BACCALAURÉAT-Session 2017

Épreuve de Discipline Non Linguistique

Mathématiques/Anglais

Topic: calculations

Starting small and working upwards

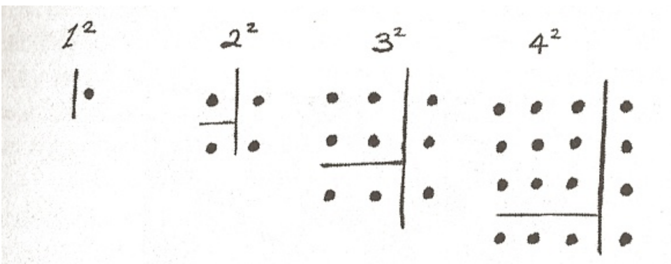
"[...] Another helpful approach in tackling life's problems is to start by thinking about the question in its simplest form, and work up from there. [...] It sometimes helps in mathematical problem solving too. Here is a nice example. Everyone knows that $3^2 - 2^2 = 9 - 4 = 5.$ But what is the answer to this sum:

$A = 222{,}222{,}222{,}222{,}222{,}222{,}222^2 - 222{,}222{,}222{,}222{,}222{,}222{,}221^2$?

Most calculators won't help here, [...] and even desktop computers are likely to get it wrong. One way to tackle the problem is to start small and look for patterns.
$1^2 - 0^2 = 1,\quad 2^2 - 1^2 = 3,\quad 3^2 - 2^2 = 5,\quad 4^2 - 3^2 = 7$ ...

There seems to be a pattern here. To find the difference between two adjacent squares, it looks like all you have to do is add the unsquared numbers together. For example 2+1=3, 4+3=7, and so on. [...] How can we be sure that this pattern goes on for ever?

One way is to draw pictures using dots. Here are the first four squares.



Put this way, it is obvious why the difference between two adjacent squares will always be the smaller + the smaller plus one [...] This, rather informally, is a proof (by induction). "

adapted from How long is a piece of string, Rob Eastaway & Jeremy Wyndham

Questions

1. Make a short presentation of the text.

2.
   a. Calculate $5^2 - 4^2$.
   b. Predict the next calculus.
   c. Draw the picture for n^2.
   d. Deduce the nature of A.

3. What do you think of this kind of trick?