MATHEMATICS 308 Euclidean geometry

FALL 2002

Project: Geometric Explanation

ARCHIMEDES - Relation of Sphere and Cylinder Surface Area

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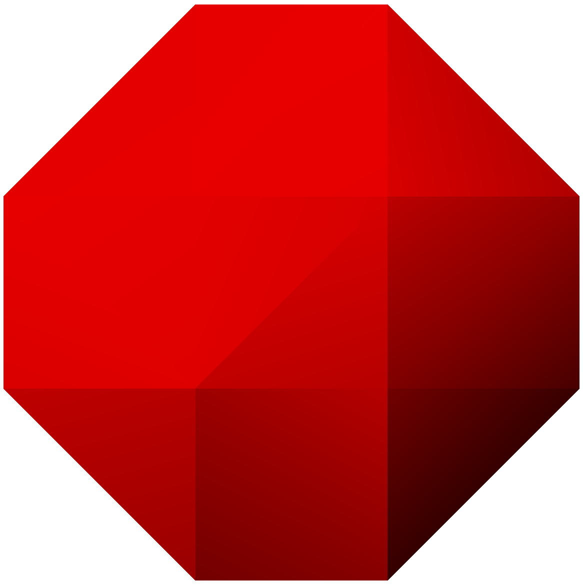
INTRODUCTION

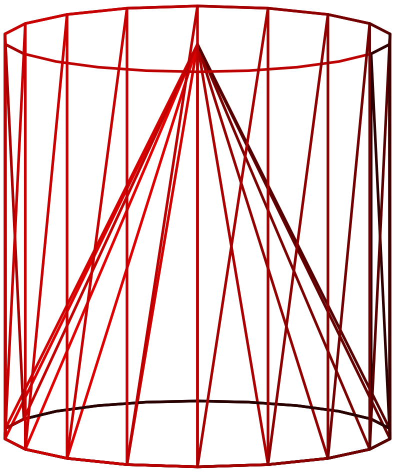
ARCHIMEDES - The surface area of a sphere is two-thirds of the cylinder that is inscribed by the sphere.



From Euclid XII. 10

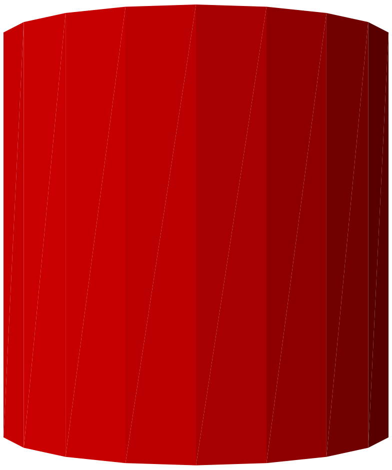
The Cylinder is 3 times the Cone with the same base and height

(IN TERMS OF VOLUME)

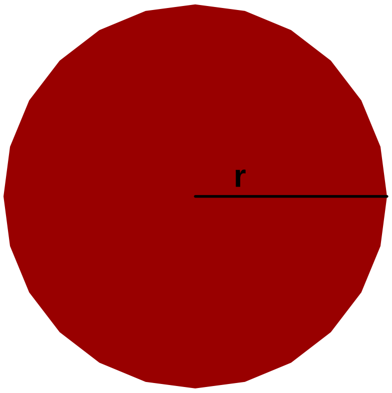


The surface of any right cylinder excluding the bases is equal to a circle whose radius is a mean proportional between the side of the cylinder and the diameter of its base.

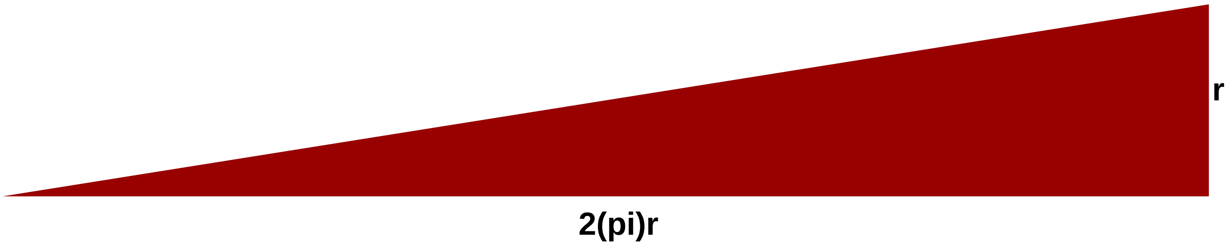
-ARCHIMEDES Proposition 13 On the Sphere and the Cylinder I



Archimedes proved through his exhaustive methods that the area of a circle is equal to the area of a triangle with base equal to the circle’s circumference and height equal to the circle’s radius.



Area of Circle = pi * r * r



Area of Triangle = 0.5 * base * height
= 0.5 * (circumference of cicle) * (radius of circle)
= 0.5 * (2*pi*r) * (r)
= pi * r * r

Part 4 - Back to the Sphere and the Cylinder

The Great Circle of the sphere is the cross section at the center (equator) of the sphere.