24.1: Introduction to Work

If a force is applied to an object over some distance, the force is said to have done work on the object. The work done is equal to the product of the force and the distance through which the force acts.

Work is measured in SI units in joules (J), named for the English physicist James Joule:

$$1\ \mathrm{J} = 1\mathrm{Nm} = 1\frac{\mathrm{kgm}^2}{\mathrm{s}^2} \tag{24.1.1}$$

In CGS units, work is measured in ergs:

$$1\ \mathrm{erg}\ = 1\ \mathrm{dyne\ cm} = 1\frac{\mathrm{gcm}^2}{\mathrm{s}^2} \tag{24.1.2}$$

The British engineering system does not have any special name for work; it is simply measured in foot-pounds (ft-lbf).

Although work is always the product of force and distance, there are simpler expressions if the force is constant or in the direction of motion. We'll look at these special cases before examining the general case.