Free Body Diagram Practice

Draw a Free Body Diagram for the Following Situations and Calculate the unknown forces where possible.

1.0 kg object in free fall (assume zero air resistance)

$\vec{F}_{net} = \vec{F}_g$

$= 9.8N$

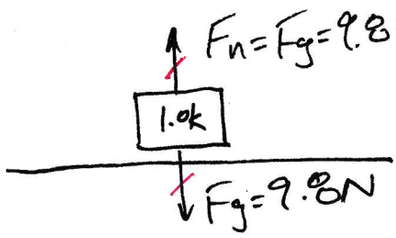
1.0 kg object in free fall experiencing 2N of air resistance.

$\vec{F}_{net} = \vec{F}_g - \vec{F}_{air}$

$= 7.8N[\downarrow]$

$\vec{a} = \frac{\vec{F}_{net}}{m} = 7.8 m/s^2[\downarrow]$

1.0 kg resting on earth $\vec{F}_{net}=0$



Formula Summary

1. Newton's 2nd Law

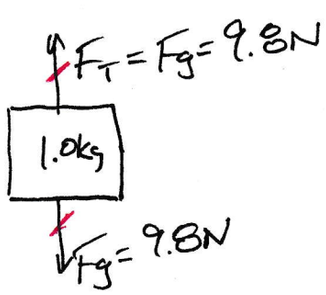
$F_{net} = ma$

2. Friction

$F_f = \mu F_n$

1.0 kg object hanging by a string

$\vec{F}_{net} = 0$



1.0 kg object hanging by a string & being accelerated upwards at 3.0 m/s²

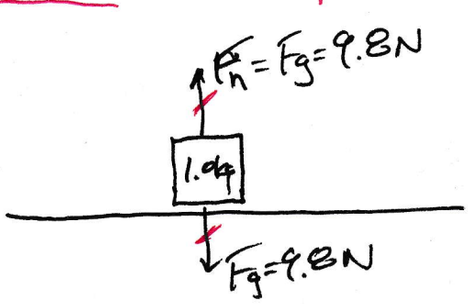
$\vec{F}_{net} = m\vec{a} = 3N \uparrow$

$F_{net} = F_T - F_g$

$3N = F_T - 9.8N$

$F_T = 11.8N \uparrow$

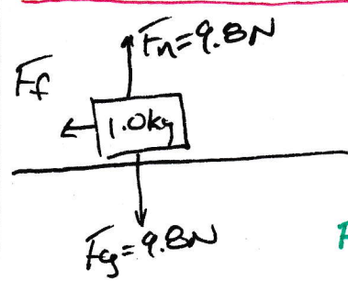
1.0 kg object sliding at 2.5 m/s on a frictionless surface $F_f = 0$.



→ motion (acceleration = 0)

$F_{net} = 0$.

1.0 kg object sliding at 2.5 m/s on a horizontal surface with friction and coming to a stop in 5.0 seconds.



$\vec{v}_1 = 2.5 m/s$

$v_2 = 0$

$\Delta t = 5.0s$

$a = -0.5 m/s^2$

$F_{net} = ma$

$= -0.5N$

$F_{net} = F_f$

$\therefore F_f = 0.5N[\leftarrow]$

$\mu_k = \frac{F_f}{F_n} = \frac{0.5N}{9.8N} = 0.05$