



Engineers Demonstrating Science: an Engineer Teacher Connection



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EDS-ETC Workshop at the ASEE Zone 1 Conference - April 2014



*Promoting excellence in the field of
electron devices for the benefit of
humanity*

EDS Mission Statement

To foster professional growth of its members by satisfying their needs for easy access to and exchange of technical information, publishing, education, and technical recognition and enhancing public visibility in the field of Electron Devices.

What we do

Conferences

- Meetings and symposia
- Workshops
- Large-scale conferences and expositions

Publishing

- Open Access
- Proceedings
- Journals

Education

- Live Webinars
- Distinguished Lectures
- Student Outreach

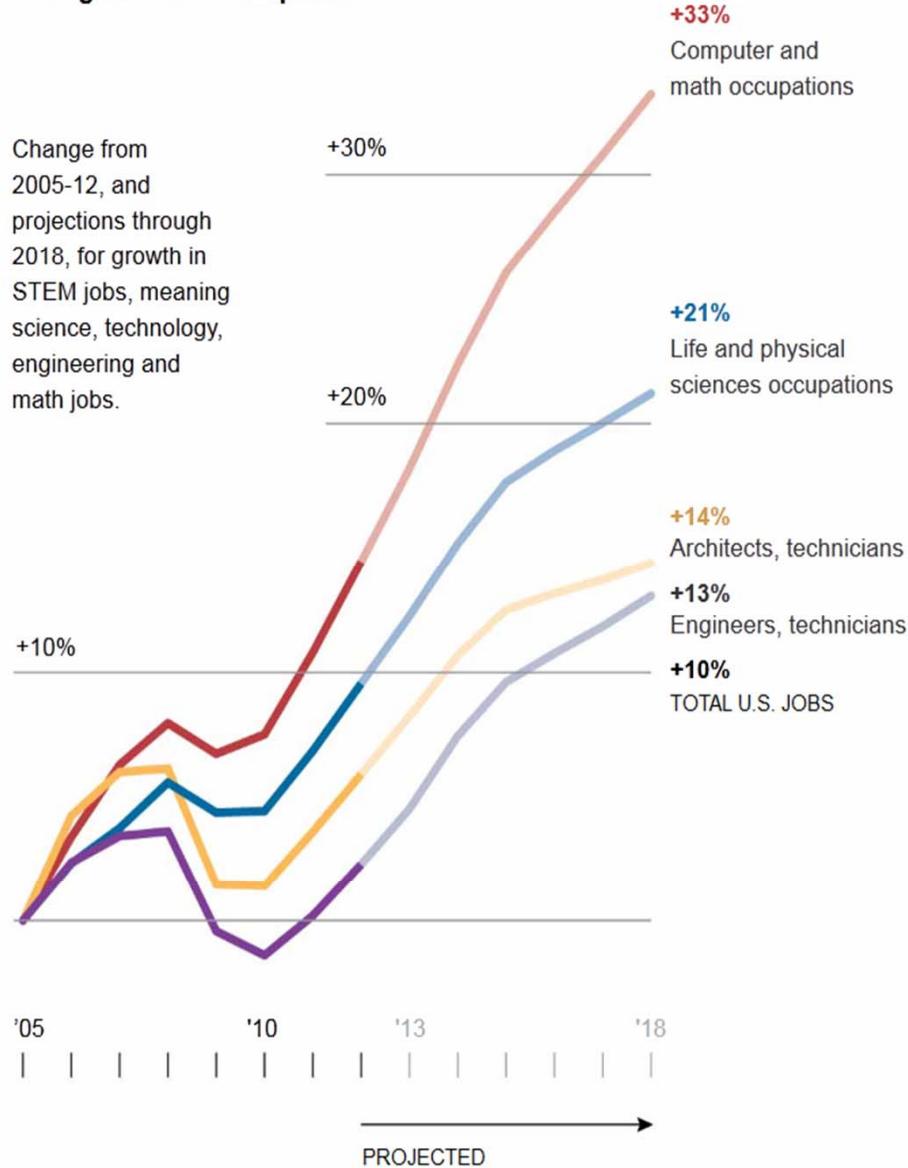
Technical Recognition

- Awards
- Student Fellowships



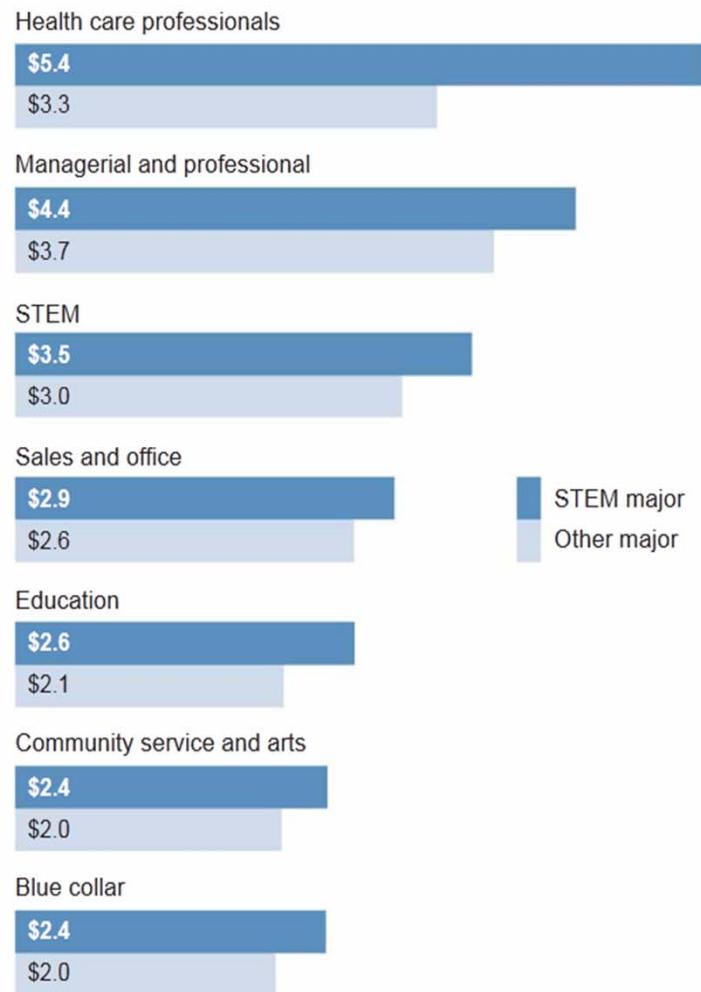
Expected STEM Related Job Growth

Strong Job Growth Expected



Studying Science and Tech Boosts Income

A comparison of lifetime earnings in selected fields for workers with STEM majors and workers with other majors.
In millions of 2009 dollars.



IBM Program Implemented by IEEE EDS in 2011 Due to Efforts of EDS Volunteer Fernando Guarin



IEEE EDS Program overview

- › Program Launched in 2010
- › Program designed to enable chapter members to visit local schools or host events designed to engage young students in the field of electrical engineering.
- › Utilizing the easy-to-use Snap Circuit Kits, students learn about electronic circuits using a “hands on” approach to experience the exciting and creative field of electronics.
- › Train and work with Science Teachers
- › We intend to encourage young students to consider electrical and electronic engineering as a career. This versatile tool, along with your enthusiasm and expertise, will be used to demonstrate the many applications and motivate young students into the exciting electron devices field.

Goals for EDS-ETC

- › Encourage and promote Engineering, Math and Science in schools.
- › Encourage EDS Chapter members to get involved
 - Not only eWeek activity
- › Encourage EDS student members to get involved.
- › Forge relationships between local school teachers, communities, EDS Student members and EDS professionals.
- › Exploit Synergy with existing programs i.e. STAR, Corporate reach-out, government programs.
- › Provide a “hands-on” learning environment.
- › Make learning science “fun”
- › Share your passion for Engineering

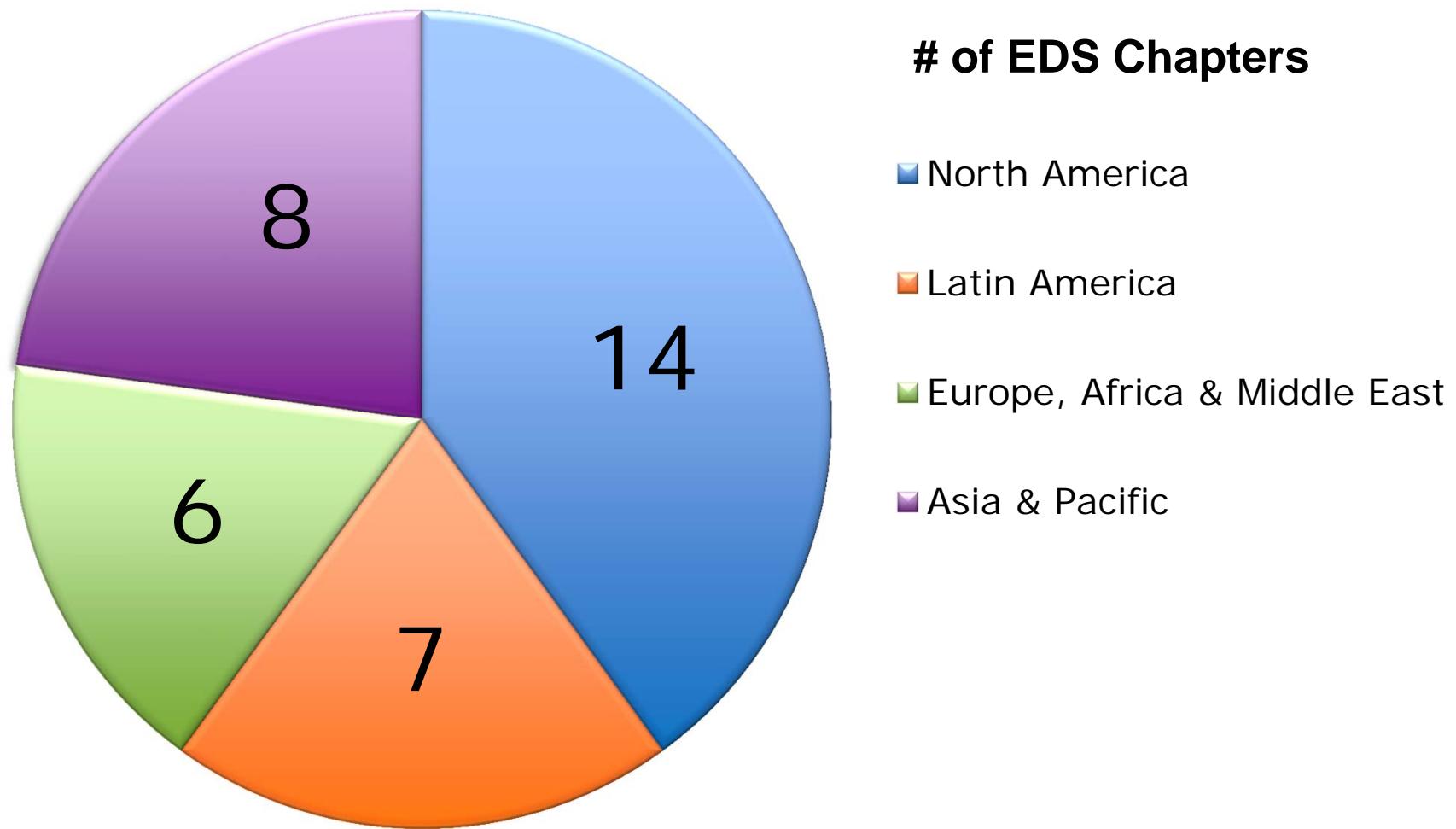
GLOBAL REACH



**More than 2,000
students have been
introduced to the
world of engineering
at 120 events
worldwide**

Chapter Participation –

EDS Programs in more than 30 cities around the world



Award Winning Chapter Initiatives - Brazil

<http://sites.ieee.org/projeto-electron/material/>

The screenshot shows the homepage of the Projeto ELECTRON website. At the top, there is a navigation bar with links to IEEE.org, IEEE Xplore Digital Library, IEEE Standards Association, IEEE Spectrum Online, and More IEEE Sites. Below the navigation bar is the Projeto ELECTRON logo, which features the word "ELECTRON" in a colorful, blocky font where each letter has a different theme (e.g., "E" is blue, "L" is green, "C" is red, etc.), accompanied by a small circuit board icon. To the right of the logo is the IEEE logo. A horizontal menu bar below the logo includes Home, Sobre, Aulas, Material, Eventos, Prêmios, Newsletter, and Contato. A search bar is located just below the menu. On the left side of the main content area, there are logos for the IEEE ELECTRON Devices Society, RAMO ESTUDANTIL UNB, and Women in Engineering (WIE) UnB. The main content area features a large banner with a photo of a young boy and a girl working on a circuit board, with the text "Quem disse que Circuito Elétrico é coisa de gente grande?" and "Conheça o nosso Projeto Electron!". Below the banner is a calendar for May and June 2013, listing four events: "Aula do Projeto @ Escola CED Pompilio" on May 25, "Aula do Projeto @ CENOL" on May 25, "Aula do Projeto @ Casa de Ismael" on May 27, and "Aula do Projeto @ Casa de Ismael" on June 3. A share menu is open on the right side of the page, showing options like Facebook, Twitter, Email, Print, Gmail, StumbleUpon, Favorites, and More... (339). At the bottom right is the IEEE logo with the tagline "Advancing Technology for Humanity".

Projeto



Project Electron Prizes

Student Branches National Meeting 2012: Case of Success Prize

IEEE Student Activity 2013

IEEE Darrel Chong Student Activity 2013

PROEXT 2014

Spreading fast through IEEE



For more information: www.ieee.org/eds



The EDS-ETC Program | IEEE Electron Devices Society

IEEE.org | IEEE Xplore Digital Library | IEEE Standards | IEEE Spectrum | More Sites

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The EDS-ETC Program
Chapter Subsidy Program
Chapter of the Year Award
Membership Fee Subsidy Program
Form a Society Chapter
Form a Student Branch Chapter
IEEE Web Entity Hosting

Home :: Chapters :: The EDS-ETC Program

The EDS-ETC Program

EDS-ETC
Engineers Demonstrating Science: an Engineer Teacher Connection

In order to excite young minds, EDS has created the Engineers Demonstrating Science: an Engineer Teacher Connection or EDS-ETC program. The goal of the program is to enable EDS chapter members to visit local schools or host events designed to engage young students in the field of electrical engineering. By utilizing the easy-to-use Elenco Snap Circuit® kits, students learn about electronic circuits using a "hands-on" approach to experience the exciting and creative field of electronics. We hope to encourage them to consider electrical and electronic engineering as a career.

These versatile tools, along with our members' enthusiasm and expertise, are used to demonstrate the many applications of circuits and motivate young students to explore the electron devices field.

Begun in 2011 by EDS Secretary Fernando Guarin, under then President Renuka Jindal, the program grew with the help of volunteers from the Rochester, Boise and Mid-Hudson Valley Chapters. The program now has dozens of EDS chapters participating, worldwide. Dedicated volunteers are hosting EDS-ETC events with their local science teachers ranging from the 4th through 12th grade levels. See EDS-ETC in action with this fun video!

00:00 00:00

Get involved today and host an event yourself! To learn more about the program, including how your chapter can obtain Snap Kits at no cost, please contact Joyce Lombardini in the EDS executive office.

[Download EDS-ETC Information and Forms](#)

- Snap Circuit Kit Information
- Order Form (EDS members only)
- EDS-ETC Event Reporting Form
- Sample EDS-ETC event curriculum (EDS members only)
- Certificate of Participation (for instructor's use)

Learn how to use the exciting new QAMA Calculator, shown to increase math scores in students.

EDS-ETC Goals

- Distill the NY Standards down into clear, student-centered objectives, and then use lessons, labs, and projects to directly reinforce the student objectives or tasks.
- Projects selected to achieve three learning goals related to electrical engineering education. The goals are to demonstrate attainment of knowledge in:
 - Electrostatics
 - Electric Circuits
 - Magnetism

Integrating Learning Goals with NY State Curriculum Standards

- › EDS-ETC is using a experiential learning model for their efforts in 4th-12th grade outreach in electrical engineering. [Sternberg and Zhang, 2000]
- › The hands-on projects use the commercially available Elenco Electronics Snap Circuits® kits.
- › The projects have been aligned with NY State Science Learning and Core Curriculum Standards.

R. J. Sternberg and L. F. Zhang (Eds.), Perspectives on cognitive, learning, and thinking styles. NJ: Lawrence Erlbaum, 2000.

NYS Science Learning and Core Curriculum:
<http://www.p12.nysed.gov/ciai/mst/scirg.html>

Examples That Demonstrate Learning of an Objective

- › For each topic, a student will be able to explain, define, calculate...the following:
- › Electrostatics
 - Calculate the charge on an object.
 - Describe the differences between conductors and insulators.
- › Electrical Circuits
 - Define and calculate electric current.
 - Define and calculate resistance using Ohm's law.

Examples to Demonstrate Learning of an Objective

- › Magnetism
 - Describe the magnetic poles and interactions between magnets.
 - Draw magnetic field lines.

NY State Science Learning and Common Core Curriculum

- › Elementary Science Grades: K - 4
- › Key Idea 4 (Pg. 15):
 - “Energy exists in many forms, and when these forms change energy is conserved.”
 - “Students should understand that energy exists in a variety of forms. Students should observe the results of simple energy transformations from one form to another in their physical environment. The safe use and respect of various energy forms should be stressed in the classroom.”

THE UNIVERSITY OF THE STATE OF NEW YORK THE STATE EDUCATION DEPARTMENT
<http://www.emsc.nysesd.gov/ciai/>

NY State Science Learning and Common Core Curriculum

- › Performance Indicator 4.1
- › “Describe a variety of forms of energy (e.g., heat, chemical, light) and the changes that occur in objects when they interact with those forms of energy.”

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<http://www.emsc.nysesd.gov/ciai/>

NY State Science Learning and Common Core Curriculum

- › Associated Major Understandings with Relevant Project
 - “4.1a Energy exists in various forms: heat, electric, sound, chemical, mechanical, light.” **(Project 2)**
 - “ 4.1b Energy can be transferred from one place to another.” **(Project 2)**
 - “4.1c Some materials transfer energy better than others (heat and electricity).” **(Project 9)**
 - “4.1e Electricity travels in a closed circuit.” **(Project 2)**

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<http://www.emsc.nysesd.gov/ciai/>

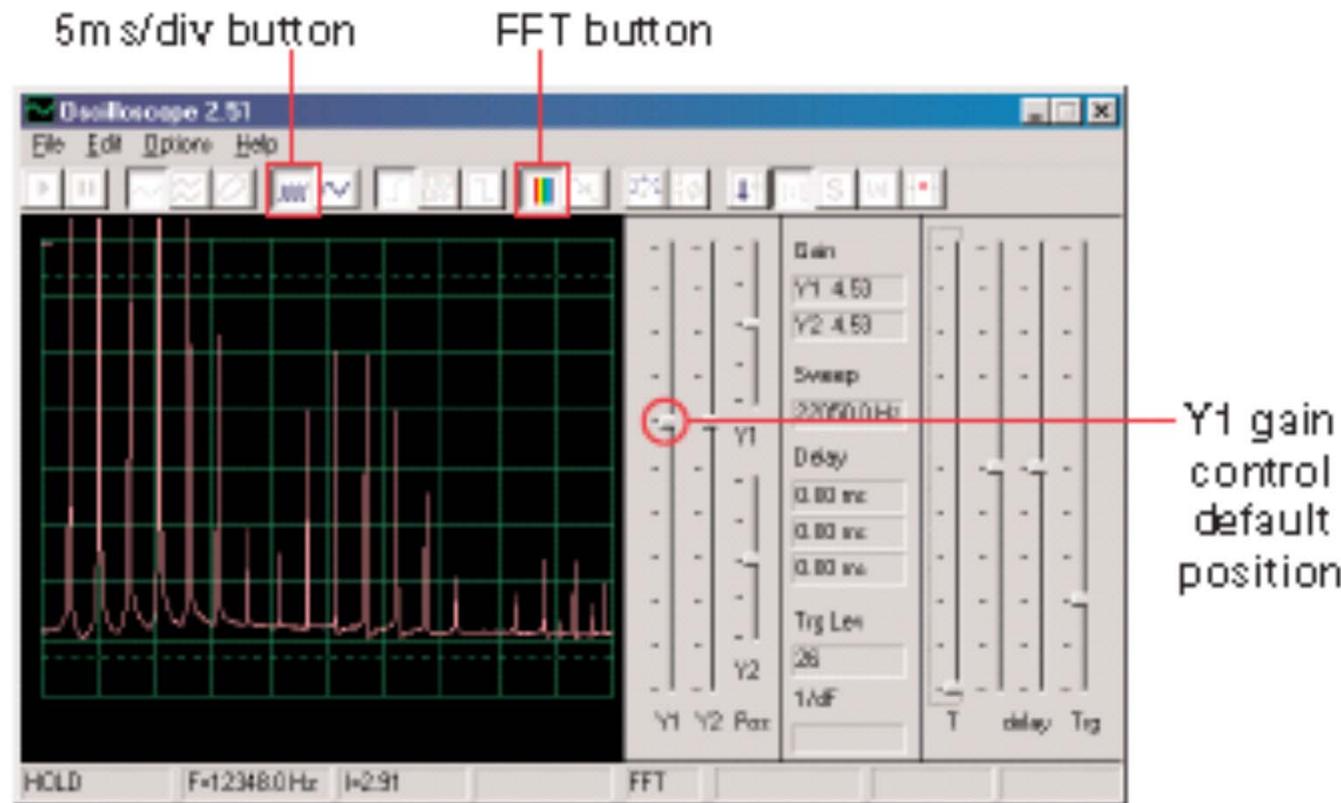
We are currently using the following Elenco Electronics Snap Circuits® kits in our program:

- **SC-750R Snap Circuits® Extreme**
 - 750 Circuit Projects, includes Oscilloscope application
 - We provide a digital multimeters to use with this kit
 - Good for all age ranges (6 – 96)
- **SC-100R Snap Circuits® Jr.**
 - 100 Circuit Projects
 - Better suited for younger participants
- **SCM-400 Snap Circuits® SnapMicro 1 Standard**
 - Easy way to learn about microcontrollers and how used
 - Better suited for older students

SC-750R with Digital Multimeter



FFT also through computer Microphone Input

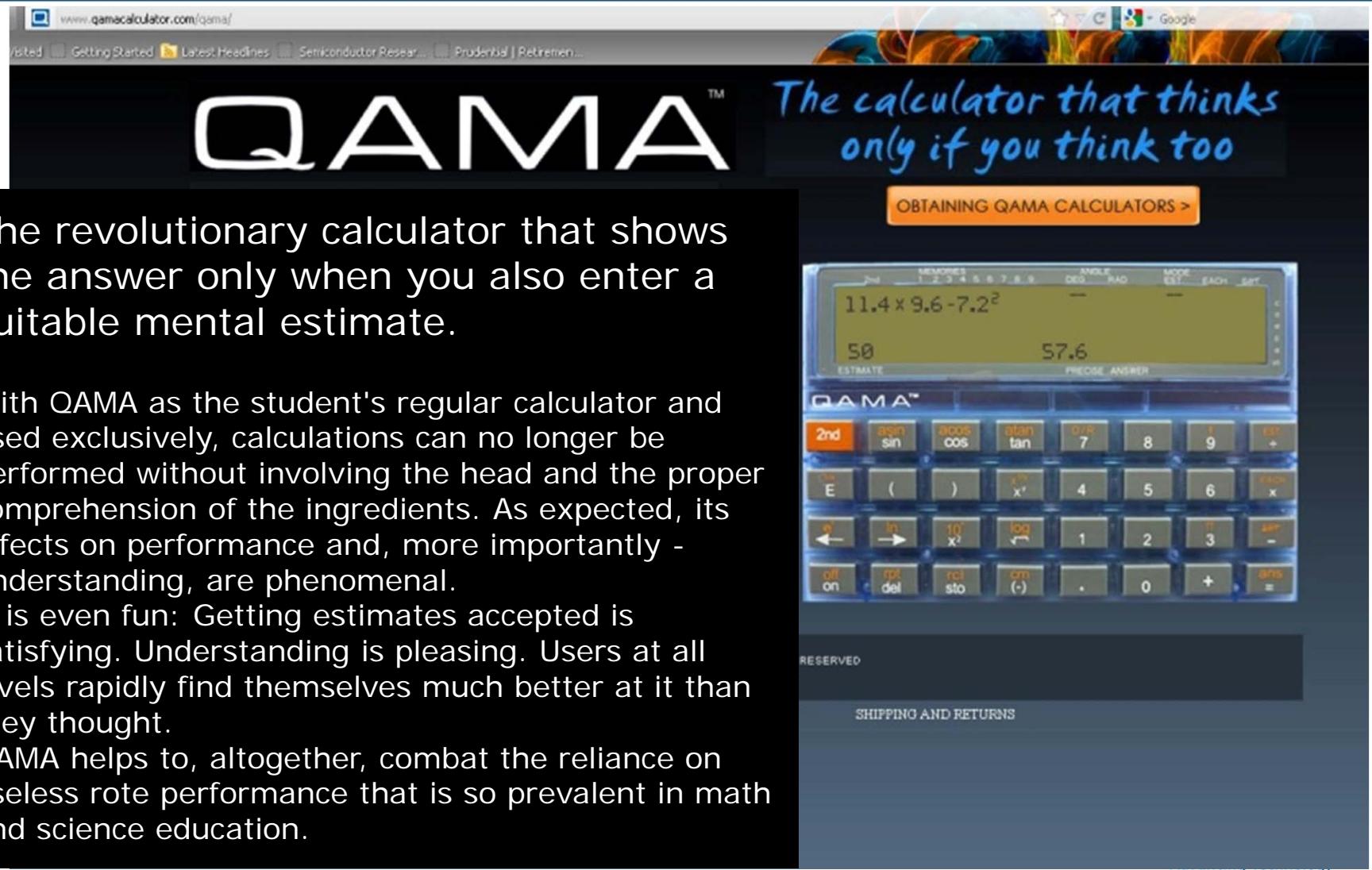


You are seeing the frequency spectrum of your signal, up to 22kHz. Notice that most of the energy is at the low frequencies (below 7kHz), and there is very little as you go higher.



IEI
Innovating technology
for Humanity

QAMA or Quick Approximate Mental Arithmetic



The revolutionary calculator that shows the answer only when you also enter a suitable mental estimate.

With QAMA as the student's regular calculator and used exclusively, calculations can no longer be performed without involving the head and the proper comprehension of the ingredients. As expected, its effects on performance and, more importantly - understanding, are phenomenal.

It is even fun: Getting estimates accepted is satisfying. Understanding is pleasing. Users at all levels rapidly find themselves much better at it than they thought.

QAMA helps to, altogether, combat the reliance on useless rote performance that is so prevalent in math and science education.

The calculator that thinks only if you think too

OBTAINING QAMA CALCULATORS >

RESERVED

SHIPPING AND RETURNS

for Humanity

Snap Circuits® SnapMicro 1 Standard



Snap Circuits® SnapMicro I Standard

is an easy way to learn about micro-controllers and how they are used in the world around us. Our easy-to-follow instructions will guide you through the programming of basic commands by using flow charts to operate the micro-controller. After a brief intro; Snap-Micro® I will have you programming over 25 projects such as data loggers; A/D converters; DC motors and much more using Snap Circuits® components. No prior understanding of micro-controllers required.

SC-100R

Snap Circuits® Educational Series Training Program Model SC-100R

The Model SC-100R is an in-depth exploration of the electronic components included with the SC-100 Snap Circuits Jr. Ideal for use in home schooling, middle schools and high schools, where students will grasp the basic principles of electronics. *Requires 2 "AA" Batteries*

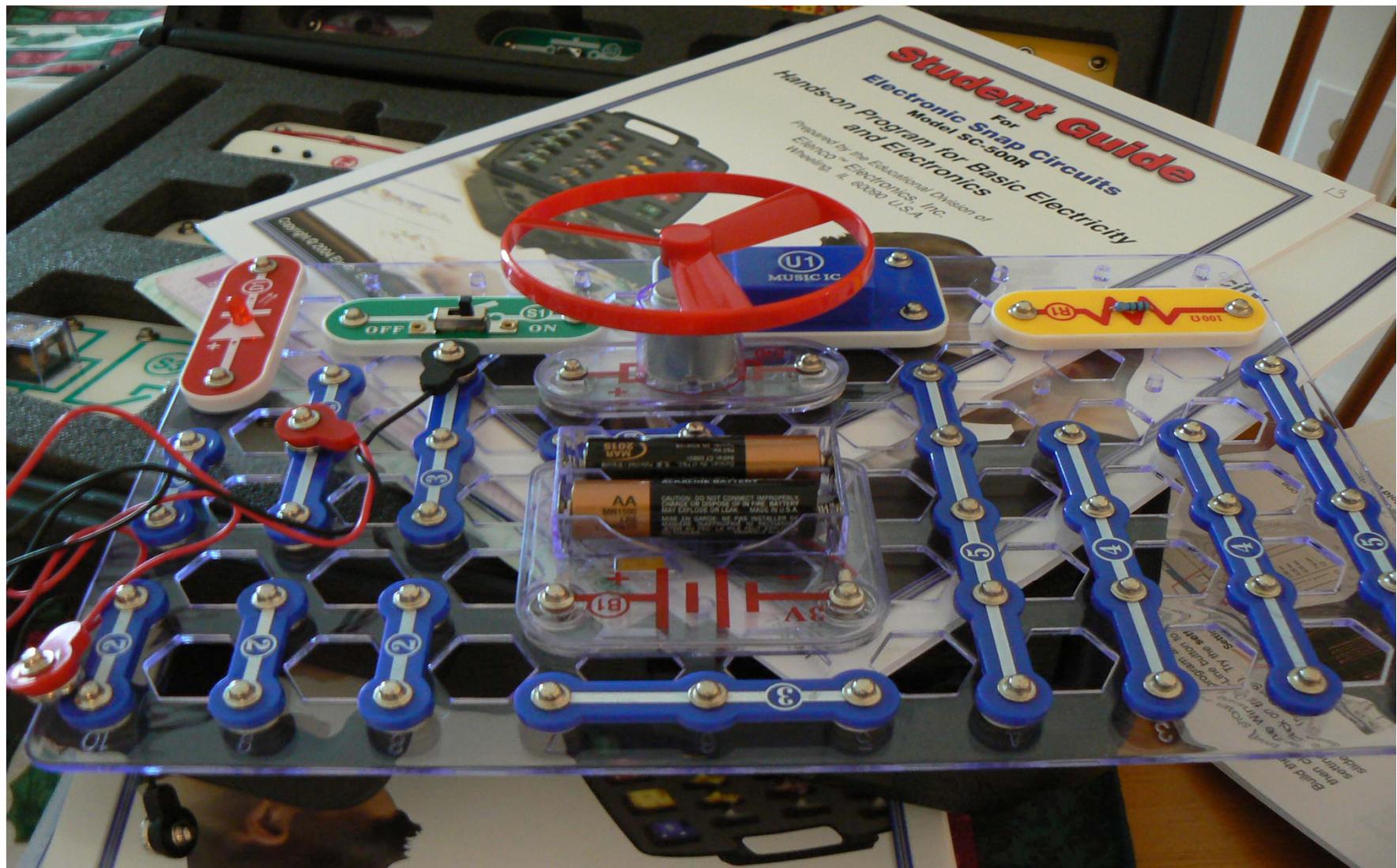
Project book of over 100 experiments, and student guide included.

Topics Covered:

- Resistors
- Capacitors
- Transistors
- Motors
- Switches
- Series Circuits
- Parallel Circuits



Components are mounted on clear base

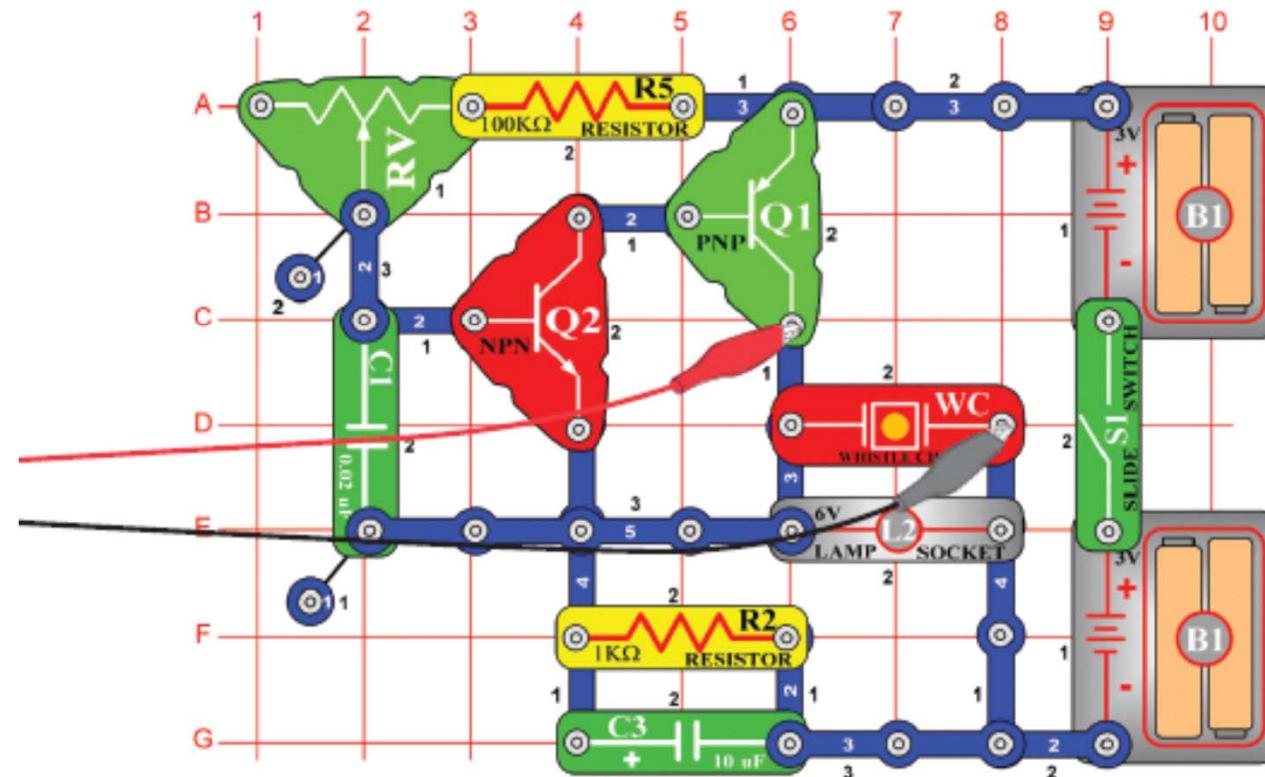


Typical Circuit Diagram

Project #PC1

Pitch PC

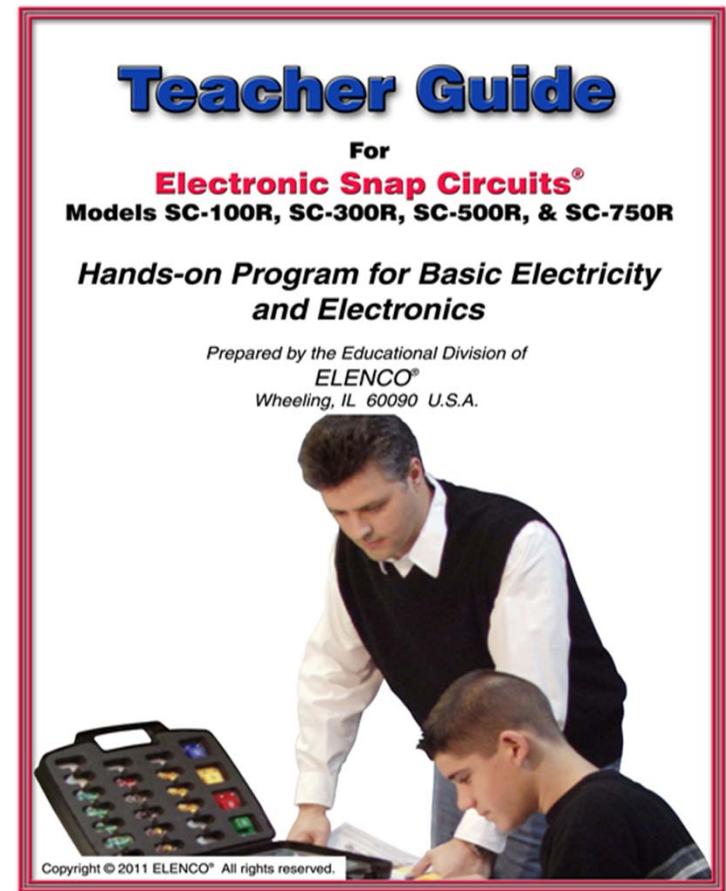
OBJECTIVE: To look at the output signal from a transistor oscillator while changing the pitch of the sound.



Projects are easy to assemble

Teacher Guides Include:

- Introduction & Important Information
- Notes about the Snap Circuits® Project Manual
- Suggestions for Instructor Preparation/Organization
- Table of Contents for each kit's Student Guide
 - Helps to plan lessons and to have all needed parts on hand
- Questions for Quizzes
- Answers to Quiz Questions
- Replacement Parts & Upgrade Ordering Information



Kit Exploration using the SC-100R

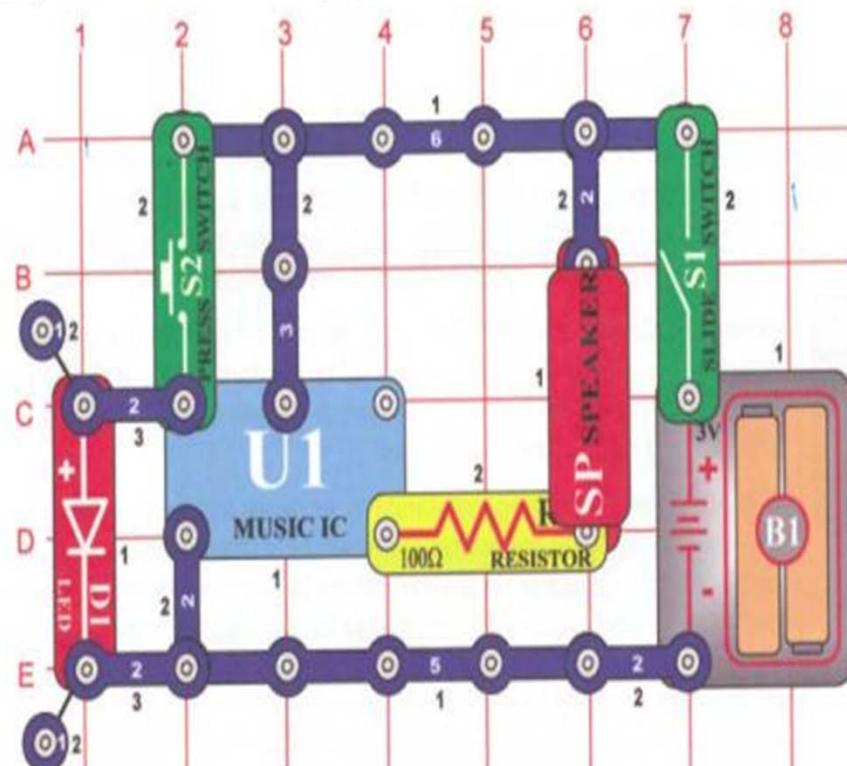
- › **SC-100R – Project #15 Musical Doorbell**
 - *Objective: To show how an integrated circuit can be used as a musical doorbell.*

- › **SC-100R – Project #74 Light-Controlled LED**
 - *Objective: To control an LED using light.*

SC-100R – Project #15 Musical Doorbell



Project #15



Musical Doorbell

OBJECTIVE: To show how an integrated circuit can be used as a musical doorbell.

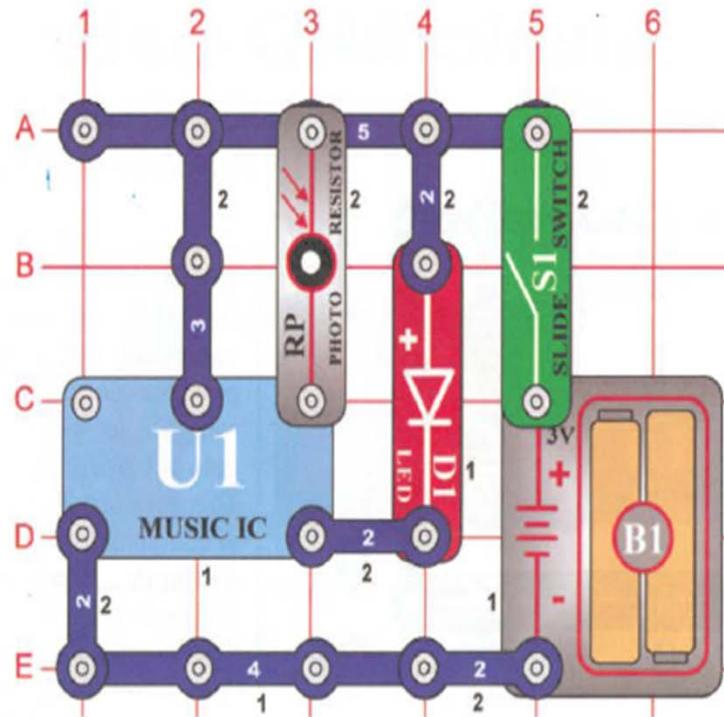
Build the circuit shown on the left. When you close the slide switch (S1), the music integrated circuit (U1) may start playing one song then stop. Each time you press the press switch "doorbell button" (S2) the song will play again and stop. Even if you let go of the press switch (S2), the integrated circuit keeps the song playing until it has reached the end of the song.

Musical integrated circuits are used to entertain young children in many of the toys and chairs made to hold infants. If the music is replaced with words, the child can also learn while they are entertained. Because of great advances in miniaturization, many songs are stored in a circuit no bigger than a pinhead.

SC-100R – Project #74 Light-Controlled LED



Project #74



Light-Controlled LED

OBJECTIVE: To control an LED using light.

Cover the unit, turn the slide switch (S1) on, and notice that the LED (D1) is on for a few seconds and then goes off. Place the unit near a light and the LED will light. Cover the photoresistor (RP) and place it near the light again. The LED will not turn on. The resistance of the photoresistor decreases as the light increases.

QUESTIONS?

