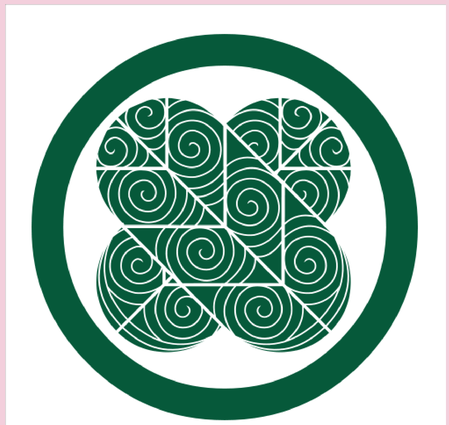
π in Other Eastern Countries

Japan

In the Edo Period of Japan (1603 to 1868), 3.16 was used for π. But as people recognized that this value was not accurate, different values for π were calculated. Wasan scholars such as Muramatsu Shigekiyo, Seki Takakazu, Kamata Toshikiyo, Takebe Katahiro, and Matsunaga Yoshisuke all made calculations of π, and accomplished results comparable to their European mathematician counterparts.

Muramatsu's Method

Shigekiyo Muramatsu published *Sanso* in 1663. Muramatsu served the Asano family and possibly had a math institute in Edo (present day Tokyo). In his work, *Sanso*, Muramatsu arranged problems published earlier in Japanese mathematics texts without answers. Muramatsu classified these problems into different levels according to how difficult he thought they'd be to learn.



Asano Crest

It is in this book that he also showed the calculation of π from the regular inscribed polygon of 32,768 sides. He correctly obtained the value 3.1415926. Thus, this book was the first to contain a mathematical calculation of π in Japan.

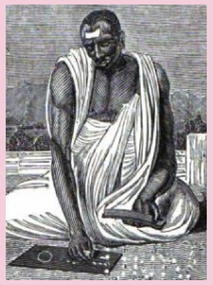
Muramatsu's method was used in many circles. However, most academics of the country still used the "root of perfection" $\sqrt{10}$ as the favored approximation for π until 1800.

India

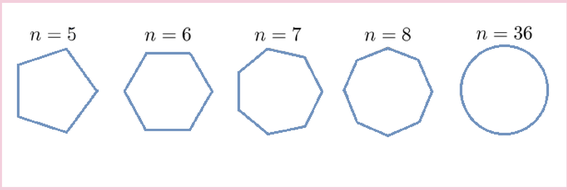
Aryabhata (499 AD)

Aryabhata used the perimeter of a 384-sided polygon to find $\pi \approx \sqrt{9.8684}$. Later Aryabhata would publish an "approximation" for his square root value, 3.1416. Note that his approximation is more accurate than his official value!

Brahmagupta (640 AD)



Brahmagupta used a pattern of inscribed polygons that increased in the number of sides to calculate the perimeter of a circle. Using these data points, he came to believe that $\pi = \sqrt{10}$.



Ramanujan (1887-1920)

Srinivasa Ramanujan found several formulas for $\frac{1}{\pi}$. His work greatly sped up algorithms for finding π. Further, it is still the basis for algorithms employed for computations today.