

New trigonometry is a sign of the times

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Mathematics students have cause to celebrate. A University of New South Wales academic, Dr Norman Wildberger, has rewritten the arcane rules of trigonometry and eliminated sines, cosines and tangents from the trigonometric toolkit.

What's more, his simple new framework means calculations can be done without trigonometric tables or calculators, yet often with greater accuracy.

Established by the ancient Greeks and Romans, trigonometry is used in surveying, navigation, engineering, construction and the sciences to calculate the relationships between the sides and vertices of triangles.

"Generations of students have struggled with classical trigonometry because the framework is wrong," says Wildberger, whose book is titled *Divine Proportions: Rational Trigonometry to Universal Geometry* (Wild Egg books).

Dr Wildberger has replaced traditional ideas of angles and distance with new concepts called "spread" and "quadrance".

These new concepts mean that trigonometric problems can be done with algebra," says Wildberger, an associate professor of mathematics at UNSW.

"Rational trigonometry replaces sines, cosines, tangents and a host of other trigonometric functions with elementary arithmetic."

"For the past two thousand years we have relied on the false assumptions that distance is the best way to measure the separation of two points, and that angle is the best way to measure the separation of two lines.

"So teachers have resigned themselves to teaching students about circles and pi and complicated trigonometric functions that relate circular arc lengths to x and y projections – all in order to analyse triangles. No wonder students are left scratching their heads," he says.

"But with no alternative to the classical framework, each year millions of students memorise the formulas, pass or fail the tests, and then promptly forget the unpleasant experience.

"And we mathematicians wonder why so many people view our beautiful subject with distaste bordering on hostility.

"Now there is a better way. Once you learn the five main rules of rational trigonometry and how to simply apply them, you realise that classical trigonometry represents a misunderstanding of geometry."

Wild Egg books: wildegg.com/

Divine Proportions: web.maths.unsw.edu.au/~norman/book.htm

Source: University of New South Wales

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