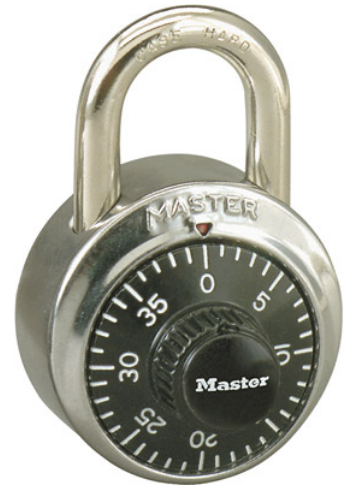

Matt's Bike Lock

Matt made an elaborate code to remember the 10-digit combination to his bike lock. The code he came up with is A-K-B-J-C-H-D-G-E-F. In his code, each letter stands for a different digit (0-9). To find the combination, use the clues below to figure out what digit is represented by each letter. When two letters are written together without an operation symbol, they represent a tens digit and a ones digit.

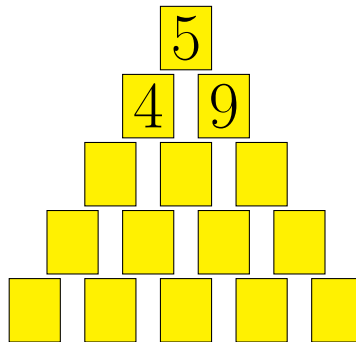
- $D + D + D = F$
- $B / H = K$
- $H + H = B$
- $D \times H = CK$
- $G + B + E = F + A + C$
- $A \times H = KE$
- $J + A = CC$
- $J / D = K$
- $F \times D = KG$
- $D / J = H / B$



What is the 10-digit combination to Matt's bicycle lock?

15 Cards

I have fifteen cards, numbered consecutively from 1 to 15. I want lay them out in a triangle. However, I don't want any old arrangement. I want each card to be the difference between the two cards immediately below it, to the left and right. Suppose my first three cards are as follows:



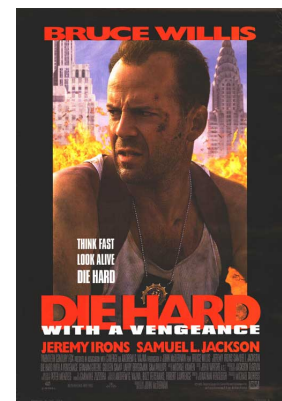
Can you find how to place the remaining 12 cards?

John and Zeus

In the movie “Die Hard with a Vengeance” a time bomb is about to go off. Detective John McClane and his sidekick Zeus have just seconds to defuse it, however, in order to do so they discover they must solve a mathematical puzzle.

The bomb's timer will stop if they place a jug containing 3 liters of water on a scale attached to the bomb. However, they only have a 9 liter jug and 5 liter jug, and obviously do not have time to go get a jug of any other size.

John and Zeus realize that they can't just refill the larger jug one-third of the way up to get 3 liters, since the villain, being a devious villain, has insisted that the total amount be **exactly** 3 liters.



- How can John and Zeus measure out exactly 3 liters of water with only a 9 liter and 5 liter jug?

Mrs. Gould's Strange Test

In math class one day, Mrs. Gould gave you the following test:

- 1.) How many questions on this test have the answer "a"?
 - (a) 0
 - (b) 1
 - (c) 2
 - (d) 3
 - (e) 4
- 2.) How many questions on this test have the answer "b"?
 - (a) 0
 - (b) 1
 - (c) 2
 - (d) 3
 - (e) 4
- 3.) How many questions on this test have the answer "c"?
 - (a) 0
 - (b) 1
 - (c) 2
 - (d) 3
 - (e) 4
- 4.) How many questions on this test have the answer "d"?
 - (a) 0
 - (b) 1
 - (c) 2
 - (d) 3
 - (e) 4
- 5.) How many questions on this test have the answer "e"?
 - (a) 0
 - (b) 1
 - (c) 2
 - (d) 3
 - (e) 4

What are the answers?

Sudoku

Many of you are familiar with Sudoku puzzles. For this variation, place the integers 1 through 9 into each row below so that the following are true.

- The product of each set of three numbers is given at the end of the row or column.
- Each digit appears exactly once in each row.
- Each digit appears exactly once in each column.
- Each digit appears exactly once in each 3×3 grid.

Some products are provided below. The numbers on the bottom are the products of the three numbers in the column. The numbers on the left represent the products of the first three numbers in each row. The numbers on the right are the products of the last three numbers in each row. (The product of the middle three numbers in each row is not given.)

14									96
72									315
360									12
	27	40	336	48	216	35	56	27	240

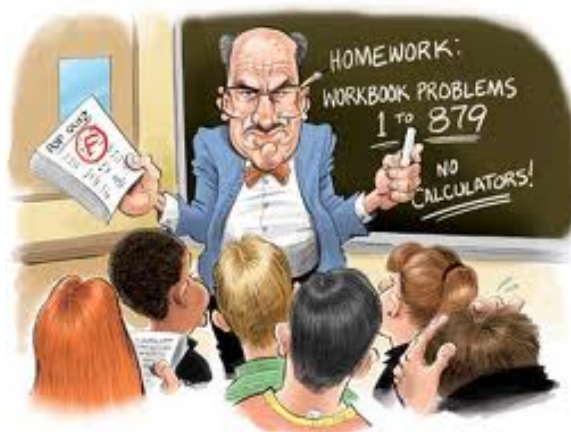
Carl Gauss' Teacher

Gauss' teacher, annoyed that he was able to sum the first 100 numbers so quickly, gave his students another problem in hopes that he could stump the young Gauss. He asked the students to sum the first 303 integers where each multiple of 3 is negative, that is, he wanted them to sum

$$1 + 2 + (-3) + 4 + 5 + (-6) + \dots$$

$$\dots + (-300) + 301 + 302 + (-303).$$

How should Carl Gauss do this? What is the sum?



Kendoku

Kendoku is a Sudoku-like puzzle that consists of a grid containing blocks surrounded by bold lines. Like Sudoku, the object of Kendoku is to fill all empty squares so that the numbers 1 to 6 appear exactly once in each row and column. In addition, the numbers in each block must be able to be combined using the math operation in the top left corner to produce the number in the top left corner.

Individual shapes may contain a digit twice, but within each row and column a digit can be used only once. The four arithmetic operations used are addition (+), subtraction (−), multiplication (×), and division (÷).

×10	×36			−1	
		÷5	×32	×108	
×90	×8				
		−1	×15		
			×12		×10
−1		÷6			

Frogs and Toads

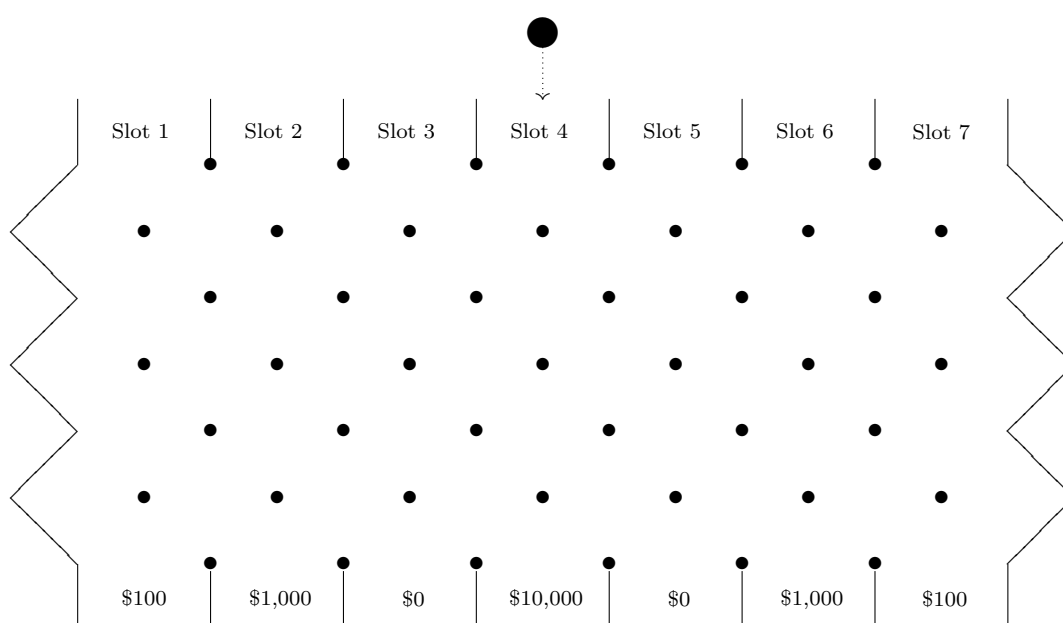
The goal of Frogs and Toads is to move the the toads into the 3 leftmost positions and the frogs into the 3 rightmost positions.

Frogs only move rightward, and toads move leftward. Every move is either a “slide” to the nearby square or a “jump” over one position, which is allowed only if the latter is occupied by a fellow of a different kind. In any case, no two animals are allowed in the same square.



Plinko

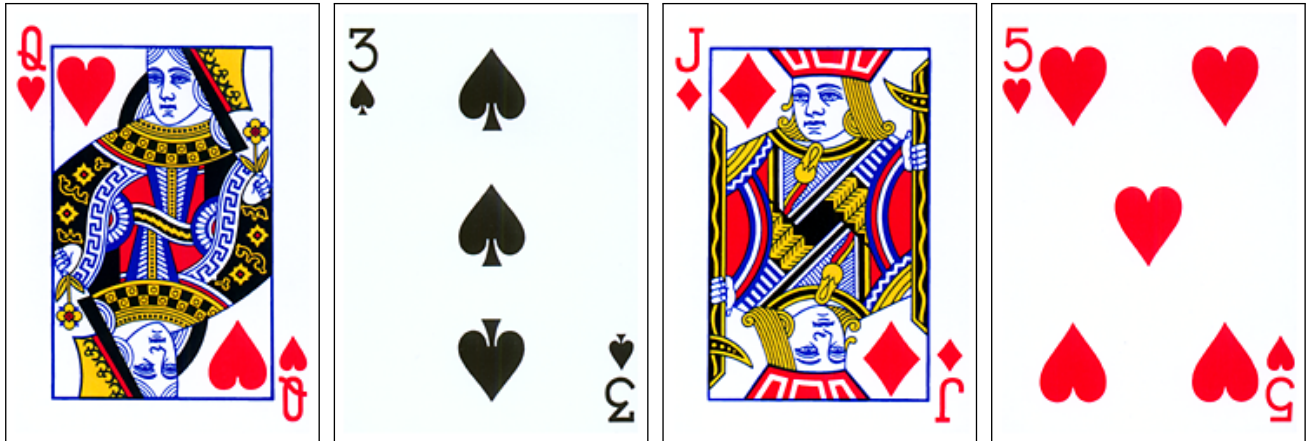
One of the most popular games that contestants play on the game show “The Price is Right” is called “Plinko”. In Plinko, the contestant will have between one and five Plinko chips to drop onto the Plinko board. The contestant releases the first chip from any of the nine slots at the top of the Plinko board (*see below*). As the chip makes its way down the board, it will encounter 6 pegs. If it encounters a peg that is directly adjacent to a wall, it simply falls in the only available direction. Otherwise, it falls to the left or right of the peg. The chip will ultimately fall into a bin at the bottom of the Plinko board, and the contestant wins the amount shown.



- (1) If you were to drop a Plinko chip from slot number 4, how many different paths could the chip take to the \$10,000 slot? How many paths could the chip take that end in a \$1,000 slot? How about a \$100 slot?
- (2) If you were to drop a Plinko chip from slot number 4, how many different paths can the Plinko chip take?
- (3) Suppose we were to add one more level of pegs. How many different paths could the chip take to the \$10,000 slot? How many paths could the chip take that end in a \$1,000 slot? How about a \$100 slot? Do you see a pattern?

Card Game

At lunch time Mrs. Gould asks if you and four of your friends would like to play a card game. You and your friends agree and she deals one card from a 52 card deck of playing cards to each of you face down. Mrs. Gould tells you and your friends to pick up the card without looking at it and hold out so that you cannot see your own card, but you can see everyone else's. You see that your four friends have the following four cards:



Mrs. Gould then proposes a bet, "If any of you can tell me if your card is red or black, you will get an A in my class. However, if you are incorrect, you get an F."

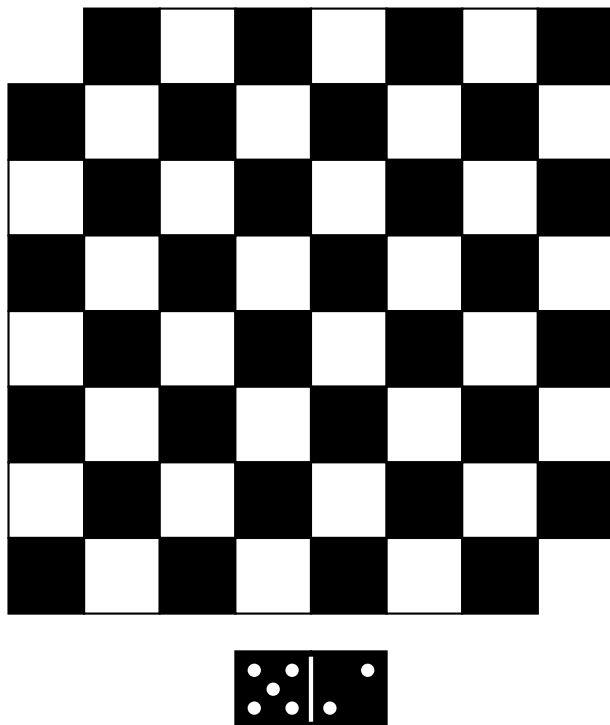
You and your friends have no idea, so you remain silent...

After a few seconds of silence Mrs. Gould asks, "What if I told you that one of you has a black card. Now can any of you tell me what color your card is?"

Even with this hint, your friends remain silent. What color is your card?

Chess and Dominoes

Suppose we have a chess board and with the two opposing corners removed, so that there are only 62 squares remaining, and 31 dominoes such that the shape of each domino covers exactly two squares of our chess board.



Can you arrange the 31 dominoes so that they cover all of the 62 squares on the chess board? If not, can you explain why not?

Change Jar

Every night when Priya came home from work she put any change she had in her pockets into a jar. One day she wanted to know how much change she had in her jar. She noticed that she had two more nickels than twice the number of dimes, and eight fewer quarters than twice the number of nickels. If the value of the quarters was \$1.60 more than four times the value of the nickels and dimes together, what was the total value of the change in Priya's jar?



Chicken McNuggets

Chicken McNuggets can be purchased in quantities of 6, 9, and 20 pieces. You can buy exactly 15 pieces by purchasing a 6 and a 9, but you can't buy exactly 10 McNuggets. What is the largest number of McNuggets that can **NOT** be purchased, and how do you know it is the largest?



Discs and rods

The following is a very old and famous mathematical puzzle. Suppose you have three rods, and four discs of different sizes which can slide onto any rod. You begin with all of the discs on one rod in ascending order of size (imagine the picture to the right with the top disc removed). The goal is to move the entire stack to another rod, under the following restrictions:

- Only one disc may be moved at a time.
- Each move consists of taking the upper disc from one of the rods and sliding it onto another rod, on top of the other discs that may already be on that rod.
- No disc may be placed on top of a smaller disc.



Can you figure out how to get all the discs to one of the other rods? How many moves did it take?

Chantel's Challenge

There are no tricks, just pure logic, so good luck and don't give up!

1. On a street there are five houses in row, painted five different colors.
2. In each house lives a St. Michael's student with a different favorite subject, soda, TV show and restaurant.

THE QUESTION: What color is the house of the student whose favorite subject is Math?

HINTS:

1. The student whose favorite restaurant is Cafe Poca Cosa lives in the red house.
2. The student whose favorite restaurant is Oregano's likes history best.
3. The student whose favorite restaurant is Chipotle likes Pepsi best.
4. The Green house is next to, and on the left of the White house.
5. The student that lives in the Green house likes Dr. Pepper best.
6. The student whose favorite TV show is "The Office" likes Latin best.
7. The favorite TV show of the student that lives in the Yellow house is "Glee".
8. The student living in the center house likes Mountain Dew best.
9. The student whose favorite restaurant is Beyond Bread lives in the first house.
10. The student whose favorite TV show is "30 Rock" lives next to the one whose favorite subject is english.
11. The student whose favorite subject is science lives next to the student whose favorite TV show is "Glee".
12. The student whose favorite TV show is "The Daily Show" likes Sprite best.
13. "Mad Men" is the favorite TV show of the student whose favorite restaurant is Zinburger.
14. The student whose favorite restaurant is Beyond Bread lives next to the blue house.
15. The student whose favorite TV show is "30 Rock" has a neighbor whose favorite soda is Coke.

The Read Wilder Inn

Ben, Doug, and Will decide to stay at the Read Wilder Inn. The price for the room is \$30. The owner of the Read Wilder Inn, one Read Wilder, likes Ben, Doug, and Will so he gives them \$5 back. Ben, Doug, and Will divide \$3 among themselves and give Read back the remaining \$2. Ben, Doug, and Will each spent \$9, so all together they spent \$27. That \$27 plus the \$2 they gave back equals \$29. Where did the 30th dollar go?

5 Digit Number

Can you find a five digit number with the following property: When you add a 1 after the right most digit you get a number that is three times the number you get when you add a 1 to the before the left most digit.

Consecutive Integers

Suppose we have N consecutive even integers, where N is also a positive even integer. If the sum of the first $N/2$ integers is 32 less than the sum of the last $N/2$ integers, and five times the smallest integer is 272 more than twice the sum of the largest two, what are the consecutive integers?

Driving to St. Michael's

When Mr. Lafferty drives from the University of Arizona to St. Michael's he always leaves at the same time and he likes to take the scenic route. He finds that when he averages 45 miles per hour he is always 18 minutes late. When he averages 60 mph he is always 9 minutes early. How many miles is Mr. Lafferty's scenic route, and how fast should he drive so that he'll be right on time?

Strimko

Strimko is a lot like Sudoku. The goal is to fully fill in the grid below with missing numbers 1 through 6 observing three simple rules:

1. Each row must contain the numbers 1-6 once and only once.
2. Each column must contain the numbers 1-6 once and only once.
3. Each path must contain the numbers 1-6 once and only once.

