Grade 7 Unit 6
Lesson 6 Anchor Problem 2
“Discovery of π” Activity

fish tank LEARNING

Babylon (about 1900–1600 BCE)

The Babylonians were some of the first people to write down a value for π. On clay tablets, they showed that they thought the circumference of a circle was about 3 times the diameter, or sometimes 25/8. Histo[r] $\frac{25}{8}$ believe they may have measured round objects like wheels or jars, first across the middle (diameter) and then around the edge (circumference) using rope or string. By comparing these two lengths, they saw the ratio was a little bigger than 3. The number 25/8 is ver[y] $\frac{25}{8}$ [c]e to π, only a little too small. Even without fancy tools, their method gave them a practical number they could use for building and astronomy.

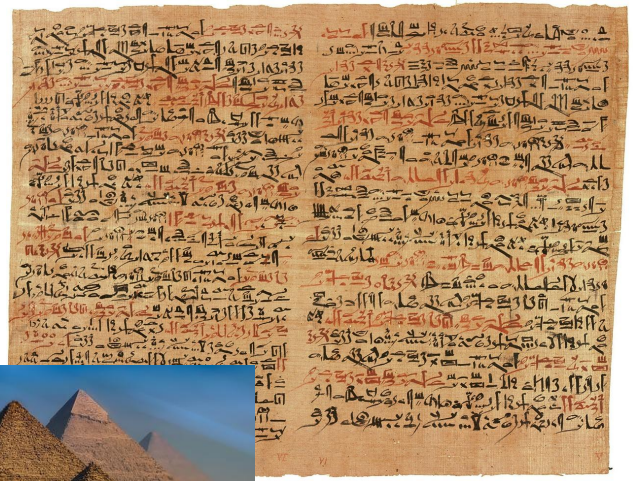
Approximation: $\frac{25}{8}$

https://pixabay.com/photos/ancient-sumerian-assyrian-1827228/

Egypt (about 1650 BCE)

In ancient Egypt, a scribe named Ahmes copied down a rule for circles on the Rhind Mathematical Papyrus. His method was to take the diameter, multiply it by $\frac{8}{9}$, and then square that number to find the area of the circle. This idea leads to an approximation of π equal to $\frac{256}{81}$. We don't know exactly how Egyptians measured circles, but they drew careful diagrams, used straightedges, and sometimes compass-like tools. They may have worked with rope or wooden rods to measure diameters and circumferences. Their value for π is close to the real number, just a little too big. This shows they were already thinking about π as a constant idea, not just one measurement.

Approximation: $\frac{256}{81}$



https://pixabay.com/photos/papyrus-hieroglyphs-ancient-egyptian-63004/

https://pixabay.com/photos/giza-pyramid-pyramids-1756946/

Greece — Archimedes (about 250 BCE)

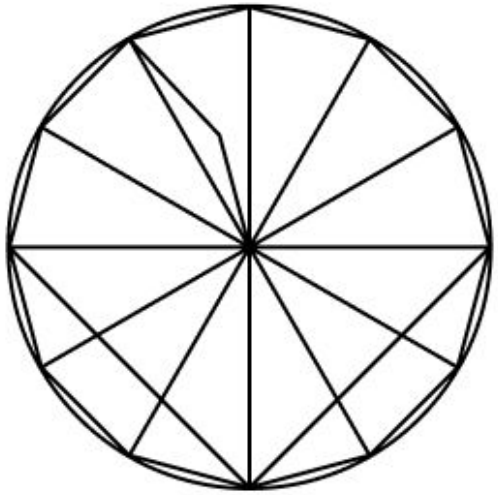
Archimedes was a Greek mathematician who wanted to find a very accurate value for π. Instead of measuring strings around circles, he drew polygons with many sides inside and outside a circle. He started with a hexagon and kept doubling the sides until he had a 96-sided polygon. By finding the perimeters of these polygons, he showed that π had to be bigger than $\frac{223}{71}$ and smaller than $\frac{22}{7}$. His method was a big step forward because it showed that you could 'trap' π between two numbers. People used his approximations for hundreds of years after his time.

Approximation: between $\frac{223}{71}$ and $\frac{22}{7}$

China — Liu Hui and Zu Chongzhi (about 250–480 CE)

Chinese mathematicians used polygons to get better and better estimates of π. Liu Hui, in the 3rd century, drew polygons with thousands of sides and calculated their perimeters to get π ≈ 3.1416. A later mathematician, Zu Chongzhi, went even further. Around the year 480, he showed that π is between 3.1415926 and 3.1415927. He also gave the fraction $\frac{355}{113}$, which is amazingly close to the true value of π. We think he used very large polygons, maybe with over 20,000 sides, and careful calculations to reach this result. His fraction was the most accurate in the world for nearly 1,000 years.

Approximation: $\frac{355}{113}$

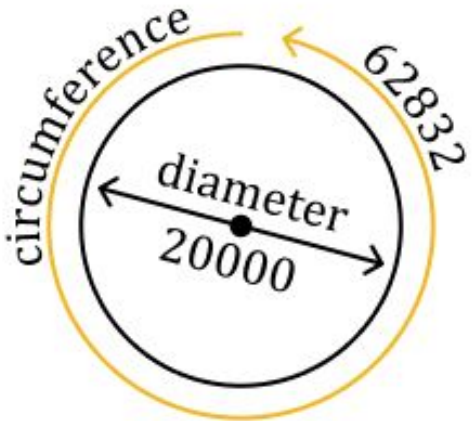


三点一四

India — Aryabhata (about 500 CE)

Aryabhata was a famous Indian mathematician and astronomer. In his book *Aryabhatiya*, written around 500 CE, he described a rule for finding the circumference of a circle with a diameter of 20,000 units. His rule gave a circumference of 62,832 units. This works out to $\pi = \frac{62832}{20000}$. He didn't explain exactly how he found this number, but it shows that Indian mathematicians were studying the circle very carefully. Aryabhata also said his number was only an approximation, which means he knew π could not be written exactly as a fraction. His value was extremely accurate and was as good or better than what the Greeks had at the same time.

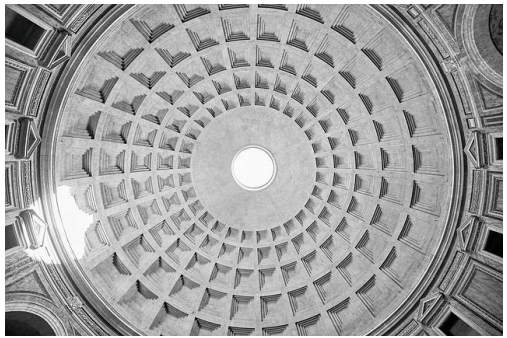
Approximation: $\frac{62832}{20000}$



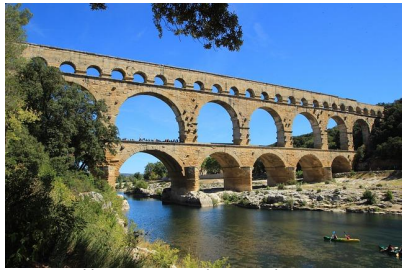
Rome (about 0–300 CE)

The Romans were great engineers and builders, but they usually did not create new theories of mathematics. Instead, they used values of π from earlier cultures, especially the Greeks and Babylonians. Many Roman builders used simple approximations like 3 or $\frac{25}{8}$ when designing aqueducts, temples, and arenas. These fractions were easy to work with and accurate enough for building. Because their focus was on practical construction, they did not try to make π more precise. Still, their use of π shows how mathematical ideas traveled and were applied in real life projects.

Approximation: 3



https://pixabay.com/photos/rome-architecture-italy-tourism-3540064/



https://pixabay.com/photos/pont-du-gard-provence-france-533365/

https://pixabay.com/photos/temple-jupiter-roman-antique-3657483/