Some Weird Problems with Surprising Answers

Here are some problems that have unusual answers (which you will see next week).

(1) Take a really deep breath (as much as your lungs will hold) and hold it for ten seconds, then exhale. In the year 44 BC, Julius Caeser was assassinated by being stabbed a number of times. What is the probability that a molecule of air, that he breathed out on his dying breath, has just been breathed in by you now, some 2 053 years later?

(2) I am in a gathering of 30 people. A buddy of mine looks around and bets me $20.00 that two people in our group have the same birthday. Assume 365 days in the year, and there are thirty people including yourself and your buddy. Do you take the bet?

(3) There are two baseball players, Player A and Player B. In the first half of the season, Player A has a greater batting average than Player B. In the second half of the season, Player A has a greater batting average than Player B as well. However, in the whole season, Player B has a greater batting average than Player A. How can that happen?

(4) Qwerty and I are flipping two coins. His slips off the table and onto the floor, while mine is showing "HEADS". What is the probability that both are "HEADS" ? By the way, another way of saying the same problem is: Hey, Qwerty's family has two children, and I know Bobby, the boy. What is the probability that both are boys?

Answers to Last Week's Questions

(1) Imagine a rope that fits tightly around a smoothed-out Earth. The rope is positioned at the Equator. The Circumference of the Earth is considered to be 40 074 km or 24 900 miles, with the radius considered to be 6 378 km or 3 963 miles. Lets cut the rope and insert 3m (or if you prefer use 10 feet). Question: Since the rope now is longer than the circumference of the Earth, it will fit loosely around the Earth and leave a bit of a gap between it and the Earth. How big is that gap?

Answer: About 19 1/8 inches or about 47.75 cm. Surpised? In fact it doesn't really matter whether your rope is around the earth, or around a basketball, the answer is the same. Here is the proof:

Let C = Circumference of the Earth, and R = Radius of the Earth. Then assuming a perfect sphere, $C = 2\pi R$.

Solving for "R" we get: $R = \frac{C}{2\pi}$.

Let C_1 = Circumference of the Earth with the rope added in, and R_1 = Radius of the Earth with the rope added in. Then assuming a perfect sphere, $C_1 = 2\pi R_1$. Solving for "R_1" we get: $R_1 = \frac{C_1}{2\pi}$. Now in our problem we have inserted a 10 ft piece (or 3m piece, if you prefer the problem in metric), So $C_1 = C + 10$ (or $C_1 = C + 3$). So let's work out the new Radius, R_1 by doing the following:

$$R_1 = \frac{C_1}{2\pi}\text{, and since } C_1 = C + 10\text{ :}$$

$$R_1 = \frac{C+10}{2\pi}\text{, or } R_1 = \frac{C}{2\pi} + \frac{10}{2\pi}\text{,but, since } \frac{C}{2\pi} = R$$

$$R_1 = R + \frac{10}{2\pi} = R + 1.591549431 \text{ feet, or R + } 19\frac{1}{8} \text{ inches}$$

Doing the same thing, but in metric, we get $R_1 = \frac{C}{2\pi} + \frac{3m}{2\pi}$, or $R_1 = R + 0.4774648293m$ or 47.75 cm.

Note, "R" could be any radius, and the answer is the same: the length of the rope inserted divided by 2π.

(2) As a bonus question: A gambler approaches you with the following: He shows you three cards that he has in a bag. Card A is red on one side and blue on the other; card B is red on both sides; and card C is blue on both sides. He puts the cards into the bag and shakes them up. Then he carefully slides one card out so that you cannot see the other side. You are looking at a card with the Blue side up. What colour do you think is the other side, and what are the odds that you are correct?

Answer: There is a 2/3 chance that the colour on the others side is **BLUE**, whereas most think that it is a 50% chance that it is **BLUE**. The working is below:

Here is a diagram illustrating the problem:

Card	Side	Colour	Colour Other Side
A	1	RED	BLUE
	2	BLUE	RED
B	1	RED	RED
	2	RED	RED
C	1	BLUE	BLUE
	2	BLUE	BLUE

As you can see from the diagram, if you are seeing **BLUE**, the other side could be **RED** in one case, but **BLUE** in two cases. Thus the probability of the other side being **BLUE** is 2/3. Similarly, if you were seeing **RED**, the other side is **BLUE** in one case and **RED** in two cases. Thus the probability of the other side being **RED** is 2/3.

So whatever colour you are seeing, the probability that the other side being THE SAME COLOUR is 2/3.