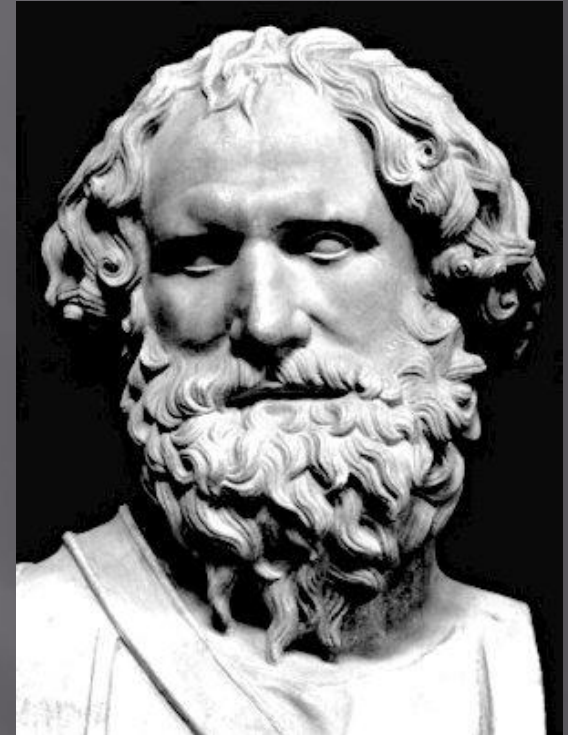


“THE FATHER OF CALCULUS”: ARCHIMEDES

By: Roger Hill

Background

- ▣ Archimedes was born 287 B.C.
- ▣ Lived Syracuse, Greece
- ▣ Studied Alexandria, Egypt
- ▣ Inventor, Astronomer, Physics', Engineer, Mathematician
- ▣ Died either 212 or 211 B.C.



Basics of Calculus

▣ Limit

▣ Derivative

▣ Integrate

Limits

- ▣ Find the value approached from a function
- ▣ Does not exist if not a function, unbound, or oscillating behavior

$$\lim_{x \rightarrow c} f(x) = L$$

Derivative

- ▣ Used to find the slope of a point
- ▣ Only exist following the same rules of limits
- ▣ Significance: a slope of zero or undefined means there is a maximum or minimum

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

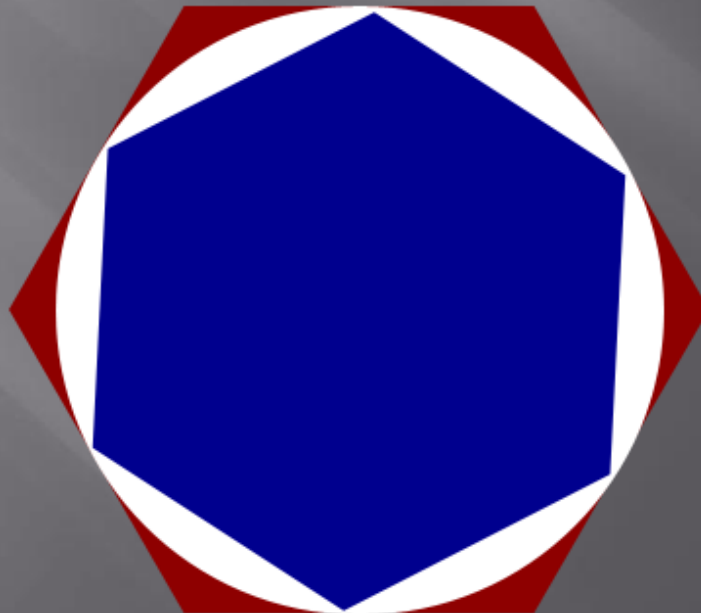
Integrals

- ▣ Used to find the area under a curve
- ▣ Uses limits and incorporates derivatives

$$\int f(x)dx = \lim_{n \rightarrow \infty} \sum_{i=1}^n f(x) \delta x$$

Method of Exhaustion

- ▣ Early method of calculating area under a curve
- ▣ Used inscribed and circumscribed polygons
- ▣ Found the difference of the two polygons to get an estimation of the area under a curve

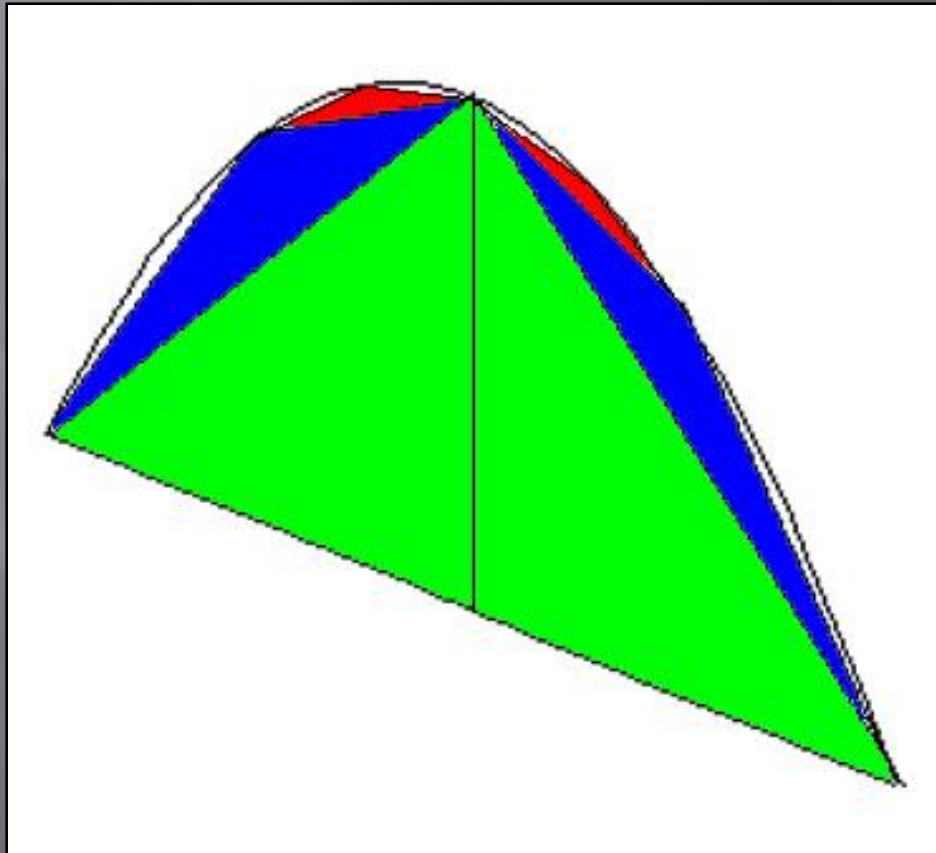


Infinity

- ▣ In order to get the exact area of a circle, he would have to use an infinite sided polygon
- ▣ Though Could not be reached

Area of a Parabola

- ▣ Used triangles to approximate the area of a parabola

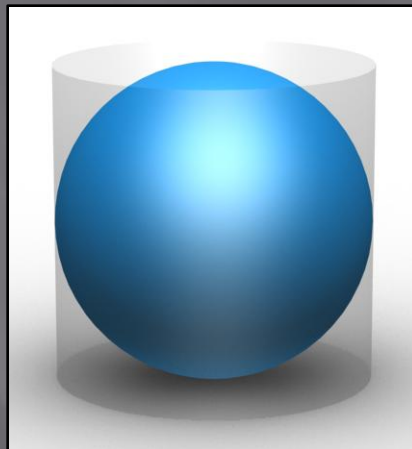


Circles

- ▣ As shown in the method of exhaustion slide, Archimedes used polygons to calculate the area of circle
- ▣ Stated that a ninety-six sided would be close enough to approximate the area of a circle
- ▣ From this he was also able to find another approximation of π
- ▣ Calculated π to between $3(1/7)$ and $3(10/17)$ and was only 0.00126 and 0.000748 off

Three-Dimensional

- ▣ Continued the Method of Exhaustion for three-dimensional objects
- ▣ Most famous was the sphere in the cylinder
- ▣ Found that the cylinder was $\frac{2}{3}$ the area of the circumscribed cylinder



http://commons.wikimedia.org/wiki/Image:Archimedes_sphere_and_cylinder.png

Father

- ▣ First to find calculus
- ▣ Used geometry to found the basics of integral calculus
- ▣ Recognized the limit of infinity on method of exhaustion

Sources

- Image for sphere and cylinder:
http://commons.wikimedia.org/wiki/Image:Archimedes_sphere_and_cylinder.png
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