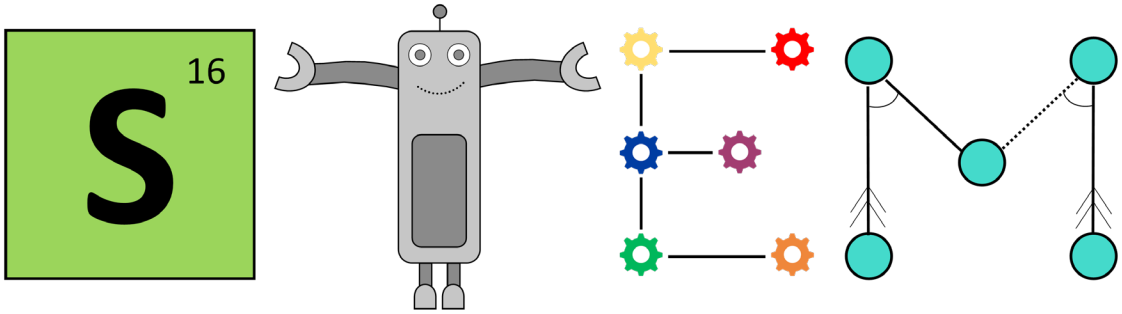
CAL RIPKEN, SR. Foundation

TRANSFORM COMMUNITIES
CHANGE KIDS' LIVES



Ripken Foundation STEM Center

Curriculum Guidebook

INTRODUCTION

ABOUT THE CAL RIPKEN, SR. FOUNDATION

During his 37-year career with the Baltimore Orioles organization, Cal Ripken, Sr. taught the basics of the game and life to players big and small. After he passed away, his sons Cal and Bill recognized that not every child is lucky enough to have such a great mentor and role model. In this spirit, the Ripken family started the Cal Ripken, Sr. Foundation, a national 501(c)(3) nonprofit organization, in 2001.

By teaching kids how to make positive choices no matter what life throws at them, the Cal Ripken, Sr. Foundation strives to help underserved youth fulfill their promise and become healthy, self-sufficient, and successful adults.

ABOUT THE CAL RIPKEN, SR. FOUNDATION STEM PROGRAM

The Cal Ripken, Sr. Foundation provides programs, resources, training, and support to community-based youth organizations across the country that directly impact the lives of underserved kids. When it comes to the fields of Science, Technology, Engineering, and Math (otherwise known as STEM), we have created a program that makes STEM activities and learning easy for mentors at community-based youth organizations to implement.

We have developed Ripken Foundation STEM Centers to facilitate STEM learning with youth partners nationwide. Each Ripken Foundation STEM Center is equipped with this STEM curriculum guidebook paired with STEM Center products and activity kits which provide a comprehensive, experiential learning environment for kids. The activities in the guidebook are designed to offer mentors many ways to teach critical thinking and problem-solving skills, all while having fun.

GUIDING PRINCIPLES OF THE CAL RIPKEN, SR. FOUNDATION

Cal Ripken, Sr. was a player, coach, and manager in the Baltimore Orioles organization for nearly four decades. He developed great players and, more importantly, great people through his style of coaching which we use as our guiding principles at the Foundation. No matter what you are teaching, you can use these four key ideas as your guide:

Keep It Simple

Lessons on the field and in life are best learned when presented in a simple manner. Teach the basics and keep standards high.

Explain Why

By helping kids understand the connections between everyday decisions and real-life outcomes, we can help them make smarter choices for brighter futures.

Celebrate The Individual

When kids are encouraged to be themselves, respected for their opinion, and are encouraged to share it, they are more likely to have a higher self-esteem and feelings of self-worth.

Make It Fun

If kids aren't paying attention or participating, how much are they learning? Whether it's using a game to teach a concept or motivating kids with a little friendly competition, keeping kids engaged is essential.

Want to hear Bill Ripken explain the guiding principles of the Foundation?
Go to **http://www.RipkenFoundation.org** *and sign up for a free account today!*

KEEPING KIDS ENGAGED

Here are some tips to help you structure activities that keep kids engaged, excited, and coming back:

- **Have a plan**
- **Keep activities structured**
- **Provide feedback**
- **Encourage, encourage, encourage**
- **Allow kids opportunities to collaborate and learn from each other**
- **Set achievable goals**
- **Let kids be silly – they're kids!**
- **Use short time increments and reminders**
- **Rotate activities frequently**
- **Let kids have input in the activities they like best**
- **Stay consistent and create routine**
- **Affirm kids when they do well**

SQUISHY CIRCUITS

OVERVIEW

Squishy Circuits teach circuitry and electronics by using conductive dough, LEDs, and other components using a fun and easy-to-grasp product. Using conductive and insulating dough, Squishy Circuits can create any shape imaginable while still teaching circuitry and electronics.

PRODUCT SPECIFICS

Squishy Circuits Kits include:

- **1 Group Kit (includes enough components for a class), including:**
  - **Battery holder**
  - **LEDs (various colors)**
  - **Piezoelectric Buzzer**
  - **Motor with fan blades**
  - **Switch**
- **2 Dough kits**

***Note:** *The dough is a consumable product will need replacing periodically. You can purchase more dough from the Squishy Circuits store, or make it using recipes included with the kit or found online.*

MENTOR NOTES

Kids love how easy this product is to use. The dough provided works well, but there are alternatives as it is a consumable product and will need occasional replenishing. One option is to use commercial play dough as a conductive dough with modeling clay as the insulating dough. There are also recipes found online as well as in the kit to make your own doughs.

There are no official lessons provided from Squishy Circuits. You can find project ideas in the quick start guide and on the Squishy Circuits website.

ONLINE RESOURCES

- **https://squishycircuits.com/**
  Official site with store to purchase additional supplies.

SQUISHY CIRCUITS CONDUCTIVE CREATIONS

OVERALL TIME *60-minute lesson*

GROUPS *Three to four kids per kit*

Next Generation Science Standards

Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

(Energy 4PS3-4)

OBJECTIVE

Kids will identify materials as conductors or insulators for electricity to travel.

OVERVIEW

Children will have the opportunity to build upon previous circuit learning while creating circuits using electrical and motion energy with conductor (Playdoh) and insulator (modeling clay) materials.

MATERIALS

- **Squishy Circuits**
- **Circuit Sketch Sheet**
- **Pencils (optional-colored pencils)**
- **Insulator and Conductor examples**
- **Batteries (AA)**

KEY TERMS

Circuit: a complete and closed path around which electricity can flow.

Closed Circuit: an endless path for electricity to flow.

Conductor: an object or material that allows the flow of electrical current in one or more directions.

Insulator: an object or material that allows little or no electricity to go through.

Negative: the negative pole of a storage battery.

Open Circuit: an electrical circuit that is not complete.

Parallel Circuit: a circuit which has two or more paths for electricity to flow.

Polarity: attraction toward a particular object or in a specific direction.

Positive: the positive pole of a storage battery.

Series Circuit: an electrical circuit in which electricity passes through components following one path.

Short Circuit: the failure of electricity to flow properly.

PREPARATION

Gather some common everyday materials ahead of time:

Sample conductors: penny, aluminum foil, paperclip, water, (Playdoh will be the conductor in the experiment)

Sample insulators: rubber band or rubber ball, something plastic, glass, wood (baseball bat) (modeling clay will be the insulator in the experiment)

LAUNCH *15 to 20 minutes*

Activity 1-Circuit Model

Have kids form a circle by holding hands. This activity will model how electricity flows through a circuit. The leader starts by squeezing the hand of the person next to them. Kids will squeeze the hand of the person next to them and this pattern continues until it comes back to the leader. The leader can then ring a bell or raise their hand to represent a closed complete path. Next, have one kid step out of the circle to represent an open, not complete circuit. Ask kids, what just happened? What might the break in the chain represent?

Activity 2-Conductor or Insulator

The previous activity modeled how a complete circuit is made. Now, we are going to learn about different types of materials that allow electricity to flow in one or more directions called conductors. Other materials that allow little or no electricity to go through are called insulators.

Hold up the common everyday items (i.e. paperclip) one at a time. Ask the group: Does this paperclip act as a "conductor" or as an "insulator" for electricity? A follow up question could be, what makes you think that?

EXPLORATION *35 to 40 minutes*

Task the children to use Squishy Circuits and challenge them to do the following:

1.) Make a complete circuit with a light bulb.

2.) Make a circuit with a motor and switch.

3.) Choose a circuit to create.

Review the materials that come in the kit (battery holder, wires, motor, switch, Playdoh, modeling clay, LED lights). Hold up the LED light and show kids the longer terminal. This terminal will need to go in the dough with the positive (red) wire. Have kids sketch and label each of the circuits created using the Circuit Sketch sheet.

CLOSING *5 minutes*

Have youth partner up with someone from a different group to share new learning from their choice circuit.

ENRICHMENT AND NEXT STEPS

Have extra colored Playdoh out for children to design a creature or organism light up sculpture.

CIRCUIT SKETCHES

NAME _____

Design, sketch, and label the following circuits:

COMPLETE CIRCUIT

MOTOR AND SWITCH

CHOOSE YOUR OWN

STEM RESOURCES

STEM RESOURCES

These resources listed are websites and products that exist which could assist with facilitation of STEM programming.

CODING AND COMPUTER SCIENCE

Code Academy – learn coding for free

- **http://www.CodeAcademy.com**

Code.org – learn coding and programming with popular characters and games

- **http://www.Code.org**

Scratch Visual, Block-based programming language

- **http://scratch.MIT.edu**

Khan Academy Computer Science Courses

- **http://www.KhanAcademy.org/CS**

CodeCombat.com - game using coding principles, free and paid versions

- **http://www.CodeCombat.com**

Mozilla Thimble – online code editor teaching HTML, CSS, and JavaScript

- **http://https://thimble.mozilla.org/en-US**

AppInventor.org – learn to build Android apps

- **http://www.AppInventor.org**

GameBlox – create and edit games with code

- **http://gameblox.org**

MIT App Inventor

- **http://appinventor.mit.edu/explore**

ROBOTICS

Robotics activities come in all shapes and sizes. Here are a few resources to research if interested in starting a robotics program!

LEGO Mindstorms

SeaPerch

NASA Robotics

- **http://nasa.gov/audience/foreducators/robotics http://robotics.nasa.gov**

Sphero

VEX Robotics

STEM RESOURCES

3-D PRINTING

TinkerCAD – online 3D design program. Offers free lessons and design tools

- **http://www.TinkerCAD.com**

Thingverse – website with 3D design files to download and print on your own

- **http://www.Thingiverse.com**

Tinkerine U – online lessons to introduce 3D printing. Has challenges and ideas for kids to design

- **http://www.u.tinkerine.com**

SketchUp – 3D design software, has both a free and paid version

- **http://www.SketchUp.com**

Biological and Earth Sciences

Howard Hughes Medical Institute

- **www.hhmi.org/biointeractive**

EarthWatch Institute

- **http://earthwatch.org/Education**

Earth Science Activities & Experiments

- **http://www.Education.com/activity/earth-science**

MATH

MathChip – math games and activities

- **http://www.MathChimp.com**

STEMCollaborative.org – math games

- **http://www.STEMCollaborative.org**

Adventures in Math

- **http://www.scholastic.com/regions**

Math Playground – math games and activities

- **http://www.MathPlayground.com**

MathSnacks.com – math games and videos

- **http://mathsnacks.com/**

STEM RESOURCES

TECHNOLOGY AND ENGINEERING

Engineering.com – news and articles related to engineering

- **http://www.Engineering.com**

Rube Goldberg Challenges – create elaborate inventions to accomplish a simple task!

- **http://www.RubeGoldberg.com**

Engineering is Elementary – lessons and activities for educators available for purchase

- **http://www.eie.org**

TryEngineering.org – information and lesson plans related to engineering

- **http://www.TryEngineering.org**

TeachEngineering.org – lesson plans and activities that tie into the Next Generation Science Standards

- **http://www.TeachEngineering.org**

PHYSICAL AND CHEMICAL SCIENCES

PhysicsGames.net – games related to physics

- **http://www.Physicsgames.net**

Science Kids – simple experiments and activities

- **http://www.ScienceKids.co.nz/physics.html**

myPhysicsLab.com – interactive online physics simulations

- **http://www.MyPhysicsLab.com**

Algodoo – free physics simulation software

- **http://www.algodoo.com**

ChemCollective.org – online simulations and experiments related to chemistry

- **http://www.chemcollective.org/**

GENERAL STEM RESOURCES

STEM Works – articles, activities, and information about all things STEM!

- **http://www.STEM-works.com**

New Mexico State University Learning Games Lab- fun and educational games on a variety of topics

- **http://www.LearningGamesLab.org**

STEM RESOURCES

4-H National Youth Science Experiment – a new experiment released annually related to various STEM concepts

- **http://www.4-h.org/NYSD**

Magic School Bus – games, activities, and stories on a wide variety of topics

- **http://www.Scholastic.com/MagicSchoolBus**

National Geographic Kid's Website

- **http://Kids.NationalGeographic.com**

IXL.com – quizzes and activities to reinforce concepts and skills across disciplines. A preview is free but full site use requires subscription

- **http://www.ixl.com**

PBS – The Public Broadcasting Service has several pages related to education and learning

- **http://www.PBSLearningMedia.org**
- **http://www.PBSKids.org/DesignSquad**
- **http://www.PBSKids.org/**

BrainPOP – online educational videos and games. Some videos and games are free, but most require a subscripton

- **http://www.BrainPOP.com**
- **http://www.brainpop.com/games/**

Makerspace.com – Online community for the Maker movement of invention and creativity. Get and share ideas of what to create and make next!

- **http://www.MakerSpace.com**

SEA Research's STEM Mentoring Program

- **http://stemmentoringprogram.org/**

Common Sense Media – resource with ratings and information on various technology media such as games, cyber safety, and other web resources

- **https://www.commonsensemedia.org/**

STEM RESOURCES

You are on the front lines, empowering kids in your community each and every day. You're there through life's challenges, just as Cal Ripken, Sr. was for his kids and his players: teaching them how to make the best of every situation, leading by example, and encouraging them to swing for the fences.

At the Cal Ripken, Sr. Foundation, we see our role as supporting you in this shared mission. This guidebook is just a stepping-stone to start your STEM program! We hope you find ways to expand and keep your program going in perpetuity. Here are some resources to encourage program growth.

ADDITIONAL CAL RIPKEN, SR. FOUNDATION RESOURCES

For more information about the Cal Ripken Sr. Foundation, visit our website at

- **http://www.ripkenfoundation.org**

Follow us on twitter at **http://www.twitter.com/CalRipkenSrFdn**

Find us on Facebook at **http://www.facebook.com/CalRipkenSrFdn**

Check out our YouTube Channel at **http://www.youtube.com/CalRipkenSrFdn**

ACKNOWLEDGEMENTS

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