Momentum 2

① a) impulse = $F\Delta t$

$= (25)(3.2) = \boxed{80\ N\cdot s\ [E]}$

b) impulse = $F\Delta t$

$= (120)(0.05) = \boxed{6\ N\cdot s\ [forward]}$

c) $F_g = mg = (12)(9.8) = 117.6\ N$

impulse = $F\Delta t$

$= (117.6)(3) = \boxed{352.8\ N\ [down]}$

d) impulse = area

$= \frac{1}{2}bh = \frac{1}{2}(0.5)(4) = \boxed{1\ N\cdot s}$

e) impulse = area (estimated)

$= \frac{1}{2}(0.05)(1) + (0.05)(1) + \frac{1}{2}(0.05)(2) + (0.05)(3)$

$+ \frac{1}{2}(0.05)(3) + (0.05)(6) + \frac{1}{2}(0.05)(2) + (0.05)(8)$

$+ \frac{1}{2}(0.05)(1) + (0.05)(9) + \frac{1}{2}(0.05)(1)$

$= \boxed{1.6\ N\cdot s}$

② a) $\Delta p = m\Delta v$

$= (0.4)(-2-2)$

$= -0.8$ kg·m/s

$=$ **0.8 kg·m/s [left]**

b) impulse $= \Delta p =$ **0.8 N·s [left]**

③ c) $\Delta p = m\Delta v$

$= (0.2)(10-18)$

$= -1.6$

$\Delta p =$ **1.6 kg·m/s [backward]**

b) impulse $= \Delta p =$ **1.6 N·s [backward]**

c) impulse $= F\Delta t$

$-1.6 = F(2.5)$

$F = -0.64$ N or **0.64 N [backward]**

④ $F\Delta t = m\Delta v$

$(-1.4)(1.5) = (0.5)(v_f - 2.4)$

$-2.1 = 0.5v_f - 1.2$

$-0.9 = 0.5v_f$

$v_f = -1.8$ m/s or **1.8 m/s [backward]**

⑤ $F\Delta t = m\Delta v$

$(6)(0.5) = 2(4.5 - v_i)$

$3 = 9 - 2v_i$

$2v_i = 6$

$v_i = 3$ m/s or **3 m/s [forward]**

⑥ impulse $= \Delta p$

$= m\Delta v$

$8.83 = 0.44(v_f - 0)$

$0.44v_f = 8.83$

$v_f =$ **20.1 m/s**

⑦ impulse $= F\Delta t$

$5 = F(1.2)$

$F =$ **4.17 N**

⑧ a) $a = \frac{\Delta v}{\Delta t} = \frac{0 - 35.2}{0.163} =$ **-215.95 m/s^2**

b) $F = ma = (0.145)(215.95) =$ **31.3 N**

force on the mitt is positive b/c the ball hits it moving forward. Force on the ball would be negative.

⑨ a) $Ft = m\Delta v$

$F(0.097) = 0.445(13.7 - 0)$

$F = \boxed{63\ N}$

b) $\boxed{-63\ N}$ (equal but opposite)

⑩ $Ft = m\Delta v$

$F(0.0021) = (3.14)[(-34) - (28)]$

$F(0.0021) = -8.68$

$F = \boxed{-4133.3\ N}$