

ComPADRE Content Contextualization

<http://www.compadre.org>

Bruce Mason & Caroline Hall



Levels of Context

- **Collections**
- **Course and Topics**
- **Modules for Teaching**
- **Connections, Relations, Textbooks, etc.**



ComPADRE Community Collections

Editor run Collections for specific audiences



[Introductory University Physics](#)



[Introductory Astronomy](#)



[Physics Students](#)



[K-12 Teachers](#)



[Thermal
Physics](#)



[Quantum Physics](#)



[Advanced Labs](#)



Catalog Records

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Physics
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Website Detail Page
Save into folder: **Save**

PhET Simulation: Circuit Construction Kit (DC Only)
published by the Physics Education Technology Project

This interactive java application gives students a virtual circuit simulator for building dc circuits. Wires, batteries, resistors, light bulbs, and switches are available to be added to the circuit, along with common "real world" objects. Parameters, such as resistance and voltage, can be modified as desired. Meters are available for measuring voltages and currents. Circuit elements can be arranged in any geometry desired by the user; circuit elements are not required to connect to a grid. The circuits can be viewed using either images of the objects or using schematic symbols. This is part of a large collection of simulations freely available from the Physics Education Technology group at the University of Colorado.

http://phet.colorado.edu/simulations/sims.php?sim=Circuit_Construc...

| Subjects | Levels | Resource Types |
|---------------------------------------------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Electricity & Magnetism - DC Circuits = Circuit Analysis = Currents = Ohm's Law | - Lower Undergraduate - Middle School - High School | - Instructional Material = Activity = Curriculum support = Interactive Simulation - Audio/Visual = Movie/Animation |
| Intended Users | Formats | Ratings |
| - Learners - Educators | - application/java - text/html | ☆☆☆☆☆ |

Item Details
Related (2)
Comments (3)
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Mirror: <http://phet.colorado.edu/sims/cir...>

Access Rights: *Free access*

Restriction: © 2004 PHET and University of Colorado
 PhET Interactive Simulations by The PhET Team, University of Colorado are licensed under a Creative Commons Attribution-

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 PSRC Status: **R**
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Supplements
[Comments \(3\)](#)

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Related Materials
Expanded On
[PhET Simulation: Circuit Construction Kit \(AC+DC\)](#)
Covers the Same Topic As
[Phyzlab: Open and Short Case - An Investigation of Faulty Circuits](#)
[See details...](#)

Similar Materials
[PhET Simulation: Battery-Resistor Circuit](#)
[Multimeter VOM](#)



Physics Front: Topics & Units

Dynamics: Forces and Motion

This topic is broken into units to help in formulating cohesive, effective lessons. Clicking on each unit title below will display appropriate activities, lesson plans, or labs.

Unit materials are a subset of all possible materials available for this topic, selected especially with the new physics teacher in mind. You may instead [browse all materials for this topic here](#).

Conceptual Physics *Dynamics: Forces and Motion* Units

A branch of mechanics that deals with forces and their relation primarily to motion but also sometimes to the equilibrium of bodies. Units are not listed in a prescribed order.

- [+ Newton's First Law & Inertia \(22\)](#)
- [+ Newton's Second Law & Net Force \(8\)](#)
- [+ Newton's Third Law \(2\)](#)
- [+ Applications of Newton's Laws \(6\)](#)

Editor Selections, particularly for new teachers
Sorted by Course, Topic, Specific Content, Type




Physics Front: Topics & Units Content

Lesson Plans:

[Molecular Expressions: Light, Prisms, and the Rainbow Connection](#)

Simulation-Based Lesson Plan


Grades 6-12

This multimedia lesson/activity integrates a hands-on prism lab, a Java simulation on light refraction, and an historical vignette on Isaac Newton's classic study of prisms. It is appropriate for middle school, and can be adapted for more advanced students by extending the study to the Refractive Index and the visible light spectrum. Overall, a nicely cohesive introduction to prepare students for further study of rainbows. ([Open Website](#) )

[Explorations in Optics](#)

Instructional Unit


Grades 9-12

If your students think studying optics would be boring, wait until they try building their own spectroscopes and watching light refract through Jello Jigglers. This resource is a set of 16 low-cost lesson/labs designed as an overview of the behavior of light. For the 9th grade physical science class, try the explorations on light spectra, reflection, and refraction. For more advanced students, we suggest the labs on diffraction, polarization, and fluorescence. The lens labs would be appropriate for both. ([Open Website](#) )

[NanoSense: Clear Sunscreen: How Light Interacts with Matter](#)

Experiential Learning Unit

Grades 11-12


This high-quality, standards-based classroom project explores the interaction of light with particles found in sunscreen. The student task is to learn about absorption and reflection of ultraviolet light, design a computer model for an improved sunscreen that would contain zinc oxide nanoparticles, and create an ad campaign to promote the product. Included materials are lesson plans, syllabus, Power Point lectures, student guides, free computer modeling software, and assessments. ****NOTE: May be taught as a short mini-unit or as a two week project.** ([Open Website](#) )

Activities:

[Physics of Rainbow](#)

Interactive Simulation

Grades 9-12

This page contains a short explanation and Java simulation of the physics behind rainbows. It explores the reflection and refraction effects of light inside a water droplet as well as polarization. A discussion forum regarding this material is also provided. ([Open Website](#) )

[Exploratorium: Snacks About Light](#)

Hands-On Activities/Labs

Grades 6-12

San Francisco's Exploratorium Museum has compiled this collection of more than 40 affordable, simple classroom experiments related to light. The activities cover a wide range of topics relating to the behavior of light, from reflection/refraction and diffraction to pinhole optics and polarization. All are miniature versions of some popular exhibits at the museum. ([Open Website](#) )

Units may include:

- Lesson Plans
- Activities
- References
- Content Support
- Student Tutorials
- Assessments



Physics Front: Topics & Units Usage

- About 26% of page views are Topics & Units pages (Catalog pages 55%)
- Usage larger than search and homepage
- Growth in usage generally between 50% and 200% between 2008/09 and 2009/10
- Avg. of 2 min. on page, less than 50% exits



Physics Front: Model Teaching Units

The screenshot shows the website interface for ThePhysicsFront.org. The header includes the site name, a search bar, and navigation tabs for Lesson Plans, Activities, Labs, and Assessments. A left sidebar contains various user navigation options like home, logout, admin, topics and units, advanced search, suggest a resource, discussion forums, shared folders, my account, my filing cabinet, about, people, sitemap, and contact us. The main content area displays a breadcrumb trail: Nature of Light: Unit-Grades 7-8 Folder < Caroline Hall-Contributing Editor's Shared Folders < Shared Folders < Member Directory <. Below this, a blue header reads 'Caroline Hall-Contributing Editor's Shared Folders: Nature of Light: Unit-Grades 7-8'. A folder tree shows 'Model Units (1)' containing 'Nature of Light: Unit-Grades 7-8 (2)', which is expanded to show sub-folders for Day 1 through Day 8-10. A detailed description of the unit follows, explaining it as a model unit exploring light's behavior, with a 7-day or two-week duration. It mentions that students will learn about light as electromagnetic radiation, covering a spectrum from ultraviolet to gamma rays, and will engage in hands-on activities like reflection, refraction, and color experiments. A 'National Standards' section notes that lessons are aligned with AAAS Benchmarks for Science Literacy. The AAPT PTR logo is visible in the bottom left of the page.

- Editor-recommended approach to topic
- Unified content, activities, and support



Physics Front: Model Teaching Units

📁 Day 2: Light Waves and Wavelength -- An e-inquiry

This is an exceptional web-based lesson plan, created by the folks who gave us the Benchmarks for Science Literacy. Students will access an online "e-sheet" that takes them step-by-step through an inquiry-based investigation of the behavior of light. *Allow two full class periods in the Computer Lab.*

AAAS Benchmarks

4F/M8: There are a great variety of electromagnetic waves: radio waves, microwaves, infrared waves, visible light, ultraviolet rays, X-rays, and gamma rays. These wavelengths vary from radio waves, the longest, to gamma rays, the shortest.

4F/M6: Light acts like a wave in many ways. And waves can explain how light behaves.

4F/M6: Something can be "seen" when light waves emitted or reflected by it enter the eye--just as something can be "heard" when sound waves from it enter the ear.

4F/M5: Human eyes respond to only a narrow range of wavelengths of electromagnetic waves-visible light.

📄 ScienceNetLinks: Light 1 - Making Light of Science

Complete Lesson Plan

[Lesson Plan: Making Light of Science E-Inquiry](#) (Science NetLinks)

Preparations:

1) Print e-sheet for students

<http://www.sciencenetlinks.com/Esheet.cfm?DocID=34>

2) Assign students to work in pairs in computer lab (need 12-15 stations)

3) Prisms -- bring one for each pair of students

Review

Elicit comments about what students learned yesterday about light (i.e., part of a spectrum, light is radiation, stars give off radiation, there are several kinds of radiation other than light, we cannot see most forms of electromagnetic radiation with our eyes, etc.)

- Introduction
- Standards, Challenges
- Link to Content and Teaching Resources
- Wrap-up



Shared Context: Personalization

Shared Folders « Kevin Warren «

Kevin Warren's Shared Folders

Please choose a folder below to access [Kevin Warren's](#) stored materials.

- Measurement and Dimensional Analyses
- One-Dimensional Kinematics
 - Computer Graphing Simulations for Visualization and Practice
 - More Links on Graphing and Equations in One-Dimension (3)
- One-Dimensional Newton's Laws
 - More Links on Forces (2)
 - Force Simulations (2)
- Vectors
 - Vector Simulations (3)
 - More Links on Vectors (3)

Cirque du Circuit: A Unit on Electric Circuits for High School Physics (1 resource, [9 subfolders](#))

This two-week multimedia unit explores the fundamentals of electrical circuits in a highly interactive format for the beginning learner. Recent physics education research indicates that student outcomes improve when they are allowed to interactively explore concepts in a low-stakes environment, such as a computer model or simulation, prior to doing a hands-on lab. Within this unit, students will explore animated tutorials and online circuit simulators to promote concept-building before doing classroom labs. The labs are student-centered activities that ask learners to solve real-life problems by applying the ideas they explored with simulators and models. In the first lab, students are presented with a crisis situation and must extend their knowledge of electricity to build a working flashlight with salvage materials. In the second lab, students will build a small alarm device that can be used to keep laptops secure. The final lab introduces them to a very simple electromagnet.

All About Circuits: Volume 1 - DC Circuits

This resource is a free online textbook that is part of the Open Book Project, covering basic concepts of electricity such as Ohm's law, series and parallel circuits, batteries and capacitors, and inductance. Teachers can use this text as background and content support before starting this unit. Chapters can also be printed and used as supplementary materials for the students to prepare them for assessments and labs.

[detail page](#) - [website](#)

Copy selected into:

Cirque du Circuit: A Unit on Electric Circuits for High School Physics Subfolders

- Day 1: An Electricity Model (3)
- Day 2: The Voltaic Pile Experiment - Rediscovering Voltage (3)
- Day 3: Current and Voltage - What's the Difference? (3)
- Day 4: Lights Out! - Problem Solving with Circuits (1)
- Day 5: Introducing Resistance and Ohm's Law (5)
- Day 6: Series and Parallel Circuits - Simulate and Explore (2)
- Days 7-8: Stop Thief! - Build Your Own Alarm Circuit (1)
- Day 9: Tesla - The Forgotten Pioneer of AC Current (1)
- Day 10: Alternating Current - Illuminating the World (3)



Relations: Content to Content

| SEI: Junior E&M I Course Materials Relations | |
|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| PSRC Related Resources | |
| SEI: Junior E&M I Course Materials Contains SEI: Junior E&M Course Materials - Concept Tests/Clicker Questions | |
| These concept tests were developed as part of the SEI Junior Level E&M Course reform. | <i>relation by Bruce Mason</i> <i>Priority: Important</i> <i>edit - remove</i> |
| SEI: Junior E&M I Course Materials Contains SEI: Junior E&M Course Materials - Electric Fields in Matter | |
| The Electric Fields in Matter materials cover dielectrics, polarization, and boundary value problems. | <i>relation by Bruce Mason</i> <i>Priority: Important</i> <i>edit - remove</i> |
| SEI: Junior E&M I Course Materials Contains SEI: Junior E&M Course Materials - Homework | |
| This homework problem set is created for the research-based Junior E&M I course. | <i>relation by Bruce Mason</i> <i>Priority: Important</i> <i>edit - remove</i> |
| SEI: Junior E&M I Course Materials Contains SEI: Junior E&M Course Materials - Math Fundamentals | |

- Relations provide structure of content



Relations: Pedagogical Context

| Website Detail Page | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <u>Windows to the Universe®: Order it Up</u> | | |
| <i>published by the Windows to the Universe Team</i> | | |
| Available Languages: English, Spanish | | |
| This online Java game tests knowledge of the solar system. Players are required to rank solar system objects by their properties, such as radius, density, and orbital period. Three versions are available for beginning, intermediate, and advanced students. | | |
| Additional context for this material is provided by the ComPADRE-SERC Pedagogic Service . | | |
| http://www.windows2universe.org/games/order_planets_intro.html | | |
| Subjects | Levels | Resource Types |
| Astronomy <ul style="list-style-type: none">- Astronomy Education= Assessment- Solar System | <ul style="list-style-type: none">- Lower Undergraduate- High School | <ul style="list-style-type: none">- Instructional Material= Activity= Game= Problem/Problem Set |

- Make connections to SERC modules
- Make connections to Phys. Ed. Research



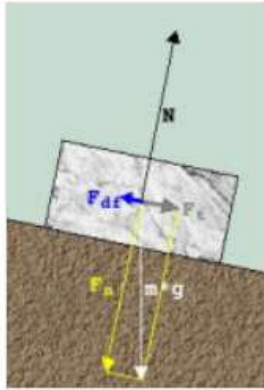
Context through Standards

Computer Program Detail Page

[Sliding Down an Incline Plane Model](#)

written by Francisco Esquembre

This interactive simulation shows a stone block lying at rest on an inclined plane. Initially, the component of gravity along the plane surface is exceeded by the force of static friction. The slope of the ramp can be increased or decreased, allowing students to see the exact point when the component of gravity equals the force of static friction. If the ramp is raised any further, the block will slide down. The coefficient of static friction is set at 0.2. As the slope is increased or decreased, students will see changing numerical values for the gravitational component, the force of static friction, and the force of kinetic friction.








See Annotations (below) for two editor-recommended interactive tutorials that take students step-by-step through exercises designed to help them form a conceptual basis for solving problems related to objects moving on an inclined plane.

This item was created with Easy Java Simulations (EJS), a modeling tool that allows users without formal programming experience to generate computer models and simulations. To run the simulation, simply click the Java Archive file below. To modify or customize the model, **See Related Materials** for detailed instructions on installing and running the EJS Modeling and Authoring Tool.

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Related Materials
Is Based On
[Easy Java Simulations Modeling and Authoring Tool](#)
Covers the Same Topic As

- Good:
Ready-to-use
Context
- Bad:
Everyone
wants
something
different

