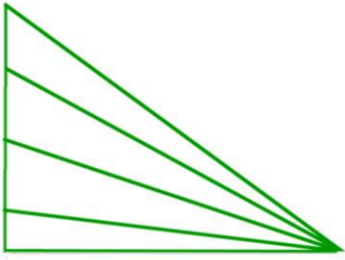




Logic and Maths Puzzles February 2017

1. This is a pre-decimal currency question. If you purchased 6 articles at 3 shillings and tuppence each, what change would you receive from a one pound note?



2. How many triangles are in this figure in total? Hint: It's more than 4!

3. Al says Beth is lying, Beth says Joe is lying, Joe accuses both of them of lying. Who is telling the truth?

4. How many times do the hour and the minute hands of a clock cross each other in any twelve-hour period?

5. What is $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{4}{5}$ of $\frac{5}{6}$ of $\frac{6}{7}$ of $\frac{7}{8}$ of $\frac{8}{9}$ of $\frac{9}{10}$ of 1000?
The answer might surprise you!
Hint: Look for an easy way of working this out.

6. What is a decagon?



7. There's a car park next to the Maths Faculty building at Trivia University. It only costs 30 cents to park all day. You can make up the 30 cents with any combination of 5 cent and 10 cent coins, (including just 6 X 5c coins or just 3 X 10c coins)

However, the order in which you insert the coins is important. For example, 5c, then 10c, 5c, 5c and 5c is different to

10c, then 5c, 5c, 5c and 5c.

The meters will only allow each person to park once for each possible combination of 5c and 10c coins making up 30 cents.

Once each person exhausts all possible combinations, they'll have to park in a more expensive area.

What is the greatest number of days for which any one person may park for just 30 cents a day?

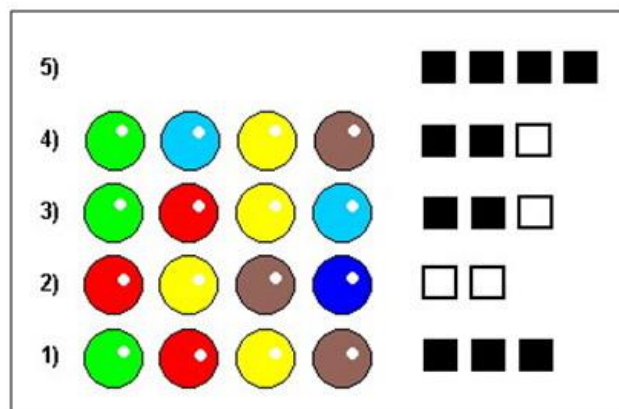
8. In the game of Mastermind, a board is sectioned off into rows, each row having four slots in which pegs can be inserted. There are 6 different colors of pegs: green, red, yellow, brown, dark-blue, light-blue. Player (A) makes up some arrangement of four pegs along a row; Player (B) tries to guess 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 color and in the correct position

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

So if B manages to guess all four colors 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)

9.

Census Taker: *How many children do you have?*

Woman: *Two.*

Census Taker: *And their ages?*

Woman: *One is five, one is two.*

Census Taker: *Is at least one of them a girl?*

Woman: *Yes.*

Is the probability that her *other* child is also a girl:

A. 1 in 2?

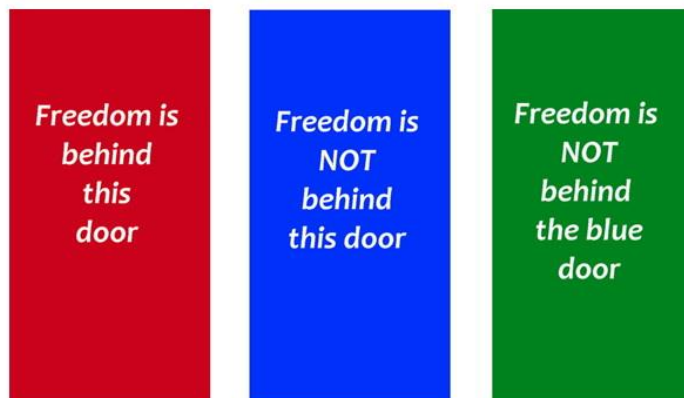
B. 1 in 3?

or

C. 1 in 4?

(Assume every pregnancy has a 50/50 chance to be a boy or a girl.)

10. You are trapped in a dungeon which has three exit doors as shown.



Behind one of the doors lies freedom. Behind the other two, however, lies certain death. Given the fact that at LEAST ONE of the three statements on the three doors is true and at LEAST ONE of them is false, which colour door leads to safety?

Solutions:

1. 1 shilling (12 pence)

2. 10

3. Beth

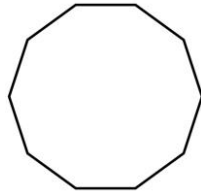
Joe can't be telling the truth because then Beth would be lying, and Al's statement (which is also a lie) would mean that Beth is telling the truth. These two facts contradict each other. Therefore Joe is lying, which means that Beth is telling the truth.

4. 11 times

5. 100

$$\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} \times \frac{5}{6} \times \frac{6}{7} \times \frac{7}{8} \times \frac{8}{9} \times \frac{9}{10} \times \frac{1000}{1}^{100}$$

6. A plane figure enclosed by 10 straight sides e.g.



7. 13 days

8. In order, left to right: Green, red, light blue, brown

9. 1 in 3

For any woman to have two children of different ages, the four equally likely outcomes are:

Two boys

Older boy, younger girl

Older girl, younger boy

Two girls

However, if you know that at least one of the children is a girl, that eliminates "two boys" and leaves only three equally likely outcomes, one of which is "two girls".

10. The Green Door.

Assume Freedom is behind the red door. All three doors would then have true statements which we know is not possible since one of them must be false.

Assume Freedom is behind the blue door. All three doors would then have false statements which we know is not possible since one of them must be true.

Freedom is therefore behind the green door. The blue door and the green door have true statements and the red door has a false statement.