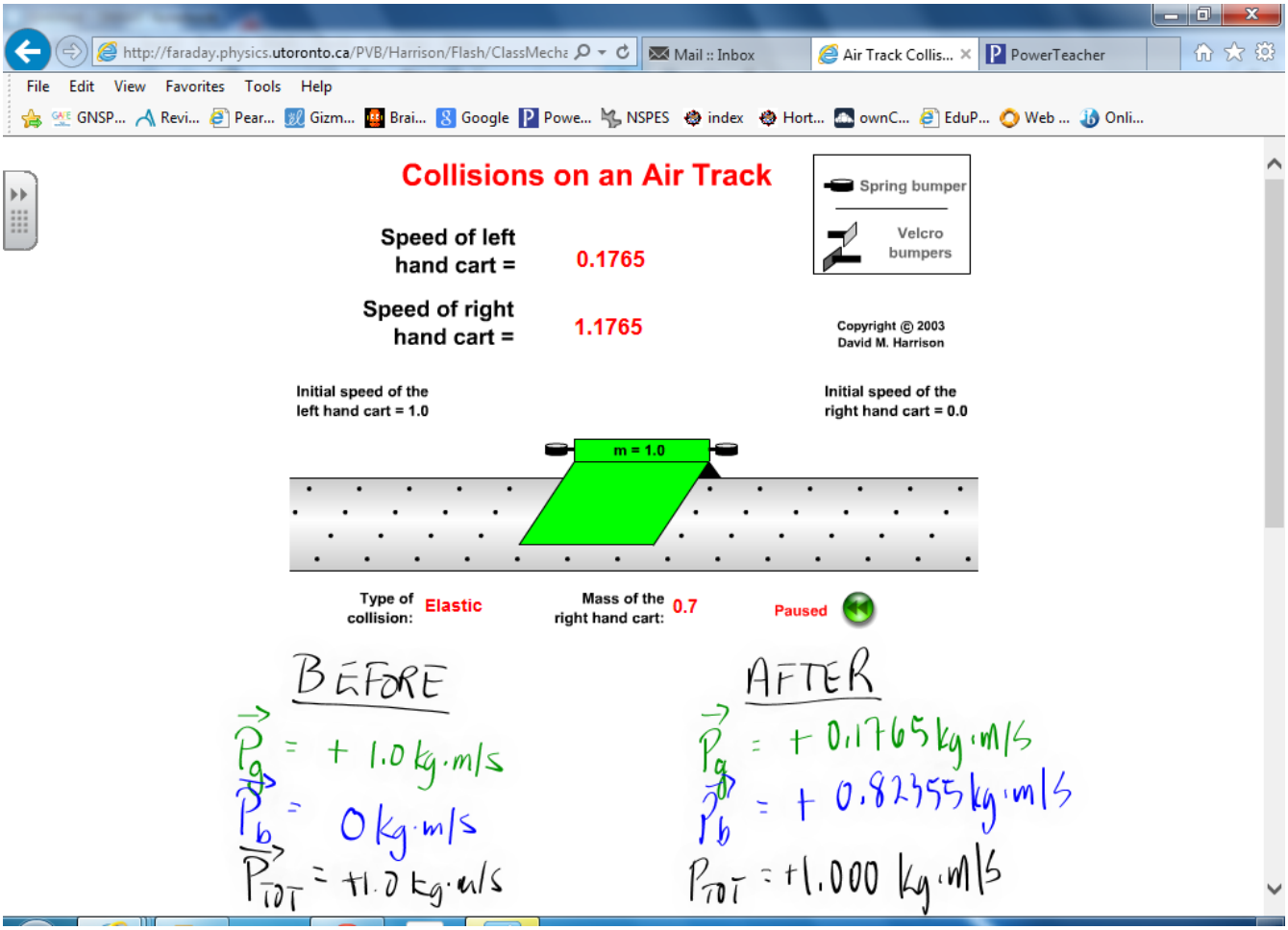
http://faraday.physics.utoronto.ca/PVB/Harrison/Flash/ClassMecha
Mail :: Inbox
Air Track Collis...
PowerTeacher
File Edit View Favorites Tools Help
Collisions on an Air Track
Spring bumper
Velcro bumpers
Speed of left hand cart = 0.1765
Speed of right hand cart = 1.1765
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Initial speed of the left hand cart = 1.0
Initial speed of the right hand cart = 0.0
m = 1.0
Type of collision: Elastic
Mass of the right hand cart: 0.7
Paused
BEFORE
$\vec{p}_a = +1.0\ kg\cdot m/s$
$\vec{p}_b = 0\ kg\cdot m/s$
$\vec{p}_{TOT} = +1.0\ kg\cdot m/s$
AFTER
$\vec{p}_a = +0.1765\ kg\cdot m/s$
$\vec{p}_b = +0.82355\ kg\cdot m/s$
$p_{TOT} = +1.000\ kg\cdot m/s$

§7-3 Conservation of Momentum

Recall Newton's 3rd Law: $\vec{F}_A = -\vec{F}_B$

$\vec{F}_A \Delta t = -\vec{F}_B \Delta t$

$\Delta \vec{p}_A = -\Delta \vec{p}_B$ ← in terms of change in momentum

$\vec{p}_A' - \vec{p}_A = -(\vec{p}_B' - \vec{p}_B)$

$\vec{p}_A' - p_A = -\vec{p}_B' + \vec{p}_B$

$\vec{p}_A' + \vec{p}_B' = \vec{p}_A + \vec{p}_B$

Law of Conservation of Momentum

$\vec{p}_{TOTAL} = \vec{p}_{TOTAL}'$

- In an isolated system (i.e. no friction) the total momentum before a collision is equal to the total momentum after.

* Remember that momentum is a vector quantity and direction matters!!

MP/313

+east

	BEFORE		AFTER
	CAR 1	CAR 2	CAR (1+2)
m	1.75×10^4 kg	2.00×10^4 kg	3.75×10^4 kg
v	+5.45 m/s	0	v
p	+95375 kg·m/s	0	$(3.75\times10^4\text{ kg})v$

$p = mv$

$\vec{P}_{TOTAL}$ $\vec{P}'_{TOTAL}$

$$\vec{P}_{TOTAL} = \vec{P}'_{TOTAL}$$

$$95375\text{ kg}\cdot\text{m/s} + 0 = (3.75\times10^4\text{ kg})v$$

$$95375\text{ kg}\cdot\text{m/s} = (3.75\times10^4\text{ kg})v$$

$$v = +2.54\text{ m/s}$$

$$\vec{v} = 2.54\text{ m/s [E]}$$

mp|316

+ forward

	BEFORE	AFTER	
	your canoe	you	canoe
m	180kg	65kg	115 kg
v	0	+0.75m/s	v
p	0	+48.75 kg·m/s	(115kg) v

$\vec{P}_{TOTAL}$ $\vec{P}'_{TOTAL}$

$$\vec{P}_{TOTAL} = \vec{P}'_{TOTAL}$$

$$0 = 48.75\ kg\cdot m/s + (115kg)v$$

$$-48.75\ kg\cdot m/s = (115kg)v$$

$$v = \frac{-48.75\ kg\cdot m/s}{115kg}$$

$$v = -0.424\ m/s$$

$$\vec{v} = 0.424\ m/s\ [backwards]$$

TO DO

① PP|315

② PP|317