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Understanding Introductory Physics Concepts with Computational Essays[1] ANDREA HOUCK, Lawrence Technological University — Computational essays utilize a combination of text, input code, and computer output to communicate complex concepts. Due to their interactive nature, computational essays are ideal for investigating, describing, and demonstrating ideas in introductory physics. We use Mathematica as our computational platform to demonstrate concepts such as simple harmonic motion and refraction of light. In this presentation, I will demonstrate how we create and animate a visual representation of a horizontal mass and spring system on a frictionless surface to help visualize a simple harmonic motion. We then plot the position, velocity, and acceleration of the block as functions of time to communicate the physics concepts. In another computational essay, we determine the optical path of light rays through two or three media to visualize the apparent position of a fish in a pond or a tank. This essay helps us understand the ideas behind refraction of light. I will discuss how computational essays further allow us to test the limits of each problem and approach problems too difficult or time consuming to solve by hand.

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