(59) $F = ma$

$$m = \frac{F}{a} = \frac{5}{0{,}2} = \underline{25\ kg}$$

$$F_1 = m \cdot a_1 \Rightarrow a_1 = \frac{F_1}{m} = \frac{10}{25} = 0{,}4\ m/s^2$$

$$a_2 = \frac{F_2}{m} = \frac{15}{25} = 0{,}6\ m/s^2$$

$$a_3 = \frac{F_3}{m} = \frac{20}{25} = 0{,}8\ m/s^2$$

$$a_4 = \frac{F_4}{m} = \frac{50}{25} = 2\ m/s^2$$

$F_1 = m \cdot a_1 = 25 \cdot 0{,}1 = 2{,}5\ N$

$F_2 = ma_2 = 25 \cdot 0{,}3 = 7{,}5\ N$

$F_3 = ma_3 = 25 \cdot 1 = 25\ N$

$F_4 = ma_4 = 25 \cdot 2{,}4 = 60\ N$

(63) $F = ma \qquad a = \frac{v}{t}$

$$F = m\frac{v}{t}$$

$$F = 0{,}4 \cdot \frac{25}{0{,}1} = \underline{100\ N}$$

(64) $F_1 = 320\ kN = 320 \cdot 10^3\ N$

$t = 2{,}5\ min = 150\ s$

$v = 6\ km/h = 6000\ m/h$

$m = ?$

$$a = \frac{v}{t} \qquad F = ma$$

$$m = \frac{F}{a} = \frac{F \cdot t}{v} = \frac{320 \cdot 10^3 \cdot 150}{6000}$$

$$m = \underline{8000\ kg}$$

(65) $F = ma \qquad a = \frac{v}{t} \qquad s = \frac{1}{2}at^2$

$t = \frac{v}{a}$

$s = \frac{1}{2} a \frac{v^2}{a^2} = \frac{1}{2} \frac{v^2}{a} \Rightarrow a = \frac{v^2}{2s}$

$F = m \frac{v^2}{2s} = 200\,000 \cdot \frac{20^2}{2 \cdot 400}$

$F = \underline{100\,000\,N}$

(66) $F = ma \qquad a = \frac{v}{t} \qquad s = \frac{1}{2}at^2$

$a = \frac{2s}{t^2} = \frac{2 \cdot 80}{10^2} = \frac{100}{100} = \underline{1\,m\cdot s^{-2}}$

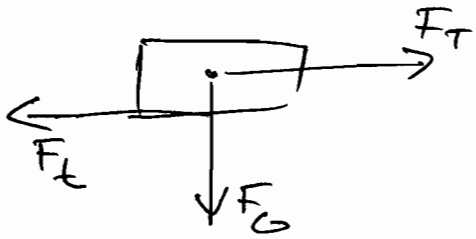
$F = 80 \cdot 1 = \underline{80\,N}$

(67) $F = ma \Rightarrow a = \frac{F}{m} = \frac{80}{50} = \underline{1{,}6\,m\cdot s^{-2}}$

$v = a \cdot t = 1{,}6 \cdot 5 = \underline{8\,m\cdot s^{-1}}$

$s = \frac{1}{2}at^2 = \frac{1}{2} 1{,}6 \cdot s^2 = \underline{20\,m}$

(69)



$F_T = F_t \qquad F_t = F_N \cdot f \qquad F_N = F_G$

$F_T = \frac{1}{5} F_G$

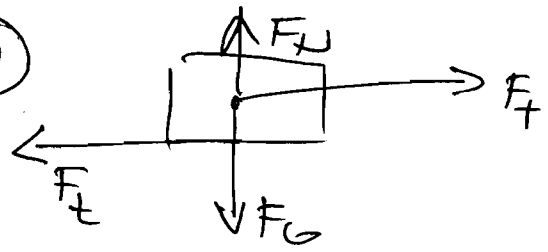
$F_G = m \cdot g$

$\frac{1}{5} mg = m \cdot g \cdot f$

a) $f = \frac{1}{5} = 0{,}2$

b) $F_t = (40 + 50) \cdot g \cdot f = 90 \cdot 10 \cdot 0{,}2 = \underline{180\,N}$

70



$F_t = F_N \cdot f$

$F_N = F_G$ $\quad F_G = m \cdot g$

$F_t = F_G \cdot f$

$F_t = m \cdot g \cdot f$

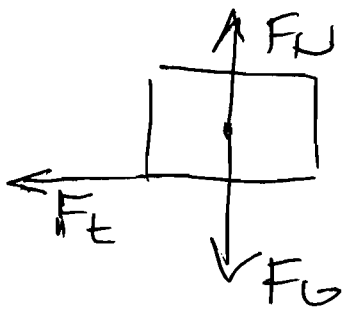
$F_1 = 20\ N$

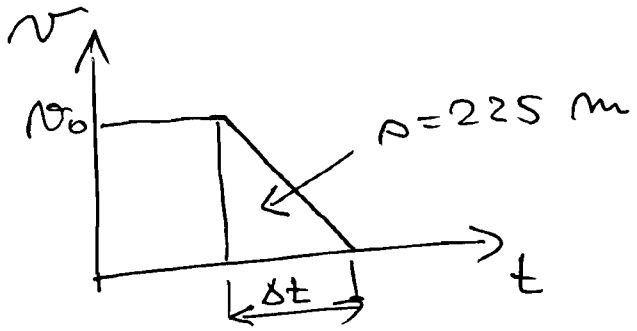
$F_2 = 5\ N$ $\quad F_T = F_t$

$F_T = m \cdot g \cdot f \Rightarrow f = \frac{F_T}{mg}$

$f_1 = \frac{20}{5 \cdot 10} = \frac{2}{5} = 0{,}4$ $\quad f_2 = \frac{5}{50} = \frac{1}{10} = \underline{0{,}1}$

72





ZDE SE $F_t = F_B$

F_B JE BRZDNÁ SÍLA KTERÁ ZASTAVILA AUTOMOBIL

$s = \frac{1}{2} a (\Delta t)^2$ $\quad a = \frac{v_0}{\Delta t}$

$s = \frac{1}{2} \frac{v_0}{\Delta t} (\Delta t)^2 = \frac{1}{2} v_0 \cdot \Delta t$

$\Delta t = \frac{2s}{v_0} = \frac{2 \cdot 225}{15} = \underline{30\ s}$

$F_t = F_N \cdot f$ $\quad F_N = F_G$ $\quad F_G = mg$

$F_t = m \cdot g \cdot f$ $\quad F_t = F_B$ $\quad F_B = m \cdot a$ (ZPOMALENÍ AUTOMOBILU)

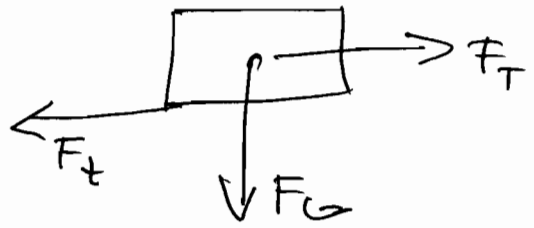
$m \cdot g \cdot f = ma$

$f = \frac{a}{g} = \frac{0{,}5}{10} = \underline{0{,}05}$

$a = \frac{v_0}{\Delta t}$

$a = \frac{15}{30} = \underline{0{,}5\ m/s^2}$

77



$F = ma$

$$F_T - F_t = ma$$

KDYBY $F_T = F_t$, PAK BY SE AUTOMOBIL POHYBOVAL $v = konst$

$$F_T = m \cdot a + F_t \qquad F_t = mg \cdot f$$

$$F_T = ma + m \cdot g f$$

$$F_T = 1000 \cdot 0{,}12 + 1000 \cdot 10 \cdot 0{,}11$$

$$F_T = 200 + 1000 = \underline{1200\,N}$$

78

$$\frac{n_2}{n_1} = \frac{54}{90} = 0{,}6 = \frac{3}{5}$$

$p = m \cdot v$ ← HYBNOST

$$p_1 = m_1 v_1 = 800 \cdot 25 = 20000\ kg\,ms^{-1}$$

$$p_2 = m_2 v_2 = 2000 \cdot 15 = 30000\ kg\,ms^{-1}$$

$$\frac{p_1}{p_2} = \frac{20000}{30000} = \frac{2}{3} \doteq 0{,}67$$

79

$F = ma \qquad a = \frac{v}{t}$

$F = m \cdot \frac{v}{t}$

$v = \frac{F \cdot t}{m} = \frac{300 \cdot 0{,}02}{0{,}8} = 7{,}5\ m/s$

$F = m \cdot \frac{v}{t} \Rightarrow t = \frac{mv}{F}$

$t = \frac{0{,}8 \cdot 12}{300} = 0{,}032\ s$

80

$F \cdot t = m \cdot v \Rightarrow I = mv$

$I \qquad p$

$I_1 = m \cdot v_1 = 10 \cdot 1{,}8 = 18\ kg\ m\ s^{-1}$

$I_2 = m \cdot v_2 = 10 \cdot \frac{1{,}8}{3{,}6} = 5\ kg\ m\ s^{-1}$

81

$F = m \cdot a \qquad a = \frac{v}{t}$

$F = m \frac{v}{t}$

$F \cdot t = m \cdot v$

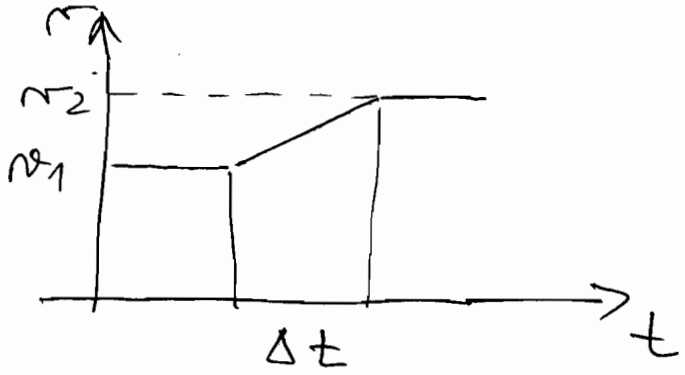
$F \cdot t = 200 \cdot 1{,}5 = 300\ kg\ m\ s^{-1}$

1) 300 N PO DOBU 1 s

2) 3 N PO DOBU 100 s

3) 1 N PO DOBU 300 s

82



$$F = m \cdot a$$

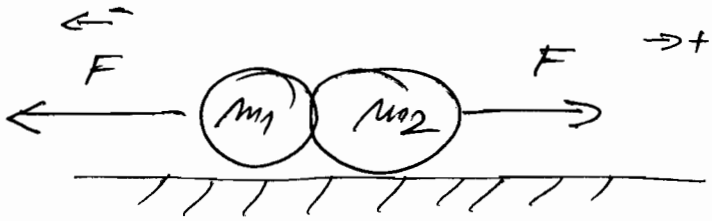
$$a = \frac{\Delta v}{\Delta t}$$

$$a = \frac{v_2 - v_1}{\Delta t}$$

$$a = \frac{20 - 5}{120} = \frac{15}{120} = 0{,}125 \ m/s^2$$

$$F = 400\,000 \cdot 0{,}125 = 50\,000 \ N$$

86



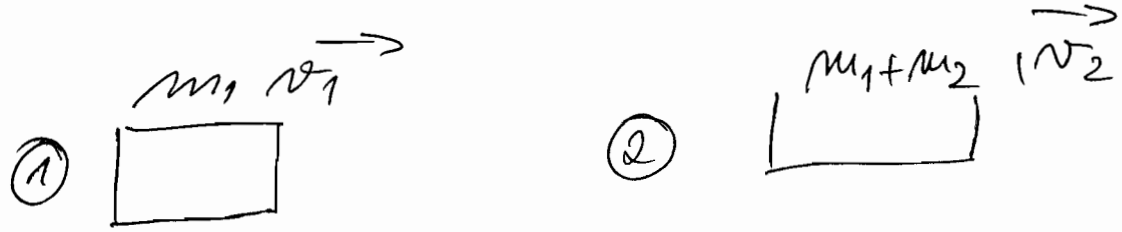
$$p_c = 0$$

$$-p_1 + p_2 = 0$$

$$p_c = m_1 v_1 = m_2 v_2 \Rightarrow \frac{m_1}{m_2} = \frac{v_2}{v_1}$$

$$\frac{v_2}{v_1} = \frac{m_1}{m_2} = \frac{2}{5}$$

89



PLATI' 2 2 H

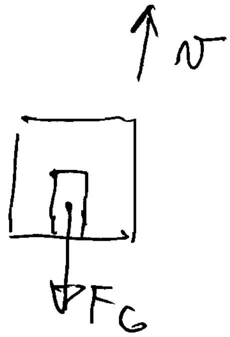
$$m_1 v_1 = (m_1 + m_2) v_2$$

$$v_2 = \frac{m_1 v_1}{m_1 + m_2}$$

$$v_2 = \frac{600 \cdot 0{,}5}{600 + 400} = \frac{300}{1000} = 0{,}3 \ m/s$$

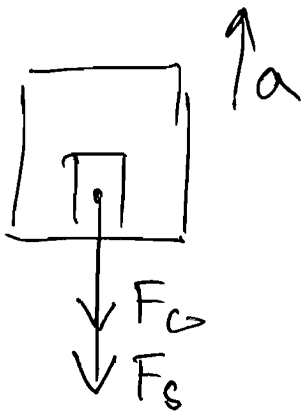
96

a)



$F_T = F_G = m \cdot g = \underline{800\,N}$

b)



SÍLA SETRVAČNÁ

$F_S = -ma$

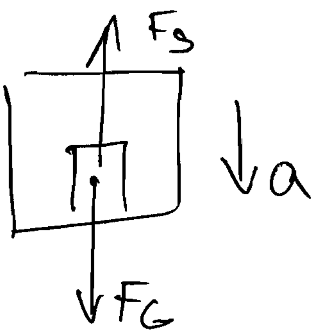
$F_G = m \cdot g \Rightarrow m = \frac{800}{10}$

$m = 80\,kg$

$F_S = 80 \cdot 2 = 160\,N$

$F_S + F_G = 800 + 160 = \underline{960\,N}$

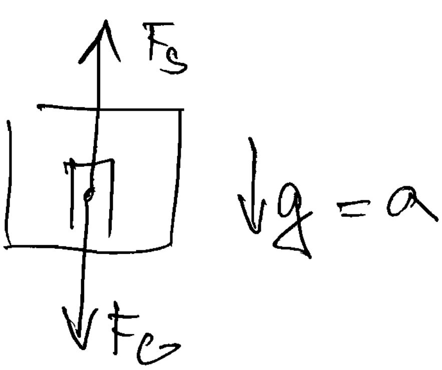
c)



$F_G - F_S = 800 - 160$

$F_G - F_S = \underline{640\,N}$

d)

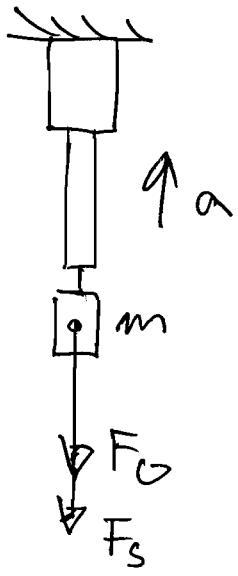


$F_G - F_S = 800 - 800$

$F_G - F_S = \underline{0\,N}$

(97)

$$F_G = 10\,N \Rightarrow m = \frac{F_G}{g} = \frac{10}{10} = 1\,kg$$



← ZNAČÍ SMĚR PŮSOBENÍ!

$$F_S = -ma$$

$$F_G + F_S = F_T$$

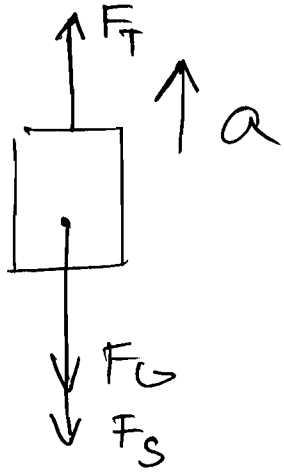
$$F_G = mg$$

$$mg + ma = F_T$$

$$1.10 + 1.10 = F_{T1} = 20\,N$$

$$F_{T2} = 1.10 + 1.50 = 60\,N$$

(98)



$$F_T = F_G + F_S$$

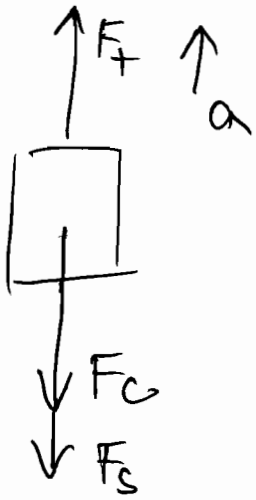
$$F_T = mg + ma$$

$$a = \frac{v}{t}$$

$$F_T = mg + m\frac{v}{t}$$

$$F_T = 2000 \cdot 10 + 2000\,\frac{8}{5} = 23200\,N$$

99



$F_T = 5kN = 5000N$

$F_T = F_G + F_S$

$F_T = mg + ma$

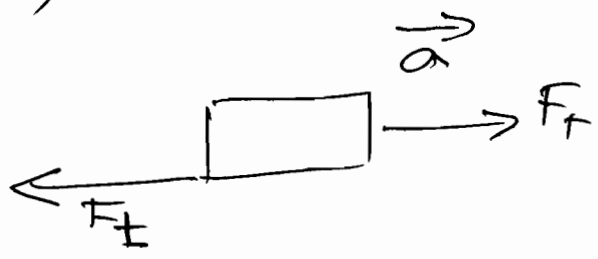
$\frac{F_T - mg}{m} = a$

$\frac{5000 - 400.10}{400} = 2,5\ ms^{-2} = a$

100

a) $F = ma = 10.5 = 50N = F_T$

b)

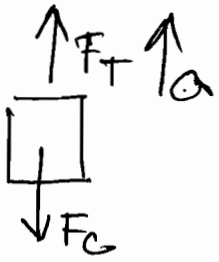


$F_T - F_t = ma$

$F_T = ma + F_t = ma + mg.f$

$F_T = 10.5 + 10.10.0,2 = 70N$

c)



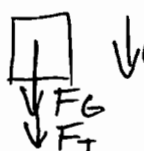
$F_T - F_G = ma$

$F_T = m.a + mg = 10.5 + 10.10$

$F_T = 150N$

$-F_T - F_G = -ma$

d)

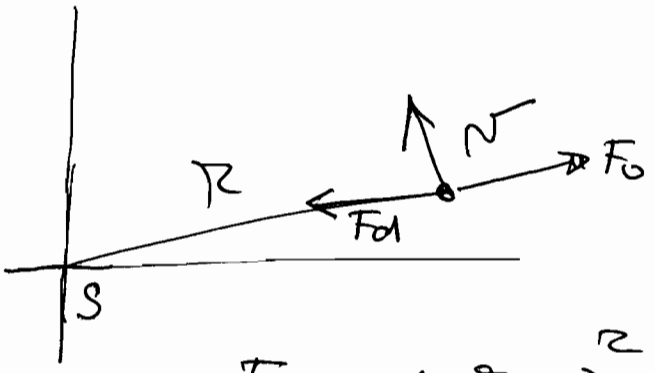


$F_T = ma - mg$

$F_T = 10.5 - 10.10$

$F_T = -50N$

(103)



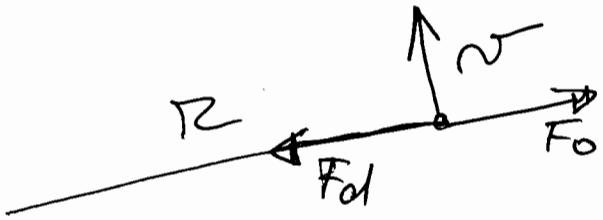
$$F_d = m r \omega^2 \qquad \omega = v r$$

$$F_d = m r \frac{v^2}{r^2} = m \frac{v^2}{r}$$

a) $F_d = 60 \cdot \frac{5^2}{20} = \underline{75\ N}$

b) $F_0 = F_d = \underline{75\ N}$

(107)



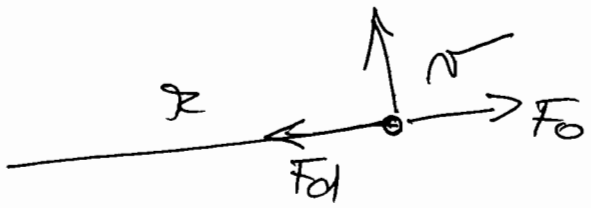
$$F_d = F_0 = ma$$

5 TI NÁSOBNÉ TÍHOVÉ ZRYCHLENÍ $a = 5g$

$$F_d = m \frac{v^2}{r} = m \cdot a \Rightarrow$$

$$r = \frac{v^2}{a} = \frac{v^2}{5 \cdot g} = \frac{250^2}{5 \cdot 10} = \underline{1250\ m}$$

108



$$\omega = \frac{2\pi}{T} \qquad F_d = F_o = ma$$

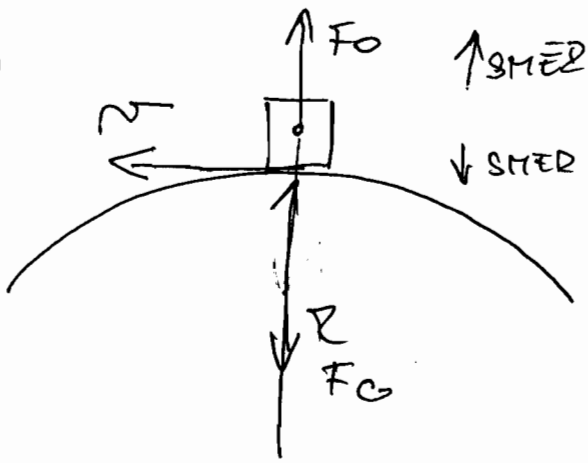
$$F_d = mr\omega^2 = ma$$

$$\Rightarrow \quad a = r\omega^2$$

$$a = r\left(\frac{2\pi}{T}\right)^2 = 7 \cdot \left(\frac{2\pi}{2}\right)^2$$

$$a \doteq \underline{69\ m\,s^{-2}} \doteq 7g$$

109



SMĚR + ↑

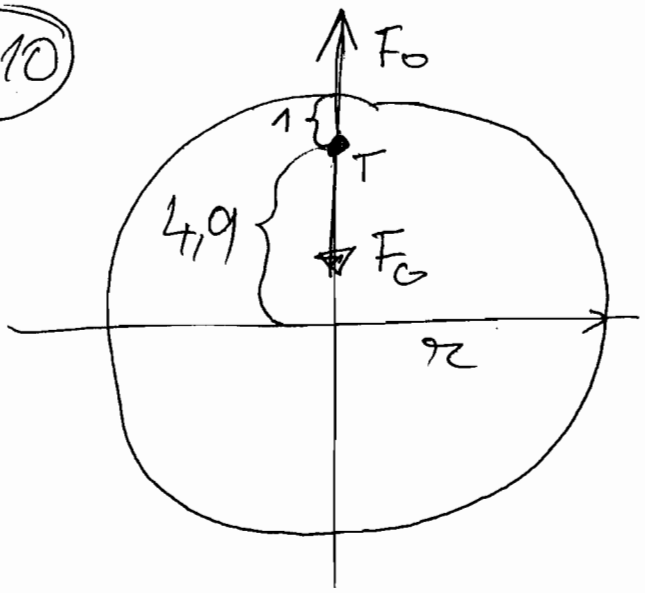
SMĚR − ↓

$$F_o - F_G = +F_T$$

$$F_T = mr\omega^2 - mg = m\frac{v^2}{r} - mg = 80 \cdot \frac{10^2}{16} - 800$$

$$F_T = \underline{-300\ N} \quad - \text{TLAKOVÁ SÍLA PŮSOBÍ DOLŮ}$$

110



$F_o = F_G$ $\quad \omega = v \cdot r$

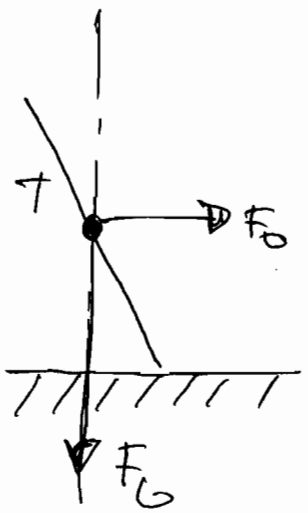
$m r \omega^2 = mg$

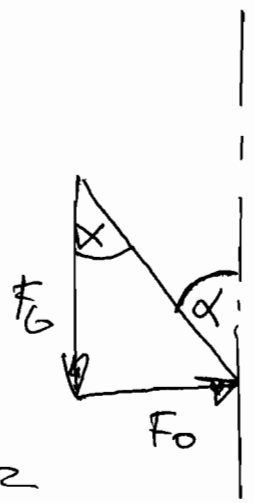
$m r \frac{v^2}{r} = mg$

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

$v = \sqrt{g \cdot r} = \sqrt{10 \cdot \left(\frac{118-2}{2}\right)} \doteq \underline{7 \text{ m/s}}$

111





$tg\alpha = \frac{F_o}{F_G} = \frac{m \frac{v^2}{r}}{mg} = \frac{v^2}{rg}$

$tg\alpha = \frac{5^2}{30 \cdot 10} = \frac{25}{100} = 0{,}25 \Rightarrow$

$\alpha \doteq 14°$