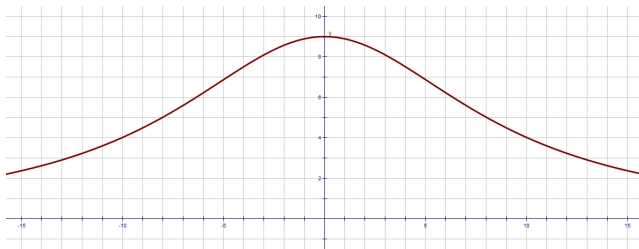


The Witch of Agnesi

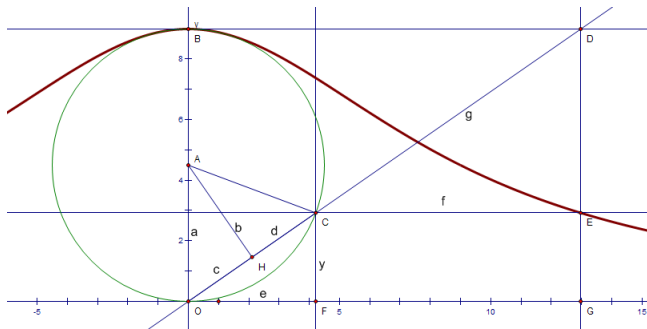
Mike Rasmussen

Fall 2007



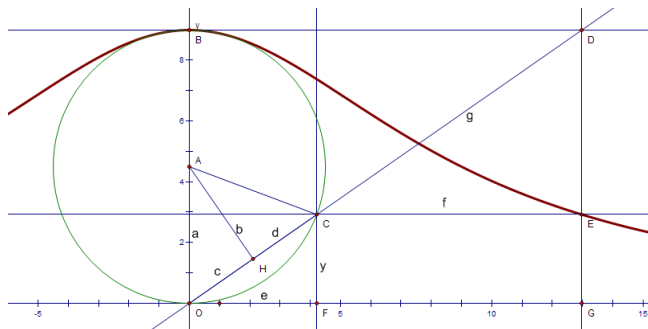
- ▶ The witch of Agnesi was named for Maria Agnesi, who studied it in 1748. It had also been studied earlier in the century by Fermat and Guido Grandi.
- ▶ The name “Witch of Agnesi” is a mistranslation of “Curve of Agnesi” as it was translated to English, and the name stuck.

Construction of the Witch



The Witch of Agnesi is shown above as the locus of point E as $\angle COF$ changes.

Parametrization (finding y)

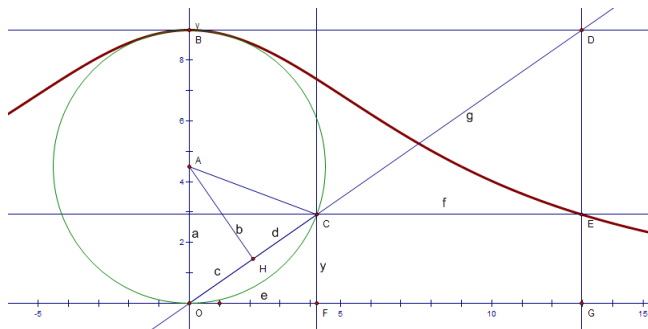


Let $\angle COF = \theta$. It follows that $\angle AOC = \frac{\pi}{2} - \theta$, and that

$$c = a \cos\left(\frac{\pi}{2} - \theta\right).$$

Since $c + d = 2a \cos\left(\frac{\pi}{2} - \theta\right)$, it follows that $y = 2a \cos\left(\frac{\pi}{2} - \theta\right) \sin \theta$.

Parametrization (finding x)



Recall that $\theta = \angle COF$.

Observe that $\angle COF = \angle ODB = \theta$, and that $g \sin \theta = 2a$.

Note that $g = \|\overline{OD}\|$.

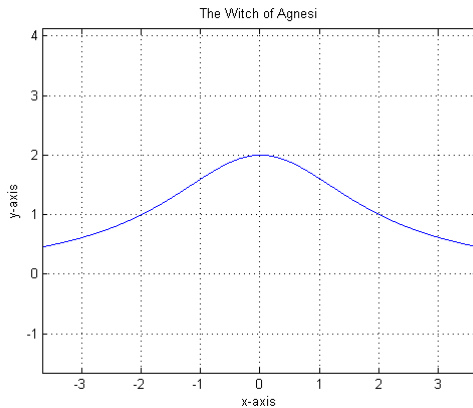
$$g = \frac{2a}{\sin \theta}$$

The parametric equations for the Witch of Agnesi are

$$x = 2a \cot \theta$$

$$y = 2a \sin^2 \theta$$

Parametrization



- ▶ Weisstein, Eric W. “Witch of Agnesi.” From MathWorld—A Wolfram Web Resource.
<http://mathworld.wolfram.com/WitchofAgnesi.html>
- ▶ “Witch of Agnesi.” Wikipedia.
http://en.wikipedia.org/wiki/Witch_of_Agnesi