

$$\textcircled{1} \quad R = 6370 \text{ km} + 300 \text{ km} = 6670 \text{ km} = 6.67 \times 10^6 \text{ m}$$

$$F = \frac{GMm}{R^2} = \frac{mv^2}{R}$$

$$v = \sqrt{\frac{GM}{R}} = 7727 \text{ m/s}$$

$$v = \frac{2\pi R}{T} \Rightarrow T = \frac{2\pi R}{v} = 5421 \text{ s} = 90.2 \text{ min}$$

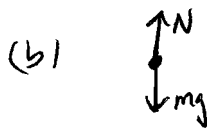
$\textcircled{2}$

$$F = \frac{1}{4\pi\epsilon_0} \frac{q_1 q_2}{R^2} = \frac{mv^2}{R} \quad q_1 = q_2 = e$$

$$v = \sqrt{\frac{1}{4\pi\epsilon_0} \frac{e^2}{mR}} = 2.19 \times 10^6 \text{ m/s}$$

$$T = \frac{2\pi R}{v} = 1.5 \times 10^{-16} \text{ s}$$

$$\textcircled{3} \text{ (a)} \quad F = \frac{GMm}{R^2} = \frac{(6.67 \times 10^{-11} \text{ N}\cdot\text{m}^2/\text{kg}^2)(5.97 \times 10^{24} \text{ kg})(60 \text{ kg})}{(6.37 \times 10^6 \text{ m})^2} = 588.8 \text{ N}$$



$$\text{(c)} \quad v = \frac{2\pi R}{T} = 463 \text{ m/s} \quad \frac{v^2}{R} = 0.0334 \text{ m/s}^2$$

$$\begin{aligned} \text{(d)} \quad mg - N &= \frac{mv^2}{R} \Rightarrow N = mg - \frac{mv^2}{R} \\ &= 588.8 \text{ N} - (60 \text{ kg})(0.0334 \frac{\text{m}}{\text{s}^2}) \\ &= 586.8 \text{ N} \end{aligned}$$