

Contemplating 10 Trillion Digits of π

The current record claimed for calculating digits of π stands at about 10 trillion. Alexander J. Yee and Shigeru Kondo used a custom made desktop computer and a program called Y-Cruncher. The calculation took a year to complete. (2011)

The Guinness Book of World Records credits 24 year-old Lu Chao with reciting 67,890 digits of π from memory in 24 hours, 4 minutes. He was trying for 91,300 digits, but said “5” where there is a “0.” (2005)

diameter

As amazing as these feats sound, if we knew the exact diameter of the Universe, we could calculate its circumference with an accuracy of the width of a single proton with just the first 40 or so digits of π .

$\pi = c/d$

There are web sites that allow us to search for strings of digits in the first million digits of π . We tried 2 of our birthdays, in MM/DD/YYYY format, but didn't get hits until we pared them down to M/DD/YY.

circumference

Any numerical representation of π is an approximation, although 5 trillion digits give us a *very* close approximation. The symbol π represents the exact value.

3.14159265358979323846264338327950... The first 0 in π appears in the 33rd place. By that point 3 has occurred six times. This depends on our expressing pi in the decimal (base 10) number system.

Contrary to the claims of a clever web site, nothing terrible happens if we compute pi in binary (base 2):

11.0010010000111111011010101000100010000101101000110
0001000110100110001001100011001100010100010111000000
0110111000001110011010001001010010000001001001110000
0100010001010011001111100110001110100000000100000101
110111110101001100011101100010011100110110010001001
... (2 + 1 + 1/8 + 1/64 + 1/2048 + 1/4096...)

diameter

Questions:

If we wrapped a no-stretch rope snugly around the equator of a perfect sphere the size of Earth (8,000 miles in diameter), how much longer would it have to be if we wanted to raise it 1 foot above the surface all the way around? What about a sphere the size of the Sun (880,000 miles in diameter)?

$\pi = c/d$
circumference

Imagine a tube made by rolling and taping a 3 X 5" file card standing on a table. Will it hold more grains of rice if we roll it the wide, hamburger way or the tall, hot dog way?

Why are man-hole covers always round?