74. (a) Using Eq. 38-7, we expect the dilated time intervals to be

$$\tau = \gamma \tau_0 = \frac{\tau_0}{\sqrt{1-(v/c)^2}} \ .$$

(b) We rewrite Eq. 38-30 using the fact that period is the reciprocal of frequency ($f_R = \tau_R^{-1}$ and $f_0 = \tau_0^{-1}$):

$$\tau_R = \frac{1}{f_R} = \left(f_0 \sqrt{\frac{1-\beta}{1+\beta}} \right)^{-1} = \tau_0 \sqrt{\frac{1+\beta}{1-\beta}} = \tau_0 \sqrt{\frac{c+v}{c-v}} \ .$$

(c) The Doppler shift combines two physical effects: the time dilation of the moving source *and* the travel-time differences involved in periodic emission (like a sine wave or a series of pulses) from a traveling source to a "stationary" receiver). To isolate the purely time-dilation effect, it's useful to consider "local" measurements (say, comparing the readings on a moving clock to those of two of your clocks, spaced some distance apart, such that the moving clock and each of your clocks can make a close-comparison of readings at the moment of passage).