6. (4+4+4 points) Harry Potter, Ron, and Hermione decide to attend the Wizard Fair. The newest ride at the fair, called **The Coil of Doom**$^{\text{TM}}$, is a spin-off on bungee jumping. Riders are attached to a special bungee cord which oscillates up and down. The riders' position above the ground, in feet, is given as a function of time, t, in seconds, by $y = y_0 cos(\omega t) + C$, with y_0, ω, and C constants.

(a) The riders board from a platform 15 feet above the ground, are pulled upward until, 6 seconds later, they reach a maximum height of 165 feet. In another 6 seconds, riders are back at the initial position. The cycle repeats for one minute, at which point the ride ends. Using this information, determine an explicit formula for y. [Show all constants in *exact* form.]

(b) Find formulas for the velocity and acceleration of the riders as a function of t.

(c) Show that the function y satisfies the equation $\frac{d^2y}{dt^2} + \omega^2 y = K$, where K is a constant. What is the value of K?