ARDUINO SCIENCE KIT
PHYSICS LAB

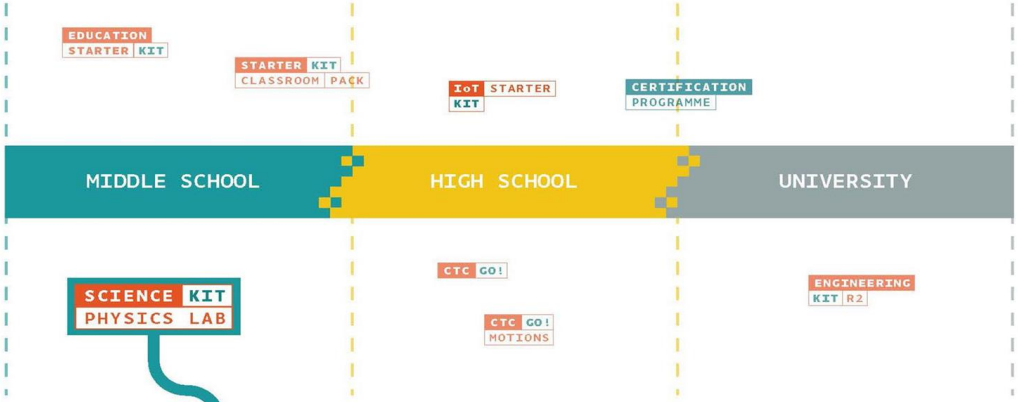
ARDUINO
EDUCATION

ENABLE MIDDLE SCHOOL STUDENTS TO THINK AND ACT LIKE REAL SCIENTISTS

SCIENCE TEACHERS WHO WANT TO BRING AN INQUIRY-BASED, HANDS-ON APPROACH TO THEIR MIDDLE SCHOOL CLASSROOMS CAN ENABLE THEIR STUDENTS TO THINK AND ACT LIKE REAL SCIENTISTS WITH SCIENCE KIT PHYSICS LAB.

ARDUINO EDUCATION LEARNING EVOLUTION

Our aim is to help students achieve their dream careers in STEAM. Our cross-curriculum content and open-source approach are essential tools for STEAM classes that develop with students as they progress **through middle school, high school, and university**, preparing them for a successful future.



Step by step, we champion students as they progress through their STEAM education with projects that increase in complexity to challenge them as they develop their skills.

We support students in achieving successful careers in STEAM-related fields with educational kits that are targeted to their age and ability. The technology is practical, creative, and fun. Students learn using the same products that companies around the world use in applications like rapid prototyping, AI, drone technology, and developing machine learning.

WHAT IS THE ARDUINO SCIENCE KIT PHYSICS LAB?

- Developed in partnership with **Google**, the kit and nine exciting projects challenge students to explore and explain the physics behind amusement park rides, make their own hypotheses, check their assumptions and log data on Google's Science Journal app, a digital notebook for conducting and documenting science experiments in real-time. No prior coding experience is needed - students can simply run their experiments straight out of the box with plug-and-play projects.

- Science Kit Physics Lab includes all the hardware and software needed to assemble and conduct nine fun physics experiments based on favorite amusement park rides, covering **electromagnetism, thermodynamics, kinetics, and kinematics**.

- The kit includes a range of sensors to measure light, temperature, motion, and magnetic fields, along with a set of props and access to online course content for both teachers and students. You'll just need to provide a few essential classroom supplies (pencils, rulers, etc.) and a LiPo battery. We recommend two students per kit.

DEVELOPED IN PARTNERSHIP WITH Google

WORKS WITH Science Journal an initiative by Google

- Arduino-based physics lab
- No coding experience required
- Aligned with NGSS and English National Curricula
- Data collection and analysis through the Google Science Journal App
- Compatible with Google Classroom

CURRICULUM ALIGNMENT

- The projects featured in Science Kit Physics Lab are aligned with several national curricula for students aged 11-14 including the **Next Generation Science Standard** (NGSS) for K-12 in the U.S. and the **National Curriculum of England**, which is used in international schools across the world. Curriculum links are provided within the educators' software platform. Additionally, these lessons teach students important **21st-century skills** such as problem-solving and critical thinking.

SUBJECT AREA	ACTIVITY NO.	ACTIVITY NAME	DESCRIPTION
Getting Started	1	**GETTING STARTED**	Setup your devices
Electromagnetism and Thermodynamics	2	**ELECTRIC FORTUNE TELLER**	Investigate conductivity of different materials
Electromagnetism and Thermodynamics	3	**BUZZ WIRE MAZE**	Steadiest hand wins! Build a conductive 'maze' and then try to avoid the buzzer as you guide the loop around your course
Electromagnetism and Thermodynamics	4	**HAUNTED HOUSE THEREMIN**	Did you hear that? Make spectacular sounds with a magnet and the magnetometer sensor
Electromagnetism and Thermodynamics	5	**THERMO MAGIC SHOW**	Measure the changes in temperature by comparing what materials are better insulators or conductors of heat
Kinetics and Kinematics	6	**DROP ZONE**	Explore gravity and measure the acceleration of your Arduino board
Kinetics and Kinematics	7	**GRAVITRON**	Learn about rotations per minute, circular motion, the force required to spin this ride, and the relationship to centrifugal forces
Kinetics and Kinematics	8	**PIRATE SHIP**	Captain the ship and test the oscillation of a pendulum
Kinetics and Kinematics	9	**SPRING RIDER**	You will determine the amount of energy stored in the elastic bands by measuring the motion created by the Centrifuge as it runs using Science Journal and accelerometers
Kinetics and Kinematics	10	**CENTRIFUGE**	You will determine the amount of energy stored in the elastic bands by measuring the motion created by the Centrifuge as it runs using Science Journal and accelerometers

KEY LEARNING VALUES

- Present experimental data in tables and charts
- Evaluate a scientific hypothesis
- Explore possible variables to design an open-ended investigation
- Distinguish between a conductor and an insulator, and measure resistance and conductivity of different materials
- Represent magnetic fields through sound
- Investigate the effect of materials between a magnet and the magnetometer on the strength of magnetic field
- Compare the thermal conductivity of different materials
- Identify materials that are thermal conductors or thermal insulators based on experimental observations
- Describe the motion of a pendulum, measure its period and frequency, monitor its acceleration, and identify the forces acting on it.

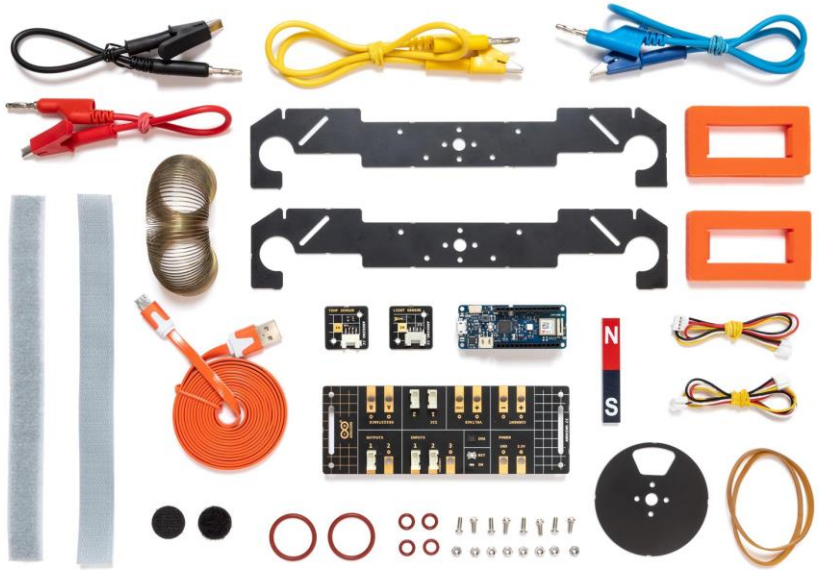
BENEFITS OF THE ARDUINO SCIENCE KIT PHYSICS LAB

- Enables students to think critically, solve problems, and get them acquainted with data analysis
- No prior electronics knowledge is necessary - just plug and play!
- Easy to set up
- Extensive learning outcomes help students to thrive in science
- Create a playful, collaborative environment where students want to learn
- Meet key curriculum targets with links to NGSS and the English National Curriculum for Science

WHAT'S INCLUDED

- The **Science Kit Physics Lab kit**
- **Software platform for educators** with a teacher guide and printable student worksheets
- **Software platform for students** with a detailed glossary, tutorial section, building instructions, worksheets, and nine hands-on physics experiments, including:
    - Electromagnetism and thermodynamics
    - Kinetics and kinematics

ARDUINO SCIENCE KIT PHYSICS LAB KIT



BASED ON THE ARDUINO MKR WIFI 1010

- Recommended for **two students** and a **teacher**
- Includes materials to conduct **9 exciting experiments**
  (2 x 45 minute lessons per experiment).

SOFTWARE PLATFORM FOR STUDENTS

ELECTROMAGNETISM & THERMODYNAMICS

ELECTRIC FORTUNE TELLER

Can you guess a shocking fortune? What does your future hold? Let's find out!

BUZZ WIRE MAZE

Steadiest hand wins! Build a conductive 'maze' and then try to avoid the buzzer as you guide the loop around your course!

HAUNTED HOUSE THEREMIN

Did you hear that? Make paranormal sounds with a magnet!

THERMO MAGIC SHOW

It's not magic, it's science! Learn about how different materials conduct or insulate heat.

KINETICS & KINEMATICS

DROP ZONE

Can you slide faster than your friends? Explore gravity and measure the acceleration of your Arduino board.

SPRING RIDER

Make your Arduino board bounce to learn about harmonic motion!

GRAVITRON

Learn about rotations per minute, circular motion, the force required to spin this ride, and the relationship to centrifugal forces.

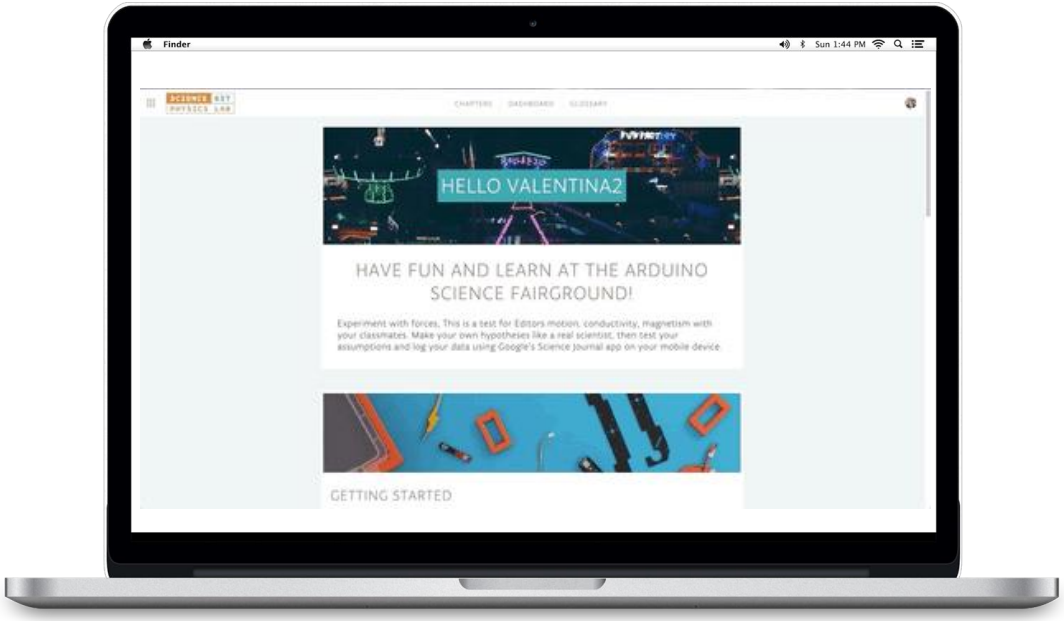
PIRATE SHIP

What changes the speed and duration of a swing? Captain the ship and test the oscillation of a pendulum.

CENTRIFUGE

How much energy can you store in a rubber band? Don't get dizzy... Learn about potential energy and motion!

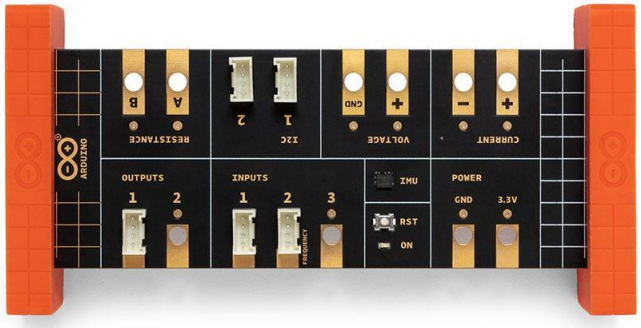
SOFTWARE PLATFORM FOR EDUCATORS



- Exclusive online course content
- Teacher guidance notes
- Student worksheets

HOW THE ARDUINO SCIENCE KIT PHYSICS LAB WORKS

Never fear - no prior electronics knowledge is required. Students simply upload a sketch of their amusement park ride onto an Arduino board, connect their Android mobile device to the board, build their project, and then use the onboard sensor and plug-and-play modules to simulate the ride's dynamics. Data is transmitted from the experiment to the student's mobile device via Bluetooth, where they can analyze and record their results in **Google's Science Journal App** or on worksheets.



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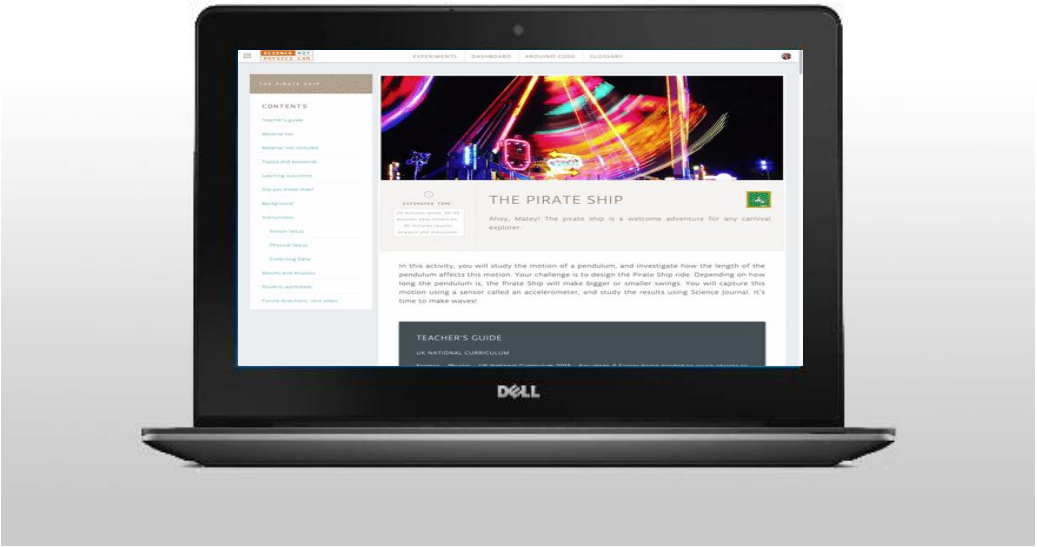
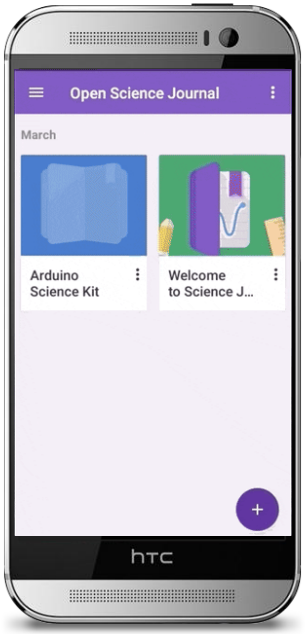


- Arduino Science Kit Physics Lab is **Google Classroom Compatible**
- Online assignments are now easier than ever!

GOOGLE´S JOURNAL APP

GOOGLE´S SCIENCE JOURNAL



Now available on Android and Chrome OS Systems supporting Android

Improved BLE connectivity
Integration of new sensors

GOOGLE´S SCIENCE JOURNAL

Real data stream, in real time

THANK YOU FOR YOUR TIME!

ANY QUESTIONS?