Riddler Express

6 December 2019

Riddle:

After being ambushed by the forces of the First Order on the planet Jakku, the droid BB-8 narrowly escaped and requires immediate help. Fortunately, there is one person (named Rey) on the planet who can help BB-8, but they've never met and BB-8 has no idea where Rey is located.

Even if BB-8 did know where Rey was, what's the probability that BB-8 could reach her within 24 hours? Assume Jakku has a radius of 4,000 miles (similar to Earth) and that BB-8 rolls along at a speed of 3 miles per hour.

Solution:

The area that BB-8 could cover is basically a circle around its starting point. Its maximum travel distance is 3 mph $\times$ 24 hours, or 72 miles. I will here assume that it would be in sight of Rey within a distance of about 2 miles, so the total coverage radius is generously 74 miles. The area of the circle is $\pi(74 \text{ mile})^2$, or 1.72×10^4 sq. miles. The surface area of the planet is $4\pi(4,000 \text{ mile})^2$, or 2.01×10^8 sq. miles. The probability is just the ratio of these two areas, so the solution is 8.556×10^{-5}, or **0.0086%**.