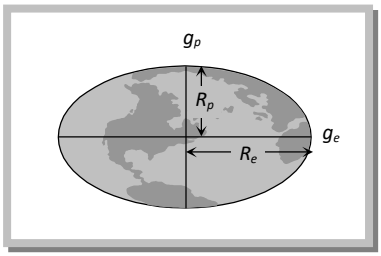
Variation in g Due to Shape of Earth.

Earth is elliptical in shape. It is flattened at the poles and bulged out at the equator. The equatorial radius is about 21 km longer than polar radius, from $g = \frac{GM}{R^2}$



At equator $g_e = \frac{GM}{R_e^2}$ .....(i)

At poles $g_p = \frac{GM}{R_p^2}$ .....(ii)

From (i) and (ii) $\frac{g_e}{g_p} = \frac{R_p^2}{R_e^2}$

Since $R_{equator} > R_{pole} \therefore g_{pole} > g_{equator}$ and $g_p = g_e + 0.018 \ ms^{-2}$

Therefore the weight of body increases as it is taken from equator to the pole.