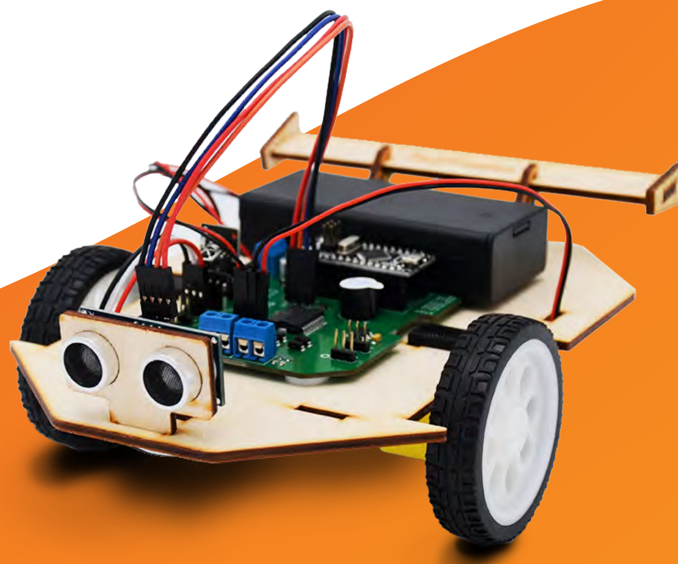
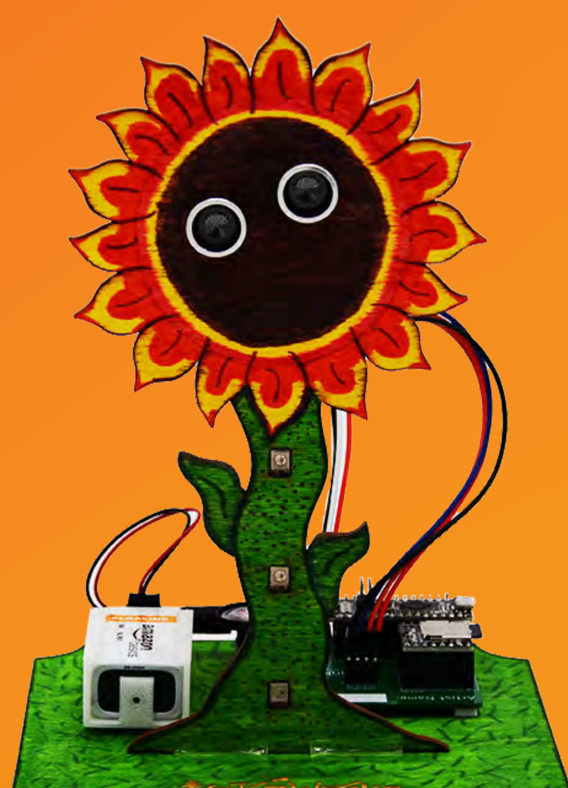
TinkRworks®

transforming learners to innovators

Hands-on STEAM Made Simple

Grades K-8





CREATE THE NEXT GENERATION OF INNOVATORS

TinkRworks for grades K-8 was developed by educators and engineers and is a critical piece of STEAM and project-based learning initiatives for school systems nationwide.

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

K-8 PROJECTS

Hands-on projects can be used flexibly across several grade levels.

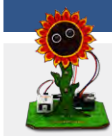
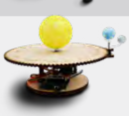
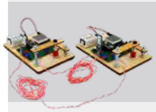
STANDARDS-RICH CURRICULUM

Comprehensive instructional support targets NGSS, CCSS, and CSTA standards.

PROFESSIONAL LEARNING

In-person, online, and blended training options support effective implementation.

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	●								
COMING SOON!	Pushes, Pulls and Pins	●								
	Smart Lamp		●	○						
	Art Electric		●	●	●	●	●	●	●	●
	Pampered Plant			●	○	○	○			
	LaunchPad				●	●	●	●	●	●
	Weather Station				●	○				
	TinkRbot				○	●	○			
	Planetary Pathways					○	●	○		
	TinkRdrone							●	●	●
	SensorBot							●	●	●
	Morse Coding							●	●	●
COMING SOON!	TinkRsynth							●	●	●

● **TARGET GRADE LEVELS**
STEAM curriculum developed to support the specific grade-level standards

○ **GOOD FOR THESE GRADES, TOO**

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.

A series of rigorous studies show that authentic, student-driven approaches to project-based learning improve student outcomes.

SECOND-GRADE STUDENTS in Michigan who used a project- based social studies and literacy curriculum demonstrated five to six more months of learning in social studies and two to three more months in informational reading than a comparison group (Duke et al., 2020).

THIRD-GRADE STUDENTS in Michigan who used an interdisciplinary project-based science curriculum performed 8 percentage points better than peers in traditional classes on a key science assessment (Krajcik et al., 2021).

MIDDLE SCHOOL STUDENTS in California who learned science with a project-based curriculum outperformed their peers by 11 percentage points on a science assessment and also did better on the state's end-of-year math and English language arts assessments (Deutscher et al., 2021).

Taken together, these studies provide clear evidence that rigorous project-based learning has a strong effect on student achievement. The research also found that these PBL programs improved certain aspects of social and emotional learning, and these effects were consistent across racial and socio-economic groups.

Core Design Principles of PBL

CHALLENGING PROBLEM OR ESSENTIAL QUESTION

Problems or questions provide the organizing structure for PBL and make learning meaningful because they give learning a purpose—students are not just gaining knowledge in order to remember it; they're gaining knowledge in order to use it.

SUSTAINED INQUIRY

Challenging problems or questions are used to launch an inquiry designed to solve the problem or answer the question. The classic PBL project begins by students asking, "What do we know?" and "What do we need to know?" to solve the problem or answer the driving question.

STUDENT VOICE

Faced with a challenging problem or question, students must be able to exercise judgment and make decisions about how to resolve it. Otherwise, the project becomes an exercise or a set of directions to follow.

REFLECTION

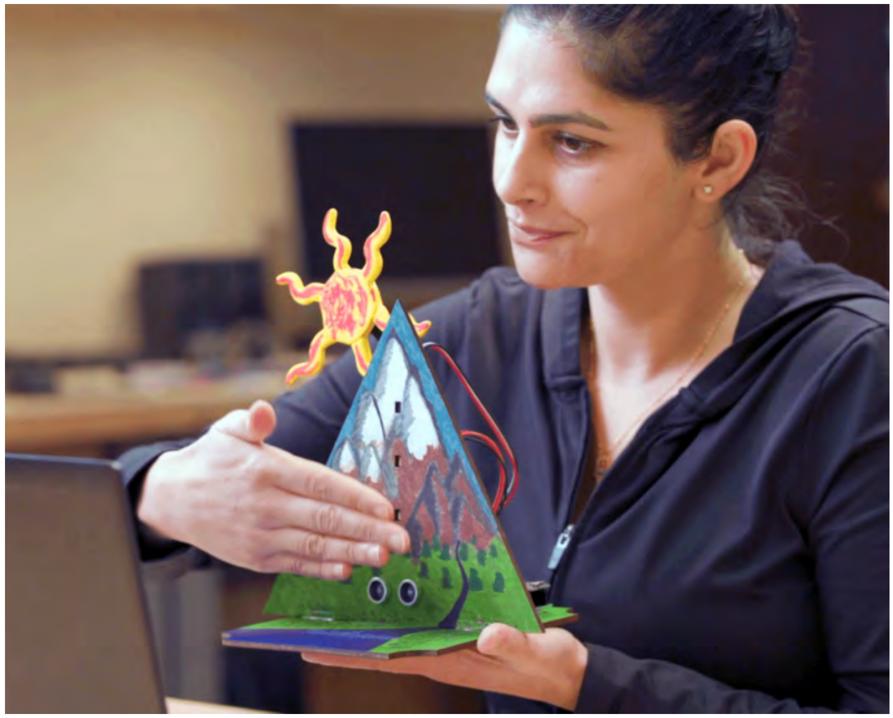
Careful reflection enables students to determine whether the problem-solving strategies they are using are appropriate to the problem being solved.

DEEP INTEGRATION OF ACADEMIC STANDARDS

Projects should feature deep integration with standards and be rooted in core subject areas, helping to deepen and build student knowledge of important topics. The goal of PBL is to help students deepen and build their knowledge of important topics.

Professional Learning

Educators receive the tools they need for effective launch and implementation, including in-person, online, and blended training, as well as individual and team coaching.



FLEXIBLE IMPLEMENTATION

TinkRworks' flexible implementation options allow educators to personalize instructional time. Each project provides 10-18+ hours of instruction and can be used in science class, STEAM lab, after school, and summer school.

EXAMPLES OF IMPLEMENTATION SCENARIOS INCLUDE:

APPROACH	MODEL	SCHEDULE
Targeted	Supplemental Science Class STEAM Club Extended Day	Once 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

Online Teaching Platform

An online teaching resource center includes all the information teachers need to facilitate classroom instruction, build projects and assess students.

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

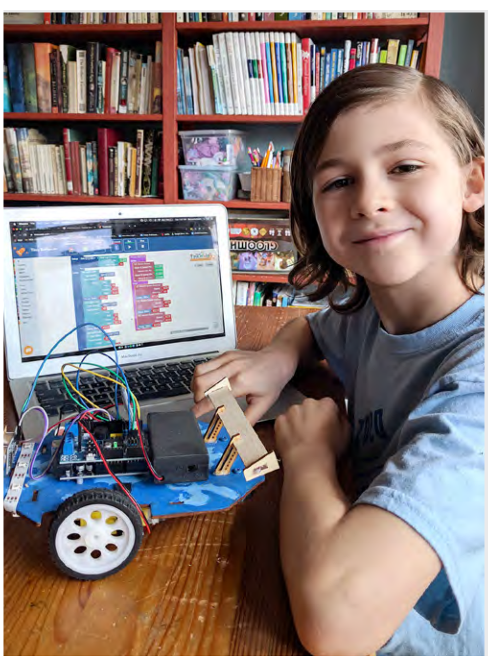
Content-rich slides are used to help structure lessons with background information and lead classroom discussion. Detailed notes are included for educators as they guide students through each lesson.

PROJECT BUILD VIDEOS

Step-by-step videos support the build process to ensure successful completion of each project. Project build videos are embedded within the instructional slides.

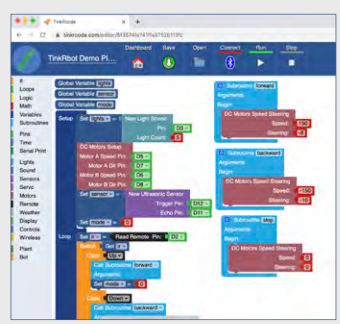
ASSESSMENTS

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.



Programming Environment

A 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 is required, for both facilitators and students.



STEAM Academy

GRADE K

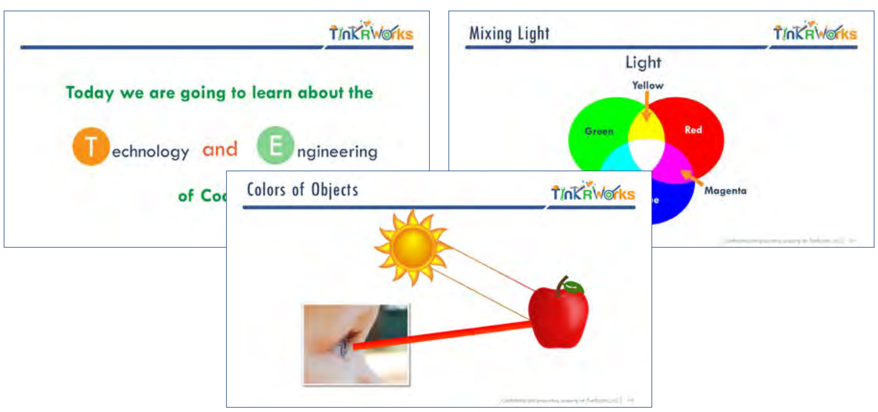
Using a circuit board, microcontroller, programmable LEDs and a speaker, students program their masterpieces into life with lights and sounds that enrich their artistic themes. Through exploratory and kinetic activities, students examine the science of light and sound, discover how electricity and circuits work, and learn 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.

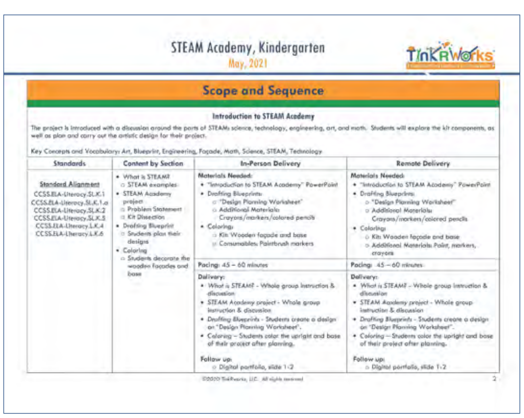
ESSENTIAL QUESTION

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

GUIDE DISCUSSION

In STEAM Academy, hundreds of slides provide rich visuals (and detailed teacher notes!) to facilitate a conversation around each learning objective, lesson by lesson.





ORGANIZE ACTIVITIES

STEAM Academy lesson plans help educators structure classroom instruction. Stay organized with lesson objectives, expected outcomes, relevant standards, pacing options and more.

LESSON MODULES

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

Smart Lamp

GRADE 1

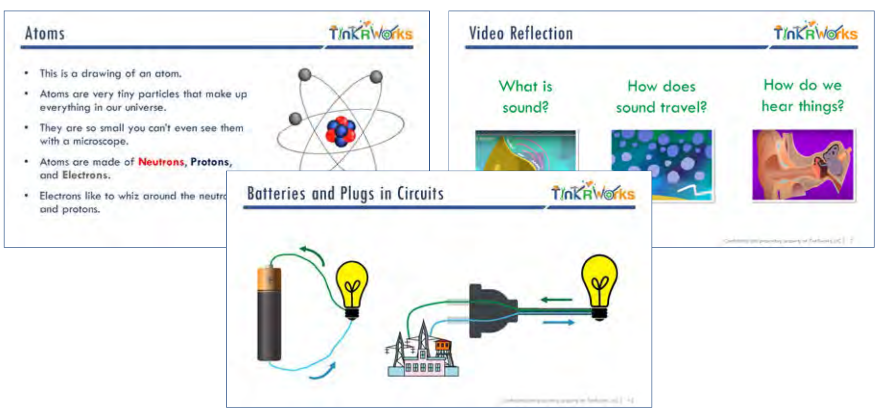
Students use technology to express emotions through the creation of a Smart Lamp—a color-changing light box that plays music. They learn about the properties of light and sound, how music is composed, and how to build their own Smart Lamp, including installing a circuit board, Arduino (micro-controller or mini-computer), speaker and LEDs. Using a touch-screen app and Bluetooth, they program expressions of emotion and set up a remote that switches between moods at a touch of a button. 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?

GUIDE DISCUSSION

In Smart Lamp, hundreds of slides provide rich visuals (and detailed teacher notes!) to facilitate a conversation around each learning objective, lesson by lesson.



ORGANIZE ACTIVITIES

Smart Lamp lesson plans help educators structure classroom instruction. Stay organized with lesson objectives, expected outcomes, relevant standards, pacing options and more.

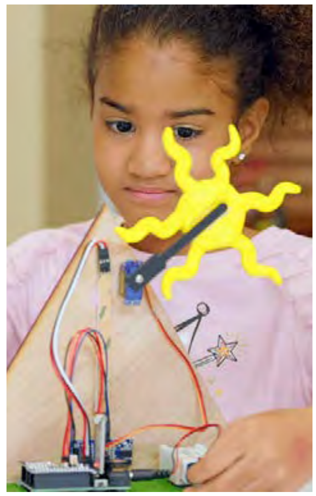
LESSON MODULES

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

Art Electric

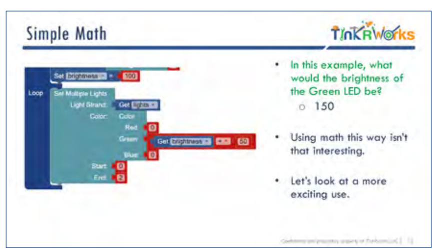
GRADES 1-2, 3-5, 6-8

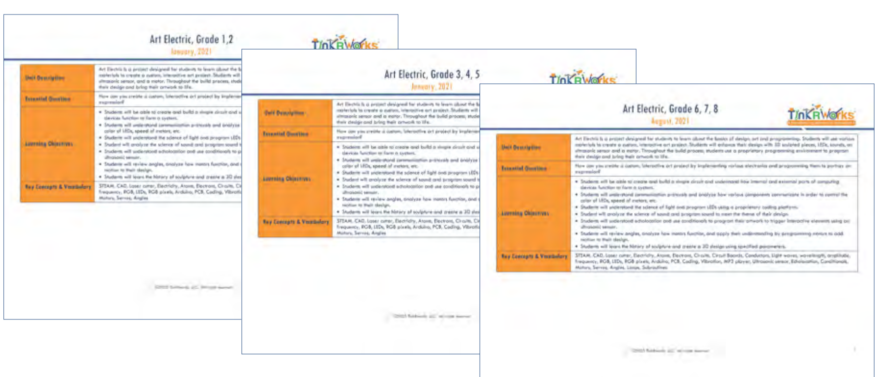
Art Electric explores the basics of design, art and programming. Students use a wide range of materials to create a custom, interactive art project and enhance their design with 3D sculpted pieces, LEDs, sounds, an ultrasonic sensor and a motor. Throughout the build process, students use a programming environment to customize their design and bring their artwork to life. This project can be used with students across many grades. Instructional guides support primary, intermediate and middle school classrooms.



GUIDE DISCUSSION

In Art Electric, hundreds of grade-appropriate slides provide rich visuals (and detailed teacher notes!) to facilitate a conversation around each learning objective, lesson by lesson.





ORGANIZE ACTIVITIES

Art Electric lesson plans help educators structure classroom instruction. Stay organized with lesson objectives, expected outcomes, relevant standards, pacing options and more.

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 to Art Electric
2. Electricity
3. Light and RGB Colors
4. Programming Lights
5. Sound
6. Programming Sound
7. Motors
8. Programming Motors
9. 3D Art
10. Sensors
11. Final Assembly and Programming

Pampered Plant

GRADE 2

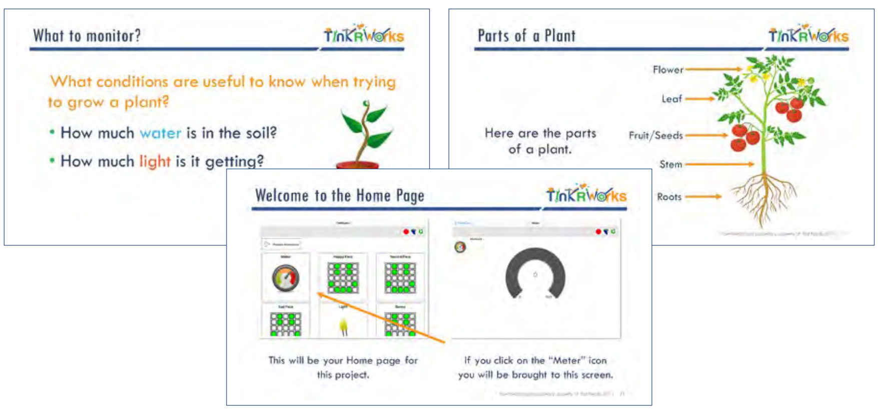
Students combine electronics, sensors and Arduino boards (micro-controllers or mini-computers) to build and code a plant-monitoring station that will indicate the "happiness level" of a plant. Along the way, students dive into biology and learn about plant science, as well as how each of the electronic components of the project function. They bring their plant monitoring system to life by animating the LED display to respond to the conditions of the plant: soil moisture and amount of light. Students will create these display designs using binary code and program their monitor using a touch-screen app.

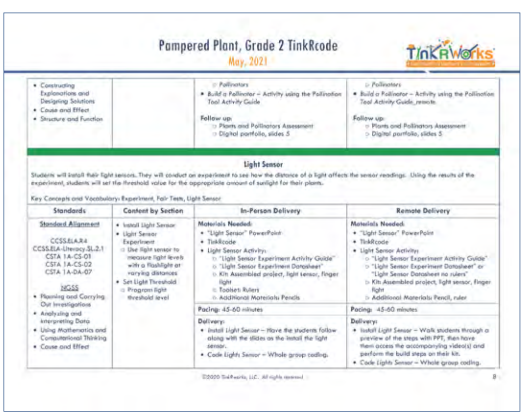
ESSENTIAL QUESTION

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

GUIDE DISCUSSION

In Pampered Plant, hundreds of slides provide rich visuals (and detailed teacher notes!) to facilitate a conversation around each learning objective, lesson by lesson.





Pampered Plant, Grade 2 TinkRcode
May, 2021

Light Sensor

Standards	Content by Section	In-Person Delivery	Remote Delivery

ORGANIZE ACTIVITIES

Pampered Plant lesson plans help educators structure classroom instruction. Stay organized with lesson objectives, expected outcomes, relevant standards, pacing options and more.

LESSON MODULES

1. Introduction to Pampered Plant
2. Plant Needs Experiment
3. Moisture Sensor
4. Binary and Symbols
5. Code LED Display
6. Plants and Pollinators
7. Light Sensor
8. Final Programming
9. Painted Pottery
10. Plant Care and Potting

LaunchPad

GRADES 3-5, 6-8

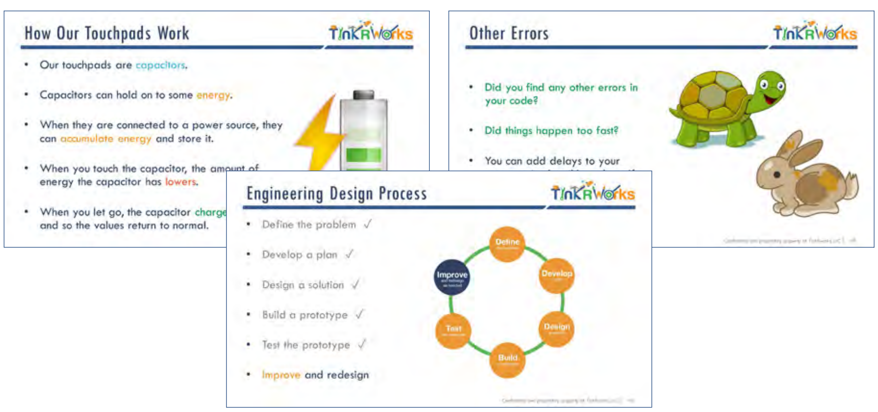
Students program a hand-held electronic circuit board equipped with touch sensors, lights, sounds, remote control and an accelerometer. The LaunchPad circuit board can be programmed as an electronic board game, a light and sound show, a musical instrument, a speed reaction game, a balance device or anything 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 make their ideas come to life.

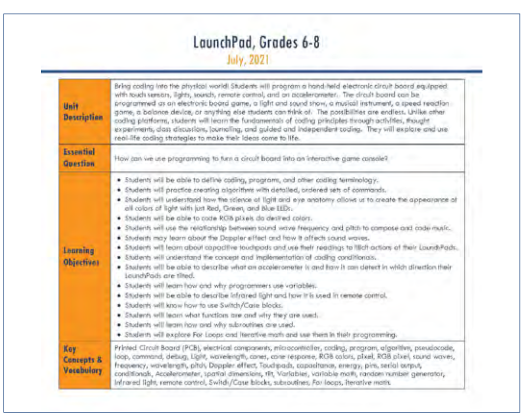
ESSENTIAL QUESTION

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

GUIDE DISCUSSION

In LaunchPad, hundreds of slides provide rich visuals (and detailed teacher notes!) to facilitate a conversation around each learning objective, lesson by lesson.





LaunchPad, Grades 6-8

July, 2021

Unit Description	Bring coding into the physical world! Students will program a hand-held electronic circuit board equipped with touch sensors, lights, sounds, remote control, and an accelerometer. The circuit board 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. The possibilities are endless. Unlike other coding platforms, students will learn the fundamentals of coding principles through activities, thought experiments, class discussions, journaling, and guided and independent coding. They will explore and use real-life coding strategies to make their ideas come to life.
Essential Question	How can we use programming to turn a circuit board into an interactive game console?
Learning Objectives	• Students will be able to define coding, program, and other coding terminology. • Students will practice creating algorithms with detailed, ordered sets of commands. • Students will understand how the science of light and eye anatomy allows us to create the appearance of all colors of light with just Red, Green, and Blue LEDs. • Students will be able to code RGB pixels do desired colors. • Students will use the relationship between sound wave frequency and pitch to compose and code music. • Students may learn about the Doppler effect and how it affects sound waves. • Students will learn about capacitive touchpads and use their readings to illicit actions of their LaunchPads. • Students will understand the concept and implementation of coding conditionals. • Students will be able to describe what an accelerometer is and how it can detect in which direction their LaunchPads are tilted. • Students will learn how and why programmers use variables. • Students will be able to describe infrared light and how it is used in remote control. • Students will know how to use Switch/Case blocks. • Students will learn what functions are and why they are used. • Students will learn how and why subroutines are used. • Students will explore For Loops and Iterative math and use them in their programming.
Key Concepts & Vocabulary	Printed Circuit Board (PCB), electrical components, microcontroller, coding, program, algorithm, pseudocode, loop, command, debug, Light, wavelength, cones, cone response, RGB colors, pixel, RGB pixel, sound waves, frequency, wavelength, pitch, Doppler effect, Touchpads, capacitance, energy, pins, serial output, conditionals, Accelerometer, spatial dimensions, tilt, Variables, variable math, random number generator, Infrared light, remote control, Switch/Case blocks, subroutines, For loops, Iterative math

ORGANIZE ACTIVITIES

LaunchPad lesson plans help educators structure classroom instruction. Stay organized with lesson objectives, expected outcomes, relevant standards, pacing options and more.

LESSON MODULES

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

Weather Station

GRADE 3

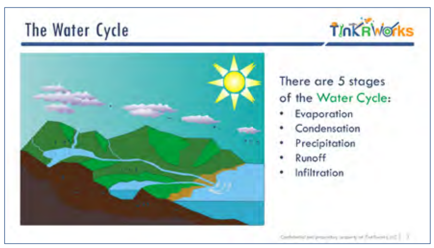
Weather Station focuses on scientific concepts related to earth science. Students will build a weather monitoring system using a microcontroller and a sensor that measures multiple weather parameters. Students program their sensor using sequencing, loops and conditionals to collect data and display this data on an LCD screen. They learn about the factors that affect weather, such as temperature and humidity, and how weather data is collected and analyzed.

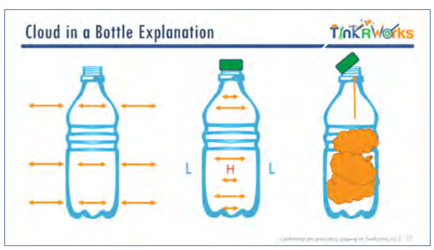
ESSENTIAL QUESTION

How can we observe and collect weather data using technology?

GUIDE DISCUSSION

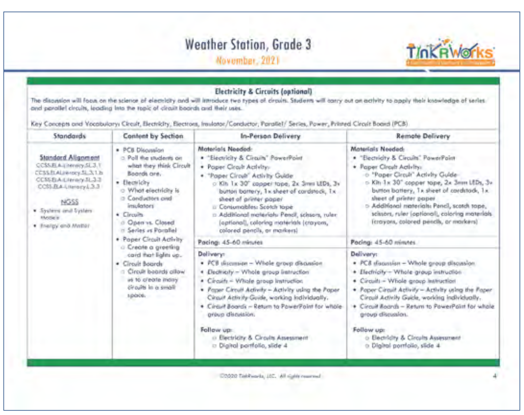
In Weather Station, hundreds of slides provide rich visuals (and detailed teacher notes!) to facilitate a conversation around each learning objective, lesson by lesson.





ORGANIZE ACTIVITIES

Weather Station lesson plans help educators structure classroom instruction. Stay organized with lesson objectives, expected outcomes, relevant standards, pacing options and more.



Weather Station, Grade 3
November, 2021

Electricity & Circuits (optional)

The discussion will focus on the science of electricity and will introduce two types of circuits. Students will carry out an activity to apply their knowledge of series and parallel circuits, leading into the topic of circuit boards and their uses.

Key Concepts and Vocabulary: Circuit, Electricity, Electrons, Insulator/Conductor, Parallel/ Series, Power, Printed Circuit Board (PCB)

Standards	Content by Section	In-Person Delivery	Remote Delivery
Standard Alignment CCSS.ELA-Literacy.SL.3.1 CCSS.ELA-Literacy.SL.3.1.b CCSS.ELA-Literacy.SL.3.3 CCSS.ELA-Literacy.L.3.3 NGSS • Systems and System Models • Energy and Matter	• PCB Discussion ○ Poll the students on what they think Circuit Boards are. • Electricity ○ What electricity is ○ Conductors and insulators • Circuits ○ Open vs. Closed ○ Series vs Parallel • Paper Circuit Activity ○ Create a greeting card that lights up. • Circuit Boards ○ Circuit boards allow us to create many circuits in a small space.	**Materials Needed:** • "Electricity & Circuits" PowerPoint • Paper Circuit Activity: • "Paper Circuit" Activity Guide ○ Kit: 1x 30" copper tape, 2x 3mm LEDs, 3x button battery, 1x sheet of cardstock, 1x sheet of printer paper ○ Consumables: Scotch tape ○ Additional materials: Pencil, scissors, ruler (optional), coloring materials (crayons, colored pencils, or markers) **Pacing:** 45-60 minutes **Delivery:** • *PCB discussion* – Whole group discussion • *Electricity* – Whole group instruction • *Circuits* – Whole group instruction • *Paper Circuit Activity* – Activity using the Paper Circuit Activity Guide, working individually. • *Circuit Boards* – Return to PowerPoint for whole group discussion. **Follow up:** ○ Electricity & Circuits Assessment ○ Digital portfolio, slide 4	**Materials Needed:** • "Electricity & Circuits" PowerPoint • Paper Circuit Activity: ○ "Paper Circuit" Activity Guide ○ Kit: 1x 30" copper tape, 2x 3mm LEDs, 3x button battery, 1x sheet of cardstock, 1x sheet of printer paper ○ Additional materials: Pencil, scotch tape, scissors, ruler (optional), coloring materials (crayons, colored pencils, or markers) **Pacing:** 45-60 minutes **Delivery:** • *PCB discussion* – Whole group discussion • *Electricity* – Whole group instruction • *Circuits* – Whole group instruction • *Paper Circuit Activity* – Activity using the Paper Circuit Activity Guide, working individually. • *Circuit Boards* – Return to PowerPoint for whole group discussion. **Follow up:** ○ Electricity & Circuits Assessment ○ Digital portfolio, slide 4

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LESSON MODULES

1. Introduction to Weather Station
2. Temperature
3. Electricity and Circuits
4. Weather Station Build
5. The Water Cycle and Clouds
6. Introduction to Programming
7. TinkRcode and LCD Screen
8. Humidity
9. Sunshine and 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 and Gluing
18. Weather Forecasting

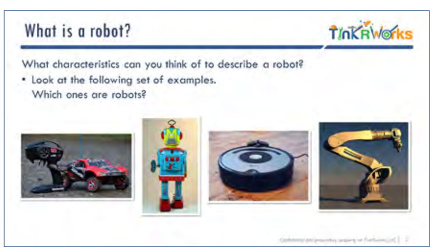
TinkRbot

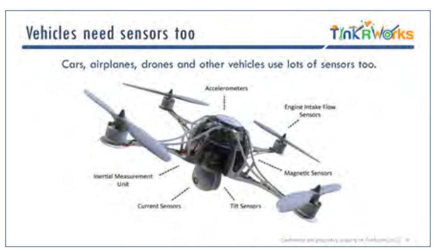
GRADE 4

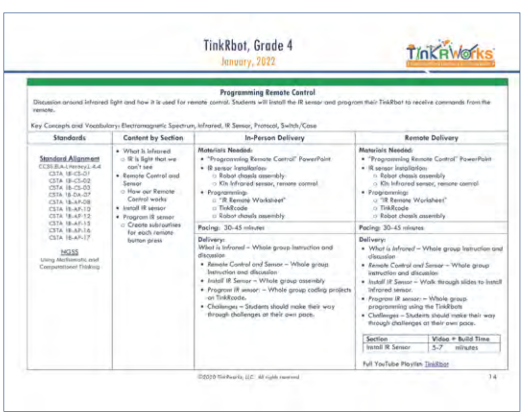
Students design, build and program a robot from scratch. The class begins with the assembly of kitted robots from parts provided by TinkRworks. Students also use our block-based programming environment to program the robots to accomplish challenges provided by instructors. These challenges are designed to allow students to develop logic and programming skills fundamental to all robotics. With a basic understanding of robotics in place, students create a robot with uniquely programmed capabilities.

GUIDE DISCUSSION

In TinkRbot, hundreds of slides provide rich visuals (and detailed teacher notes!) to facilitate a conversation around each learning objective, lesson by lesson.

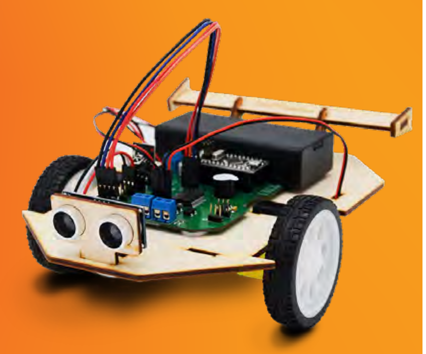





TinkRbot, Grade 4
January, 2022
Programming Remote Control

ORGANIZE ACTIVITIES

TinkRbot lesson plans help educators structure classroom instruction. Stay organized with lesson objectives, expected outcomes, relevant standards, pacing options and more.



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 to TinkRbot
2. Motors and Wheels
3. PCB and Batteries
4. Introduction to Lights and RGB pixels
5. Programming Lights
6. Introduction to Sound
7. Programming Sound
8. Introduction to Motors
9. Programming Motors
10. Introduction to Sensors and Ultrasonic
11. Programming Ultrasonic
12. Programming with Subroutines
13. Programming Remote Control
14. Final Coding

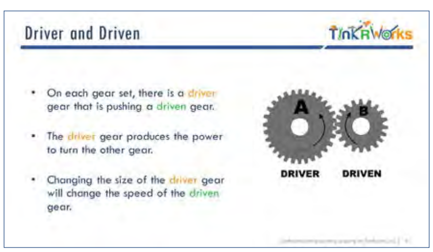
Planetary Pathways

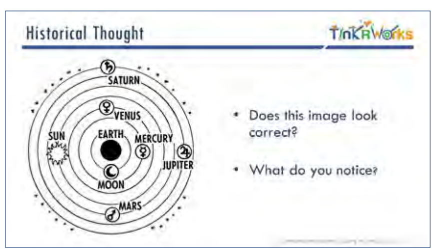
GRADE 5

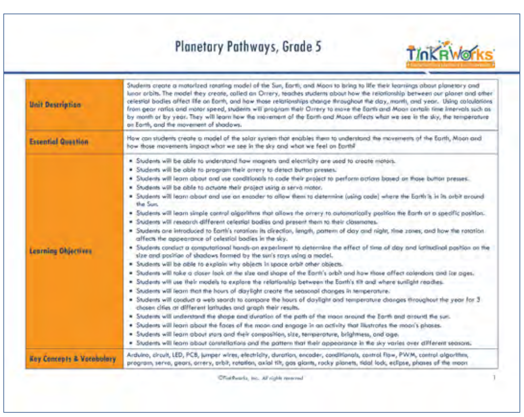
Students create a motorized rotating model of the sun, earth and moon, bringing to life their learnings about planetary and lunar orbits. The model they create, called an Orrery, teaches students about how the relationship between our planet and other celestial bodies affects life on earth, and how those relationships change throughout the day, month and year. Using calculations from gear ratios and motor speed, students will program their Orrery to move the earth and moon certain time intervals, such as by month or by year. They learn how the movement of the earth and moon affects what we see in the sky, the temperature on earth and the movement of shadows.

GUIDE DISCUSSION

In Planetary Pathways, hundreds of slides provide rich visuals (and detailed teacher notes!) to facilitate a conversation around each learning objective, lesson by lesson.

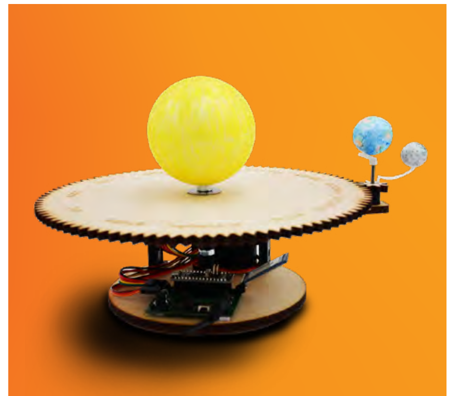






ORGANIZE ACTIVITIES

Plantetary Pathways lesson plans help educators structure classroom instruction. Stay organized with lesson objectives, expected outcomes, relevant standards, pacing options and more.



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?

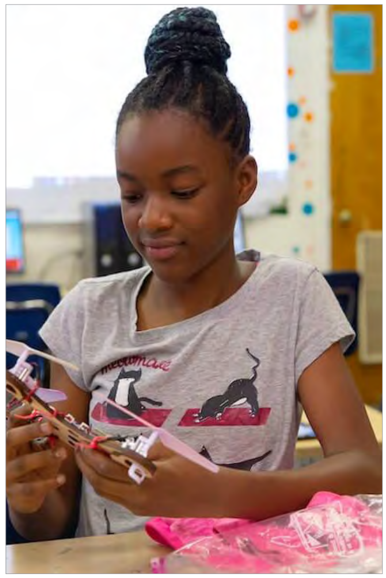
LESSON MODULES

1. Introduction to Planetary Pathways
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

TinkRdrone

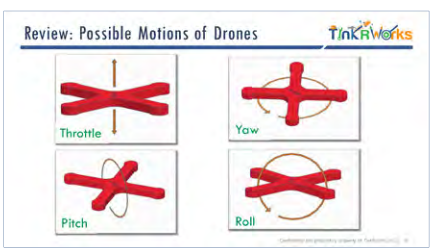
GRADES 6-8

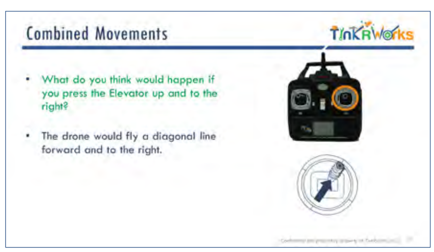
Students design, build and fly their very own quadcopters. They learn all about the science of flight as they build their drones to achieve compromises between speed, acrobatics and stability. Students experiment with different materials to find one that is optimal for their project, learn about the electronics, and wire components together to get their drones airborne. This exercise in creativity and problem-solving skills reviews key science concepts. Students practice the art of flight and take home their very own drone.

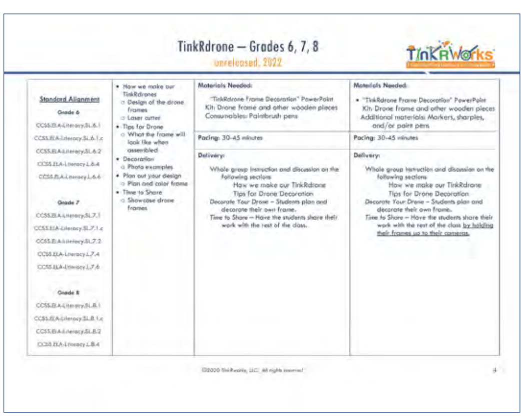


GUIDE DISCUSSION

In TinkRdrone, hundreds of grade-appropriate slides provide rich visuals (and detailed teacher notes!) to facilitate a conversation around each learning objective, lesson by lesson.







ORGANIZE ACTIVITIES

TinkRdrone lesson plans help educators structure classroom instruction. Stay organized with lesson objectives, expected outcomes, relevant standards, pacing options and more.

ESSENTIAL QUESTION

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

LESSON MODULES

1. Introduction to TinkRdrone
2. TinkRdrone Frame Decoration
3. Basics of Drone Flight
4. Drone Build: Motor Mount and Flight Board
5. Flight Preparation
6. Flight Practice Session #1
7. Drone Build – Motors
8. Flight Practice Session #2
9. Lift Experiment
10. Propeller Decoration and Installation
11. Batteries
12. Troubleshooting Challenges
13. Flight Time
14. Troubleshooting and Drone Maintenance

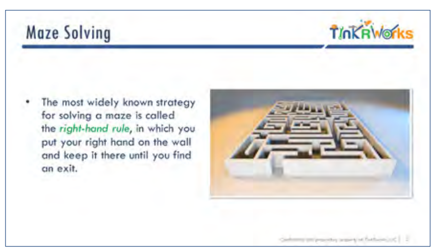
SensorBot

GRADES 6-8

Students learn about robotics as they assemble and code robots capable of sensing and reacting to their surroundings. They experiment with different sensors: touch, reflectance, ultrasonic and infrared. After integrating sensors, students develop coding skills by programming the robot to solve challenges, such as following lines and object detection and avoidance. Students incorporate motions and light into the robot's reactions.

GUIDE DISCUSSION

In SensorBot, hundreds of grade-appropriate slides provide rich visuals (and detailed teacher notes!) to facilitate a conversation around each learning objective, lesson by lesson.

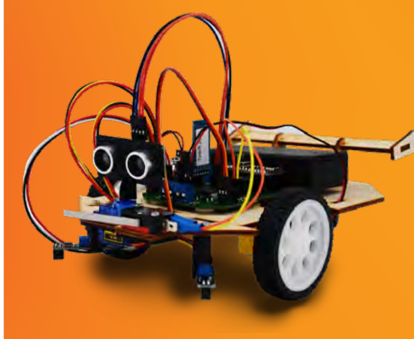


SensorBot – Grades 6,7,8

Unit Description	Students learn about robotics as they assemble and code robots capable of sensing and reacting to their surroundings. They will experiment with different sensors – touch, reflectance, ultrasonic, and infrared. After integrating sensors, students will develop coding skills by programming the robot to solve challenges focused on object detection and avoidance, as well as line following. With these capabilities, students will program their bots to move autonomously through mazes and obstacle courses. They will also incorporate patterns of lights into the robot's reactions.
Essential Question	How can the integration of multiple sensors enable a robot to move autonomously through its environment?
Learning Objectives	• Students will understand the foundations of programming and program design. • Students will analyze how software and hardware communicate and work together as a system to accomplish specific tasks. • Students will understand how magnets make electric motors work and then integrate motors and sensors to program robots to move deliberately in response to sensor measurements. • Students will be able to understand the fundamentals of the science of light and apply their knowledge to program RGB pixels. • Students will learn how to implement subroutines to aid in code re-use and organization. • Students will program functions that take a measurement as an input and produce a value as an output. • Students will understand the wavelengths of light and how to use infrared light emitted by a remote control to affect robot behavior. • Students will understand the difference between DC motors and servos and program servos to change the orientation of a distance sensor. • Students will learn how ultrasonic sensors, reflectance sensors and touch sensors work and then use them in a program to have the robot sense its environment. • Students will be able to program robots to meet a series of challenges and complete a variety of tasks such as remote control, wall following, line following, and maze solving.
Key Concepts & Vocabulary	Robotics, communications protocols, DC motors, servo motors, pulse width modulation, Arduino, RGB pixel, ultrasonic sensor, infrared, reflectance sensor, subroutine, conditionals, functions, remote control, wall following, line following, and maze solving.

ORGANIZE ACTIVITIES

SensorBot lesson plans help educators structure classroom instruction. Stay organized with lesson objectives, expected outcomes, relevant standards, pacing options and more.



ESSENTIAL QUESTION

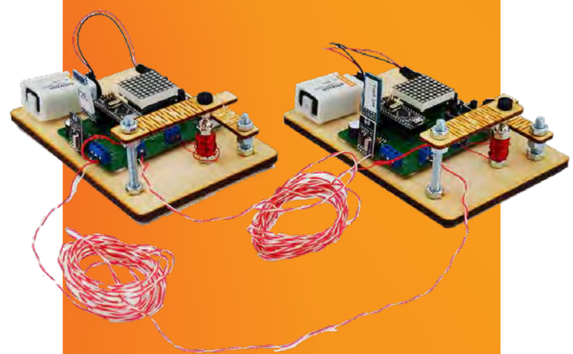
How can sensor readings be combined to make a robot accomplish specific goals?

LESSON MODULES

1. Introduction to SensorBot
2. SensorBot Build 1
3. Introduction to 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 Final Programming

Morse Coding

GRADES 6-8



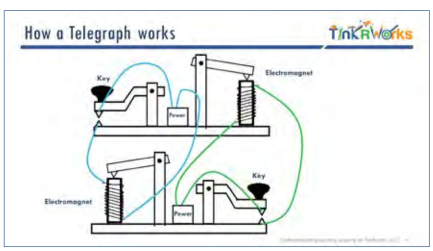
Students explore the history of human communications from cave drawings to wireless devices. They replicate a traditional wired telegraph, study Morse code and use it to communicate information with other students within the classroom, learn about wireless communications and how to create a device that acts as a "wireless telegraph," and explore how radio waves can be used to transmit and receive information. As they develop their devices, students learn all about circuits and electronics and use them to wirelessly communicate with each other.

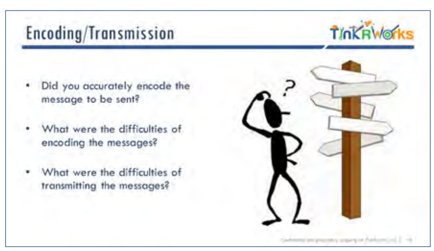
ESSENTIAL QUESTION

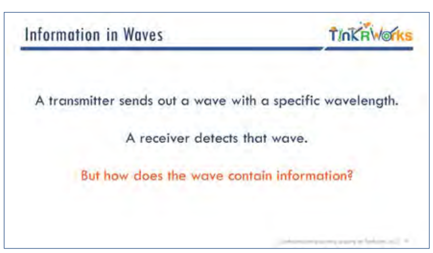
How can we use technology to create a two-way communication device?

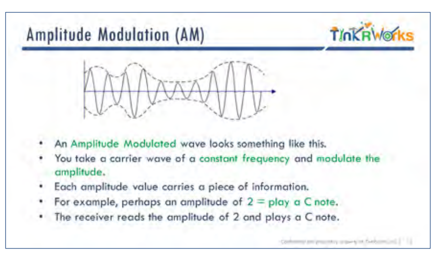
GUIDE DISCUSSION

In Morse Coding, hundreds of grade-appropriate slides provide rich visuals (and detailed teacher notes!) to facilitate a conversation around each learning objective.









ORGANIZE ACTIVITIES

Morse Coding lesson plans help educators structure classroom instruction. Stay organized with lesson objectives, expected outcomes, relevant standards, pacing options and more.

LESSON MODULES

1. Introduction
2. Electricity
3. Electromagnets
4. Build
5. Analog Signals
6. Telegraph Game
7. Digital Signals
8. LED Display
9. Programming the Button
10. Wireless
11. Coding Wireless
12. State Machines
13. Functions
14. Digital Translation 1
15. Digital Translation 2
16. Wrap Up

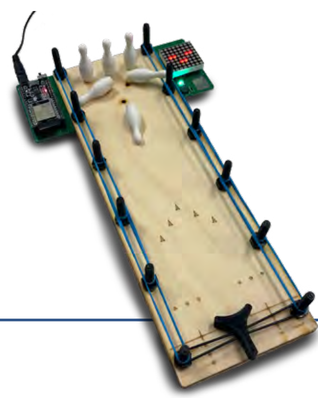
Coming Soon!

At TinkRworks, we're always working on what's next. These projects in development include hands-on activities, standards-informed instruction, age- and grade-appropriate coding environments, assessment tools and professional development.

Pushes, Pulls and Pins

GRADE K

Students explore different aspects of forces while building an electronic tabletop puck bowling game. They test different materials, explore how force affects the movement of objects, experiment with light sensors, and compose and code music and animations.



LESSON MODULES

1. Introduction to P3
2. Pushes and Pulls
3. Build
4. Strength
5. Coding Light Sensors
6. Launcher
7. Design Challenge
8. Coding Music
9. Direction
10. Coding Display
11. Collisions
12. Coding Symbols
13. Final Coding

TinkRsynth

GRADES 6-8

Students create a music mixing board to produce, manipulate and synthesize sounds. They explore using circuits to produce music and learn about electromagnetic waves, rhythms and frequency spectra. The physics of waves and energy are investigated while composing music.

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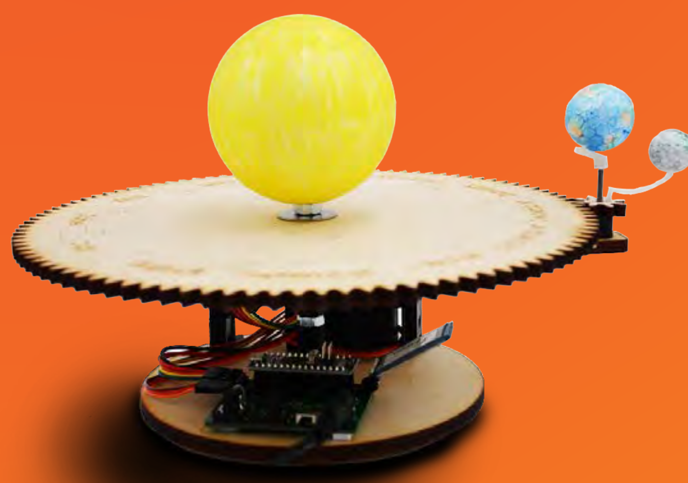

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