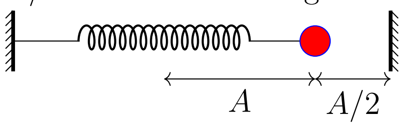
1. Show that multiplication of any complex number z by $e^{i\theta}$ is describable, in geometric terms, as a positive rotation through the angle θ of the vector by which z is represented, without any alteration of its length.

2. Consider a spring-mass oscillator of time period T as shown in the figure below. There is a wall $A/2$ distance to the right from the equilibrium position of the oscillator.



   The oscillator is given an initial displacement A towards the left and released from the rest. Considering all collisions to be elastic, what is the time period of the oscillator?

3. For an oscillator we found $\omega = \pm\omega_\circ$. If it started with $x(0) = A$ and $\dot{x}(0) = \frac{\omega_\circ A}{2}$ then find $x(t)$.

4. A mass at the end of a spring oscillates with an amplitude of 5 cm at a frequency of 1 Hz. At $t = 0$ the mass is at its equilibrium position ($x = 0$).
   (a) Find the possible equations describing the position of the mass as a function of time, in the form $x = A\cos(\omega t + \alpha)$, giving the numerical values of A, ω, and α.
   (b) What are the values of x, $\dfrac{dx}{dt}$, and $\dfrac{d^2x}{dt^2}$ at $t = \dfrac{8}{3}$ s?