SAMPLE SIZE

When testing for the proportion of a sample, WHY does the population need to be 10 times the sample size? I gave a very weak answer and would like something better to tell the kids.

We base the sampling model for proportions on Bernoulli trials, like tossing a coin. There's an assumption that the trials are independent. But we sample without replacement, like drawing cards from a deck. The probability that a given card is an ace changes from draw to draw as we deplete the deck, so the independence assumption is violated. The same is true when we sample from a population - the probability of the "success" we are investigating changes as each person is removed from the pool. But sampling 1000 voters, say, from tens of millions of people does not change the probabilities enough that we care. "Close enough for statisticians", as I tell my kids.

That's true whenever the sample is very small compared to the size of the population. How small? That's an entirely arbitrary decision, and one common rule of thumb is no more than 10%.

- Dave Bock