

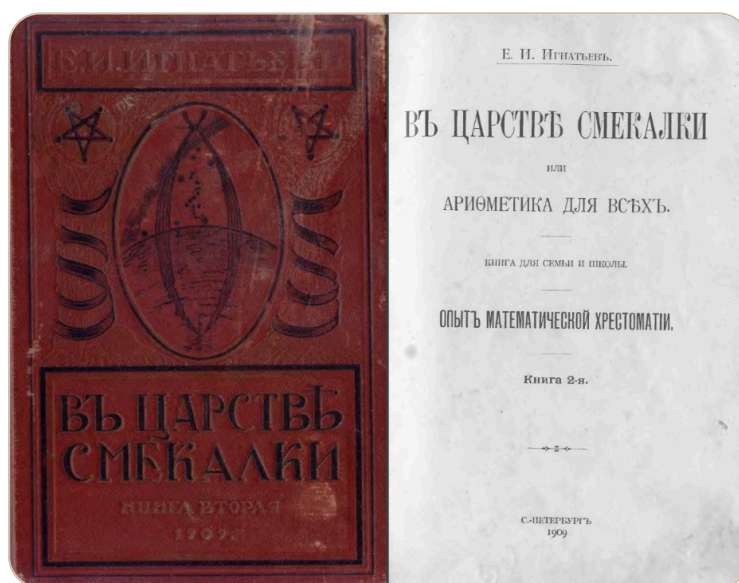
PROBLEM

The Pythagorean Number Circle: Mysticism and Mathematics

Arrange numbers in a circle, count up and then down, and a square appears. An old puzzle from Yemelyan Ignatiev's book leads to a simple proof.

Mansur Gilmullin · 09.04.2025 · EN

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E. I. Ignatiev, *In the Realm of Ingenuity, or Arithmetic for Everyone*, parts 1–3, St Petersburg: V. L. Bogushevsky, 1908–1911 (Russian edition)

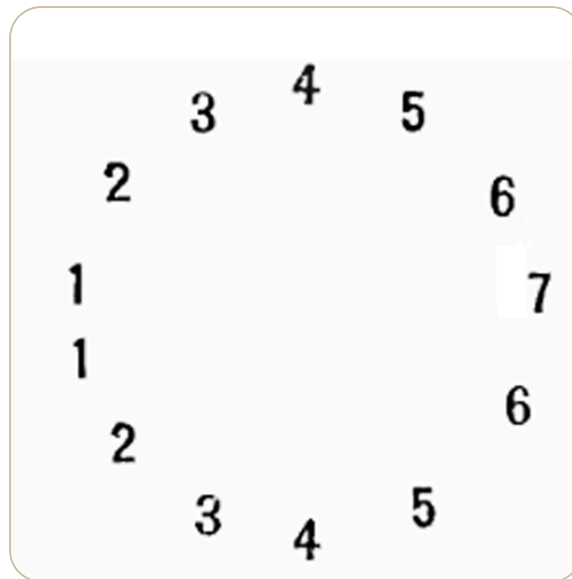
“All is number” sums up the Pythagorean view that numbers explain the world around us. Let’s explore a more concrete idea: how square numbers emerge from a “Pythagorean circle”.

Here is an old puzzle from Yemelyan Ignatiev’s *In the Realm of Ingenuity*, adapted from the Russian:

Write consecutive numbers around a circle, starting at 1 and continuing up to a number of your choice: 1, 2, 3, 4, ..., n. Once you reach n, continue around the circle in descending order until you reach 1 again: n – 1, n – 2, ..., 2, 1. The sum of all the numbers in the

circle is the square of n : that is, n multiplied by itself.

For example, to find the square of 7, arrange the numbers as shown:



The numbers in the circle add up to $49 = 7^2$

Adding them gives $49 = 7^2$, just as promised.

Try it yourself with 10. Then see if you can explain, or prove, why the method works.

Proof

The sum of the integers from 1 to $n - 1$ is $\frac{n(n-1)}{2}$. The circle contains two copies of this sequence and one additional number, n . Thus:

$$n(n - 1) + n = n^2$$

Historical note



Iamblichus of Chalcis, engraved by Johann Theodor de Bry for Jean-Jacques Boissard's *Tractatus posthumus de divinatione & Magicis Præstigiis*, Oppenheim, 1615. National Library of Spain. Inscription: "Utilius fuerat nobis nescire futura. Cogor enim irato fata Valente pati" · [Source](#) · Public domain

Iamblichus of Chalcis (c. 245–325 CE) was a Neoplatonist philosopher and the author of *On the Pythagorean Life*.

Previously published as "The Pythagorean Number Circle" (Russian original).

Notes

Yemelyan Ignatyevich Ignatiev (1869–1923) was a Russian and Soviet mathematics educator and popular science writer. His best-known work, *In the Realm of Ingenuity*, appeared in three volumes between 1908 and 1911.

Iamblichus. *On the Pythagorean Life*. Translated from Ancient Greek into Russian by I. Yu. Melnikova. Moscow: Aleteia, 2002. 192 pp.