

1) Given:

$$\begin{aligned} r &= 2.10 \text{ m} \\ v_T &= 2.50 \text{ m/s} \\ F_c &= 88.0 \text{ N} \\ m &= ? \end{aligned}$$

Soln: $F_c = \frac{m v_T^2}{r}$

$$\begin{aligned} m &= \frac{F_c r}{v_T^2} \\ &= \frac{(88.0 \text{ N})(2.10 \text{ m})}{(2.50 \text{ m/s})^2} \end{aligned}$$

$$m = 29.6 \text{ kg}$$

2) Given:

$$\begin{aligned} v_T &= 13.2 \text{ m/s} \\ F_c &= 377 \text{ N} \\ m &= 86.5 \text{ kg} \\ r &= ? \end{aligned}$$

Soln: $F_c = \frac{m v_T^2}{r}$

$$\begin{aligned} r &= \frac{m v_T^2}{F_c} \\ &= \frac{(86.5 \text{ kg})(13.2 \text{ m/s})^2}{377 \text{ N}} \end{aligned}$$

$$r = 40.0 \text{ m}$$

4) Given:

$$\begin{aligned} v_T &= ? \\ m &= 905 \text{ kg} \\ F_c &= 2140 \text{ N} \\ C_{ir} &= 3.25 \text{ km} = 3250 \text{ m} \end{aligned}$$

Soln:

$$F_c = \frac{m v_T^2}{r}$$

$$v_T^2 = \frac{F_c r}{m}$$

$$= \frac{(2140 \text{ N})(517 \text{ m})}{905 \text{ kg}}$$

$$\begin{aligned} C &= 25\pi r \\ r &= \frac{C}{25\pi} \\ &= \frac{3250 \text{ m}}{25\pi} \end{aligned}$$

$$r = 517 \text{ m}$$

$$v_T = 35.0 \text{ m/s}$$