The CSMP Library

MATH STORY-WORKBOOKS

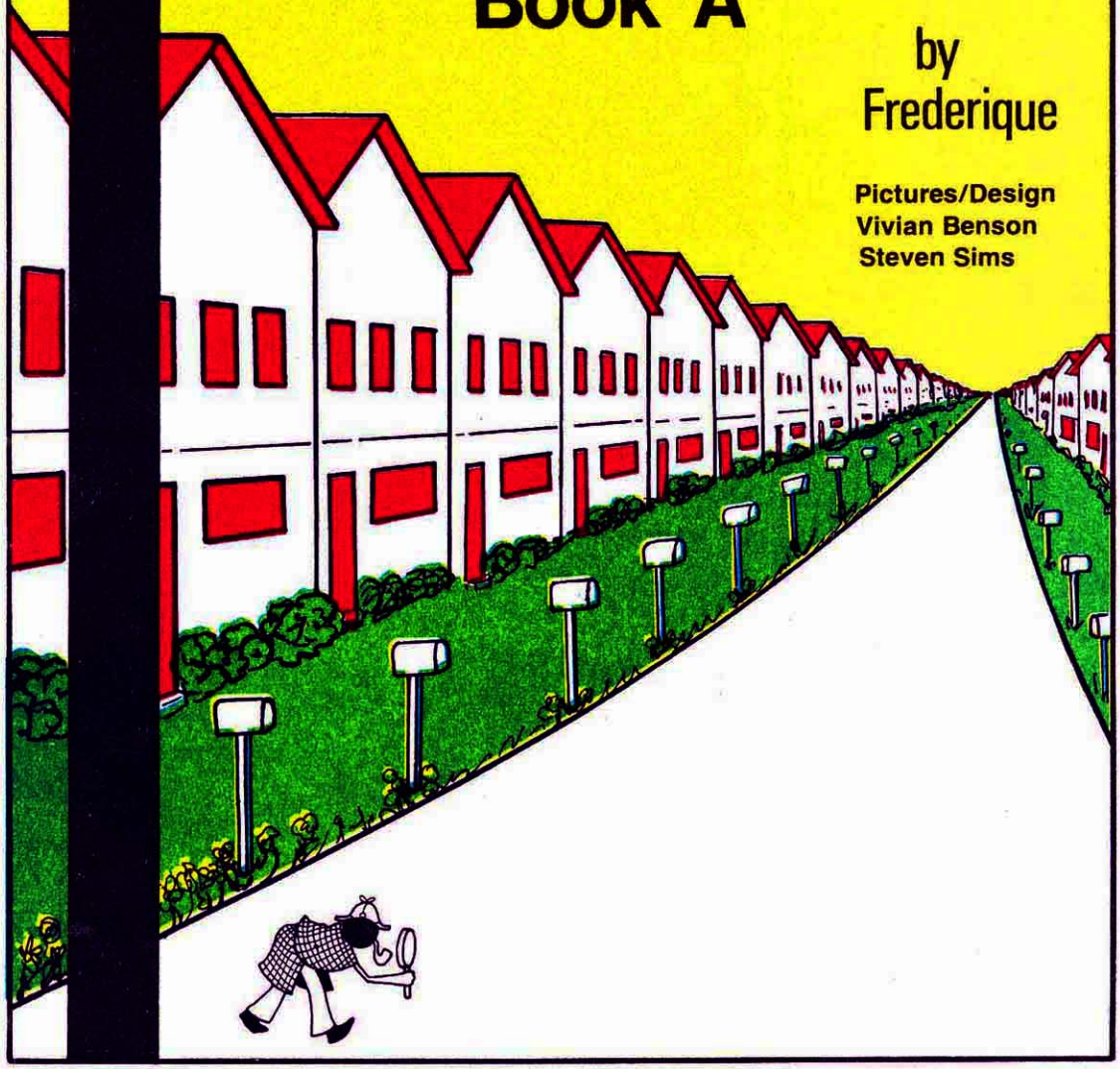
4-22701

CLINTON STREET

Book A

by
Frederique

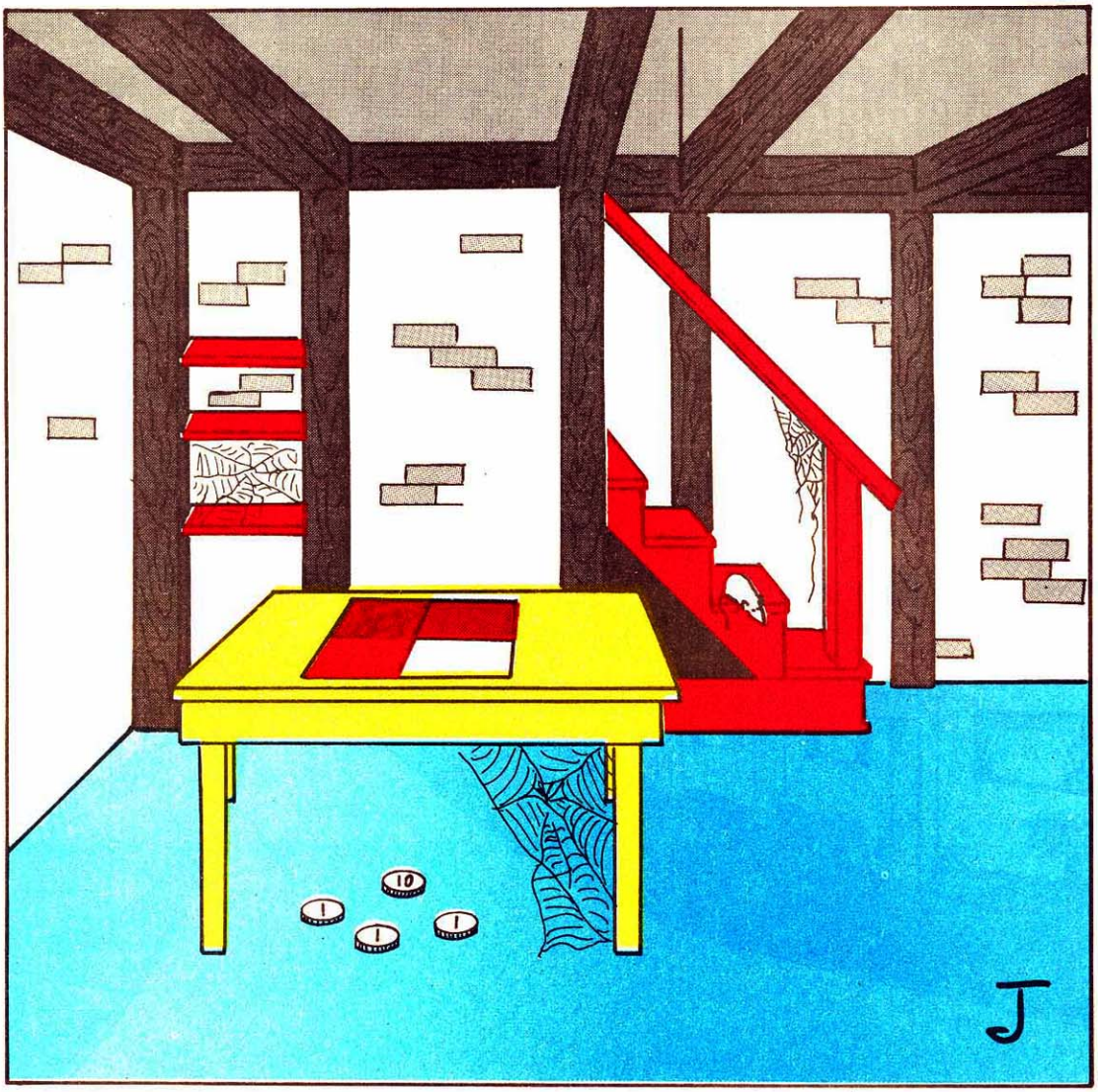
Pictures/Design
Vivian Benson
Steven Sims



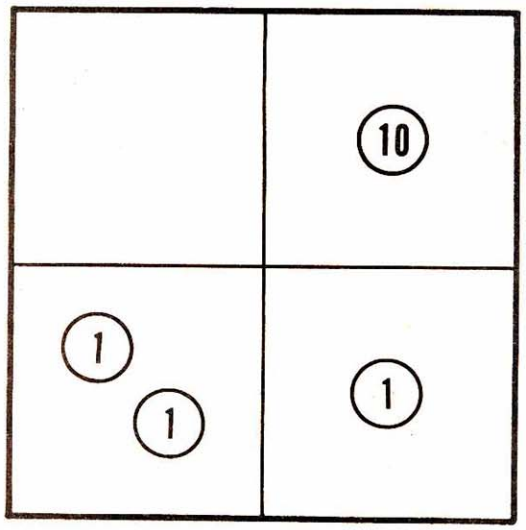
70
72
74
76

After a long investigation, the detective Spike became convinced that something very valuable had been hidden somewhere on Clinton Street. But in which house? That was the question.

One morning Spike found this picture in his mailbox.

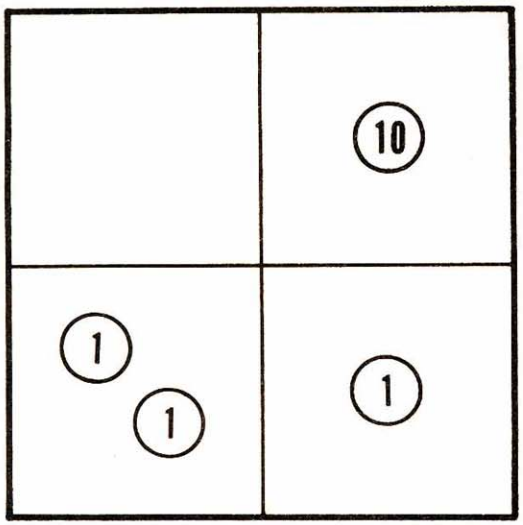


"That's very strange," muttered Spike, taking a Minicomputer board out of his desk and putting a dime and three pennies on it at random.



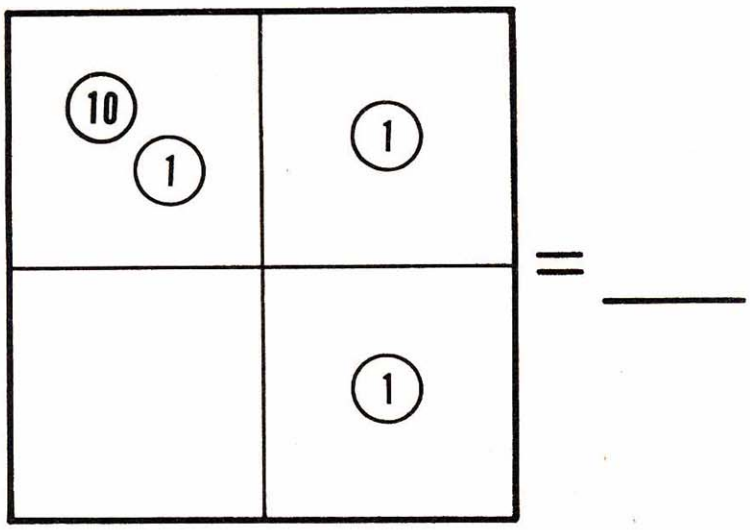
WHAT DO YOU THINK ABOUT THIS SITUATION?
CAN YOU FIGURE OUT WHAT NUMBER THIS IS?

"One dime on the 4-square," thought Spike, "probably means 4 x 10 = 40 . . . plus two pennies on the 2-square and one penny on the 1-square . . . it's the number 45."



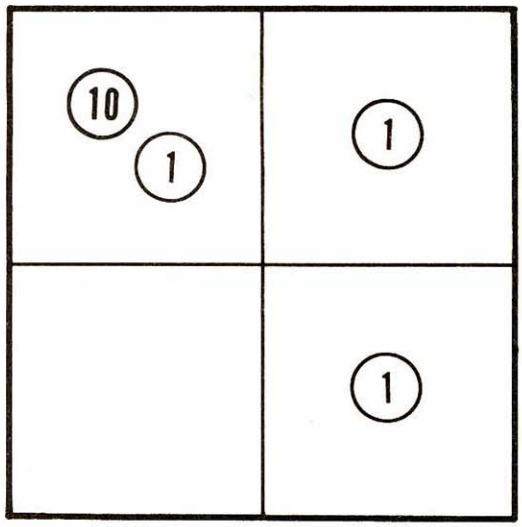
= 45

Spike moved the four coins on his Minicomputer board.



WHAT IS THIS NUMBER? WRITE THE ANSWER ON THE BLANK ABOVE.

ON A SEPARATE SHEET OF PAPER, DRAW SOME OTHER PICTURES OF ONE DIME AND THREE PENNIES ON A MINICOMPUTER BOARD. FOR EACH PICTURE CALCULATE WHAT NUMBER IS SHOWN.



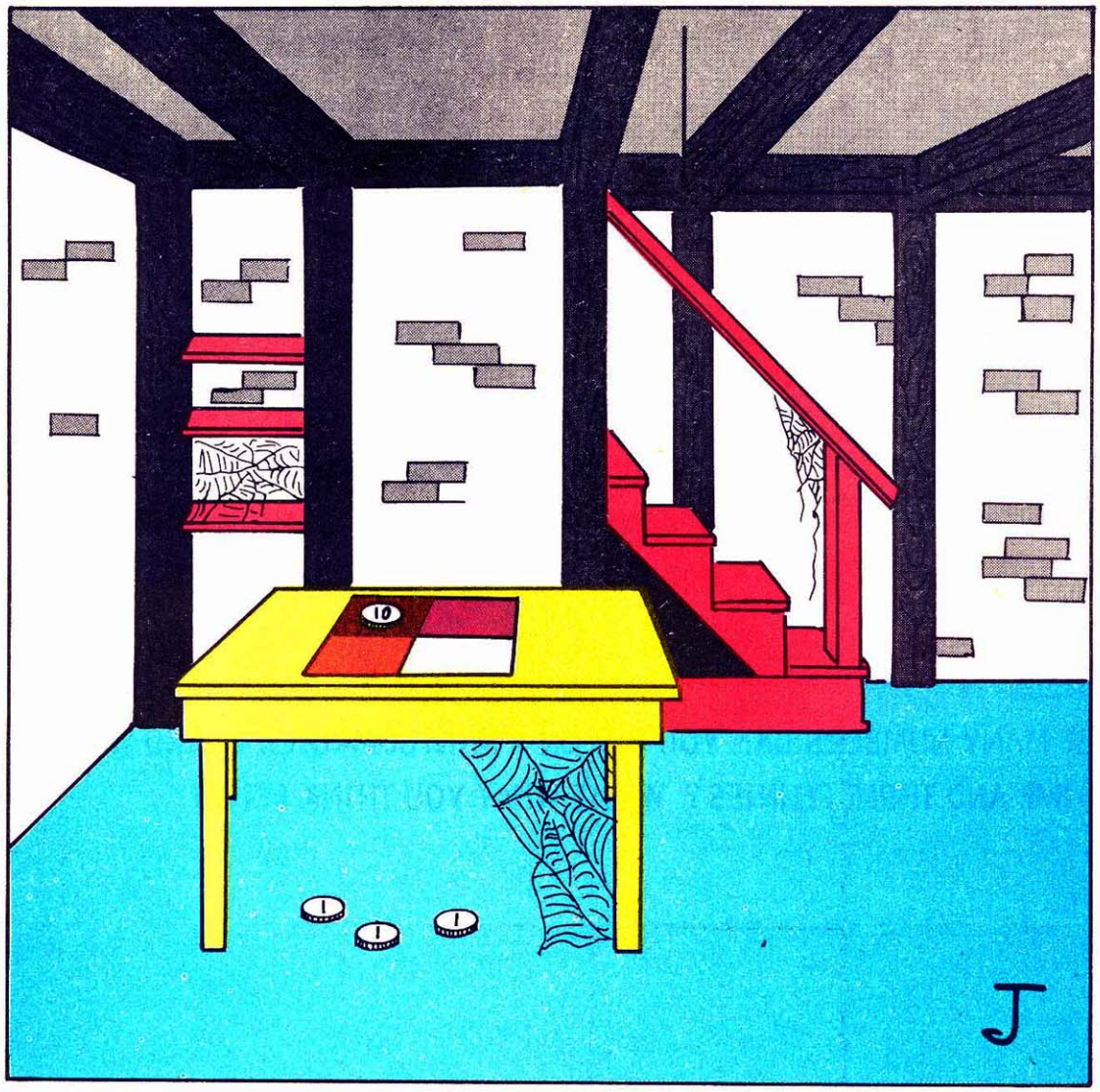
$= (8 \times 10) + 8 + 4 + 1 = 93$

"I wonder what these numbers mean," thought Spike. He looked at the picture of Clinton Street. "There are houses with numbers from 1 to 456." Spike was lost in thought.

"It must be a clue to the number of the house in which the valuables are hidden. But it's a pity that the coins have fallen on the floor. There are so many possible numbers. I will have to search a lot of houses."

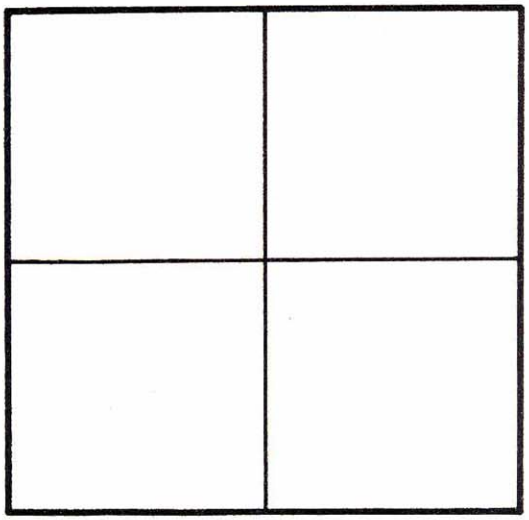
HOW MANY NUMBERS CAN YOU PUT ON A MINICOMPUTER BOARD WITH A DIME AND THREE PENNIES? WRITE WHAT YOU THINK BELOW.

The next day Spike found another picture in his mailbox.

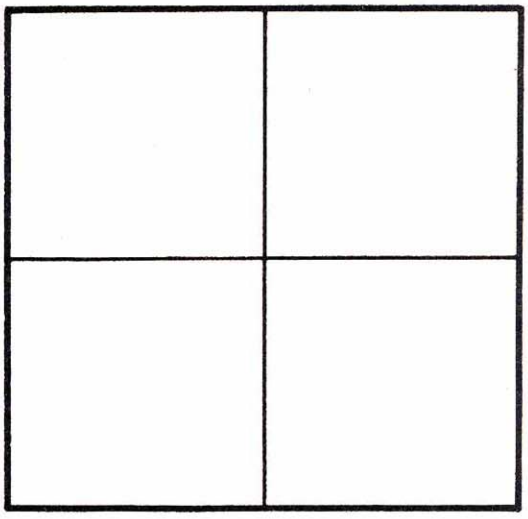


"This is good news! Now that I know the dime is on the 8-square, I will not have to search so many houses."

"What is the smallest number I can write with a dime on the 8-square and three pennies placed somewhere or other on the Minicomputer board?" Spike asked himself.

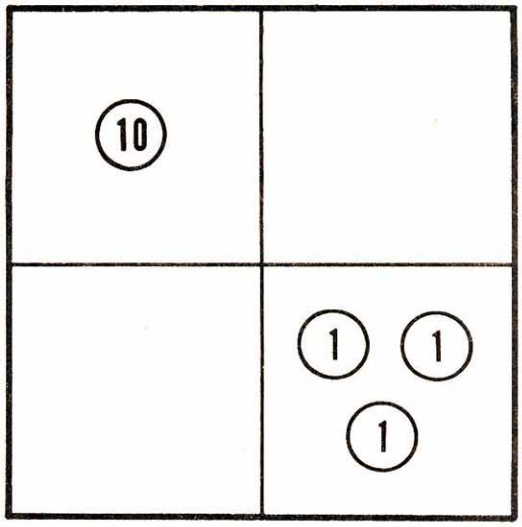


"And what is the largest number?"



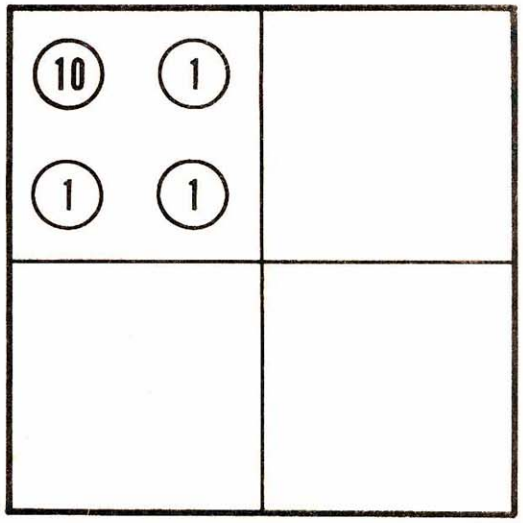
TRY TO ANSWER THESE QUESTIONS FOR YOURSELF.

The smallest such number



= 83

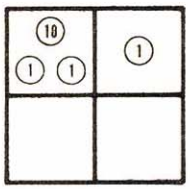
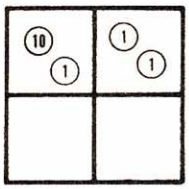
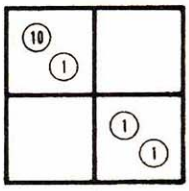
The largest such number



= 104

"I will have to search all of the houses from number 83 to number 104," grumbled Spike.

DID YOU FIND THE SAME SOLUTIONS AS SPIKE DID FOR THESE NUMBERS?

 = 100  = 96  = 90

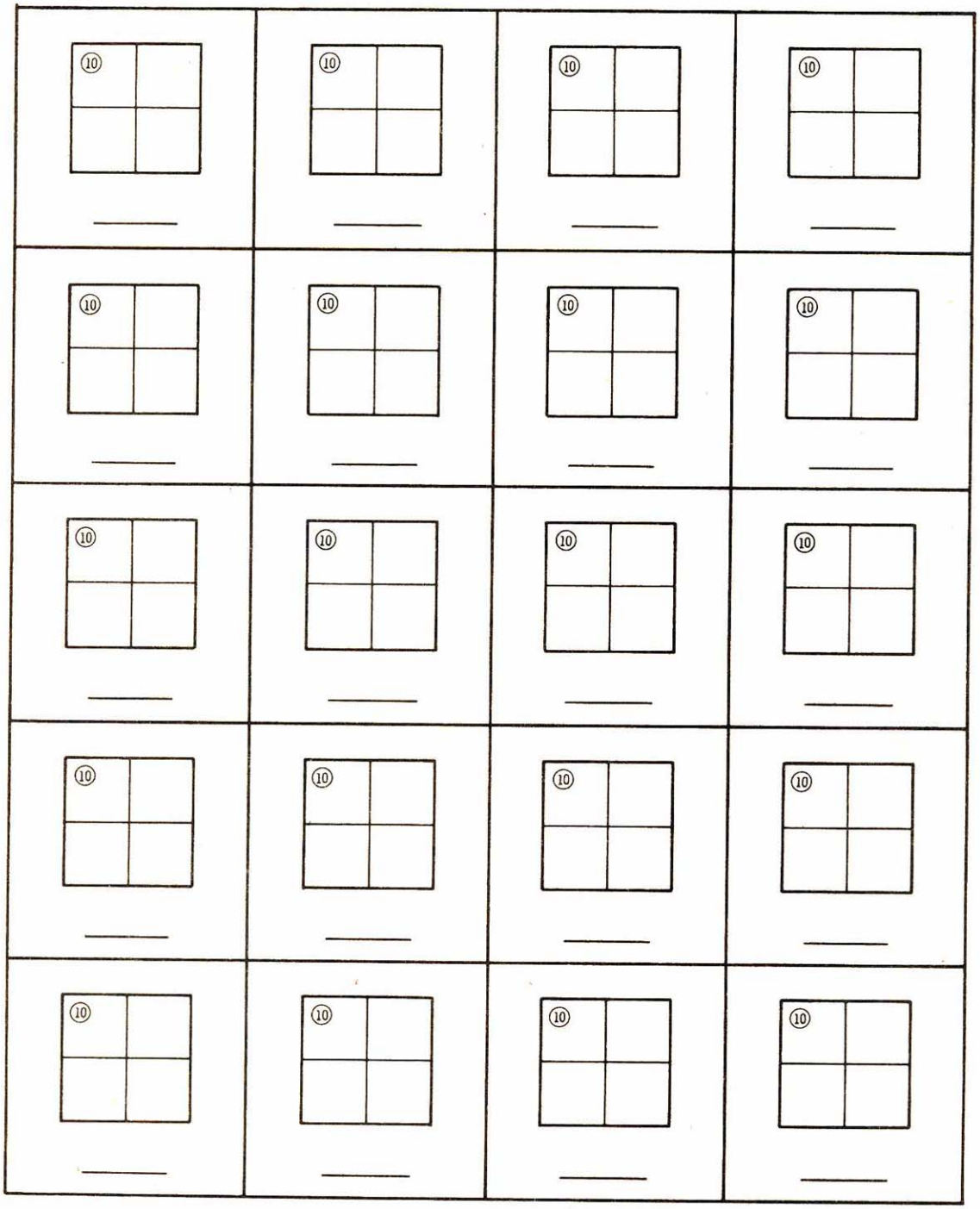
"I can't find any way to put on 102, 99, or 95 with a dime and three pennies," observed Spike.

HOW ABOUT YOU?

"If it's true that those numbers can't be shown in this way, then I won't have as many houses to search. Furthermore, there might even be some other houses I will not have to search for a similar reason.

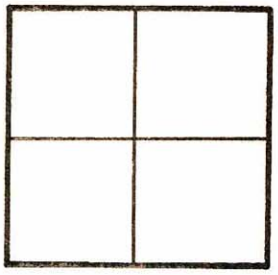
Just to find out, I am going to write down the complete list of all numbers that can be shown with a dime on the 8-square and three pennies somewhere on the Minicomputer board."

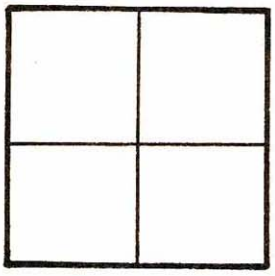
MAKE THIS LIST FOR YOURSELF ON PAGE 15.

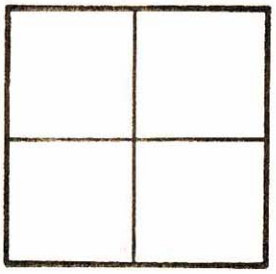

10

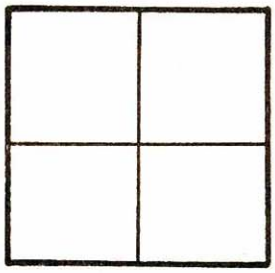
A few minutes later he had changed his mind.
"I am not so sure that each number between 83 and 104 can be shown with a dime on the 8-square and three pennies somewhere on the Minicomputer board."

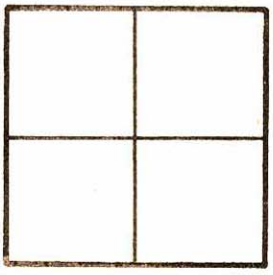
WHAT DO YOU THINK ABOUT THIS?
PUT THE FOLLOWING NUMBERS ON THE MINICOMPUTER BOARD IF YOU CAN.

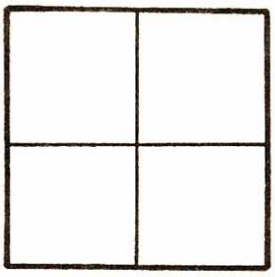
102 ? 

96 ? 

100 ? 

95 ? 

99 ? 

90 ? 

Spike found twenty different pictures, but only seventeen different numbers. Three of them can be shown on a Minicomputer board in two ways. They are:

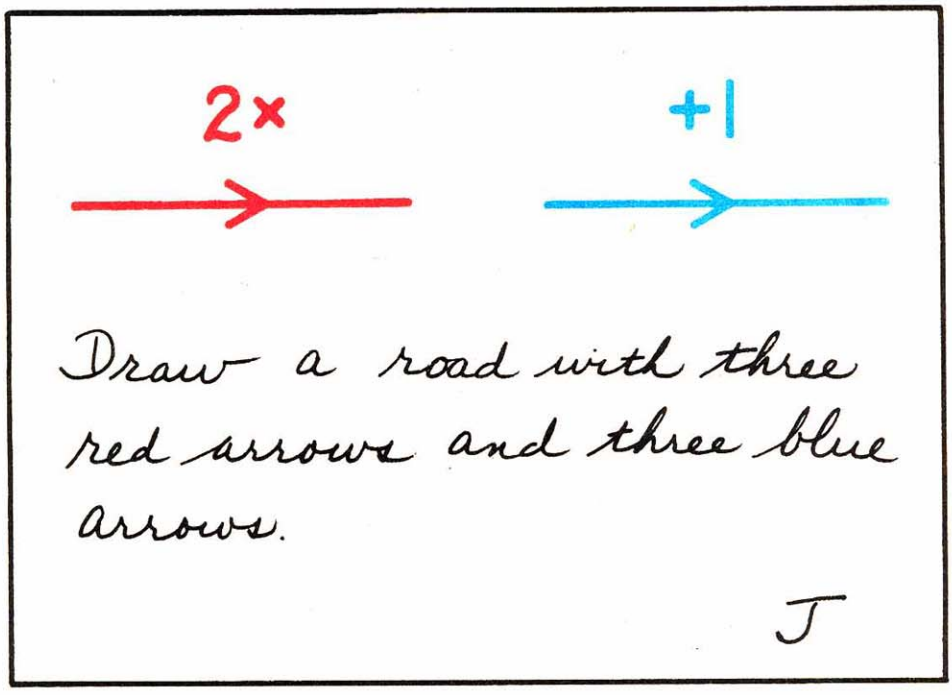
_____, _____, and _____.

Only five numbers between 83 and 104 cannot be shown with a dime on the 8-square and three pennies somewhere on the Minicomputer board. They are:

_____, _____, _____, _____, and _____.

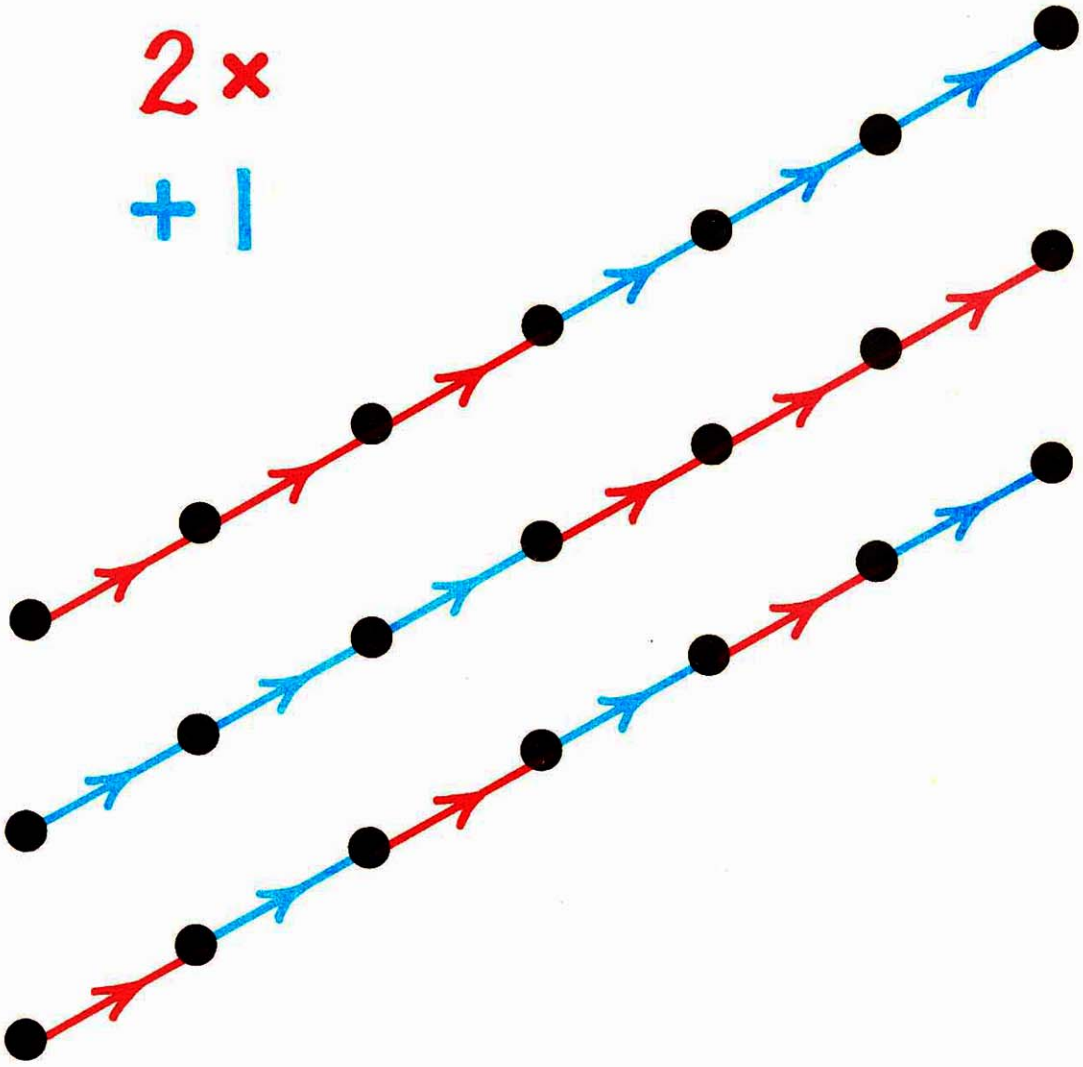
"I will have to search seventeen houses," concluded Spike.

That evening Spike found a short note in his mailbox.



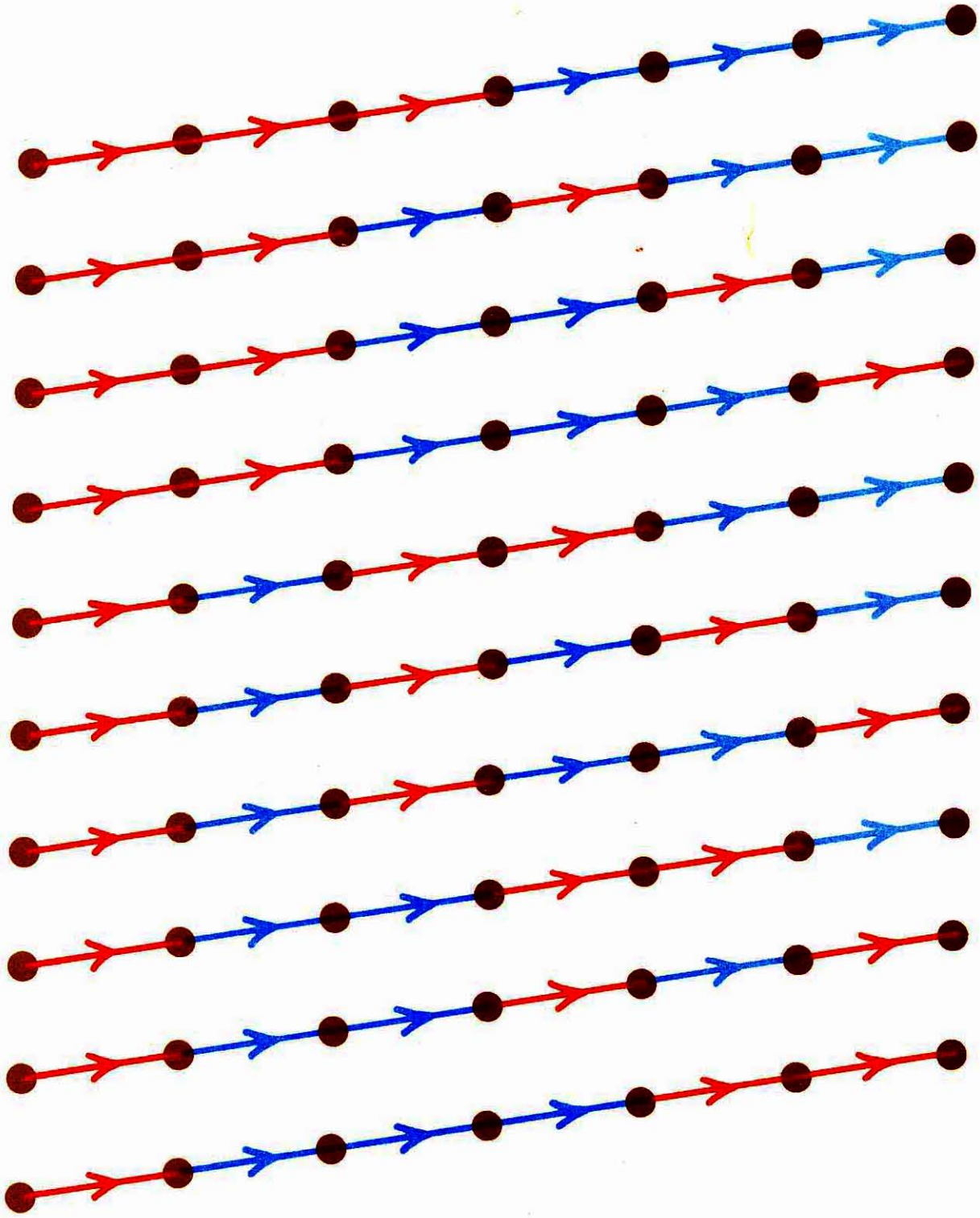
"I hope it's a new clue in my treasure hunt," thought Spike, "but I don't know in which order to draw the red arrows and the blue arrows."

He drew some of the roads.

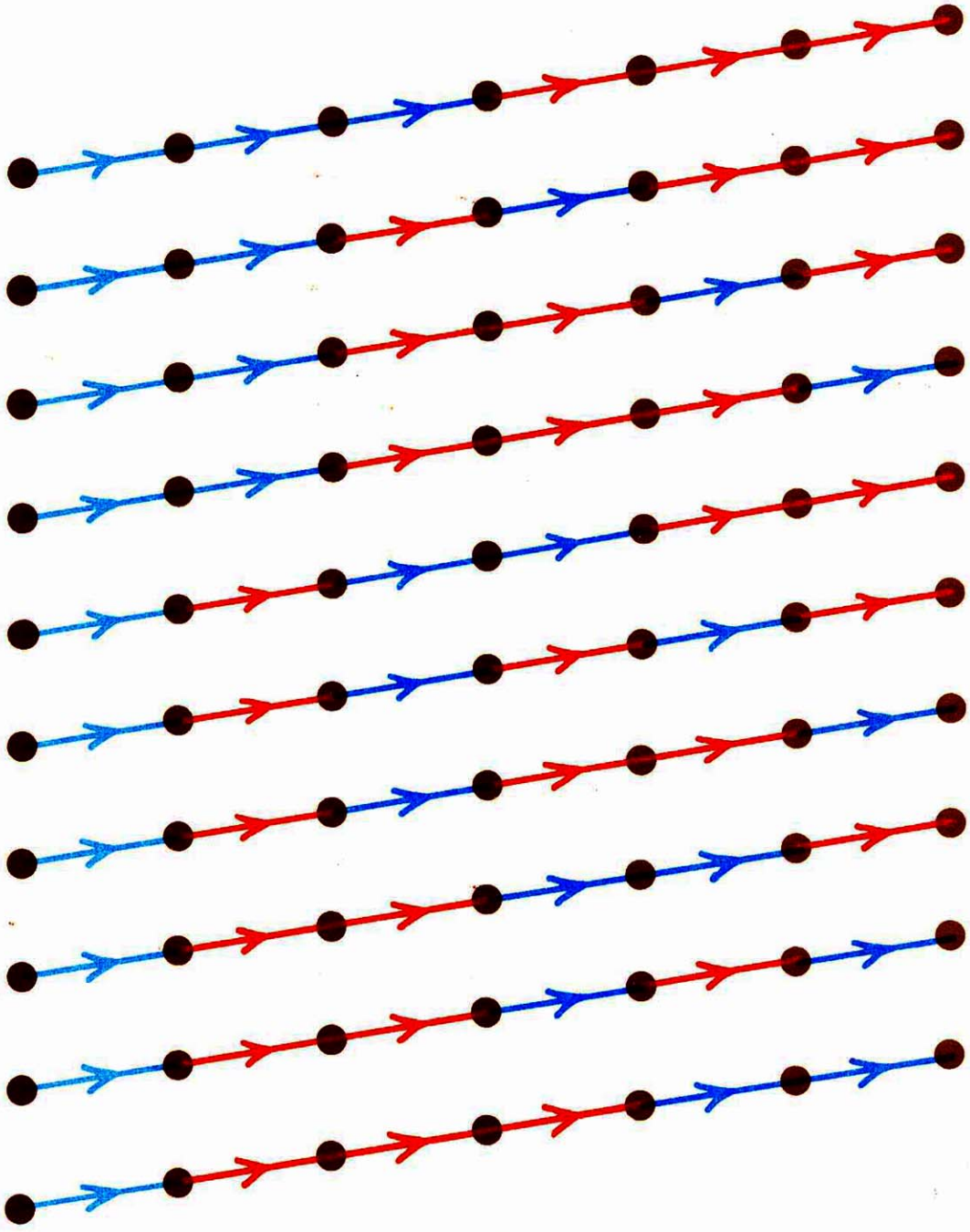


ON A SEPARATE SHEET OF PAPER, TRY TO DRAW ALL OF THE POSSIBLE ROADS. HOW MANY ARE THERE?

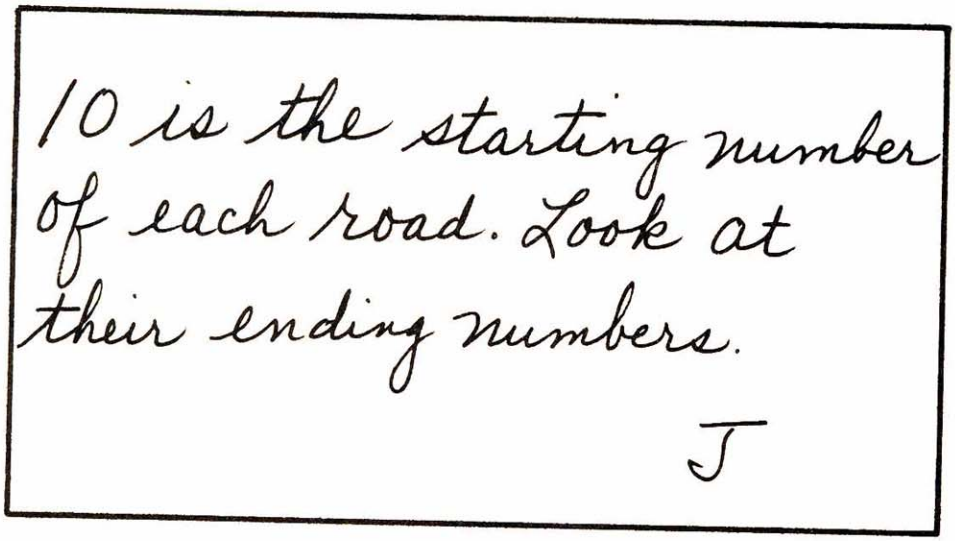
on the left page, Spike draw the ten roads that begin with a red arrow . . .



. . . and on the right page, he drew the ten roads that begin with a blue arrow. The second page was easy to draw, because all Spike had to do was switch the colors.



Then Spike found yet another message in his mailbox.



"10 is like a dime," thought Spike.
He put 10 at the beginning of each road and calculated the ending numbers.

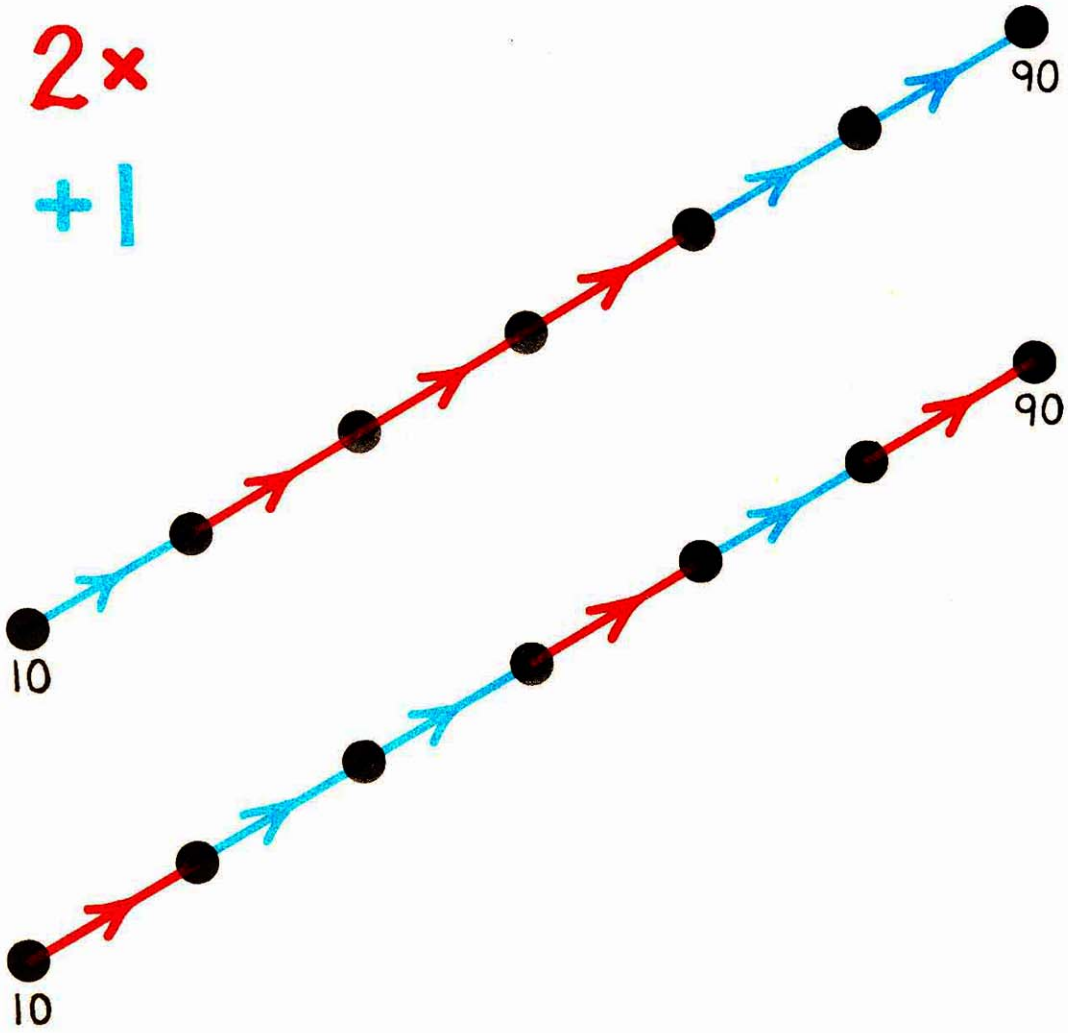
YOU DO IT TOO ON THE ROADS THAT ARE DRAWN ON PAGES 22 AND 23. WHAT DO YOU NOTICE?

DID YOU FIND TWENTY DIFFERENT NUMBERS?

DO YOU SEE SOME CONNECTION BETWEEN THE ROADS CLUE AND THE MINICOMPUTER CLUE? IF SO, WHAT CONNECTION DO YOU SEE?

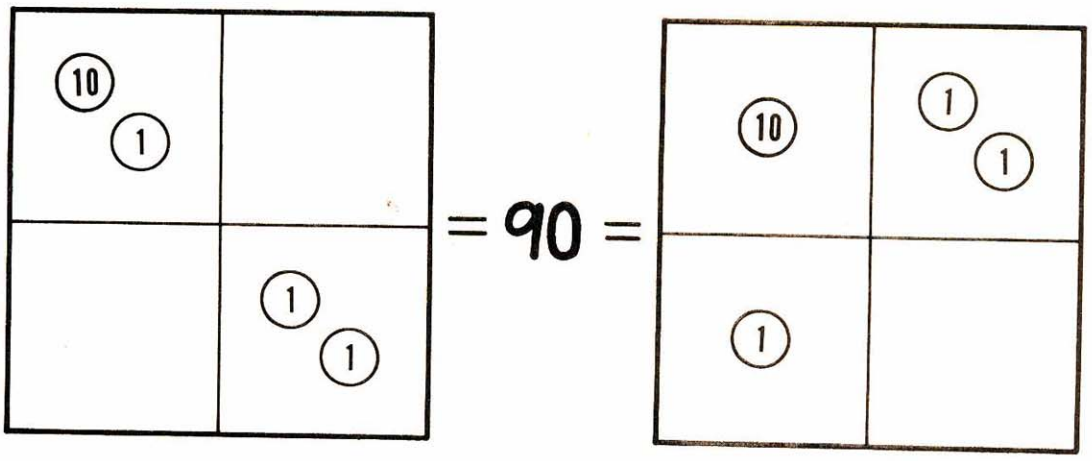
WRITE YOUR ANSWER BELOW.

"I got exactly the same seventeen numbers as before," observed Spike, "and three of them are the ending numbers of two roads: 86, 90, and 92". But those are exactly the three numbers that can be shown in two ways on a Minicomputer board. For instance,



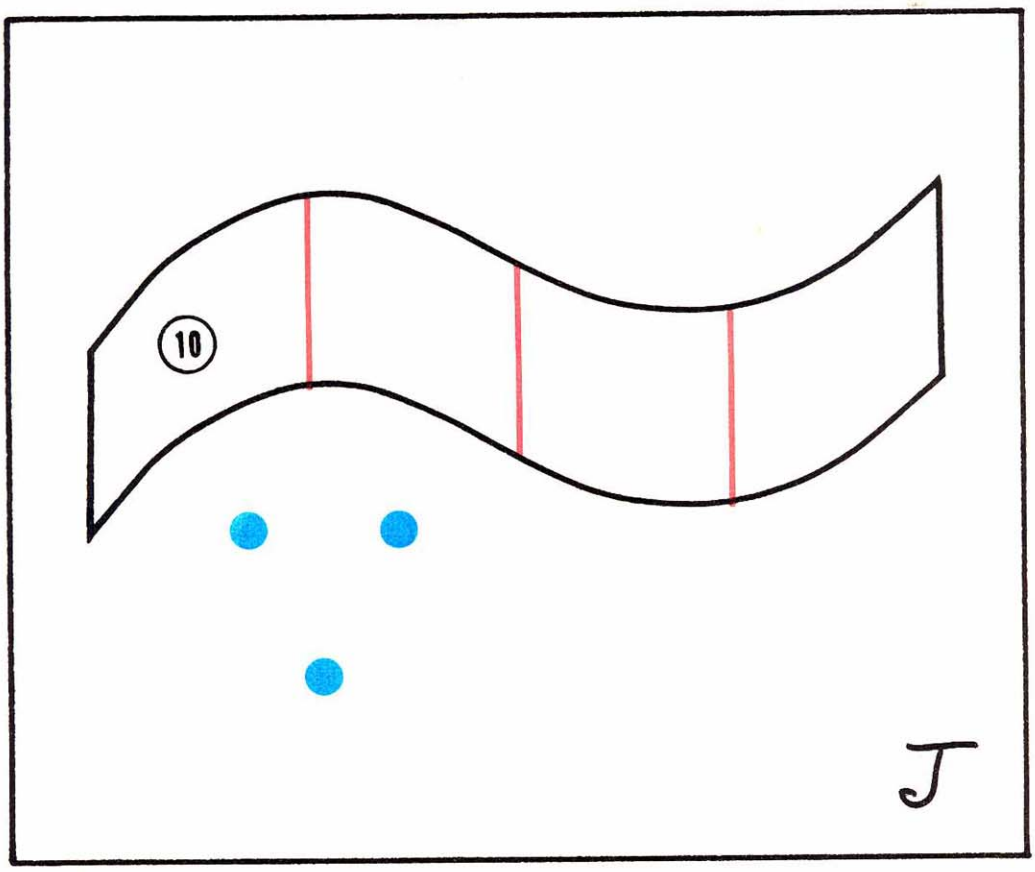
90 is the ending number of these two roads,

and 90 can be put on a Minicomputer board in these two ways:



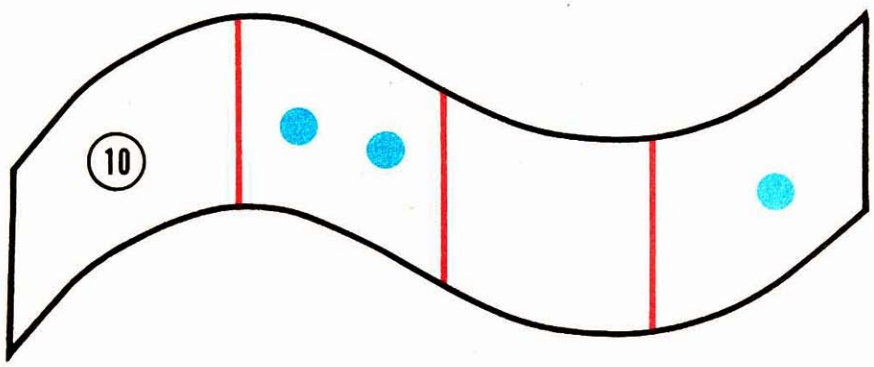
"I wonder if this road message is going to help me very much in my hunt. It doesn't give me any new piece of information," Spike looked very disappointed.

So Spike was a little suspicious when he found a new message in his mailbox.



"This J is driving me crazy," grumbled Spike. "A dime and three pennies again! And what is the meaning of this strange snake with its three red lines?"

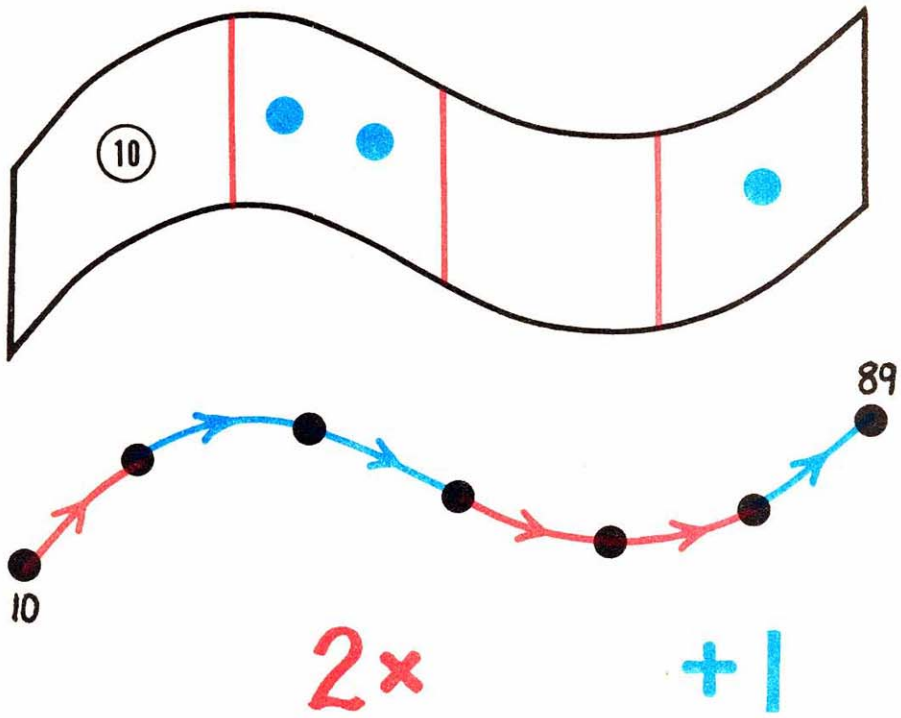
Spike placed the three pennies at random on the snake.



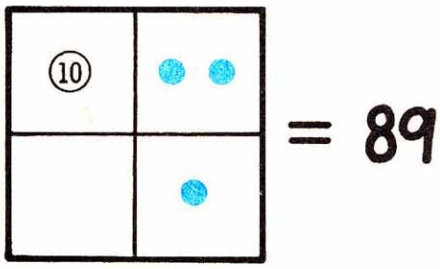
"That must be a number," thought Spike, "but which one?"

CAN YOU HELP SPIKE TO SOLVE HIS PROBLEM?

Spike is expert at coding and decoding, so he draw this red-blue road under the snake. . .



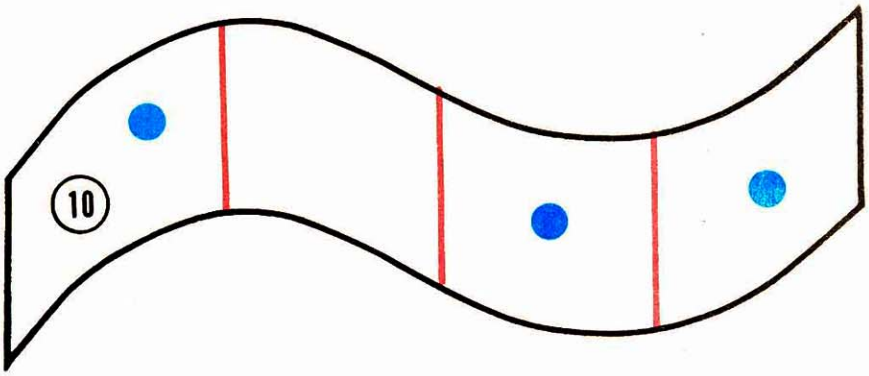
. . . and put the dime and the three pennies on the Minicomputer board.



"Three ways of showing the same number," thought Spike.

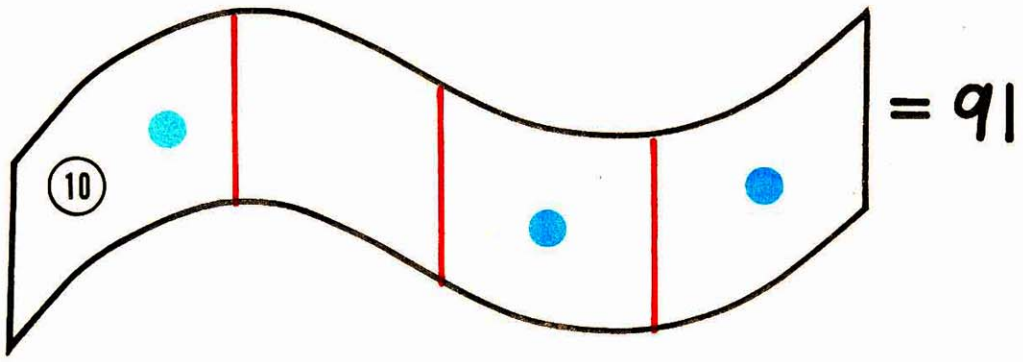
DO YOU UNDERSTAND WHY?

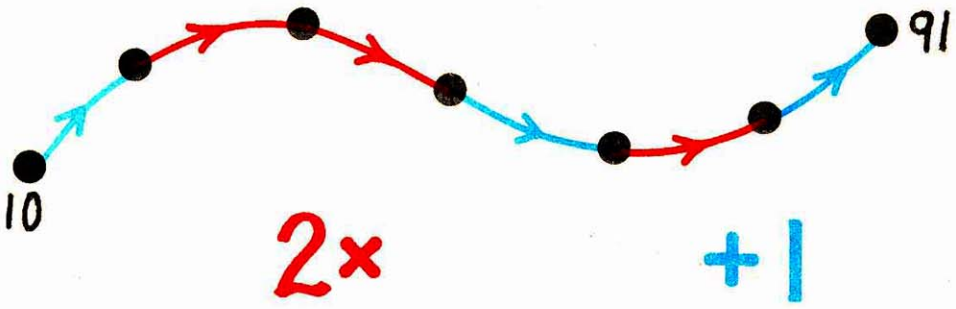
Spike moved the pennies around on the snake.

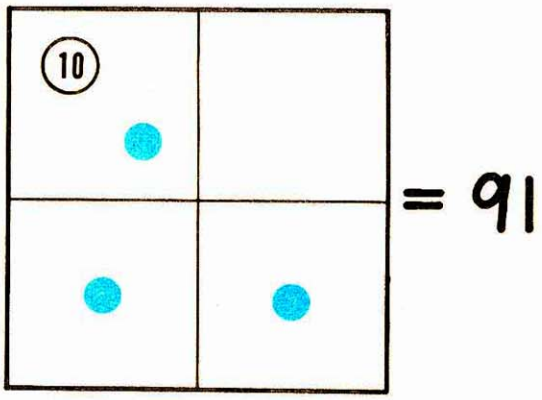


TRY TO DECODE THIS PICTURE BY DRAWING AN ARROW PICTURE ON THIS PAGE AND THEN BY DRAWING A MINICOMPUTER PICTURE BELOW.

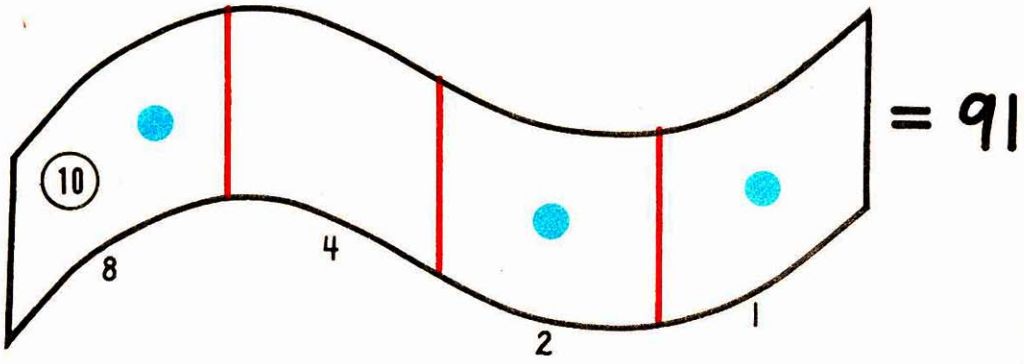
DID YOU DRAW THE SAME PICTURES AS SPIKE DID?







"That wasn't so hard to decode," said Spike. "This snake is just a binary abacus. It's like the Minicomputer board, but its squares are arranged differently: 1, 2, 4, 8 . . . from right to left."

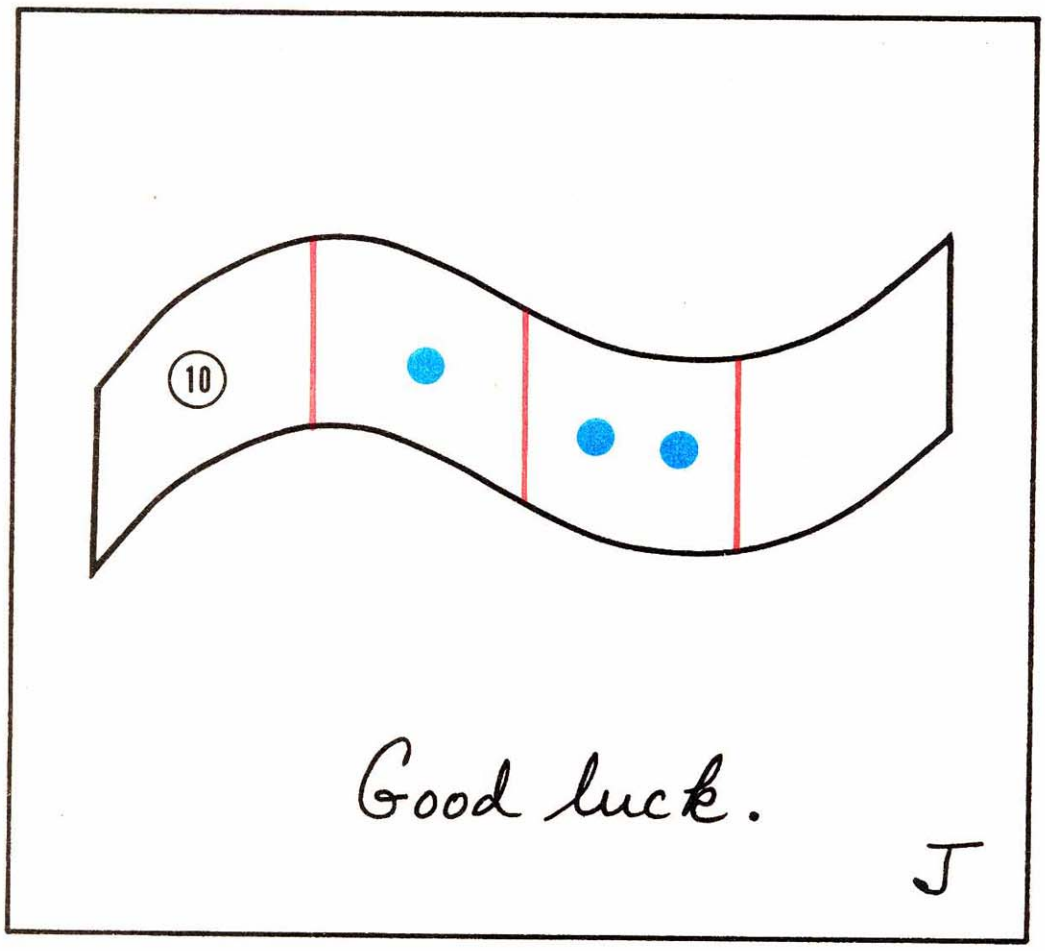


PICK ANY NUMBER (EXCEPT 95, 99, 101, 102, 103) FROM 83 TO 104 AND, IN THE SPACE BELOW, DRAW A MINICOMPUTER PICTURE, AN ARROW PICTURE, AND A SNAKE PICTURE FOR IT.

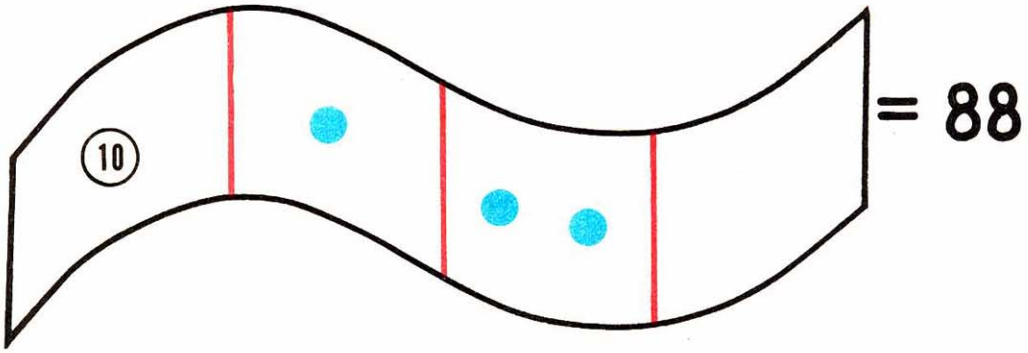
DO YOU THINK THAT THE SNAKE MESSAGE HELPED SPIKE IN HIS TREASURE HUNT?

"This binary snake seems to be a handy way of writing numbers," thought Spike, "but it doesn't help me solve my problem. It just gives me another way of looking at it."

But when Spike found this message in his mailbox, he became more hopeful again.

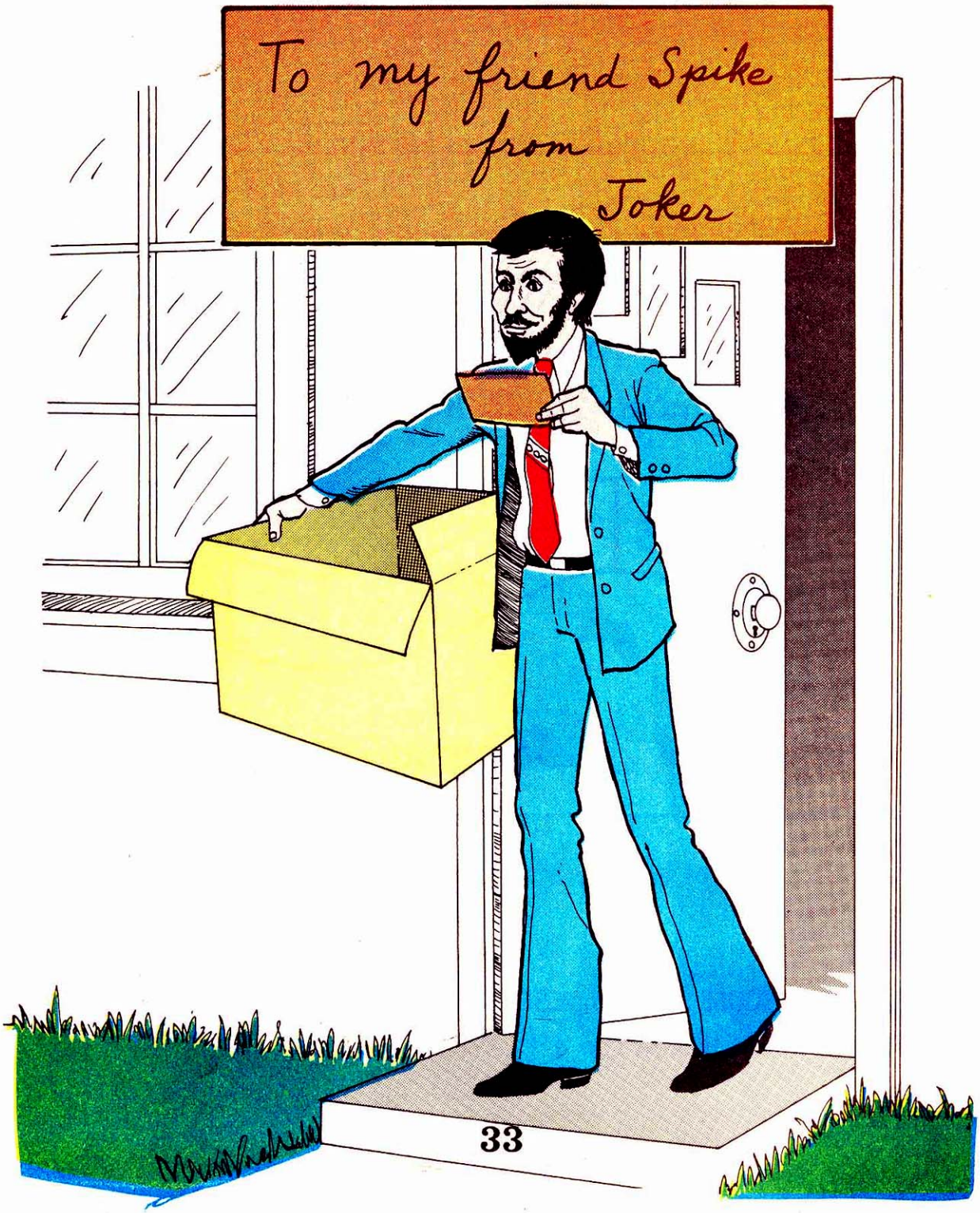


"That's easy to decode," said Spike, who was becoming an expert in binary codes.

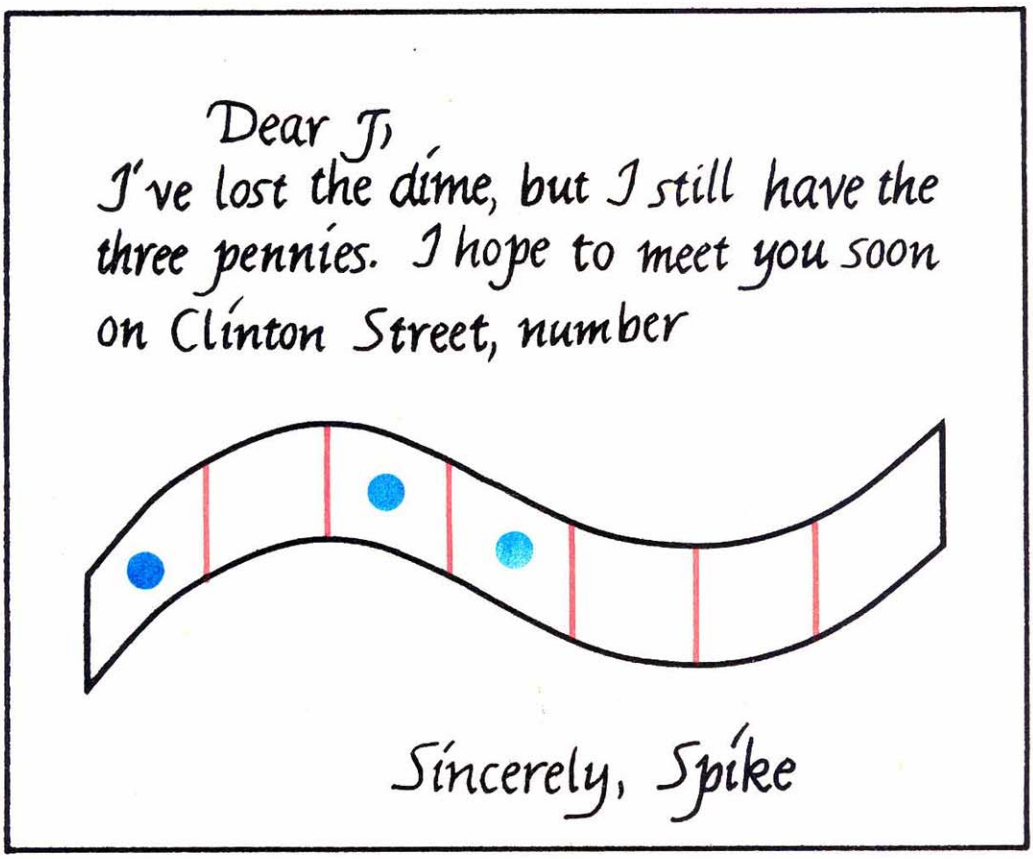


He immediately drove to 88 Clinton Street and stopped in front of the house.

Some minutes later, Spike came out of the house carrying a big box inside of which was nothing but this note:

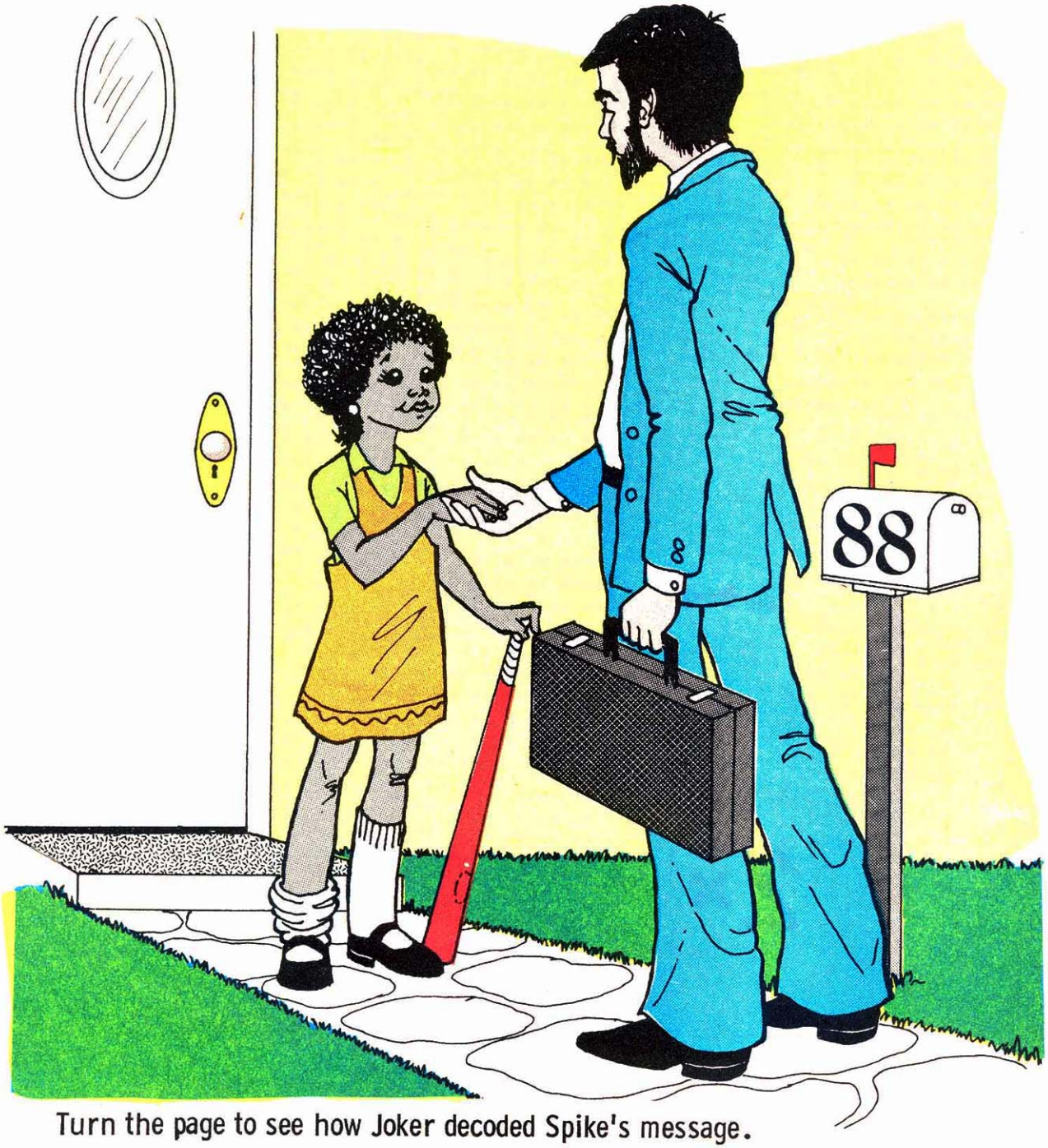


Fortunately, Spike has a good sense of humor. So that evening he wrote this letter:

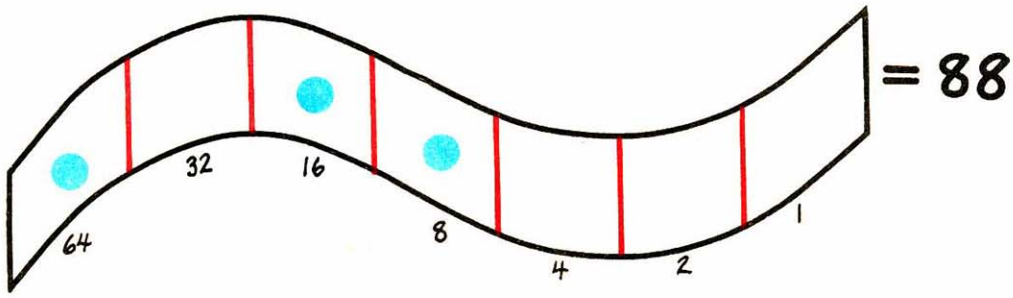


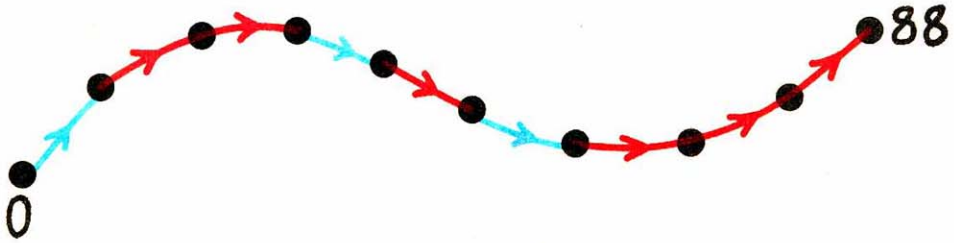
CAN YOU DECODE SPIKE'S MESSAGE? WHICH HOUSE DOES HE WANT JOKER TO MEET HIM AT?

J understood Spike's message, and the two friends met each other that same evening.



Turn the page to see how Joker decoded Spike's message.

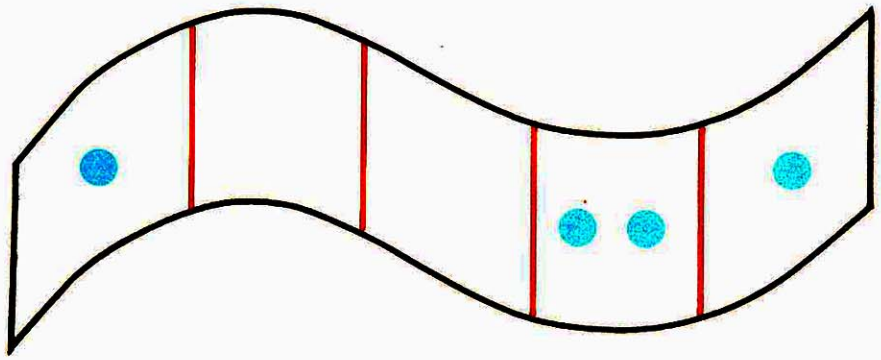


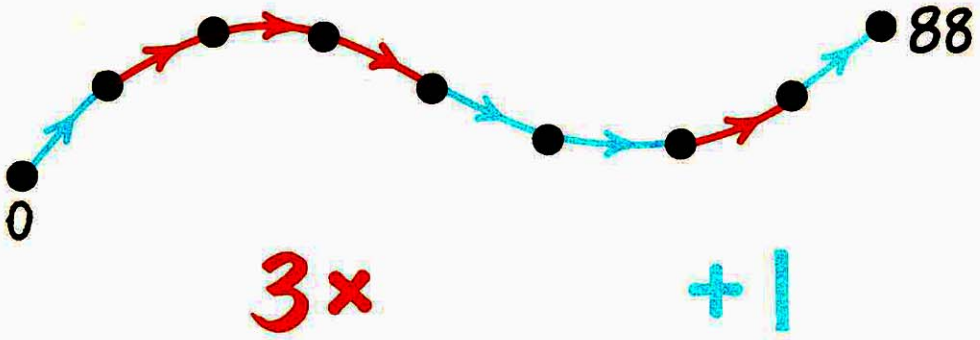


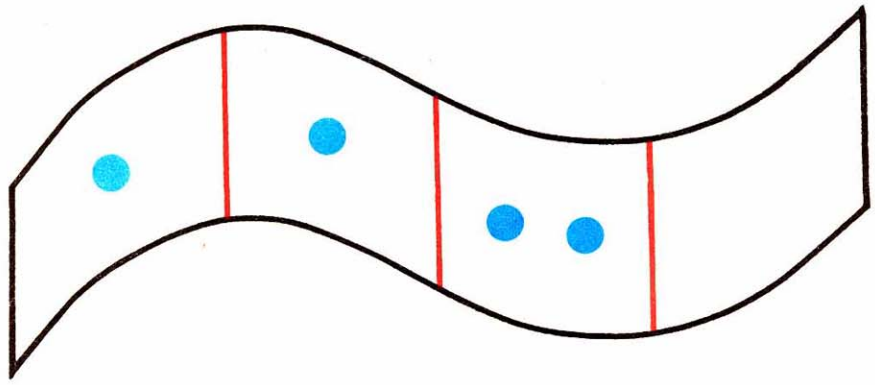
2× +1

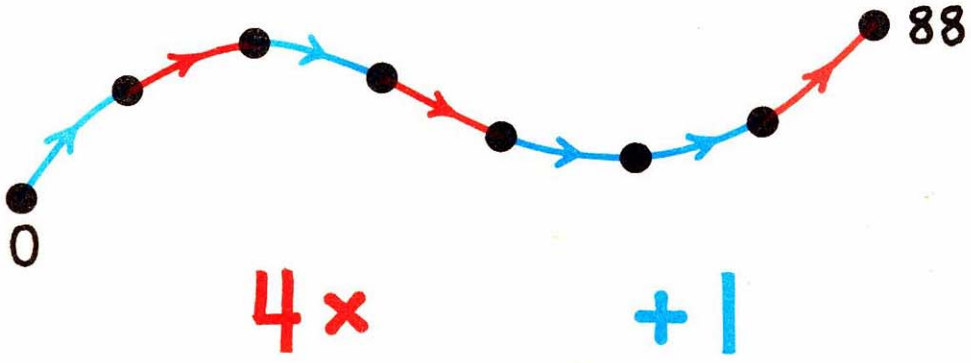
J and Spike had a great time playing with snakes. They found three ways of showing 88 with exactly four pennies.

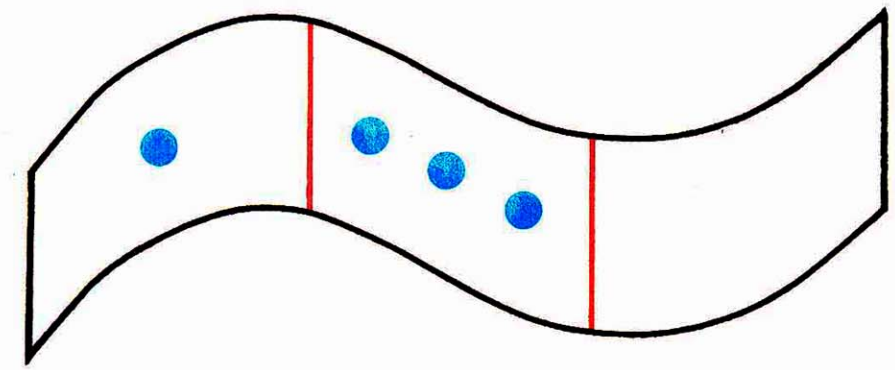
CHECK THEIR PICTURES ON PAGES 37, 38, AND 39 BY DECODING EACH ONE. LABEL THE DOTS IN EACH ARROW PICTURE.

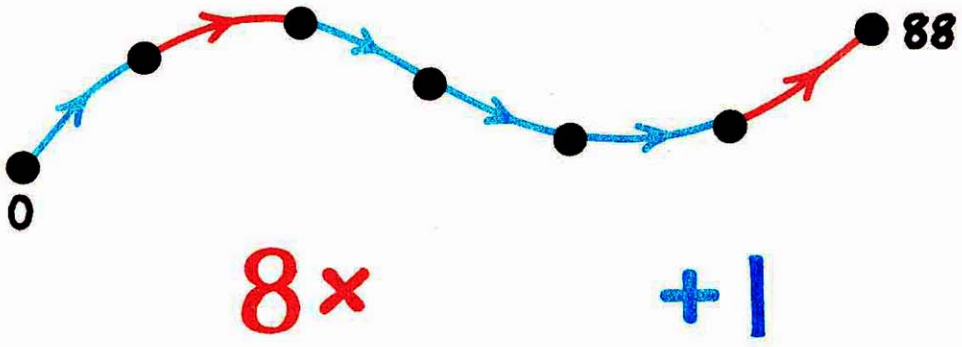







88
0
4×
+1





USING A SNAKE AND SOME PENNIES, TRY TO FIND SOME NEW WAYS OF SHOWING 88.

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Math Story-Workbooks

Current List

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Summer School — 0's Discovery
Rollerskating 37
To Picture
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Ages 9-14

Summer Camp
Halloween Puzzles
1,000's Dream
A Strange Country
Not Too Close
Clinton Street
Seven Secret Numbers
Shunda's Newsstand

A series of story-workbooks providing fanciful excursions in the colorful world of mathematics for all young people, their teachers and their parents, actively involving them in the acquisition of new mathematical insights.

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"Clinton Street" (presented in two parts) is an intriguing mystery story which expands students' understanding of the world of numbers so artfully that the pleasure of discovery motivates them to plunge ahead into unknown territory.

Cryptic pictures and notes appear in the mailbox of Spike, the detective, which show him three different ways of exploring his problem of locating a mystery house. Thus students are encouraged to be flexible in approaching a problem and to see that numbers can be represented in a variety of interesting ways.

The familiar languages of Papy's Minicomputer and the red-blue arrow roads are used in the early pages of exploration. They set the stage for the introduction of another important tool, the binary abacus. In the final pages of the second part, the problem is solved as the students are given an opportunity to become more familiar with the new tool. There is also material which encourages those who have sufficient interest to do further exploration by changing the code of the abacus.

Cille Smith