**Work-Energy and Momentum**

**Name and section number:**

**Partner’s name and section number:**

1. Sketch free-body diagrams of a cart moving at constant velocity, a cart at rest, and two carts colliding. Label the forces. You may enlarge the drawing canvas and move captions.

A cart at constant velocity, a cart at rest

The two carts colliding

2. Write the work-energy theorem and conservation of momentum in words and equations.

3. Paste your two graphs into the box below, with data and data boxes legible.

 a) b)

4. Enter your raw data into the yellow boxes and your calculated data in the green boxes. Enter the units in the square brackets. All data in the table should have at least four significant figures.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| mA= | [] | mB=  | [] | Collision: |   |
| x-Velocity [] | Kinetic energy [] | x-Momentum [] |
| vAi = |  | kAi = |  | ΔkA = |   | pAi = |   | ΔpA =  |   |
| vAf = |   | kAf = |   | ΔkB = |   | pAf = |   | ΔpB = |   |
| vBi = |   | kBi = |   | Ki = |   | pBi = |   | Pi = |   |
| vBf = |   | kBf = |   | Kf = |   | pBf = |  | Pf = |   |
|  |  |  |  | ΔK = |  |  |  | ΔP = |   |
|  |  |  |  | ΔK/Ki = |  |  |  | ΔP/Pi =  |  |
|  |  |  |  |  |  |  |  |  |  |
| mA= | [] | mB=  | [] | Collision: |   |
| x-Velocity [] | Kinetic energy [] | x-Momentum [] |
| vAi = |   | kAi = |   | ΔkA = |   | pAi = |   | ΔpA =  |   |
| vAf = |   | kAf = |   | ΔkB = |   | pAf = |   | ΔpB = |   |
| vBi = |   | kBi = |   | Ki = |   | pBi = |   | Pi = |   |
| vBf = |   | kBf = |   | Kf = |   | pBf = |   | Pf = |   |
|  |  |  |  | ΔK = |   |  |  | ΔP = |   |
|  |  |  |  | ΔK/Ki = |   |  |  | ΔP/Pi =  |   |

5. *In your own words*, state which data pair in the tables should be equal and opposite. Is your statement consistent with your free-body diagrams of the collision? Should it be?

6. *In your own words*, discuss why the ΔK/Ki values are very different for the two experiments, yet the ΔP/Pi values remain approximately the same. Where does the “lost” energy go? How does work get done on the carts?