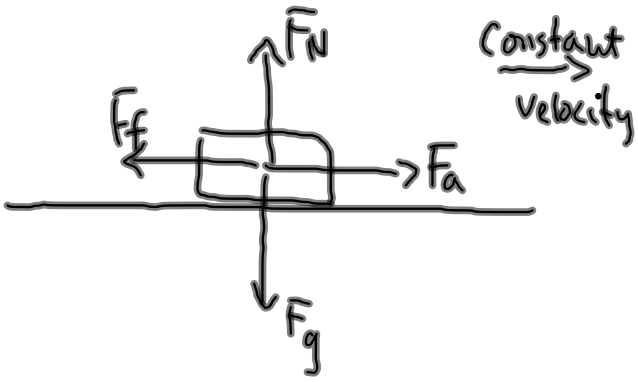
Quiz - Weight + Friction

Weight → $F_g = mg$

Friction → $F_f = \mu F_N$



constant velocity

$F_a = F_f$

$F_N = F_g$

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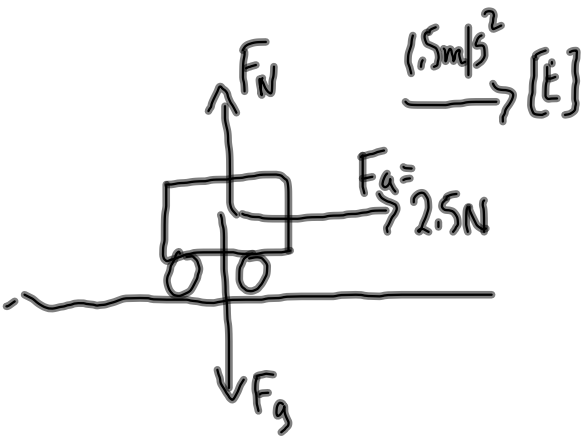
3. $\vec{F}_a = 2.5N\,[E]$

$\vec{a} = 1.5m/s^2\,[E]$

$m = ??$



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

$\vec{F}_a = m\vec{a}$

$m = \frac{\vec{F}_a}{\vec{a}}$

$m = \frac{2.5N\,[E]}{1.5m/s^2\,[E]}$

$m = 1.7kg$

Combining Dynamics + Kinematics

forces — motion

RECALL: Newton's Second Law: $\vec{F}_{net} = m\vec{a}$

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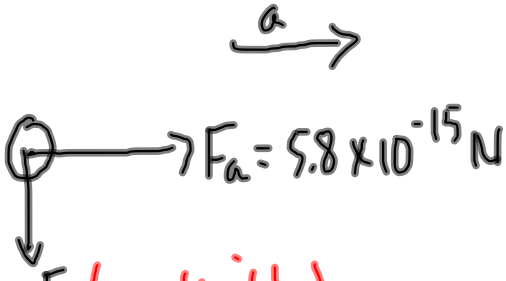
$m = 9.1 \times 10^{-31}\ kg$

$F_a = 5.8 \times 10^{-15}\ N$

$\Delta d = 3.5\ mm$

$V_1 = 0$

$V_2 = ??$



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

$\frac{F_a}{m} = \frac{ma}{m}$

$a = \frac{F_a}{m}$

$a = \frac{5.8 \times 10^{-15}\ N}{9.1 \times 10^{-31}\ kg}$

$a \doteq 6.4 \times 10^{15}\ m/s^2$

$\frac{N}{m/s^2}$ $\frac{kg \cdot m/s^2}{m/s^2}$ $\left\{ \frac{N}{kg} = \frac{kg\,(m/s^2)}{kg} \right.$

b) $V_2^2 = V_1^2 + 2ad$

$V_2^2 = 0^2 + 2(6.4 \times 10^{15}\ m/s^2)(0.0035\ m)$

$V_2 \doteq 6.7 \times 10^6\ m/s$

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$\vec{F}_a = 9.50\ N\ [S]$

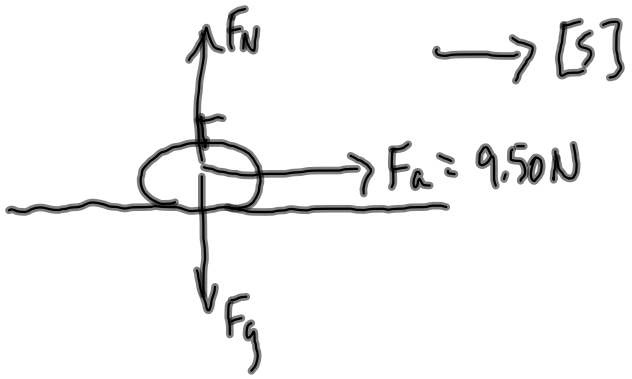
$m = 20.0\ kg$

$\Delta t = 1.86\ s$

$V_1 = 0\ m/s$

a) $\vec{a} = ?$

b) $\vec{V}_2 = ?$



a)

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

$\vec{F}_a = m\vec{a}$

$\vec{a} = \frac{\vec{F}_a}{m}$

$\vec{a} = \frac{9.50\ N\ [S]}{20.0\ kg}$

$\vec{a} = 0.475\ m/s^2\ [S]$

b) $\vec{a} = \frac{\Delta \vec{V}}{\Delta t}$

$\vec{a} = \frac{\vec{V}_2 - \vec{V}_1}{\Delta t}$

$\vec{a}\Delta t = \vec{V}_2 - \vec{V}_1$

$\vec{V}_2 = \vec{V}_1 + \vec{a}\Delta t$

$\vec{V}_2 = 0 + (0.475\ m/s^2\ [S])(1.86\ s)$

$\vec{V}_2 = 0.884\ m/s\ [S]$

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