1st & 2nd Law

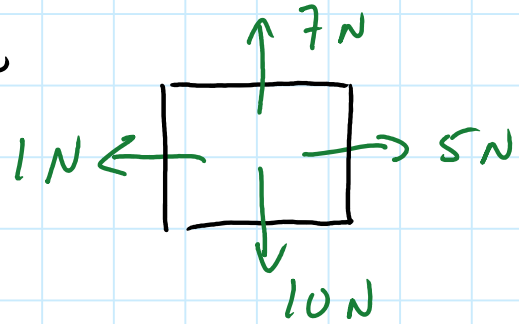
Monday, November 23, 2015 9:04 AM

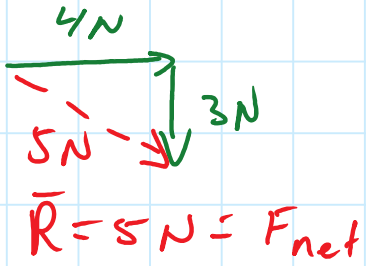
Force: A push or pull that tends to cause motion

: Vector, units N

: the vector sum of all forces on an object is called the net force (F_{net})

Top view





2 cases

$F_{net} = 0$: all forces are balanced, constant velocity or at rest

Newton's 1st Law - Law of Inertia

Inertia: resistance to change

: depends directly on mass

$F_{net} > 0$ the un balanced forces causes

the object to accelerate

Newton's 2nd law $\boxed{F_{net} = ma}$

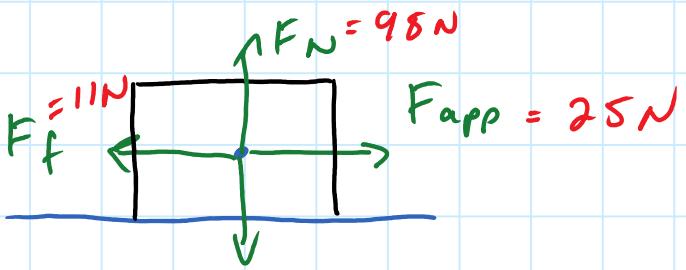
Free Body Diagrams

1) Draw a box
2) Center is the location for forces
3) Draw a vector for each force
4) Label each force vector

Some forces that may be used

$F_g, F_{app}, F_N, F_f, F_c, F_{air}, T$

Ex 1 A 10 kg box is pushed with a force of 25N. If $F_f = 11N$ determine the acc. of the box



$F_{net} = (\text{force that makes motion}) - (\text{oppos force})$

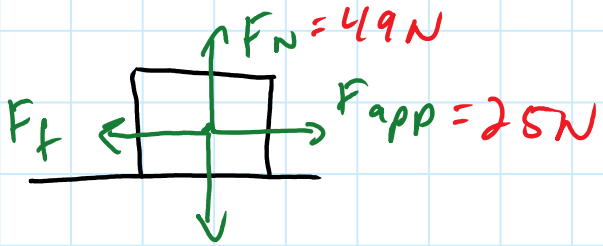
$F_{net} = F_{app} - F_f$

$ma = 25N - 11N$

$\frac{(10kg)}{10} a = \frac{14N}{10}$

$a = 1.4\ m/s^2$

Ex #2 A 5 kg box is acc. at $3.0\ m/s^2$ by a 25 N applied force. Determine F_f



$F_{net} = F_{app} - F_f$

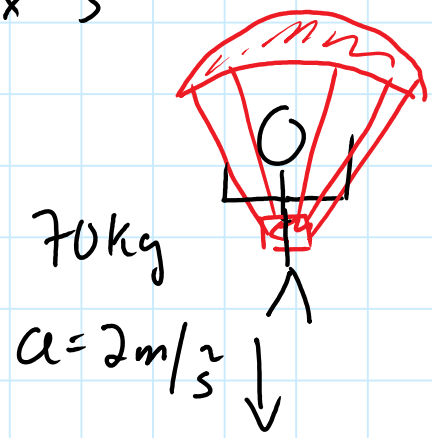
$ma = 25N - F_f$

$(5)(2)$

$15N = 25N - F_f$

$F_f = 10\ N$

Ex #3 Find the air resistance force



$F_{net} = F_g - F_{air}$

$ma = 686N$

$70(2) = 686$

$140 = 686 - F_{air}$

$F_{air} = 546\ N$

Handout

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