

Steps for applying the impulse-momentum theorem

- Step 1: Draw good pictures of each important *instant* of time. Label them with all known and unknown speeds, positions, angles, masses, etc.
- Step 2: Choose a specific object or objects (“the system”) whose momentum you will analyze.
- Step 3: Choose a specific interval (with starting and ending points represented by two of your sketches) over which you intend to apply the impulse-momentum theorem.
- Step 4: Determine the forces acting on the chosen system during the chosen interval of time. You may need to perform an auxiliary Newton’s Second law analysis to help out here.
- Step 5: Write the impulse-momentum theorem. **Impulse = \mathbf{p}**
- Step 6: Write the corresponding component equations.
- Step 7: Work on the left hand sides (lhs) of the equations by determining the components of the impulse during the chosen interval (in terms of forces, distances, angles, etc.) and use auxiliary information to simplify the lhs as much as possible.
- Step 8: Work on the right hand sides (rhs) of the equations by obtaining expressions for the momentum components of the chosen system at the beginning and end of the chosen interval (in terms of speeds, positions, masses, etc.) and use auxiliary information to simplify the lhs as much as possible.
- Step 9: Examine your resulting equations to see what you know and what you don't know and figure out where to go from here.