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Impulse & Momentum Worksheet I

| Contributed by Jane Bray Nelson | | | | | | | |
|--|--|--|----------------------------------|--|--|--|--|
| Type and Sample | Equation | Diagram and Values | Graph and Values | | | | |
| Impulse | $F\Delta t = m\Delta v$ | | A zero A Before After | | | | |
| 1) A 5.0 N force is applied on an 8.0 kg cart at rest. The carts ends up going 0.25 m/s. How long was the force applied? | | | | | | | |
| 2) A force applied to a 2.0 kg cart traveling at 3.0 m/s for 0.02s causes it to stop. How big was the force? | | | | | | | |
| Momentum | $\begin{split} m_{1i}v_{1i} + m_{2i}v_{2i} &= m_{1f}v_{1f} + m_{2f}v_{2f} \\ Before & After \end{split}$ | $ \begin{array}{c c} \hline 1 \\ \hline 2 \\ \hline 0 \\ \hline 0 \\ \hline \end{array} \end{array} \right) = \begin{array}{c c} 1 \\ \hline 2 \\ \hline 0 \\ \hline 0 \\ \hline \end{array} \\ \hline \end{array} \\ \begin{array}{c c} \hline 2 \\ \hline \end{array} \\ \hline \end{array} \\ \begin{array}{c c} \hline 1 \\ \hline 2 \\ \hline \end{array} \\ \hline \end{array} \\ \begin{array}{c c} \hline 2 \\ \hline \end{array} \\ \hline \end{array} \\ \begin{array}{c c} \hline \end{array} \\ \hline \end{array} \\ \end{array} \\ \begin{array}{c c} \hline \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c c} \hline \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c c} \hline \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c c} \hline \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c c} \hline \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c c} \hline \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c c} \hline \end{array} \\ \begin{array}{c c} \hline \end{array} \\ \end{array}$ | P 1 2 zero $1+2$ Before After | | | | |
| 3) A 3.0 kg cart moving at 8.0 m/s rams into a 2.0 kg cart setting still. They move off together. What is their speed now? | | | | | | | |
| 4) A cart with a mass of 1.5 kg going 3.0 m/s to the right hits a cart going 3.0 m/s to the left. The second cart has a mass of 8.0 kg. It continues left at 2.0 m/s. What is the new velocity of the first cart? | | | | | | | |

| Type and Sample | Equation | Diagram and Values | Graph and Values | |
|---|---|---|---|--|
| Impulse | $F\Delta t = m\Delta v$ | $ \begin{array}{c} \text{Impulse} \\ \hline \\ \hline$ | A zero A Before / After | |
| 1) A 5.0 N force is applied on an 8.0 kg cart at rest. The carts ends up going 0.25 m/s. How long was the force applied? | $\frac{F\Delta t = m\Delta v}{5.0 N * \Delta t = 8.0 kg * (0.25m/s)}$ $\frac{-0 m/s}{\Delta t = 0.4 s}$ | $ \begin{array}{c} \text{Impuls}\\ \hline A\\ \hline \\ \hline $ | A zero A Before (After | |
| 2) A force applied to a 2.0 kg cart traveling at 3.0 m/s for 0.02s causes it to stop. How big was the force? | $\frac{F\Delta t = m\Delta v}{F * 0.02 \ s} = 2.0 \ kg * (0 \ m/s)$ $\frac{-3.0 \ m/s)}{F = -1.5N}$ | A A A A A A A A A A A A A A A A A A A | Impulse A zero A A fter | |
| Momentum | $\begin{array}{c} m_{1i}v_{1i} + m_{2i}v_{2i} = m_{1f}v_{1f} + m_{2f}v_{2f} \\ Before & After \end{array}$ | $ \begin{array}{c} \hline 1 \\ \hline 2 \\ \hline 0 $ | P 1 2 zero 1+2 Before After | |
| 3) A 3.0 kg cart moving at 8.0 m/s rams into a 2.0 kg cart setting still. They move off together. What is their speed now? | $ \begin{array}{l} m_{1i}v_{1i}+m_{2i}v_{2i}=m_{1f}v_{1f}+m_{2f}v_{2f}\\ 3.0kg * 8.0\ m/s+2.0\ kg * 0\\ m/s=3.0kg * X\ m/s+2.0\ kg\\ *\ X\ m/s\\ X=4.8\ m/s \end{array} $ | $ \left\{ \begin{array}{c} 1 \\ \hline 1 \\ \hline 2 \\ \hline 0 \\ \hline 0$ | $P \qquad 1 \qquad 2 \text{ zero} \qquad 1 + 2 \\ Before \qquad After $ | |
| 4) A cart with a mass of 1.5 kg going 3.0 m/s to the right hits a cart going 3.0 m/s to the left. The second cart has a mass of 8.0 kg. It continues left at 2.0 m/s. What is the new velocity of the first cart? | $m_{1i}v_{1i} + m_{2i}v_{2i} = m_{1f}v_{1f} + m_{2f}v_{2f}$ 1.5 kg * 3.0 m/s + 8.0 kg * -3.0 m/s = 1.5 kg * X m/s + 8.0 kg * - 2.0 m/s X = - 2.3 m/s | $\begin{bmatrix} 1 & 2 \\ \hline 1 & 2 \\ \hline 0 & 0 \\ \hline Before \\ \end{bmatrix} \begin{bmatrix} 1 & 2 \\ \hline 0 & 0 \\ \hline$ | P Before After $1 + 2$ $1 + 2$ | |

MOMENTUM WORKSHEET I (TEACHER NOTES)