## Newton's Laws of Motion

1. (Inertia) If the net force acting on an object is zero, the object will have a constant velocity (which could be zero).
2. (F = ma) If the net force acting on an objectis not zero, the object will accelerate in the direction of the net force. The acceleration will be directly proportional to the magnitude of the net force and inversely proportional to the mass of the object.
3. (Action and Reaction) For every action force on an object, there is an equal and opposite reaction force on another object.

To solve problems using Newton's Laws of Motion:

1. Read the question carefully and identify all the given force vectors, accelerations and other motions of the objects. Use subcripts to distinguish between different types of force, different directions and different objects.
2. Draw Free Body Diagrams (FBD) of the object or objects and label all the forces.
3. Choose a coordinate system that makes sense for the problem. Try to choose a coordinate system so that one of the axes is in the direction of the net force = direction of acceleration.
4. Draw force vector components in the direction of the coordinate axes on the FBD.
5. Calculate the magnitudes of all the force vector components, and motion vector components.
6. Add up the forces (net force) in each coordinate direction (be careful of positive and negative values for forces in same and opposite direction).
7. Use Newton's third law on pairs of objects that have forces between them. Use Newton's second law, F = ma for the net force and acceleration along each coordinate direction. If the net force in any coordinate direction is zero, then the acceleration in that direction will also be zero.