EJERCICIO FQ1BE2647:

$m_s = 1000\ kg$

$T = 90\ minutos = 90 \cdot 60\ s$

$G = 6{,}67 \cdot 10^{-11}\ N \cdot \frac{m^2}{kg^2}$

$R_T = 6370\ km$

$M_T = 5{,}98 \cdot 10^{24}\ kg$

a) Altura sobre la Tierra:

$$F_g = m \cdot a_N$$

$$G\frac{M m}{R^2} = m \cdot \frac{v^2}{R} \Rightarrow v^2 = \frac{GM}{R}$$

$$\left(\frac{2\pi R}{T}\right)^2 = \frac{GM}{R}$$

$$\frac{4\pi^2 R^2}{T^2} = \frac{GM}{R} \Rightarrow \boxed{R^3 = \frac{GM}{4\pi^2} \cdot T^2}$$

$$R^3 = \frac{6{,}67 \cdot 10^{-11} \cdot 5{,}98 \cdot 10^{24}}{4\pi^2} \cdot (90 \cdot 60)^2$$

$$R^3 = 2{,}95 \cdot 10^{20} \Rightarrow R = \sqrt[3]{} = 6{,}65 \cdot 10^6\ m$$

$$R = R_T + h \Rightarrow h = R - R_T$$

$$h = 6{,}65 \cdot 10^6 - 6370 \cdot 10^3$$

$$h = 2{,}8 \cdot 10^5 \Rightarrow \boxed{280\ km = h}$$

b) Velocidad y aceleración en órbita:

$$v = \sqrt{\frac{GM}{R}} = \sqrt{\frac{6{,}67 \cdot 10^{-11} \cdot 5{,}98 \cdot 10^{24}}{6{,}65 \cdot 10^6}} = \boxed{7744{,}67\ \frac{m}{s}}$$

$$a = \frac{v^2}{R} = \frac{7744{,}67^2}{6{,}65 \cdot 10^6} = \boxed{9{,}02\ m/s^2}$$