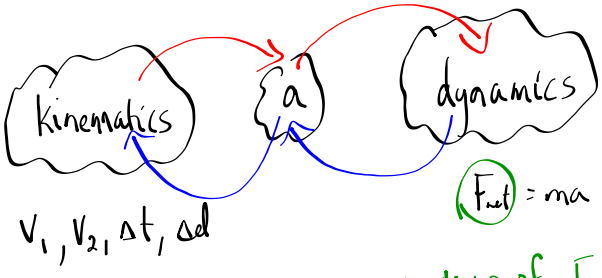
Combining Kinematics + Dynamics



made up of F_g, F_a, T, F_f etc

MP 165

$v_1 = 0$

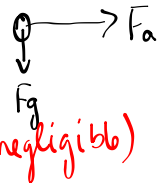
$v_2 = ?$

$\Delta d = 3.5\ mm$

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

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

Draw a FBD →



Find the acceleration

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

$F_a = ma$

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

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

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

Find the final velocity

$v_1 = 0$

$\Delta d = 3.5\ mm$

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

$v_2 = ?$

$v_2^2 = \cancel{v_1^2}^{0} + 2a\Delta d$

$v_2^2 = 2(6.4 \times 10^{15}\ m/s^2)(0.0035 m)$

$v_2 = 6.7 \times 10^{6}\ m/s$

MP|166

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

$m = 20.0\,kg$

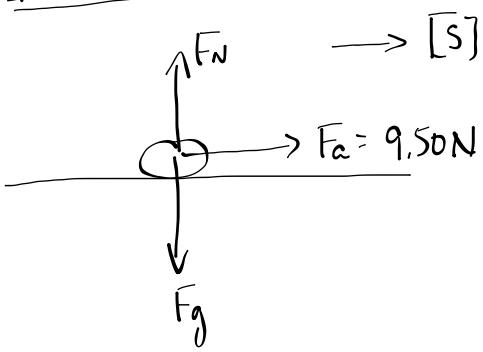
$V_1 = 0$

$\Delta t = 1.86\,s$

a) $\vec{a} = ?$

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

Draw a FBD



Find the acceleration:

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

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

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

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

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

b) find the final velocity:

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

$\vec{a} = \frac{\vec{V}_2 - \vec{V}_1}{\Delta t}$ ($\vec{V}_1 = 0$)

$\vec{V}_2 = \vec{a}\,\Delta t$

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

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

TODO: PP|168