Calculation of Millennium Falcon's Speed as a Percent of *c*

1. $$\Delta t = \frac{\Delta t_0}{\sqrt{1-\left(\frac{v}{c}\right)^2}}$$

2. $$\sqrt{1-\left(\frac{v}{c}\right)^2} = \frac{\Delta t_0}{\Delta t}$$

3. $$1-\left(\frac{v}{c}\right)^2 = \frac{{\Delta t_0}^2}{\Delta t^2}$$

4. $$-\left(\frac{v}{c}\right)^2 = \frac{{\Delta t_0}^2}{\Delta t^2} - 1$$

5. $$\frac{v^2}{c^2} = 1 - \frac{{\Delta t_0}^2}{\Delta t^2}$$

6. $$v^2 = c^2\left(1 - \frac{{\Delta t_0}^2}{\Delta t^2}\right)$$

7. $$v = \sqrt{c^2\left(1 - \frac{{\Delta t_0}^2}{\Delta t^2}\right)}$$

The speed of light, *c*, is 299,792,458 meters per second; v is the velocity of the ship; $\Delta t_0 =$ shipboard time and $\Delta t =$ time as measured outside the ship (stationary with respect to the ship, or Galactic Standard Time). If we assume shipboard time is two days and outside time is one year,

then converting all time units to seconds, $\Delta t_0 = 172,000s$ and $\Delta t = 31,557,600s$ Thus we get the following: $v = \sqrt{299,792,458^2\left(1-\frac{172,000^2}{31,557,600^2}\right)} = \sqrt{8.98\times10^{16}\left(1-\frac{2.96\times10^{10}}{9.96\times10^{14}}\right)}$

= 299,788,005 m/s

8. Percent of speed of light required = $100\left(\frac{299,788,005}{299,792,458}\right) = 99.99851464\%$ of the speed of light; or rounding, 99.999% of lightspeed.