ELECTION IN THE NUMBER WORLD

by Frederique

Pictures/Design
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Some of my best friends are numbers. I enjoy talking and playing with them. Almost every day I meet new numbers and together we organize interesting games; I have become very popular.

For my tenth birthday they unanimously elected me Honorary Citizen of the World of Numbers and gave me a marvelous medal coined in my name. It was one of the high points of my life.

Each day my friends send me their newspaper. I always read it with pleasure, and very often with excitement.

Right now the World of Numbers seems to be having a crisis. They are discussing problems which are very important for the future.

1
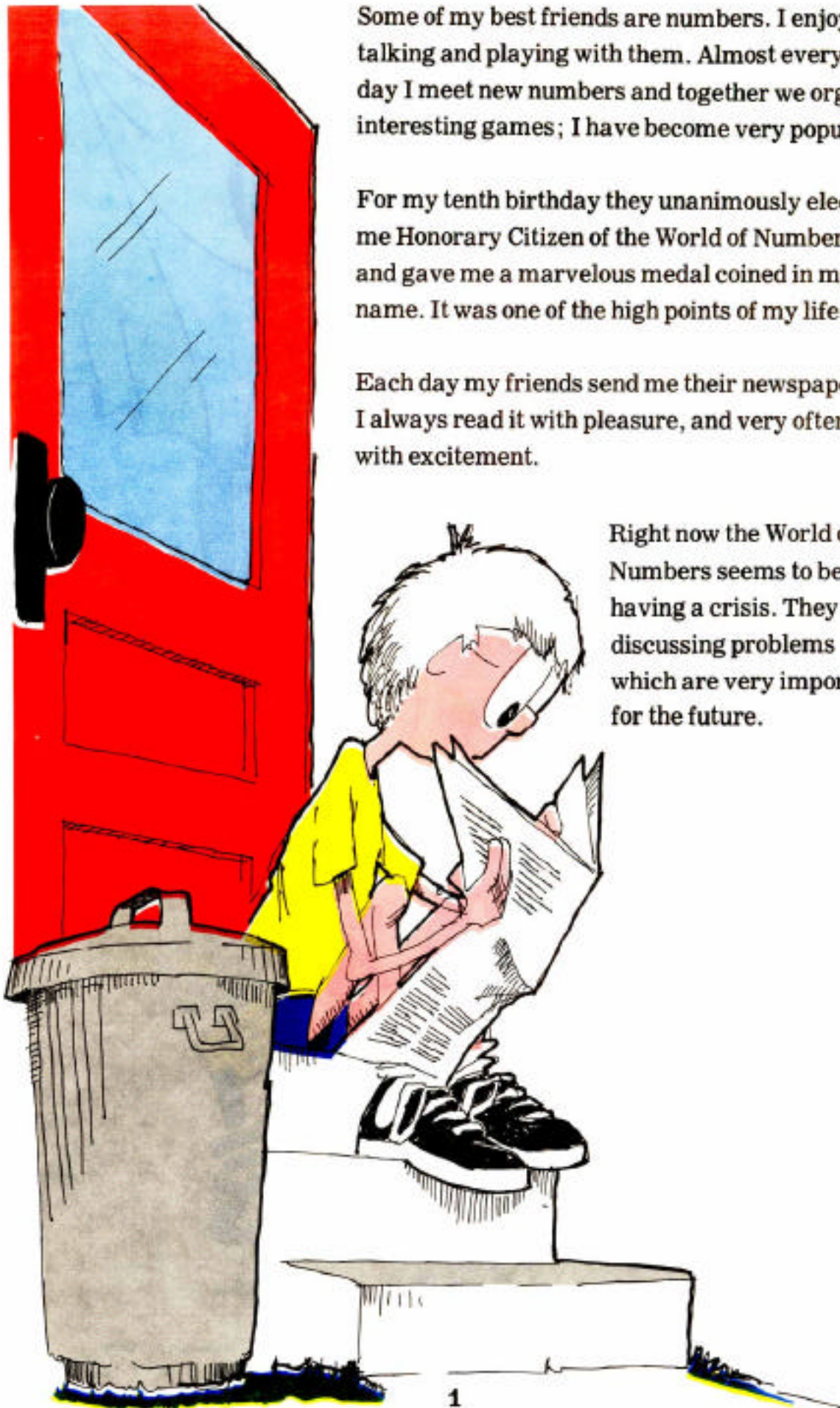
As you probably know, there are different ways of writing numbers. The most well known ways of writing numbers are the decimal, the binary and the fractional. On many occasions it is very confusing.

So, the political leaders of the numbers suggest that just one way of writing be used. But, which way should be chosen? That's the question which is discussed day after day in their newspaper and in their Parliament.
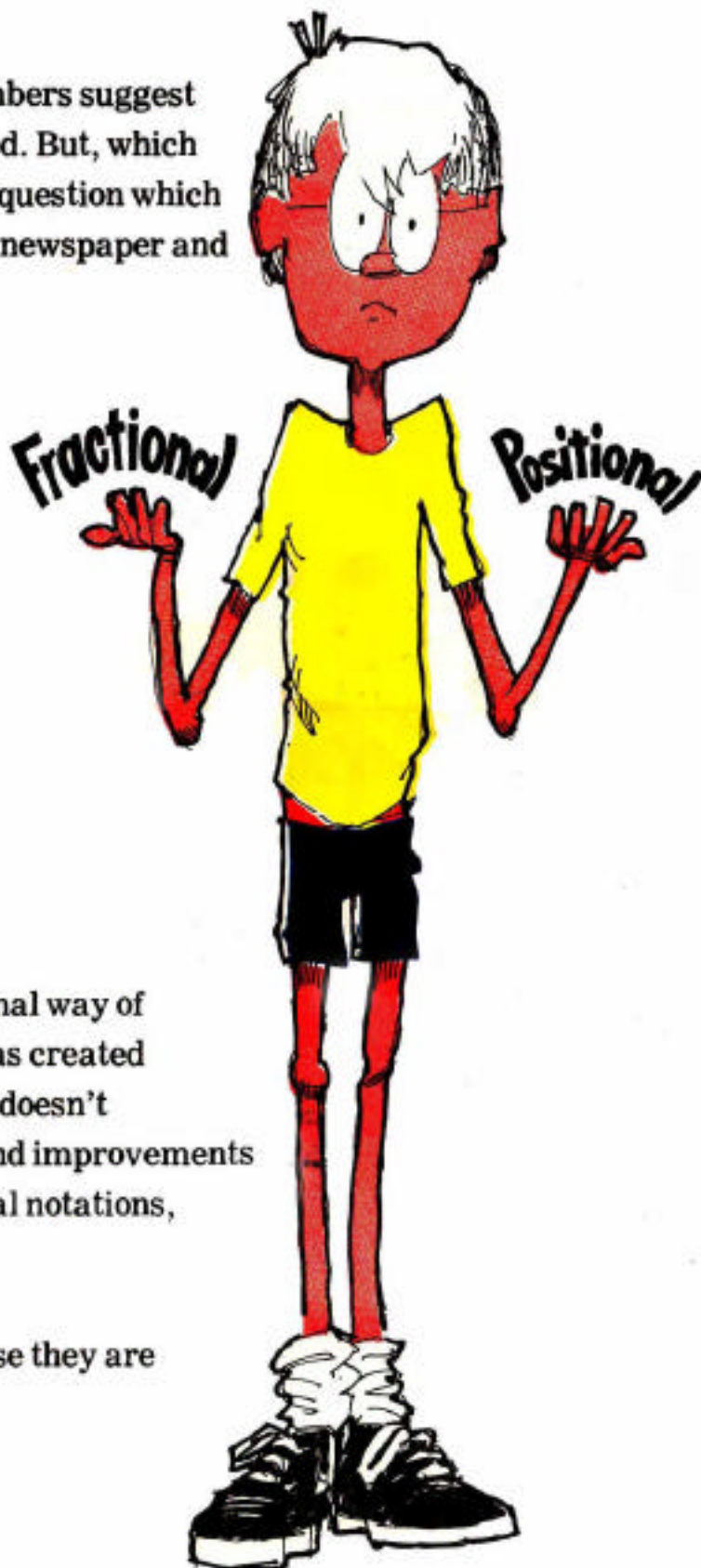
Many numbers respect the fractional way of writing because it is very old; it was created several thousand years ago. But it doesn't share the important advantages and improvements of the decimal and binary positional notations, which were introduced later.

Publishers dislike fractions because they are difficult to print.

The binary writing is becoming more and more important in the modern world and is especially useful for understanding computers and many other technical devices.

The most radical numbers fiercely support the binary system because they think it is the writing of the future. But many numbers recommend the decimal writing which is so popular with the people all over the world.

Next week, the Numbers' Parliament will hold a final discussion and then a vote will be taken.

As you can imagine, supporters of each method are very busy putting up posters and making speeches in favor of their method.

This afternoon, I met my little friend 1/2 who is very disturbed by the battle.

"Some months ago," he cried, "I found out that **1/2** was not my only name. Little by little, I got acquainted with some of my other names.

$$\frac{64}{128}$$

$$\frac{32}{64}$$

$$\frac{1}{2}$$

$$\frac{16}{32}$$

$$\frac{2}{4}$$

$$\frac{8}{16}$$

$$\frac{4}{8}$$
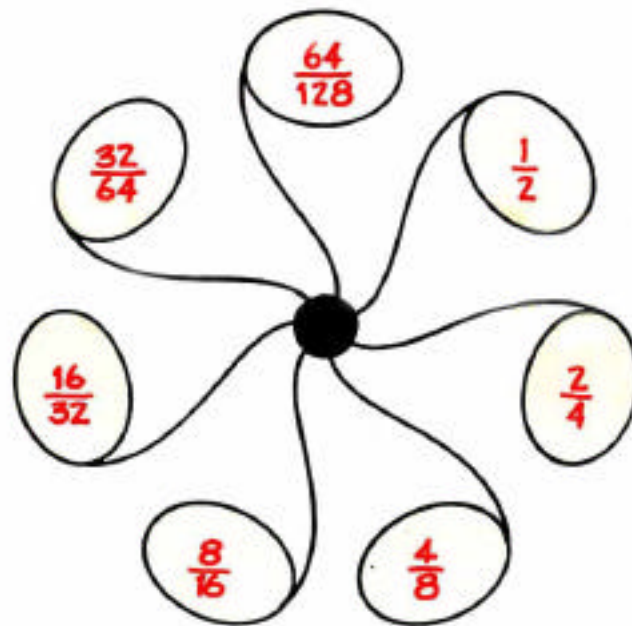
"But all of these are fractional. Now I might have to change my name again. Really, I just can't take it. I am too unhappy." And he sobbed more and more.
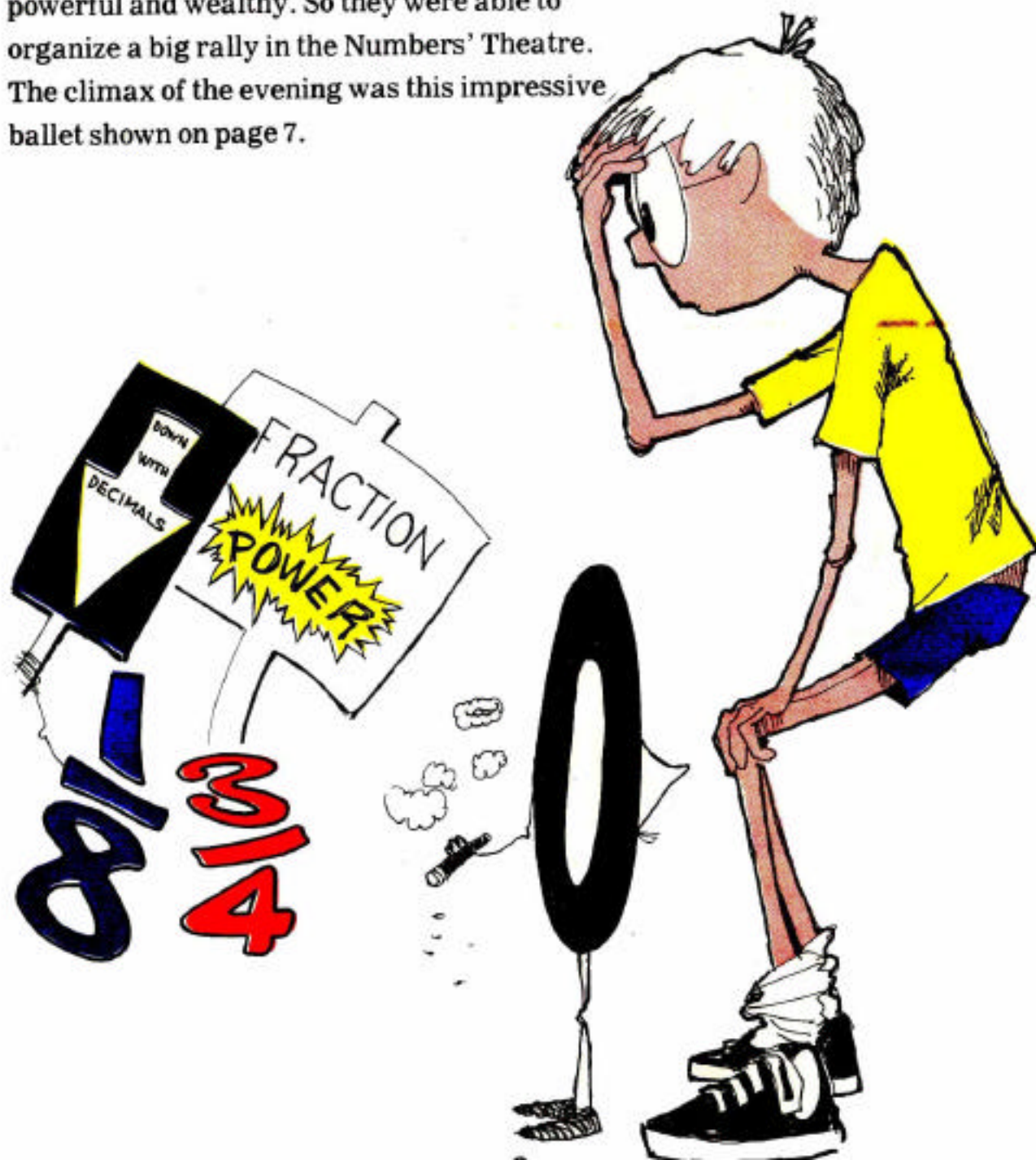
Many of his friends 1/4; 2/3; 11/7; 8/15 and 17/11 gathered around 1/2 and tried to comfort him. "Instead of crying," they said, "let us join in the fight." And they pasted this large poster on a wall.

Zero was smiling as he looked at them. "I am
not emotionally involved in this affair," he said
to me. "However the decision comes out, I
shall still be called **0**."

But he added, "In my opinion, the supporters
of the fractional writing will certainly be the
losers. It is nonsense to defend such an old-
fashioned way of writing."

The supporters of the decimal writing were very
powerful and wealthy. So they were able to
organize a big rally in the Numbers' Theatre.
The climax of the evening was this impressive
ballet shown on page 7.

.00000000000001

.000000000000001

.0000000000001

.00000000000000001

.000001

.0000000001

.00001

.00000000001

.0001

.0000000000000001

.0000001

.001

.0000001

.00000001

.000000001

.01

.000000001

All the leaders of the decimal writing movement
took part in this dance, and they received
thunderous applause.

.1

1

10

100,000,000

100

1,000,000,000

10,000,000

1,000

10,000,000,000

1,000,000

10,000

100,000,000,000

1,000,000,000,000

100,000

1,000,000,000,000,000

100,000,000,000,000

10,000,000,000,000

10,000,000,000,000,000

7

The supporters of the binary writing were very
enthusiastic. But their task was difficult because many
numbers didn't understand this new writing.

Lectures were organized to explain the binary
system and to show its usefulness in various
fields of modern life.

Unfortunately, many numbers are lazy and set in
their ways. Only the most creative ones went
to the lectures and were convinced by the
arguments.
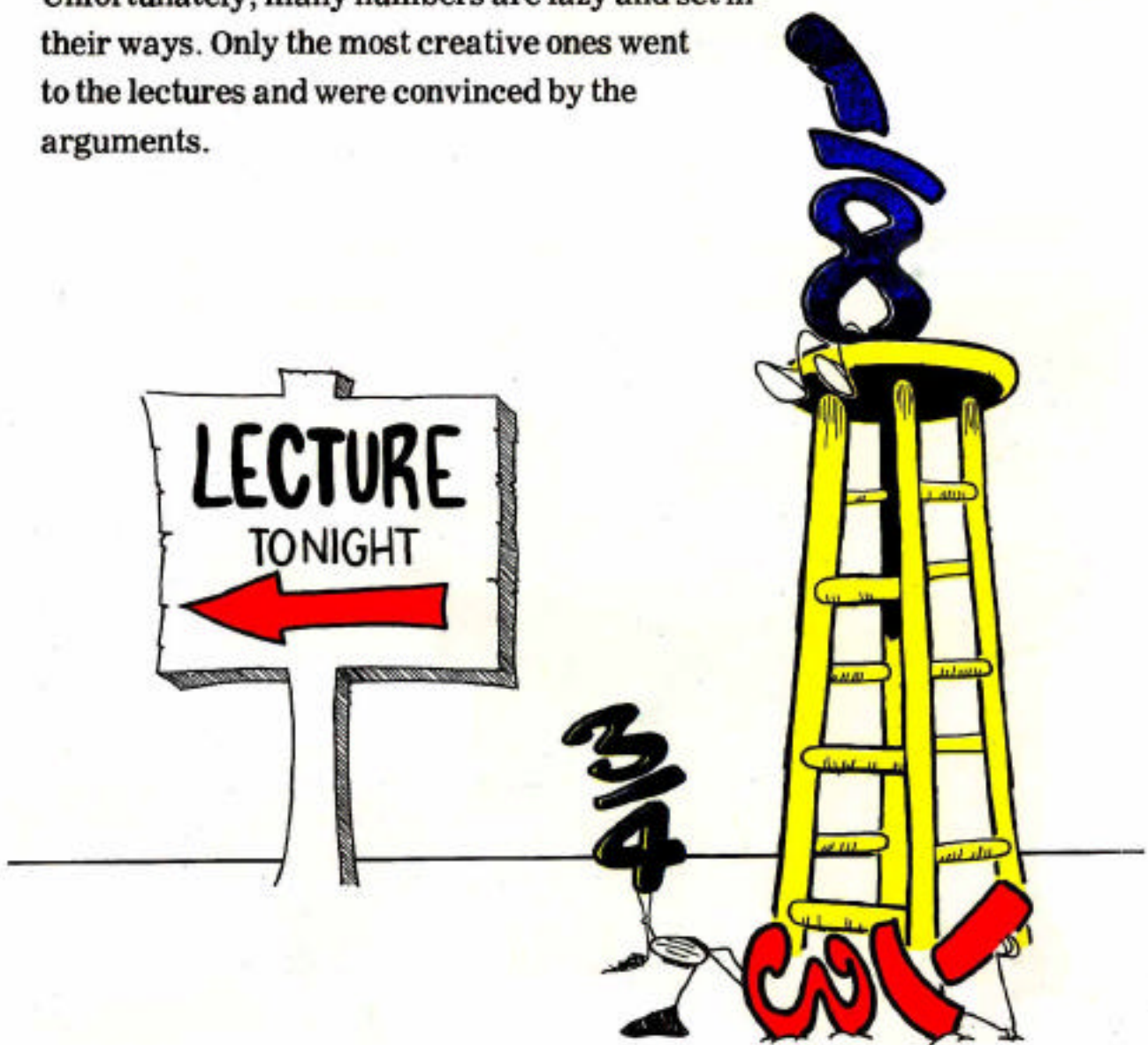
This morning, I was not surprised to learn from
the Numbers' newspaper that their Parliament
had adopted the decimal writing by a very large
majority.

For the decimal writing	95%
For the binary writing	4.7%
For the fractional writing	.3%

Before the end of the year,
all the numbers will
have to present themselves
at the City Hall in
order to be registered under
their decimal names,
which are now the only
official ones.
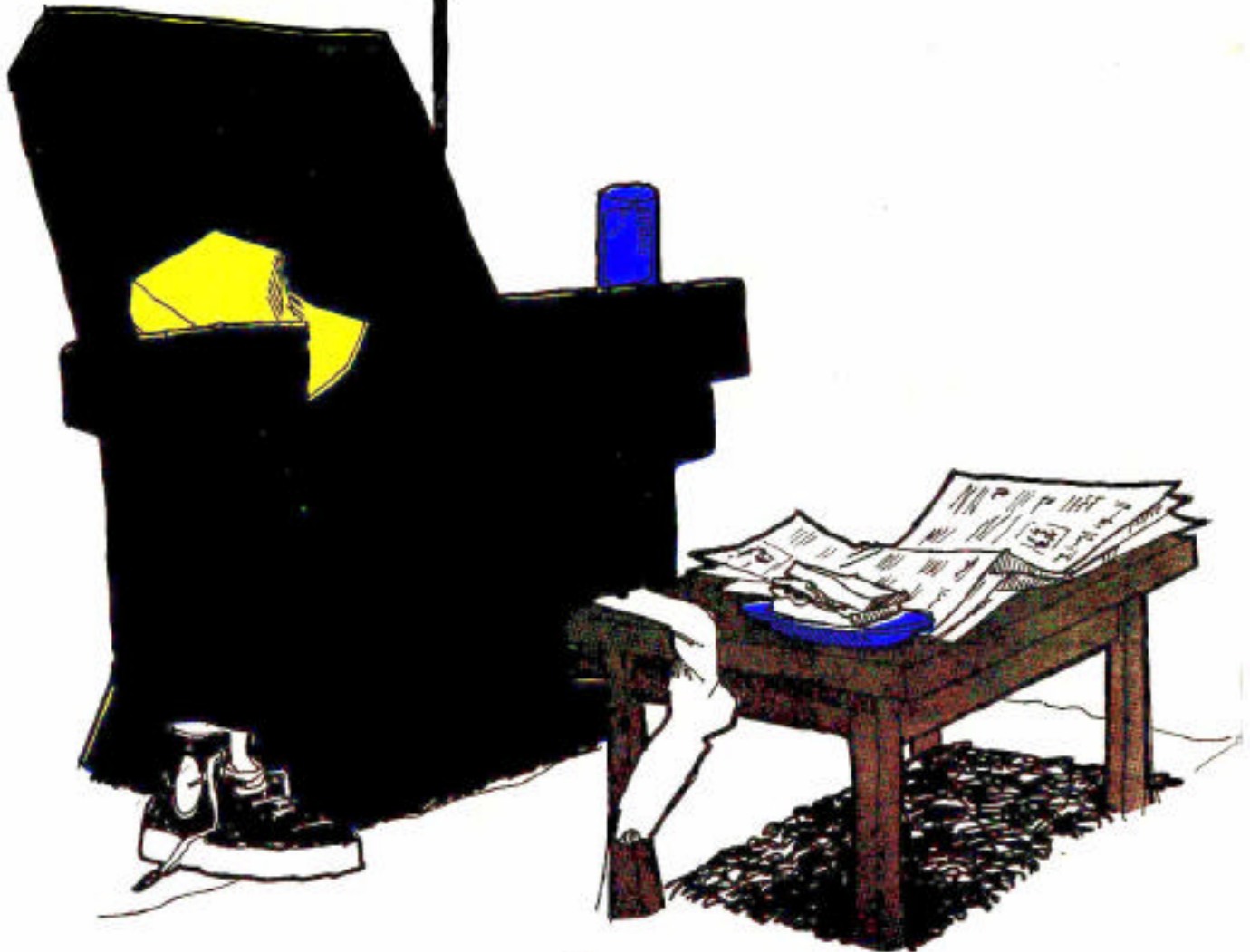
My friend .1 was one of the receptionists. He
showed 1/2 to the first office. The number 10 was
in charge. He had on his desk a large red-and-yellow
ruler with two kinds of graduations, one on
the yellow side, the other on the red side.

He smiled as he looked at 1/2.

"Your problem is very easy to solve," he said,
and he marked a dot on the yellow side of this ruler.

CAN YOU PUT A DOT ON THE YELLOW SIDE
OF THE RULER FOR THE NUMBER 1/2?
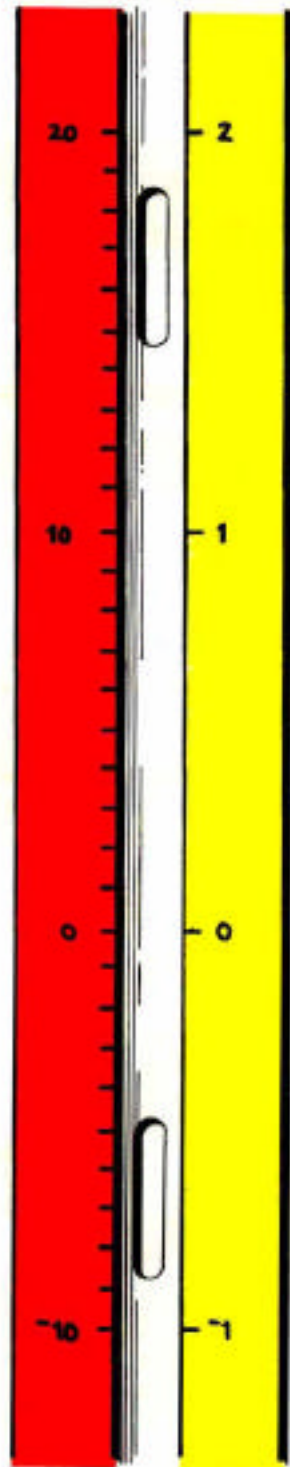
"Look," said 10 to 1/2, who was shivering. "Your dot is halfway between the yellow **0** and the yellow **1**, and just across from the red **5**. So your official name will be

.5

He wrote my friend's name in a large notebook and we went out.

"When we are alone together," said .5, "I would prefer it if you would still call me **1/2**." I promised him that I would.
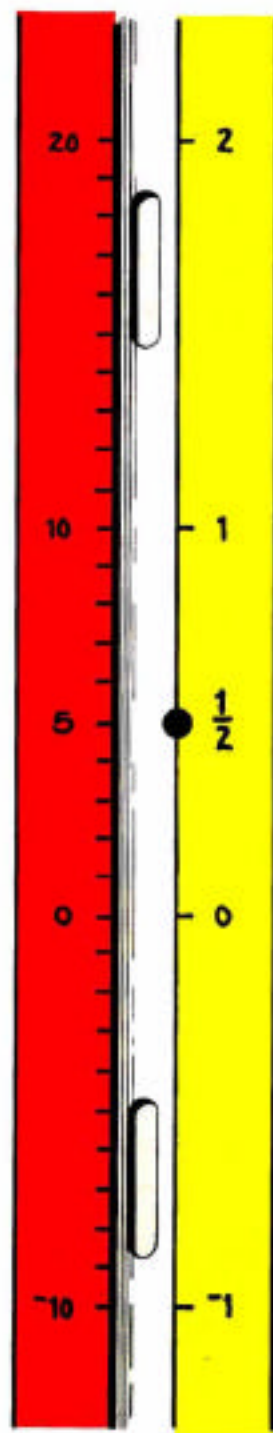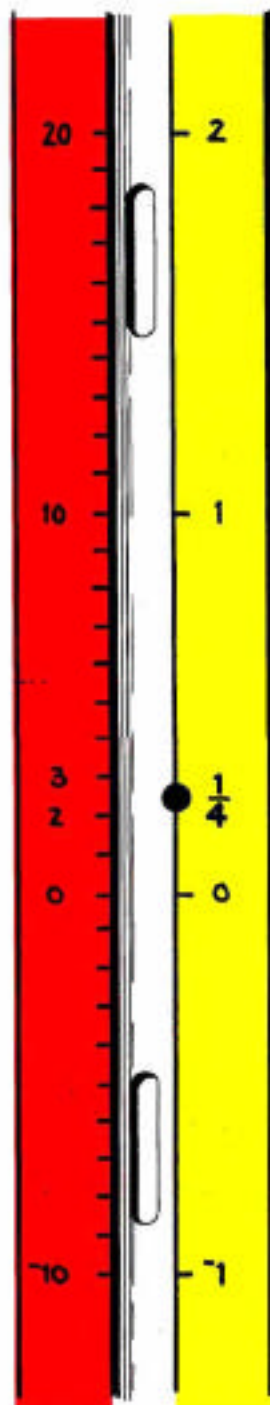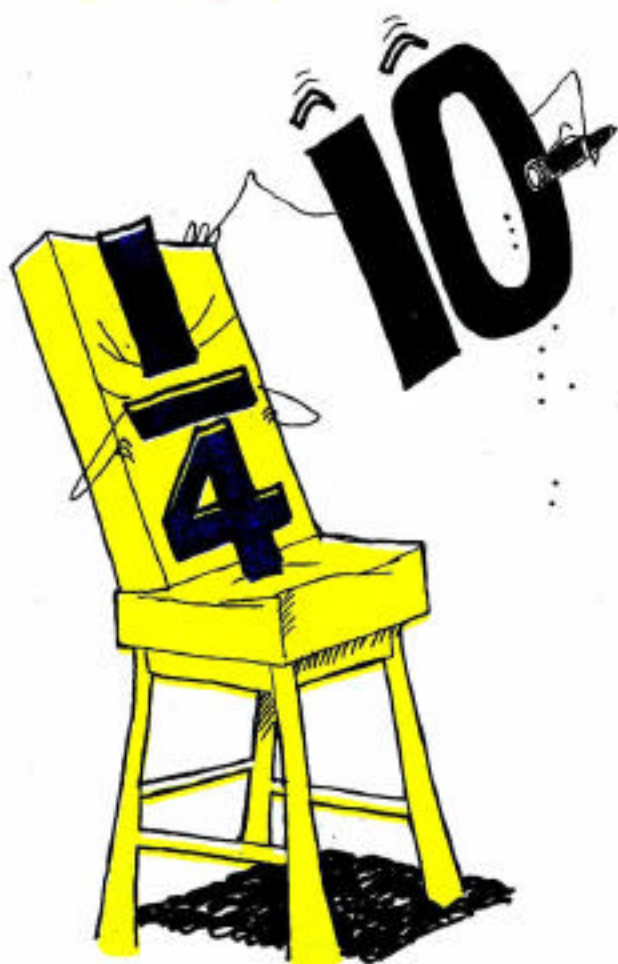
$$\frac{1}{2} = .5$$

Next, it was 1/4's turn. When he was taken to
10's office, 10 looked at him with raised eyebrows.

"I don't think that I can solve your problem,"
he said. "Look, I have drawn a dot for you on the
yellow side of the ruler, but you are not across
from any mark on the red side. You are between
the red **2** and the red **3**. You will have to go
to the next office."

1/4 went out, very disappointed.

The number 100 was in charge of the next office.

He smiled as he looked at 1/4.

"I believe I can solve your problem without too much trouble," he said, as he looked at his large ruler.
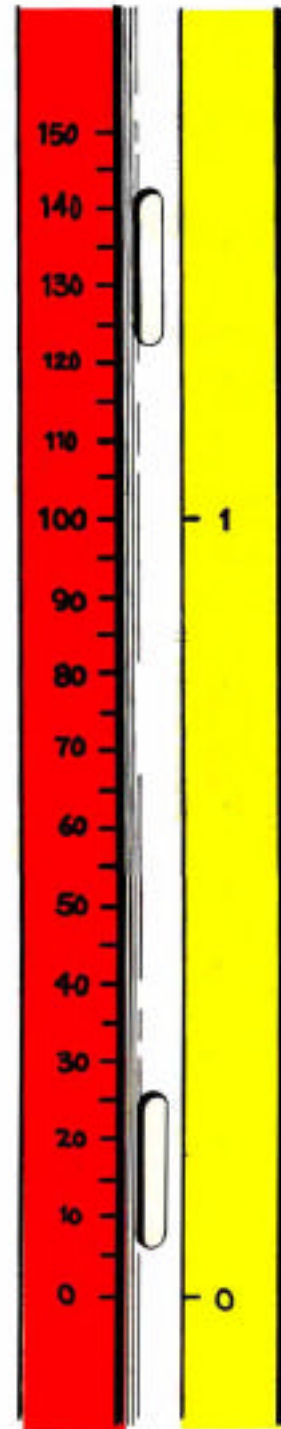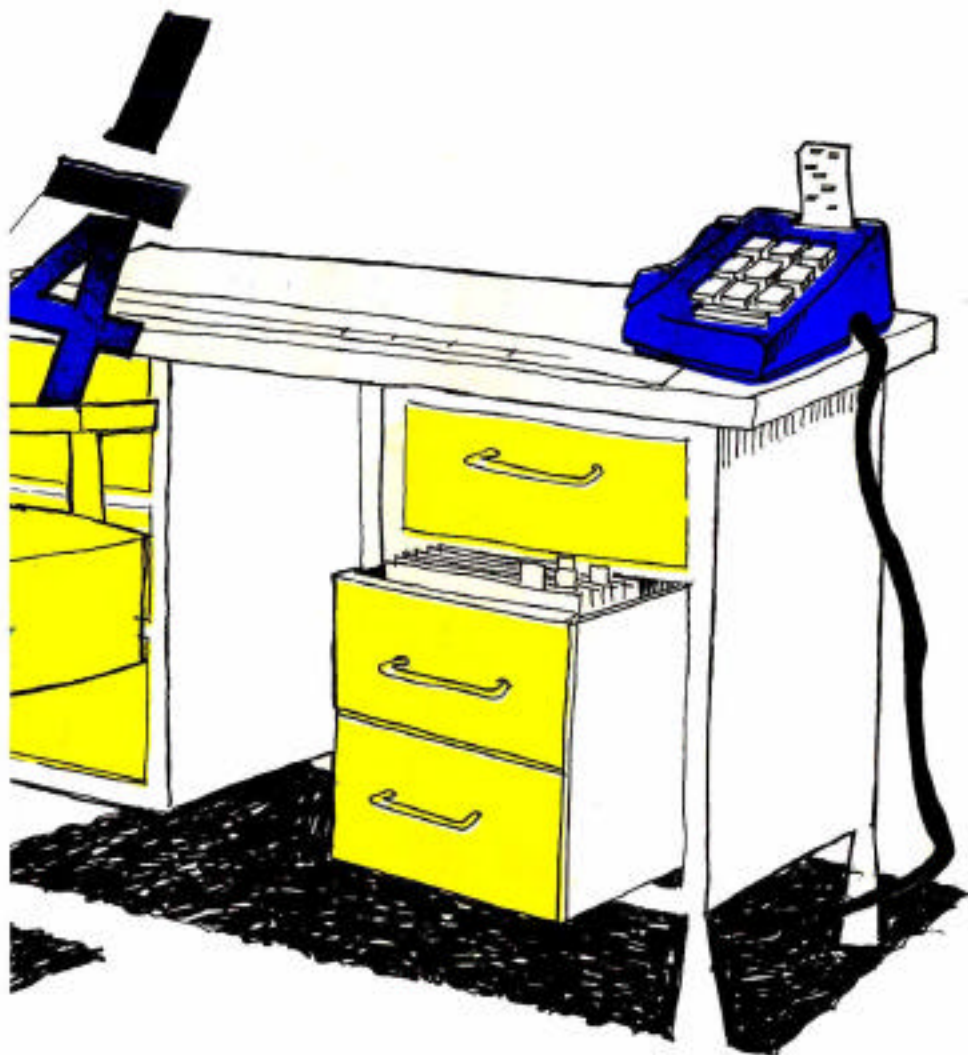
"The red side of your ruler is not exactly the same as the red side of 10's ruler," I observed. "This time, the red **100** is just across from the yellow **1**."

"That's right. Let us mark a dot for 1/4 on the yellow side," he said.

15

CAN YOU DRAW A DOT
ON THE YELLOW SIDE OF
THE RULER FOR

$$\frac{1}{4}$$ **?**

16

100 drew this dot.

"I am just across from the red **25**," observed 1/4 happily.

"That's easy to understand," I thought, "because $4 \times 25 = 100$."
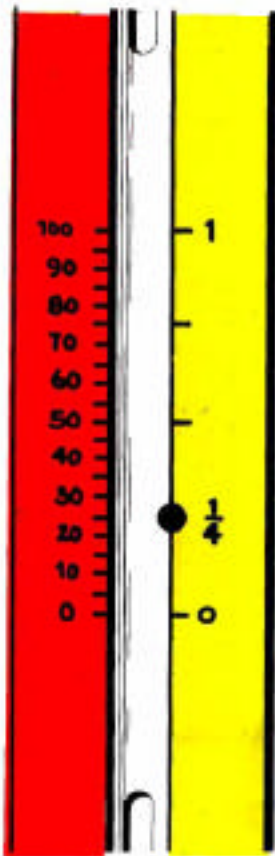
"I'll let you guess your name," said 100.

1/4 remained silent for a long time. Suddenly, he shouted,
"I know it! It is

.25

"Very well done," 100 said approvingly.

"I like my new name," said 1/4, a very optimistic
fellow indeed.

$$\frac{1}{4} = .25$$

The problem of 1/8 was not solved so quickly. He was sent from 10's office to 100's office and from 100's office to 1,000's office.

He was getting a little nervous. But 1,000 received him in a very friendly way and took out his large ruler. The red side of his ruler was different once again. This time the red **1,000** was right across from the yellow **1**.

"Look," said 1000. "I have put a dot for you on the yellow side of the ruler. Now you can easily guess your name."
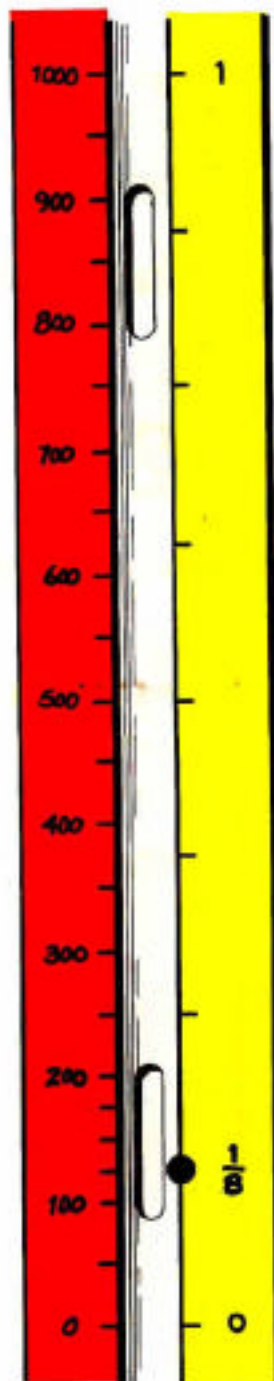
WHAT DO YOU THINK 1/8's DECIMAL NAME IS?

"I am right across from the red **125**," observed 1/8.

"That's not difficult to understand," I thought, "because $8 \times 125 = 1,000$."

"Can you find your name?" asked 1,000.

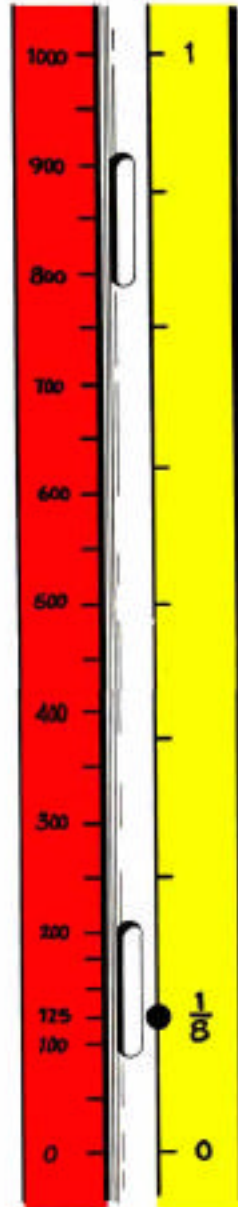1/8 was thoughtful.

"Easy!" he shouted. "I will be called

.125

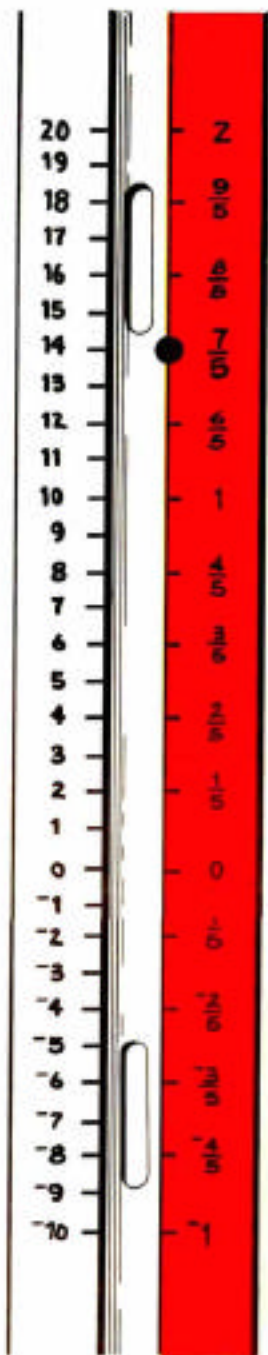"What an interesting name," he added. "I like it better than my old one."
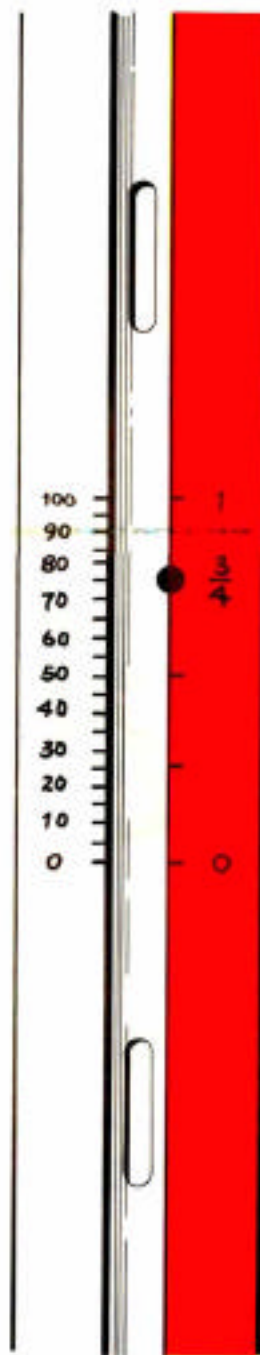
I was relieved and I shared the happiness of my friend.

$$\frac{1}{8} = .125$$

I shall not tell you the adventures of my friends 3/4 and 7/5, because you can easily imagine them by looking at these pictures.

$$\frac{7}{5} = 1.4$$

$$.75 = \frac{3}{4}$$

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After such a busy day, I had a restless night. I dreamt that each of the numbers 10; 100; 1,000; 10,000; 100,000; 1,000,000 and so on, was in a chicken coop surrounded by many angry numbers.

I was still very sleepy when the doorbell rang early in the morning. It was my little friend .5 again. He was very excited.

"The number 1/3 is quite upset," he told me. "Yesterday evening I called him to explain how easily our problems were solved. So this morning he went to the City Hall, very relaxed. But things are not going very well for him. He is being sent from office to office. Nobody seems to be able to solve his problem."

.5 sketched the pictures on pages 23 and 24.

"In 10's office, they couldn't help him," he said, "because his dot on the yellow side of the ruler was between the red **3** and the red **4**."

"In 100's office, the situation was no better. His dot on the yellow side was between the red **33** and the red **34**."

"I understand why," I thought, and I wrote in my notebook:
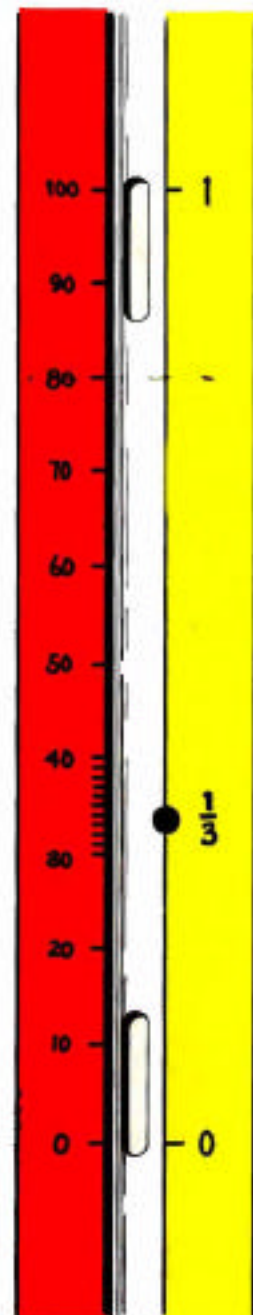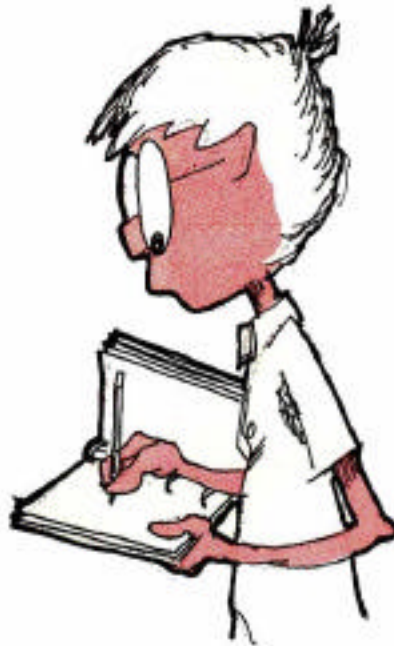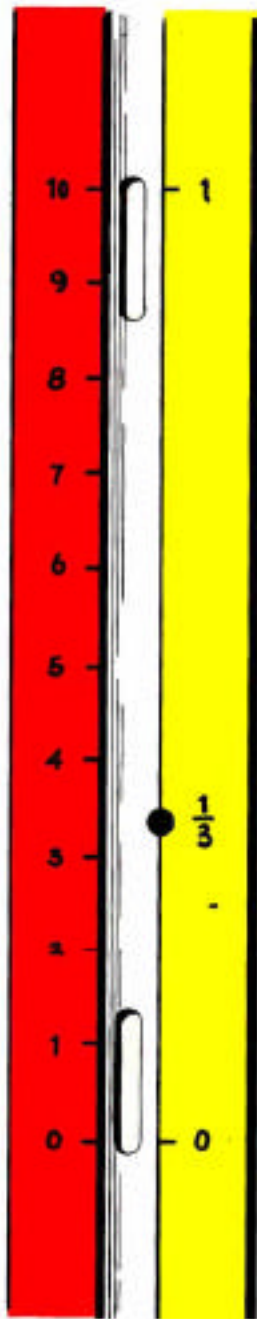
3 X 33 = 99
3 X 34 = 102

"In 1,000's office, he still had the same bad luck. His dot on the yellow side was in between the red **333** and the red **334**."

1000
900
800
700
600
500
400
300
200
100
0

1

$\frac{1}{3}$

0

3 X 333 =   999
3 X 334 = 1,002

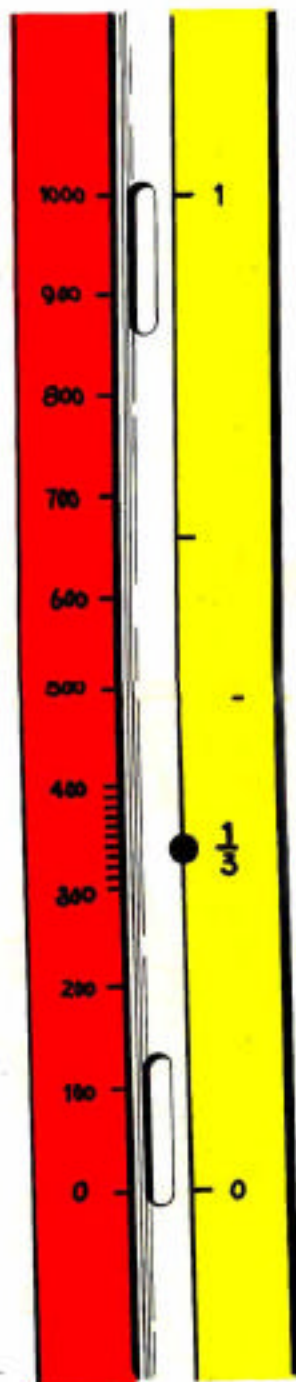"Afterwards, 1/3 went to see 10,000; 100,000 and 1,000,000, but none of them could solve his problem. Then 1,000,000 who is very old and wise, advised him to consult 0 in the Complaints Office."

Little .5 added, "I know that 0 is one of your best friends. Would you be willing to go with 1/3, who is too upset to go by himself?"

"With pleasure," I answered. I was very happy to meet 0 in his new office.

0 welcomed us with a large smile. "Don't worry," he said to 1/3. "I can help you to solve your problem. But it is useless going to the other offices, because in none of them will you find your name. On their graduated rulers, you will be between

3,333,333	and	3,333,334
33,333,333	and	33,333,334
333,333,333	and	333,333,334
3,333,333,333	and	3,333,333,334

and so on, forever."

The number 1/3 looked very frightened. "So, I shall not have any official name," he said sadly. "How can I live without an official name? I shall not be able to buy a car or a house. At the bank, they will refuse to open an account for me." He was getting desperate.

"Be a little patient," advised 0 , "and listen to me. You will have a name, but your name never ends. You will be called

.33333333333333333333333333333333 and so on.

In other words, after each **3** , there is another **3** , and so on, forever."

1/3 listened in amazement.

"But it is not possible to write such a name," he objected. "No notebook will be large enough. I will have to spend all my life writing my name, and I shall never be able to write it completely."

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"That's right," said 0. "But I have studied your problem carefully and found a very simple solution."

1/3 became very attentive.

"Your name will be written in this way:

$$.\overset{\star}{3}$$

The figure **3** with the little star on its head is an abbreviation for a never ending list of **3** 's.

In fact, $.\overset{\star}{3}$ is a kind of nickname. But your nickname clearly shows what your official name is."

"Yesterday, I had to solve a similar case for the number 1/7," he added. "Like you, 1/7 was very upset when he learned that his official name was

.142857142857142857142857142857142857 and so on.

In his name each **142857** is followed by another **142857** and so on, forever."

"Can you guess a nickname for 1/7?" asked 0.

After thinking for a few minutes, 1/3 smiled and wrote:

$$\frac{1}{7} = .\overset{\star}{1}428\overset{\star}{57}$$

.3 was relieved and so was I. "Thank you very much for your help," he said. "You have practically saved my life."

"You are welcome," answered 0 who seemed to be very happy.

On our way back, we met .5 who was waiting for us outside the City Hall with some of his friends. We shared the good news with them.
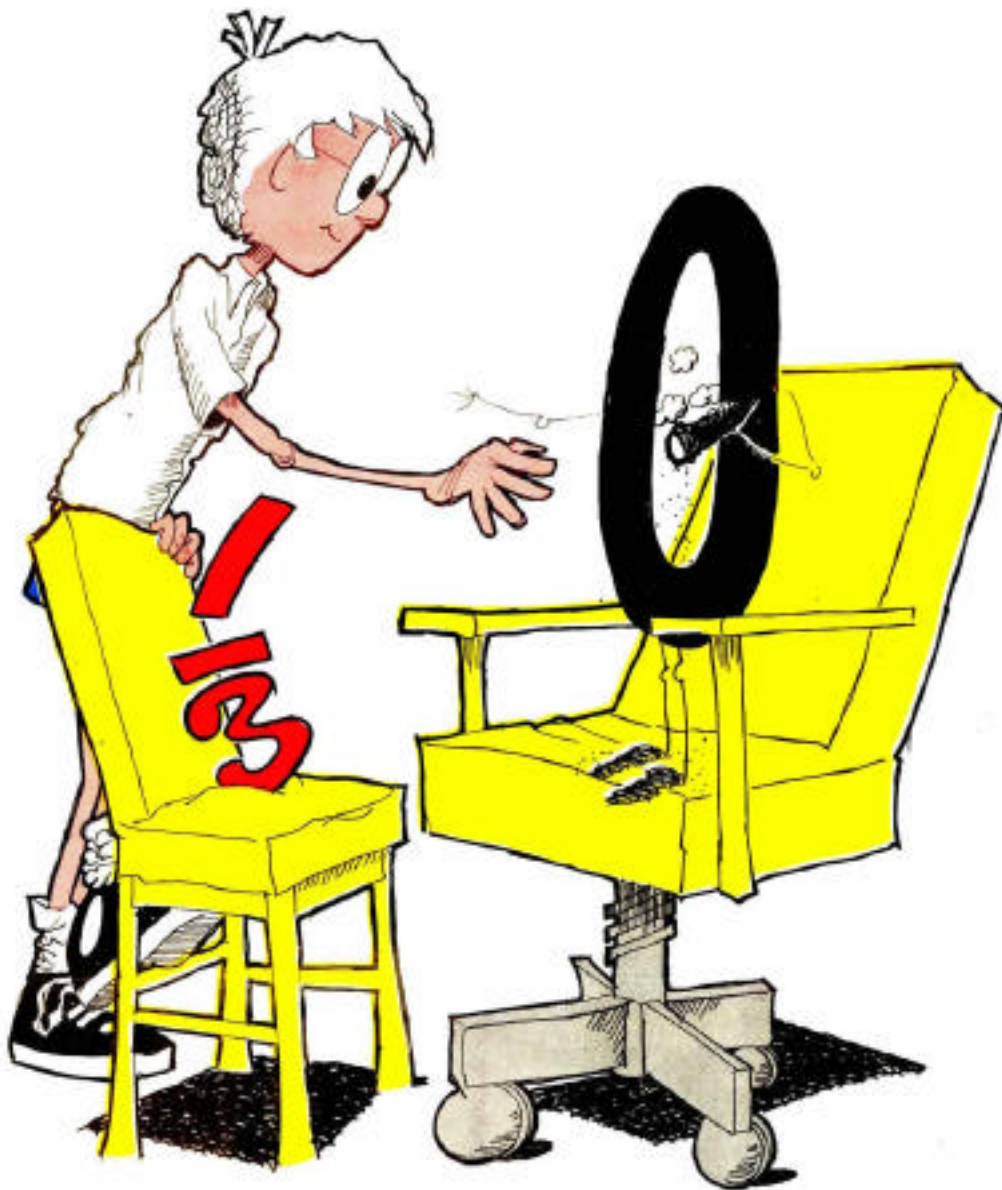
The next Sunday, I was invited by the number .3̂
to a big party. A lot of my friends were there, in
particular

.3
.33
.333
.3333
.33333
.333333
.3333333
.33333333
.333333333
.3333333333
   and so on.

They were talking excitedly together.

After some drinks, 0 announced, "To share
the happiness of our host, who is very proud of
his new name, some of our friends have created
a new dance in his honor. He will be the star
of this dance."

A band including all the whole numbers began to
play and we watched this marvelous ballet. We
cheered and clapped loudly.

.3

.33

.333

.3333

.33333

.333333

.3333333

.33333333

.333333333

.3333333333

.33333333333

.333333333333

.3333333333333

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.333333333333333333

.3333333333333333333

.3

30
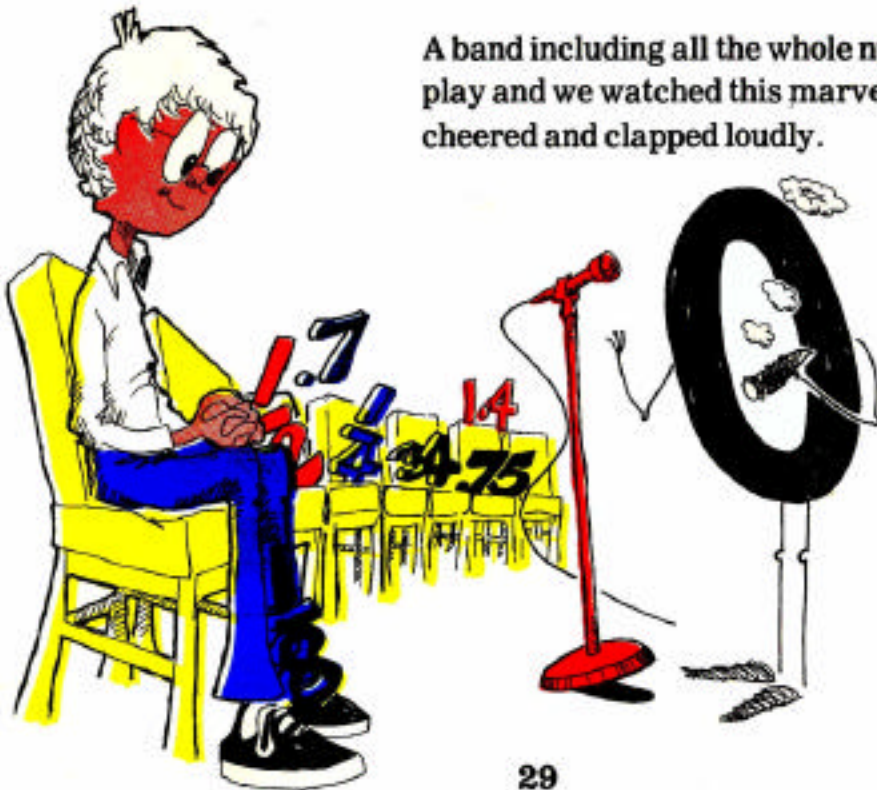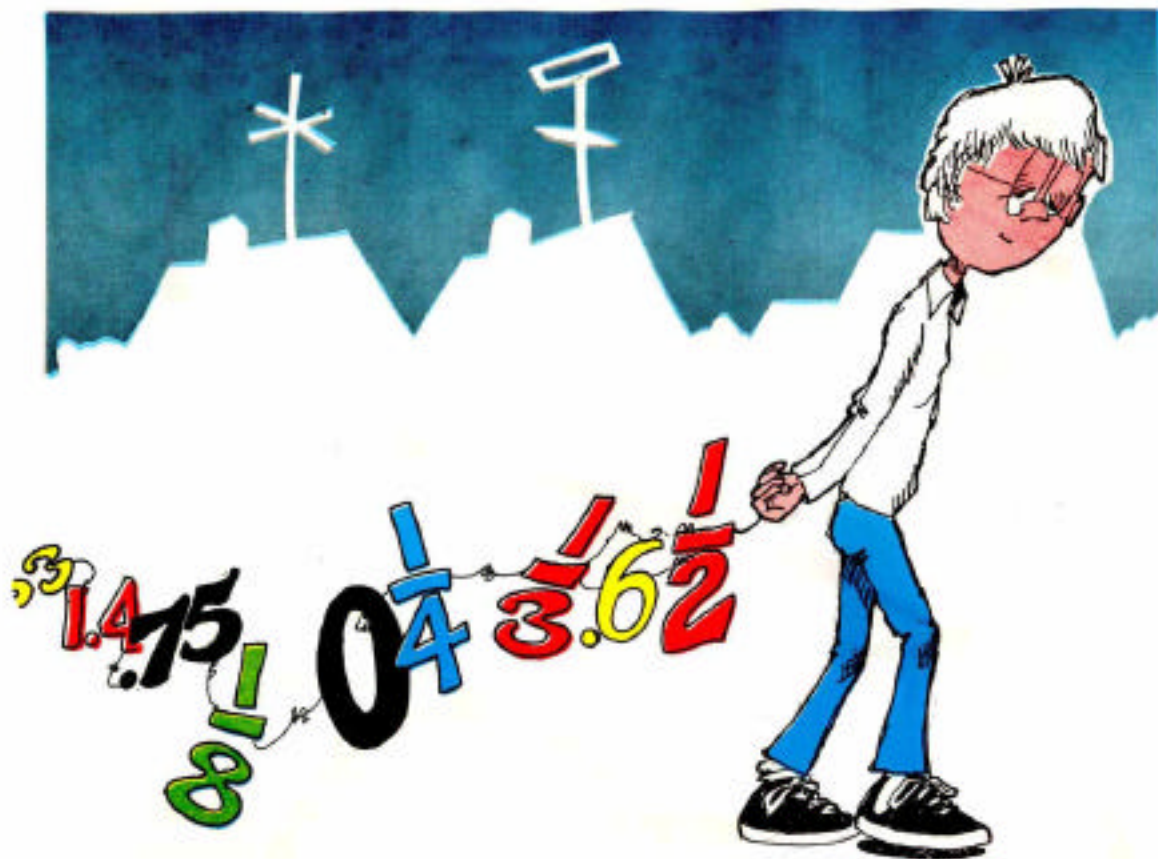
At the end of such an exciting day, we were completely exhausted and we all went home to bed.

With an overwhelming majority the Numbers' Parliament has enacted legislation requiring the decimal way of writing numbers. This means, of course, that all the numbers have to register at the City Hall using their decimal names. Many numbers, such as 1/2, 1/4 and 1/8, are greatly distressed about this because they had grown up believing that their fractional names were perfectly adequate. To their relief, they discover that assuming their decimal names does not present such an upheaval as they had feared.

The situation is not so simple in the case of 1/3, however. He is sent from office to office at the City Hall, and no one seems to be able even to tell him what his decimal name is. Fortunately, the Complaints Office is run by 0, who carefully explains why 1/3 is having such problems, and promptly provides him with a manageable nickname.

"Election in the Number World" is a story which will capture the young reader's attention and involve him deeply in a situation that emphasizes the relationship between the fractional and the decimal ways of writing. Thus a painless - indeed, enjoyable - introduction is made to the full decimal positional system of numeration.

Edward Martin

Stories by Frederique

Age 5 to 8

81 Roses
I Am A Very Happy Boy
One Out of Seven
The Happy Puppet
The Old Shoemaker
Two by Two
The Little Dreamer
The Little Donkey
The Magic Box
The Baby Is Born

Age 8 to 12

Where's My Nose?
Singing Friends
Dancing Friends
The Living Lines
I Am Not My Name
Nabu Wins An Award
The Square Trap

Age 10 to 14

The Hidden Treasure
A Very Strange Neighborhood
Election in the Number World
A Valentine Mystery

Comprehensive School Mathematics Program