Review of Impulse + Momentum

momentum: $\vec{p} = m\vec{v}$ (PP|197)

impulse: $\vec{J} = \vec{F}\Delta t$ (PP|200)

area under a F-t graph

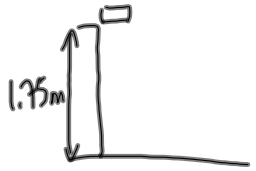
impulse-momentum theorem: (PP|203)

$\vec{J} = \Delta\vec{p}$ ← concept

$\vec{F}\Delta t = m\Delta\vec{v}$ ← practical

PP|203

35.



$m = 1.5\,kg$

① falling
② stopping

① When the book falls:

$v_1 = 0$
$v_2 = ?$
$a = -9.81\,m/s^2$
$\Delta d = -1.75\,m$

$v_2^2 = v_1^2 + 2a\Delta d$

$v_2^2 = 0^2 + 2(-9.81\,m/s^2)(-1.75\,m)$

$v_2 = \pm 5.86\,m/s$

② When the book stops:

$v_1 = -5.86\,m/s$
$v_2 = 0$
$m = 1.5\,kg$
$\vec{J} = ?$

choose: $v_2 = -5.86\,m/s$ ↑ down

According to the impulse-momentum theorem:

$\vec{J} = \Delta\vec{p}$ ($v_2 - v_1$)

$\vec{J} = m\Delta\vec{v}$ or $\vec{p}_2 - \vec{p}_1$

$\vec{J} = (1.5\,kg)(0 - (-5.86\,m/s))$ ($v_2 - v_1$)

$\vec{J} = +8.8\,kg\cdot m/s$ or $N\cdot s$

$\vec{J} = 8.8\,kg\cdot m/s\ [UP]$