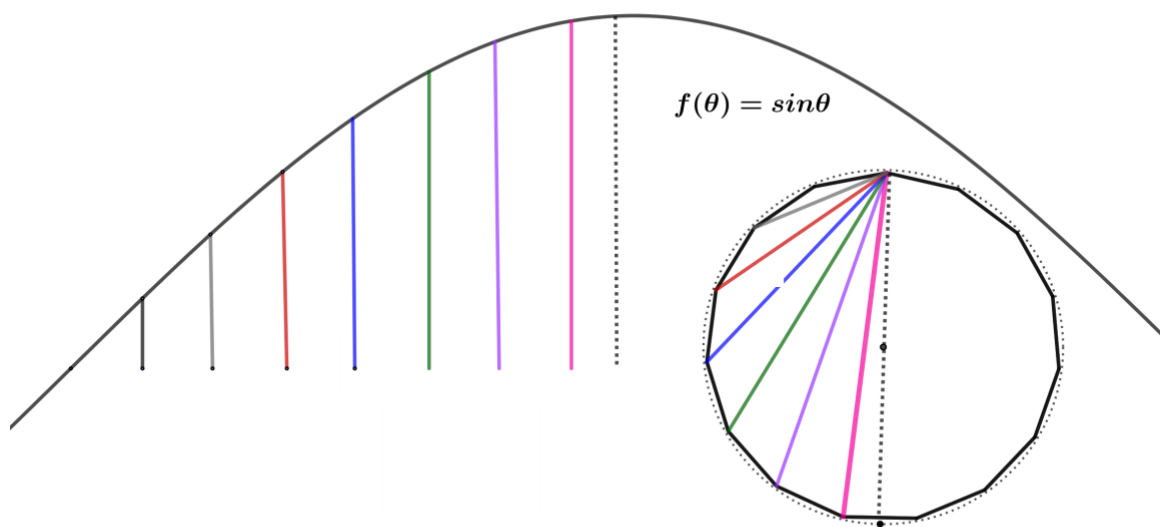


This 15-gon is inscribed in a circle of unit radius. Multiply all the diagonal and side lengths and the answer's 15. Explain.*



* A level students doing ‘further pure’ and knowing about the complex roots of unity, should google ‘product of the diagonals of a regular polygon’ and bring up the entry on the cut-the-knot website. There is an alternative. The figure above shows sines whose arguments run in arithmetic progression. On Wikipedia’s list of trigonometric identities they can find just the one to use:

$$2^{n-1} \prod_{k=1}^{k=n-1} \sin \frac{k\pi}{n} = n.$$