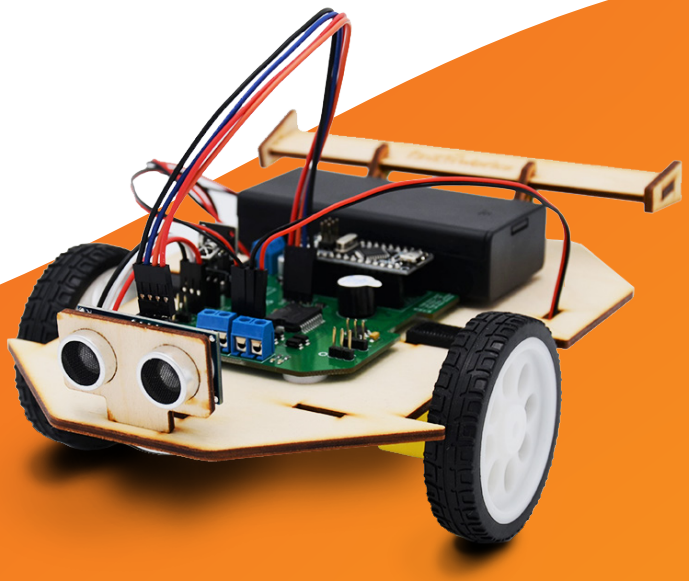
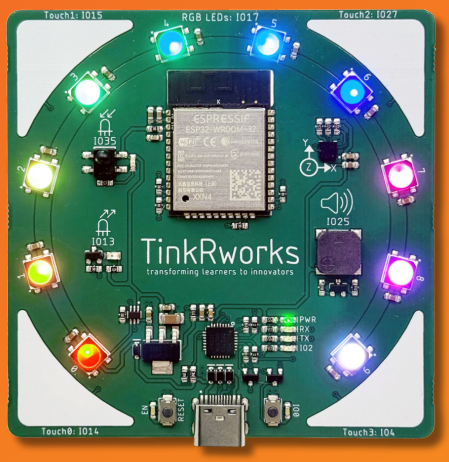
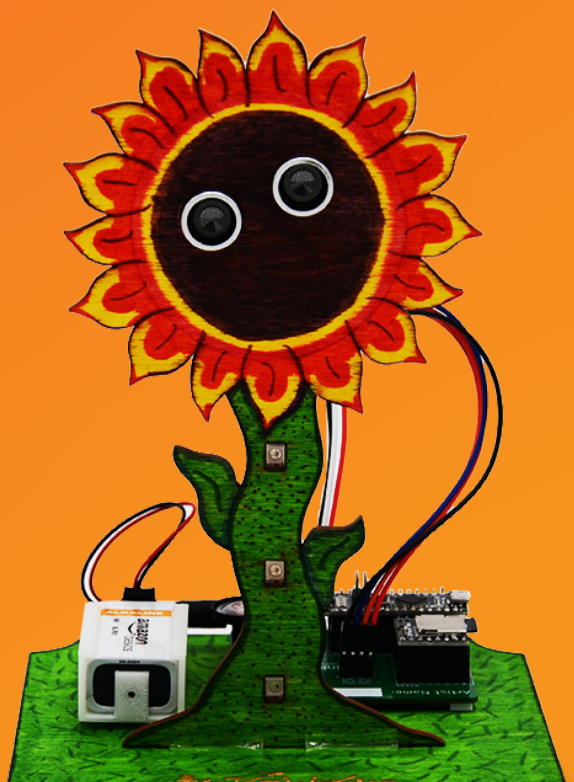
TinkRworks®
transforming learners to innovators

Hands-on STEAM Made Simple

Grades K-8







CREATE THE NEXT GENERATION OF INNOVATORS

TinkRworks for grades K-8 is a critical piece of STEAM Project-based Learning initiatives for school systems nationwide. We provide all of the essential ingredients to ensure successful STEAM implementation — powered by professional support.

Designed to motivate students in unprecedented ways, TinkRworks promotes cross-curricular connections to computer science, data analysis, design, ELA, engineering, math, and science.

SUPPLEMENTAL K-8 CURRICULUM

Our standards-rich STEAM curriculum is designed to target key learning objectives: CCSS (ELA and Math), NGSS, CSTA, and others.

EDUCATOR RESOURCES & SUPPORT

We provide all the tools you need—lesson plans, instructional slides, activity guides, student assessments, and professional development.

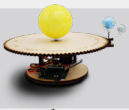
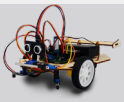
HANDS-ON STEAM PROJECTS

Individual kits include everything you need to deliver comprehensive, grade-appropriate STEAM. Make-and-take and reusable versions available.

USER-FRIENDLY CODING ENVIRONMENT

TinkRcode, our web-based coding environment, uses a visual drag-and-drop environment and links wirelessly to project kits.

Curriculum-Rich Projects for Grades K-8

PROJECTS	BEGINNER PROGRAMMING ENVIRONMENT			ADVANCED PROGRAMMING ENVIRONMENT					
	K	1	2	3	4	5	6	7	8
 STEAM Academy	●								
 Pushes, Pulls & Pins ♻	●	●	●						
 Smart Lamp ♻		●	●						
 Art Electric		●	●	●	●	●	●	●	●
 Pampered Plant ♻			●	●	●	●			
 Tech-A-Sketch ♻				●	●	●			
 LaunchPad ♻				●	●	●	●	●	●
 Weather Station				●	●	●			
 TinkRbot				●	●	●			
 Planetary Pathways					●	●	●		
 TinkRdrone							●	●	●
 SensorBot							●	●	●
 TinkRsynth ♻							●	●	●

● TARGET GRADE LEVELS ♻ REUSABLE KITS (PAGE 7)

Supplemental K-8 Curriculum

TinkRworks supports teachers at every step — no extra preparation required. The resource center includes all the tools teachers need to facilitate classroom instruction, complement essential standards, support project construction, and administer assessments.

LESSON PLANS

Detailed curriculum maps provide a comprehensive overview for each lesson — including learning objectives, key concepts, vocabulary, pacing suggestions, and how content is aligned to grade-specific standards.

INSTRUCTIONAL SLIDES

Content-rich slides are used to help structure lessons with background information and lead classroom discussion. Detailed notes are included for educators as they guide students through each lesson.

ACTIVITY GUIDES

Every project arrives with ready-to-teach activity guides to supplement lessons — including learning objectives, materials needed, setup procedure, detailed instructions on how to administer and discuss the activity, and troubleshooting tips to aid instructors.

ASSESSMENTS

Formal and informal assessments offer a combination of multiple choice, written response, and true/false questions. Students may be assessed on content-specific understanding and/or their ability to create, understand, or troubleshoot programming. Digital portfolios are also included as a place for students to document and reflect on their experience.

Our Approach: PBL

Project-based Learning (PBL) is at the heart of everything we do.

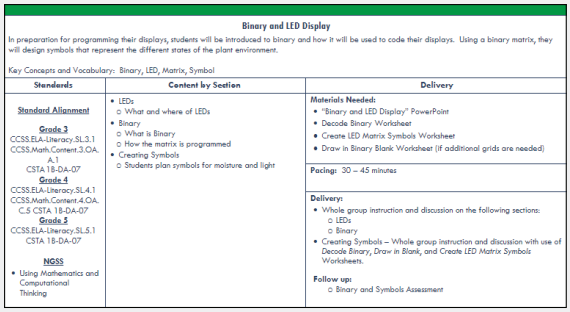
PBL is an educational approach in which students explore real-world problems through individual and group projects. When done well, it allows students to make sense of why content is useful and how it might be applied.

Curriculum: At a Glance

TinkRworks' projects come ready-to-teach and include everything you need to deliver targeted, grade-appropriate STEAM learning.

LESSON PLANS

TinkRworks curriculum is divided into modules (or lesson plans). Each covers a specific subject or project build.



Binary and LED Display

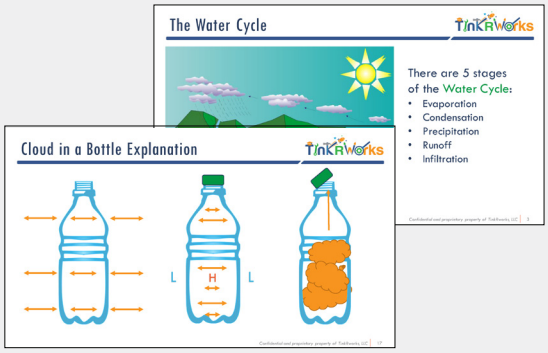
In preparation for programming their displays, students will be introduced to binary and how it will be used to code their displays. Using a binary matrix, they will design symbols that represent the different states of the plant environment.

Key Concepts and Vocabulary: Binary, LED, Matrix, Symbol

Standards	Content by Section	Delivery
Standard Alignment **Grade 3** CCSS.ELA-Literacy.SL.3.1 CCSS.Math.Content.3.OA.A.1 CSTA 1B-DA-07 **Grade 4** CCSS.ELA-Literacy.SL.4.1 CCSS.Math.Content.4.OA.C.5 CSTA 1B-DA-07 **Grade 5** CCSS.ELA-Literacy.SL.5.1 CSTA 1B-DA-07 **NGSS** • Using Mathematics and Computational Thinking	• LEDs ○ What and where of LEDs • Binary ○ What is Binary ○ How the matrix is programmed • Creating Symbols ○ Students plan symbols for moisture and light	**Materials Needed:** • "Binary and LED Display" PowerPoint • Decode Binary Worksheet • Create LED Matrix Symbols Worksheet • Draw in Binary Blank Worksheet (if additional grids are needed) **Pacing:** 30 – 45 minutes **Delivery:** • Whole group instruction and discussion on the following sections: ○ LEDs ○ Binary • Creating Symbols – Whole group instruction and discussion with use of *Decode Binary*, *Draw in Blank*, and *Create LED Matrix Symbols* Worksheets. **Follow up:** ○ Binary and Symbols Assessment

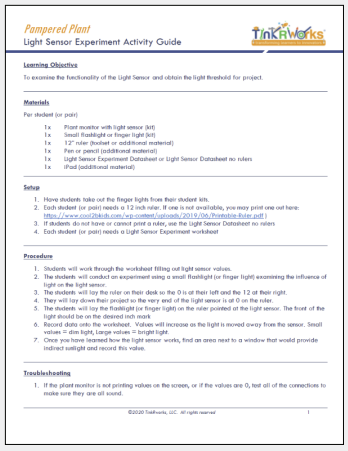
INSTRUCTIONAL SLIDES

Each module is structured with content-rich slides that help guide discussion and activities.



ACTIVITY GUIDES

Every project arrives ready-to-teach with hands-on activities to apply lesson concepts.



Pampered Plant
Light Sensor Experiment Activity Guide

Learning Objective

To examine the functionality of the Light Sensor and obtain the light threshold for project.

Materials

For student (or pair):

1x Plant monitor with light sensor (kit)
1x Small flashlight or finger light (kit)
1x 12" ruler (toolset or additional material)
1x Pen or pencil (additional material)
1x Light Sensor Experiment Datasheet or Light Sensor Datasheet no rulers
1x iPad (additional material)

Setup

1. Have students take out the finger lights from their student kits.
2. Each student (or pair) needs a 12 inch ruler. If one is not available, you may print one out here: https://www.cool2bkids.com/wp-content/uploads/2019/06/Printable-Ruler.pdf)
3. If students do not have or cannot print a ruler, use the Light Sensor Datasheet no rulers
4. Each student (or pair) needs a Light Sensor Experiment worksheet

Procedure

1. Students will work through the worksheet filling out light sensor values.
2. The students will conduct an experiment using a small flashlight (or finger light) examining the influence of light on the light sensor.
3. The students will lay the ruler on their desk so the 0 is at their left and the 12 at their right.
4. They will lay down their project so the very end of the light sensor is at 0 on the ruler.
5. The students will lay the flashlight (or finger light) on the ruler pointed at the light sensor. The front of the light should be on the desired inch mark
6. Record data onto the worksheet. Values will increase as the light is moved away from the sensor. Small values = dim light, Large values = bright light.
7. Once you have learned how the light sensor works, find an area next to a window that would provide indirect sunlight and record this value.

Troubleshooting

1. If the plant monitor is not printing values on the screen, or if the values are 0, test all of the connections to make sure they are all sound.

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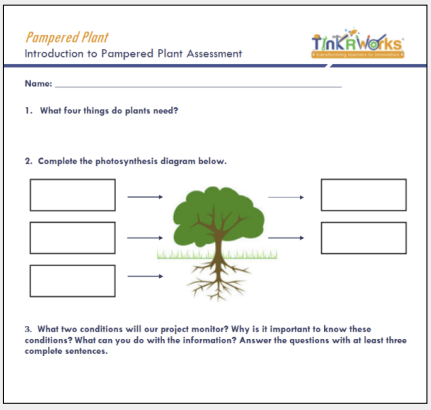
STUDENT ASSESSMENTS

Skills and knowledge assessments are completed at the end of a lesson to gauge each student's ability to reflect on content.



Pampered Plant
Introduction to Pampered Plant Assessment

Name: _____

1. What four things do plants need?

2. Complete the photosynthesis diagram below.

3. What two conditions will our project monitor? Why is it important to know these conditions? What can you do with the information? Answer the questions with at least three complete sentences.

Getting Started

A STEAM solution that empowers educators.

PROFESSIONAL DEVELOPMENT (PD)

You don't need to be a STEM expert, Project-based Learning whiz, or have experience with coding to teach TinkRworks. Every project includes an online PD session to ensure effective implementation.

CUSTOMER SUPPORT

If you run into any technical or curricular questions during PD or implementation, we're here to help! Partnering with TinkRworks means you can expect responsive and personalized assistance from our support team.

FLEXIBLE IMPLEMENTATION

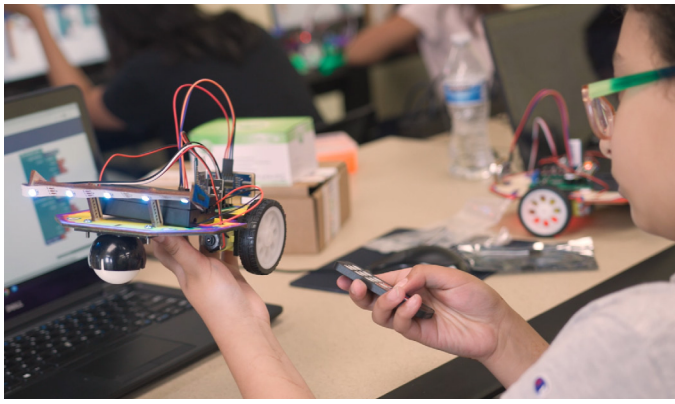
Personalize your instructional time with TinkRworks. Each project provides 10-18+ hours of instruction and can be used in science class, STEAM lab, after school, and summer school.

APPROACH	MODEL	SCHEDULE
Targeted	Supplemental Science Class STEAM Club Extended Day	Once or twice weekly for 45-60 minutes up to 15 weeks
STEAM Everyday	STEAM Lab Summer School Extended Day	Every day for 45-60 minutes over a 5-6-week period

Two Types of Projects

Ready-to-teach projects that include everything you need to deliver comprehensive, grade-appropriate STEAM learning.

Choose from two types of project kits:

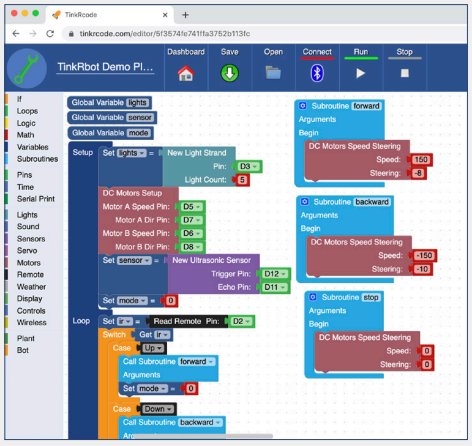


MAKE-AND-TAKE KITS

Many TinkRworks' projects are consumable — meaning students receive their very own project kit that they can customize and take home to keep. This means the learning adventure doesn't end in the classroom. Students can continue to engage with STEAM and bring their ideas to life long after the curriculum is complete.

REUSABLE KITS

Select projects are designed with reusability in mind. Reusable projects can be can implemented with students, disassembled, and used again with another group of students throughout the day or school year — creating endless opportunities to reinforce key concepts. Licensing per user is renewed annually.



TinkRcode

User-friendly Coding Environment

Projects include access to TinkRcode. Our drag-and-drop, block-based programming environment helps students develop algorithms and create code that is uploaded wirelessly to projects. Each student's custom code for their project's various components (including lights, speakers, motors, and more) brings their project to life in their own unique way. No prior coding experience required — for teachers or students.

Reach More Students With Budget-friendly STEAM

Our team is here to help you find the right STEAM solution for your school.

Mix and match TinkRworks' make-and-take and reusable project kits to create a STEAM program that fits your budget. Our reusable kits offer the same innovative, comprehensive STEAM instruction as our make-and-take projects, but they are not limited to one-time use. Reusable projects can be can implemented with students, disassembled, and used again with another group of students throughout the day or school year. Select projects are available as reusable kits — with more coming soon!

REUSABLE PROJECTS *More Coming Soon!*

PUSHES, PULLS & PINS | GRADES K-2
Introduce students to electronics, coding, and forces with an electronic table-top bowling game. Learn more on page 8.

SMART LAMP | GRADES 1-2
Discover smart technology with a color-changing light box that plays music. Learn more on page 9.

PAMPERED PLANT | GRADES 2-5
Explore plant science, coding, and art history with an electronic plant monitoring system. Learn more on page 10.

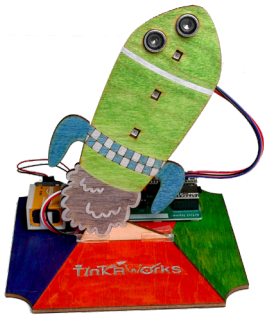
TECH-A-SKETCH | GRADES 3-5
A classic drawing toy meets the 21st century. This digital drawing project brings together electronics, coding, and art. Learn more on page 11.

LAUNCHPAD | GRADES 3-8
Dive into coding with an interactive, hand-held electronic circuit board. Learn more on page 12.

TINKRSYNTH | GRADES 6-8
Inspire future composers with a sound mixing board. Students explore the fundamentals of coding through music. Learn more on page 14.

STEAM Academy
GRADE K

Bring STEAM concepts to life with programmable art. Students assemble, design, and program their very own masterpieces with customizable lights and sounds that enrich their artistic themes. Along the way, students learn about the science of light and sound, how electricity and circuits work, and how echolocation can be mimicked with technology. This project supports Social and Emotional Learning through activities that allow students to relate how sound and color affect how they feel.



ESSENTIAL QUESTION

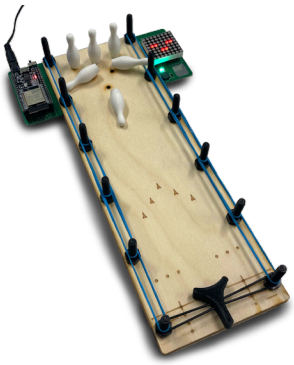
What can we create that uses all five parts of STEAM?

LESSON MODULES

1. Introduction
2. Electricity
3. Circuit Board Build
4. What is Coding?
5. Light & Dark
6. Colored Light
7. Programming Lights
8. Sound is Vibration
9. Sound Choices
10. Programming Sound
11. Sensors & Echolocation
12. Attach Ultrasonic Sensor
13. Final Assembly & Programming

Pushes, Pulls & Pins
GRADES K-2

Explore forces and programming with an electronic tabletop bowling game. Through experiments and kinetic exercises, students learn about the effect of push and pull forces, different materials, strength, speed, direction, and collision on the movement of objects. While exploring these concepts, students learn how to program their projects to use light sensors to determine how many pins have been knocked down. They flex their creative muscles by composing and coding music, as well as designing animations that indicate strikes and spares.



ESSENTIAL QUESTION

How can we use electronics and coding to help us understand strength and direction of forces?

LESSON MODULES

1. Introduction
2. Pushes & Pulls
3. Build
4. Strength
5. Coding Light Sensors
6. Launcher
7. Surface Texture
8. Coding Music
9. Direction
10. Coding Display
11. Collisions
12. Coding Symbols
13. Final Coding

Smart Lamp

GRADES 1-2

Explore smart technology and self-expression with a color-changing light box that plays music. Students learn about the properties of light and sound, how music is composed, and how to build their own Smart Lamp — including installing electronics and using programming to express emotion. This project supports Social and Emotional Learning through activities that allow students to relate how they feel.

ESSENTIAL QUESTION

How can we use smart technology to express our emotions and moods?

LESSON MODULES

1. Introduction
2. Electricity & Circuits
3. Illumination & Transparency
4. Smart Lamp Build
5. Colored Light Mixing
6. Programming Lights
7. Communicating with Light
8. Sound
9. Music & Programming Music
10. Composing Moods
11. Final Programming
12. Decorate Your Smart Lamp

Art Electric

GRADES 1-8

Inspire creativity and self-expression with programmable art that explores the basics of design, art, and programming. Students bring STEAM concepts (and their very own interactive art project) to life using coding, design, electronics, motors, 3D sculpted pieces, light, and sound. Three grade-appropriate versions are available: Grades 1-2, 3-5, and 6-8.

ESSENTIAL QUESTION

How can you create a custom, interactive art project by implementing various electronics and programming them to portray an expression?

LESSON MODULES

1. Introduction
2. Electricity & Circuits
3. Light & RGB Colors
4. Programming Lights
5. Programming Sound
6. Sound
7. Motors & Servos
8. Programming Servos
9. Artwork
10. Sensors
11. Programming Ultrasonic
12. Final Assembly & Programming

Pampered Plant

GRADES 2-5

Dive into plant science, coding, and art history. Using electronics and programming, students create a customizable plant monitoring system with an animated light display that responds to environmental conditions (soil and light). Along the way, they learn about electronics and how to conduct experiments, gather data, and analyze their findings. Students wrap up the course with a lesson on the history of pot decoration — showing off their creativity with their own artistic designs. Two grade-appropriate versions are available: Grades 2 and 3-5.

ESSENTIAL QUESTION

How can we know when a potted plant needs more water or light?

LESSON MODULES

1. Introduction
2. Introduction to Programming
3. Moisture Sensor
4. Binary & LED Display
5. Code LED Display
6. Animation
7. Conditional Statements
8. Light Sensor
9. Putting It All Together
10. Painted Pottery
11. Plant Care & Potting

Weather Station

GRADE 3-5

Immerse students in programming and earth science with an electronic weather monitoring system. Students design and assemble a system using electronics that measure multiple weather parameters. Students program sequences, loops, and conditionals to collect and display data. Along the way, they learn about the factors that affect weather, such as temperature and humidity, and how weather data is collected and analyzed.

ESSENTIAL QUESTION

How can we observe and collect weather data using technology?

LESSON MODULES

1. Introduction
2. Temperature
3. Electricity & Circuits
4. Build
5. Water Cycle & Clouds
6. Introduction to Programming
7. TinkRcode & LCD Screen
8. Humidity
9. Sunshine & Rainbows
10. Programming Current Weather Measurements
11. Data Trends
12. Programming Dial
13. Conditionals
14. Weather Impact
15. Measurement Logs
16. Climate
17. Final Programming & Gluing
18. Weather Forecasting

Tech-A-Sketch

GRADES 3-5

A classic drawing toy meets the 21st century! In this project, students assemble a handheld digital drawing project — complete with programmable LCD display, buttons, and knobs — to create their own unique artist palette. Students explore the science of displays, coordinate systems, plotting basic shapes, and creating brushes, while applying these learnings through a customizable, one-of-a-kind drawing experience.

ESSENTIAL QUESTION

How can we use electronics and coding to create a color digital drawing device?

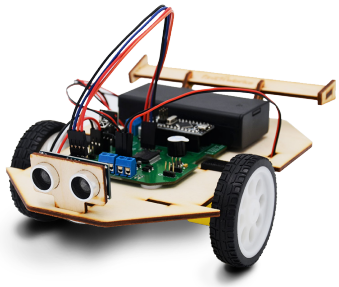
LESSON MODULES

1. Introduction
2. Introduction to Programming
3. Build
4. Display
5. Draw Rectangle
6. Sketch
7. Buttons
8. Toolkit
9. Backgrounds
10. Widgets
11. Accelerometer
12. Additional Features
13. Custom Brushes
14. Final Programming

TinkRbot

GRADES 3-5

Introduce the fundamentals of robotics with this highly customizable STEAM project. Students build a robot with unique capabilities from scratch. They develop logic and programming skills through design, build, and coding. Using a cloud-based coding environment, students program their robots to complete a variety of challenges — designed to allow students to develop logic and programming skills fundamental to all robotics. Through hands-on exploration and experimentation, students learn about conversion, conservation, and transfer of energy.



ESSENTIAL QUESTION

How can we build, personalize, and program a robot that can meet a variety of challenges while expressing our individualism?

LESSON MODULES

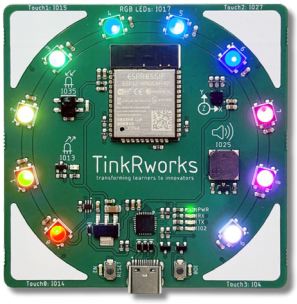
1. Introduction
2. Motors & Wheels
3. PCB & Batteries
4. Energy
5. Light & RGB Pixels
6. Programming Lights
7. Programming Sound
8. Motors
9. Programming Motors
10. Transfer of Energy
11. Sensors & Ultrasonic
12. Programming Ultrasonic
13. Programming with Subroutines
14. Programming Remote Control
15. Final Coding

LaunchPad

GRADES 3-8

A lot of science in a small package! LaunchPad is a hand-held electronic circuit board — equipped with touch sensors, lights, sounds, remote control, and an accelerometer — that can be programmed as an electronic board game, a light and sound show, a musical instrument, a speed reaction game, a balance device, or anything else students can think of. Unlike other coding platforms, students learn the fundamentals of coding principles through activities, thought experiments, class discussions, journaling, and guided and independent coding.

They also explore and use real-life coding strategies to bring their ideas to life. Two grade-appropriate versions are available: Grades 3-5 and 6-8.



ESSENTIAL QUESTION

How can we use programming to turn a circuit board into an interactive game console?

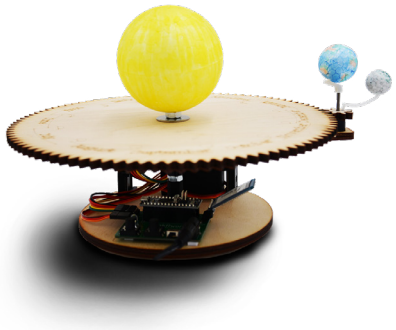
LESSON MODULES

1. Introduction
2. Lights
3. Sounds
4. Touchpads & Conditionals
5. Accelerometer
6. Variables & Math
7. Remote Controller
8. Subroutines
9. Loops
10. Final Programming

Planetary Pathways

GRADES 4-6

Bring planetary and lunar orbits to life with programming. Students create an Orrery — a motorized rotating model of the Sun, Earth, and Moon — and learn about how their relationship affects life on Earth. They explore how the movement of the planets change throughout the day, month, and year, along with what we see in the sky, shadows, and the Earth's temperature. They also explore how to program buttons and motors to control movement of the earth and moon around the sun.



ESSENTIAL QUESTION

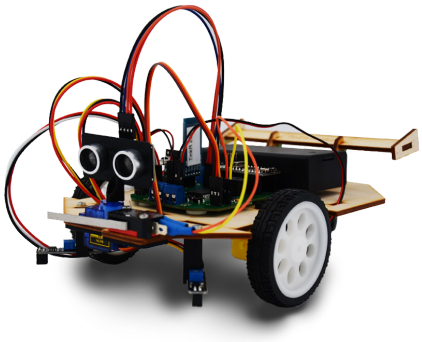
How can we create a model of the solar system that demonstrates the movements of the earth and moon and how that impacts what we see in the sky and feel on earth?

LESSON MODULES

1. Introduction
2. Build the Base
3. Motors
4. Programming Motors
5. Earth's Rotation
6. Programming Buttons
7. Gears
8. Encoder
9. Finish Build
10. Earth's Orbit
11. Program Earth's Orbit
12. Earth's Seasons
13. Moon's Orbit
14. Stars
15. Wrapping Up

SensorBot
GRADES 6-8

Immerse young innovators in the world of robotics. Students assemble and code robots capable of sensing and reacting (through motion and light) to their surroundings. They experiment with different sensors and develop their coding skills by programming their robots to solve mazes and challenges — such as following lines and object detection and avoidance.



ESSENTIAL QUESTION

How can sensor readings be combined to make a robot accomplish specific goals?

LESSON MODULES

1. Introduction
2. SensorBot Build 1
3. Motors
4. SensorBot Build 2
5. Programming Movement
6. Lights
7. Subroutines
8. Servos
9. Ultrasonic Sensor
10. Reflectance Sensor
11. Touch Sensor
12. IR Sensor
13. Mazes
14. Final Programming

TinkRdrone
GRADES 6-8

Take flight with Project-based Learning! Students decorate, build, and fly their very own quadcopters. Students work together to investigate the interaction of lift and weight in a controlled experiment. Along the way they learn about forces, electricity, voltage, graphing findings, and how to problem-solve technical difficulties.

ESSENTIAL QUESTION

How can we explore and investigate the forces that affect drone flight?

LESSON MODULES

1. Introduction
2. Frame Decoration
3. Basics of Drone Flight
4. Motor Mount & Flight Board
5. Flight Prep & Practice
6. Motors
7. Flight Practice
8. Lift Experiment
9. Propeller Decoration & Installation
10. Batteries
11. Troubleshooting Challenges
12. Flight Time
13. Troubleshooting & Drone Maintenance

TinkRsynth

GRADES 6-8

Inspire future composers and reinforce the fundamentals of coding through music. Students create a sound mixing board to produce, manipulate, and synthesize sounds. They do this by programming the board to combine various electrical waves together to create sound for their unique instruments. Along the way, they explore the properties and physics of sound waves and use their instruments to learn about rhythm, chords, melodies, and to compose music. Students show off what they've learned by orchestrating a solo performance or forming an ensemble with classmates!

ESSENTIAL QUESTION

How can we develop a device that enables us to create and modify sounds that we can use to compose and play music?

LESSON MODULES

1. Introduction
2. Basic Waveforms
3. Buttons
4. Knobs & After Effects
5. Dial
6. Create Instruments
7. Keyboards, Functions, & Presets
8. Melody
9. Final Coding
10. Ensemble Part 1
11. Ensemble Part 2

Coming Soon!

NEW PROJECTS

At TinkRworks, we're always working on what's next. Projects in development feature hands-on activities, standards-informed instruction, age- and grade-appropriate coding environments, assessment tools, and professional development. Keep an eye out for more reusable projects and the addition of Machine Learning/Artificial Intelligence (ML/AI), Internet of Things (IoT), Data Science, and more to our innovative STEAM curriculum!

TinkRworks®
transforming learners to innovators

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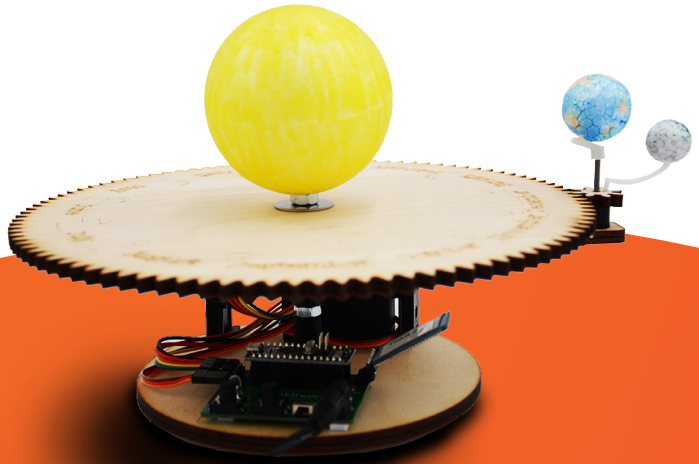

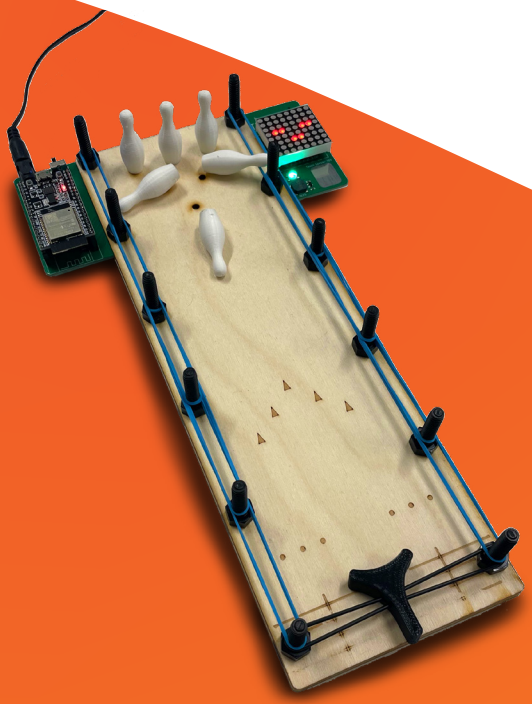

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