

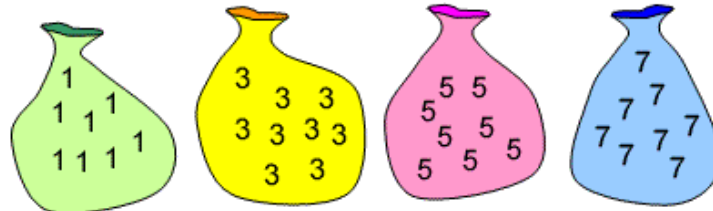
Problem Solving Tasks for Session 2

Problem 1

Draw the side of the covered cube face.....

Problem 2

Four bags contain a number of 1's, 3's, 5's and 7's.



Pick any ten numbers from the bags above so that their total is 37.

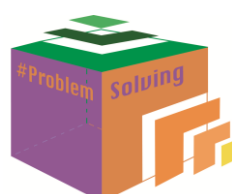
Problem 3

You are a prisoner sentenced to death. Your captor offers you a chance to live by playing a simple game. He gives you 20 yellow cubes, 20 red cubes and 2 empty bowls. He then says 'Divide these 40 cubes into these 2 bowls. You can divide them any way you like as long as you use all the cubes. Then I will blindfold you and mix the bowls around. You can then choose one bowl and remove one cube. If the cube is YELLOW you will live but if the cube is RED you will die'. How do you divide the cubes up so that you have the greatest probability of choosing a YELLOW cube?

Problem 4

The island of Aruba is well known for its beaches and predictable warm, sunny weather. In fact, Aruba's weather is so predictable that the daily newspapers don't even bother printing a forecast. Strangely enough, however, on New Year's Eve 2012, as the islanders were counting down the last 10 seconds of 2012, it began to rain. What is the probability, from 0 to 1, that 72 hours later the sun will be shining?

Problem 5



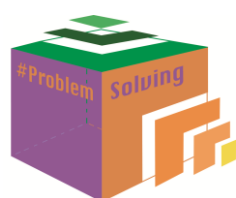
Problem 6

$$\begin{aligned} \text{Horse} + \text{Horse} + \text{Horse} &= 30 \\ \text{Horse} + \text{Horseshoe} + \text{Horseshoe} &= 18 \\ \text{Horseshoe} - \text{Boots} &= 2 \\ \text{Boots} + \text{Horse} \times \text{Horseshoe} &= ?? \end{aligned}$$

Problem 7

$$123 + 1423 + 7453 = 218.06$$

Where do the decimals go?



Problem 8

In the 2012 Olympics, Usain Bolt from Jamaica won the gold medal in the 100m race with a time of 9.63s. In the first ever event of the modern Olympic games in April 1896, Thomas Burke from the US won the 100m race in a time of 12s. If both athletes ran in the same 100m race repeating their respective performances, what would be the distance between the athletes at the finish line?



Problem 9

The volume of a shape is 216. What can it be?

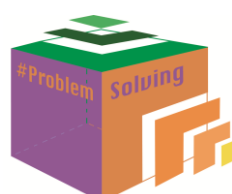
Problem 10

Two different families of frogs want to move over to the opposite side of the pond (i.e. the green frogs want to get to the right hand side and the yellow frogs want to move to the left hand side).



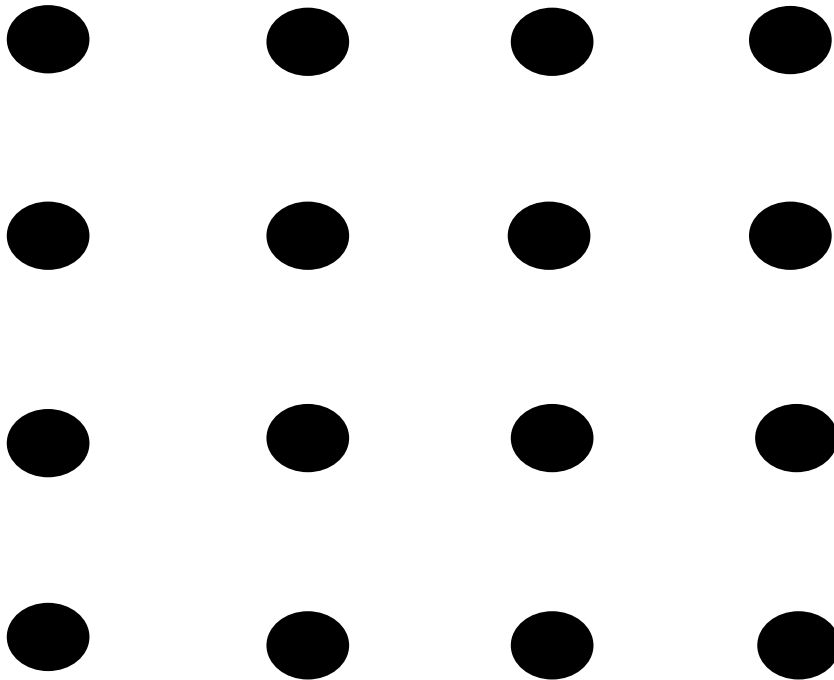
Frogs can jump over each other onto an empty stone or they can slide onto an empty stone which is immediately in front of them. Only one frog is allowed on each stone at a time and they cannot move backwards. The challenge is to do this in as few moves as possible. Each individual slide and jump counts as 1 move.

Begin with 1 frog on both sides and record the number of moves taken. Once you have this done, see if you can do it for a different number of frogs. Can you find a rule that predicts how many moves a given number of frogs will take?



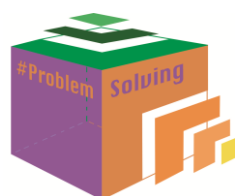
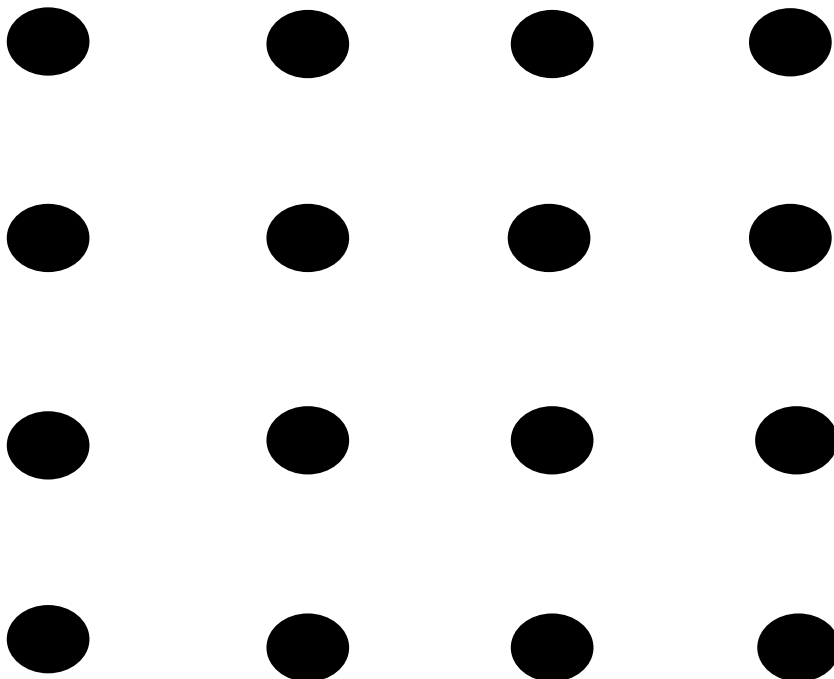
Extra..... Problem 11

How many squares can you make using any four points from the grid below as corners?



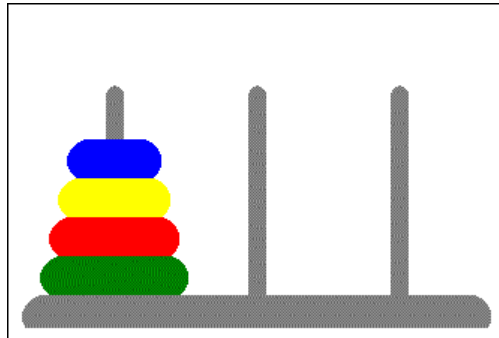
Extra..... Problem 12

How many equilateral triangles can you make using any three points from the grid below as corners?



Extra..... Problem 13

In this problem we have a set of n disks all of different sizes, and we have three pegs. All of the disks are on the first peg, and they are in order of size with the largest disk on the bottom. The goal is to move all the disks from the first peg to the third peg, moving only one disk at a time. There is only one catch. You can never put a larger one on top of a smaller one. Can you find a rule that predicts the minimum number of moves a given number disks will take?



Extra..... Problem 14

Albert and Bernard just became friends with Cheryl, and they want to know when her birthday is. Cheryl gives them a list of 10 possible dates: May 15, May 16, May 19, June 17, June 18, July 14, July 16, August 14, August 15, August 17.

Cheryl then tells Albert and Bernard separately the month and the day of her birthday, respectively.

Albert: I don't know when Cheryl's birthday is, but I know that Bernard does not know too.

Bernard: At first I didn't know when Cheryl's birthday is, but I know now.

Albert: Then I also know when Cheryl's birthday is.

So when is Cheryl's birthday?

Extra..... Problem 15

In a long hall of the Arts Block, there are 100 lockers numbered 1 to 100. In preparation for the beginning of term, the custodian cleans the lockers, resets the combinations, and closes the locker doors. When the students return from summer vacation, they decide to celebrate the beginning of the college term by working off some energy. Student 1 runs down the row of lockers and opens every door. Student 2 closes the doors of lockers 2, 4, 6, 8, and so on to the end of the line. Student 3 changes the state of the doors of lockers 3, 6, 9, 12, and so on to the end of the line. (This means the student opens the door if it is closed and closes the door if it is open.) Student 4 changes the state of the doors of lockers 4, 8, 12, 16, and so on. This continues until every student has had a turn. When all 100 students have finished, which locker doors are open?

