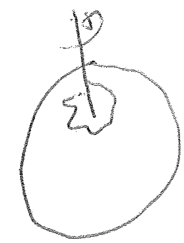
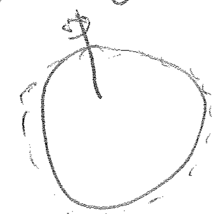
11-8 If the Earth's polar caps melt, they'd flood the oceans, which would rise by ~30m.

At the poles, all that ice is close enough to the axis of rotation to not add much to I_{earth}.



spread out over everything it's as if the Earth's radius increased by ~30m, so $R_\oplus = R_\oplus + 30m = R_\oplus'$



$\omega = 2\pi/T$, so $\frac{\omega'}{\omega} = \frac{2\pi/T'}{2\pi/T} = \frac{T}{T'}$

$\frac{\Delta\omega}{\omega} = \frac{\omega'-\omega}{\omega} = \frac{\omega'}{\omega} - 1$ subst in T's $= \frac{T}{T'} - 1 = \frac{\Delta T}{T'}$

or $\frac{\Delta\omega}{\omega} \simeq \frac{\Delta T}{T}$ (if T' not so different from T)

Conserve ang. momentum $L = I\omega$

or $I\omega = I'\omega'$: $\Delta L = 0 = \Delta(I\omega) = I\Delta\omega + \omega\Delta I$

so $\frac{\Delta\omega}{\omega} = \frac{\Delta I}{I}$ for a sphere, $I = \frac{2}{5}MR^2$

$\frac{\Delta\omega}{\omega} = \frac{\Delta T}{T'} = \frac{\Delta R_\oplus^2}{R_\oplus^2} = \frac{(6.37\times10^6 m + 30m)^2}{(6.37\times10^6 m)^2} = 1.0000094$

There are 86400 s in a day, so $\frac{\Delta T}{T'} = (1.0000094)(86400 s) =$

$= 0.81$ seconds more!