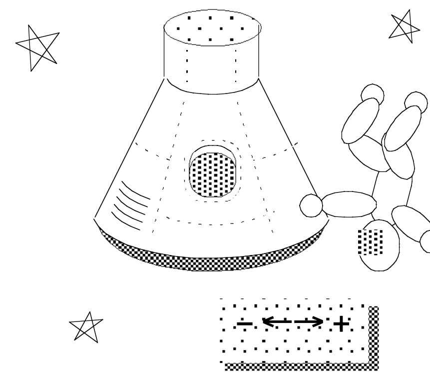
PhyzJob:
The Newton III E.V.A. Adventure

FELIX

1. The astronaut exerts a force with a **magnitude** of 100 N on the capsule for 2.0 s. The mass of the capsule is 2000 kg and the mass of the fully equipped astronaut is 125 kg. (Include **signs** to indicate direction in answers below.)



a. What is the magnitude (how many newtons) and direction (+/–) of the force acting on the capsule?

$F_{ac} = -100$ N

b. What is the resulting acceleration of the capsule?

$a_c = F_{ac}/m_c = -100\text{ N} / 2000\text{ kg} = -0.05\text{ m/s}^2$

c. What is the final velocity of the capsule?

$a_c = v_c/ t \quad v_c = a_c \; t = -0.05\text{ m/s}^2 \cdot 2.0\text{ s} = -0.10\text{ m/s}$

d. What is the force acting on the astronaut?

$F_{ca} = +100$ N

e. What is the acceleration of the astronaut?

$a_a = F_{ca}/m_a = 100\text{ N} / 125\text{ kg} = 0.8\text{ m/s}^2$

f. What is the final velocity of the astronaut?

$v_a = a_a \cdot t = 0.8\text{ m/s}^2 \cdot 2.0\text{ s} = 1.6\text{ m/s}$

gee. Multiply the mass of the capsule by its final velocity and multiply the mass of the astronaut by its final velocity (don't forget the signs). Ponder the result (write something about it).

capsule: $m_c\mathbf{v}_c$ = $2000\text{ kg} \cdot -0.10\text{ m/s} = -200\text{ kgm/s}$

astronaut: $m_a\mathbf{v}_a$ = $125\text{ kg} \cdot 1.6\text{ m/s} = 200\text{ kgm/s}$

2. Circle the correct answer to the right.

a. Which object was acted on by a greater magnitude of force?	*Astronaut*	*Capsule*	*(Same for both)* circled
b. Which object has the greater mass?	*Astronaut*	*(Capsule)* circled	*Same for both*
c. Which object underwent the greater acceleration?	*(Astronaut)* circled	*Capsule*	*Same for both*
d. Which object attained the greater final speed?	*(Astronaut)* circled	*Capsule*	*Same for both*
e. Which object attained the greater magnitude $m\mathbf{v}$ value?	*Astronaut*	*Capsule*	*(Same for both)* circled

1a. -100 N b. -0.05 m/s² c. -0.10 m/s gee. cap = -200 kg·m/s (and no, "gee" is not a brownie point!)