Chapter 7 Section 1 Practice B

Formulas: $F_c = ma_c$ $F_c = \frac{mv_t^2}{r}$

1. $r = 2.10\,m$, $v_t = 2.50\,m/s$, $F_c = 88.0\,N$, $m = ?$

$F_c = \frac{mv_t^2}{r}$ $\quad F_c r = mv_t^2$ $\quad \boxed{m = \frac{F_c r}{v_t^2}}$

$m = \frac{(88.0\ kg\cdot m/s^2)(2.10\,m)}{(2.50\,m/s)^2}$ $\quad m = \frac{184.8\ kg\cdot m^2/s^2}{6.25\ m^2/s^2}$ $\quad \boxed{m = 29.6\,kg}$

$\frac{kg\cdot m^2}{s^2} \times \frac{s^2}{m^2}$

2. $v_t = 13.2\,m/s$, $F_c = 377\,N$, $m = 86.5\,kg$

$F_c = \frac{mv_t^2}{r}$ $\quad F_c r = mv_t^2$ $\quad r = \frac{mv_t^2}{F_c}$

$r = \frac{(86.5\,kg)(13.2\,m/s)^2}{377\ kg\cdot m/s^2}$ $\quad r = \frac{15071.76\ kg\cdot m^2/s^2}{377\ kg\cdot m/s^2}$ $\quad \boxed{r = 40.0\,m}$

$\frac{kg\cdot m^2}{s^2} \times \frac{s^2}{m\cdot kg}$

3. $r = 1.50\,m$, $v_t = 1.80\,m/s$, $m = 18.5\,kg$, $F_c = ?$

$F_c = \frac{mv_t^2}{r}$ $\quad F_c = \frac{(18.5\,kg)(1.80\,m/s)^2}{1.50\,m}$ $\quad F_c = \frac{59.94\ kg\cdot m^2/s^2}{1.50\,m}$ $\quad \boxed{F_c = 40.0\ kg\cdot m/s^2 \text{ or } N}$

$\frac{kg\cdot m^2}{s^2} \times \frac{1}{m}$

4. $m = 905\,kg$, $F_c = 2140\,N$, radius $= \frac{\text{circumference}}{2\pi}$, $r = \frac{3250\,m}{2\pi}$, $v_t = ?$

$F_c = \frac{mv_t^2}{r}$ $\quad F_c r = mv_t^2$ $\quad v_t^2 = \frac{F_c r}{m}$ $\quad v_t = \sqrt{\frac{F_c r}{m}}$

$v_t = \sqrt{\frac{(2140\ kg\cdot m/s^2)(517.25\,m)}{905\,kg}}$ $\quad v_t = \sqrt{\frac{110695\ kg\cdot m^2/s^2}{905\,kg}}$ $\quad v_t = \sqrt{1223.110497\ m^2/s^2}$ $\quad \boxed{v_t = 35.0\,m/s}$