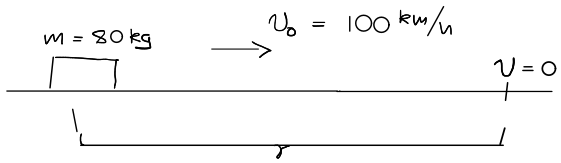
1-05-36



Find the force of the seat belt on the passanger. we approximate by assuming constant acceleration

stops in 45.0 m

100 km/h ≈ 27,8 m/s

$v = v_0 - at$ or $v^2 = v_0^2 - 2ad$

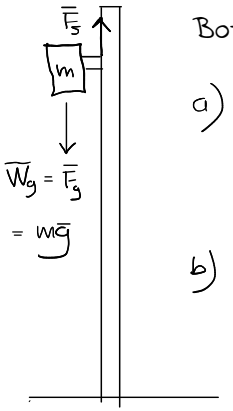
$\rightarrow 0 = v_0^2 - 2ad \rightarrow v_0^2 = 2ad \rightarrow a = \frac{v_0^2}{2d}$

$F = ma = m\frac{v_0^2}{2d} = \frac{80\,kg\,(27,8)^2\,m^2/s^2}{2 \cdot 45,0\,m}$

$= 687\ kg\frac{m}{s^2} = \underline{687\ N}$ in direction ← as $\bar{a}$

1-05-48

Fireman slides down a pole with acceleration $|\bar{a}| < |\bar{g}|$



Both foces needed are vertical

a) $ma = F_s - mg$, $a < 0$

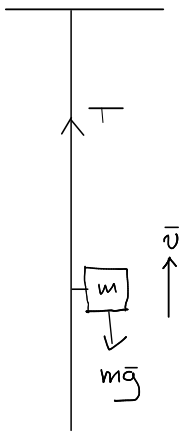
$\rightarrow F_s = ma + mg = m(a+g)$

b) $m = 90,0\,kg$, $a = -5,00\ m/s^2$

$F_s = m(a+g) = 90,0\{-5,00 + 9,81\}\frac{m}{s^2}kg$

$= \underline{433\ N}$

1-05-60



a) Find T in the rope if v = constant, a = 0, mass less rope

$m = 60,0\,kg$

$am = T - mg$

if $a = 0 \rightarrow T = mg = 60 \cdot 9,81\ N$

$= \underline{589\ N}$

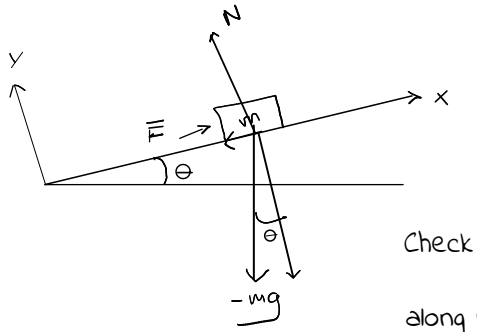
b) $am = T - mg$, now $a = 1,50\ m/s^2$

$\rightarrow T = m(a+g)$

$= 60 \cdot \{1,50 + 9,81\}\ N$

$= \underline{679\ N}$

1-05-66



$m = 100\,kg$ $\theta = 30°$, or $\frac{\pi}{6}$ rad

How large force F do we need to push the crate up the slope with acceleration a?

$a = 2,0\ m/s^2$

Check the forces:

along y-direction: $N - mg\cos\theta = 0$

along x: $F - mg\sin\theta = am \rightarrow F = am + mg\sin\theta$

$= m\{a + g\sin\theta\}$

$\rightarrow F = 100\{2,0 + 9,81 \cdot \sin(\frac{\pi}{6})\}\,kg\frac{m}{s^2} = \underline{691\ N}$