Chapter 05

1a $m = 135\ kg$ $g = 9.80\ m/s^2$

$a = 0\ m/s^2$

$\theta = 30.0^\circ$ $F_N = ?$ $F_G = ?$ $F_T = ?$

1b Assumptions and simplifications

2-D problem (ignore the third dimension)

Treat the crate as a particle.

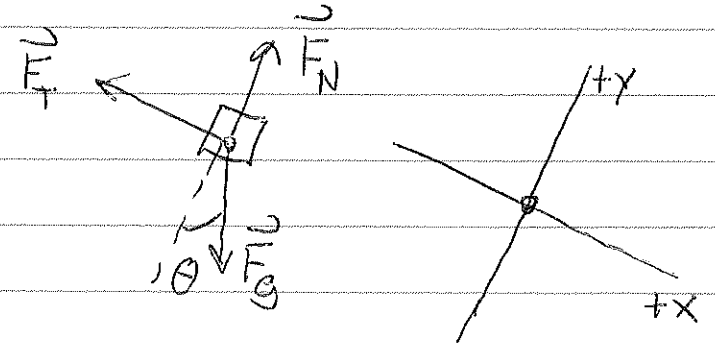
The crate is near the Earth's surface.

Air resistance is negligible.

Concepts and Laws

Newton's 1st law. Mass vs. weight.

2a FBD



2b $\Sigma \vec{F} = 0$ $F_g = mg$

3a $\Sigma \vec{F}_x = F_g \sin\theta + (-F_T) = 0$ $F_T = F_g \sin\theta$

$\Sigma \vec{F}_y = F_N + (-F_g \cos\theta) = 0$ $F_N = F_g \cos\theta$

$F_g = mg = (135\ kg)(9.80\ m/s^2) = 1323\ N = 1.32\ kN$

$F_t = F_g \sin\theta = (1323\,N)(\sin 30.0^\circ) = 662\,N = 0.662\,kN$

$F_N = F_g \cos\theta = (1323\,N)(\cos 30.0^\circ) = 1150\,N = 1.15\,kN$

4a The units all balance because $N = kg \cdot m/s^2$. All answers are reasonable: $F_t < F_g$ and $F_N < F_g$.