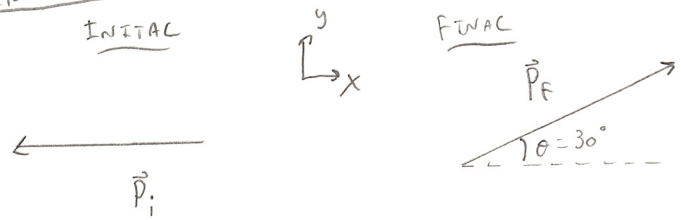
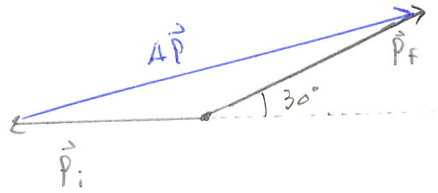
MOMENTUM: IMPULSE – FUNDAMENTAL EXAMPLE SOLUTIONS

① VECTOR OP.



$\Delta\vec{P} = \vec{P}_f - \vec{P}_i$



MATH

INITAL

$\vec{P}_i = \langle -45, 0 \rangle$ kgm/s

FINAL 47.6 27.5

$\vec{P}_f = \langle 55\cos(30), 55\sin(30) \rangle$ kgm/s

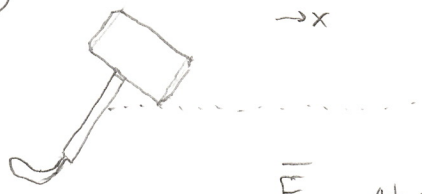
$\Delta\vec{P} = \langle P_{fx} - P_{ix}, P_{fy} - P_{iy} \rangle$

$P_{fx} - P_{ix} = 47.6 - (-45) = 92.6$ kgm/s

$P_{fy} - P_{iy} = 27.5 - 0 = 27.5$ kgm/s

$\Delta\vec{P} = \langle 92.6, 27.5 \rangle$ kgm/s

②



$\bar{F}_{NET,x}\,\Delta t = \Delta P_x$

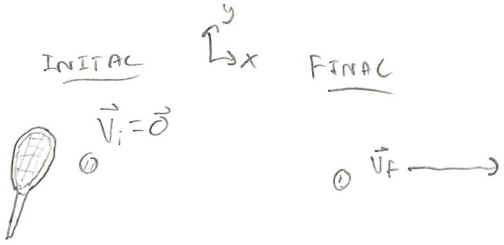
$\bar{F}_{NET,x} = \dfrac{P_{fx}^{\,0} - P_{ix}}{\Delta t}$

$\bar{F}_{NET,x} = \dfrac{-mV_{ix}}{\Delta t}$

$\bar{F}_{NET,x} = \dfrac{-(32)(61)}{(0.5\times10^{-3})} \approx -3.9\times10^{6}$ N

"HOW LARGE" → MAGNITUDE ... ANS: 3.9×10^{6} N

③



IMPULSE $\equiv \vec{J} = m\,\Delta\vec{V}$

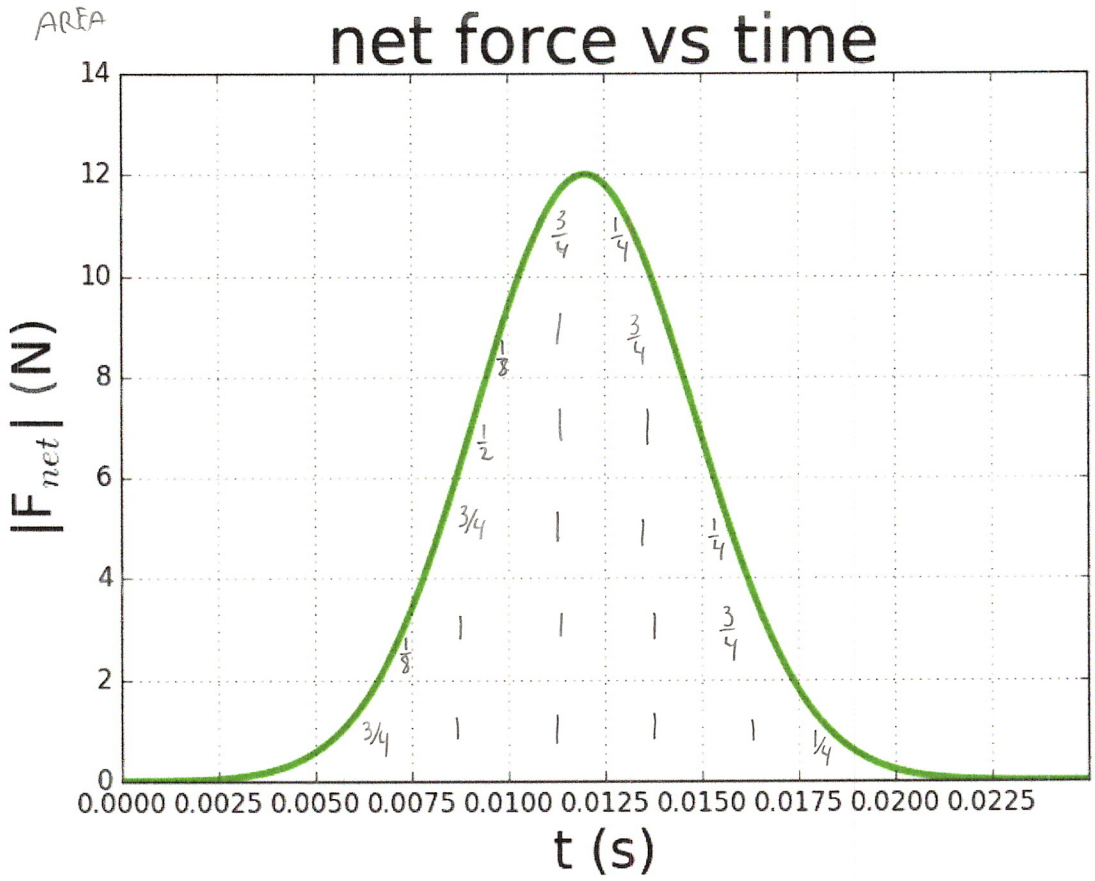
$\vec{J} = m(\vec{V}_f - \vec{V}_i^{\,0})$

$\vec{J} = m\vec{V}_f$

$\vec{J} = 58\langle 73.18, 0 \rangle$

$\vec{J} \approx \langle 4244, 0 \rangle$ N·S

4) $\overbrace{F_{NET,x}}^{\text{AREA}}\,\Delta t = m\Delta v_x$



IN BOX = FRACTION OF BOX ENCLOSED BY GRAPH.

AREA OF ONE BOX .... HEIGHT = 2N
WIDTH = 0.0025 SECONDS
} AREA = (2)(0.0025)
AREA = 0.005 Ns

APPROX TOTAL # BOXES ENCLOSED BY GRAPH = 17.25

APPROX AREA $\approx$ $17.25(0.005) \approx 0.08625$

$0.08625 = m\Delta v_x$

$0.08625 = m(v_{f_x} - v_{i_x})$

$0.08625 = 3(v_{f_x} - v_{i_x})$

$v_{f_x} - v_{i_x} = 0.02875$

$v_{f_x} = 0.02875 + v_{i_x}$

↑ NEED TO KNOW v_{ix} !!!