

Maths With Zombies

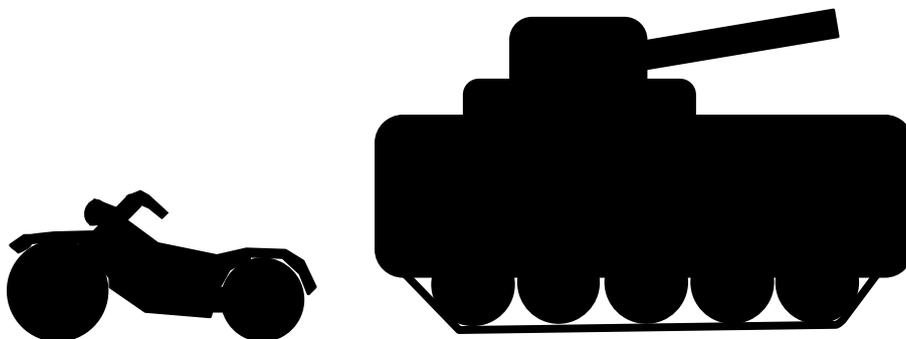
...because everything's better with zombies!

<http://MathsWithZombies.wordpress.com>

17. The Tank vs Motorcycle Problem

You've heard about a safe zone which has been set up and you figure getting there is your best chance of surviving the zombie outbreak in your country. The bad news is that it's 125 miles away. You have two transport options: a motorbike and a tank. The motorbike's much faster and you'll be able to travel at 60 miles per hour. However, it's also much more dangerous and there's a one in six chance you'll get grabbed by a zombie during each hour you're on the road. The tank's a lot slower and can only travel at 7 miles per hour, meaning you'll be on the road for longer, but it's also much safer and there's only a one in fifty chance of a zombie getting you during each hour you are travelling. Which transport option offers you the best chance of getting to the safe zone in one piece?

- A. The tank's slower but safer, so it's the best option.
- B. While the motorbike is less safe, you'll get there quicker, so overall it's the best option.



What answer did you get?

- A:** Bad choice! There's a 35.7% chance of you getting caught by a zombie before you reach the safe zone if you choose to travel by tank. This means travelling by tank is marginally more dangerous than travelling by motorbike.
- B:** Well done, you made the right choice. With a 34.7% chance of getting grabbed by a zombie before you get to the safe zone, the motorbike is safer than the tank.

How to work it out: The key to this problem is working out how long it will take to reach the safe zone using each mode of transport. This is done by dividing the distance you need to travel (125 miles) by the speed of each vehicle. For the tank, this is $125/7$ and it means you'll be on the road for 17.86 hours. For the motorbike, it's $125/60$, meaning you'll get to the safe zone in 2.08 hours. Now, you can work out the cumulative probability that you'll get caught by a zombie for each one. For the tank, it's 1/50 per hour or, if you convert this into a percentage by dividing 1 by 50 and multiplying it by 100, 2%. To get the cumulative probability, you multiply this value by the length of time the journey will take (17.86 hours), which gives you a total chance of falling victim to a zombie before you get to the safe zone of 35.7%. For the motorbike, there's a 1 in 6 chance of a zombie getting you per hour, or if converted into a percentage, 16.67%. When you multiply this by the time it would take you to get there on the motorbike (2.08 hours) this gives you an overall probability getting killed by a zombie before you get there of 34.7%. Despite the fact there is a far greater risk of you getting caught by a zombie in each hour, the motorbike's much faster speed means you spend less time on the road, so overall it's marginally safer.