# STEP BY STEP

## MATHS FOR ALL

Keep on doing

Do again

Do

Plan

Analyse

Think

Start


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# ABOUT THE BOOK

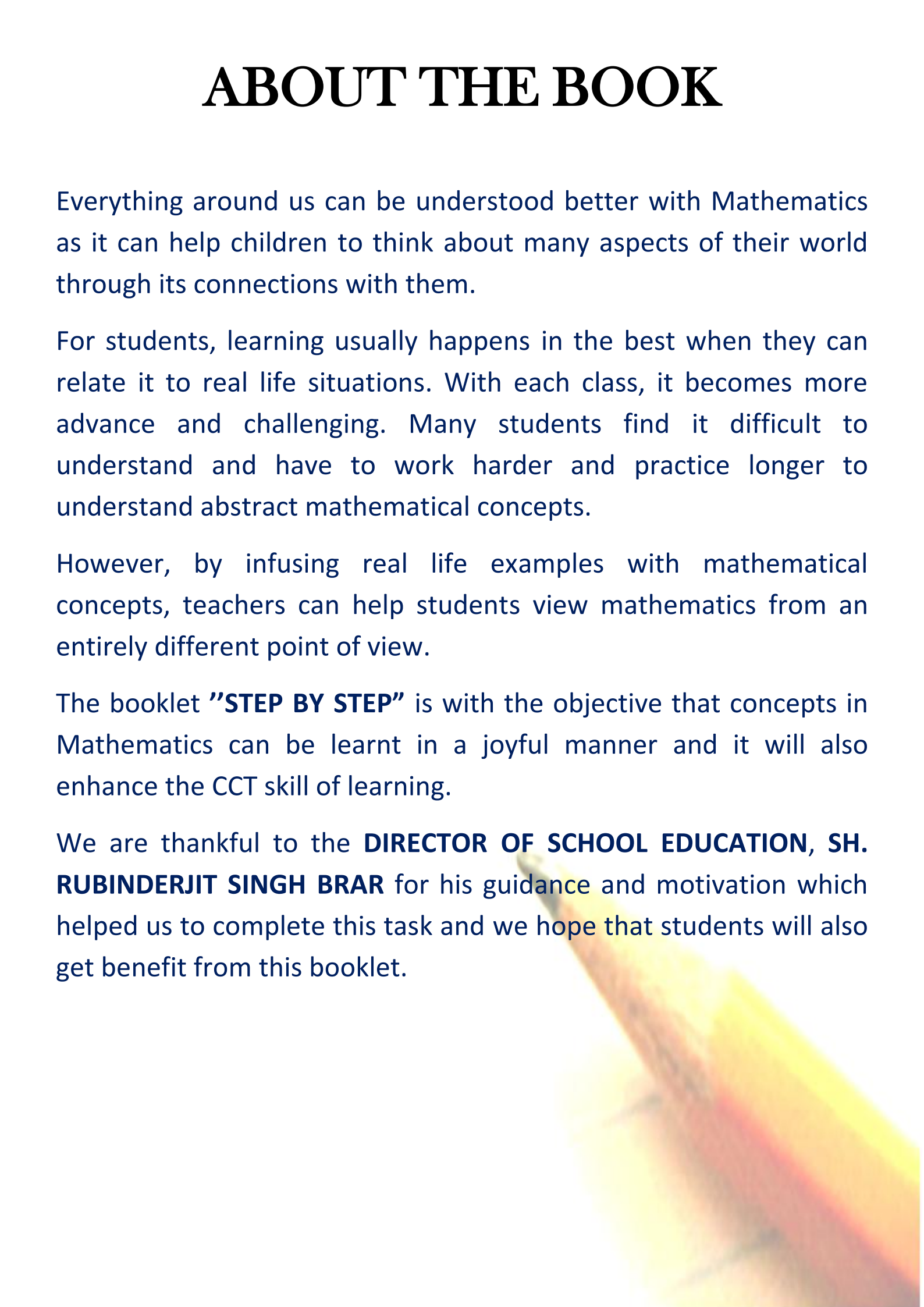
Everything around us can be understood better with Mathematics as it can help children to think about many aspects of their world through its connections with them.

For students, learning usually happens in the best when they can relate it to real life situations. With each class, it becomes more advance and challenging. Many students find it difficult to understand and have to work harder and practice longer to understand abstract mathematical concepts.

However, by infusing real life examples with mathematical concepts, teachers can help students view mathematics from an entirely different point of view.

The booklet **''STEP BY STEP"** is with the objective that concepts in Mathematics can be learnt in a joyful manner and it will also enhance the CCT skill of learning.

We are thankful to the **DIRECTOR OF SCHOOL EDUCATION**, **SH. RUBINDERJIT SINGH BRAR** for his guidance and motivation which helped us to complete this task and we hope that students will also get benefit from this booklet.



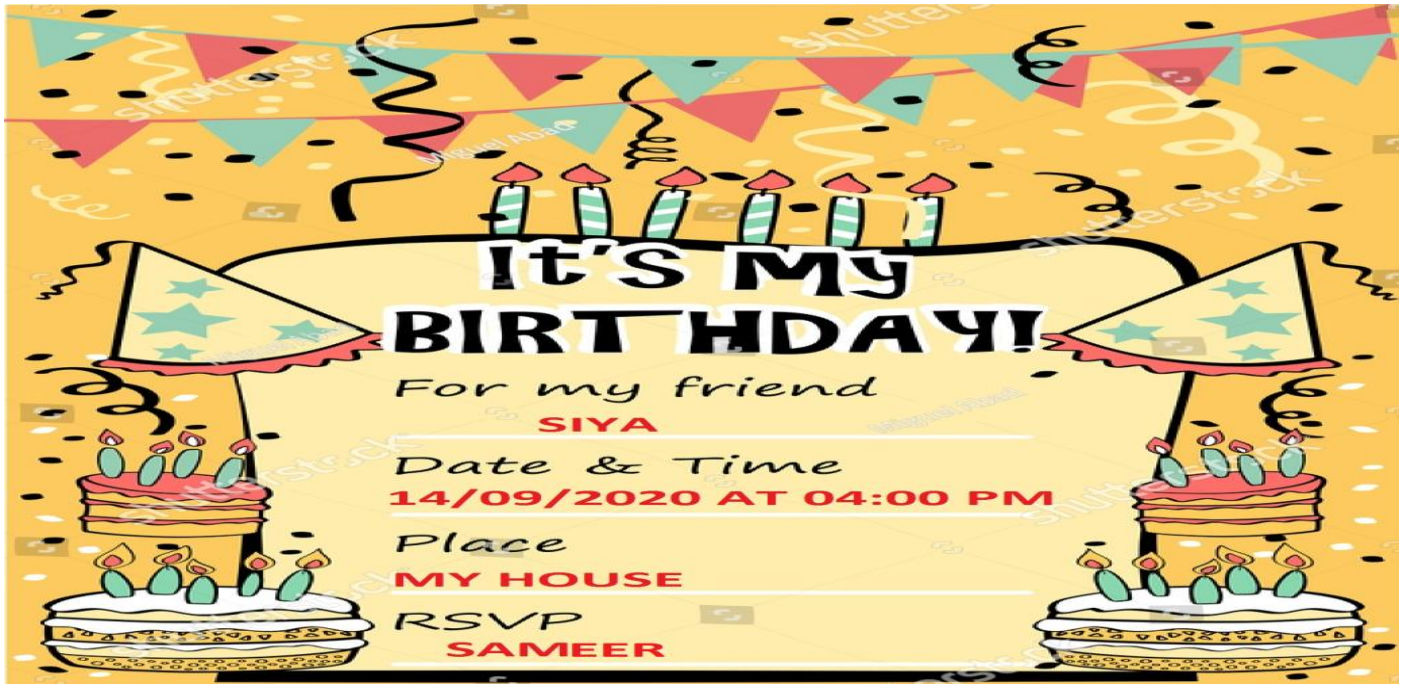
# NUMBER SYSTEM

SIYA

I am very confused about the number system. Can you explain?

Okay I will explain you in a way you will never forget.

SAMEER




Thanks for your invitation Sameer. But don't you know because of COVID parties are not allowed.


Don't be over smart, I know it's COVID, so I invited only 10 friends.

Okay. But I am sorry Sameer as my parents will not allow me to come but send me pictures.

It's okay, I will miss you and will see you the after party.

# AFTER PARTY

Wow! Nice picture. How old are you now?

How many friends attended your party?

It was my 13th birthday.

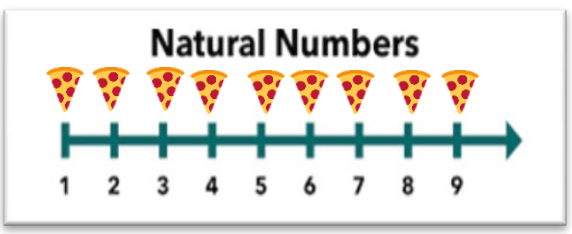
Can you count in the picture and tell me?

Oh, you mean to say that I don't know counting. I can easily count everything in the picture.
As I can see

- 1 big yummy cake
- There are 6 friends including you
- 6 birthday caps
- 2 piles of paper napkins
- 4 piles of glasses
- 5 balloons
- 6 white candies

**The Numbers that comes naturally to count the objects are called NATURAL NUMBERS.**

**Samjh aaya!!!!!**



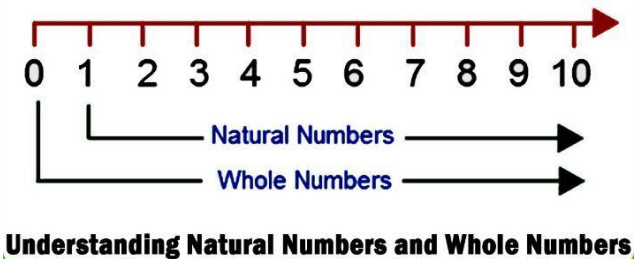

Okay, tell me if there is no object then we count it as zero?

Will it be a **NATURAL NUMBER?**

**No No!!!**

**Let me explain. Counting number 1,2,3.... are Natural Numbers (N) and 0,1,2,3..... are whole numbers (w).**

Amazing!!!
Sameer, can you please explain me about **EVEN Numbers, Odd Numbers, Prime Numbers and Composite Numbers. They are very confusing.**
Samjh hi nhi aata

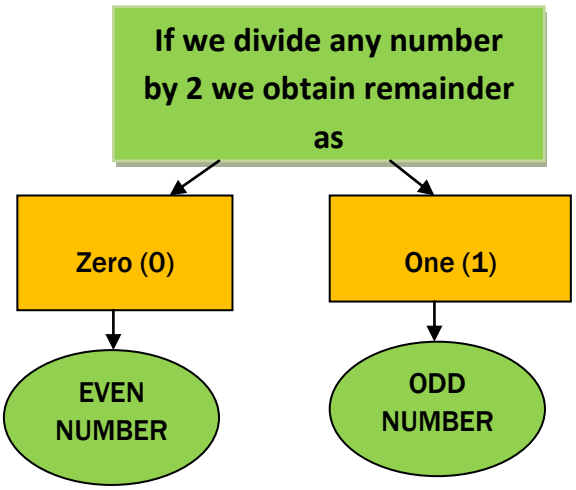



**Understanding Natural Numbers and Whole Numbers**

Okay, I will explain you.

**ACHI TARHA SE SAMJH LO, BAR BAR NAHI SAMJHAUGA**

**SEE BELOW**

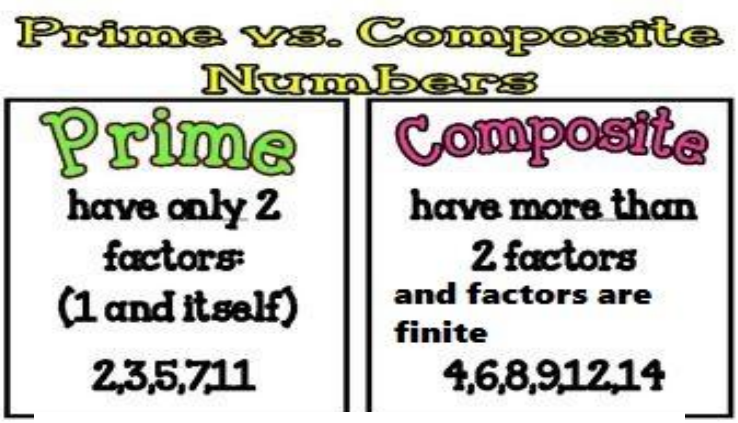



| EVEN | ODD |
|---|---|
| Number ending in | Number ending in |
| 0, 2, 4, 6, 8 | 1, 3, 5, 7, 9 |

**Well explained Sameer... Ye to bahut hi easy Hai...**
**Now I will write few ODD and EVEN numbers.**
**Odd numbers:**
**1,3,5,7,9,11,13,15,17,19,21,23...**
**Even numbers:**
**2,4,6,8,10,12,14,16,18,20,22,24...**

Now I will tell you about **PRIME NUMBERS AND COMPOSITE NUMBERS.**

**Always remember:**
**All-Natural number GREATER THAN 1 are either Prime or Composite Numbers**
**See picture below**




**0 and 1 are neither Prime nor Composite number**

Okay, but why "0" and "1" are neither PRIME nor COMPOSITE NUMBER?

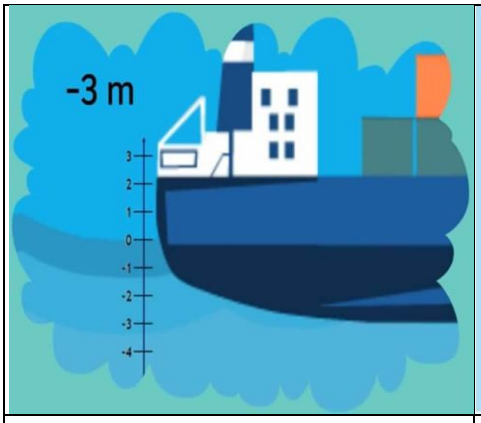
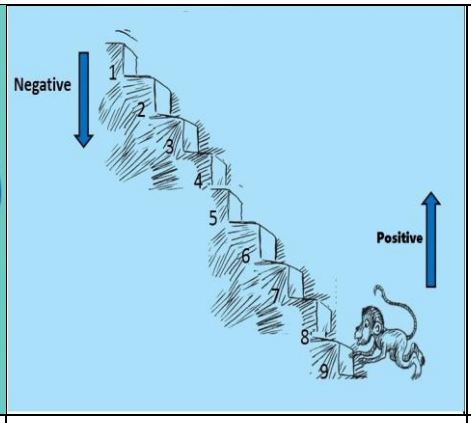
"0" has infinite numbers of factors such as 0×1,0×2,0×3,0×4 and so on. So, factors are not finite.
"1" has only one factor (prime number has exactly two factors, so "1" cannot be PRIME)

Yeahhhh... I have done, kindly see the following chart
Orange blocks are PRIME and white are COMPOSITE numbers.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
| 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |

WELL DONE!!!

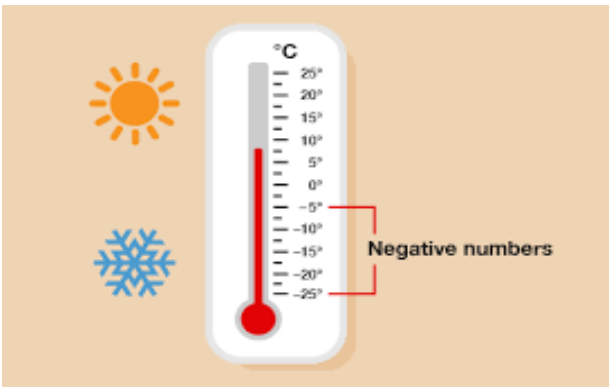
Dear students, there are many types of numbers other than those which we have studied in the previous pages, which I will explain you one by one.

| | | |
|---|---|---|
|  |  |  |
| **Depth of ship below see level..** | **Climbing upstairs and coming downstairs** | **Temperature of shimla drops below $0^0$** |

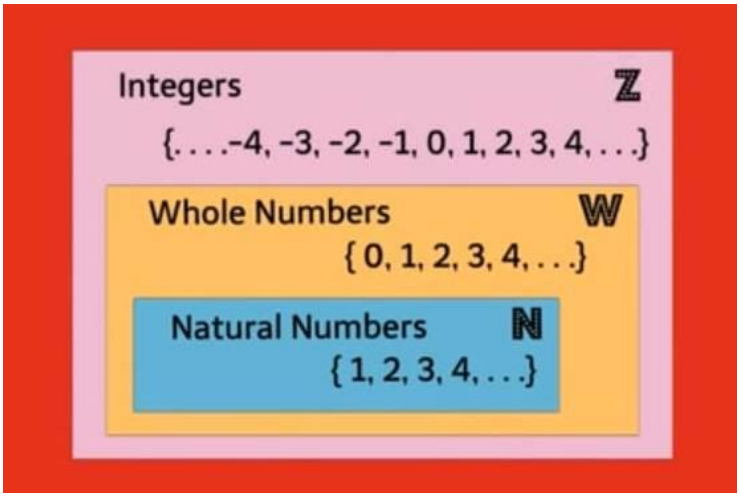
As you see all these are negative number.

When we club negative numbers with whole numbers, they will become INTEGERS.

**SEE THIS**




WOW, Very Interesting

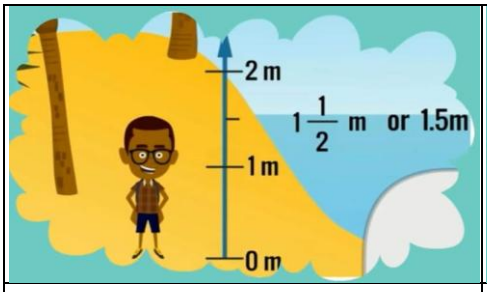



WOW, it is very easy.

## SAMJH AA GYA NA BACHO

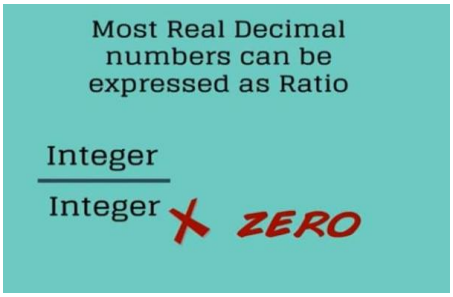
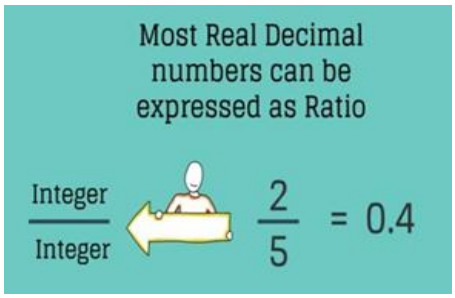
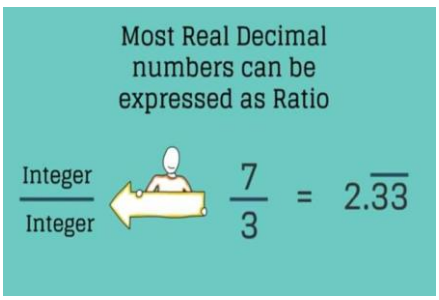
Now I will explain you about FRACTIONS, DECIMALS, RATIONAL and IRRATIONAL Numbers.

Some examples of Fraction and Decimals in the real world are given below.

| | | |
|---|---|---|
|  |  |  |
| **Measuring exact height.** | **Parts of a PIZZA** | **Measurement of Ingredient in CAKE reciepe** |

**Most of the numbers can be expressed as decimals.**


Few examples of Decimal representation of fraction are given below.

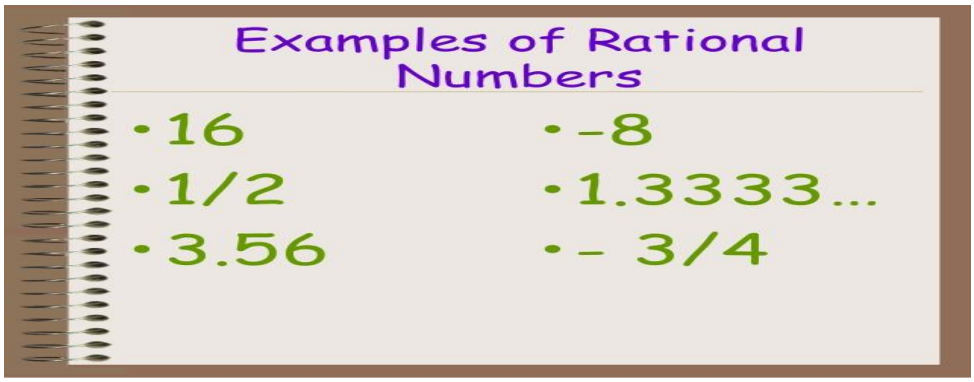
| | | |
|---|---|---|
|  |  |  |
| **Denominator should not be ZERO** | **Decimal expansion is terminating** | **Decimal expansion is Non-terminating but repeating** |

**Denominator should not be ZERO**

# STUDENTS ALWAYS REMEMBER

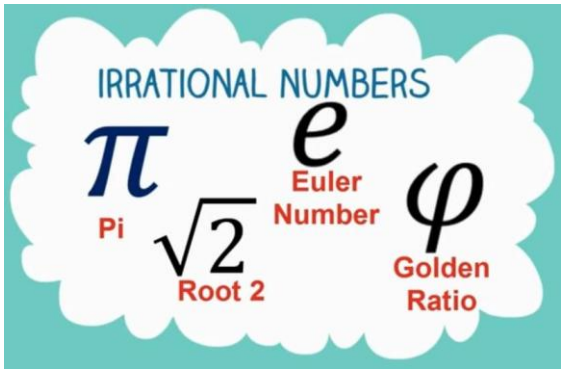
## RATIONAL NUMBER

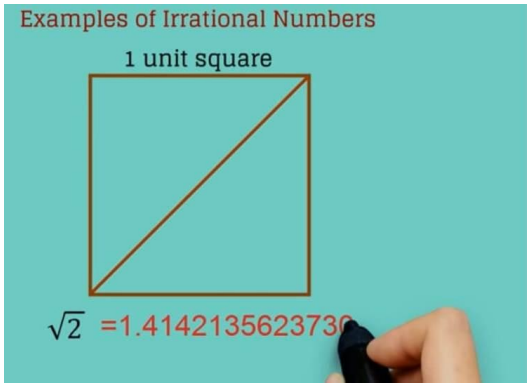
**A rational number is defined as a number that can be expressed in the form p/q where p and q are integers and q ≠ 0. Rational numbers include natural numbers, whole numbers, integers, fractions, decimals (terminating, and non-terminating but repeating) and negative fractional quantities.**

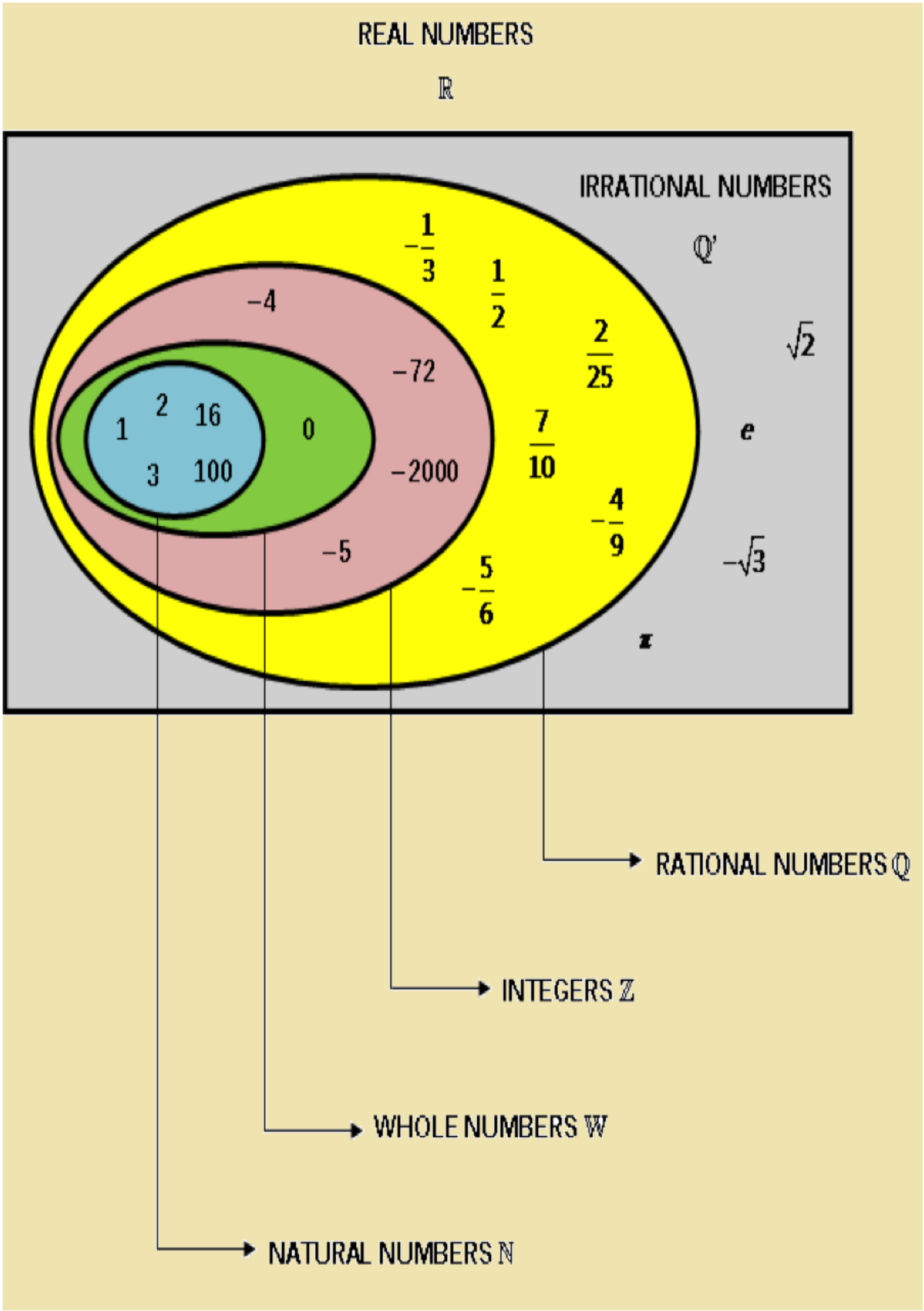



## IRRATIONAL NUMBER

**Irrational numbers are the real numbers that cannot be represented as a simple fraction. It cannot be expressed in the form of a ratio, such as p/q, where p and q are integers, q≠0. It is a contradiction of rational numbers. Irrational number in decimal representation are non-terminating and non-repeating. For example, √5, √11, √21,1.397365..., etc., are Irrational Number.**




REAL NUMBERS
ℝ
IRRATIONAL NUMBERS
ℚ'
$-\frac{1}{3}$
$\frac{1}{2}$
$\frac{2}{25}$
$\sqrt{2}$
−4
−72
2
16
1
0
$\frac{7}{10}$
e
3
100
−2000
$-\frac{4}{9}$
−5
$-\sqrt{3}$
$-\frac{5}{6}$
π
RATIONAL NUMBERS ℚ
INTEGERS ℤ
WHOLE NUMBERS 𝕎
NATURAL NUMBERS ℕ

The important thing is not to stop questioning curiosity has its own reason for existing.

Albert Einstein

# SOME BRAIN STORMING

## Challenge - 1

I am a number

I am not an ODD number

I am higher than 90

I am not higher than 100

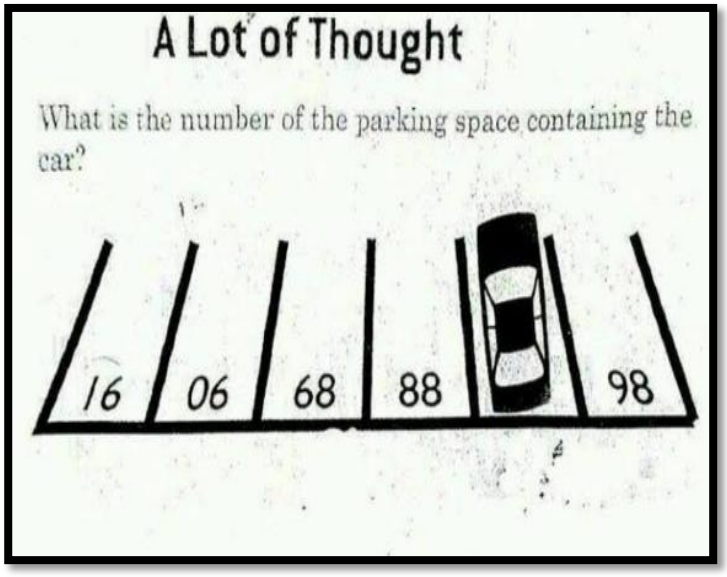
If you subtract me from 100,

You get nothing

What number am I?

## Challenge - 2

WHAT IS THE NUMBER OF PARKING SPACE CONTAINING THE CAR?



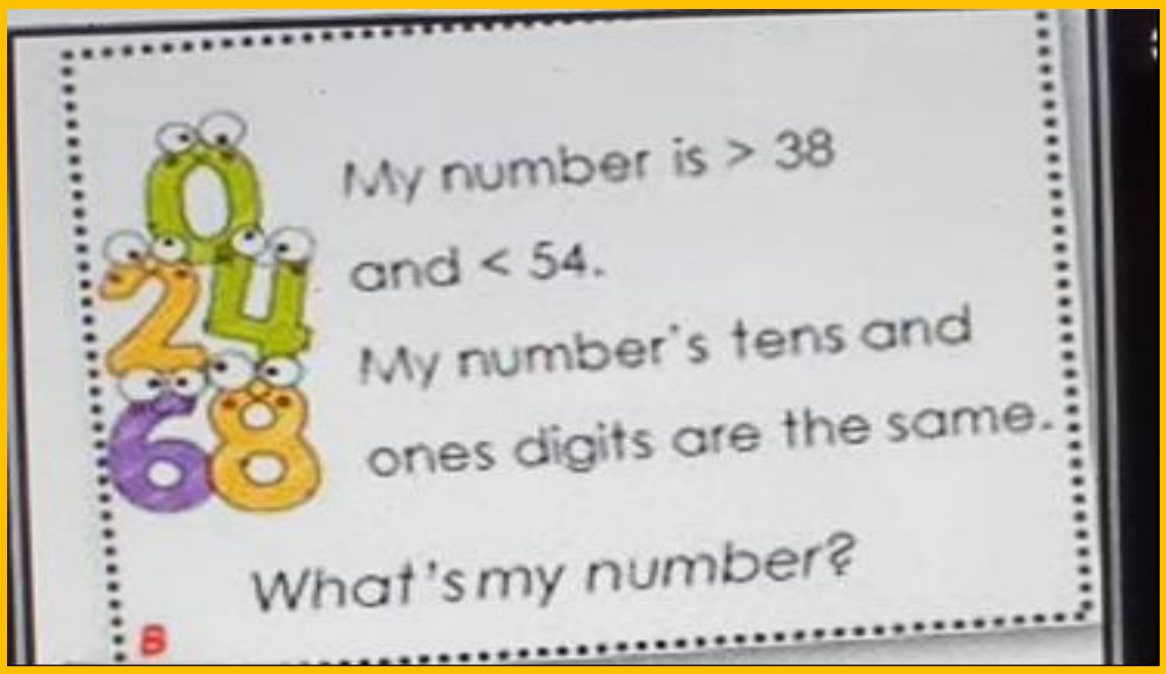
# Challenge - 3

Sets of 3 integers have committed a crime and are hiding now. Find all the three integers in a row, column or diagonal, where the third number is the difference of the first and second. One set has been found by Tukaram. Find at least 9 more.

# Challenge - 4

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| -9 | 0 | 60 | -64 | 1 | 18 | 8 | 22 |
| 8 | -3 | 20 | -42 | -10 | 9 | 1 | 99 |
| 5 | 0 | -6 | -22 | -16 | 2 | 6 | -100 |
| 6 | -1 | 7 | 14 | 8 | 20 | 4 | 199 |
| -3 | 2 | 21 | 7 | 13 | -6 | 100 | 10 |
| -2 | 180 | 6 | -2 | 1 | -44 | -1 | -43 |
| 0 | 90 | 10 | 8 | -23 | -11 | 2 | -7 |
| 42 | 2 | -4 | 9 | 26 | -4 | -3 | 4 |

## Challenge - 5

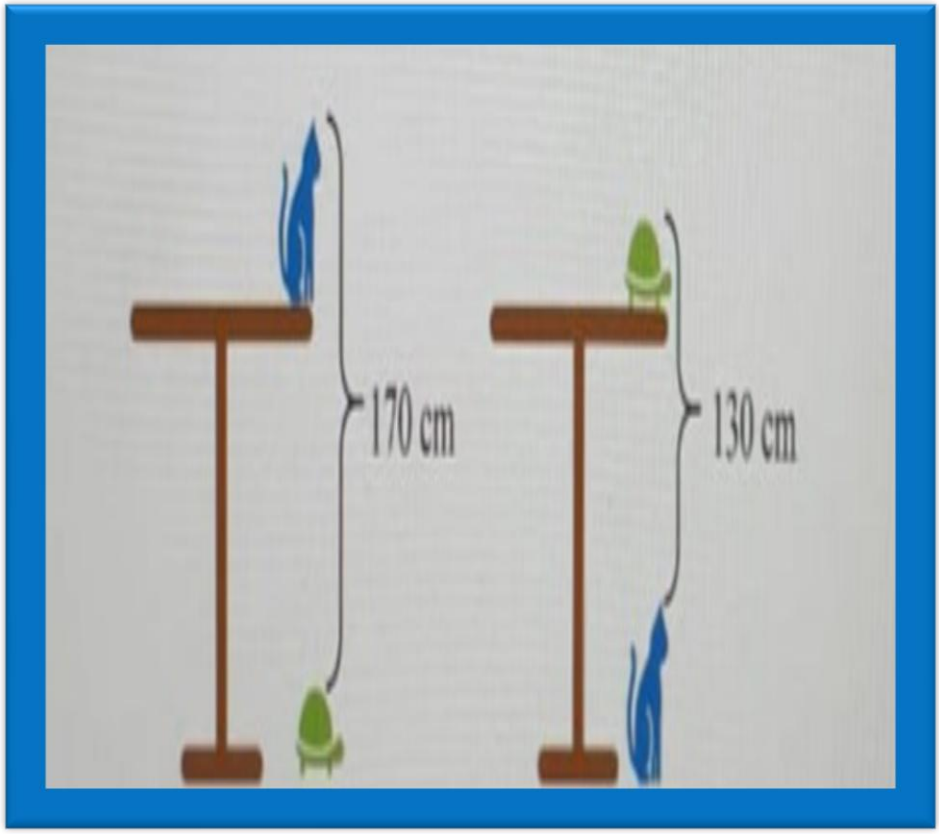



## Challenge - 6

# Challenge - 7

A man buys a horse for Rs. 6000, He sells the horse for Rs. 7000, he then buys the horse back for Rs. 8000, And he sells the horse again for Rs. 9000, In the end, how much money, Did the man make or lose?

# Challenge - 8




Find the height of the table?

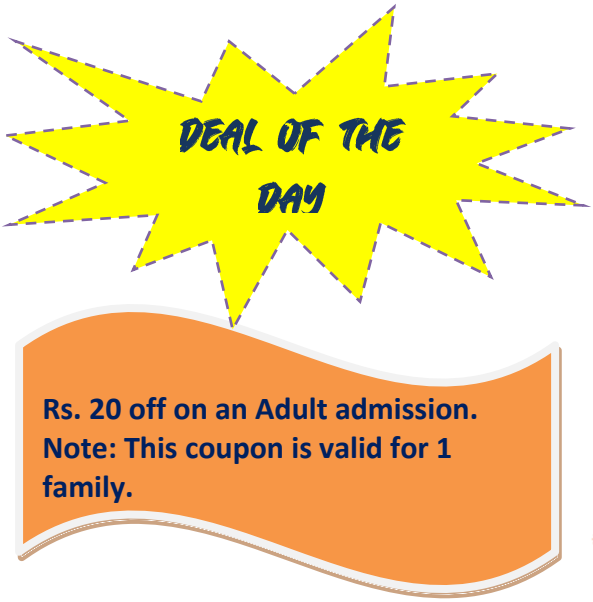
# Challenge - 9

Anshika who is 7 year old and himansh who is 10 year old like amusement park so they visited FUNSHUN AMUSEMENT PARK along with their father Mr. Rihan.

## FUNSHUN AMUSEMENT PARK


| | | | | | |
|---|---|---|---|---|---|
| Adult | - ₹ 100 | Popcorn(Small) | - ₹ 10 | 2 Balloons | - ₹ 20 |
| Kids below 8 years | - ₹ 50 | Popcorn (Large) | - ₹ 20 | Stuffed toys | - ₹ 75 |
| Parking | - ₹ 20/Hour | Chips | - ₹ 30 | Purse | - ₹ 170 |
| | | Candy | - ₹ 15 | | |






i. What was the cost of his admission ticket.

ii. Himansh went to the snack shop and bought three small bags of popcorn for his family. Later on, he returned and bought three packets of chips. How much did he spent?

iii. Mr. Rihan bought four balloons for Himansh and one stuffed toy for Anshiska. He gave ₹ 200 to cashier. How much balance will he get back.

# Challenge - 10

Ajay,Vijay and Dev are keeping score of the game they are playing together. When a players wins a game, he gets 5 points. If he looses a game, 3 points are taken away. If it is a tie every players gets 2 points.


## RULES OF GAMES

| | |
|---|---|
| Even Number | Win |
| Odd Number | Lose |
| Prime Number | Tie |

i. Each of them has 20 points to start with. How many points do they have in total?

ii. Ajay wins the first game, how many points does Ajay has?

iii. Vijay wins the second game, how many points does Vijay has after the second game?

iv. Third game is tie, how many points does Dev have after the third game.

v. Dev wins the fourth game. Write the score of Ajay,Vijay and Dev after four games.

# Challenge - 11

The post office is having busy time as every one was sending out presents and cards to their loved ones before Diwali.


i. Before the Post office opened on Monday morning, there were 80 pack of stamps. At the end of the day there were 53 pack of stamps left. How many pack of stamps were sold on Monday.

ii. 87 post cards and 76 parcels were received on Tuesday. In the morning the mail truck took away 24 parcels in the afternoon. The mail truck took away another 19 parcels. How many parcel are left in the Post office.

iii. On Wednesday, 45 packages were sent in for pickup. 9 of the packages had the fragile label and 8 of the packages required the recipient signature. How many packages did not required signature.

iv. On Thursday, 70 customers visited the post office, on Friday there were 6 customers less than number of customers on Thursday. On Saturday there were 14 customers less than the customers on Friday. How many customers visited the post office on Sunday.

v. On Sunday, 80 letters were received at the post office. However 9 letter were not addressed properly and needed to be returned and 7 letters did not have enough stamps. How many letters could be mailed out sucessfully.

THINKING ABOUT THE ANSWERS, TRYING TO SOLVE IT

KYA TUMHE QUESTIONS SAMJH AAYE?

Mujhe sab samajh aa gya. These questions were very easy. Anyone can solve them if their basics are clear

Siya, hopefully you can solve all these questions now

Keep on doing Bacho.

I will share the answers next time.

# LEARNING OUTCOMES ACHIEVED

## CLASS 6

- Solves problems involving large numbers by applying appropriate operations (addition, subtraction, multiplication and division).

- Recognizes and appreciates (through patterns) the broad classification of numbers as even, odd, prime, co-prime, etc.

## CLASS 7

- Multiplies /divides two integers.

- Interprets the division and multiplication of fractions. For example, interprets - as of. Also, is interpreted as how many make?

- Solves problems related to daily life situations involving rational numbers.

## CLASS 8

- Define rational number in order to identify whether the given number is a rational number or not.

- Solves puzzles and daily life problems using variables.

## CLASS 9

- Recall natural numbers, whole numbers, integers and Rational numbers and classify a given number as either of them.

- Modify a given non-terminating decimal number in the form of p /q and comment whether this number is irrational.

- Deduce the value of a given fraction in its decimal form and infer if the decimal number is terminating or non-terminating.

## CLASS 10

- Recall the properties of irrational number and prove that whether the sum /difference/product /quotient of two numbers is irrational or not.

- Apply theorems of irrational number and prove whether a given number is irrational or not.

- Apply theorems of rational numbers and find out about the nature of their decimal representation and their factors.

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