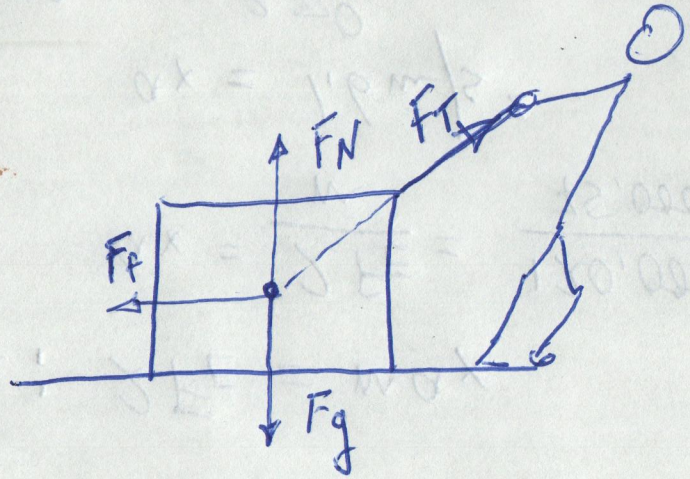
Physics

April 16, 2020



External Forces on Box (A)

F_f Grounds resists Box Back
(B) (A)
Box (A) exerts force on ground (B) (forward)

F_T Person pulls Box forward
(B) (A)
Box (A) pulls Person Back (B)

Newton's 3rd Law

F_N Ground pushing box up
(B) (A)
Box pushing ground down
(A) (B)

F_g Earth pulls box down
(B) (A)
Box pulls Earth up
(A) (B)

P. 314

8.

$m = 75{,}000\,kg$

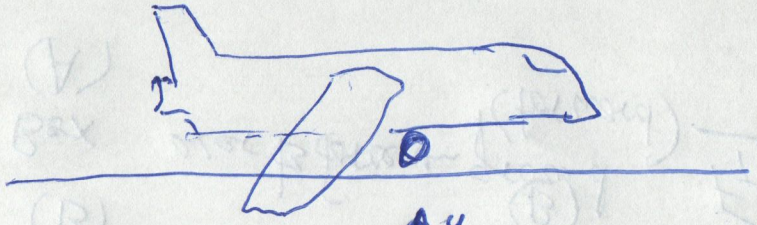
$F_E = 60{,}000\,N$

$v_f = 220\,km/h = 61.1\,m/s$ (2)

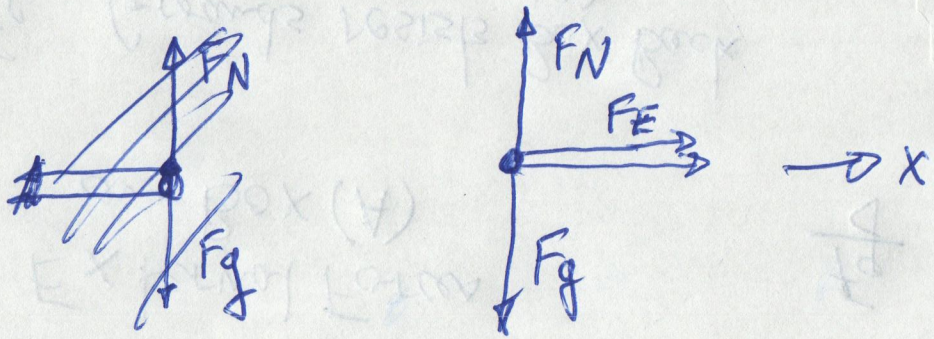
$v_{ix} = 0$

$a = 1.6\,m/s^2$

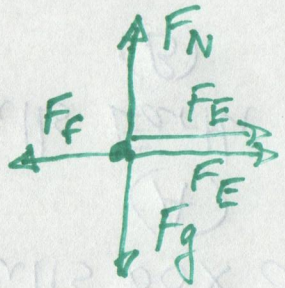
$\Delta x = ?$



a)



b)



F_x: $2F_E = ma_x$

$$a_x = \frac{2F_E}{m} = \frac{120{,}000\,N}{75{,}000\,kg}$$

$$a_x = 1.6\,m/s^2$$

$$v_{fx}^2 = \cancel{v_{ix}^2}^{\,0} + 2a\Delta x$$

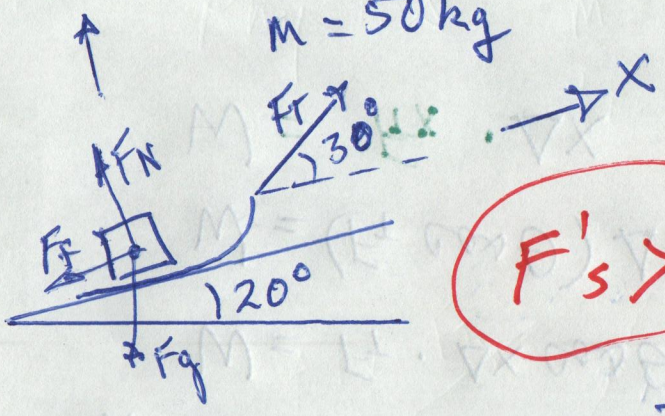
$$\Delta x = \frac{v_{fx}^2}{2a_x} = \frac{(61.1\,m/s)^2}{2(1.6\,m/s^2)}$$

$$\boxed{\Delta x = 1{,}167\,m}$$

F_x: $2F_E - F_f = ma_x$

$a_x = \dfrac{2F_E - F_f}{m}$ < parte

$2F_E - F_f < 2F_E$

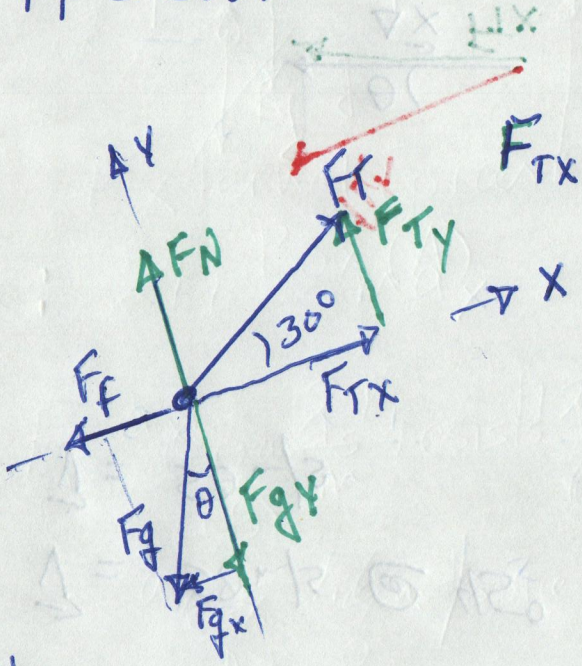


$F'_s > 0$

$F_f = 50N$

$F_T = 300N$

$a_x = ?$



SOH

$F_{gx} = F_g \sin 20°$

$F_{Tx} = F_T \cos 30°$

$F_x : F_{Tx} - F_{gx} - F_f = ma_x$

$$a_x = \frac{F_{Tx} - F_{gx} - F_f}{m}$$

$$a_x = \frac{F_T \cos 30° - F_g \sin 20° - F_f}{m}$$

$$= \frac{(300N)\cos 30° - (50kg)(9.8m/s^2)\sin 20° - 50N}{50kg}$$

$$a_x = 0.84\ m/s^2$$

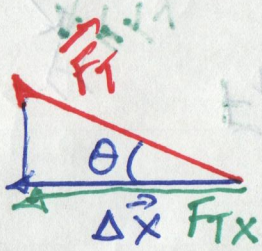
Ch. 15.1

$\vec{u} = 10\text{m} \ @ \ 180°$

$u = 10\text{m}$

$\vec{V} = 50\text{m/s} \ @ \ 45°$

$\vec{V} = 50\text{m/s}$



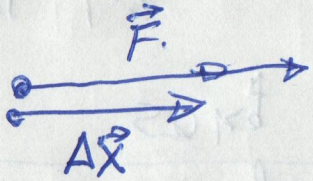
$W = \vec{F}_T \cdot \Delta\vec{X}$

$W = F_T \cdot \Delta X \cos\theta$

$W = (F_T \cos\theta)\,\Delta X$

$W = F_{Tx} \cdot \Delta X$

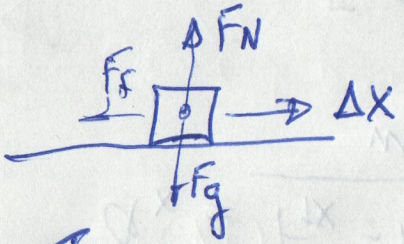
Case I $\theta = 0°$



$W = F_T \cdot \Delta X \ (\cos\theta^{\,1})$

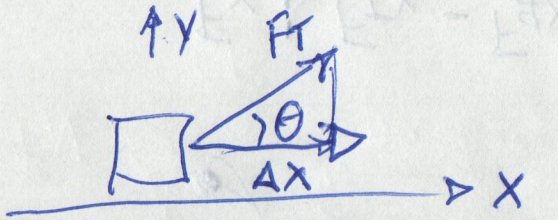
Case II $\theta = 90°$

$W = F_N \cdot \Delta x \cos 90^{\,0}$



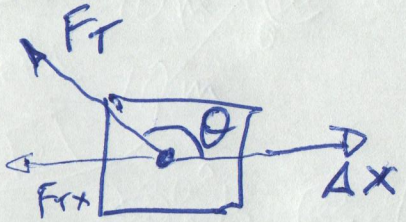
$W = 0$

Case III $0° \le \theta \le 90°$

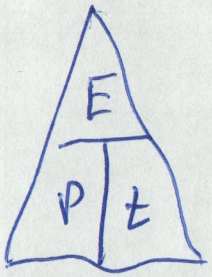


Work by F_T $\quad W = F_T \cdot \Delta X \cos\theta > 0$

Case IV $90° \leq \theta \leq 180°$



$W = F_T \cdot \Delta x \cos\theta < 0$



$E = P \cdot \Delta t$

$E = P \cdot t$ Work & Energy: Unit, J.

$P = \frac{W}{\Delta t} = \frac{E}{\Delta t}$ $P: 1\frac{J}{s} = 1W$

Energy is the ability to do work.
Work is move a force through a distance.