Journal of Humanistic Mathematics

Volume 2 | Issue 1 January 2012

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Lisl Gaal
University of Minnesota

Crosby Lewy
Berkeley, CA

Recommended Citation
Lisl Gaal & Crosby Lewy, "The Volume of a Sphere," *Journal of Humanistic Mathematics*, Volume 2 Issue 1 (January 2012), pages 58-60. DOI: 10.5642/jhummath.201201.06. Available at: https://scholarship.claremont.edu/jhm/vol2/iss1/6

The Volume of a Sphere

Lisl Gaal[1]

University of Minnesota, Minneapolis, MN

`gaalx001@math.umn.edu`

Crosby Lewy[2]

Berkeley, CA

`hclewy@speakeasy.net`

Synopsis

This picture (with a brief explanation) and poem are intended to show that even serious mathematics can be fun for all ages.

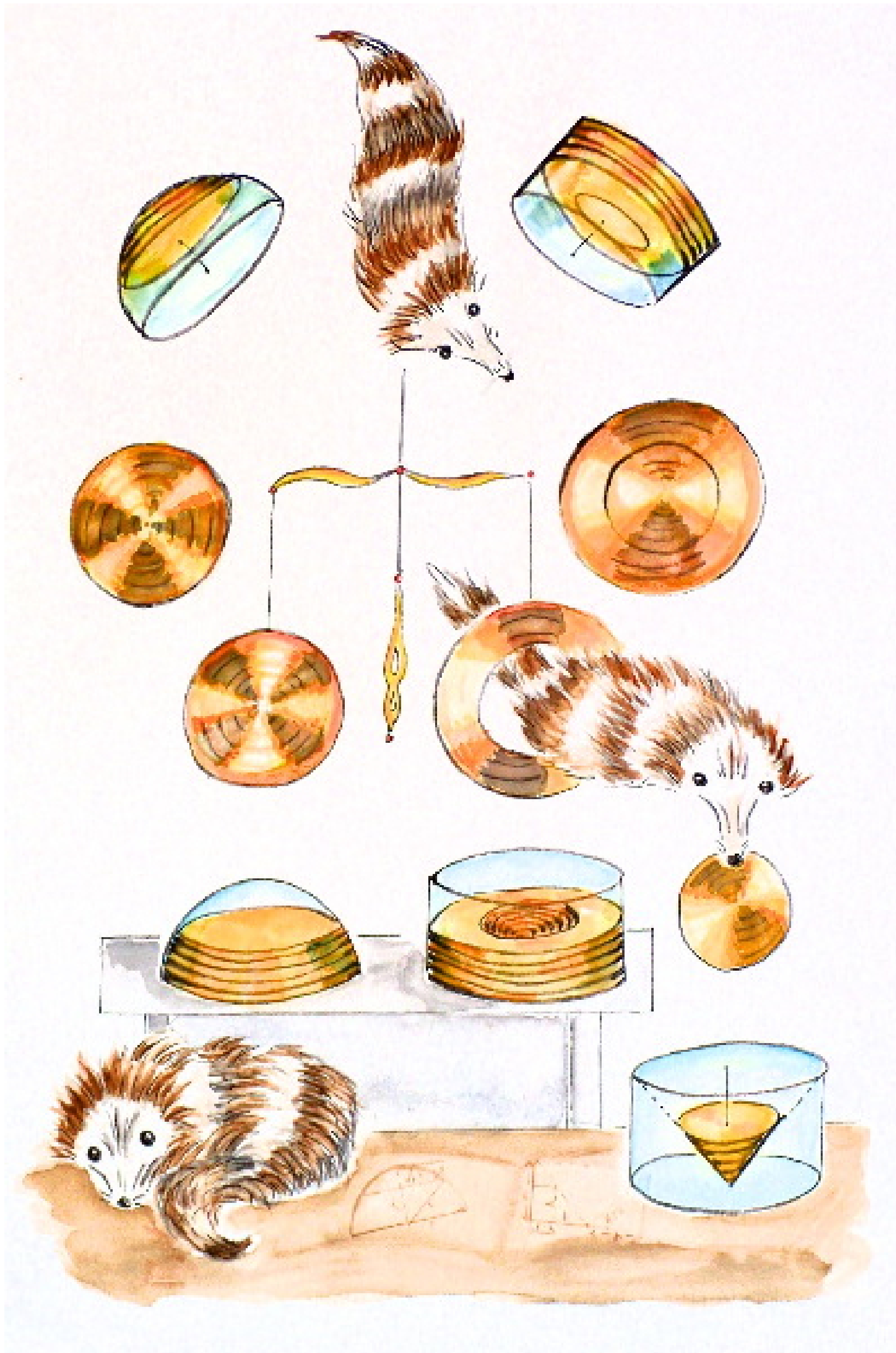
Archimedes noticed that when two objects always have the same cross-sectional area at the same height, then they must have the same volume. He also knew that a cylinder with radius and height both equal to r would have volume πr^3 and that a circular cone with the same dimensions would have volume $\frac{1}{3}\pi r^3$. So when you cut out such a cone from a cylinder, you are left with a volume of $\frac{2}{3}\pi r^3$. Moreover he calculated that such a hollow cone and a hemisphere with the same dimensions would always have the same cross section at the same height. Thus the volume of the hemisphere would be $\frac{2}{3}\pi r^3$ and the volume of the whole sphere would be

$$\frac{4}{3}\pi r^3.$$

[1]Lisl Gaal, now retired from the Mathematics Department at the University of Minnesota in Minneapolis, is still pursuing her hobby of printing lithographs, so it is not surprising that some of these have mathematical content. This essay contains one of these. The lithograph in question started out as a $20'' \times 30''$ black and white image and this was colored in with watercolors, so no two copies of the image ever turn out to be quite the same. She thinks it is more interesting that way!

[2]Crosby Lewy is a California writer, painter, and translator. Her oddball verse has appeared widely in newspapers and magazines. Crosby Lewy is most recently the author of *Amusings from a Life: Tales, Poems, Translations and Nonsense*, see `http://www.helencrosbylewy.com/amusings.htm` for more.

PICTURE BY LISL GAAL



POEM BY CROSBY LEWY

This ancient scholar
Knew how to deduce!
    By Zeus!
This Archimedes of Syracuse*

Hydrostatics, Levers, the Screw, the Claw,
And the volume of a sphere
Were the special fields
Of this sage pioneer.

Now, we can calculate
Whenever the need is:
We have some tools
Not there for Archimedes:

Without Arabic numbers
And no scrap-papers,
He came up with
Some astounding capers

Which made him more famous
Than even Candide is!
Lets celebrate this Master:
HOMAGE TO ARCHIMEDES!

*Sicily, silly, not NY State