Line Change Momentum Question

1. If you jumped off the bench during a line change, as your skates hit the floor you let your legs bend at the knees. Explain why?

By bending you knees, you lengthen the time over which you are stopping. Since $\Delta p = F\Delta t$, a longer Δt means less force is required, so it won't hurt as much.

Puck vs Goalie Momentum Question

1. A 0.105 kg hockey puck moving at 48 m/s is caught by a 75 kg goalie at rest.

a) With what speed does the goalie slide along the ice?

b) If the coefficient of friction between the goalie and the ice is 0.25, how far does the goalie slide before she stops?

a) Using Conservation of Momentum:

$m_p = 0.105$ kg

$v_p = 48$ m/s

$m_t = 75$ kg + 0.105kg = 75.105 kg

$v_t' = ???$

$p_i = p_f$

$p_p = p_t'$ (where ' means after the collision)

$m_p v_p = m_t v_t'$

$0.105\ (48) = 75.105\ v_t'$

$v_t' = 0.067$ m/s

b)

$ma = -f_f$

$ma = -\mu F_N$

$ma = -\mu mg$

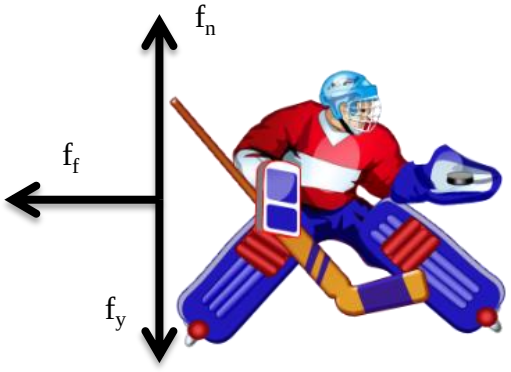
$a = -0.25\ (9.8)$

$a = -2.45\ m/s^2$

$d = \frac{v_f^2 - v_i^2}{2a}$

$d = \frac{0 - (0.067)^2}{2(-2.45)}$

$d = 0.0092$ m



Puck vs. Goalie Glove Momentum Question

1. A 35.0 g puck strikes a 5.0 kg stationary goalie glove and embeds itself in the gloves mitt. The glove and the puck fly together at 8.6 m/s. What was the original velocity of the puck?

m_1= 0.0.35 kg
v_1=??
m_2= 5.00 kg + 0.035kg = 5.035 kg (puck and glove weight)
v_2'= 8.6 m/s

$P_i = P_f$

$P_i = P_t$'

$m_1 v_1 = m_2 v_2$'

$0.035\ v_1 = 5.035\ (8.6)$

Puck vs. Practice Puck Momentum Question

1. A 0.50 kg puck traveling at 6.0 m/s collides head on with a 1.00 kg practice puck moving in the opposite direction at a velocity of -12.0 m/s. The 0.50 kg puck moves away at -14.0 m/s after the collision. Find the velocity of the practice puck?

m_1= 0.0.35 kg
v_1=??
m_2= 5.00 kg + 0.035kg = 5.035 kg (puck and glove weight)
v_2'= 8.6 m/s

$P_i = P_f$

$P_i = P_t$'

$m_1 v_1 = m_2 v_2$'

$0.035\ v_1 = 5.035\ (8.6)$

Skater Question
Energy

1.

a) 40 kg skater travelling at 4 m/s overtakes a 60 kg skater travelling at 2 m/s in the same direction and collides with her. If the two skaters remain in contact, how much kinetic energy is lost?

b) Assume now that the two skaters are travelling in opposite directions when they collide. If they still remain in contact after the collision, how much kinetic energy is lost?

a) m_1*=40 kg*
v_1*= 4 m/s*
m_2*= 60 kg*
v_2*= 2 m/s*
mt= 100 kg
vt'= ??

$p_i = p_t$
$m_1v_1 + m_2v_2 = m_tv_t'$
40 (4) + 60(2) = 100 v_t'
v_t' *= 2.8 m/sE*

$E_i = ½\ m_1v_1^2 + ½\ m_2v_2^2$
$E_i = ½\ (40)(4)^2 + ½\ (60)(2)^2$
E_i *= 440 J*

$E_f = ½\ m_tv_t'^2$
$E_f = ½\ (100)(2.8)^2$
E_f *= 392 J*

$\Delta E = E_f - E_i$
ΔE = 392- 440
ΔE = -48 J

b) $p_i = p_t$
$m_1v_1 + m_2v_2 = m_tv_t'$
40(4) + 60(-2) = 100 v_t'
v_t' *= 0.40 m/s*

$E_f = ½\ m_tv_t'^2$
$E_f = ½\ (100)(0.40)^2$
E_i *= 440 J* E_f *= 8 J*

$\Delta E = E_f - E_i$
ΔE = 8 - 440
ΔE = -432 J