Funding the Future

Maths is great, but not if it’s taught to imply that ...

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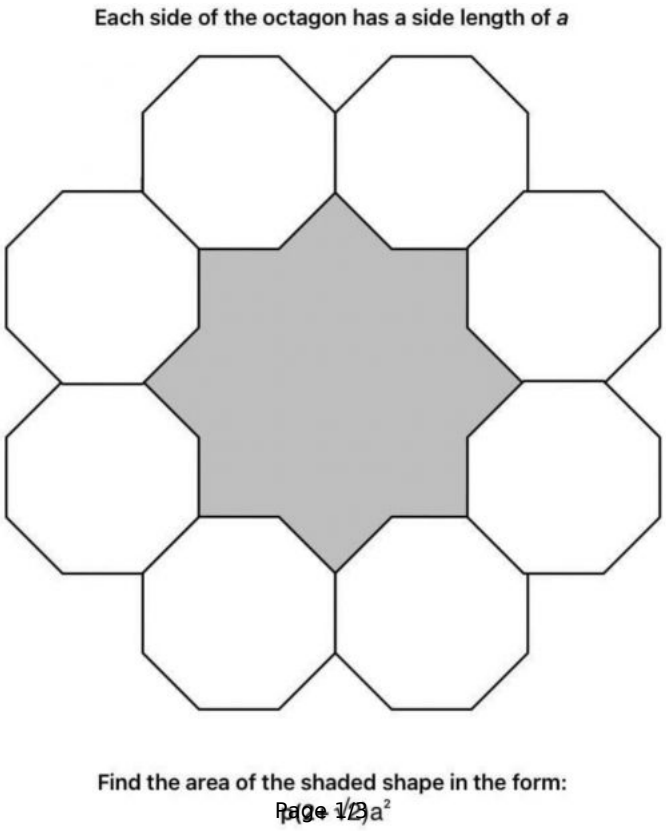
I seemed to stir up a hornet’s nest with regard to maths education here based on a YouTube short video I posted yesterday.

Most commentators seemed to think I was wrong to suggest that the teaching of largely uncontextualised, formulaic, trigonometry in schools is wrong when there is so much that is vastly more useful, in my opinion, that can be taught about maths that will be much more relevant to most young people.

My opinion is based on a lot of discussion. It has to be said, the comments offered on this blog are way out of line with those I am offered almost everywhere else - including by many mathematically competent, well-trained people as well as a lot of young people still suffering the shock of their maths education.

I offer two observations. The first is to ask what is the use of this question posed by EdExcel in a GCSE paper:



I wonder how many of those saying I had missed the point could answer this question posed of sixteen year olds. Admittedly, this was in the higher paper for those wanting the better grades of GCSE, but is knowing this really a requirement at 16?

Now let me pose a question I often put on the board when starting a discussion of maths in the context of the political economy of data with second year undergraduates. It was this:

2 + 2 = ?

I have never yet had a student give the right answer.

They all say 4.

It isn't.

It's 5. Both those figures written as 2 were 2.49 rounded to the nearest whole number. The sum of the two is 4.98, which rounded to the nearest whole number is 5. The answers the students gave me were almost 25% out in all cases.

And these wrong answers came despite children being taught about rounding to whole numbers in primary schools, just about anywhere in the world.

It would also have been extraordinary for a student to have arrived in my class without having used a spreadsheet, where such rounding is commonplace.

And, to be candid, you would have thought that if I asked such a question they would have assumed the answer was not going to be 4, or why would I have asked it?

But no one has ever wondered if I was asking for an answer in base 3.

No one has ever thought about rounding.

No one has ever suggested anything but 4.

And that answer is wrong.

And then I explained the relevance of this. In accounting - financial, management, national, whatever - figures are usually rounded to thousands, millions or even billions. So the figure presented is always representational. They often do not not add up as a result. Taking them at literal face value is wrong in that case. They always represent a range.

And that's before we ever get near understanding the uncertain assumptions on the basis of which they are almost always estimated.

My point was to emphasis that the blind mathematical assumption they had all been

taught and absorbed that there are right answers to questions expressed in numerical form is wrong, and often deeply dangerous because grossly misleading conclusions can be drawn if the quality of the representation that a figure conveys to the literal mind is not questioned.

My whole point was to make clear that we do not live in closed, discrete systems. We exist within open, malleable, uncertain environments where certainty is almost always an unknown luxury and the assumptions we make - in this case the entirely false one that both of the figures were discrete numbers - can profoundly impact our conclusions, often making them completely incorrect.

Based on this thinking I used to set essays on the appraisal of data quality as a pre-condition to actually undertaking any calculation using it. The world would, I suggest, be a vastly better place if this issue was better understood.

So why do I think trigonometry so unhelpful to the vast majority of the population who will, as a matter of fact, whatever some have claimed here, never use it in the rest of their lives? It teaches that there are certain answers to any question that involves numerical data. Bizarrely, people carry this belief with them for life. And so they are conned by neoclassical economists and so many other snake oil merchants.

So, most certainly I want people to learn maths. But I want them to learn the maths that matters in the world where we live, where there are very few right answers.

One final comment. I remember discussing the maths involved in bridge construction with a bridge engineer once upon a time. I asked what happened when all the safety tolerances had been calculated. “Then we double them”, they said. But why is doubling enough, was my question. They had no answer, and yet that was where the risk really was.

When we think maths gives answers we can rely on we are in trouble. And yet most of it is taught as if that is the case. And that, in my opinion, is wrong. Maths is staggeringly useful, but only when it is understood that it only provides answers within a range, at best. My example yesterday highlighted a case where the exact opposite is implied. And that’s of very limited real world benefit, as even the bridge engineer knew, even if they had also failed to question their assumptions.