Questions

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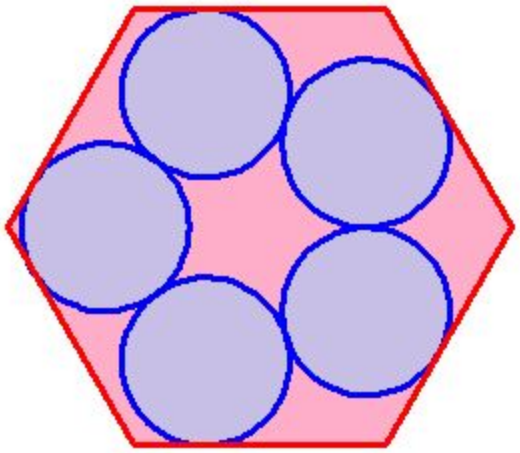
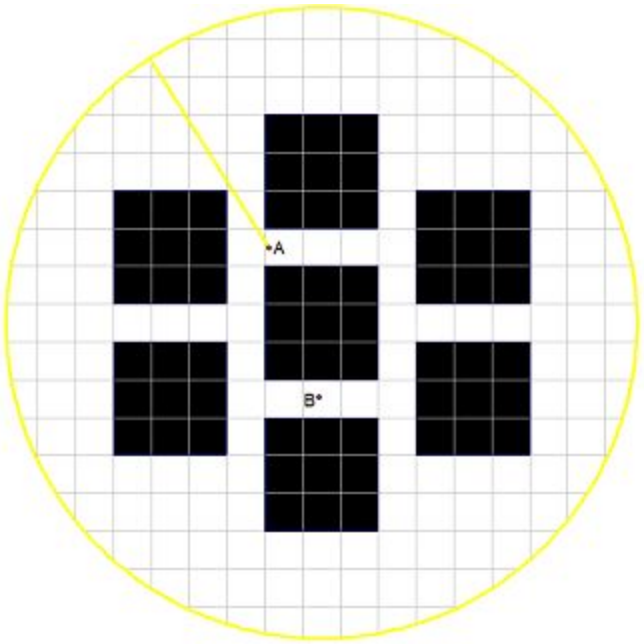
1. Bhomik's Idli Shop(Geometry)

The famous Bhomik is starting his own south Indian restaurant and decides to sell Idlis. He takes delivery orders in multiples of five. He has a hexagonal shaped packaging box in which he packages his Idlis. He wants to pack five perfectly circular Idlis of unit radius inside a regular hexagon shaped packing box. What is the length of each side of the box?

Round off the answer to the nearest integer.



2. In the dark.(Geometry)



Seven squares are arranged on a unit grid as shown. Now you can find 2 types of points in this circle.

a. From some positions within the squares, you can see to the outside as with point A.
b. On the other hand, point B cannot see to the outside.

Find the area of the region(s) formed by all points that cannot see to the outside (That is all points like A).

The area is a fraction which when completely reduced formes a fraction a/b. Enter the remainder when (a+b) is divided by 10.

3. An Eggy Problem(Logical Reasoning)

You are given only two identical boiled eggs. You need to find out the lowest story of a 146-storeyed building (excluding ground floor) from which the eggs would break if dropped, using a minimum number of egg-drops.

Let story X be the story from which we make the first egg-drop. Give (X+1)/2.

4. Probably a Martian(Logical reasoning)

I ask people at random if they have two children and also if one is a boy born on a Tuesday. After a long search, I finally find someone who answers yes. What is the probability that this person has two boys? Assume an equal chance of giving birth to either sex and an equal chance of giving birth on any day.

Give ⅓ of the denominator of the rational number probability.

5.Birthday Query(Logical reasoning)

Kowndinya had his first birthday after 8 years of his birth.

Give 1/6th of the sum of all digits (DD/MM/YYYY) in his exact birthdate, which is the closest to today's date.

6. Beware Of Thugs!(Logical reasoning/Greedy algorithm)

Five thugs have obtained 100 gold coins and have to divide up the loot. The thugs are all extremely intelligent, treacherous and selfish (especially the captain). The captain always proposes a distribution of the loot. All thugs vote on the proposal, and if half the crew or more go "Aye", the loot is divided as proposed, as none would be willing to take on the captain without superior force on their side. If the captain fails to obtain the support of at least half his crew (which includes himself), he faces a mutiny, and all thugs will turn against him and make him walk the plank. The thugs start over again with the next senior pirate as captain.

What is the maximum number of coins the captain can give up without risking his life?

7. Poisoned Booze(Logical reasoning)

There are 512 bottles of beer, which have been arranged for a party by a king. The party starts in 6 hours. However, exactly 1 of the bottles contains poison. The king needs to find that bottle and remove it. He has slaves, whose job will be to taste the bottles. The poison on being consumed will show its effect in 6 hours. **What is the minimum number of slaves needed to find the poisoned bottle?**

8. And Then There Were None(Verbal reasoning)

On an island, there are 100 blue-eyed people, 100 brown-eyed people, and the Guru (she happens to have green eyes). They are all perfect logicians. No one knows the color of their own eyes. Everyone can see everyone else at all times and keeps a count of the number of people they see with each eye color (excluding themselves), but they cannot otherwise communicate.

Every night at midnight, a ferry stops at the island. Any islanders who have figured out the color of their own eyes then leave the island, and the rest stay.

The Guru speaks to them just once on the first day when all of them arrive on the island. Standing before the Islanders, she says the following:

"I can see someone who has blue eyes."

On what night does the first person leave the island? **Give 5% of that value.**

There are no mirrors or reflecting surfaces. It is not a trick question, and the answer is logical. It doesn't depend on tricky wording or anyone lying or guessing. The Guru is not making eye contact with anyone in particular; she's simply saying "I count at least one blue-eyed person on this island who isn't me."

9. The Labyrinth(Discrete Maths)

There is a labyrinth (Just another word for the maze!) that has 2 points of entry/exit. If you enter through one of them, the labyrinth closes that opening, so you cannot return via that opening. The labyrinth is also infinite, but the path connecting the entrance and exit is of finite length. The labyrinth is also 2D: The paths of the labyrinth goes north, south, east or west (but not up or down).

You and some friends want to enter and exit the labyrinth. You guys have a communication system that enables one to communicate whether they have found the exit to the others regardless of how far apart you guys are from each other.

What is the minimum number of people that have to go into this labyrinth together (from the same opening) for there to be a strategy to guarantee that all can come out of the labyrinth in a finite amount of time?

Assume that the only information you can get about the labyrinth is from walking the paths of the labyrinth (no satellite images, etc). Also, assume that the exit of the labyrinth is not somewhere inside the boundaries of the labyrinth but is at the periphery of the grand maze.

10. Can Ben nail it?(Discrete Maths)

Alex and Ben are playing a game in which Alex thinks of a number in the set {1,2,3,4,5,6} and Ben has to guess the number. If Ben guesses correctly, Ben wins. Otherwise, at each incorrect guess of Ben, Alex increases or decreases his number by one, keeping the number in the set.

What is the minimum number k such that Ben has a strategy to win the game within k moves?

11.Bobby Business(Discrete Probability)

Bob: Hey Alice lets play "Guess a number".
Alice: Oh I couldn't be bothered...

Bob: Oh come on, please?
Alice: Fine, I'll play. But you must submit your guesses in batches of 4. Except at the end. On your last attempt you can guess just one number, but if you are wrong you lose.

Bob: Oh, OK. But what will you tell me about my guesses when I make 4 at once?
Alice: The usual. Whether each one is too small, too big, or correct. Tell you what, I'll make it a bit easier. I'll choose a number between 1 and 6249.

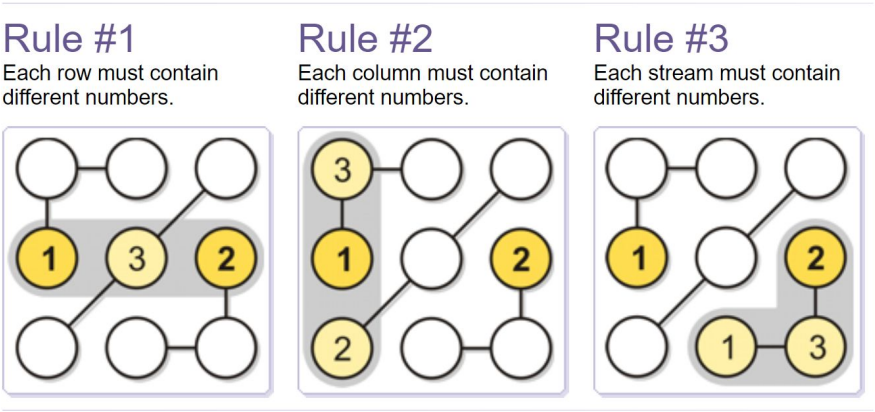
So Alice thinks of a number between 1 and 6249.

Bob may play as many rounds of guessing four numbers as he wishes. [Note: the four guesses need not be distinct, but they will count for four guesses]. On the final round, he must commit to a single number that he believes is Alice's number.

How many guesses does Bob need in order to correctly identify Alice's number and guarantee a win? Report the quotient when the obtained number of guesses is divided by 4.

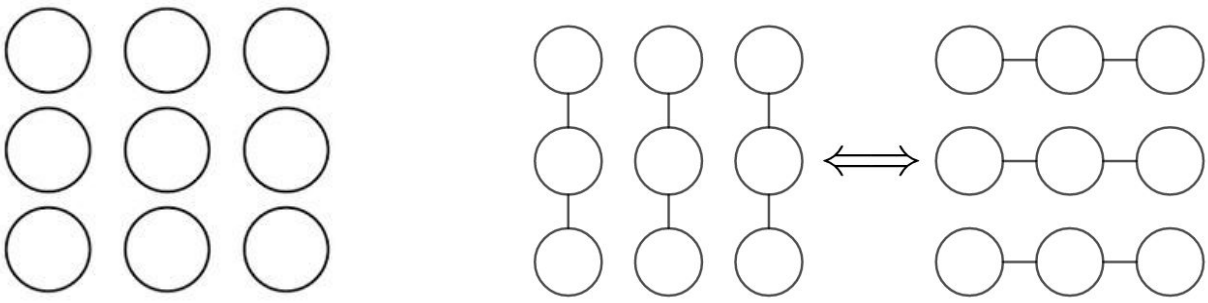
12. Strimko Special Number?(Discrete maths)

Like the game of Sudoku, *Strimko* involves filling out all distinct numbers for all rows, columns, and equal-length strings with following rules



For this problem, consider the following set of empty, 3X3 unconnected cells. Given the conditions of creating a *Strimko* puzzle, how many unique arrangements of 3 strings are there, such that an empty puzzle can have at least a valid solution?

Clarification: Multiple distinct constructions, where the whole setup can all be reoriented (via rotation or reflection) to look like each other, are all counted as one.



Report the sum of digits of the obtained number as the answer.

13. Cryptogram(Analytical skills)

B I D O N G

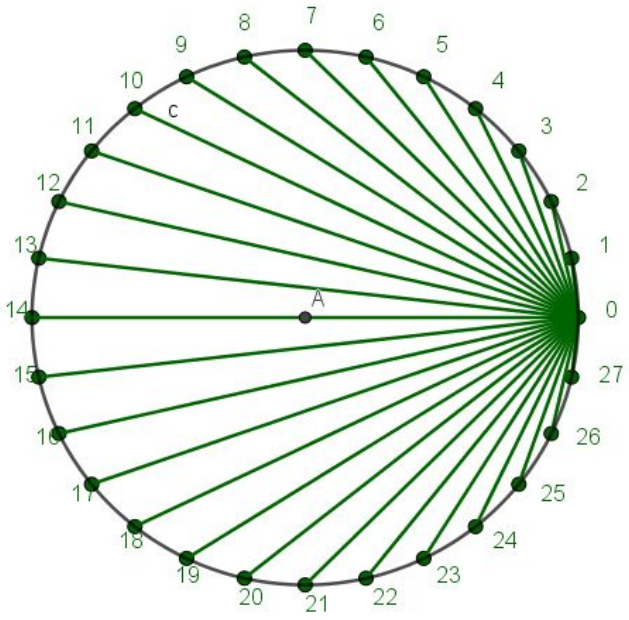
+ Y U 2 0 1 7

J I A Y O U

Given that each alphabet in the cryptogram above represents distinct digits.

Find the number of possible solutions to the cryptogram.

14. Loopin′ Round(Geometry)



The diagram shows 28 equidistant points (labeled 0,1,2,...,27) placed on a unit circle centered at point A. Join the point to each of the other points, and let X_k denote the length of the segment joining the points 0 and k.

Find the sum of squares of all the values of X_k from k=1 to k=14 multiplied by 10.

15. Blackjack(Discrete Probability)

You hold 10 cards, the Ace through 10 and you lay them randomly down in a row...

Now you turn them over one at a time starting with the first. Each time you turn a card face up, that card tells you the position of the card to flip over next. Once it tells you to flip over a card that is already face up, you are done.

What is the probability that you will turn every card face up?

(The Ace counts as a 1)

Report the obtained probability multiplied by 20 as the answer.