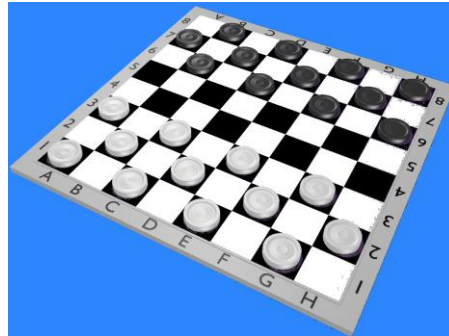




Vic Skeptics Logic and Maths Puzzles 57 April 2017

1. How many possible opening moves are there for each player in a game of draughts or checkers?



2. What is the next number in this mathematical sequence: **18, 20, 24, 32, __**

3. What is the square root of (a) **121**? (b) **12321**? (c) **1234321**?

4. What is the maximum number of Friday the 13ths possible in one calendar year, including leap years?



5. How many sheets of **A4** paper are necessary to cover an **A1** sheet?

6. Let's say you have a garden. On day one, there is only one weed. If the number of weeds doubles every day, and the garden is full of weeds on the 30th day, how many days will it take to fill the garden if we start with two weeds?

7. The year **2013** consisted of four different digits in no particular order. In what year did that most recently occur previous to 2013?

8. The year **2013** also consisted of four consecutive digits in no particular order. In what year did that most recently occur previous to 2013?

9. In the game of Mastermind, a board is sectioned off into rows, each row having four slots in which pegs can be inserted.

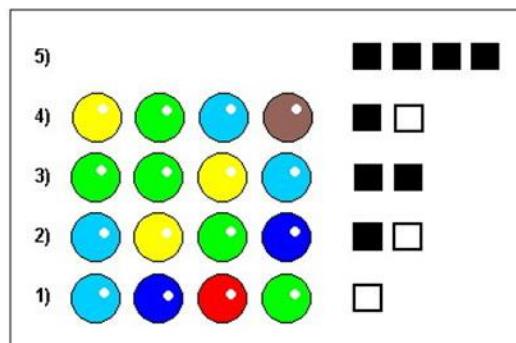
There are 6 different colours of pegs: green, red, yellow, brown, dark-blue, light-blue. Player (A) makes up some arrangement of four pegs along a row; Player (B) tries to guess what this arrangement is. For every guess that B makes, A responds by putting black and/or white keypegs right next to A's guess; as follows:

Black keypeg = one of B's pegs is the correct colour and in the correct position

White keypeg = one of B's pegs is the correct colour but in the wrong position

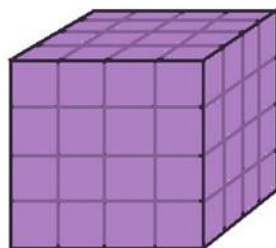
So if B manages to guess all four colours and positions correctly, A will respond with four black keypegs, and the game is over.

Here's a completed game of Mastermind.



B was able to determine A's arrangement using only five guesses. What's is A's arrangement? (State the four colours, left to right)

10. A solid, four centimetre cube of wood is coated with paint on all six faces; then the cube is cut into smaller one centimetre cubes.



These new one-centimetre cubes will have either three painted faces, two painted faces, one painted face, or no painted faces.

- How many of the cubes will have three painted faces?
- How many of the cubes will have two painted faces?
- How many of the cubes will have one painted face?
- How many of the cubes will have no painted faces?

Solutions:

1. 7
2. 48 (the differences start at 2 and keep doubling)
3. (a) 11 (b) 111 (c) 1111
4. 3
5. 8
6. 29 days
7. 1987
8. 1432
9. yellow, yellow, yellow, light-blue

In the second row there was one colour change from the first row; red was taken out and replaced with yellow... and this guess received one more keypeg. This means yellow is in and red is out. And if yellow is in, obviously it must be in column 3.

There was one colour change from the second and fourth rows... dark-blue was taken out and replaced with brown. Since the number of keypegs stayed the same, this means they are either both in or both out. So if they are both in then green and light-blue must both be out, according to the information received with the fourth guess. (Since it must be yellow and brown that are drawing the two keypegs.)

But how can green and light-blue both be out if two black keypegs were received in the third guess? They can't so this means that dark-blue and brown must both be out, not in.

*So, red is out, dark-blue is out, brown is out
Yellow is in.*

*One of green or light-blue is in but not both.
A double of green is out (Row 3)*

*So the four colours must be either:
yellow, light-blue, light-blue, light-blue
yellow, yellow, yellow, green
yellow, yellow, light-blue, light-blue
yellow, yellow, yellow, light-blue
A triple with light-blue just doesn't work.*

If green is in it can't be in columns 3 or 4. A simple check indicates no solution fits with it in either columns 1 or 2 either so this colour combination is not correct.

If light-blue is in twice one must be in column 4 and the other must be in column 2 since light-blue can't be in column 1 (row 1) or column 3. But yellow, light-blue, yellow, light-blue would not receive a black keypeg in row two, which it did.

The only combination left happens to work. yellow, yellow, yellow, light-blue fits each guess.

10. a. 8 b. 24 c. 24 d. 8