$$\frac{1}{c^2}=2a \Rightarrow y'=\sqrt{\frac{2a-y}{y}}, \quad x-x_0=\int\sqrt{\frac{y}{2a-y}}\,dy$$

$$y=a(1-\cos\theta), \quad x-x_0=2a\int \sin^2\frac{\theta}{2}\,d\theta = a(\theta-\sin\theta)$$

$\Rightarrow$ postać parametryczna: $x=a(\theta-\sin\theta)+x_0$

$y=a(1-\cos\theta)$

3. powierzchnia $A=\frac{1}{2}\int_{t_A}^{t_B}(xy'-x'y)\,dt, \quad x(t), y(t)$

długość $L=\int ds=\int_{t_A}^{t_B}\sqrt{x'^2+y'^2}\,dt$

$$h=\frac{1}{2}(xy'-x'y)+\lambda\sqrt{x'^2+y'^2} \qquad \frac{\partial h}{\partial x}-\frac{d}{dt}\left(\frac{\partial h}{\partial x'}\right)=0=$$

$$=\frac{1}{2}y'-\frac{d}{dt}\left(-\frac{1}{2}y+\lambda\frac{x'}{\sqrt{x'^2+y'^2}}\right) \Rightarrow y'=\lambda\frac{d}{dt}\left(\frac{x'}{\sqrt{x'^2+y'^2}}\right)$$

równanie na y: $x'+\lambda\frac{d}{dt}\left(\frac{y'}{\sqrt{x'^2+y'^2}}\right)=0$

bezpośrednio całkujemy równania:

$$y-\lambda\frac{x'}{\sqrt{x'^2+y'^2}}=y_0, \quad x+\lambda\frac{y'}{\sqrt{x'^2+y'^2}}=x_0$$

$$\Rightarrow \quad (x-x_0)^2+(y-y_0)^2=\lambda^2$$

$$A=\iint dx\,dy=\iint\left(\frac{\partial Q}{\partial x}-\frac{\partial P}{\partial y}\right)dx\,dy \Rightarrow P=-y,\ Q=x$$

tw. Greena: $A=\frac{1}{2}\oint(-y\,dx+x\,dy)=\frac{1}{2}\int(xy'-x'y)\,dt$