Phy 7.3

Pg 172 49, 50, 52, 53, 54, 55

49) $m = 615\,kg$
$t = 14.3\,s$
$r = 50.0\,m$

$a_c = \frac{(22.0\,m/s)^2}{50.0\,m} = 9.68\,m/s^2$ (A)

$V = \frac{2\pi r}{T} = \frac{2\pi(50.0\,m)}{14.3\,s} = 22.0\,m/s$

$F = m\left(\frac{4\pi^2 r}{T^2}\right)$

$= (615\,kg)\left(\frac{4\pi^2(50.0\,m)}{(14.3\,s)^2}\right)$

(B) $= 5.94 \times 10^3\,N$

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50) 

$m = 7.00\,kg$ $\quad a_c = ?$
$r = 1.3\,m$
$T = 1.0\,s$

$V = \frac{2\pi(1.3\,m)}{(1.0\,s)^2} = 8.17\,m/s$

(A) $a_c = \frac{(8.17\,m/s)^2}{1.3\,m} = 51\,m/s^2$

B) $F_T = (7.00\,kg)\left(\frac{4\pi^2(1.3\,m)}{(1.0\,s)^2}\right) = 3.6 \times 10^2\,N$

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53) $r = 6.38 \times 10^3\,km = 6.38 \times 10^6\,m$ $\quad T = 86400\,s$
$m_p = 97\,kg$

(A) $V = \frac{2\pi(6.38 \times 10^6\,m)}{86400\,s} = 464\,m/s$

(B) $a_c = \frac{(464\,m/s)^2}{6.38 \times 10^6\,m} = .0337\,m/s^2$

$F = (97\,kg)(.0337\,m/s^2)$
$= 3.3\,N$

(C) $WT = (97\,kg)(9.80\,m/s^2) = 950\,N$

(D) $F_N = 950\,N - 3.3\,N$
$= 946.7\,N$
$= 950\,N$

55) $r = 80.0\,m$ $\quad F_{FR} = \mu_s mg$

$\mu_s = .40$ $\quad F = m\frac{v^2}{r}$

$$\mu_s mg = m\frac{v^2}{r}$$

$$\mu_s g = \frac{v^2}{r} \qquad v = \sqrt{\mu_s g r}$$

$$= \sqrt{(.40)(9.80\,m/s^2)(80.0\,m)}$$

$$= 17.7\,m/s$$

$$= 18\,m/s$$

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52) $v = 2010\,m/s$

$r = 15.3\,cm = .153\,m$

A) $A_c = ?$ $\quad A_c = \frac{v^2}{r} = \frac{(2010\,m/s)^2}{.153\,m} = 2.64\times10^7\,m/s^2$

$F_c = ?$

B) $F_c = ma_c = (.001\,kg)(2.64\times10^7\,m/s^2) = 2.64\times10^4\,N$

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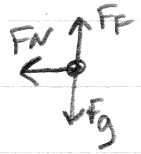
54) $r = 2.0\,m$ $\quad T = .90\,s$ $\quad$ A) $v = \frac{2\pi r}{T} = \frac{2\pi(2.0\,m)}{.90\,s} = 13.96\,m/s$

$v = ?$ $\quad a_c = ?$

$v = 14\,m/s$

B) $A_c = \frac{v^2}{r} = \frac{(14\,m/s)^2}{2.0\,m} = 97.48\,m/s^2 = 97\,m/s^2$ $\quad$ C) Wall of Drum

D) 

E) $F_F = \mu F_N$ $\quad \mu = \frac{F_F}{F_N} = \frac{mg}{m\frac{v^2}{r}}$

$$\mu = \frac{g}{\frac{v^2}{r}} = \frac{gr}{v^2} = \frac{(9.80\,m/s^2)(2.00\,m)}{(13.96\,m/s)^2}$$

$\mu = .10$