

Exercise 9-3

As in Exercise 9-2, $a_c = \frac{v^2}{r}$, but $v = \frac{2\pi r}{T}$ and $T = \frac{1}{f}$

$$\therefore a_c = 4\pi^2 r f^2$$

$$\begin{aligned}\therefore f &= \frac{1}{2\pi} \sqrt{\frac{a_c}{r}} = \frac{1}{2\pi} \sqrt{\frac{9.80 \text{ m/s}^2}{1.00 \times 10^3 \text{ m}}} \\ &= 0.158 \text{ Hz} \quad (0.01576 \text{ Hz})\end{aligned}$$

$$T = \frac{1}{f} = 63.5 \text{ s} \quad (63.47 \text{ s})$$

$$v = \frac{2\pi r}{T} = \frac{2\pi (1.00 \times 10^3 \text{ m})}{63.47 \text{ s}} = 99.0 \text{ m/s}$$