The Sums of Odd Numbers

Here is a pattern that seems to emerge from observing square numbers. The sums of odd numbers produce square numbers:

$1 = 1$ (a square number)

$1 + 3 = 4$ (another one)

$1 + 3 + 5 = 9$ (yup!)

$1 + 3 + 5 + 7 = 16$ (hmmm..... interesting.....)

$1 + 3 + 5 + 7 + 9 =$ _____ (well?)

Check a few more. Will this always be true?

If you don't think this will always work, come up with a counterexample (in other words, find a case where it does not work).

If you think it will always be true, find a way to show that it will always work (in other words, find a way to convince a skeptic.)

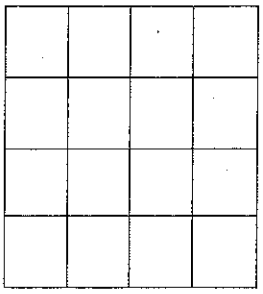
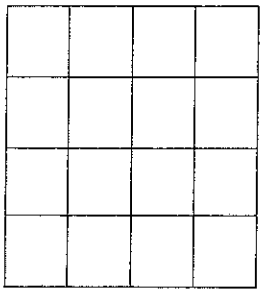
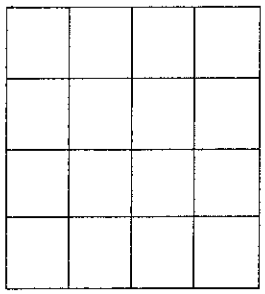
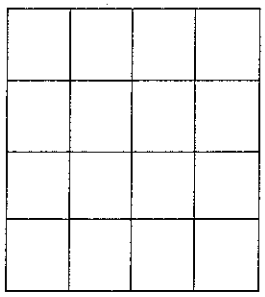
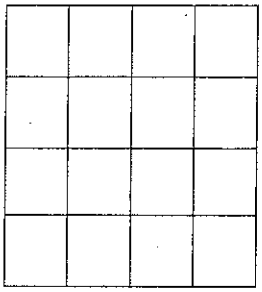
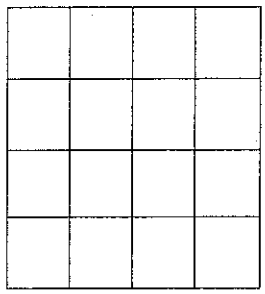
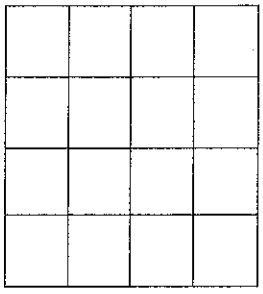
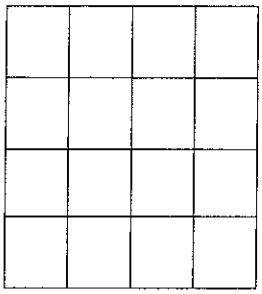
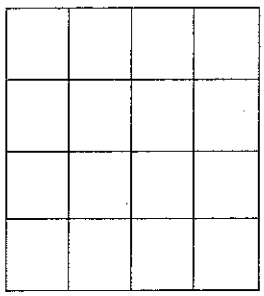
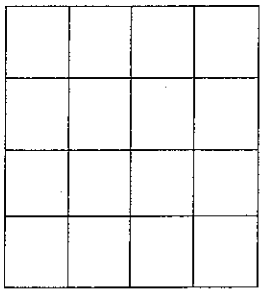
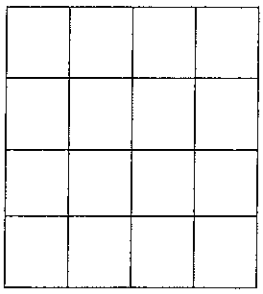
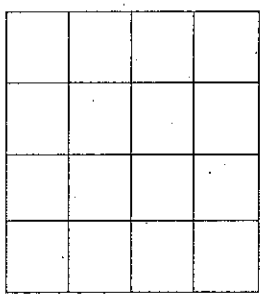
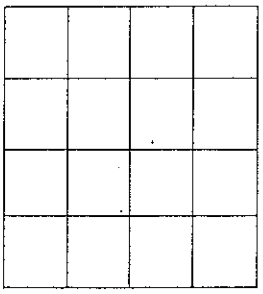
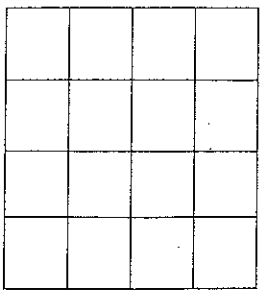
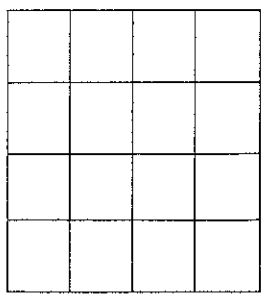
A Supermagic Magic Square

This square with these numbers appeared in a famous painting exactly 500 years ago! Do you see where the painter hid the year 1514 in the pattern? Cool, huh?

16	3	2	13
5	10	11	8
9	6	7	12
4	15	14	1

But that is not what makes this square magic, or supermagic. It is a magic square because it has a mystery number hidden in it many, many times.

The mystery number is 34. How many ways can you add together four squares to get 34? There are many. Try to count how many ways you can get 34 by adding four squares together. Try to find a way to keep track, and record all the different patterns.

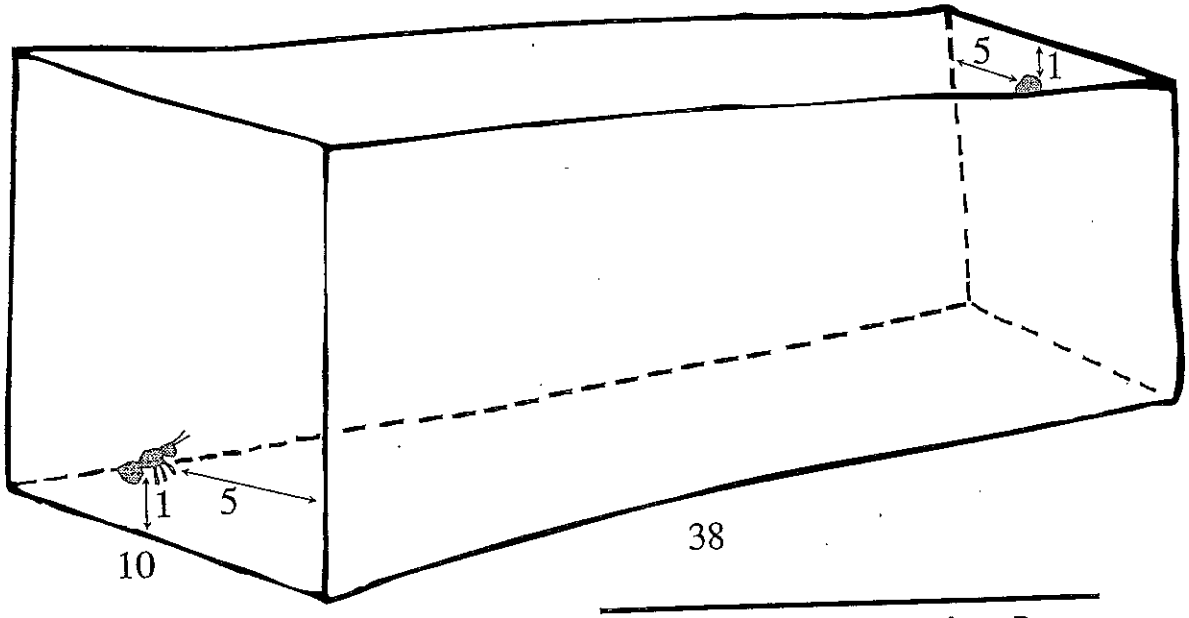
The Ant and the Crumb

There was once a very large, rectangular room. It contained only two things: an ant and a cookie crumb. The room had these dimensions:

It was 20 feet tall.
It was 38 feet long.
It was 10 feet wide.

The ant sat 1 foot above the floor in the middle of one of the small end walls. The cookie crumb is stuck on the middle of the opposite wall, one foot below the ceiling. The picture below will help you imagine how this looked.

The ant crawls to the crumb along the shortest possible path. How far did the ant crawl?



thought PROVOKERS®

By Doug Rohrer
Drawings by Joe Spooner

Big hint: The shortest path includes both the floor and the ceiling. Hmmmm.....

A Magic Trick
Amaze Your Friends

Pick any three-digit number.

Then turn it into a six-digit number by writing it twice. (For example, if your three-digit number is 289, your six-digit number is 289,289).

I don't know what number you have created, but I think it is divisible by 13. Am I right? Check and see.

After you divide by 13, I bet the quotient is divisible by 11. Check this out.

And I bet that quotient is not a prime number. In fact, I bet it is divisible by 7. Right?

Pick another three-digit number and repeat. Does it work now?

What is going on here? Will this always work? Convince your friends that it will always work – or find an example where it doesn't.

Circling the Earth

A string is wrapped around the Earth's equator and the two ends of the string just exactly touch. Now, suppose that another string is tied to the original string so that it is 100 feet longer.

If this new string is placed around the equator and pulled tight so that it is suspended in the air, evenly, how high will the string be above the ground?

As you begin thinking about this problem, take a guess. Just your first thought would be good.

1. It will be barely above the ground at all: you could barely squeeze an atom underneath the string.

2. It will be a little bit above the earth. You could roll a bowling ball underneath, maybe.

3. Maybe a little higher than that. I bet I could stack all the books in my cubby and fit them underneath the string (a foot or two).

4. I think I could walk underneath the string. Maybe even Mr. Postema.

5. I think a tractor-trailer truck on the highway could drive under it (about 13 – 14 feet high).

6. A tree in Church Square Park could fit (a 50-foot tree).

7. A 9-story building could fit (about 100 feet).

Circle the answer you think is correct, put your name below, and turn this in to Mr. L. Thanks for playing!

Name:_____ Date:_____

Circling the Earth

Now that you have made a guess, figure out how to figure it out. Come up with a way to calculate how high the string will be above the earth. You will want to create a beautiful submission to explain your thinking and convince someone which answer is correct. Here the problem is again:

A string is wrapped around the Earth's equator and the two ends of the string just exactly touch. Now, suppose that another string is tied to the original string so that it is 100 feet longer.

If this new string is placed around the equator and pulled tight so that it is suspended in the air, evenly, how high will the string be above the ground?

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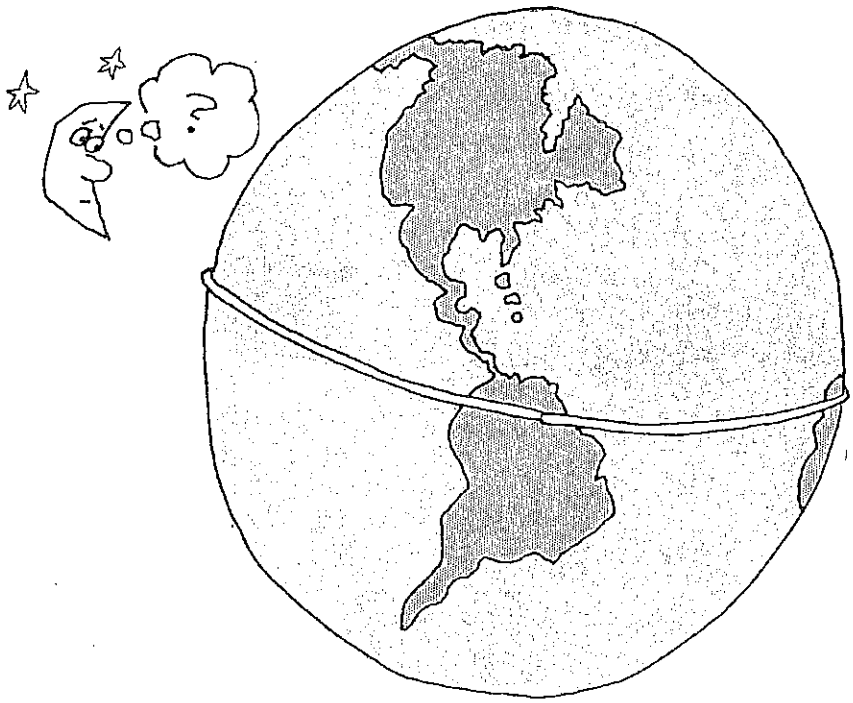
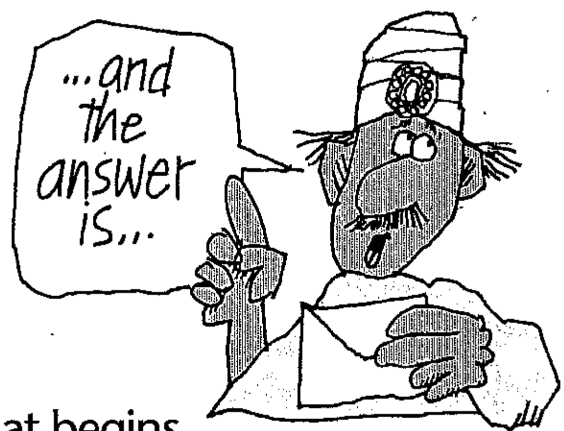


The Mind Reader

Choose an integer between 2 and 9.
Multiply by 9.
Find the sum of the two digits.
Subtract 3.
Add 1 if your eyes are brown.
Find the letter in the alphabet that corresponds to this number. For example, 1-A, 2-B, 3-C, 4-D, 5-E, 6-F, 7-G, 8-H, etc.



Think of a U.S. state that begins with this letter (or look at a map, if necessary).
Write down a color whose name begins with the third letter in this state's name and a fruit that begins with the last letter in this state's name.
Now hold this puzzle page upside down in a mirror and read the message below.
Yowza. How did that happen?

There is no such thing as an orange apple.

Strawberry Ice Cream Problem

Mr. Smith has three daughters. Some friends come to visit, and they want to know how old the daughters are.

Mr. Smith, a bit of a joker, says that the product of his daughters' ages is 72. The friends think about this for a while, and realize this is not enough information.

So Mr. Smith, who likes math very much, tells his friends that the sum of his daughters' ages is the same as his house number. The friends go look at the house number.

This helps, but the friends still do not know how old the daughters are.

Mr. Smith finally reports that the daughter who has lived the greatest number of years likes strawberry ice cream.

"Ahhhh," said the friends. "Now we know your daughters' ages."

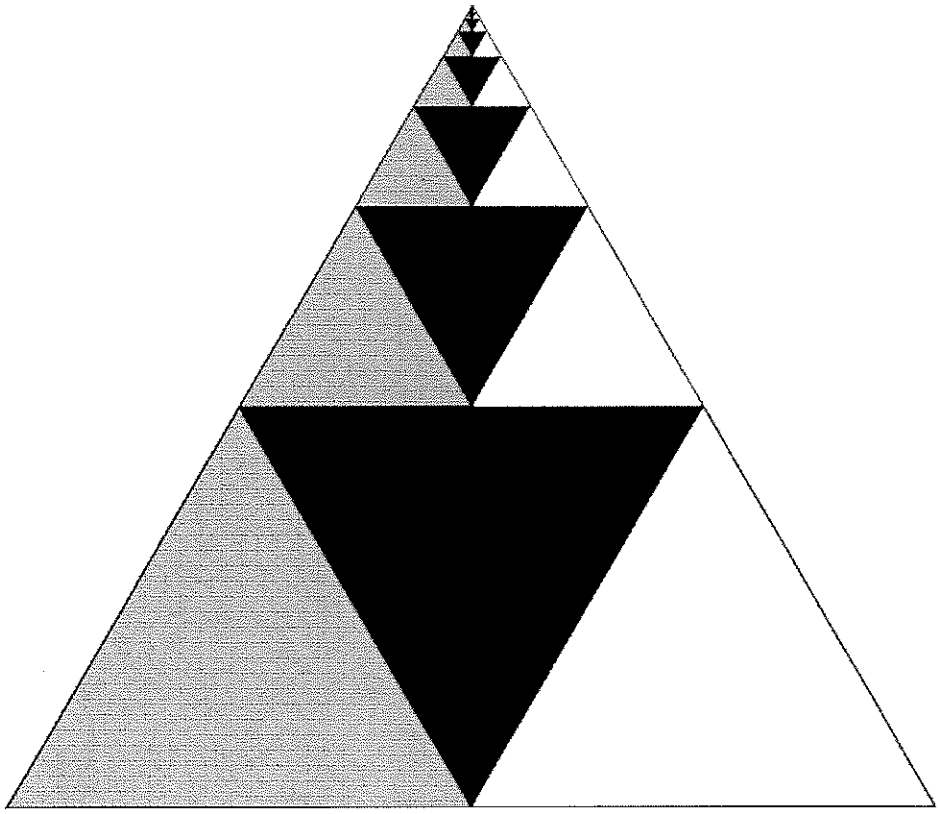
How old are the three girls?

How to Make a Third Out of Fourths

Bob told his friend Mark that he could make the fraction 1/3 just by using fourths. Mark did not believe him, so Bob showed him how:

$$(1/4) + (1/4)^2 + (1/4)^3 + (1/4)^4 + \ldots = (1/3)$$

Mark did not think this could be true, so Bob said, "Look at the picture below." "Ahhhh....." Mark said. "Now I get it."



You and your team need to do two things in your submission:

1. Explain the meaning of the equation using words. Come up with words that make the meaning of all those symbols clear.

2. Figure out how the picture relates to the equation. Come up with pictures, drawings or other explanations that would help a skeptic understand why the picture proved Bob's point.