



# HAPPY MATHS

## Numbers



LEVEL 3

Written by **Mala Kumar**  
Illustrated by **Angie & Upesh**

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# Happy Maths - 1

## Numbers



Written by  
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**Sankhya and Ganith have been learning a lot of things  
in their mathematics class.**

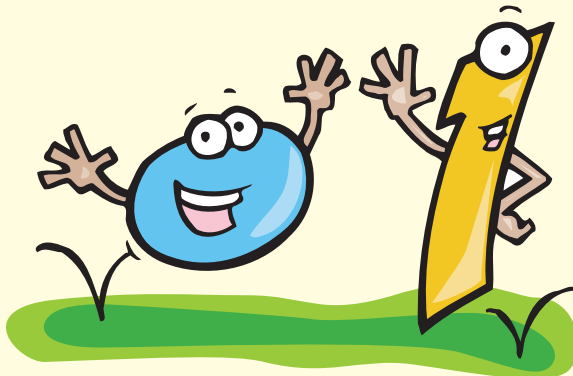
**Join Sankhya and Ganith in their  
happy discoveries about mathematics.**

**Zzero and Eka are friends of Sankhya and Ganith.**

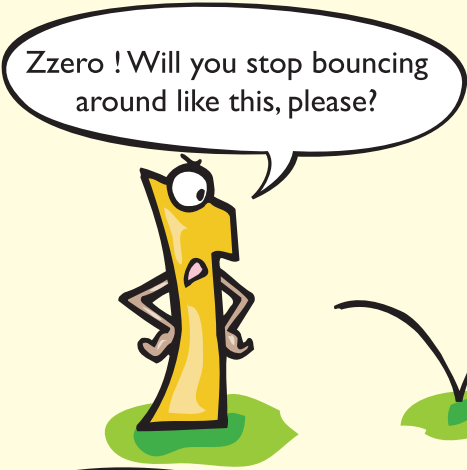
**In this book Sankhya and Ganith discover the magic of  
numbers. They think of numbers as their friends.**

**They want to share some of the things  
they have found out about numbers.**

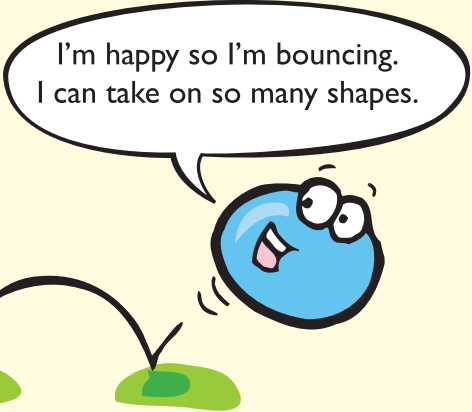
**They learnt about numbers from stories that  
they read in many books in their school library.**



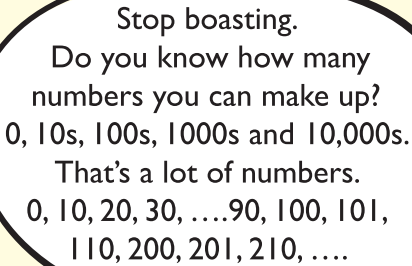
# The Big Challenge



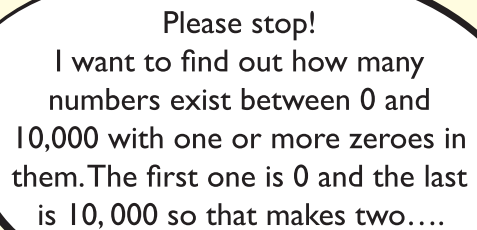
Zzero ! Will you stop bouncing around like this, please?



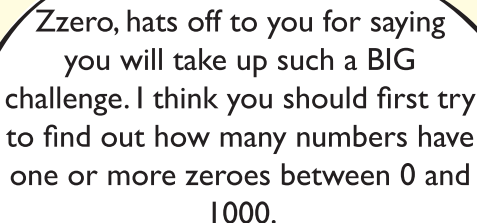
I'm happy so I'm bouncing. I can take on so many shapes.



Stop boasting.  
Do you know how many numbers you can make up?  
0, 10s, 100s, 1000s and 10,000s.  
That's a lot of numbers.  
0, 10, 20, 30, ....90, 100, 101,  
110, 200, 201, 210, .....



Please stop!  
I want to find out how many numbers exist between 0 and 10,000 with one or more zeroes in them. The first one is 0 and the last is 10,000 so that makes two....



Zzero, hats off to you for saying you will take up such a BIG challenge. I think you should first try to find out how many numbers have one or more zeroes between 0 and 1000.

**Readers, can you help us please?**

# Grains of Rice

---

Acharya Vinoba Bhave was a freedom fighter. He followed the teachings of Mahatma Gandhi and lived between the years 1895 and 1982.

When he was a young boy in Maharashtra, his mother had made a vow of offering 10,000 grains of rice to God. She carefully counted 100 grains each day and offered it in prayer, reciting God's name each time she made an offering.

Vinoba's elder brother had an idea. He said, "Mother, why do you do this everyday? After counting 100 grains on one day, measure its weight. From the next day, you just have to weigh out an equal amount and offer it to God. This will save you time and effort."

Vinoba said, "I don't think that would be right. When you count 100 grains of rice each day, you will repeat God's name 100 times. But if you weigh out 100 grains, you would say God's name only once!"



1. Vinoba's mother wanted to offer 10,000 grains of rice. If each grain weighs half a gram, how many grams will 100 grains weigh?

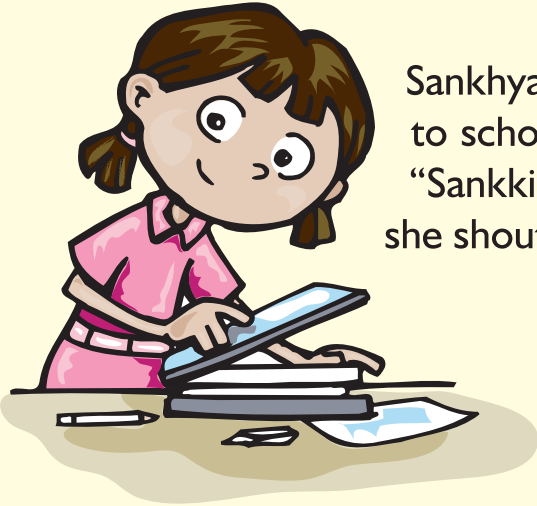


2. If Vinoba's mother had counted 100 grains on the first day, and then followed her elder son's advice, how many times would she have said God's name till she made the complete offering?

3. If Vinoba's mother followed Vinoba's suggestion, how many days would it take for her to finish the offering?



# How Big Is A Million?



Sankhya's mother was getting ready to go to school. She was a geography teacher. "Sankkima, eat your breakfast quickly!" she shouted.

"Ki-ki, have you finished your homework?" asked Sankhya's father.



"S V!" yelled Sankhya's friend Manjula from the street. Sankhya's father's name is Venkat.

"I have a million names!" said Sankhya with a grin, as she got ready to eat her breakfast.

Sankhya answers to all the different names she is called by.

Numbers are like Sankhya too.

They have different names in different countries.





# What is a million?

It is a very big number.

$10 \times 10 = 100$ . Ten 10s make a hundred

$10 \times 100 = 1000$ . Ten 100s make a thousand

$100 \times 100 = 10000$ . Hundred 100s make ten thousand

$100 \times 1000 = 100000$ . Hundred 1000s make a lakh

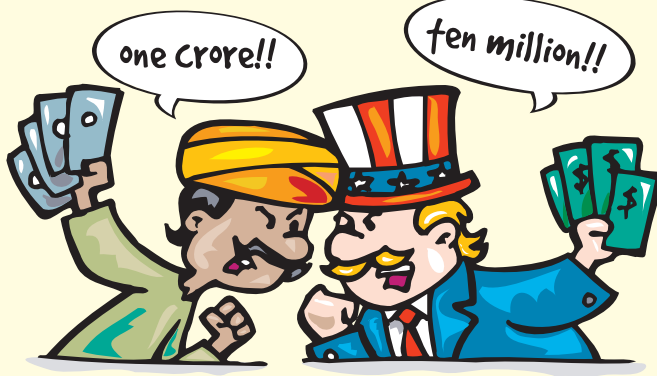
But the word 'lakh' is not used in European and American countries. When someone wins a One-lakh lottery, people in these countries would say, "I won hundred thousand!"



$1000 \times 1000 = 1000000$ . Thousand 1000s make a million.  
In India, we say 10 lakhs instead of one million.



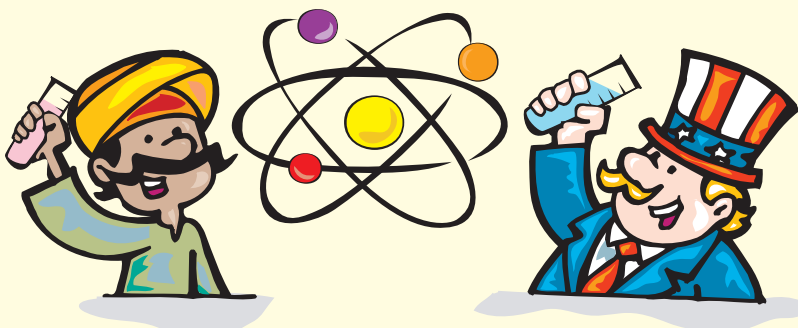
$100 \times 100000 = 10000000$   
Hundred lakhs is called one crore in India.



$1000 \times 1000000 = 1000000000$   
In America, 1000 millions are called a billion.



$1000 \times 1000 \times 1000000 = 1000000000000$   
And a billion is a thousand thousand million in all countries.



**Surprisingly, scientists, whether in India or America mean 1000 million when they say billion.**

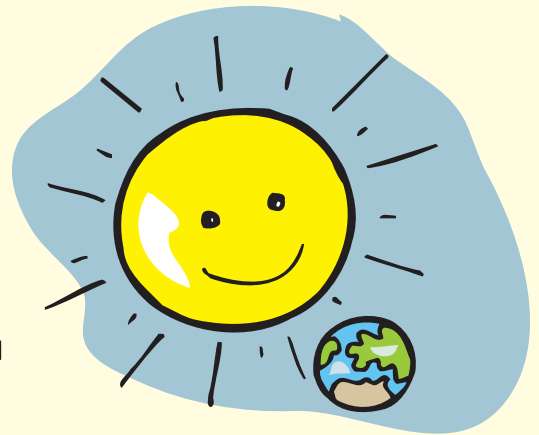
# Why Do We Need Big Numbers?

When someone asks you how far your school is from your house you may say, "Very far."



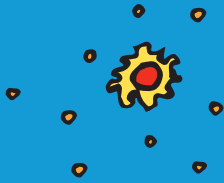
To a stranger asking for directions to the school, you would probably say, "Five kilometres, Sir."

The Sun is 300,000 times heavier than the Earth. To write the mass of the Sun in tonnes you need to write 2 followed by 27 zeroes.



**Numbers help us to understand the world around us better.**

# Scientists say the universe was formed because of a 'Big Bang'.



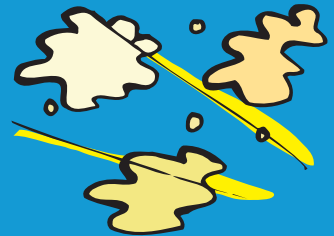
15 billion years ago there was a small super hot, super dense, ball of fire.



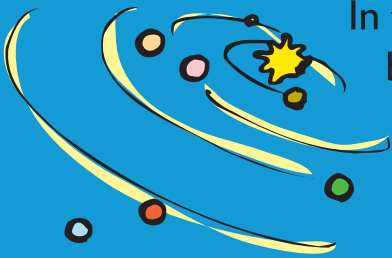
The ball was less than 1 cm wide. Suddenly, the ball exploded.



In less than a millionth of a second, it grew to a huge ball, 16 billion km across.

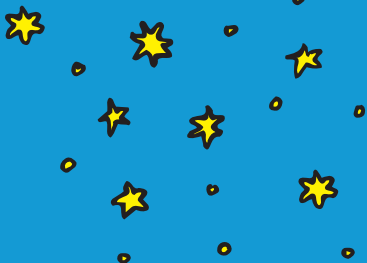


In the next million years, the exploded pieces became colder and formed galaxies.

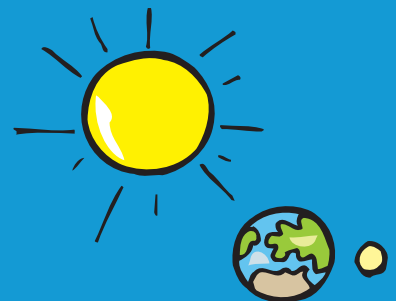


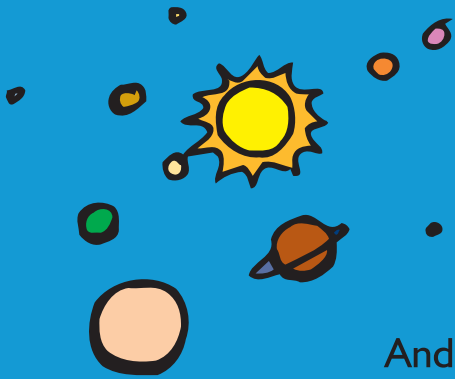
The Earth, Moon and Sun belong to a galaxy called the Milky Way.

They were born less than 5 billion years ago.



There are 200 billion stars in our galaxy.





Our Sun is one of them. Earth is one of the eight planets moving around our Sun.

And the Earth has over 7,000,000,000 people.



You are one of 1,200,000,000 people living in India!

1. Write the number of zeroes that follow the digit 1 in  
a) lakh, b) 10 million, c) 10 lakhs, d) 100 lakhs e) 10 crores.
2. How many years ago was the Earth born? Can you give the answer in two different ways?
3. How many crores of people live in India?
4. A millionth of a second means 'the part that you get when you divide one second into a million parts.'  
Can you imagine this? A blink of a healthy eye takes a fraction of a second. I can blink three times in one second. Can you tell me how long it takes to blink once?

# Everyone In Their Place



The principal of Aryanagar Vidyamandir is very strict. He insists that students stand in their specified places during morning assembly.

Ranjit, a class 4 student, always stood in the fourth row from the right side of the hall.



One day, he got into the sixth row, where all the Class 6 students stood. He felt very important. He also felt very scared that the principal would seek him out and punish him.



The principal did find out and called Ranjit to his room. “Young fellow, so you don’t want to stand in your place, is it?”

If you want to stand in the Class 6 row, you have to increase your value by studying well and learning

well to deserve the value of being in the Class 6 row. Understand?

Now, run to class!”





Ranjit scratched his head, and walked back to his class. What was his value, he wondered.

He had learnt place value in arithmetic recently and this is what he understood about value. The digit 2 means just 2.



When you write 20, the 2 indicates there are 2 tens.



Similarly when you write 2032, the 2 on your right denotes just 2 but the 2 on your left means there are 2 thousands.

So, depending upon the 'place' where a digit sits, it gets different values.



Let's take the number 167234. Each digit here has a different place value. 1 is in the lakh's place. In the number 167234, the place value of 1 is one lakh. 6 is in the ten-thousand's place. The place value of 6 in 167234 is 60,000. A number is the sum of the place values of its digits.

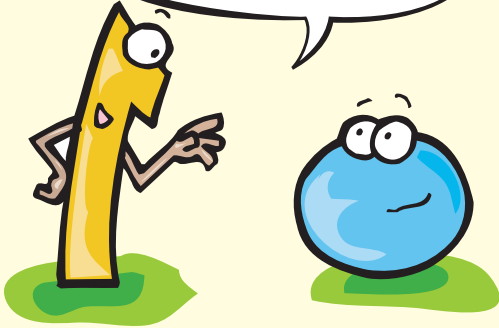
$$1,00,000 + 60,000 + 7000 + 200 + 30 + 4 = 167234.$$

Ranjit has understood place value quite well now.

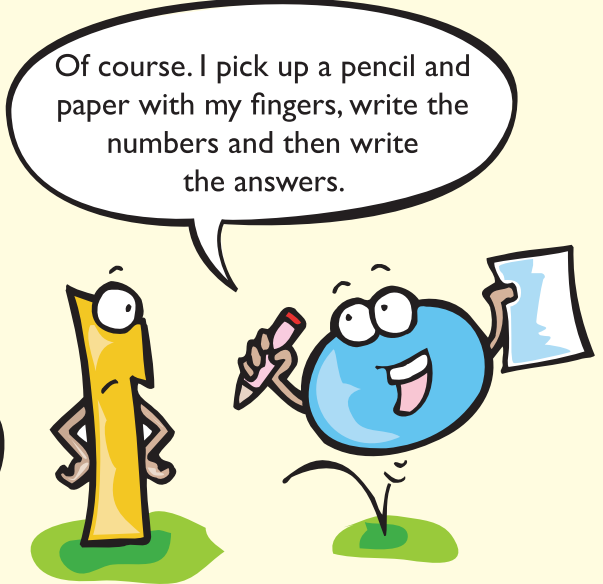
1. Ranjit's uncle has a car that has the registration number 1945. What is the place value of 9 in it?
2. Add 496, 3051 and 27. Find the digit in the hundred's place of the sum that you get.

# Finger Fun

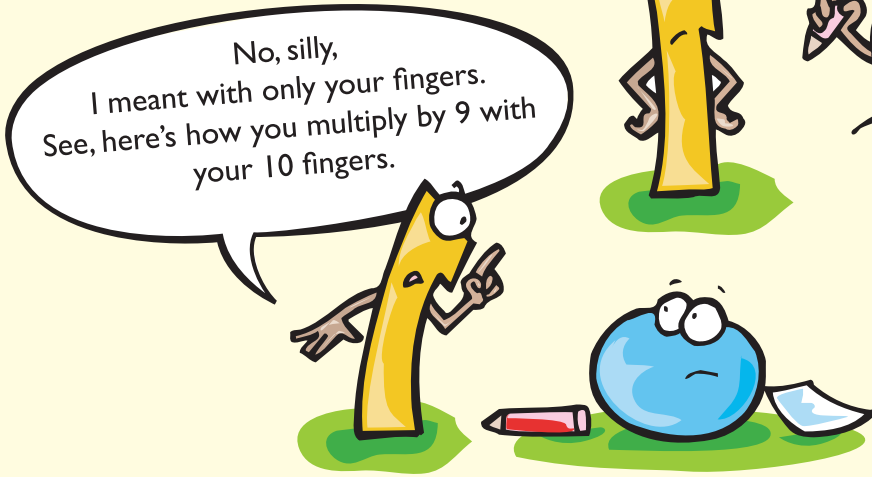
Zzero, do you know how to multiply with your fingers?



Of course. I pick up a pencil and paper with my fingers, write the numbers and then write the answers.



No, silly, I meant with only your fingers. See, here's how you multiply by 9 with your 10 fingers.



## Try this



Stretch out your fingers.



To calculate  $9 \times 1$ , bend finger number 1. Count the number of fingers on either side of the bent finger. 0 and 9. So 9 is your answer.



$9 \times 2$ . Bend finger 2. One finger on the left, 8 on the right of bent finger. Answer is 18



$9 \times 3$ . Bend finger 3. Answer=27



$4 \times 9$  Bend finger 4. Answer=36



$5 \times 9$  Bend finger 5. Answer=45

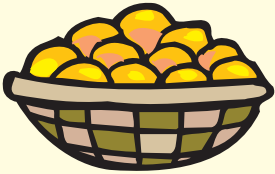
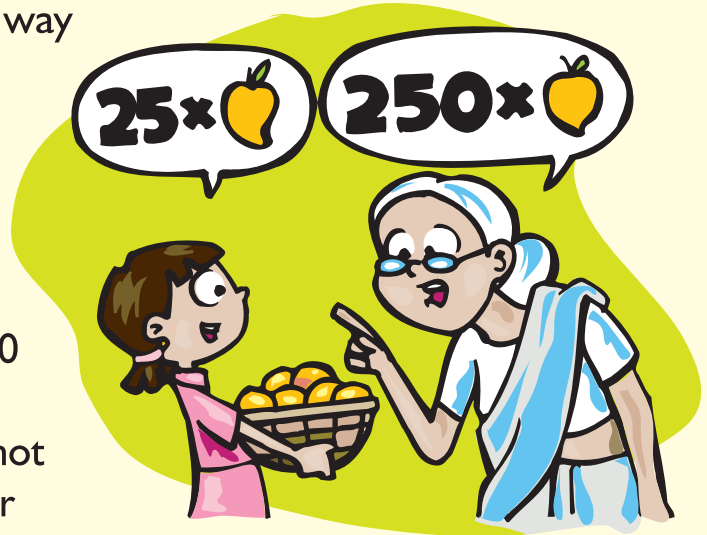


# What is Multiplication?

Multiplication is a quick way of adding.

Suppose you pluck 25 mangoes from one tree in an orchard, and your grandmother has asked you to get 250 mangoes to make spicy mango pickles, you do not have to keep count after

plucking every mango.



Just pluck 25 mangoes from each tree. Leave them in separate baskets at the foot of the tree.

One basket contains 25 mangoes.

2 Baskets will contain  $25 + 25 = 50$  mangoes.

You can just multiply 25 by 2 instead.  $25 \times 2 = 50$ .

3 baskets  $\times$  25 mangoes in each =  $3 \times 25 = 75$ .

10 baskets  $\times$  25 mangoes in each =  $10 \times 25 = 250$ .

When the numbers to be multiplied are small, it is easy to add repeatedly.

But when numbers are big, it is easier to multiply.



## Try this

Let's try 24 multiplied by 6. Let's say you have 20 red marbles and 4 green marbles. Suppose you and five of your friends (that's 6 of you) want to have the same number and kind of marbles each. When you want 6 times the number of marbles, you will have 6 times the number of red marbles in addition to 6 times the number of green marbles, right?

$$20 \times 6 = 120$$

$$4 \times 6 = 24$$

$$120 + 24 = 144 \text{ marbles. Easy!}$$

**Now try this.** Multiply 34768 by 987 by the same method. You would have to write  $30000 + 4000 + 700 + 60 + 8$ . Then multiply each of these by 7, 80 and 900. And add up all the answers to get your final answer. Doing this horizontally, then writing it down vertically and then adding the numbers is a very tiring process. To make this work simple, we follow a pattern of writing while multiplying big numbers.

$$34768 \times 987$$

		<u>3</u>	<u>4</u>	<u>7</u>	<u>6</u>	<u>8</u>	x	<u>9</u>	<u>8</u>	<u>7</u>
<b>A.</b>					2	4	3	3	7	6
<b>B.</b>				2	7	8	1	4	4	x
<b>C.</b>			<u>3</u>	<u>1</u>	<u>2</u>	<u>9</u>	<u>1</u>	<u>2</u>	x	x
<b>D.</b>			<b>3</b>	<b>4</b>	<b>3</b>	<b>1</b>	<b>6</b>	<b>0</b>	<b>1</b>	<b>6</b>

- Multiply 34768 by 7.
- Put an X or a 0 in the unit's place. Then multiply 34768 by 8.
- Put X marks in the unit's and ten's place. Multiply 34768 by 9.
- Add the answers you got in steps A, B and C.

**It becomes easy to add the numbers vertically, starting from the right, if you write the digits neatly one below the other!**

# Odd Fishing



An old man lived by the river Kaveri.

He used to catch fish for a living. But he did not eat fish himself.

Everyday he caught fish and sold them in the evening at the market.

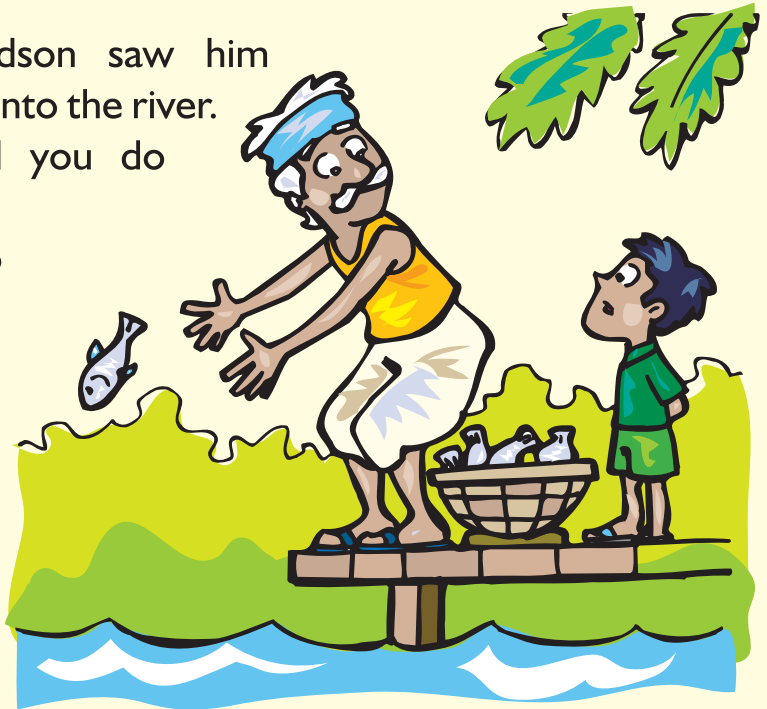
He was not a greedy man.

One day his grandson saw him throwing back a fish into the river.

“Grandpa, why did you do that?” he asked.

“Little one, I need to earn, so I catch fish. But I don’t need too much money. So I put back some fish into the river.”

“And how do you decide which fish to put into the basket and which fish to throw back into the river?”





“Each day, I make up a rule for myself. Yesterday, I threw back the first fish I caught, kept the second, threw back the third, kept the fourth...”

“I know, you threw back Fish 1, Fish 3, Fish 5.....You threw back the odd-numbered fish!”

“That’s right. Today, I kept the first fish, threw back the second, kept the third, threw back the fourth...”

“All the even-numbered ones went back into the river. Poor odd-numbered ones!”

“Tomorrow, I’m going to need a little more money. So I’ll have a new system. Fish numbers 2, 3, 5, 7, 11, 13, 17, 19, 23, and so on will go back into the river. The rest will get into my basket.

“Grandpa, how many fish do you sell each day?”

“About 50.”

1 is an odd number. 2 is an even number.

Numbers that cannot be divided by 2 are called odd numbers.

Numbers that can be divided by 2 are called even numbers.



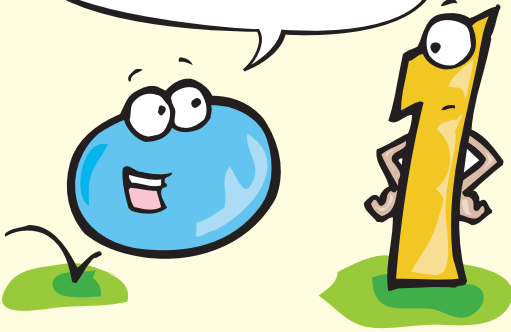
1. According to the story, how many fish went back into the river yesterday?
2. Did he throw back more or less number of fish today? How many fish went into the basket today?
3. Tomorrow, Grandpa has to really think hard before throwing back the fish. There is something special about the numbers 2, 3, 5, 7, .... Can you guess what?
4. How many fish did Grandpa catch today?
5. A prime number is a number that can be divided exactly by two numbers, one and by itself.

1 can be divided ONLY by 1. So 1 is not a prime number. 13 can be divided by 1. It can be divided by 13. So it is a prime number. 15 can be divided by 1, 3, 5, and 15. So it is not a prime number. Can you count the number of prime numbers between 1 and 50?



# Bits and Pieces

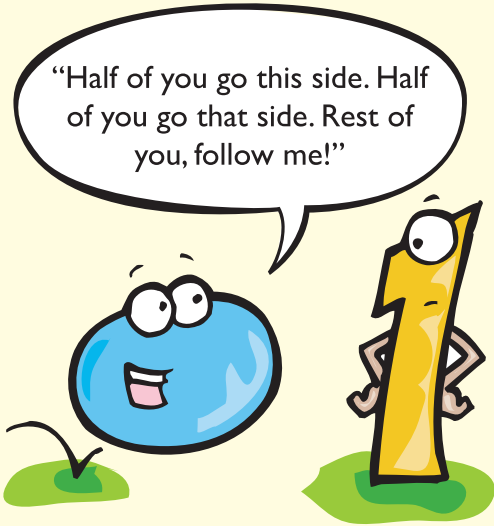
Eka, have you seen the Hindi film 'Sholay'?



There is a scene in the movie that has a jailer telling his officers,



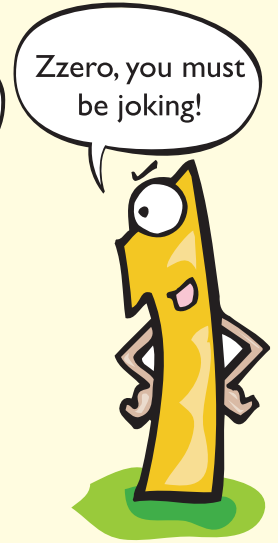
"Half of you go this side. Half of you go that side. Rest of you, follow me!"



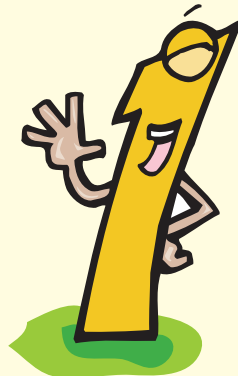
Tell me Eka, how many people followed the jailer?

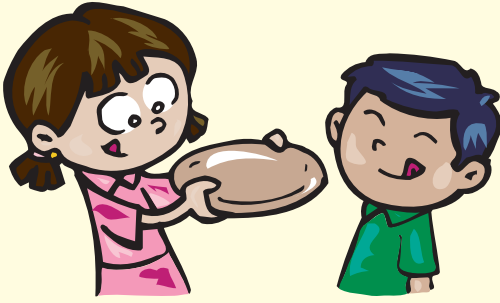


Zzero, you must be joking!



No one followed the jailer. One half plus another half of the same thing makes a full!





Sankhya and Ganith had to share a huge aloo *paratha* for lunch. They both liked aloo *paratha* very much. “Let’s cut it into two. Each of us can have one part,” said Ganith. “You cut it, Sankhya.”

Sankhya was going to fold the *paratha* into two, when her friends Faisal and John walked in. “We want a piece too!” they said.



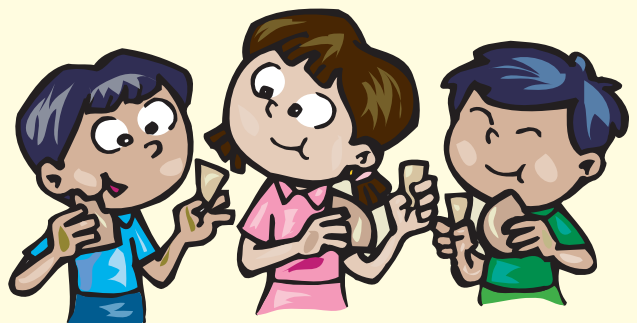
Sankhya and Ganith

would have had  $\frac{1}{2}$  a *paratha* each. Now they would have to have  $\frac{1}{4}$  of a *paratha*.



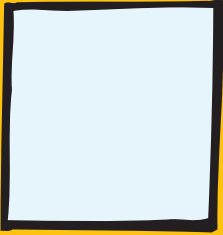
So they had to divide one *paratha* into four equal pieces. After Sankhya had cut the *paratha* neatly into four pieces, John saw a sugarcane piece in the kitchen. “I’ll eat the sugarcane. I don’t want the *paratha*,” he decided.

Sankhya, Ganith and Faisal had a quarter of the *paratha* each. And they cut up John’s quarter into three. What do you think they did with that!

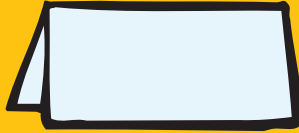


# Fractions are nothing but parts of a whole.

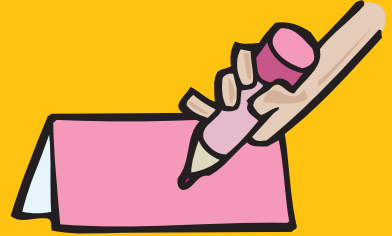
## Try this



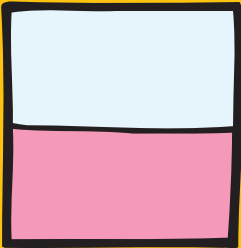
Take a sheet of notepaper.



Fold it in half.



Colour the top flap  
You have coloured half of the sheet.



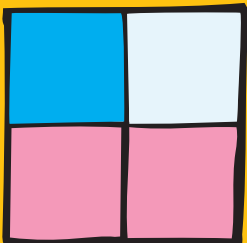
It means you have coloured one part of two equal parts that make up a whole. ( $1/2$ )



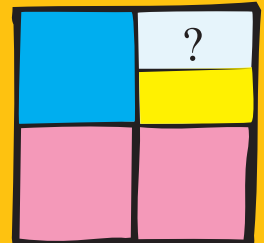
Fold it in half again.



Colour the top in a different colour. You have coloured one part out of four ( $1/4$ ).



Fold the sheet again another time. Colour the top using another colour pencil. Open the sheet out fully and see what fraction you have coloured.





# Shapely Numbers

---



Sankhya watched as Amma made a beautiful rangoli. First she made many dots. Then she joined the dots to make designs.

“Amma, how do you know how many dots to make?”

Amma mumbled something, because she really did not have an answer.

But Zzero has discovered a way to make shapes out of numbers.

Take any number and its next number.  
(Two numbers that have a difference of one are called consecutive numbers)

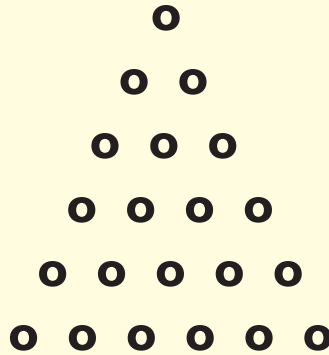
Multiply them and divide the answer by 2.

You can make a triangular number grid with this new answer.

$$6 \times 7 \div 2 = 21.$$



You can form a triangle with 21 dots, starting with 6 dots at the bottom, reducing 1 dot as you go higher, till you have just 1 dot on top.



Or you can start with 1 dot on top, and keep increasing 1 dot in the next line as you go down.

1. Can you tell how many dots you need to make an 8 - decker triangle with dots?

## Try this

Make grids using dots. Then draw funny figures.



# Let's Fly!

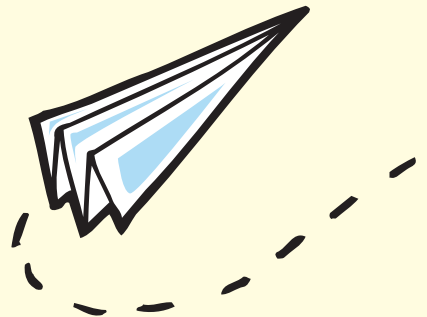


Write a coded message using numbers on a piece of paper. Make this into a paper plane. Send it zooming in the class.

The person on whom the plane lands has to decode the message.

The numbers must represent alphabets.

The numbers that make up one word can be put together with hyphens.



Some students scratched their heads.

Some scratched busily on papers with their pencils. Soon there were different kinds of planes flying in class.



Can you decode some of these messages that 'landed'?

1. 13-29 / 15-29-25-9! (Notice that all the numbers are ODD)
2. 49-29-41 / 1-35-9 / 13-29-29-7.
3. 51-51-9-35-29 / 17-37 / 1 / 15-9-35-29.
4. 28-42-26-4-10-36-38 / 2-36-10 / 12-42-28.

Sankhya and Ganith have made friends with numbers.

Sometimes the 'friends' behave oddly!

But most of the time, they are good!

Look at the numbers around you.

You may find something interesting about them.



# Answers

## Answers to Grains of Rice Page 5

1. 50 grams. If 1 grain weighs  $1/2$  gram, 2 grains will weigh 1gm. How many 2's in 100?  $100/2=50$ .  $50 \times 1=50$ .
2. 199 times. On Day 1, she would have uttered God's name 100 times while offering hundred grains. That would leave 9900 grains ( $10,000 - 100 = 9900$ ).  $9900 \div 100=99$ .  $100+99=199$ .
3. 100 days.  $10,000 \div 100=100$  days.

## Answers to Why do We Need Big Numbers Page 11

1. a) 5 b) 7 c) 6 d) 7 e) 8
2. Less than 5 billion years ago, or 5000 million years ago.  
5,000,000,000 years ago.
3. 109 crores.
4. One third of a second.

## Answer to Everyone in their place Page 13

1. 900. 1945 has 9 hundreds in addition to 1 thousand, 4 tens and 5 units.
2. 5. The sum or total of the three numbers is 3574.

## Answers to Odd Fish Page 19

1. 50. To sell 50 fish, Grandpa would have to catch 100 fish on Day 1. The odd ones went back into the river.
2. Less. He threw back 49 fish. 50 fish went into the basket.
3. They are prime numbers. 2 can be divided by 1 and 2. 3 can be divided by 1 and 3. Four can be divided by 1, 2, and 4. 4 is not a Prime number.

99 fish. When he caught the 99th fish and put it in his basket, he had 50 fish in the basket. So he did not have to catch the 100th fish to throw back!

15 prime numbers. In a grid, write numbers 1 to 50. After 3, cut out all the even numbers (They can all be divided by 1,2 and themselves so they are not prime). Cut out all the numbers that can be divided by 3. (9, 21 etc. They are all divisible by 1, 3 and themselves so they are not prime.) Cut out all the multiples of 5. (Why?) The remaining numbers are prime numbers.

	<b>2</b>	<b>3</b>		<b>5</b>		<b>7</b>			
<b>11</b>		<b>13</b>				<b>17</b>		<b>19</b>	
		<b>23</b>						<b>29</b>	
<b>31</b>						<b>37</b>			
<b>41</b>		<b>43</b>				<b>47</b>			

## Answers to Shapely Numbers Page 24

1. 36.

$$8 \times 9 / 2 = 36.$$

## Answers to Let's Fly 26

1. GO HOME! (Starting with 1 for A, 3 for B.....51 for Z)
2. YOU ARE GOOD.
3. ZZERO IS A HERO
4. NUMBERS ARE FUN. (2 for A, 4 for B.....52 for Z)



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Mala Kumar is a journalist, writer and editor based in Bangalore. Her stories for children have won awards from Children's Book Trust. She discovered her love for teaching while conducting non-formal workshops in mathematics in schools, using the day's newspaper instead of text-books.



Angie is a graphic designer and in her spare time loves to keep busy with ceramic. Upesh is an animator who collects graphic novels and catches up with alternate cinema in his spare time. Together they form 'The Other Design Studio'.

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