# Pattern power

"What's the next number?" questions have always been a staple of IQ tests. But there is confusion about what such questions mean. Consider, for example, the sequence of numbers 2, 4, 8, 16. What comes next? It is difficult to imagine anyone not viewing the pattern as doubling and thus the next number as 32. But consider the following "proof" that the answer is 30:
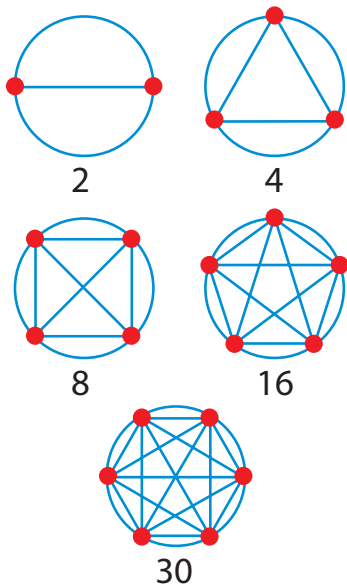


Take a circle, place two dots on the edge on opposite sides, and connect them by a straight line. Then the inside of the circle is divided into two regions. Placing three dots equally spaced on the edge and then connecting the dots by lines, the inside is divided into four regions. Placing four equally spaced dots on the edge, the resulting lines give eight regions and lines connecting five dots give 16 regions. And so on? Given six equally spaced dots, the number of regions is 30. Voila!

So, 32 or 30? Which answer is correct? Both. Neither.

There is simply not one correct answer. There are many other answers. In fact, the Encyclopedia of Integer Sequences (research.att.com/~njas/sequences/index.html) lists 60 possible integer (whole number) answers — including every number from one to 37 — each with its own justifying pattern.

Indeed, there is no end to this: mathematically, everything is a pattern. So, no matter what you claim the next number to be, you can always find a pattern to justify the claim. And, being maths guys, we'll claim the next number is one of our favourites — $\pi$.

Don't believe us? Then email us (Burkard.Polster@sci.monash.edu.au or martinirossi@gmail.com) and we'll send you the proof.