



THE CONCORD CONSORTIUM PRESENTS

ENGINEERING ENERGY EFFICIENCY WORKBOOK

energy.concord.org

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The workbook contains a complete one-month curriculum for studying the basics of heat transfer and solar heating in the context of an engineering challenge to build an energy-efficient, solar-heated model house. Each concept and task is linked to a hands-on experiment or a computer simulation. Science content is integrated into the engineering process. Connections to real buildings are made throughout the project.

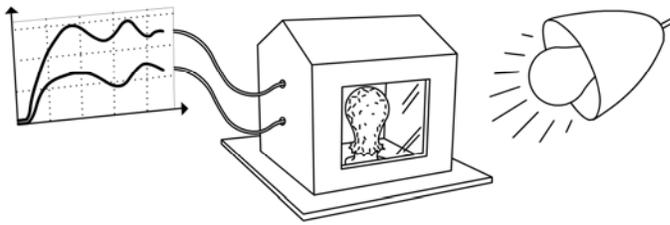
Table of Contents

- **Build and test a standard house**
Learn the basic building techniques and the standard experimental procedures for measuring heat loss and solar heat gain in a model house.
- **Heat transfer basics**
Explore the underlying science of conduction, convection, radiation, heat storage, and energy from the sun, using hands-on experiments and/or computer simulations (Energy2D).
- **Design and build your own house**
Construct a model house of your own design and measure its thermal performance.
- **Modify your house**
Improve on your design and repeat the performance tests.
- **Summer cooling**
Measure solar heat gain in the summer and modify your design to minimize it.
- **Final report**
Use a presentation of your work to persuade a committee to hire you as a consulting engineer for an energy-efficient housing development.



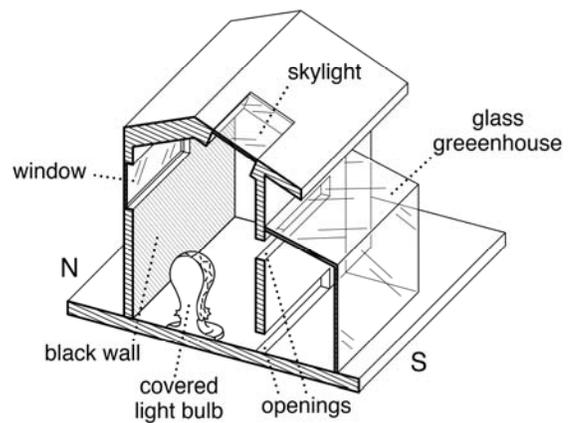
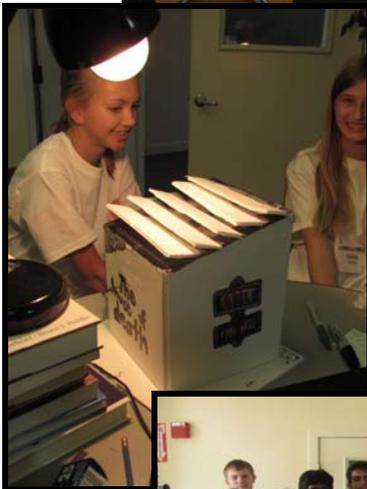
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A Solar House Design Project



Features:

- Scores of innovative hands-on experiments and computer simulations ready for classroom use.
- Challenge-based, step-by-step learning progression through improving energy efficiency of model houses.
- Bridges the gap between science and engineering: scientific inquiry and engineering design are both incorporated.
- Introduces modern engineering methodology to the classroom.



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Field tested in four high schools in Massachusetts.