1. **Buttons and Boxes**
   Imagine you have 3 boxes, one containing 2 red buttons, one containing 2 green buttons, and the third, 1 red button and 1 green button. The boxes are labeled according to their contents – RR, GG, and RG. However, the labels have been switched so that each box is now incorrectly labeled. Without looking inside, you may take 1 button at a time out of any box. Using this process of sampling, what is the smallest number of buttons needed to determine the contents of a 3 boxes?

2. **A flock of geese**
   Two bothers, Guy and George, inherited a flock of geese. They sold the entire flock, receiving for each goose the same number of dollars as there were geese in the flock. The money was given to them in $10 bills except the odd amount, less than $10, which was paid in change. They divided the fills by dealing them out alternately, though Guy complained that this was not fair because George received both the first and last fills, thus getting $10 more. George gave Guy all the change but Guy still argued he was still worse off. Was he? Bu how much?

3. **The Prisoner’s Test**
   A wicked king amuses himself by putting 3 prisoners to a test. He takes 3 hats from a box containing 5 hats – 3 red hats and 2 white hats. He puts one hat on each prisoner, leaving the remaining hats in the box. He informs the men of the total number of hats of each color, and then says, “I want you men to try to determine the color of the hat on your own head. The first man who does so correctly, and can explain his reasoning, will immediately be set free. But if any of you answers incorrectly, you will be executed on the spot.”

   The first man looks at the other two and says, “I don’t know.”
   The second man looks at the hats on the first and third man, and finally says, “I don’t know the color of my hat either.”
   The third man is at something of a disadvantage. He is blind. But he is also clever. He thinks for a few seconds and then announces, correctly, the color of his hat.
   What is the color? How did he know?

4. **Jugs**
   There are many variations of puzzles involving decanting (pouring from one container to another). The one presented here is knows to be at least 400 years old.

   ![Image of jugs](8, 5, 3)

   Three jugs have capacity 8, 5, and 3 pints respectively. The 8-pint just is filled entirely with water and the other tow just are empty. Your task is, by decanting, to divide the water into
two equal parts, i.e., 4 pints in each of the larger 2 jugs. None of the jugs is calibrated, so the only want to the task can be successfully performed is to pour water from one jug to another until the first jug is entirely empty of the second jug is entirely full. You must assume that the decanting is done with great care so that no water is spilled.

5. **Only One Left**
Place nine coins on a 5 x 5 board as shown. A move consists of one coin jumping over another coin in an adjacent square to land in an unoccupied square on the other side of the coin being jumped over. Moves can be vertical, horizontal, or diagonal. The object is to end up with one coin in the center in eight moves.

6. **Knight’s Solitaire**
This is an interesting version of solitaire. It consists of a 5 x 5 board and two sets of 12 pieces, arranged as shown with the middle square vacant. The challenge is to interchange the two sets of pieces in as few moves as possible. A move is the same as a knight’s move in the game of chess – to move a piece to the square which has been left vacant by the previous move.

One commercial version of the game says 50 to 55 moves is average, less than 50 is good, and 45 is excellent.

7. **Toothpick puzzles**
Create the figure pictured on the right using 16 toothpicks.
Change the position of, but do not remove, two toothpicks to form exactly four squares.

Change the position of, but do not remove, three matches to form exactly three squares.

8. **Juggling with Digits**
Arrange the ten digits in three arithmetical equations, employing three of the four operations of addition, subtraction, multiplication, and division, and using no signs except the ordinary ones implying those operations. Here is an example to make it quite clear:

9. \[ 3 + 4 + 7; \quad 9 - 8 = 1; \quad 30 / 6 = 5 \]
But this is not correct, because 2 is omitted and 3 is repeated.