2. The Hit And Miss Problem

There’s 20 walking dead coming up the street towards your house. You know you need to shoot the zombies in the head to kill them but you’re scared so your aim is off. This means there’s only a 60% chance of you killing a zombie with each shot. What’s the fewest number of shots you will to fire before you are certain to have killed them all?

A. 32
B. 34
C. 33
D. 35
What answer did you get?

A: Oh boy, you’re in trouble, there’s still be one zombie left.
B: That’s perfect! All the walking dead are now ... err ... deader?
C: Oh so close, but there’s still a small chance you’ll miss the last one.
D: That’s one shot too many! This is a zombie apocalypse, you can’t afford to waste ammo like that!

How to work it out: A 60% chance of killing a zombie means that for every 100 shots you fire, you’ll only kill 60 zombies. If you divide both these numbers by 100, you get the probability of killing a zombie with each shot (in this case it’s 0.6 for every one bullet fired). The minimum number of shots you’d need to fire to make sure all the zombies are killed is calculated by taking the number of zombies (20) and dividing it the probability of killing a zombie each time you fire your gun (the 0.6 you worked out above). 20/0.6 is 33.3333. However, you can’t fire 0.3333 of a bullet. If you round it down to 33 shots, there’s a small possibility that you won’t kill the last zombie (and when you’re trying to survive in a zombie apocalypse you don’t want that!), so you’d need to round up to 34 shots to make sure you’ve got the lot. Any more shots than that would just be a waste of precious ammo.