**Force, displacement, velocity, and acceleration for an oscillator**

A screenshot of a cell phone

Description automatically generatedSimple harmonic motion is governed by a restorative force. For a spring-mass system, such as a block attached to a spring, the spring force is responsible for the oscillation (see Figure 1).

Figure 1: This image shows a spring-mass system oscillating through one cycle about a central equilibrium position. The vectors of force, acceleration, and displacement from equilibrium are given at each for the five positions shown.

Since the restoring force is proportional to displacement from equilibrium, both the magnitude of the restoring force and the acceleration is the greatest at the maximum points of displacement. The negative sign tells us that the force and acceleration are in the opposite direction from displacement.