

Pi Day @ Edison Tech Center

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March 14 2015

All Day Celebration of Pi

and the International Year of Light

π Definition

- Pi is the constant defined by the ratio of the circumference of a circle to its diameter.

- Pi is represented by the Greek letter π

- This relationship is often described by the formula using the radius of the circle:

$\pi = C/2r$ where C is the circumference and r is the radius

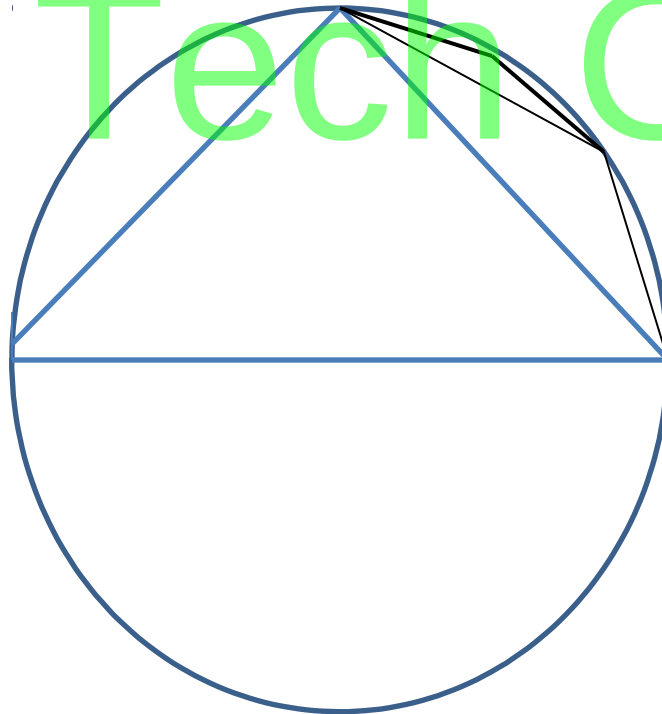
- π is also used to represent other functions, notably the number of prime numbers less than a number. Pi Day does not celebrate that function.

- π is also used when talking about a kind of controller, the PID controller. This is not what Pi Day celebrates.

Some π History

- Archimedes attempted to determine the value of π using measurements of triangles lengths inside a circle.

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Approximations of Pi

- Archimedes $223/71 < \pi < 22/7$
- Ancient China $\pi \approx \sqrt{10}$
- ZuChongzhi $\pi \approx 355/113$
- Dante $\pi \approx 3 + \sqrt{2}/10$

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Some Infinite Series Pi Algorithms

Gregory-Leibniz:

$$\pi = 4 - \frac{4}{3} + \frac{4}{5} - \frac{4}{7} + \frac{4}{9} - \frac{4}{11} + \frac{4}{13} - \frac{4}{15} \dots$$

$$\pi = 3 + \frac{4}{(2 \times 3 \times 4)} - \frac{4}{(4 \times 5 \times 6)} + \frac{4}{(6 \times 7 \times 8)} \dots$$

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$$\pi = \sum_{i=0}^{\infty} \frac{1}{16^i} \left(\frac{4}{8i+1} - \frac{2}{8i+4} - \frac{1}{8i+5} - \frac{1}{8i+6} \right)$$

Pi Quiz2015

1) There is a story that Archimedes told soldiers to stand in a half-circle facing the sun, and that the sun reflecting off their shields set an attacking ship on fire. How many soldiers did he need (if the ship was 42 shield lengths away)?

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Pi Quiz2015

2)One day, the shadow from the building next to the Edison Tech Center blocks sun into the Edison Tech Center. The building is thirty feet away and is thirty feet tall.

What time is it? Sunrise was at 6am.

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Pi Quiz2015

3) Bob Hall fires a laser diode beam into a perfectly clear, spherical marble. If he shoots through the center of the marble, he hits his alignment target. In terms of pi, what happens if he is out of alignment?

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Pi Quiz2015

4) Steinmetz used salts to increase the amount of light out of an incandescent lightbulb by 25%. If he performed his experiments using a standard lightbulb, how much brighter would the light be on a piece of 8.5x11 inch paper three feet away?

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Pi Quiz2015

5) A business wants to replace its tubular T-12 fluorescents with round metal halide bulbs which are 90% more efficient. How many metal halide bulbs will be needed to cover the same rooms with the same amount of light?

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Pi Quiz2015

6) A 3D Scanner needs to illuminate the object it is scanning in order to determine its shape. How many light sources are needed to illuminate the object completely?

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Pi Quiz2015

7) Ernst Alexanderson used a spinning Nipkow disk to make a mechanical television.

If the disk was spinning at 72 rpm, and the disk was 1 meter in diameter, how long

would it take for the outer edge of the disk to move 10 centimeters?

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Pi Quiz2015

8) When the Clute Brothers made the armor for the USS Monitor, they heated the iron until it was red hot. What temperature was that?

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Pi Quiz2015

9) What is the optical reason why lenses are round and not square or rectangular?

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$\pi \approx$

3.141592653589793238462643383279502884197169399375

10582097494459230781640628620899862803482534211706

79821480865132823066470938446095505822317253594081

28481117450284102701938521105559644622948954930381