Presentations05

Show that light traveling along a line toward a parabolic mirror (assume equation $\boldsymbol{y = ax^2}$) parallel to the axis of symmetry is reflected toward the focus.	
State and explain Newton's generalized binomial theorem.	
Use the binomial theorem to expand $\frac{\mathbf{1}}{\mathbf{1+x}}$. Then use long division to do the same expansion. Find the interval of convergence and repeat for the function $\frac{1}{1-x}$.	
Use the identity $\ln a - \ln b = \ln\left(\frac{a}{b}\right)$ and the above expansions to get a power series for $\ln\left(\frac{1+x}{1-x}\right)$, find the interval of convergence and show that this can be used to calculate $\ln N$ for $N > 1$.	
Use the binomial theorem to expand $\sqrt{\mathbf{1+x}}$.	
Use long division and (modern) integration to obtain Mercator's identity: $$\mathbf{\ln(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \cdots}$$	
Derive Newton's method to calculate a root of an equation. Do an example.	
Describe the "Witch of Agnesi" curve. What is it good for?	
Work through the details of the Tautochrone problem.	