

Use of the symbol π

Often William Jones' book A New Introduction to Mathematics from 1706 is cited as the first text where the Greek letter π was used for this constant, but this notation became particularly popular after Leonhard Euler adopted it some years later, (cf. History of π).

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Early approximations

The value of π has been known in some form since antiquity. As early as the 19th century BC, Babylonian mathematicians were using $\pi = 25/8$, which is within 0.5% of the true value.

The Egyptian scribe Ahmes wrote the oldest known text to give an approximate value for π , citing a Middle Kingdom papyrus, corresponding to a value of 256 divided by 81 or 3.160.

It is sometimes claimed that the Bible states that $\pi = 3$, based on a passage in 1 Kings 7:23 giving measurements for a round basin as having a 10 cubit diameter and a 30 cubit circumference. Rabbi Nehemiah explained this by the diameter being from outside to outside while the circumference was the inner brim; but it may suffice that the measurements are given in round numbers. Also, the basin may not have been exactly circular.

Archimedes of Syracuse discovered, by considering the perimeters of 96-sided polygons inscribing a circle and inscribed by it, that π is between $223/71$ and $22/7$. The average of these two values is roughly 3.1419.

The Chinese mathematician Liu Hui computed π to 3.141014 (good to three decimal places) in AD 263 and suggested that 3.14 was a good approximation.

The Indian mathematician and astronomer Aryabhata in the 5th century gave the approximation $\pi = 62832/20000 = 3.1416$, correct when rounded off to four decimal places.

The Chinese mathematician and astronomer Zu Chongzhi computed π to be between 3.1415926 and 3.1415927 and gave two approximations of π , $355/113$ and $22/7$, in the 5th century.

The Indian mathematician and astronomer Madhava of Sangamagrama in the 14th century computed the value of π after transforming the power series expansion of $\pi/4$ into the form

$$\pi = \sqrt{12} \left(1 - \frac{1}{(33)} + \frac{1}{(532)} - \frac{1}{(733)} + \dots \right)$$

and using the first 21 terms of this series to compute a rational approximation of π correct to 11 decimal places as 3.14159265359. By adding a remainder term to the original power series of $\pi/4$, he was able to compute π to an accuracy of 13 decimal places.

The Persian astronomer Ghyath ad-din Jamshid Kashani (1350-1439) correctly

computed π to 9 digits in the base of 60, which is equivalent to 16 decimal digits as:

$$2\pi = 6.2831853071795865$$

By 1610, the German mathematician Ludolph van Ceulen has finished computing the first 35 decimal places of π . It is said that he was so proud of this accomplishment that he had them inscribed on his tombstone.

In 1789, the Slovene mathematician Jurij Vega improved John Machin's formula from 1706 and calculated the first 140 decimal places for π of which the first 126 were correct [1] and held the world record for 52 years until 1841, when William Rutherford calculated 208 decimal places of which the first 152 were correct.

The English amateur mathematician William Shanks, a man of independent means, spent over 20 years calculating π to 707 decimal places (accomplished in 1873). In 1944, D. F. Ferguson found that Shanks had made a mistake in the 528th decimal place, and that all succeeding digits were fallacious. By 1947, Ferguson had recalculated pi to 808 decimal places (with the aid of a mechanical desk calculator).
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