Physics 2A
Conservation of Momentum
Instructor: Eyal Goldmann

Step 1 – Diagrams:
(a) Draw diagrams illustrating the situations of interest. Label the situations as “initial” and “final.”
(b) Introduce a coordinate axis.

Step 2 – Apply conservation of momentum
Write down expressions for \( p_{\text{total},i} \) and \( p_{\text{total},f} \).

Step 3 – Apply conservation of momentum:
On your paper, write down the equation for conservation of momentum, i.e.

\[ p_{\text{total},i} = p_{\text{total},f} \]

and plug in your expressions from Step 2. Get cracking with the algebra.

Note:
Often problems which involve conservation of momentum also require you to use the energy for conservation of mechanical energy, or the equation for conservation of energy. It is important to know when each of these equations apply. Use the table below as a guide.

| Conservation of Mechanical Energy | \( U_{gi} + U_{si} + K_i = U_{gf} + U_{sf} + K_f \) | True when only conservative forces act on the system. |
| Conservation of Energy | \( \Delta K + \Delta U_g + \Delta U_s = W_{nc} \) | Always true, but usually useless without detailed knowledge of all nonconservative forces |
| Conservation of Momentum | \( p_{\text{total},i} = p_{\text{total},f} \) | True only when no outside forces act on the system of interest |