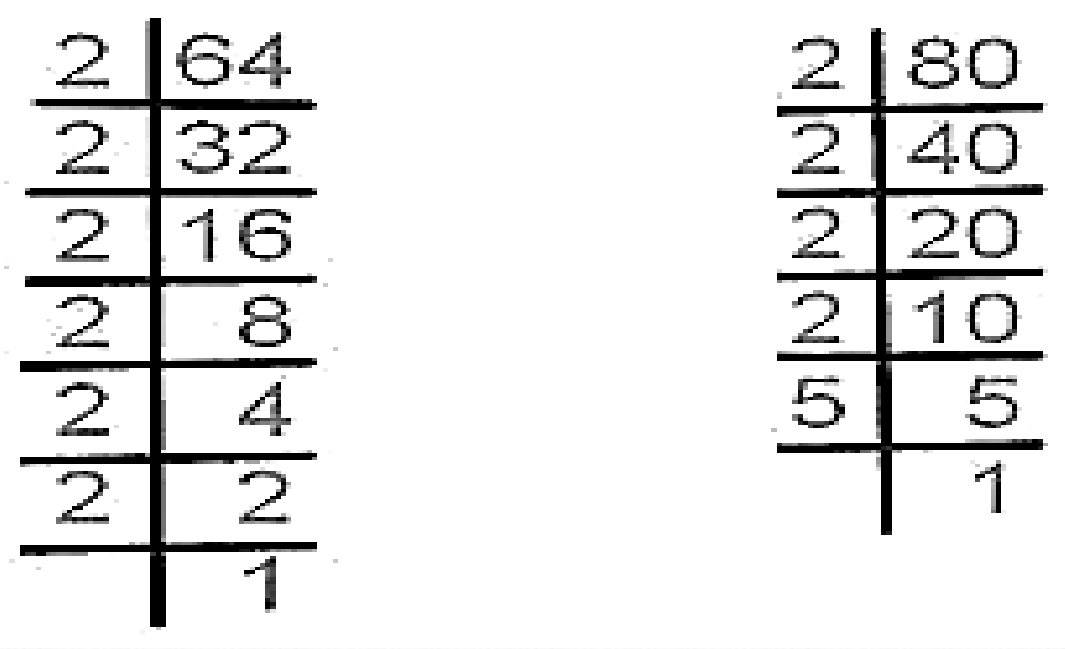
1. Prime factorisation using a factor tree

We can find the prime factors of 70 in two ways.

The prime factors of 70 are 2, 5 and 7 in both the cases.

2. Repeated Division Method

Find the prime factorisation of 64 and 80.



2	64
2	32
2	16
2	8
2	4
2	2
	1

2	80
2	40
2	20
2	10
5	5
	1

The prime factorisation of 64 is $2 \times 2 \times 2 \times 2 \times 2 \times 2$.

The prime factorisation of 80 is $2 \times 2 \times 2 \times 2 \times 5$.

Highest Common Factor (HCF)

The highest common factor (HCF) of two or more given numbers is the greatest of their common factors.
Its other name is **(GCD) Greatest Common Divisor.**

Method to find HCF

To find the HCF of given numbers, we have to find the prime factorisation of each number and then find the HCF.

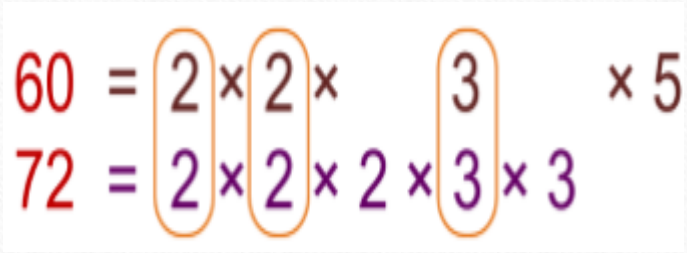
Example

Find the HCF of 60 and 72.

Solution:

First, we have to find the prime factorisation of 60 and 72.

Then encircle the common factors.



HCF of 60 and 72 is 2 × 2 × 3 = 12.

Lowest Common Multiple (LCM)

The lowest common multiple of two or more given number is the smallest of their common multiples.

Methods to find LCM

1. Prime Factorisation Method

To find the LCM we have to find the prime factorisation of all the given numbers and then multiply all the prime factors which have occurred a maximum number of times.

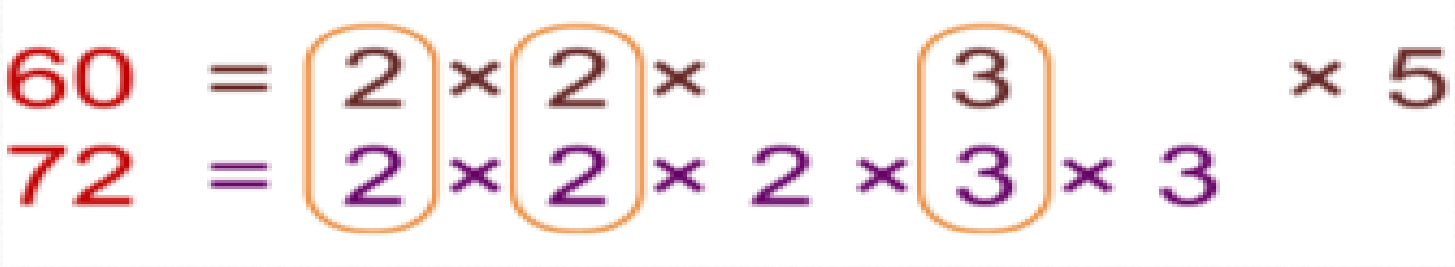
Example

Find the LCM of 60 and 72.

Solution:

First, we have to find the prime factorisation of 60 and 72.

Then encircle the common factors.



To find the LCM, we will count the common factors one time and multiply them with the other remaining factors.

LCM of 60 and 72 is $2 \times 2 \times 2 \times 3 \times 3 \times 5 = 360$

2. Repeated Division Method

If we have to find the LCM of so many numbers then we use this method.

Example

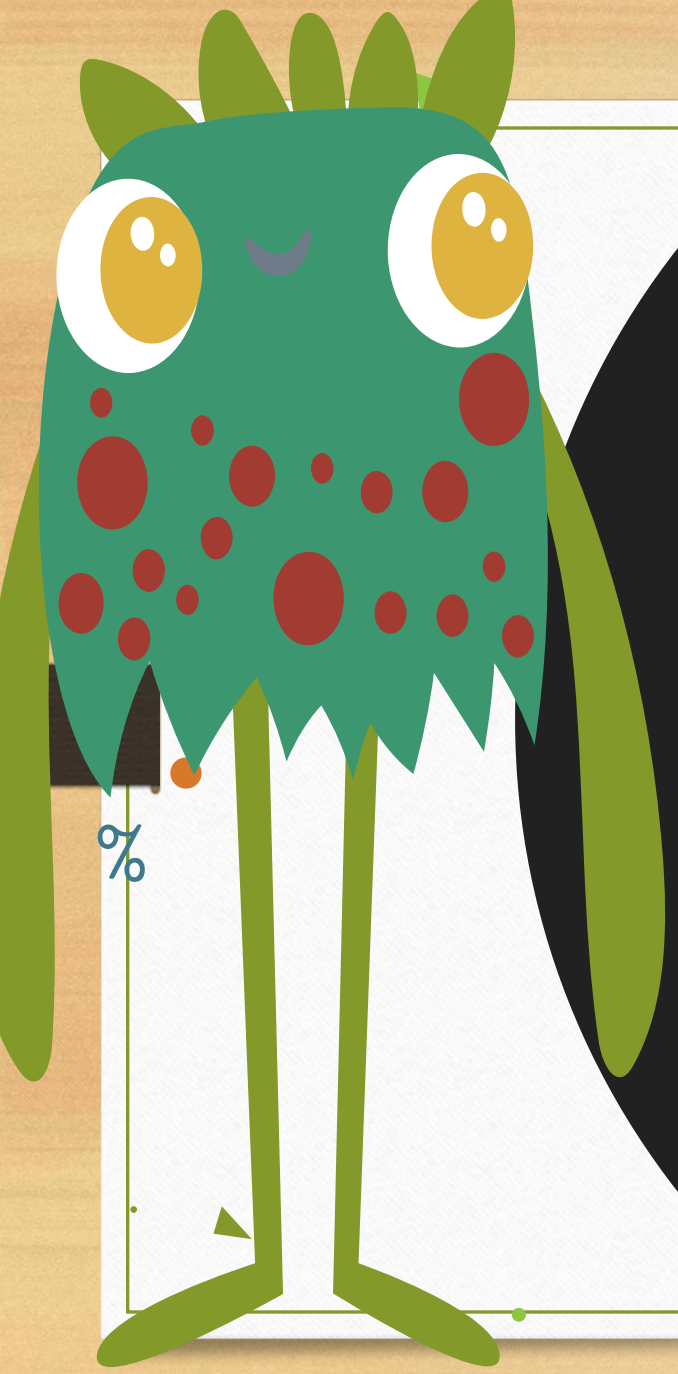
Find the LCM of 105, 216 and 314.

Solution:

Use the repeated division method on all the numbers together and divide until we get 1 in the last row.

2	105	216	314
2	105	108	157
2	105	54	157
3	105	27	157
3	35	9	157
3	35	3	157
5	35	1	157
7	7	1	157
157	1	1	157
	1	1	1

LCM of 105,216 and 314 is $2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 5 \times 7 \times 157 = 1186920$



Math Is Very Fun!

THANKYOU

2+2=4

$\sqrt[n]{x}$

%

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x/2y