CHAPTER OVERVIEW

13: Lagrangian Mechanics

Sometimes it is not all that easy to find the equations of motion and there is an alternative approach known as **lagrangian mechanics** which enables us to find the equations of motion when the newtonian method is proving difficult. In lagrangian mechanics we start, as usual, by drawing a large, clear diagram of the system, using a ruler and a compass. But, rather than drawing the forces and accelerations with red and green arrows, we draw the *velocity* vectors (including angular velocities) with blue arrows, and, from these we write down the *kinetic energy* of the system. If the forces are *conservative* forces (gravity, springs and stretched strings), we write down also the *potential energy*. That done, the next step is to write down the *lagrangian equations of motion* for each coordinate. These equations involve the kinetic and potential energies, and are a little bit more involved than $F = ma$, though they do arrive at the same results.