The Wonder That Is Pi

R (Chandra) Chandrasekhar

2004-01-14 | 2024-06-29

This blog began life more than two decades ago as part of a series of lectures I delivered to very bright first-year engineering students at an Australian university.

The number π (pronounced like "pie") has been recognized from time immemorial because its physical significance can be grasped easily: it is the ratio of the circumference of a circle to its diameter. But who would have thought that such an innocent ratio would exercise such endless fascination because of the complexities enfolded into it?

Not surprisingly, some students I met recently wanted to know more about π. Accordingly, I have refreshed and revised my original presentation to better accord with the form and substance of a blog. The online references have also been updated to keep up with a rapidly changing Web.

If there are any errors or omissions, please email me your feedback.

Circumference, diamater and pi

The straight line and circle are arguably among the simplest of geometrical objects. The circle is the most symmetrical figure on the two-dimensional plane while the straight line is the shortest distance between any two points on it. The diameter is both the straight line passing through the centre of the circle, intersecting it at two points, and its length. Yet, when we divide the perimeter of circle, more properly called its circumference, C, by the diameter, d, we get the enigmatic number π:

$$\frac{C}{d} = \pi. \tag{1}$$

Figure 1 shows this relationship pictorially.

All circles are similar

You might wonder why the ratio of the circumference to the diameter of *any* circle is *always* π. This is because *all circles are similar*. The ratios of corresponding lengths of similar figures are equal. This idea is treated at greater length in my blog A tale of two measures: degrees and radians.

Acknowledgements

Feedback

Please email me your comments and corrections.

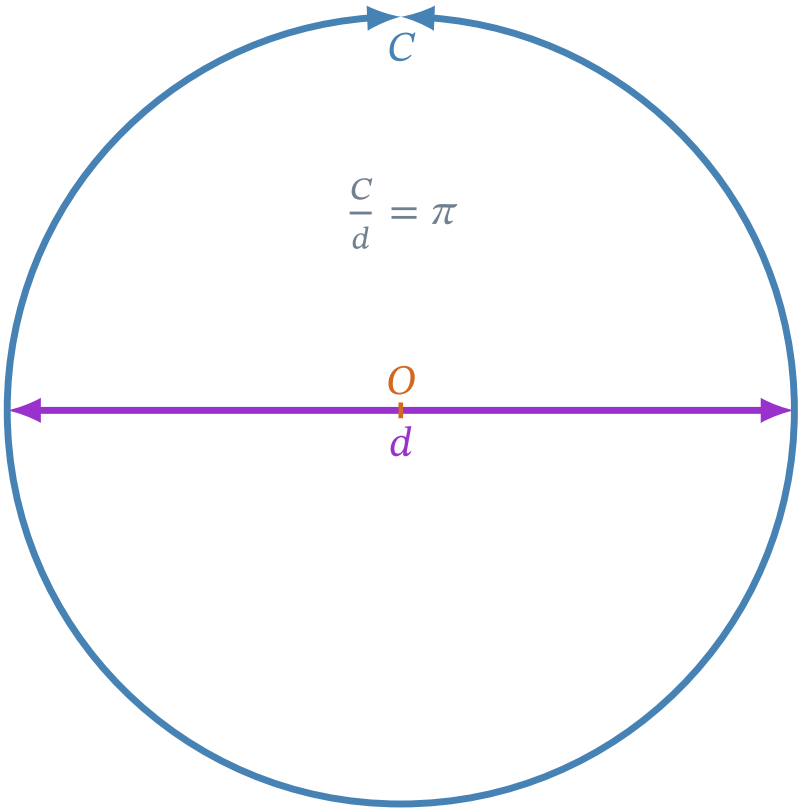

Figure 1: The ratio of the circumference to the diameter of *any* circle is π.

A PDF version of this article is available for download here:

https://swanlotus.netlify.app/blogs/the-wonder-that-is-pi.pdf