Problems by Martin Gardner

Running Race

Saul and Sal race each other for 100 yards. Sal wins by 10 yards. They decide to race again, but this time, to even things up, Sal begins 10 yards behind the start line. Assuming that both run with the same constant speed as before, who wins?

Solution

Sal wins again. In the first race she ran 100 yards in the time it took Saul to run 90. Therefore, in the second race, after Saul has gone 90 yards, Sal will have gone 100, so she will be alongside him. Both will have 10 more yards to go. Since Sal is the faster runner, she will finish before Saul.

Scrambled Box Tops.

Imagine that you have three boxes, one containing two black marbles, one containing two white marbles, and the third, one black marble and one white marble. The boxes were labelled for their contents–BB, WW, BW–but someone has switched the labels so that every box is now incorrectly labelled. You are allowed to take one marble at a time out of any box, without looking inside, and by this process of sampling you are to determine the contents of all three boxes. What is the smallest number of drawings needed to do this?

Solution

You can learn the content of all three boxes by drawing just one marble. The key to the solution is your knowledge that the labels on all three of the boxes are incorrect. You must draw a marble from the box marked "black-white". Assume that the marble drawn is black. You know then the the other marble in this box must be black also, otherwise the label would be correct.

Since you have now identified the box containing two black marbles, you can at once tell the contents of the box marked "white-white": you know it cannot contain two white marbles, because its label has to be wrong; it cannot contain two black marbles, for you have identified that box; therefore it must contain one black and one white marble. The third box, of course, must then be the one holding two white marbles. You can solve the puzzle by the same reasoning if the marble drawn from the "black-white" box happens to be white instead of black.

1. Una iarda è più lunga o più corta di un metro?

2. Un miglio è lungo 1609.344 metri.

3. Assumiamo che le tre scatole non siano trasparenti!

4. Quante biglie bianche ci sono?

5. Se ci fossero biglie di tre colori ci vorrebbero più scatole.