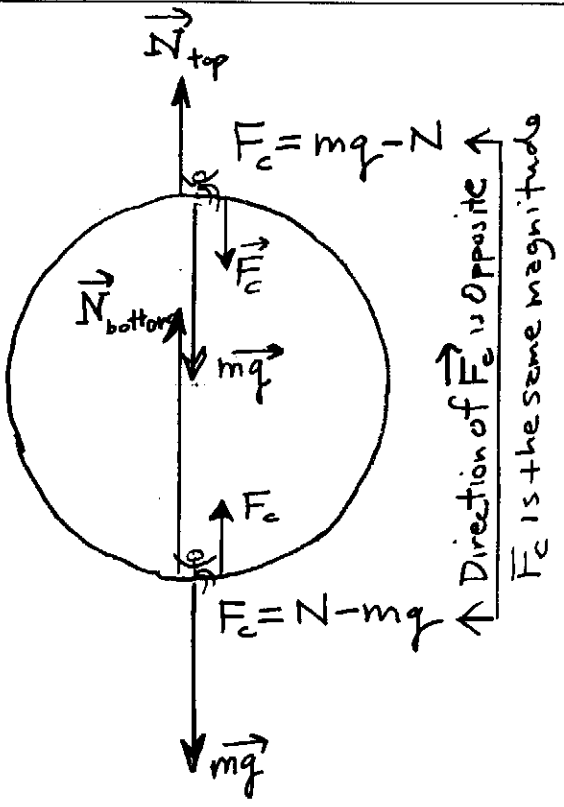
STAEDTLER® No. 937 811E Engineer's Computation Pad

••45 A circular-motion addict of mass 80 kg rides a Ferris wheel around in a vertical circle of radius 10 m at a constant speed of 6.1 m/s. (a) What is the period of the motion? What is the magnitude of the normal force on the addict from the seat when both go through (b) the highest point of the circular path and (c) the lowest point?



$$v = \frac{2\pi r}{T} \Rightarrow T = \frac{2\pi r}{v}$$

$$T = \frac{2\pi\, 10}{6.1} = 10.3 \text{ sec}$$

$$a_c = v^2/r = \frac{6.1^2}{10} = 3.7 \frac{m}{s^2}$$

$$\vec{F}_c = m\vec{a}_c \Rightarrow F_c = \frac{mv^2}{r}$$

$$\vec{F}_{c\ \text{on addict}} = \vec{N}_{\text{on addict by seat}} + m\vec{g}_{\text{on addict by Earth}}$$

$$\vec{F}_c \underset{\text{top}}{@} (-N + mg)\,[\widehat{\text{down}} = \widehat{\text{to center}}] = \frac{mv^2}{r}\,\widehat{\text{down}}$$

$$-N + mg = \frac{mv^2}{r} \Rightarrow N = mg - \frac{mv^2}{r}$$

$$N = 80(9.80) - 80(3.7) = 488 \text{ N}$$

= apparent weight is LIGHT

$$\vec{F}_c \underset{\text{bottom}}{@} (N - mg)\,[\widehat{\text{up}} = \widehat{\text{to center}}] = \frac{mv^2}{r}\,\widehat{\text{up}}$$

$$N - mg = \frac{mv^2}{r} \Rightarrow N = mg + \frac{mv^2}{r}$$

$$N = 784 + 296 = 10{,}800 \text{ N}$$

= apparent weight is heavy