

ABACUS Tesseract 2013 – Set #11

Question #1:

A family wants to get through a tunnel. Dad can make it in 1 minute, mama in 2 minutes, and son in 4 and daughter in 5 minutes. Unfortunately, not more than two persons can go through the narrow tunnel at one time, moving at the speed of the slower one. Can they all make it to the other side if they have a torch that lasts only 12 minutes and they are afraid of the dark?

Question #2:

A mad bomber is out on the job, making bombs. He has two fuses (pieces of string) of varying thickness which each burn for 30 seconds. Unfortunately he wants this bomb to go off in 45 seconds. He can't cut the one fuse in half because the fuses are of different thicknesses and he can't be sure how long it will burn. How can he arrange the fuses to make his bomb go off at the right time?

Question #3:

Mr. Kothari runs a taxi service in Ahmedabad. Every day, he travels from Ahmedabad to one nearby city and back. All the cities are less than 100 km away from Ahmedabad. Everyday morning, Mr. Kothari fills his car's fuel tank to the brim. On a full tank, the car can travel maximum 250 km. Unfortunately, Mr. Kothari forgot to fill his tank today. What is the probability that he will run out of fuel during the day?

SOLUTIONS

Solution 1:

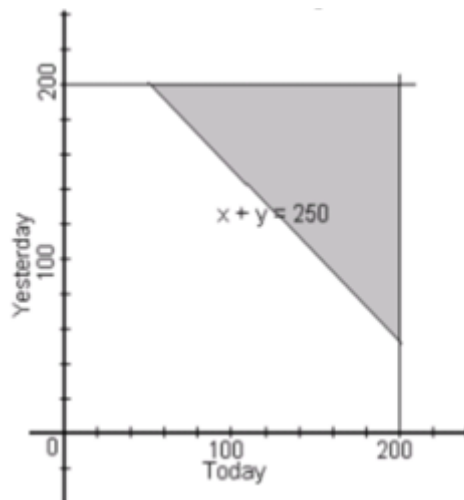
First mom and dad – 2 minutes. Dad comes back – 3 minutes, both children go to mom – 8 minutes. Mom comes to dad – 10 minutes and they both get to their children – 12 minutes.

Solution 2:

Light both ends of one of the fuses. When that fuse goes out, 15 seconds has elapsed. Then light the other fuse.

Solution 3:

This problem can be solved graphically:



The distances travelled today and yesterday are represented on X-axis and Y-axis respectively. Since the maximum distances that can be (to a city and back) is 200, the kilometers travelled on either day would be represented within a square of side 200 km as shown. Now, if the sum of side 200 km as shown. Now if the sum of distances travelled today and tomorrow is greater than 250, Mr. Kothari will run out of fuel. The line $x+y=250$ is shown in the figure. The shaded region represents the cases when Mr. Kothari will run out of fuel. Therefore, the probability is : $[(1/2) * 150 * 150]/(200^2) = 9/32 = 0.28125$