10-13

$\alpha = 3 \text{ rad/s}^2$

eqs. $\theta = \theta_0 + \omega_0 t + \frac{1}{2}\alpha t^2 \quad \omega = \omega_0 + \alpha t \quad \omega_f^2 - \omega_0^2 = 2\alpha(\theta_f - \theta_0)$

$\theta - \theta_0 = \omega_0 t + \frac{1}{2}\alpha t^2$ ← use to calculate the initial angular velocity at the beginning of the 4s interval

$120 = \omega_0(4) + \frac{1}{2}(3)(4)^2$

$\omega_0 = 24$

Now take what is ω_0 above and make it ω_f since we are interested in how long it took to get to the above interval

$\omega = \omega_0 + \alpha t$

$24 = 0 + 3(t)$

$t = 8$ sec.