

63.1: Review of Newtonian Mechanics

We begin by reviewing Newtonian classical mechanics in one dimension. In this formulation, we begin by writing Newton's second law, which gives the force F required to give an acceleration a to a mass m :

$$F = ma. \quad (63.1.1)$$

Generally the force is a function of x . Since the acceleration $a = d^2x/dt^2$, Eq. 63.1.1 may be written

$$F(x) = m \frac{d^2x}{dt^2} \quad (63.1.2)$$

This is a second-order ordinary differential equation, which we solve for $x(t)$ to find the position x at any time t . Solving a problem in Newtonian mechanics then consists of these steps:

- Write down Newton's second law (Eq. 63.1.2);
- Substitute for $F(x)$ the specific force present in the problem;
- Solve the resulting differential equation for $x(t)$.

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