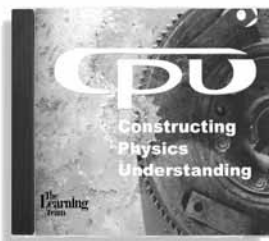


Enhancing the *Active Physics* Communication Unit with CPU Simulators



Constructing Physics Understanding (*CPU*) simulators are a rich resource, which allow teachers and students to explore fundamental physics concepts quickly and safely. Because images used in the *CPU* simulators look like the objects students use in the *Active Physics* units, the transition from hands-on activities to the simulations and back is fairly smooth. *CPU* simulations can be used to introduce topics, deepen understanding of topics covered, or extend studies to related areas. The usage notes correlating *CPU* simulator activities to the *Active Physics* unit should be considered

carefully before classroom use to assist in planning computer access time and to provide a proper transition between the two.

CPU simulation activities have been written to: introduce sections where student prior experience may not allow them to make predictions called for in the *Active Physics* unit; supplement sections where visual reinforcement of concepts will enhance their level of understanding; and provide applications for concepts the unit has developed.

Materials in the *CPU* simulators have been designed to represent real objects. Bulbs and fuses can be burned out, batteries run down and shadows of extended objects have both penumbra and umbra. Once students are familiar with the *CPU* simulators, they can use them to investigate their own “what if” questions, allowing them to safely, quickly and cheaply extend the investigations initiated in *Active Physics*.

The Designed Simulations are setups for the *CPU* simulations that have been created to match the *Active Physics* units. Teachers who wish to design their own simulations or have capable students do so can use the *CPU* simulations palette to build custom simulations. Instructions on building and saving your own custom simulations can be found on the *CPU* simulation disk in the Tutorials folder. This is a comprehensive tutorial that allows the learner to read the instructions and perform the suggested actions on the same screen.

What follows is a cross-index between *CPU* simulator activities and the *Active Physics Communications* unit that attempts to use the strength of each. For example, after *Active Physics* has students construct a circuit to produce sound, the *CPU* simulations activity guides them to consider the role of the major components and the measurements that can be made in simple DC circuits. *CPU* activities and *Active Physics* share the background that both were developed in response to National Standards in science education and knowledge about student learning gained by the physics education research community.

Chapter 6: Is Anyone Out There?

Active Physics Contents	Page Number	Matching CPU Simulators	Usage Notes
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The designed simulations are setups that have already been created using the CPU Simulators. The CPU Simulators mentioned are blank palettes that teachers and students can use to design their own simulation investigations.

Activity 1 Lenses and Ray Optics

For You To Do	301	Designed Simulation: Lenses CPU Simulator: Lens Images	This simulation could be used as an additional Step #9 on 302. The simulator shows ray tracing and image formation for convex and concave lenses.
Stretching Exercises	305	Designed Simulation: Convex Lens CPU Simulator: Lens Images	Simulator could be used to perform the Stretching Exercise.

Activity 8 The Doppler Effect

For You To Do	340	Designed Simulation: Doppler CPU Simulator: Sound Lab	The simulator can be used to provide an alternative to Step 5 on page 341 of the For You To Do activity. It will also show students why the pitch changes with speed since they will see the waves compressed and stretched.
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