$y' = 4\sqrt{x}$, $y(0) = 2$

Integrate both sides:

$$y = \int 4x^{\frac{1}{2}} = 4\left(\frac{2}{3}x^{\frac{3}{2}}\right) + C$$

$$= \frac{8}{3}x^{\frac{3}{2}} + C$$

Apply initial condition:

$$y(0) = \frac{8}{3}(0)^{\frac{3}{2}} + C = 2$$

$\rightarrow C = 2$

So, $\boxed{y = \frac{8}{3}x^{\frac{3}{2}} + 2}$