Thought Experiments (p153

	A	B	C	D
1	0	1	27	3
2	0	0	1	29
3	10	1	7	13

NEWTON'S LAWS

Newton's First Law - Law of Inertia.

An object at rest or in uniform motion will stay at rest or in uniform motion unless acted on by an external force.

Newton's Second Law

- acceleration is directly proportional to force $a \propto F$
- acceleration is inversely proportional to the mass $a \propto \frac{1}{m}$

combined: $a \propto \frac{F}{m}$

$F \propto ma$

$F = kma$ (k is special)

$k = \frac{1\,N}{1\,kg \cdot m/s^2}$

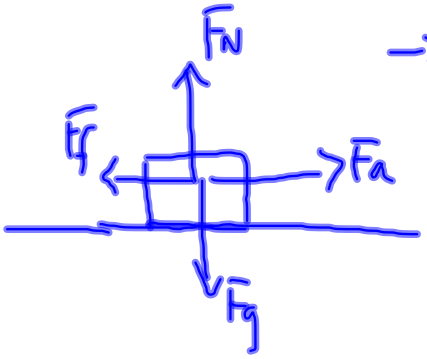
$\vec{F}_{net} = m\vec{a}$

where F_{net} is the unbalanced force (N)

m is the mass (kg)

a is acceleration (m/s^2)

FBD



→+

If $F_a > F_f$, + acc

If $F_a < F_f$, − acc

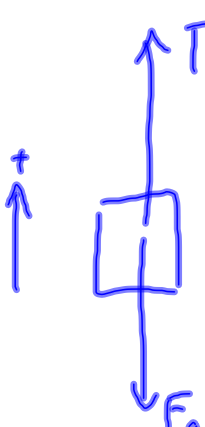
If $F_a = F_f$, no acc

MP|162

$m = 7.00 \times 10^2 kg$

$T = 7.50 \times 10^3 N$

$\vec{a} = ?$



$\vec{F}_{net} = m\vec{a}$

$T - F_g = ma$

$F_g = (7.00 \times 10^2 kg)(9.81 m/s^2)$

$F_g = 6867 N$

$7500 N - 6867 N = (7.00 \times 10^2 kg)a$

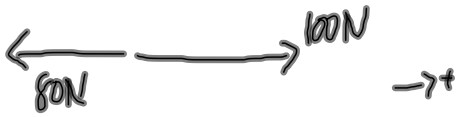
$633 N = (7.00 \times 10^2 kg)a$

$a = +0.90 m/s^2$

$\vec{a} = 0.90 m/s^2$ [UP]

(moving up) speeding up!

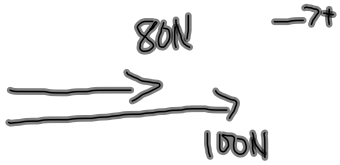
(going down) slowing down



$F_{net} = 100N - 80N = 20N$ [right]

$F_{net} = 80N - 100N = -20N$

20N [left]



$\vec{F}_{net} = 80N + 100N$

$= 180N$

$\Rightarrow$ 180N [Right]

PP|163