



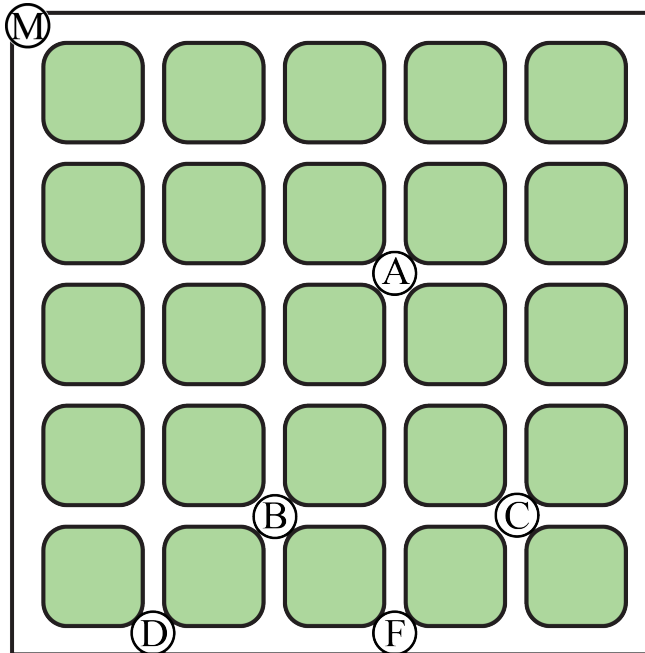
Problem of the Week

Problem B and Solution

For Your Amusement

Problem

The map of an amusement park looks like a grid with six horizontal paths and six vertical paths. The main gate and five rides are marked with letters, as shown.



M: Main Gate
A: Airplanes
B: Bumper Cars
C: Carousel
D: Drop Tower
F: Ferris Wheel

All visitors must walk on the paths. It takes 1 minute for Anton to walk along a path from one intersection to the next, and 5 minutes to go on any ride.

- Anton arrives at the main gate and wants to go on two rides before returning to the main gate for lunch in 25 minutes. Which two rides could he choose?
- Starting at the main gate, Anton wants to go on the Ferris Wheel, the Airplanes, and the Bumper Cars, and then back to the main gate to meet a friend. In which order should Anton go on the three rides if he wants to be back at the main gate as quickly as possible?

Solution

- Anton wants to go on two rides, and each ride takes 5 minutes, so he can walk for at most $25 - 5 - 5 = 15$ minutes.

Notice that it takes 8 minutes to walk from the main gate to the Carousel, and so takes 16 minutes to walk there and back. Thus, Anton cannot go on the Carousel. Similarly, it takes 8 minutes to walk from the main gate to the Ferris Wheel, so Anton cannot go on the Ferris Wheel.



That leaves the Airplanes, Bumper Cars, and Drop Time.

Can Anton go on the Airplanes and the Bumper Cars? It takes 5 minutes to walk between the main gate and the Airplanes, 3 minutes to walk between the Airplanes and the Bumper Cars, and 6 minutes to walk between the main gate and the Bumper Cars. Thus, this would take a total of $5 + 3 + 6 = 14$ minutes of walking. So one possibility is that Anton goes on the Airplanes and Bumper Cars.

Can Anton go on the Airplanes and Drop Time? It takes 5 minutes to walk between the main gate and the Airplanes, 5 minutes to walk between the Airplanes and Drop Time, and 6 minutes to walk between the main gate and Drop Time. Thus, this would take a total of $5 + 5 + 6 = 16$ minutes of walking. So it is not possible for Anton to go on the Airplanes and Drop Time.

Can Anton go on the Bumper Cars and the Drop Time? It takes 6 minutes to walk between the main gate and the Bumper Cars, 2 minutes to walk between the Bumper Cars and Drop Time, and 6 minutes to walk between the main gate and Drop Time. Thus, this would take a total of $6 + 2 + 6 = 14$ minutes of walking. So another possibility is that Anton goes on the Bumper Cars and Drop Time.

We have looked at all possibilities. Therefore, in 25 minutes, Anton could go on the Airplanes and Bumper Cars, or go on the Bumper Cars and Drop Time.

(b) There are six possible orderings of the three rides that Anton goes on.

- Suppose Anton goes from the main gate to the Ferris Wheel, then the Airplanes, then the Bumper Cars, then back to the main gate. This will take a total of $8 + 3 + 3 + 6 = 20$ minutes of walking.
- Suppose Anton goes from the main gate to the Ferris Wheel, then the Bumper Cars, then the Airplanes, then back to the main gate. This will take a total of $8 + 2 + 3 + 5 = 18$ minutes of walking.
- Suppose Anton goes from the main gate to the Airplanes, then the Ferris Wheel, then the Bumper Cars, then back to the main gate. This will take a total of $5 + 3 + 2 + 6 = 16$ minutes of walking.
- Suppose Anton goes from the main gate to the Airplanes, then the Bumper Cars, then the Ferris Wheel, then back to the main gate. This will take a total of $5 + 3 + 2 + 8 = 18$ minutes of walking.
- Suppose Anton goes from the main gate to the Bumper Cars, then the Ferris Wheel, then the Airplanes, then back to the main gate. This will take a total of $6 + 2 + 3 + 5 = 16$ minutes of walking.
- Suppose Anton goes from the main gate to the Bumper Cars, then the Airplanes, then the Ferris Wheel, then back to the main gate. This will take a total of $6 + 3 + 3 + 8 = 20$ minutes of walking.

So, it follows that Anton should go to the Airplanes, then the Ferris Wheel, then the Bumper Cars (or the reverse order) in order to get back to the main gate as quickly as possible.