

You should be able to do the following:

1. Write the action functional for simple physical systems involving masses, pendula, balls, inclines, hoops, etc.
2. Vary any (reasonable) action to find the equations of motion.
3. Use Lagrange multipliers to include constraints, and use them to find forces of constraint.
4. Apply Noether's theorem to find constants of the motion from the action or Lagrangian.
5. Use Cartesian, polar, or spherical coordinate systems, or choose coordinates adapted to a particular (simple) problem.
6. Solve the equations of motion for simple systems.
7. Correctly use index notation and the Einstein convention to manipulate vectors and matrices.