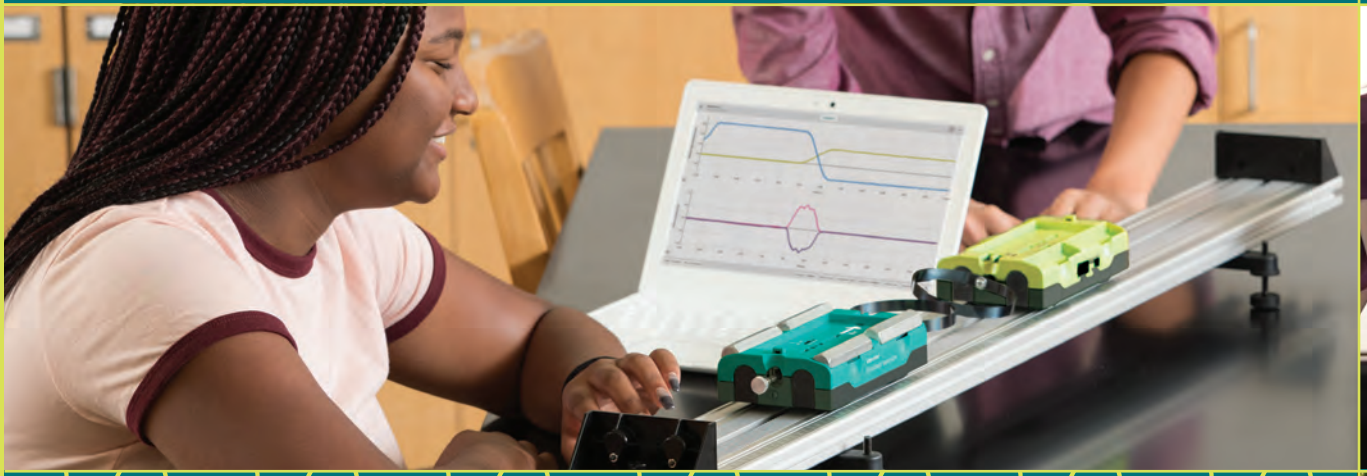
Vernier Science Education

Vernier
SCIENCE EDUCATION

K–12 Catalog
2023



Welcome!

Dear educator,

At Vernier, educators are at the heart of everything we do. Many of us are former educators—and all of us are dedicated to supporting current educators. That support starts with understanding the unique challenges educators face today, such as helping students catch up on unfinished learning caused by the COVID-19 pandemic and seeing many colleagues recently retire from teaching.

We also care deeply about education, which is why we are dedicated to setting educators up for success and giving them the tools they need to engage students through hands-on, socially relevant science education. For example

- We provide educators with one hour of complimentary professional development on how to use our technology in the classroom or in a particular lesson.
- We host free subject-specific webinars to demonstrate engaging ways to use our technology.
- We offer more than 1,000 educator-tested, ready-to-use experiments that bring science to life for students.

Recovering from the pandemic is everyone's job. Ensuring we have a STEM-literate society to tackle the challenges of today and tomorrow is our goal—and partnering with educators and communities to build a STEM-literate society is our guiding principle. To emphasize this commitment, in 2022, we changed our name to Vernier Science Education.

Although our name is different, our dedication to hands-on science learning, our deep commitment to being an authentic and trusted partner to educators, and our support for all aspects of STEM education remain the same.

In addition, we remain dedicated to developing new and better ways to engage all students—regardless of whether they want to pursue a STEM career.

To that end, we are continuously developing data-collection devices based on educators' feedback and needs. We are also working on Vernier Connections™, a web-based platform that helps educators engage students through phenomena-based learning and real-world applications, and strengthening our Vernier Graphical Analysis™ Pro software to help students make critical connections between abstract scientific ideas and the natural world.

We appreciate your ongoing support, and we are grateful for everything you do. If you have any questions or need ideas for how to use our products, please contact us. We are here to help!

Thank you for continuing to inspire us—and partnering with us to create the next generation of STEM-literate citizens.

John Wheeler
CEO
jwheeler@vernier.com

Dave and Christine Vernier
Co-Presidents
dvernier@vernier.com and cvernier@vernier.com

About Vernier Science Education

Vernier Science Education was co-founded in 1981 by Dave and Christine Vernier. Dave's background as a physics teacher and Christine's knack for business combined to form a company with a deep commitment to education.

More than 40 years later, the company is still owned by Christine and Dave, along with nine employee owners who have backgrounds in science and math education, as well as business.

Vernier is proud to be recognized for its philanthropic commitment, environmental policies, steady growth, and as one of the Best 100 Companies to Work For in Oregon for more than 20 years.

2022 Best Companies to Work For in Oregon

2022 Healthiest Employers of Oregon

2022 Best Green Companies in Oregon

Graphing Your Motion

Watch as students use the Go Direct® Motion Detector and their mobile devices to plot graphs of their movement across a school gym. Visit our website to learn more about this experiment (available in our *Physics with Vernier* lab book).

vernier.com/cover-23

Grants

10 Tips for Writing Your Best Grant Proposal

We understand that grants are essential for obtaining the supplies, tools, and resources necessary to address the many needs of your students.

This year, with school budgets in such a precarious place, securing grant funding means you and your students can have the support needed to thrive, no matter where learning takes place.

We have created an infographic with 10 tips for grant writing to help you perfect your proposal with newfound confidence.

In addition, discover tips and opportunities for funding your K–12 STEM projects in our updated grant-writing guide. This comprehensive resource includes best practices for writing a successful grant proposal, as well as over 100 upcoming national and state-specific funding opportunities.

vernier.com/grants

Contents

Why Vernier?

Instill a Love of Learning in All Students

Your passion and dedication, along with the implementation of high-quality sensors, experiments, and resources in your classroom, enable your students to explore science in new ways.

Our mission is to provide you with the tools you need to encourage scientific curiosity in all students—see what partnering with us can do.

Learn more at vernier.com

Our Must-Have Products for K–12

Vernier Science Education is committed to providing high-quality solutions for hands-on STEM learning.
Whether you're new to our solutions or a longtime customer, these products are a must-have for your classroom!

K–8

For Teaching Life Science

Go Direct® Gas Pressure Sensor

Learn more on pp. 8, 22.

For Teaching Physical Science

Go Direct Motion Detector

Learn more on pp. 8, 23.

For Teaching Earth and Space Science

Go Direct Temperature Probe

Learn more on pp. 7, 24.

For Teaching Renewable Energy

Go Direct Energy

Learn more on pp. 12, 27.

For Teaching Coding

Go Direct Force and Acceleration Sensor

Learn more on pp. 13, 26.

High School

For Teaching All Science Subject Areas

LabQuest® 3

See page 34.

For Teaching Chemistry

Go Direct SpectroVis® Plus Spectrophotometer

See page 88.

For Teaching Biology

Go Direct CO_2 Gas Sensor

See page 46.

For Teaching Environmental Science

Go Direct Weather System

See page 65.

For Teaching Physics

Dynamics Cart and Track System with Go Direct Sensor Carts

Learn more on pp. 102–103.

Do more with your Go Direct sensors with Vernier Graphical Analysis Pro!

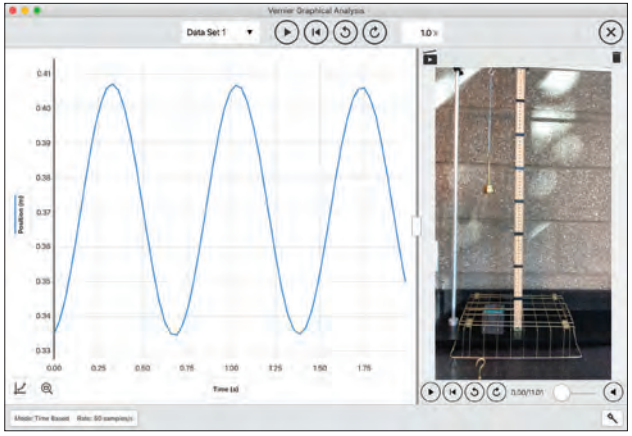
Deepen students' understanding of natural phenomena through engaging and meaningful interactions with real data.

Wirelessly connect most Go Direct sensors to our Graphical Analysis Pro app in just seconds and allow students to collect, visualize, and interact with data in real time—from anywhere and on multiple devices.

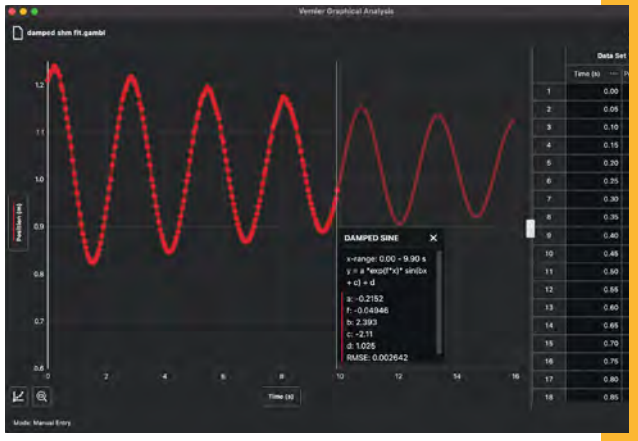
Graphical Analysis Pro features that teachers love

- **Live data sharing** during demonstrations—great for in-person and remote learning
- **More graph types,** including bar graphs, histograms, and FFTs, plus the ability to plot categorical data
- **Video-sensor data sync,** which enables students to replay, speed up, slow down, and pause recorded experiments at key moments in time
- **Library of over 45 sample experiments** ready to be analyzed by students as prep work, homework, or a makeup assignment
- **User-defined curve fits,** which allow advanced and more meaningful data analysis

Vernier Graphical Analysis™ Pro supports synchronous learning with online data sharing. Students can observe the experiment, collaborate with their peers, and share the results from anywhere—in real time.



With Graphical Analysis Pro, educators can replay data collected with sensors, visually represent the data on a graph, and synchronize the data to video recorded as data were collected. The synchronized data and video can later be played back to help students make a visual connection to the scientific concepts in the lesson.



Bring data to life for students with custom curve fits in Graphical Analysis Pro.

Learn more on page 39, or visit vernier.com/graphical-analysis

Elementary School

Why Vernier?

Technology engages young students. Our carefully designed hands-on data-collection technology helps elementary school teachers introduce young learners to science and STEM. We've created easy-to-use resources to help you educate and inspire your students.

EASY

Simple for students and teachers to use

AFFORDABLE

Priced to fit school budgets

VERSATILE

Compatible with a variety of devices

> "I can't even imagine all of the amazing things I'll be able to do with the kids with your products. I'm just beyond grateful for companies like yours who give back and help teachers inspire tomorrow's science leaders.
>
> ***Covey Denton***
> ***Greenfield School***

vernier.com/elementary-school

Topics

Explore a sampling of our featured experiments by topic to learn how Vernier technology helps your students deepen their understanding of key STEM concepts.

Instill a Lifelong Love of Learning

Young minds are naturally curious; engage your students with fun, interactive lessons that encourage investigation of their world and instill a lifelong love of learning.

New Lessons? They're Now a Breeze

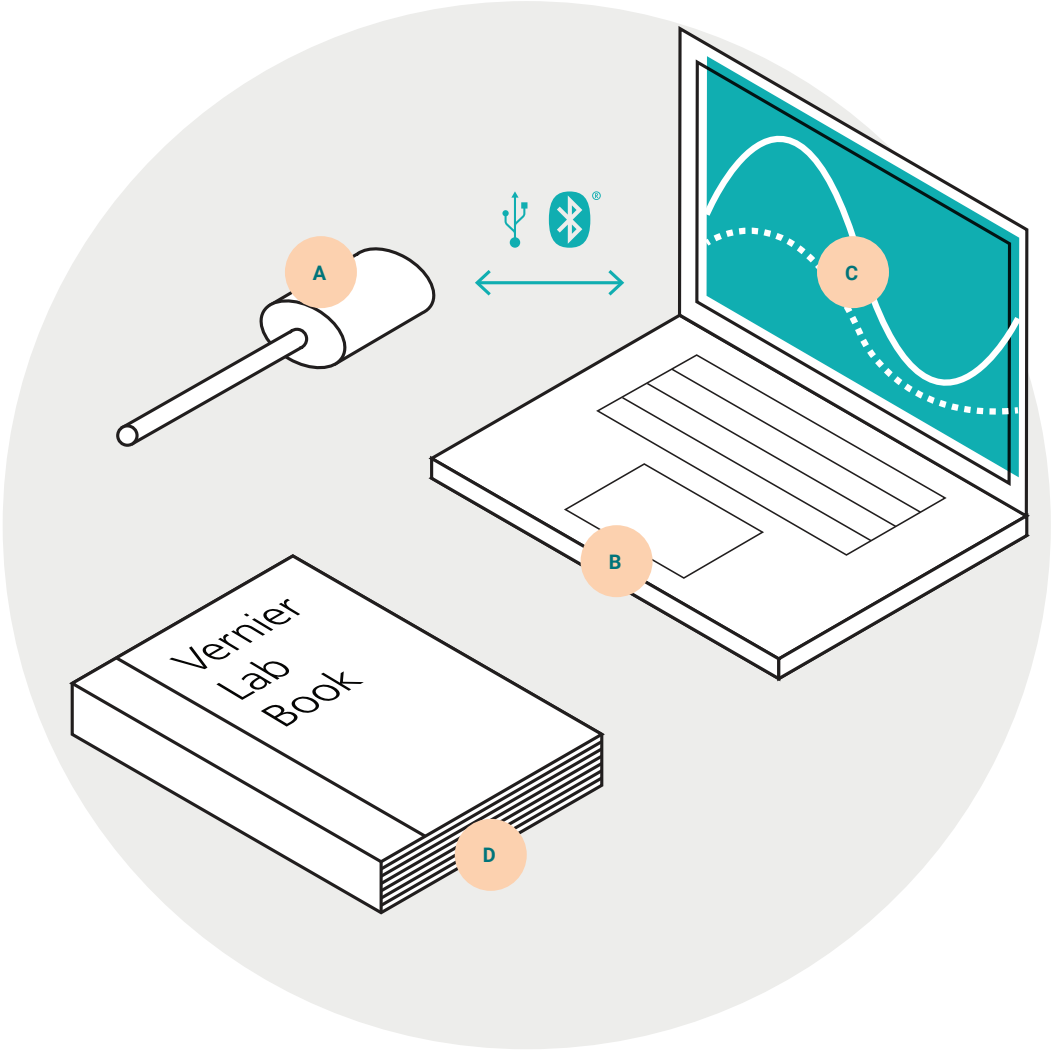
From bubbling bread and baking soda reactions to reflectivity of light and simple motion, we offer a variety of student-ready, easy-to-implement investigations designed to help excite and engage your young learners.

Educational Standards

Helping students meet standards is an important aspect of teaching. Vernier technology helps teachers as they prepare students to meet the NGSS and state standards through investigations that support three-dimensional learning.

vernier.com/standards

Getting Started



What You Need to Get Started

A Go Direct Sensor

These versatile sensors connect to your device via Bluetooth® wireless technology or USB.

B Device

Go Direct® sensors connect to a wide variety of devices commonly used in classrooms, including Chromebooks, computers, compatible mobile devices, and LabQuest® 3.

C Vernier Graphical Analysis App

Our data-collection app facilitates student understanding with real-time graphs of experimental data.

D Lab Book

Step-by-step instructions at your fingertips save valuable time when integrating probeware into your curriculum. All of our lab books for elementary school provide support for Go Direct sensors and the Vernier Graphical Analysis™ app.

Our lab books come with a generous site license—purchase once and share files school wide.

Next Generation Science Standards

Hands-on learning has been at the core of Vernier's mission for over 40 years, and as we create new products—whether it is hardware, software, or written investigations—we work to align to the NGSS, making it easy for teachers and science supervisors to help students meet these standards.

	NGSS Domains			
Vernier Book	**Physical Science**	**Life Science**	**Earth and Space Science**	**Engineering Design**
Investigating Temperature	●			●
Investigating Gas Pressure	●	●		
Investigating Motion	●	●		
Investigating Force	●			
Investigating Light	●		●	
Investigating Magnetism	●			
Investigating Voltage	●			
Elementary Science with Vernier	●	●	●	●
Investigating Wind Energy	●			●
Investigating Solar Energy	●			●

Temperature

Investigating Temperature

Watch a video

Download only
ELB-TEMP-E $22

Download + print
ELB-TEMP $27

In this book, students investigate topics related to temperature, including melting and freezing of water, insulation design, and chemical reactions.

10 Experiments Included

Physical Science

STRUCTURE AND PROPERTIES OF MATTER

- I'm Melting! Water Changes States
- Solid, Liquid, Gas: Water Can Do It All

ENERGY

- Are We Cool or What?
- Why Do We Need Thermometers?
- Celsius or Fahrenheit: What's the Difference?
- Getting it *Just* Right! Adjusting Water Temperature
- The Temperature Probe Spends the Night
- Hold Everything! Comparing Insulators
- Keeping it Cool! Design Your Own Thermos
- Cool Reaction! The Reaction of Baking Soda and Vinegar (*shown above*)

Sensor Used

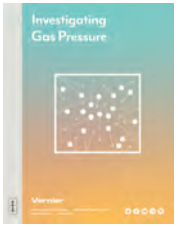
Go Direct Temperature
Students use this rugged, general-purpose sensor to monitor temperature.
GDX-TMP $78

Teacher pack also available
(includes 8 Go Direct Temperature Probes and a Charge Station)
GDX-TMP-TP $692

Learn more a vernier.com/elb-temp

Gas Pressure

Investigating Gas Pressure



Download only
ELB-GP-E $12

Students investigate gas pressure when more gas is added or the volume of the container changes.

4 Experiments Included in E-book

- Learning to Use a Pressure Sensor

Life Science

MATTER AND ENERGY IN ORGANISMS AND ECOSYSTEMS

- Bubbles in Your Bread

STRUCTURE, FUNCTION, AND INFORMATION PROCESSING

- Get a Grip! *(shown above)*

Physical Science

FORCES AND INTERACTIONS

- Under Pressure

Products Used

Go Direct Gas Pressure

Measure the change in gas pressure as variables such as temperature and volume change.

GDX-GP $99

Gas Pressure Sensor Bulb

GPS-BULB1 $6

Learn more at vernier.com/elb-gp-e

Motion

Investigating Motion

Download only
ELB-MD-E $12

The motion of a bouncing ball and a toy car are just two examples of the investigations about motion that students conduct using this e-book.

7 Experiments Included in E-book

- Learning to Use a Motion Detector

Physical Science

FORCES AND INTERACTIONS

- e-Motion!
- Spring into Action
- Air Ball! *(shown above)* also uses Go Direct® Gas Pressure.

ENERGY

- Driving with Energy
- Weigh Station—All Trucks Stop!

Life Science

STRUCTURE, FUNCTION, AND INFORMATION PROCESSING

- Batty About Science

Sensor Used

Go Direct Motion

Monitor the position of a moving object using ultrasound.

GDX-MD $114

Learn more at vernier.com/elb-md-e

Force

Investigating Force

Download only
ELB-FOR-E $12

Everyday forces, such as the friction on a shoe, are investigated in this e-book.

4 Experiments Included in E-book

- Learning to Use a Force Sensor

Physical Science

FORCES AND INTERACTIONS

- Lift the Load!
- What a Drag! *(shown above)*
- Oh! My Aching Back! How Ramps Make Lifting Easier

Sensor Used

Go Direct Force and Acceleration

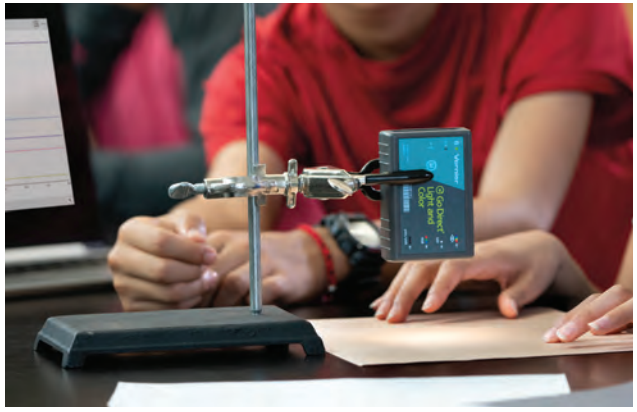
Use this force sensor to measure pushes and pulls in the classroom and outdoors. This sensor can also measure acceleration.

GDX-FOR $119

Learn more at vernier.com/elb-for-e

Light

Investigating Light



Download only
ELB-LC-E $12

Students investigate light properties, including how light changes with distance, reflects off different colors, and varies with the seasons.

5 Experiments Included in E-book

- Learning to Use a Light Sensor

Physical Science

WAVES: LIGHT AND SOUND

- Sunshine on My Shoulders

Earth and Space Science

EARTH'S SYSTEMS

- Summer and Winter
- Reflectivity of Light *(shown above)*

SPACE SYSTEMS: STARS AND THE SOLAR SYSTEM

- Distance From the Sun

Sensor Used

Go Direct Light and Color

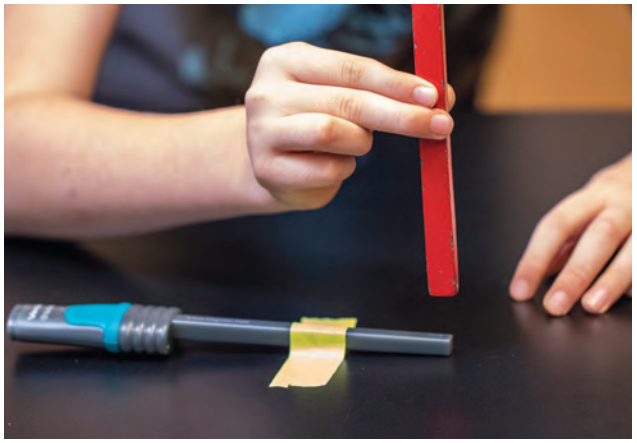
Students use this sensor to measure the brightness of a light bulb or the reflectance of light off of various objects. They can also measure UV light and relative amounts of red, blue, and green light.

GDX-LC $89

Learn more at vernier.com/elb-lc-e

Magnetism

Investigating Magnetism



Download only
ELB-3MG-E $12

In this e-book, students investigate the magnetic field of magnets and electromagnets.

4 Experiments Included in E-book

- Learning to Use a Magnetic Field Sensor

Physical Science

FORCES AND INTERACTIONS

- Exploring the Poles *(shown above)*
- Making Magnets
- Electromagnets

Sensor Used

Go Direct® 3-Axis Magnetic Field

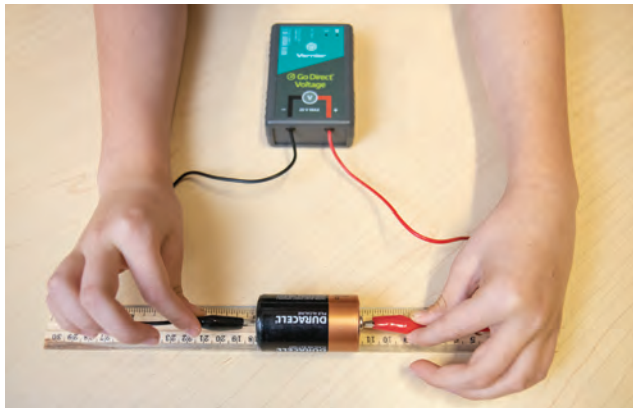
Use this sensor to explore properties of magnets, electromagnets, and the Earth's magnetic field.

GDX-3MG $75

Learn more at vernier.com/elb-3mg-e

Voltage

Investigating Voltage



Download only
ELB-VOLT-E $12

Do C-cell batteries provide a higher voltage than AA batteries? Students investigate this type of question in this e-book focused on voltage.

4 Experiments Included in E-book

- Learning to Use a Voltage Probe

Physical Science

ENERGY

- Are All Batteries the Same? *(shown above)*
- Stacked Batteries
- All Worn Out

Sensor Used

Go Direct Voltage

This sensor is an excellent choice for investigating batteries, circuits, and electromagnets.

GDX-VOLT $79

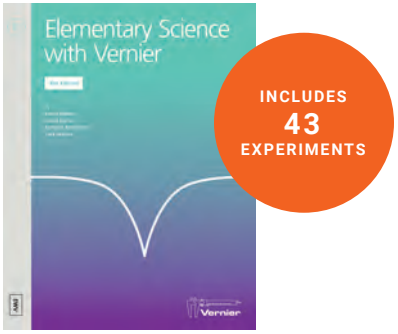
Learn more at vernier.com/elb-volt-e

Elementary Science with Vernier

This collection of experiments for elementary students includes the topics of temperature, motion, force, magnetism, light, electricity, and gas pressure.

Includes Experiments from These E-books

- *Investigating Temperature*
- *Investigating Gas Pressure*
- *Investigating Motion*
- *Investigating Force*
- *Investigating Light*
- *Investigating Magnetism*
- *Investigating Voltage*



Download only
EWV-E $44

Printed book + download
EWV $52

Learn more at vernier.com/ewv

Elementary Go Direct Package

8 Products • GDP-EL-DX • $659
Buy 8 or more packages at $639 and save $160.

This package includes

Go Direct Temperature

Go Direct Light and Color

Go Direct Motion

Go Direct 3-Axis Magnetic Field

Go Direct Gas Pressure

Go Direct Voltage

Go Direct Force and Acceleration

Gas Pressure Sensor Bulb

All sensors work with the Vernier Graphical Analysis™ app and LabQuest® 3.

Learn more at vernier.com/gdp-el-dx

Wind Energy

Investigating Wind Energy

Download only
ELB-WIND-E $22

Download + print
ELB-WIND $27

Students investigate wind energy to learn about energy transfer, basic electric circuits, and blade design.

11 Experiments Included

- Introduction to Wind Turbines
- Exploring Wind Energy
- Introduction to the Energy Sensor
- Wind Turbine Output: The Effect of Load *(shown above)*
- Exploring Wind Turbine Blades
- Blade Design: Pitch
- Blade Design: Area
- Blade Design: Quantity
- Blade Design: Mass
- Blade Design: Material
- Project: Power Up! (Engineering Design)

Package Available

Investigating Wind Energy Package

Contains the following products

- Go Direct® Energy
- Vernier Resistor Board
- KidWind MINI Wind Turbine with Blade Design

GDP-EL-WE $186
Buy 8 or more at $180 and save $48.

Learn more at vernier.com/elb-wind

Solar Energy

Investigating Solar Energy

Download only
ELB-SOLAR-E $22

Download + print
ELB-SOLAR $27

Solar energy provides a real-world example in which students investigate energy transfer, series and parallel circuits, and other factors that affect solar panel output.

11 Experiments Included

- Introduction to Solar Panels
- Exploring Solar Energy
- Introduction to the Energy Sensor
- Making Connections: Circuits
- Solar Panel Output: Effect of Load
- Solar Panel Output: Effect of Shade
- Solar Panel Output: Effect of Angle *(shown above)*
- Pumping Water with Solar Energy
- Exploring Surface Temperature
- Project: Solar Homes (Engineering Design)
- Project: What's Cookin'? (Engineering Design)

Package Available

Investigating Solar Energy Package

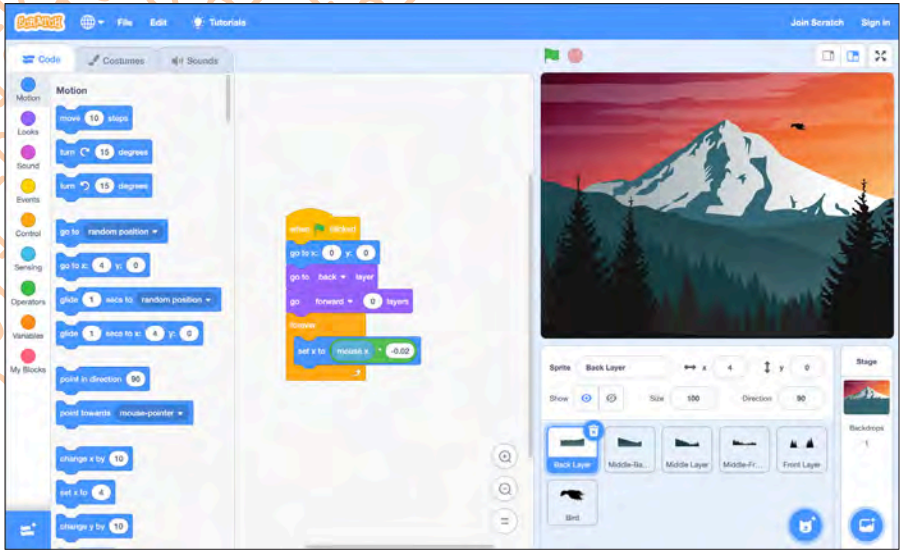
Contains the following products

- Go Direct Energy
- Go Direct Surface Temperature
- Solar Energy Exploration Kit
- Vernier Resistor Board

GDP-EL-SE $305
Buy 8 or more at $296 and save $72

Learn more at vernier.com/elb-solar

Coding



Creating interactive art in Scratch with Go Direct Force and Acceleration

Coding with Scratch

Integrate Go Direct Force and Acceleration into your classroom activities with Scratch. Your students can learn coding by applying their skills to fun, collaborative, hands-on coding projects.

We've designed a free module of Vernier Scratch activities—including a teacher's guide—that helps students sharpen coding skills and gain valuable experience with data-collection technology.

Download the module at **vernier.com/scratch**

Vernier Scratch Activities

- **Storytelling in Scratch:** Use block-based coding to tell the story of Newton's "year of wonders."
- **Interactive Art:** Write code in Scratch to create a parallax effect.
- **Ideal Gas Laws:** Combine coding and an exploration of the ideal gas laws.
- **Emergency Scratch Game:** Learn the fundamentals of coding in Scratch by creating a simple game in which players pilot an ambulance as it dodges traffic.
- **Sustainable Living Activity:** Code an interactive sustainable living poster to help peers understand what they can do to reduce their impact on the environment.
- **Lunar Lander Game:** Use block-based coding to build a lunar lander game with custom sprites and stages.

Product Used

Go Direct Force and Acceleration

With Go Direct Force and Acceleration, your students can make a sprite move in response to spinning, tilting, falling, or applying a force to the sensor.

GDX-FOR $119

Learn more at vernier.com/scratch

Featured Products

Go Direct Sensors

Sensor		Order Code	Price
Go Direct® 3-Axis Magnetic Field		GDX-3MG	$75
Go Direct Energy		GDX-NRG	$98
Go Direct Force and Acceleration		GDX-FOR	$119
Go Direct Gas Pressure		GDX-GP	$99
Go Direct Light and Color		GDX-LC	$89
Go Direct Motion		GDX-MD	$114
Go Direct Sound		GDX-SND	$95
Go Direct Surface Temperature		GDX-ST	$99
Go Direct Temperature		GDX-TMP	$78
Go Direct Voltage		GDX-VOLT	$79
Go Direct Weather		GDX-WTHR	$109

Go Direct Charge Station

Accessory		Order Code	Price
Go Direct Charge Station		GDX-CRG	$89

See all our products for elementary school science at vernier.com/elementary-school

Additional Products

Product		Order Code	Price
Davis® Weather Stations		vernier.com/weather	
Gas Pressure Sensor Bulb		GPS-BULB1	$6
KidWind MINI Wind Turbine with Blade Design		KW-MWTBD	$69
Solar Energy Exploration Kit		KW-SEEK	$89
USB Digital Microscope		BD-EDU-100	$119
Vernier Resistor Board		VES-RB	$19

Coding

Product		Order Code	Price
Go Direct Force and Acceleration (for use with Scratch)		GDX-FOR	$119

Lab Books

Title	Order Code	Price
Elementary Science with Vernier	Download only: EWV-E Download + print: EWV	$44 $52
*Investigating Temperature**	Download only: ELB-TEMP-E Download + print: ELB-TEMP	$22 $27
*Investigating Motion**	Download only: ELB-MD-E	$12
*Investigating Light**	Download only: ELB-LC-E	$12
*Investigating Magnetism**	Download only: ELB-3MG-E	$12
*Investigating Gas Pressure**	Download only: ELB-GP-E	$12
*Investigating Force**	Download only: ELB-FOR-E	$12
*Investigating Voltage**	Download only: ELB-VOLT-E	$12
Investigating Solar Energy	Download only: ELB-SOLAR-E Download + print: ELB-SOLAR	$22 $27
Investigating Wind Energy	Download only: ELB-WIND-E Download + print: ELB-WIND	$22 $27

** All experiments from this e-book are included in* Elementary Science with Vernier.

See all our products for elementary school science at vernier.com/elementary-school

Middle School

Why Vernier?

Hands-on learning with technology is ideal for middle school students. Enhance their discovery and understanding of the world around them with the use of Vernier technology. Using our versatile, cutting-edge products and ready-to-go experiments correlated to the NGSS, you can encourage your students' curiosity and prepare them for high school—and the world beyond.

Easy

Simple for students and teachers to use

Affordable

Priced to fit school budgets

Versatile

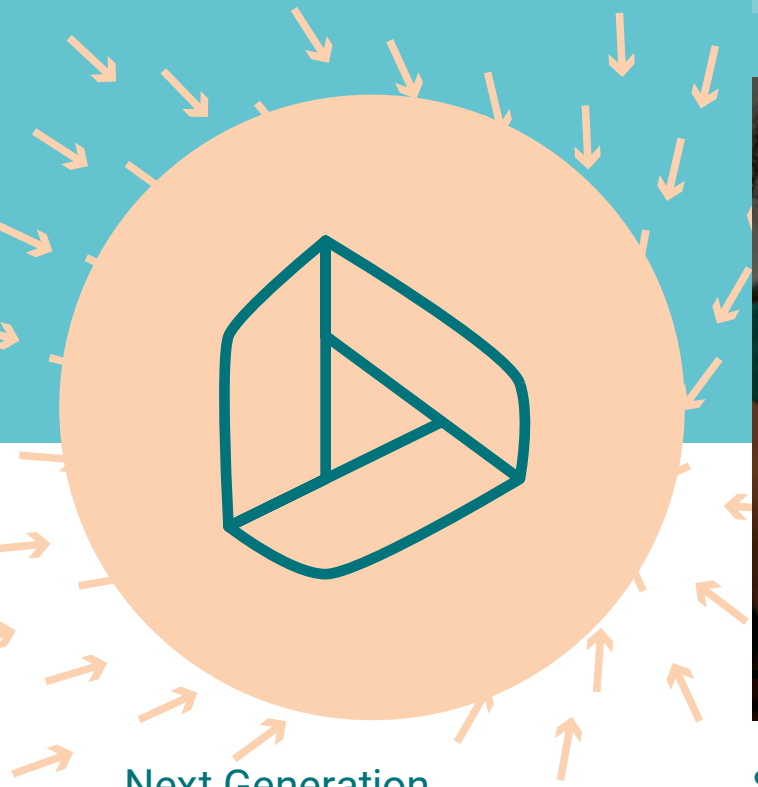
Supports a variety of devices and investigations

> The technology's ease of use and accessibility allows students to really take charge of the learning process as they acquire data; the technology has been a game changer.
>
> ***Susan Foster,***
> ***Manlius Pebble Hill School***

vernier.com/middle-school

Contents

Explore our offerings for middle school and learn how Vernier technology helps your students deepen their understanding of key STEM concepts.



Next Generation Science Standards

Hands-on learning has been at the core of our mission for over 40 years, and as we create new products—whether it is hardware, software, or written investigations—we work to align them to the NGSS, making it easy for you to help students meet these standards.

vernier.com/ngss-correlations

Student-Friendly Technology

Set your middle school students up for success with student-friendly, cutting-edge products that encourage curiosity and enhance their understanding of the world.

vernier.com/middle-school

Professional Development

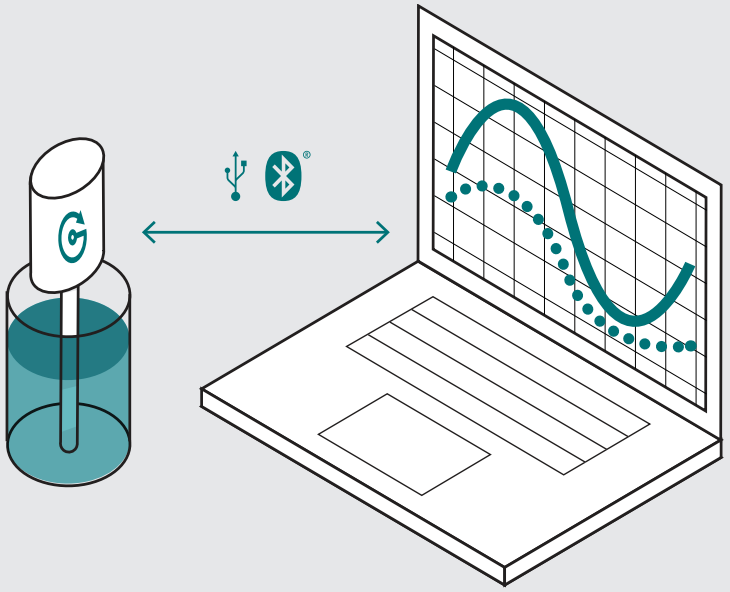
We are here to help. Our webinars, workshops, and personalized training options offer innovative ways to engage students with STEM in a traditional classroom or virtual environment.

vernier.com/training

Vernier Graphical Analysis Pro

Collect, Graph, and Analyze Data in Real Time

Vernier Graphical Analysis™ Pro enables students to form critical connections between abstract scientific ideas and the real world. With this easy-to-use app, students can visualize the data they collect via nearly any Vernier sensor and interact with that data on every desktop or mobile device commonly found in today's classrooms.



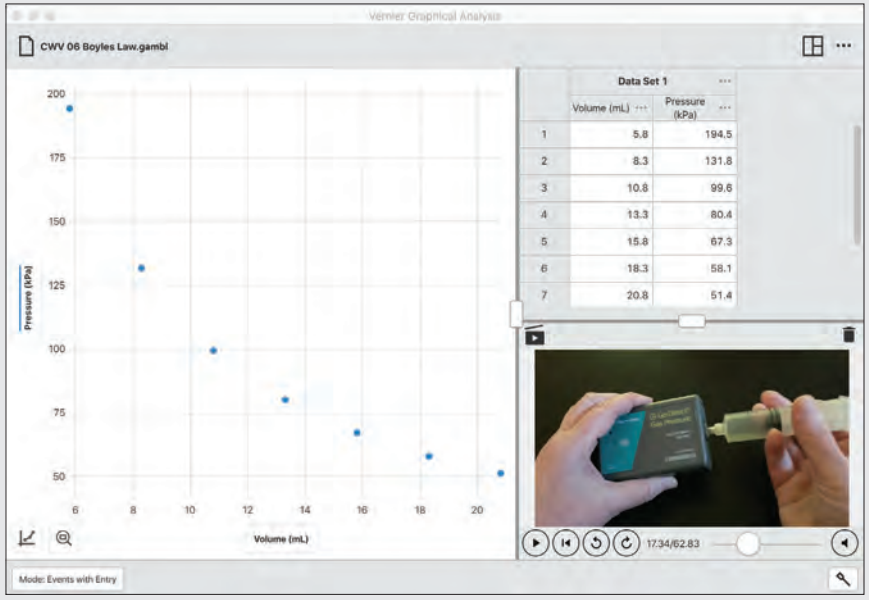
Awards

TECH & LEARNING AWARDS OF EXCELLENCE — REMOTE LEARNING — WINNER

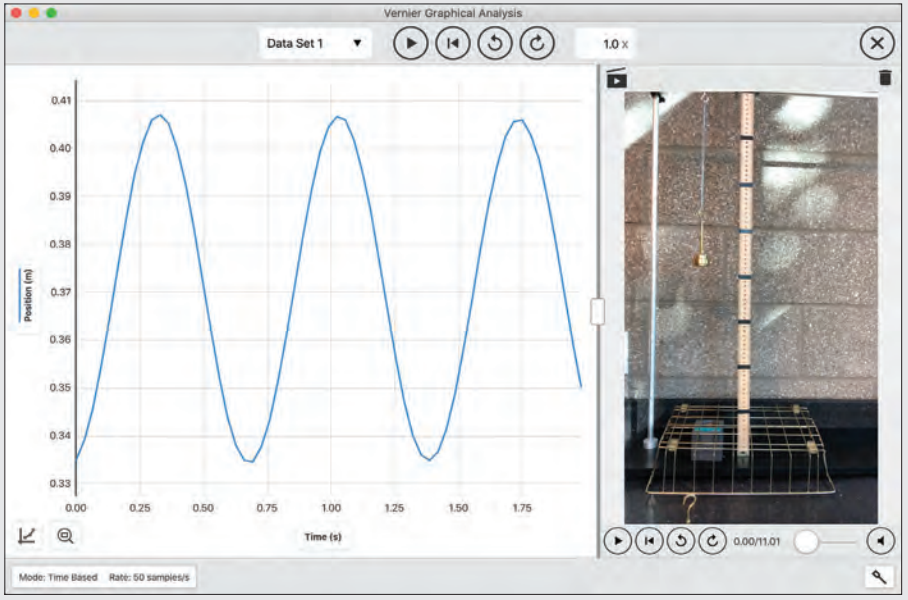
TECH & LEARNING BEST of SHOW — ISTE20 LIVE — Winner

2020 NEW PRODUCT AWARD — THE

THE EDTECH AWARDS — COOL TOOL FINALIST 2021

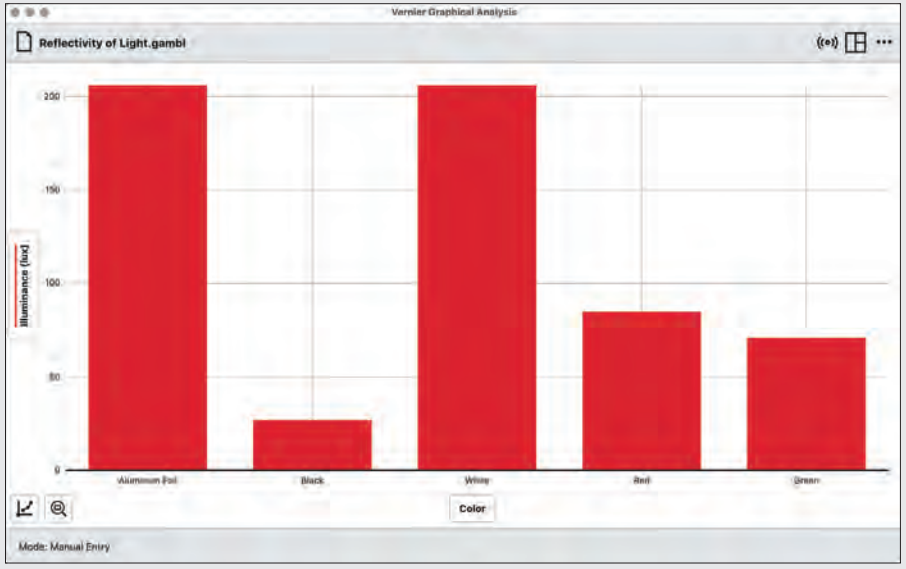


With over 45 ready-to-be-analyzed sample experiments, students can build their understanding of key scientific concepts—even when lab equipment is unavailable.



Data display is synchronized with the video, enabling students to replay, speed up, slow down, and pause recorded experiments at key moments.

Graphical Analysis Pro was designed to meet the needs of today's science classrooms by facilitating synchronous and asynchronous learning, data sharing, mobile access, and remote learning.



Students can plot categorical data in addition to collecting sensor data.

> Our school is really focused on STEM education and the use of all of this technology—both prior to COVID and now—continues to really help students make sense of what they are learning in a fun and engaging way.
>
> ***Jessica Freeman***
> ***The Carver School for Mathematics, Science, and Technology***

Key Features

With Graphical Analysis Pro, you get all the features you expect from a data-analysis app, plus a whole lot more!

Enhanced Data Display

Collect data from multiple sensors simultaneously, plot categorical items, and create more graph types (e.g., bar graphs, histograms, and FFTs).

Advanced Data Analysis

Use error bars to describe measurement uncertainty and ensure the best fit with the ability to define the curve fit expression.

Live Data Sharing

Increase student engagement during live demonstrations by sharing your experiment data with students' personal devices—a great approach for in-person and remote learning!

Video Playback with Synchronized Data

Increase comprehension by giving students the ability to replay, speed up, slow down, and pause recorded experiments, crystallizing the connection between what they see and the data they record.

Ready-to-Analyze Experiments

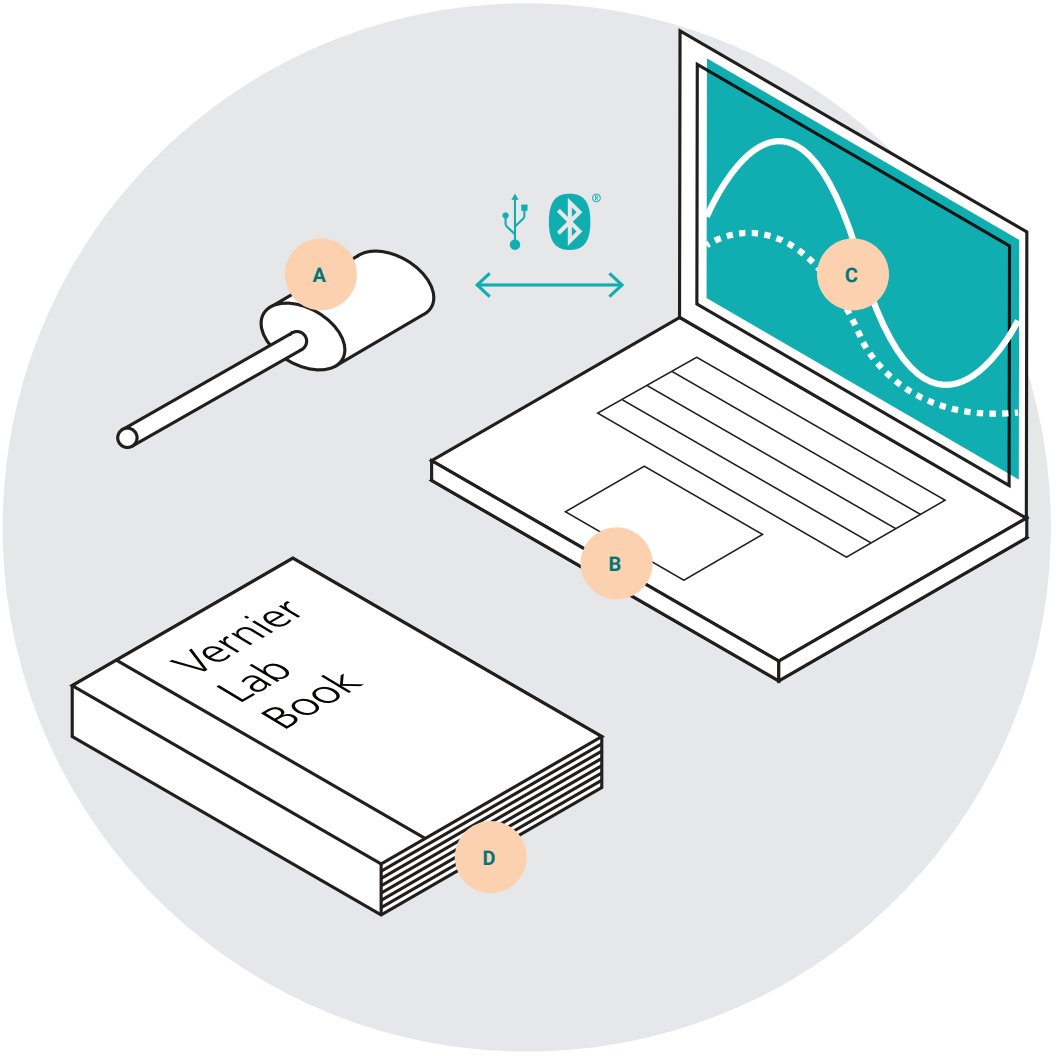
Access a library of over 45 sample experiments that are ready to be analyzed by students, even when lab equipment isn't available (e.g., prep work, homework, and make-up assignments).

Easy Event Marking

Mark important events—such as when melting begins and ends or when the pH indicator changes color—with just one click.

For more information, go to vernier.com/graphical-analysis

Getting Started



What You Need to Get Started

A Go Direct Sensor

These versatile sensors connect to your device via Bluetooth® wireless technology or USB.

B Device

Go Direct® sensors connect to a wide variety of devices commonly used in classrooms, including Chromebooks, computers, compatible mobile devices, and LabQuest® 3.

C Vernier Graphical Analysis Pro

With Vernier Graphical Analysis™ Pro, students can collect, graph, analyze, and share scientific data collected from Vernier sensors.

Learn more at vernier.com/graphical-analysis

D Lab Book

Step-by-step instructions at your fingertips save valuable time when integrating probeware into your curriculum. All of our lab books for middle school provide support for Go Direct sensors and the Graphical Analysis app.

Our lab books come with a generous site license—purchase once and share files school wide.

Overview

Classic Approach

Vernier Lab Books

While the three-dimensional learning approach is valuable, sometimes a more classic approach to instruction is a better fit for your students, teaching style, and resources. In a classic approach, students follow detailed directions to conduct an experiment or investigate a specific science concept, topic, or law.

Vernier supports this more classic approach by providing a robust library of lab books covering most science disciplines. Our lab books provide teacher-created, step-by-step experiments that help your students work toward meeting the NGSS performance expectations and guide students through conducting hands-on experiments in a more structured way.

Learn more at vernier.com/lab-books

Overview

Three-Dimensional Learning Approach

Vernier and OpenSciEd

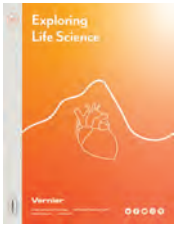
Vernier knows that science education is not static. Your students need to understand critical scientific concepts, use these concepts to solve problems, and understand how they connect to the real world. These objectives are incorporated into the main pillars of the three-dimensional learning framework developed by the National Research Council. Vernier provides downloadable e-books, shown on page 25, that incorporate the three-dimensional learning approach.

We are proud to partner with OpenSciEd™, a provider of high-quality, open-source science instructional materials. Our partnership gives you access to free field-tested and EQuIP-approved units that support the three-dimensional learning approach. Vernier provides free downloadable supplements that integrate data-collection technology into these units. When Vernier technology is paired with OpenSciEd's classroom-tested curriculum, your students establish a deep understanding of critical scientific concepts through data collection.

Learn more at vernier.com/openscied

Life Science

Exploring Life Science



Download only
MSB-LS-E $12

From yeast to humans, this e-book provides opportunities for students to learn about life science.

5 Experiments Included in E-book

Structure, Function, and Information Processing

- Get a Grip *(shown above)*
- Heart Rate and Body Position
- Heart Rate and Exercise

Matter and Energy in Organisms and Ecosystems

- Diffusion: How Fast?

Growth, Development, and Reproduction of Organisms

- Yeast Beasts in Action

Package Available

Exploring Life Science Go Direct Package GDP-MS-LS $322

This package contains the following: Buy 8 or more at $312
Go Direct® Gas Pressure, Go Wireless® Heart Rate, and save $80.
Go Direct Conductivity, Gas Pressure Sensor Bulb

Learn more at vernier.com/msb-ls-e

Physical Science

Middle School Explorations: Chemical Reactions

Download only
MSB-CR-E $22

In the six experiments in this book, students gain an understanding of various types of chemical reactions as they build a model to explain what goes on at the molecular level during a chemical reaction.

6 Experiments Included in E-book

Students investigate endothermic and exothermic reactions, precipitate formation, conservation of mass, and other reactions.

Sensor Used

Go Direct Temperature

This is a rugged, general-purpose sensor that students can use to monitor temperature.
GDX-TMP $78

Teacher pack also available
(includes 8 Go Direct Temperature Probes and a Charge Station)
GDX-TMP-TP $692

Learn more at vernier.com/msb-cr-e

Physical Science

Exploring Physical Science

Watch a video

Download only
MSB-PS-E $22

From matter and energy to motion and forces, students explore a wide variety of topics in basic chemistry and physics in this e-book.

22 Experiments Included in E-book

Structure and Properties of Matter
- Fun with Pressure

Chemical Reactions
- Boiling Temperature of Water
- Freezing Temperature of Water
- How Low Can You Go? Freezer Bag Ice Cream

PLUS 2 MORE

Forces and Interactions
- Friction
- First Class Levers
- Pulleys *(shown above)*

PLUS 7 MORE

Energy
- A Hot Hand
- A Good Sock
- Lemon "Juice"

Waves and Electromagnetic Radiation
- Reflectivity of Light
- Mapping a Magnetic Field
- Electromagnets

Package Available

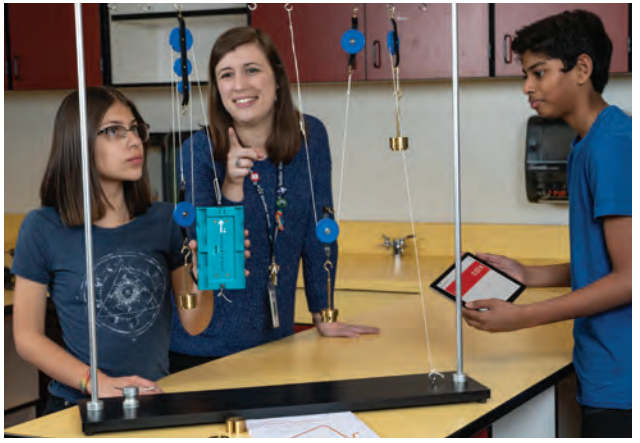
Exploring Physical Science Go Direct Package GDP-MS-PS $731

This package contains the following Go Direct sensors: Temperature (2), Gas Pressure, Force and Acceleration, Motion Detector, Voltage, 3-Axis Magnetic Field, Light and Color

Buy 8 or more at $709 and save $176.

Learn more at vernier.com/msb-ps-e

Exploring Motion and Force with Go Direct Sensor Cart



Download only
MSB-CART-E
$22

In this e-book, students explore the force of friction, aspects of motion, and simple machines such as the lever, ramp, and pulley.

7 Experiments Included in E-book

- Investigating Friction
- Levers as Machines
- Pulleys as Machines *(shown above)*
- Ramps as Machines
- Getting Faster
- Crash Test
- Newton's Second Law

Package Available

Exploring Motion and Force with Go Direct Sensor Cart Package GDP-MS-SC $378

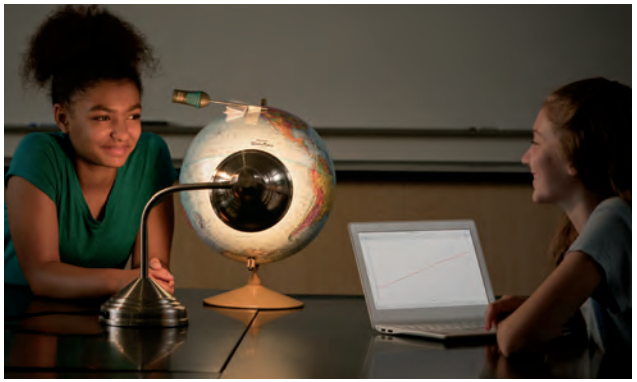
This package contains the following Go Direct sensors: Sensor Cart (Green) and Sensor Cart (Yellow)

Buy 8 or more at $367 and save $88.

Learn more at vernier.com/msb-cart-e

Earth and Space Science

Exploring Earth and Space Science



Download only
MSB-ESS-E $22

Weather, soil, and water quality are a few of the Earth science topics students explore in this e-book.

12 Experiments Included in E-book

Earth's Systems

- Soil Study
- Ocean Floor Mapping
- Water Hardness Study
- A Water Field Study

Weather and Climate

- Heating of Land and Water
- The Greenhouse Effect
- Relative Humidity
- Absorption of Radiant Energy
- Reflectivity of Light
- Schoolyard Study
- What Causes the Seasons? *(shown above)*
- Solar Homes (Engineering Design)

Package Available

Exploring Earth and Space Science Go Direct Package

This package contains the following Go Direct® sensors: Temperature (2), Light and Color, Motion Detector, Conductivity, pH

GDP-MS-ESS $587

Buy 8 or more at $569 and save $144.

Learn more at vernier.com/msb-ess-e

Climate and Meteorology Experiments

Download only
HSB-CM-E $22

This lab book is packed with interactive investigations that challenge students to use data-collection technology to explore weather, climate, and other important weather-related topics.

11 Experiments Included in E-book

Weather and Climate

- Modeling Solar Insolation
- What Causes Land and Sea Breezes?
- Investigating Albedo
- Exploring the Greenhouse Effect
- Effect of Air Temperature on Humidity
- What is Dew Point?
- Measuring Wind Chill
- Changes in Barometric Pressure
- Formation of Clouds
- Measuring Wind Direction
- Studying Microclimates: Urban Heat Islands

Package Available

Climate and Meteorology Experiments Go Direct Package

This package contains the following Go Direct sensors: Surface Temperature (2), Light and Color, Weather System

GDP-CM $425

Buy 8 or more at $412 for a savings of $104.

Learn more at vernier.com/hsb-cm-e

Vernier Supplements to OpenSciEd

EXPERIMENTS

Thermal Energy

18 Lessons

Free Download
OSE-62TE-E

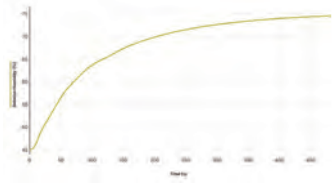
Students plan and carry out investigations to systematically test cup systems, tracking the flow of matter and energy into or out of the system as they develop a model of thermal energy.

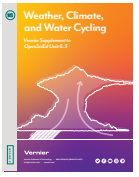
Sensor Used

Go Direct Temperature
GDX-TMP $78

Weather, Climate, and Water Cycling

22 Lessons





Free Download
OSE-63WC-E

In this Earth science unit, students use data-collection technology to explain small-scale storms, mesoscale weather systems, and global-level patterns of precipitation. In the culminating lesson, students explain how climate varies in different parts of the world.

Sensors Used

Go Direct Temperature
GDX-TMP $78

Go Direct Light and Color
GDX-LC $89

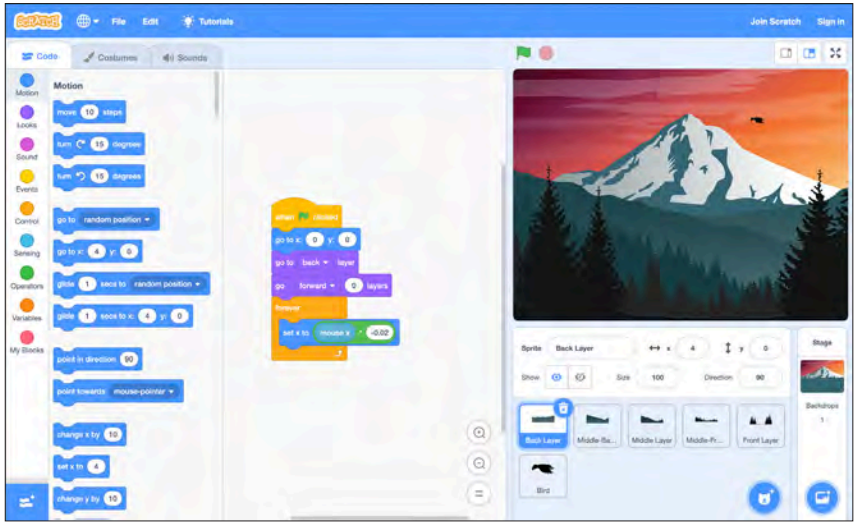
Go Direct Weather
GDX-WTHR $109

LAB BOOKS AND SENSORS

Book Title	Grade	Order Code	Sensors Used
 ***Light and Matter***	Grade 6	OSE-61LM-E Free Download	Go Direct Light and Color GDX-LC $89
 ***Thermal Energy***	Grade 6	OSE-62TE-E Free Download	Go Direct Temperature GDX-TMP $78
 ***Weather, Climate, and Water Cycling***	Grade 6	OSE-63WC-E Free Download	Go Direct Temperature GDX-TMP $78 Go Direct Light and Color GDX-LC $89 Go Direct Weather GDX-WTHR $109
 ***Metabolic Reactions***	Grade 7	OSE-73MR-E Free Download	Go Direct CO_2 Gas GDX-CO2 $225
 ***Matter Cycling and Photosynthesis***	Grade 7	OSE-74MC-E Free Download	Go Direct CO_2 Gas GDX-CO2 $225
 ***Contact Forces***	Grade 8	OSE-81CF-E Free Download	OpenSciEd™ Sensor Cart Package OSE-GDXCART-PKG $464
 ***Sound Waves***	Grade 8	OSE-82SW-E Free Download	Go Direct Motion GDX-MD $114
 ***Forces at a Distance***	Grade 8	OSE-83FD-E Free Download	OpenSciEd Sensor Cart Package OSE-GDXCART-PKG $464

Learn more at vernier.com/openscied

Coding



Creating interactive art in Scratch with Go Direct Force and Acceleration

Coding with Scratch

Integrate Go Direct® Force and Acceleration into your classroom activities with Scratch. Your students can learn coding by applying their skills to fun, collaborative, hands-on coding projects.

We've designed a free module of Vernier Scratch activities—including a teacher's guide—that helps students sharpen coding skills and gain valuable experience with data-collection technology.

Download the module at vernier.com/scratch

Vernier Scratch Activities

- **Storytelling in Scratch:** Use block-based coding to tell the story of Newton's "year of wonders."
- **Interactive Art:** Write code in Scratch to create a parallax effect.
- **Ideal Gas Laws:** Combine coding and an exploration of the ideal gas laws.
- **Emergency Scratch Game:** Learn the fundamentals of coding in Scratch by creating a simple game in which players pilot an ambulance as it dodges traffic.
- **Sustainable Living Activity:** Code an interactive sustainable living poster to help peers understand what they can do to reduce their impact on the environment.
- **Lunar Lander Game:** Use block-based coding to build a lunar lander game with custom sprites and stages.

Product Used

Go Direct Force and Acceleration

With Go Direct Force and Acceleration, your students can make a sprite move in response to spinning, tilting, falling, or applying a force to the sensor.

GDX-FOR $119

Learn more at vernier.com/scratch

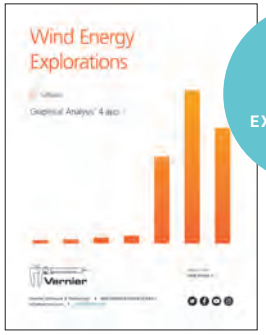
Wind Energy

Wind Energy Explorations

Students gain an understanding of energy, circuits, and loads, as well as practice engineering design as they use this e-book to explore wind energy.

Experiments Included in E-book

- Energy Transformation
- Measuring Wind Energy
- Exploring Wind Turbines
- Wind Turbines: Effect of Load
- Blade Variable: Pitch
- Blade Variable: Quantity
- Blade Variable: Area
- Blade Variable: Shape
- Project: Max Power (Engineering Design)



INCLUDES 9 EXPERIMENTS

Download only
MSB-WIND-E $22

Wind Energy Explorations Go Direct Packages

Single Station Package *(shown below)*

This package includes

- Go Direct Energy (1)
- Vernier Resistor Board (1)
- KidWind Basic Wind Experiment Kit

GDP-MS-WE $251

Classroom Package

This package includes

- Go Direct Energy Sensors (3)
- Vernier Resistor Boards (3)
- KidWind Basic Wind Experiment Classroom Pack (includes materials for 6 to 10 groups of 2 to 4 students each)

GDP-MS-WEC $705

Learn more at vernier.com/msb-wind-e

Solar Energy

Solar Energy Explorations

Solar energy provides a relevant topic for students to explore energy, temperature, and electrical circuits, culminating in an engineering design project.

Experiments Included in E-book

- Renewable Energy
- Introduction to Solar Panels and Solar Energy
- Measuring Energy
- Making Connections: Circuits
- Solar Panel Output: Effect of Load
- Solar Panel Output: Effect of Shade
- Solar Panel Output: Effect of Angle
- Solar Panel Output: Effect of Temperature
- Project: Build a Solar Car (Engineering Design)

INCLUDES 9 EXPERIMENTS

Download only
MSB-SOLAR-E $22

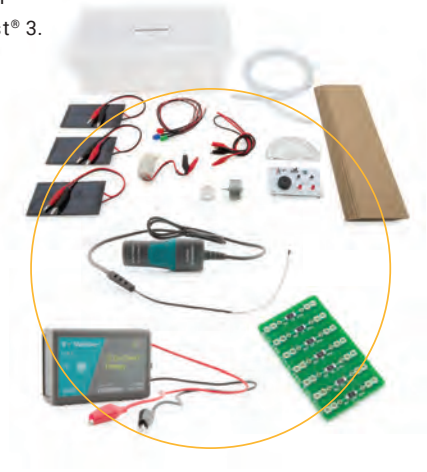
Solar Energy Explorations Go Direct Package

This package includes sensors that work with Vernier Graphical Analysis™ Pro and LabQuest® 3. It also includes an experiment kit and a resistor board.

- Go Direct Energy
- Solar Energy Exploration Kit
- Go Direct Surface Temperature
- Vernier Resistor Board

GDP-MS-SE $305

Buy 8 or more packages at $296 and save $72.



Learn more at vernier.com/msb-solar-e

Featured Products

Go Direct Sensors

Sensor		Order Code	Price
Go Direct® 3-Axis Magnetic Field		GDX-3MG	$75
Carts and Tracks			
Dynamics Cart and Track System with Go Direct Sensor Carts		DTS-GDX	$619
Go Direct Sensor Cart (Green)		GDX-CART-G	$189
Go Direct Sensor Cart (Yellow)		GDX-CART-Y	$189
Go Direct Conductivity		GDX-CON	$119
Go Direct Current		GDX-CUR	$89
Go Direct Energy		GDX-NRG	$98
Go Direct Force and Acceleration		GDX-FOR	$119
Go Direct Gas Pressure		GDX-GP	$99
Go Wireless® Heart Rate		GW-HR	$98
Go Direct Light and Color		GDX-LC	$89
Go Direct Motion		GDX-MD	$114
Go Direct Optical Dissolved Oxygen		GDX-ODO	$359
pH Sensors			
Go Direct pH		GDX-PH	$109
Go Direct Tris-Compatible Flat pH		GDX-FPH	$134
Go Direct Sound		GDX-SND	$95
Go Direct Structures & Materials Tester		GDX-VSMT	$1,199
Temperature Probes			
Go Direct Surface Temperature		GDX-ST	$99
Go Direct Temperature		GDX-TMP	$78
Go Direct Voltage		GDX-VOLT	$79
Go Direct Weather System		GDX-WTVA	$138

See all our products for middle school science at vernier.com/middle-school

Looking for Replacement Parts?

Visit vernier.com/replacements

Go Direct Charge Station

Accessory		Order Code	Price
Go Direct Charge Station		GDX-CRG	$89

Coding

Products	Order Code	Price
Go Direct Force and Acceleration (for use with Scratch)	GDX-FOR	$119

LabQuest 3 Interface and Sensors

Learn more about LabQuest® 3 and sensors at vernier.com/labq3

Additional Products

Products		Order Code	Price
Cart Guide (pkg. of 10)		CGUIDE-10	$99
Davis® Weather Stations		vernier.com/weather	
pH Storage Solution		PH-SS	$20
KidWind Basic Wind Experiment Kit		KW-BWX	$134
OHAUS® Balances ⁂		vernier.com/ohaus	
Solar Energy Exploration Kit		KW-SEEK	$89
Vernier Resistor Board		VES-RB	$19

Lab Books

Title	Order Code	Price
Middle School Science with Vernier	Download + print: MSV Download only: MSV-E	$52 $44
Exploring Motion and Force with Go Direct Sensor Cart	MSB-CART-E	$22
*Exploring Physical Science**	MSB-PS-E	$22
*Exploring Life Science**	MSB-LS-E	$12
*Exploring Earth and Space Science**	MSB-ESS-E	$22
Solar Energy Explorations	MSB-SOLAR-E	$22
Wind Energy Explorations	MSB-WIND-E	$22
Earth Science with Vernier	Download + print: ESV Download only: ESV-E	$52 $44
Climate and Meteorology Experiments	HSB-CM-E	$22

** All experiments from this e-book are included in* Middle School Science with Vernier.

See all our products for middle school science at vernier.com/middle-school

⁂ For California Proposition 65 warning, see pp. 142–143.

High School

Encourage your students and build their confidence in pursuing a STEM career path with hands-on experience using data-collection technology from Vernier. Our technology supports you as you set up students for success, as well as prepare them to meet the NGSS and state standards through experiments that support three-dimensional learning.

vernier.com/high-school

Contents

Explore a sampling of our featured experiments by topic to learn how Vernier technology helps your students deepen their understanding of key STEM concepts.

Lab Books & Investigations

E-books and Printed Books—the Choice is Yours

Many of our popular, award-winning lab books are available in both e-version and printed formats. When you purchase a printed book, you also receive the electronic version. When you purchase either format, you receive

- Anytime access to the most up-to-date versions of experiments on all supported Vernier software (free Vernier web account required)
- Editable student files and complete teacher information files, including sample data and supplies lists
- A generous site license—purchase once and share files with other teachers in your school

Helping You Meet Standards and Learning Objectives

Vernier understands that helping students meet standards is an important part of teaching. As standards change, we are committed to providing you with the most current information. You will find the following alignments and correlations for Vernier lab books at **vernier.com/standards**

- NGSS (Next Generation Science Standards)
- CSTA (Computer Science Teachers Association)
- AP* (Advanced Placement Program)
- IB† (International Baccalaureate Diploma Program)

Ideas for Your Science Classroom

If you are looking for experiments that can help you excite your students about STEM, check out our extensive library of experiments. We make it easy to find ideas from fellow educators and Vernier professionals.

Visit **vernier.com/ideas**

NGSS Aligned

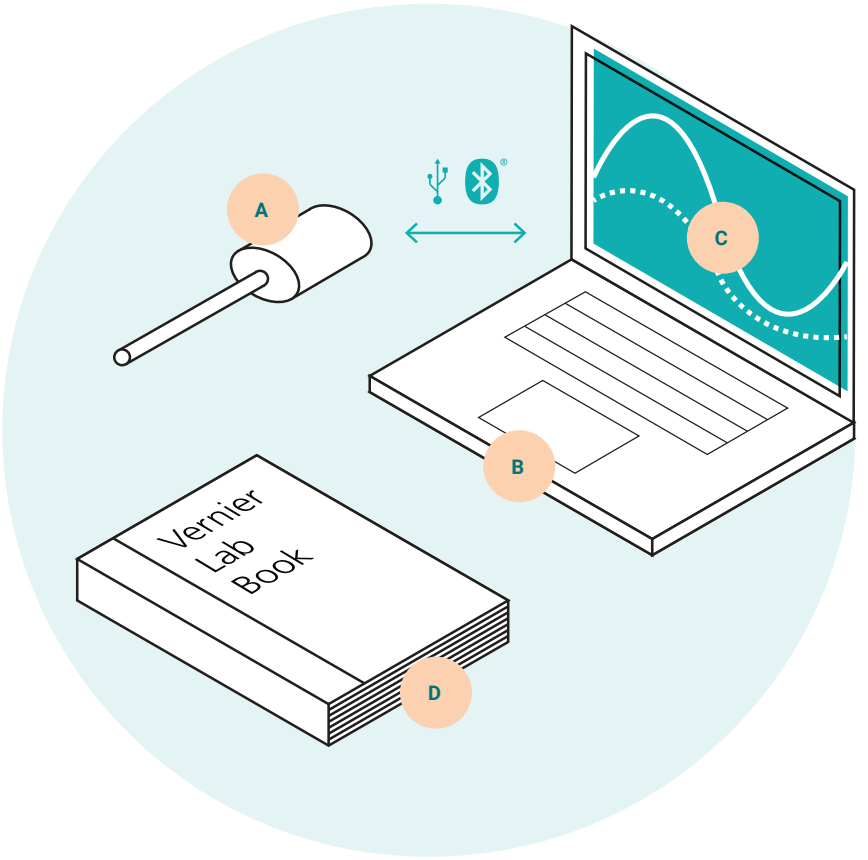
To learn about the Next Generation Science Standards and Vernier, visit vernier.com/ngss

Learn more at vernier.com/lab-books

** AP and Advanced Placement Program are registered trademarks of the College Entrance Examination Board, which was not involved in the production of and does not endorse this product.*

† The IB Diploma Program is an official program of the International Baccalaureate Organization (IBO) which authorizes schools to offer it. The material available here has been developed independently of the IBO and is not endorsed by it.

Getting Started with Go Direct Sensors



Why Choose Go Direct Sensors?

With over 60 sensors to choose from, our Go Direct® family of sensors offers an affordable solution that includes free software. Go Direct sensors are easy to use—just connect and start collecting data with your device.

What You Need to Get Started

A Go Direct Sensor

These versatile sensors connect to your device via Bluetooth® wireless technology or USB.

B Device

Go Direct sensors connect to a wide variety of devices commonly used in classrooms, including Chromebooks, computers, compatible mobile devices, and LabQuest® 3.

C Vernier Graphical Analysis Pro

With Vernier Graphical Analysis™ Pro, students can collect, graph, analyze, and share scientific data collected from Vernier sensors.

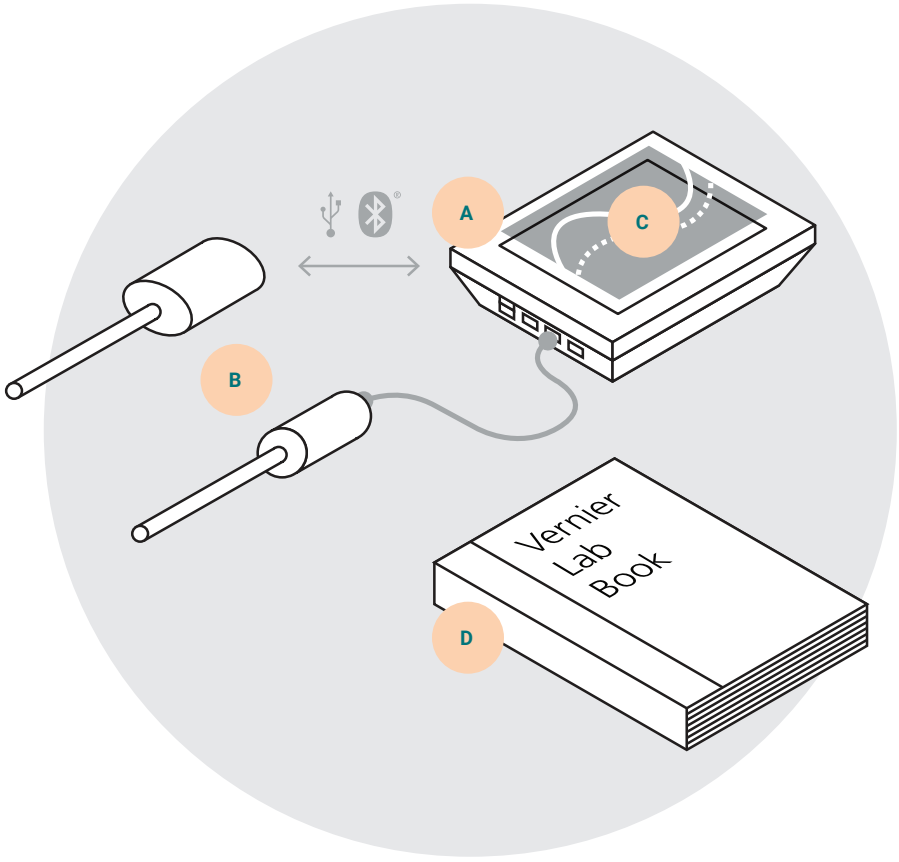
Learn more at vernier.com/graphical-analysis

D Lab Book

Step-by-step instructions at your fingertips save valuable time when integrating probeware into your curriculum. Many of our lab books provide support for Go Direct sensors and the Graphical Analysis app.

Our lab books come with a generous site license. Purchase once and share files school wide.

Getting Started with LabQuest 3



Why Choose LabQuest 3?

LabQuest 3 is a powerful, easy-to-use, and versatile data-logging solution for STEM students. A full-featured data-collection platform, LabQuest 3 is an excellent choice for laboratories, classrooms, or in-the-field investigations.

What You Need to Get Started

A LabQuest 3

With its large, high-resolution screen, LabQuest can be easily navigated using gestures. It also offers fast data collection, wireless connectivity with Wi-Fi and Bluetooth wireless technology, and a rechargeable, high-capacity battery.

B Sensors

Compatible with all Vernier sensors, LabQuest 3 connects wirelessly to the family of Go Direct sensors and connects easily with our wired LabQuest sensors.

C Software

LabQuest 3 has built-in software, LabQuest App, that gives your students real-time graphing and analysis capabilities in one handheld device. LabQuest 3 offers built-in apps, such as a Periodic Table, Sound Recorder, and more, and includes student instructions for over 75 of our most popular experiments.

D Lab Book

Looking for even more lab ideas? Our popular, award-winning lab books provide hundreds of well-tested, customizable experiments.

Our lab books come with a generous site license. Purchase once and share files school wide.

LabQuest 3

LabQuest 3 is a powerful, easy-to-navigate, and versatile data-logging solution for STEM students.

LabQuest® 3 reimagines data collection by providing students with an innovative, easy-to-use interface. A larger screen and advanced touch screen abilities make it easier for students to collect, graph, and analyze data wherever they are—in the classroom, at home, or in the field. Challenge your students to gain a deeper understanding of science through data with the accessible, groundbreaking LabQuest 3.

- Connects wirelessly to the family of Go Direct® sensors
- Easy-to-use platform enables students to generate graphs and analyze results
- An excellent choice for laboratories, classrooms, or in-the-field investigations

LABQ3 $399

LabQuest 3 purchase includes *LabQuest 3 unit, rechargeable battery (in unit), AC power adapter, micro USB computer connection cable, and Quick-Start Guide*

Full-Featured Data-Collection Platform

The most engaging and effective approach to science is interactive, with students collecting and analyzing data to understand and apply core concepts. Graphing and analyzing data is an essential component of the inquiry and learning process. LabQuest 3, with its built-in data-collection and analysis app that works with all Vernier sensors, supports hands-on data collection in the classroom, in the lab, and in the field.

- Is a Chromebook™ not available? No problem. LabQuest 3 can do it all—data collection, data analysis, and data sharing.
- Keep your expensive computers safe from spills, drops, and crashes—use LabQuest 3 in the chemistry lab, at the watershed, or next to your bridge tester. LabQuest 3 does not need another device for data collection or analysis.
- With a portable design, LabQuest 3 lets your students take it anywhere they go.
- LabQuest 3 works with both LabQuest and Go Direct sensors.

Connectivity to Other Platforms

One-to-Many Data Sharing

Students can share real-time data with multiple devices for a truly hands-on, collaborative learning experience. Use LabQuest 3 to transfer data wirelessly to computers, Chromebooks, or mobile devices running Vernier Graphical Analysis™ Pro.

USB Sensor Interface

If you want to use your own computer or Chromebook to collect data, use LabQuest 3 as a conduit between our wired LabQuest sensors and your device. LabQuest 3 works as a USB sensor interface with Vernier Graphical Analysis Pro.

Learn more at vernier.com/labq3

LabQuest 3

LabQuest App

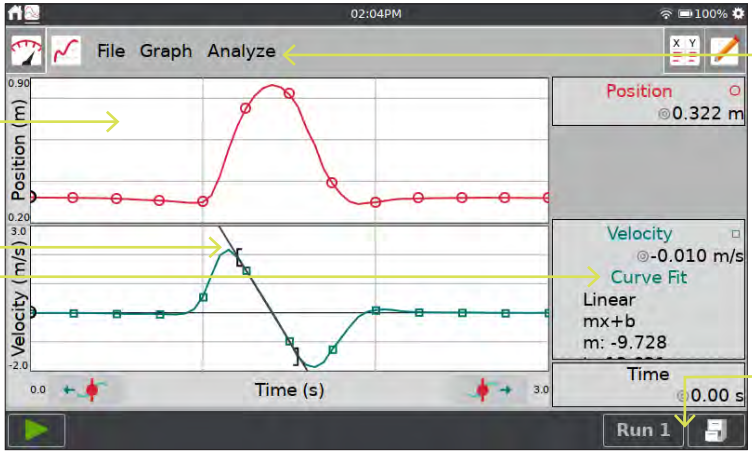
LabQuest 3 has built-in software that gives your students real-time graphing capabilities in a handheld device. It's powerful, yet beautifully simple.

- Collect data and view in a Data Table, Meter, and Graph.
- Perform curve fits.
- Use built-in sensors—GPS, accelerometers, and more.
- Draw a prediction before collecting data.
- Display two graphs at once.
- Display a tangent line or use the Integral function tool.
- Calculate statistics for your data.

Learn more about built-in applications and other great features at vernier.com/labq3

One or two high-resolution plots of data are displayed in real time.

Display curve fit statistics.

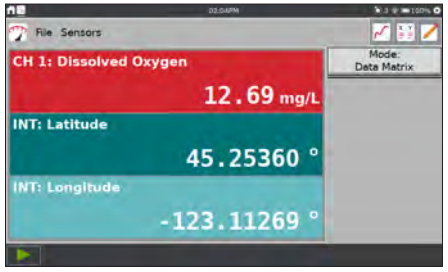


Curve fits and other analysis tools are available.

Easily store and recall multiple runs.

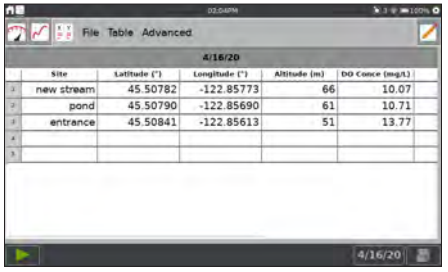
One-Touch Simplicity

Your students can collect data and view them in a Meter, Graph, or Data Table.



Meter

Graph



Data Table

Learn more at vernier.com/labq3

Accessories and Replacement Parts

Product	Order Code	Price
LabQuest Charge Station	LQ3-CRG	$149
LabQuest 3 Stand	LQ3-STN	$5
LabQuest Power Supply*	LQ3-PS	$11
LabQuest Lanyard	LQ3-LAN	$9
LabQuest 3 Battery	LQ3-BAT	$34
LabQuest Battery Boost 3	LQ-BOOST3	$119
Vernier Micro USB Cable*	CB-USB-MICRO	$5
Vernier Micro USB to USB-C Cable	CB-USB-C-MICRO	$9

**Included with LabQuest 3*

LabQuest Viewer App

LabQuest Viewer

Teach students how to use LabQuest® by projecting your LabQuest screen. Display live images of all LabQuest units in your lab to monitor student progress or compare group data. LabQuest Viewer® is compatible with both macOS® and Windows® computers.

Computer software includes a site license for every teacher's computer in your school.

CD LQ-VIEW $79
Download LQ-VIEW-E $79

For more information, visit vernier.com/lq-view

LabQuest Viewer for iPad

Use LabQuest Viewer app for iPad® on your classroom iPad to wirelessly view and control LabQuest. When your iPad is used with a projector, you can easily display any LabQuest screen for the entire class to see.

For more information, visit vernier.com/lq-view-ipad

Download on the App Store

LabQuest Mini

LabQuest Mini

LabQuest Mini brings the power of our award-winning LabQuest technology to you when you don't need the versatility of a standalone device. The perfect solution for educators collecting data with a computer or Chromebook,™ LabQuest Mini interfaces with Vernier Graphical Analysis™ Pro (computers and Chromebooks only) and Logger *Pro*® computer software.

LQ-MINI $189

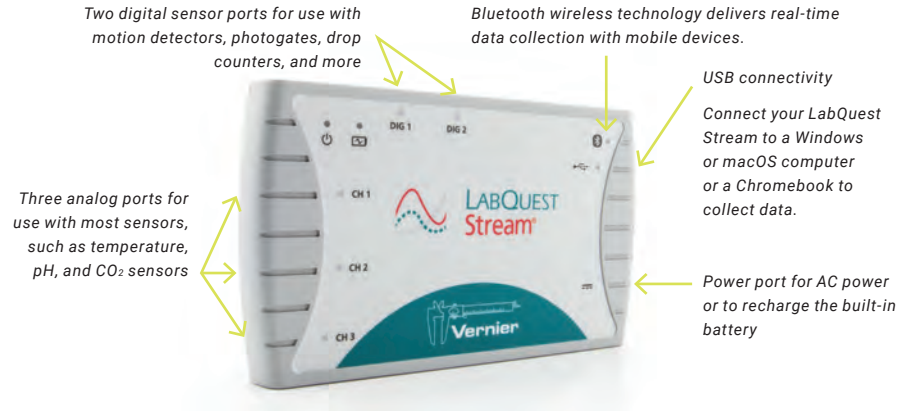
Learn more at vernier.com/lq-mini

LabQuest Stream

LabQuest Stream

LabQuest Stream® brings data collection with LabQuest sensors to even more platforms—computers, Chromebooks, smartphones, and tablets. LabQuest Stream makes a one-to-one connection to your technology via USB (computers and Chromebooks) or Bluetooth® wireless technology (smartphones and tablets) without the need to connect to your school's network. LabQuest Stream is our recommended interface for BYOD classrooms using LabQuest sensors.

LQ-STREAM $299

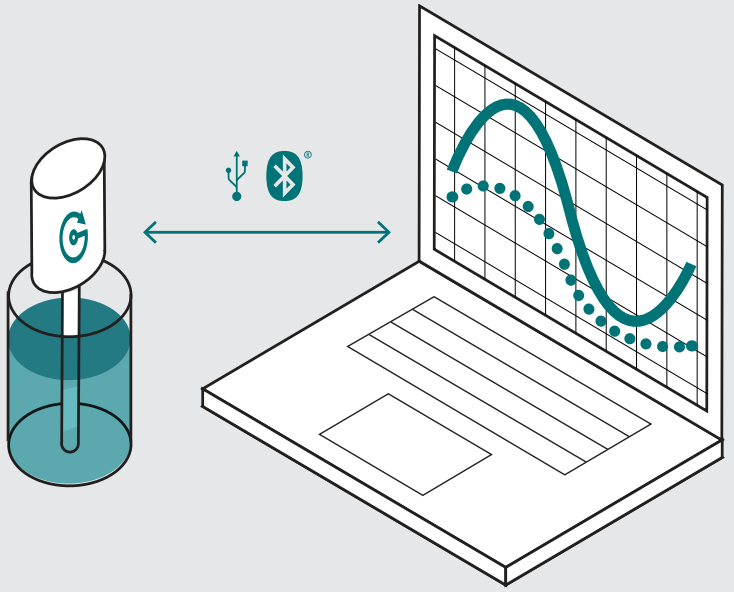


Learn more at vernier.com/lq-stream

Vernier Graphical Analysis Pro

Collect, Graph, and Analyze Data in Real Time

Vernier Graphical Analysis™ Pro enables students to form critical connections between abstract scientific ideas and the real world. With this easy-to-use app, students can visualize the data they collect via nearly any Vernier sensor and interact with that data on every desktop or mobile device commonly found in today's classrooms.



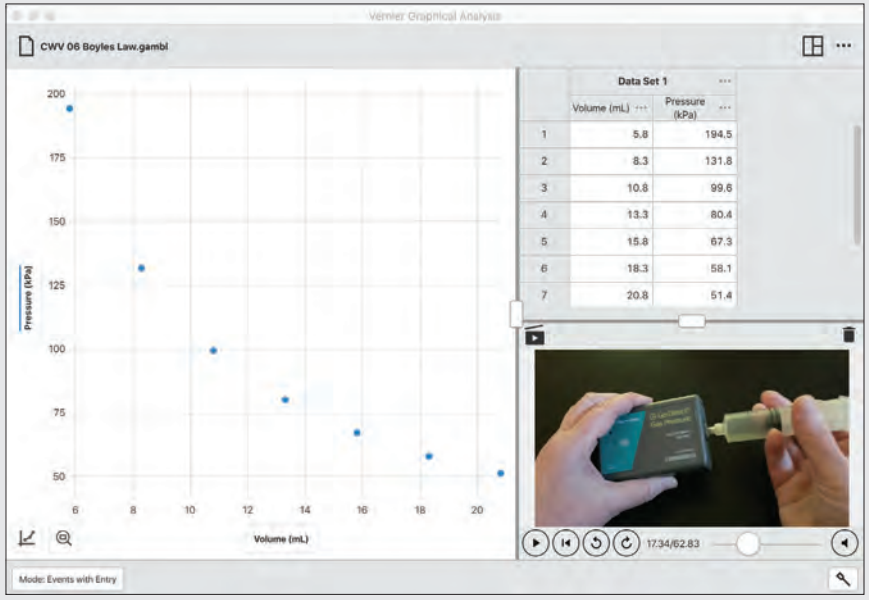
Awards

TECH & LEARNING AWARDS OF EXCELLENCE — REMOTE LEARNING — WINNER

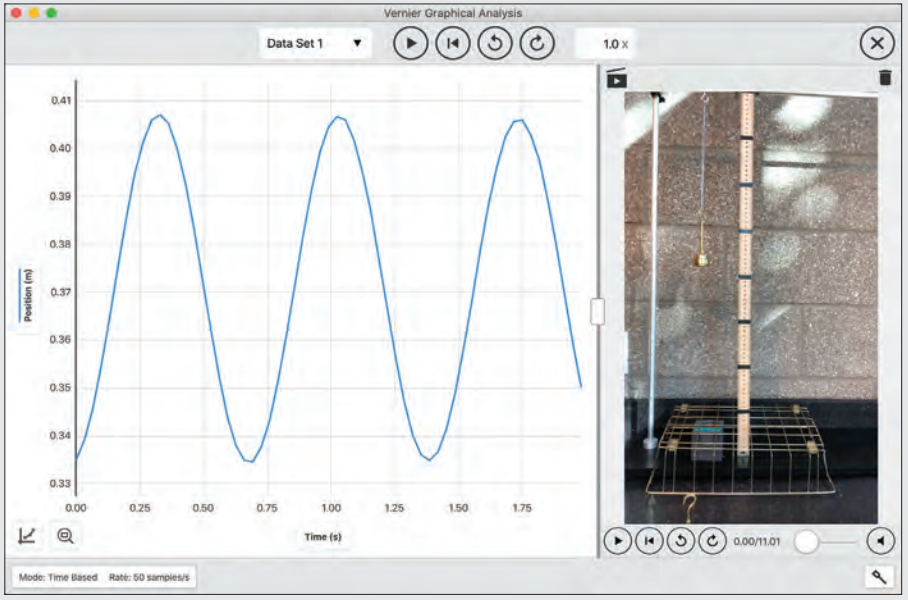
TECH & LEARNING BEST of SHOW — ISTE20 LIVE — Winner

2020 NEW PRODUCT AWARD — THE

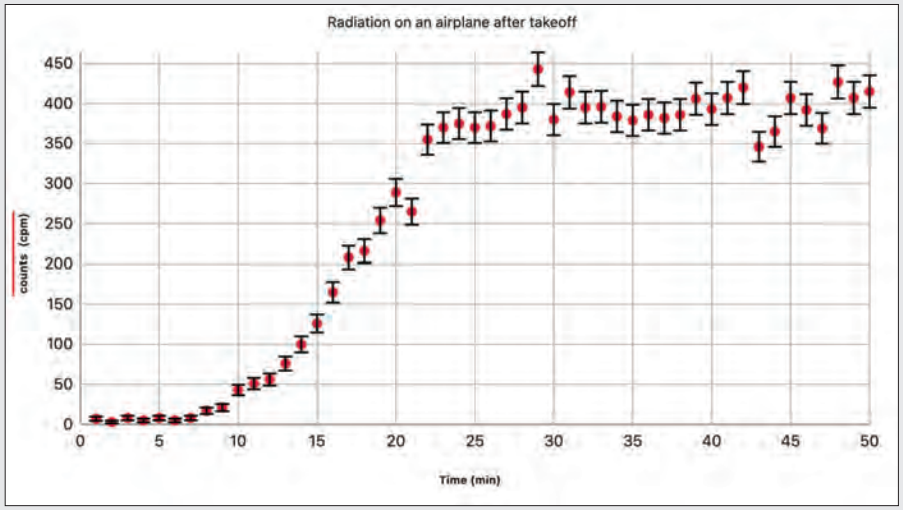
THE EDTECH AWARDS — COOL TOOL FINALIST 2021



With over 45 ready-to-be-analyzed sample experiments, students can build their understanding of key scientific concepts—even when lab equipment is unavailable.



Data display is synchronized with the video, allowing students to replay, speed up, slow down, and pause recorded experiments at key moments.



Use advanced analysis features, like error bars, to describe measurement uncertainty.

Graphical Analysis Pro was designed to meet the needs of today's science classrooms by facilitating synchronous and asynchronous learning, data sharing, mobile access, and remote learning.

Key Features

With Graphical Analysis Pro, you get all the features you expect from a data-analysis app, plus a whole lot more!

Enhanced Data Display

Collect data from multiple sensors simultaneously, plot categorical data, and create more graph types (e.g., bar graphs, histograms, and FFTs).

Advanced Data Analysis

Use error bars to describe measurement uncertainty. Define the curve fit expression to ensure the best fit.

Live Data Sharing

Increase student engagement during live demonstrations by sharing your experiment data with students' devices—a great approach for in-person and remote learning!

Video Playback with Synchronized Data

Increase comprehension by giving students the ability to replay, speed up, slow down, and pause recorded experiments, crystallizing the connection between what they see and the data they record.

Ready-to-Analyze Experiments

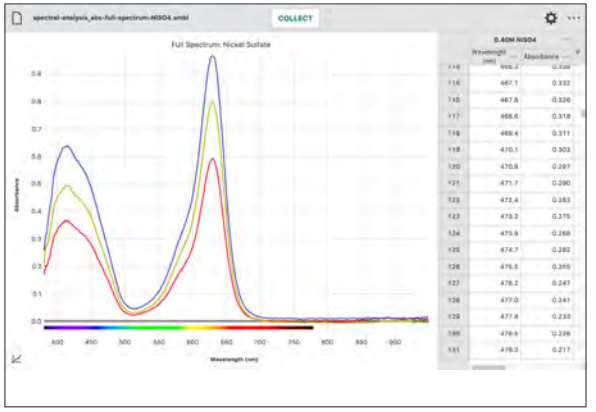
Access a library of over 45 sample experiments that are ready to be analyzed by students, even when lab equipment isn't available (e.g., prep work, homework, and make-up assignments).

Easy Event Marking

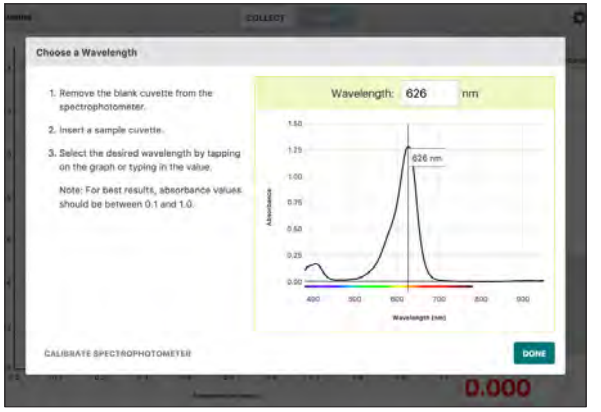
Mark important events—such as when melting begins and ends or when the pH indicator changes color—with just one click.

For more information, go to vernier.com/graphical-analysis

Vernier Spectral Analysis



Absorbance spectra of green food coloring at different concentrations



Wavelength selection screen for Beer's law and kinetics experiments

Collect, Share, and Analyze Spectrometer Data

The free Vernier Spectral Analysis® app makes it easy to incorporate spectroscopy into your biology, chemistry, and physics experiments. Using the app, students can collect a full spectrum and explore topics such as Beer's law, enzyme kinetics, and plant pigments.

Compatible with ChromeOS,™ Windows,® macOS,® iOS, iPadOS,® and Android.™

Features

- Follow on-screen instructions for simplified Beer's law or kinetics data collection.
- Collect full absorbance spectrum or percent transmittance data in less than one second.
- Analyze data with built-in analysis tools, including data interpolation and curve fittings.
- Determine the order of kinetics reaction with the calculated columns function.
- Understand color transmission using the color strip shown on full spectrum graphs.
- View a full spectrum of your sample while collecting data for Beer's law or kinetics experiments.
- View spectral lines by collecting intensity *vs.* wavelength data.

Compatible Products

Go Direct® SpectroVis® Plus Spectrophotometer

GDX-SVISPL $449

Go Direct Visible Spectrophotometer

GDX-SPEC-VIS $1,899

Go Direct UV-VIS Spectrophotometer

GDX-SPEC-UV $2,499

Go Direct Fluorescence/UV-VIS Spectrophotometer

GDX-SPEC-FUV $2,999

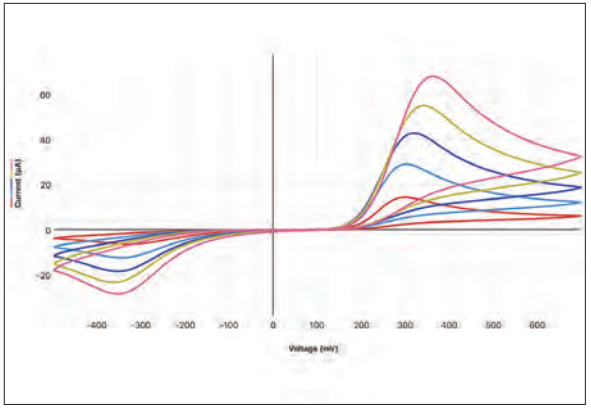
Go Direct Emissions Spectrometer

GDX-SPEC-EM $950

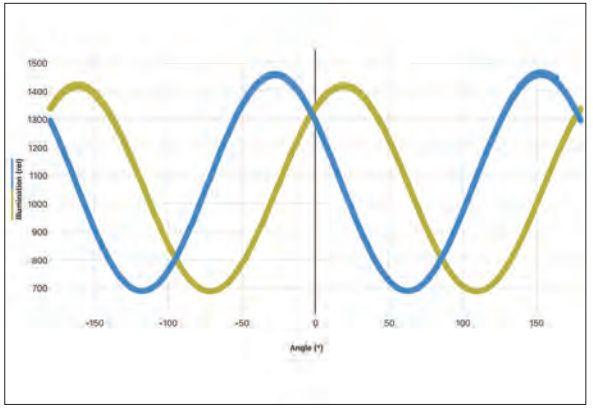
See a full list of compatible spectrometers, including supported discontinued spectrometers, on our website.

Learn more at vernier.com/spectral-analysis

Vernier Instrumental Analysis



Determining acetaminophen concentration in children's liquid Tylenol® with the Go Direct Cyclic Voltammetry System



Comparing the optical rotations of fructose and sucrose with a Go Direct Polarimeter

Incorporate Instrumentation into Your Curriculum

Our free Vernier Instrumental Analysis® app makes it easy to incorporate instrumentation into your chemistry curriculum. With this app, students can collect and analyze data from Mini GC, Mini GC Plus, Go Direct Mini GC,™ Go Direct Cyclic Voltammetry System, and Go Direct Polarimeter using computers, Chromebooks, or other mobile devices.

Compatible with ChromeOS,™ Windows,® macOS,® iOS, iPadOS,® and Android.™

Features

- Perform peak integration.
- Split peaks present in your gas chromatograms.
- Determine a peak's retention time and area.
- Capture and analyze polarimetry data to identify optically active compounds.
- Directly measure the optical rotation value of a sample in your polarimeter at a single point or over time.
- Analyze, save, and export gas chromatography, voltammetry, and polarimetry data.
- Explore electrochemistry and redox reactions with voltammograms.

Compatible Products

Go Direct Mini GC™

GDX-GC $3,599

Go Direct Polarimeter

GDX-POL $545

Go Direct Cyclic Voltammetry System

GDX-CVS $999

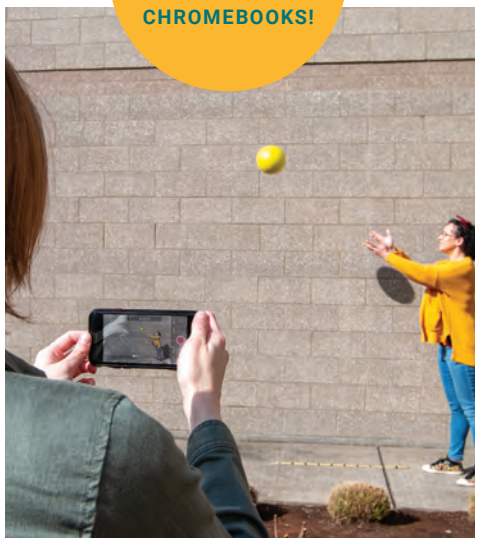
Sample experiment downloads, a list of supported instrumentation, and instructional screencasts for our Instrumental Analysis app are available on our website.

Learn more at vernier.com/instrumental-analysis

Software & Digital Curriculum

Vernier Video Analysis

WORKS ON CHROMEBOOKS!



Investigate projectile motion

Study Motion Everywhere

The Vernier Video Analysis® app brings video analysis to your students in an easy-to-use, streamlined application. Students can design their own scientific investigations, record videos, and then analyze the motion. This app brings video analysis to all your students regardless of device—it even works with Chromebooks!

Free 30-Day Trial

Get a 30-day free trial and learn about site license options and e-books at vernier.com/video-analysis

Features

- Vernier Video Analysis app is compatible with multiple devices and platforms: macOS,® iPadOS,® iOS, Windows,® ChromeOS,™ and Android.™
- Students can use prepared videos, found videos, or their own videos for analysis.
- The app makes it possible to do experiments that cannot be done with sensors, such as analyzing the motion of a basketball in flight—objects can be tracked automatically by the app.
- Analysis is easy with multiple graphing options, so students are able to think critically about the collected data—they can even analyze the motion of multiple objects in a single video.
- With this app, you can apply vectors and vector components over the video after tracking a moving object, illuminating changes in position, velocity, and acceleration.
- When multiple objects have been marked, just enter their masses and the app can automatically calculate and display the center of mass location.
- Annual site-licensing makes purchasing and renewing quick and easy.

Vernier Video Analysis: Motion and Sports

The *Vernier Video Analysis: Motion and Sports* lab book features 12 investigations using Vernier Video Analysis. In addition to traditional physics concepts such as velocity and acceleration, its investigation of sports activities expands learning opportunities and further connects the study of motion to students' daily lives.

Download only
HSB-VVAMS-E
$28

Vernier Video Analysis: Conservation Laws and Forces

This e-book features 12 investigations dealing with topics such as conservation of energy and momentum using the Vernier Video Analysis app.

Download only
HSB-VVACLF-E
$28

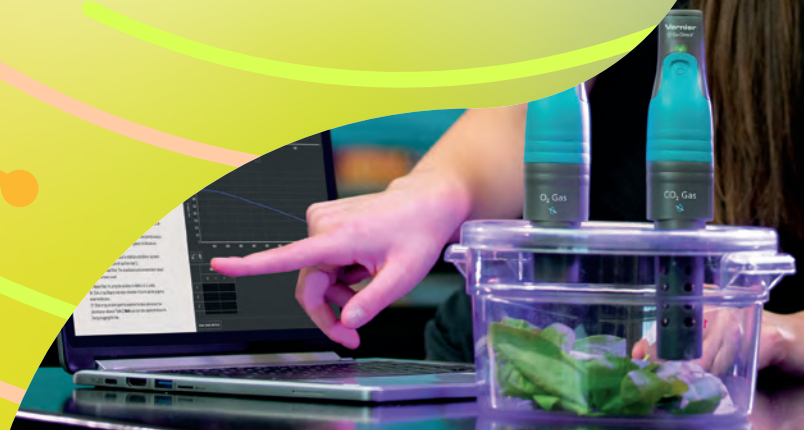
Vernier

Connections™

Boost STEM Learning with Vernier Connections

Vernier Connections™ is a web-based platform designed to engage high school students in STEM Learning. This easy-to-use platform brings together technology and high-quality resources to support hands-on science exploration using Vernier probeware and newly developed projects and investigations aligned to the Next Generation Science Standards.

Get connected at vernier.com/connections



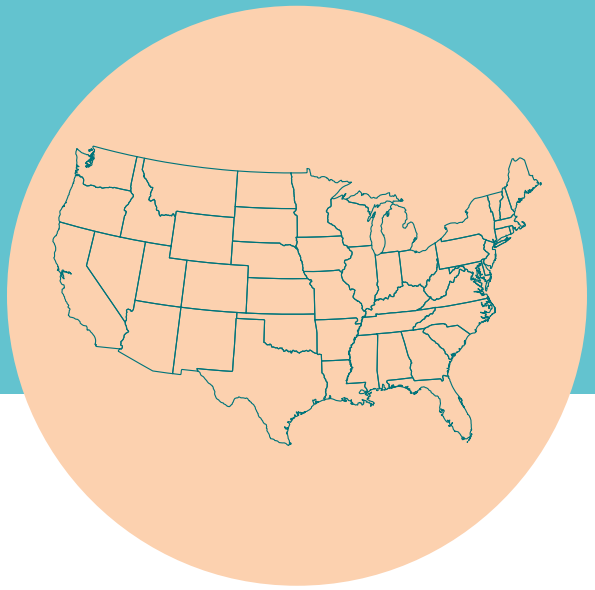
Biology

Our biology solutions include high-quality sensors, easy-to-use software, and exceptional technical support to set up you and your students for classroom success.

vernier.com/biology

Topics

Explore our featured experiments by topic to learn how Vernier technology helps your students engage with data-collection technology and deepens their understanding of key biological concepts.



Bring Your Biology Lessons to Life

From cellular biology to ecology to human physiology, get your students excited about biology using Vernier technology. Our sensors, software, and investigations help biology students explore phenomena, develop their understanding of living organisms, and encourage their scientific curiosity. Work with our team to implement high-quality sensors, experiments, and technology solutions in your classroom, and set your students up for success in science and beyond.

Professional Development

We are here to help. Our webinars, workshops, and personalized training options offer innovative ways to engage students with STEM in a traditional classroom or virtual environment.

vernier.com/training

Biology

31 Experiments Available

EXPERIMENT 11

Cell Respiration

Students measure cellular respiration in germinating peas and determine what effect temperature has on respiration rate.

Sensor Used

Go Direct CO_2 Gas

Use Go Direct® CO_2 Gas to measure CO_2 gas levels, air temperature, and relative humidity. It's an excellent sensor for measuring fermentation, cell respiration, and photosynthesis.

GDX-CO2 $225

Experiment Source

Biology with Vernier

Download only: BWV-E $44
Printed book + download: BWV $52

Learn more at vernier.com/bwv-11b

EXPERIMENT 6

Enzyme Action

Watch a video

Students measure the activity of the enzyme catalase and analyze how different factors (e.g., enzyme concentration, pH, and temperature) influence enzyme activity.

Sensor Used

Go Direct Gas Pressure

Use Go Direct Gas Pressure to monitor gas pressure in a variety of experiments. Easily change the displayed units to any one of seven options. This sensor includes a syringe, tubing, and stoppers to ease experiment setup.

GDX-GP $99

Experiment Source

Biology with Vernier

Download only: BWV-E $44
Printed book + download: BWV $52

Learn more at vernier.com/bwv-6b

EXPERIMENT 1

Energy in Food

Students determine and compare the energy content of different foods using calorimetry.

Sensor Used

Go Direct Temperature

This rugged probe measures the temperature of a variety of substances including air, soil, and water.

GDX-TMP $78

Experiment Source

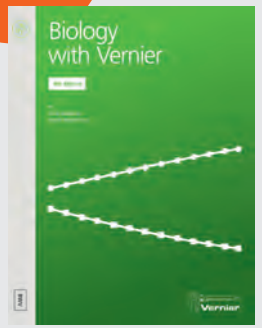
Biology with Vernier

Download only: BWV-E $44
Printed book + download: BWV $52

Learn more at vernier.com/bwv-1

INCLUDES 31 EXPERIMENTS

Biology with Vernier



Biology with Vernier addresses the fundamentals of a high school biology course with 31 experiments that include cell respiration, photosynthesis, membrane diffusion, osmosis, human physiology, transpiration, fermentation, and more.

The instructor information section included for each experiment contains reagent preparation information, sample data, and tips for successful completion.

Learn more at vernier.com/bwv

Download only
BWV-E $44

Printed book + download
BWV $52

Biology Go Direct Starter Package

This package includes four sensors that work with Vernier Graphical Analysis™ Pro and LabQuest® 3.

- Go Direct Temperature
- Go Wireless® Heart Rate
- Go Direct Gas Pressure
- Go Direct CO_2 Gas

GDP-BIO-ST $500

Learn more at vernier.com/gdp-bio-st

Standard package also available (see page 49)

Biology

31 Experiments Available

EXPERIMENT 25

Primary Productivity

Measuring the effect of light level on net and gross productivity in aquatic ecosystems helps students understand primary productivity.

Sensor Used

Go Direct Optical Dissolved Oxygen

Use this sensor to measure dissolved oxygen, water temperature, and atmospheric pressure.

GDX-ODO $359

Accessory Used

Primary Productivity Kit

This kit is an accessory for one of our most popular biology experiments, "Primary Productivity." The kit consists of a box of 7 plastic bottles, 7 rubber stoppers, and a set of screens.

PPK $44

Experiment Source

Biology with Vernier

Download only: BWV-E $44
Printed book + download: BWV $52

Learn more at vernier.com/bwv-25

EXPERIMENT 31

Photosynthesis and Respiration (CO_2 & O_2)

Students use a terrestrial plant to measure photosynthesis and cellular respiration.

Sensors Used

Go Direct CO_2 Gas

Measure gaseous carbon dioxide concentration levels, air temperature, and relative humidity using this sensor.

GDX-CO2 $225

Go Direct O_2 Gas

Use this sensor to measure gaseous oxygen concentration levels and air temperature.

GDX-O2 $205

Accessory Used

BioChamber 2000

BC-2000 » $22

Experiment Source

Biology with Vernier

Download only: BWV-E $44
Printed book + download: BWV $52

Learn more at vernier.com/bwv-31c

Biology Go Direct Standard Package

This package includes 11 sensors that work with Vernier Graphical Analysis™ Pro and LabQuest® 3. Two sampling chambers are also included.

- Go Direct® Temperature
- Go Direct Gas Pressure
- Go Direct O_2 Gas
- Go Direct CO_2 Gas
- Go Direct Colorimeter
- Go Direct Conductivity
- Go Direct EKG
- Go Direct pH
- Go Direct Optical Dissolved Oxygen
- Go Direct Respiration Belt
- Go Wireless® Heart Rate
- BioChamber 250 ⁂
- BioChamber 2000 ⁂

GDP-BIO-ODX ⁂ 1,730
Buy 8 or more packages at $1,678 and save $416.

Learn more at vernier.com/gdp-bio-odx

Starter package also available (see page 47)

Biology Lab Books

Biology with Vernier

Download only BWV-E $44
Printed book + download BWV $52

31 Experiments

*Advanced Biology with Vernier**

Download only BIO-A-E $44
Printed book + download BIO-A $52

17 Experiments

** Instructions for Graphical Analysis app not yet available*

Investigating Biology through Inquiry

Download only BIO-I-E $44
Printed book + download BIO-I $52

22 Investigations

AP† AND IB‡ CORRELATIONS

To see all AP† book recommendations, visit vernier.com/ap-correlations

† AP and Advanced Placement Program are registered trademarks of the College Entrance Examination Board, which was not involved in the production of and does not endorse this product.

To see all IB‡ correlations, visit vernier.com/ib-correlations

‡ The IB Diploma Program is an official program of the International Baccalaureate Organization (IBO) which authorizes schools to offer it. The material available here has been developed independently of the IBO and is not endorsed by it.

⁂ For California Proposition 65 warning, see pp. 142–143.

Human Physiology

29 Experiments Available

EXPERIMENT 8

Introduction to Electrocardiography

After obtaining graphical representations of the electrical activity of the heart, students learn to recognize the different waveforms in an EKG and associate them with events in the heart.

Sensor Used

Go Direct EKG

Go Direct® EKG measures electrical activity in the heart and electrical signals produced during muscle contractions.

GDX-EKG $169

Experiment Source

Human Physiology Experiments: Volume 1

Download only: HSB-HP-E $33
Printed book + download: HSB-HP $41

Learn more at vernier.com/hsb-hp-8

EXPERIMENT 7

Effect of Exercise on Heart Rate

Observing and measuring how the heart responds to exercise is a fun, hands-on way for students to learn about the cardiovascular system.

Sensor Used

Go Wireless Heart Rate

This sensor is ideal for continuously monitoring heart rate before, during, and after exercise or while a person is stationary.

GW-HR $98

Experiment Source

Human Physiology Experiments: Volume 1

Download only: HSB-HP-E $33
Printed book + download: HSB-HP $41

Learn more at vernier.com/hsb-hp-7

EXPERIMENT 1

Blood Pressure and Autonomic Reflexes

Using a blood pressure sensor, students can compare blood pressures taken before and after exposure to cold. Students obtain graphical representations of blood pressure and observe examples of the "fight-or-flight" response.

Sensor Used

Go Direct Blood Pressure

Designed for versatility, Go Direct Blood Pressure is a non-invasive sensor that measures human blood pressure—systolic, diastolic, and mean arterial pressure—using the oscillometric method.

GDX-BP $125

Experiment Source

Human Physiology Experiments: Volume 2

Download only: ALB-HP2-E $33
Printed book + download: ALB-HP2 $41

Learn more at vernier.com/alb-hp2-1

Human Physiology Go Direct Standard Package

This package includes nine sensors that work with Vernier Graphical Analysis™ Pro and LabQuest® 3. Two useful accessories are also included.

- Go Direct Blood Pressure
- Go Direct EKG
- Go Direct Force and Acceleration
- Go Direct Hand Dynamometer
- Go Direct O_2 Gas
- Go Direct Respiration Belt
- Go Direct Surface Temperature
- Go Direct Spirometer
- Go Wireless® Heart Rate
- Reflex Hammer Accessory Kit
- BioChamber 250 »

GDP-HP-DX » $1,300

Buy 8 or more packages at $1,261 and save $312.

Learn more at vernier.com/gdp-hp-dx

Starter package also available

PLTW

Learn more about PLTW Engineering

See page 127.

PLTW Biomedical Science

PLTW Biomedical Science (9–12) inspires students to make an impact on others' lives and empowers them to pursue their life and career goals—whether it's a future in diagnosing, treating, or preventing disease.

Learn more at vernier.com/pltw

» For California Proposition 65 warning, see pp. 142–143.

Featured Products

Human Physiology Experiments: Volume 2

Human Physiology Experiments: Volume 2 contains 15 experiments designed to encourage students to explore the physiology of various human organ systems. An expansion of our *Human Physiology Experiments: Volume 1* lab book, the setup for these experiments is minimal—students are collecting data within minutes.

Download only ALB-HP2-E $33
Printed book + download ALB-HP2 $41

This lab book provides instructions for data collection with Vernier Graphical Analysis™ and Go Direct® sensors only.

Download a free sample experiment at vernier.com/alb-hp2

Go Direct Blood Pressure

Go Direct Blood Pressure is an affordable, non-invasive sensor designed to easily measure human blood pressure. It reports systolic, diastolic, and mean arterial pressure using the oscillometric method. Go Direct Blood Pressure can also report pulse rate and display both individual pressure pulses and peak-to-peak pulse amplitudes, giving students a few ways to collect data.

GDX-BP $125

vernier.com/gdx-bp

Reflex Hammer Accessory Kit

The Reflex Hammer Accessory Kit converts your Vernier force sensor into a reflex hammer. Use it to capture the strike of the hammer on a tendon. When using the kit with an EKG sensor to record EMGs, students can study reflexes.

RFX-ACC $29

vernier.com/rfx-acc

Force sensor not included

Go Direct Respiration Belt

Go Direct Respiration Belt uses a force sensor and an adjustable nylon strap to measure human respiration rates before, during, and after exercise.

GDX-RB $109

vernier.com/gdx-rb

Go Direct Spirometer

This is a multi-channel sensor that reports air pressure, flow rate, volume, and respiration rate.

Measuring tidal volumes and other lung function parameters are both simple and easy due to channels that automatically adjust for baseline drift.

GDX-SPR $219

vernier.com/gdx-spr

Agricultural Science

EXPERIMENT 13

Transpiration

Students measure the rate of transpiration from a plant and then investigate how different environmental factors influence water transport in plants.

Sensor Used

Go Direct Gas Pressure

Use Go Direct Gas Pressure to monitor gas pressure in a variety of experiments. Easily change the displayed units to any one of seven options. This sensor includes a syringe, tubing, and stoppers to ease experiment setup.

GDX-GP $99

Experiment Source

Agricultural Science with Vernier

Download only: AWV-E $44

Learn more at vernier.com/awv-13

Featured Products

LabQuest 3

LabQuest 3 is a powerful, connected, and remarkably versatile data-logging solution.

Why? LabQuest® 3 can serve as a standalone data-collection platform that works with all of our sensors. This makes it an excellent choice for teachers and students in the classroom and in the field.

LABQ3 $399

vernier.com/labq3

Go Direct Weather System

Easily monitor a wide variety of environmental factors with just one sensor. The included Go Direct Weather Vane accessory is required to report wind direction.

GDX-WTVA $138

vernier.com/gdx-wthr

CASE
Curriculum for Agricultural Science Education

Vernier is proud to work with CASE, the Curriculum for Agricultural Science Education. CASE is an ambitious project started by the National Council for Agricultural Education in 2007. It is committed to the goal of improving educational experiences for agriculture students by empowering agriculture teachers.

Visit the CASE website at case4learning.org

Spectroscopy

18 Experiments Available

INVESTIGATION 14

Plant Pigments

After analyzing the absorbance spectrum of chlorophyll from spinach, students investigate the absorbance spectrum of other pigments commonly found in fruits, vegetables, and other plants.

Free sample experiment available at vernier.com/plant-pigments

INVESTIGATION 4

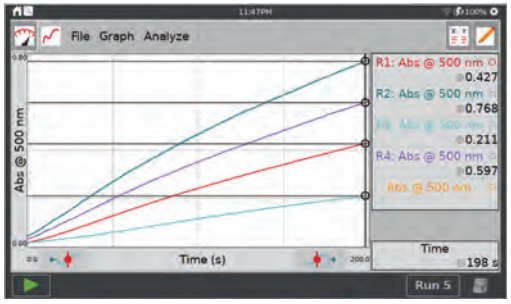
Chemistry of Membranes

After measuring how alcohol damages the cell membranes of beets, students investigate how other compounds can damage cell membranes.

INVESTIGATION 6C

Testing Enzyme Activity

Students measure the enzymatic activity of turnip peroxidase and investigate how different factors (e.g., enzyme concentration, substrate concentration, pH, and temperature) influence enzyme activity.



Investigating Biology through Inquiry

INCLUDES 22 INVESTIGATIONS

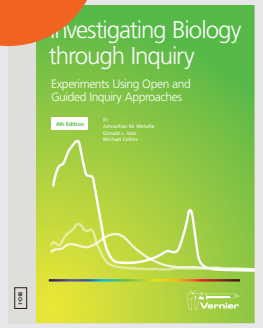
Investigating Biology through Inquiry contains investigations for many fundamental concepts in biology. Each investigation includes a preliminary activity, instructor information, sample researchable questions, and sample data.

Topics covered include

- Cell and molecular biology
- Organismal biology
- Ecology
- Evolution

If you are new to inquiry-based instruction, the extensive Instructor Information section that accompanies each investigation helps guide you through the inquiry-based style of biology instruction.

Learn more at vernier.com/bio-i



Download only
BIO-I-E $44

Printed book + download
BIO-I $52

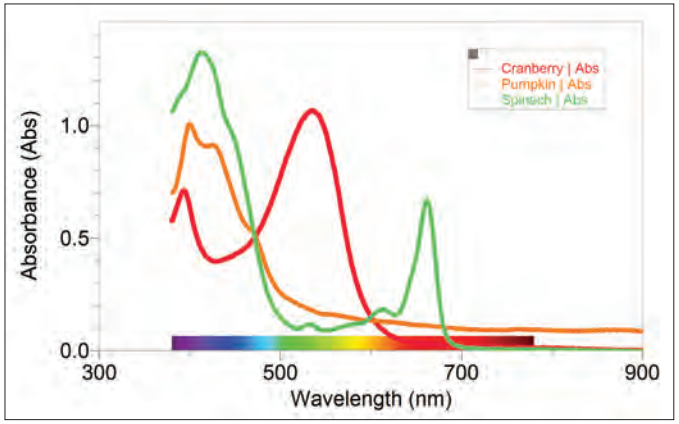
Spectrometers

Go Direct SpectroVis Plus

Introduce your students to spectroscopy with our affordable Go Direct® SpectroVis® Plus. Students can easily collect a full-wavelength spectrum (absorbance, percent transmittance, fluorescence, or intensity), study absorbance *vs.* concentration (standard curve), or monitor enzyme activity (kinetics). Collect and analyze data using Vernier Spectral Analysis® app or LabQuest® App.

GDX-SVISPL $449

vernier.com/gdx-svispl



Plant pigments spectra

Go Direct UV-VIS Spectrophotometer

The Go Direct UV-VIS Spectrophotometer connects to your device via Bluetooth® wireless technology or USB to generate full spectra, Beer's law data, and kinetic traces of ultraviolet and visible-absorbing samples such as aspirin, DNA, proteins, and NADH.

GDX-SPEC-UV $2,499

vernier.com/gdx-spec-uv

Go Direct Fluorescence/UV-VIS Spectrophotometer

This spectrophotometer measures the fluorescence and absorbance spectra of samples such as chlorophyll, tonic water, energy drinks, and fluorescent proteins, all while connected to your device via Bluetooth wireless technology or USB.

GDX-SPEC-FUV $2,999

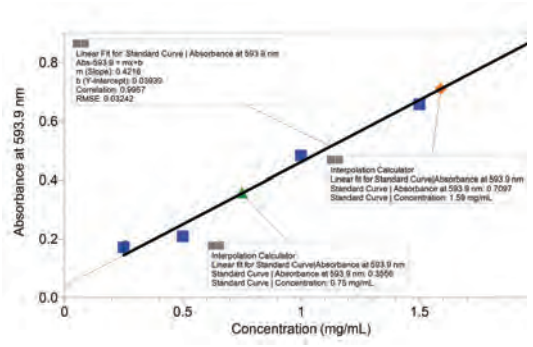
vernier.com/gdx-spec-fuv

Biotechnology

EXPERIMENT 17

Macromolecules: Experiments with Protein

Using the Bradford assay, students measure and analyze the protein content of milk and protein drinks.



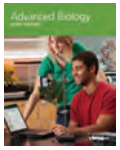
Sensor Used

Go Direct SpectroVis Plus

Use Go Direct® SpectroVis® Plus to collect a full-wavelength spectrum, create standard curves for Bradford and other colorimetric assays, or to monitor enzymatic reactions.

GDX-SVISPL $449

Experiment Source



Advanced Biology with Vernier

Download only: BIO-A-E $44
Printed book + download: BIO-A $52

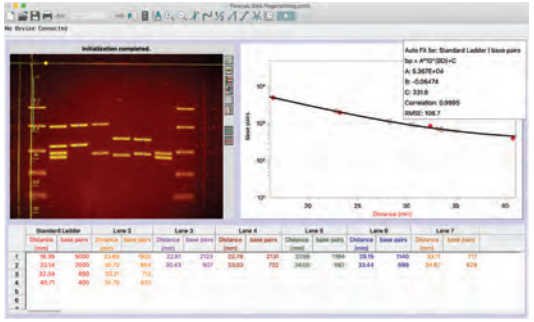
Learn more at vernier.com/bio-a-17

Download free sample experiments at vernier.com/bio-rad-kits

EXPERIMENT 6B

Forensic DNA Fingerprinting

Students use prepared DNA samples to determine if any of the five "suspects" from a "crime scene" can be excluded as suspects. Gel electrophoresis, DNA staining, and imaging techniques are used to analyze the samples.



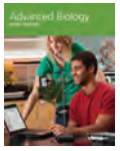
Equipment Used

BlueView™ Transilluminator

This uses super bright blue LEDs to illuminate electrophoresis gels stained with fluorescent dyes (e.g., SYBR® Safe). This combination is a safer alternative to ethidium bromide and a UV transilluminator.

BLUE-VIEW » $425

Experiment Source



Advanced Biology with Vernier

Download only: BIO-A-E $44
Printed book + download: BIO-A $52

Learn more at vernier.com/bio-a-6b

Key Products for Biotech

Go Direct Conductivity

GDX-CON $119

Go Direct Tris-Compatible Flat pH

GDX-FPH $134

Go Direct Temperature

GDX-TMP $78

Go Direct Drop Counter

GDX-DC $109

Stir Station

STIR $139

OHAUS® Balances »

vernier.com/ohaus

BIO-RAD

Vernier and Bio-Rad Laboratories

Bio-Rad® combines high-quality supplies, equipment, and curricula with outstanding customer service and technical support—things we believe are important to teachers. Vernier and Bio-Rad enhance classroom experiences with joint experiments and curricula for biotechnology.

Download free sample experiments at vernier.com/bio-rad-kits

Imagers

USB Digital Microscope

This 5 megapixel camera connects to a computer via USB. It features 10–300× magnification with manual focus and an adjustable LED light source.

BD-EDU-100 $119

vernier.com/bd-edu-100

Celestron Digital Microscope Imagers

Celestron® Digital Microscope Imagers turn your traditional compound or stereo microscope (not included) into a high-resolution digital imager using a personal computer.

CS-5MP »
CS-DMI »

vernier.com/cs-dmi

» For California Proposition 65 warning, see pp. 142–143.

Featured Products

Go Direct Sensors

Sensor		Order Code	Price
Go Direct® Blood Pressure		GDX-BP	$125
Go Direct CO_2 Gas		GDX-CO2	$225
Go Direct Colorimeter		GDX-COL	$129
Go Direct Conductivity		GDX-CON	$119
Go Direct EKG		GDX-EKG	$169
Go Direct Ethanol Vapor		GDX-ETOH	$165
Go Direct Force and Acceleration (for use with Reflex Hammer Accessory Kit)		GDX-FOR	$119
Go Direct Gas Pressure		GDX-GP	$99
Go Direct Hand Dynamometer		GDX-HD	$119
Heart Rate Monitors			
Go Wireless® Exercise Heart Rate		GW-EHR	$79
Go Wireless Heart Rate		GW-HR	$98
Go Direct O_2 Gas		GDX-O2	$205
Go Direct Optical Dissolved Oxygen		GDX-ODO	$359
pH Sensors			
Go Direct pH		GDX-PH	$109
Go Direct Tris-Compatible Flat pH		GDX-FPH	$134
Go Direct Respiration Belt		GDX-RB	$109
Go Direct SpectroVis® Plus		GDX-SVISPL	$449
Go Direct Spirometer		GDX-SPR	$219
Temperature Probes			
Go Direct Surface Temperature		GDX-ST	$99
Go Direct Temperature		GDX-TMP	$78
Go Direct Weather System		GDX-WTVA	$138

Accessories

Accessory	Order Code	Price
Go Direct Charge Station	GDX-CRG	$89
Reflex Hammer Accessory Kit	RFX-ACC	$29

See all our products for biology at vernier.com/biology

LabQuest Sensors

Sensor	Order Code	Price
25-g Accelerometer	ACC-BTA	$110
Blood Pressure Sensor	BPS-BTA	$120
CO_2 Gas Sensor	CO2-BTA	$299
Colorimeter	COL-BTA	$128
Conductivity Probe	CON-BTA	$115
EKG Sensor	EKG-BTA	$179
Ethanol Sensor	ETH-BTA	$129
Gas Pressure Sensor	GPS-BTA	$94
Goniometer	GNM-BTA ⌃⌃	$169
Hand Dynamometer	HD-BTA	$124
Heart Rate Monitors		
Exercise Heart Rate Monitor	EHR-BTA	$99
Hand-Grip Heart Rate Monitor	HGH-BTA	$129
O_2 Gas Sensor	O2-BTA	$210
PAR Sensor	PAR-BTA	$249
pH Sensors		
pH Sensor	PH-BTA	$99
Tris-Compatible Flat pH Sensor	FPH-BTA	$124
Qubit Sensors		
Qubit EKG/EMG Sensor	Q-S207	$1,249
Qubit GSR Sensor	Q-S222	$999
Soil Moisture Sensor	SMS-BTA	$129
Spirometer	SPR-BTA	$240
Temperature Probes		
Stainless Steel Temperature Probe	TMP-BTA	$40
Surface Temperature Sensor	STS-BTA	$34

Spectrophotometers

Equipment	Order Code	Price
Go Direct SpectroVis Plus	GDX-SVISPL	$449
Go Direct Fluorescence/UV-VIS Spectrophotometer	GDX-SPEC-FUV	$2,999
Go Direct UV-VIS Spectrophotometer	GDX-SPEC-UV	$2,499
Go Direct Visible Spectrophotometer	GDX-SPEC-VIS	$1,899

Digital Microscopes

Equipment	Order Code	Price
Celestron® Digital Microscope Imager	CS-DMI ⌃⌃	vernier.com/cs-dmi
5MP Celestron Digital Microscope	CS-5MP ⌃⌃	vernier.com/cs-5mp
USB Digital Microscope	BD-EDU-100	$119

Lab Books*

Title	Order Code	Price
Biology with Vernier	BWV	$52
Investigating Biology through Inquiry	BIO-I	$52
Advanced Biology with Vernier (LabQuest® sensors only)	BIO-A	$52
Human Physiology Experiments: Volume 1 (Go Direct sensors only)	HSB-HP	$41
Human Physiology Experiments: Volume 2 (Go Direct sensors only)	ALB-HP2	$41
Human Physiology with Vernier (LabQuest sensors only)	HP-A	$52
Agricultural Science with Vernier (LabQuest sensors only)	Download only: AWV-E	$44

** Includes printed book and download; also available as a download only, except where noted*

See all our products for biology at vernier.com/biology

Looking for Replacement Parts?

Visit vernier.com/replacements

⌃⌃ For California Proposition 65 warning, see pp. 142–143.

HIGH SCHOOL

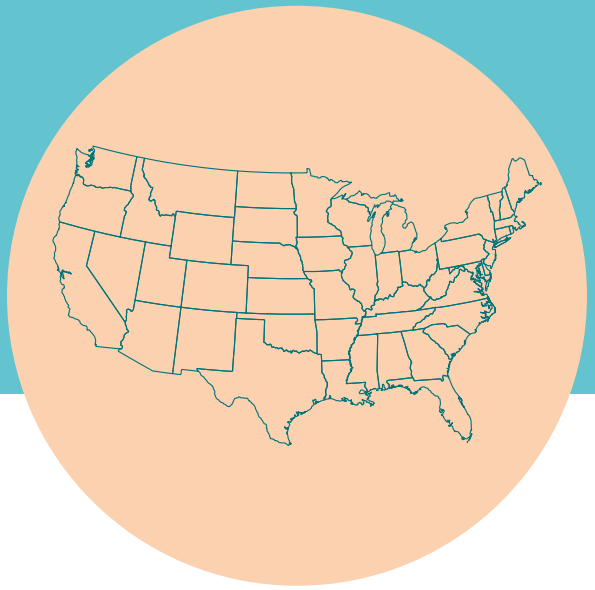
Environmental Science

Help your students see that the environmental science concepts discussed in the classroom have serious implications on the world around them. Our hands-on investigations and data-collection technology help students form a better understanding of phenomena.

vernier.com/environmental-science

Topics

Explore a sampling of our featured experiments by topic to learn how Vernier technology helps your students engage with data-collection technology and deepens their understanding of key environmental science concepts.



Show Students How to Investigate Their World

From soil studies to wind energy investigations, the study of environmental science helps students understand how to interact with the natural world. Our easy-to-use sensors support you as you help your students understand key environmental science concepts. Our lab books include ready-to-go investigations that help students establish a deep understanding of key scientific concepts.

Professional Development

We are here to help. Our webinars, workshops, and personalized training options offer innovative ways to engage students with STEM in a traditional classroom or virtual environment.

vernier.com/training

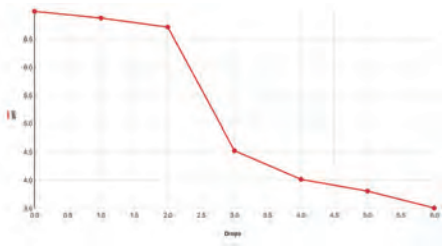
Environmental Science

34 Investigations Available

INVESTIGATION 31

The Effect of Acid Deposition on Aquatic Ecosystems

Investigate acid deposition by measuring the magnitude of the change in pH levels in an aquatic environment when dilute acid is introduced dropwise.



Sensors Used

Go Direct Tris-Compatible Flat pH

The flat glass, double-junction design makes this sensor a good choice for environmental science.

GDX-FPH $134

Go Direct Conductivity

Determine the ionic content of an aqueous solution by measuring its electrical conductivity.

GDX-CON $119

Accessories Used

Electrode Support

ESUP $10

Stir Station

STIR $139

Investigation Source

Investigating Environmental Science through Inquiry

Download only: ESI-E $44
Printed book + download: ESI $52

Learn more at vernier.com/esi-31

INVESTIGATION 26

Fossil Fuel Energy

Students calculate the amount of heat transferred from a burning candle to a known volume of water. They also design an experiment to investigate fossil fuels.

Sensor Used

Go Direct Temperature

This is a rugged, general-purpose sensor that students can use to monitor temperature.

GDX-TMP $78

Investigation Source

Investigating Environmental Science through Inquiry

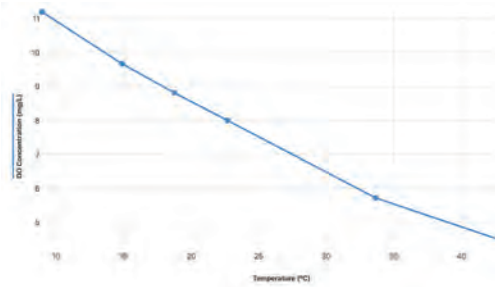
Download only: ESI-E $44
Printed book + download: ESI $52

Learn more at vernier.com/esi-26

INVESTIGATION 3

Investigating Dissolved Oxygen

Students analyze the effect temperature has on dissolved oxygen in water by measuring the concentration of dissolved oxygen in different temperatures of water.



Sensor Used

Go Direct Optical Dissolved Oxygen

This optical sensor makes it easy to measure dissolved oxygen in water, atmospheric pressure, and water temperature.

GDX-ODO $359

Investigation Source

Investigating Environmental Science through Inquiry

Download only: ESI-E $44
Printed book + download: ESI $52

Learn more at vernier.com/esi-3

INCLUDES 34 INVESTIGATIONS

Investigating Environmental Science through Inquiry

Investigating Environmental Science through Inquiry contains 34 inquiry-based environmental science investigations.

Topics include

- Earth systems and resources (air, water, and soil)
- The living world
- Global change and population
- Energy resources and consumption
- Pollution

Learn more at vernier.com/esi

Download only
ESI-E $44

Printed book + download
ESI $52

** Instructions for Vernier Graphical Analysis not yet available*

Environmental Science Go Direct Starter Package

This package includes four sensors that work with Vernier Graphical Analysis™ Pro and LabQuest® 3.

- Go Direct® Temperature
- Go Direct Tris-Compatible Flat pH
- Go Direct Conductivity
- Go Direct Optical Dissolved Oxygen

GDP-EV-ST $690

Learn more at vernier.com/gdp-ev-st

Water Quality

TEST 12

Total Dissolved Solids

Students measure the total dissolved solids of a sample from a local body of fresh water.

Sensor Used

Go Direct Conductivity

Determine the ionic content of an aqueous solution by measuring its electrical conductivity.

GDX-CON $119

Accessories Used

Water Quality Bottles

This box of 8 plastic bottles with stoppers is for general water quality use. They could also be used as replacements for the bottles and stoppers in the Primary Productivity Kit. See page 48.

WQ-BOT $28

Experiment Source

Water Quality with Vernier

Download only: WQV-E $44
Printed book + download: WQV $52

Learn more at vernier.com/wqv-12

LabQuest 3

LabQuest 3 is a powerful, connected, and remarkably versatile data-logging solution.

Why? LabQuest® 3 can serve as a standalone data-collection platform that works with all of our sensors. This makes it an excellent choice for teachers and students in the classroom as well as in the field.

LABQ3 $399

vernier.com/labq3

Go Direct Sensor Clamp

The Go Direct® Sensor Clamp securely fastens to a wand-style Go Direct sensor, and the included lanyard works as a strap to prevent accidental drops during investigations in the field. Sensors are sold separately.

GDX-CLAMP $14

Learn more at vernier.com/gdx-clamp

GLOBE & Vernier

The GLOBE® Program is an international science and education program that provides students and the public worldwide with the opportunity to participate in data collection and the scientific process as well as contribute meaningfully to our understanding of the Earth system and global environment. Use Vernier sensors to collect GLOBE data.

To learn which Vernier sensors can be used with GLOBE, see vernier.com/globe

Weather

Go Direct Weather System

Easily monitor a wide variety of environmental factors with just one sensor. Go Direct Weather System includes an affordable, wireless handheld sensor used to measure ambient temperature, humidity, wind speed, and more. The included Go Direct Weather Vane accessory is required to report wind direction.

GDX-WTVA (sensor and vane) $138

Learn more at vernier.com/gdx-wtva

Davis Instruments

Weather stations from Davis® Instruments are an option for educators seeking to monitor their local weather conditions over the long term.

Davis Vantage Vue Weather Station

The wireless Vantage Vue Weather Station provides accurate, reliable weather monitoring in a self-contained, easy-to-install system. The sensor suite of the Vantage Vue Weather system includes temperature, humidity, barometric pressure, wind speed and direction, dew point, and rainfall.

Available Products	Order Code	Price
Davis Vantage Vue® Wireless Weather Station (with console)	DWVUE	$460
Davis Vantage Pro2™ Wireless Weather Station	DWVP	$790
Davis Vantage Pro2 Plus Wireless Weather Station	DWPLUS	$1,295
Davis AirLink® Air Quality Monitor	DW-AIRLINK	$195

For accessories and weather station options, visit vernier.com/weather

Renewable Energy

Strengthen students' critical thinking skills by introducing them to alternative energy solutions to real-world problems.

The KidWind Project and Vernier have teamed up to provide the technology, resources, and support you need for your students to investigate renewable energy.

- Engage your students as they watch power output and energy production data develop in real time.
- Inspire creativity as your students build and test prototypes, test solutions to engineering problems, and optimize designs.
- Measure voltage and current, and calculate power, without using a multimeter.
- Set up activities quickly and easily, creating more time for instruction and exploration.

Recommended Classroom Setup for Wind Energy

3 Test Stations

6 to 10 Groups of 2 to 4 Students

We recommend three test stations for a classroom with 6 to 10 groups of 2 to 4 students.

Each test station should have

- Box fan
- Wind turbine tower with nacelle and generator
- Go Direct® Energy (GDX-NRG)
- Vernier Variable Load (VES-VL)

Each student group needs

- Blade Pitch Protractor
- Wind Turbine Hub
- Blade consumables

KidWind Accessories & Replacement Parts

Part Name	Order Code	Price
Balsa Blade Sheets (100 Pack)	KW-BBS10	$12
Basic Turbine Building Parts	KW-BTPART	$16
Blade Design Consumables Classroom Pack	KW-BDC	$169
Blade Pitch Protractor	KW-BPP	$4
Chipboard Sheets (50 Pack)	KW-CB50	$19
Dowels (25 Pack)	KW-D25	$5
Dowels (100 Pack)	KW-D100	$12
Gear Set	KW-GEAR	$9
High Torque Generator with Wires	KW-HIGEN	$9
KidWind Airfoil Balsa Blade Sheets	KW-ABBS10	$21
Power Output Board	KW-POBD	$39
Wind Turbine Generator (10 Pack)	KW-GEN10	$60
Wind Turbine Hub (3 Pack)	KW-WTH3	$22

Learn more at vernier.com/renewable-energy

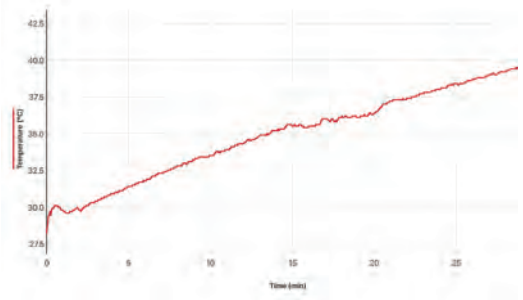
Featured Experiments

26 Experiments Available

EXPERIMENT 24

Exploring Solar Collectors

Students measure the temperature change produced when using a solar collector. They then design experiments to evaluate how changing a variable impacts a solar collector.



Sensors Used

Go Direct Surface Temperature

Use this sensor in situations in which low thermal mass or flexibility is required.

GDX-ST $99

Go Direct Light and Color

Students use this sensor to measure the brightness of a light bulb or the reflectance of light off of various objects.

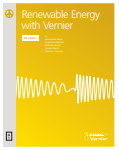
GDX-LC $89

Accessory Used

Solar Thermal Exploration Kit

KW-STXK $64

Experiment Source



Renewable Energy with Vernier

Download only: REV-E $44
Printed book + download: REV $52

Learn more at vernier.com/rev-24

EXPERIMENT 17

Exploring Solar Panels

Investigate different variables and how they impact electricity production with a solar panel. Students also calculate the efficiency of power production with the solar panel.

Sensors Used

Go Direct Energy

This sensor quantifies the voltage, current, power, and energy output of small wind turbines and solar panels, such as those used in our KidWind Experiment Kits.

GDX-NRG $98

Go Direct Light and Color

Students use this sensor to measure the brightness of a light bulb or the reflectance of light off of various objects.

GDX-LC $89

Accessories Used

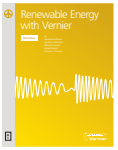
KidWind 2V/400mA Solar Panel

KW-SP2V $21

Vernier Variable Load

VES-VL $74

Experiment Source



Renewable Energy with Vernier

Download only: REV-E $44
Printed book + download: REV $52

Learn more at vernier.com/rev-17

Featured Experiments

EXPERIMENT 8

Exploring Wind Turbines

Students investigate different variables that affect how a wind turbine moves and produces electricity.

Sensor Used

Go Direct® Energy

This sensor quantifies the voltage, current, power, and energy output of small wind turbines and solar panels, such as those used in our KidWind Experiment Kits.

GDX-NRG $98

Accessories Used

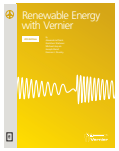
KidWind Advanced Wind Experiment Kit

KW-AWX $174

Vernier Variable Load

VES-VL $74

Experiment Source



Renewable Energy with Vernier

Download only: REV-E $44
Printed book + download: REV $52

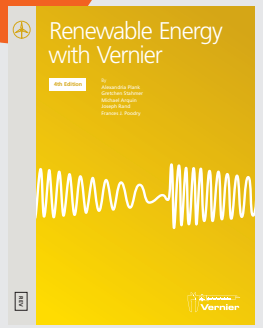
Learn more at vernier.com/rev-8

Renewable Energy with Vernier

The *Renewable Energy with Vernier* lab book features 26 experiments in wind and solar energy. The book contains a combination of explorations, classic experiments, inquiry investigations, engineering projects, and more.

Learn more at vernier.com/rev

INCLUDES 26 EXPERIMENTS



Download only
REV-E $44

Printed book + download
REV $52

KidWind Competitions—Putting the "E" in STEM

Challenge students to compete in a wind turbine design competition with peers in a supportive environment at local and national events.

To see our recommendations and to get started, visit vernier.com/kidwind-challenges

Featured Products

KidWind Advanced Wind Experiment Kit

Discover advanced concepts of wind turbine technology, including gearboxes and generator construction (with the optional KidWind simpleGEN). Students use the blades they design to generate electricity, lift weights, and pump water. This kit is recommended for use with our lab book *Renewable Energy with Vernier.*

KW-AWX $174

KidWind Advanced Wind Experiment Kit Classroom Pack

KW-AWXC $444

Learn more at vernier.com/kw-awx

KidWind simpleGEN

The simpleGEN is an easy-to-build AC generator that students can use to demonstrate Faraday's law, light LEDs, and perform experiments that explore how coils, magnets, and rotation affect power generation.

KW-SGEN $69

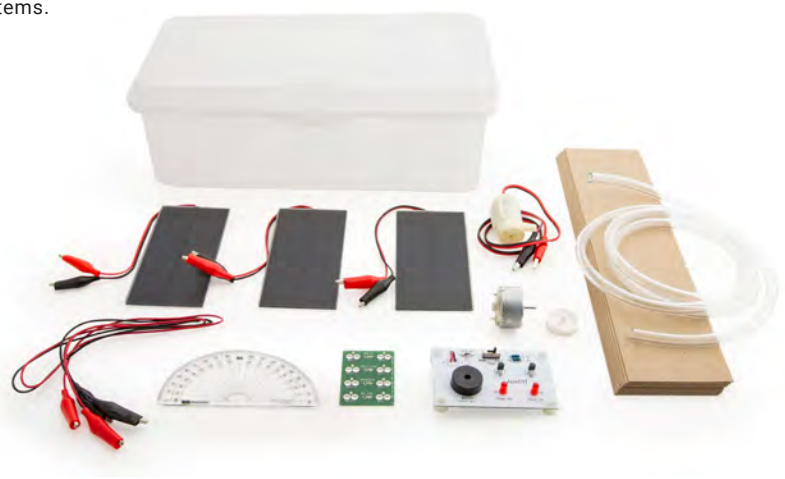
Learn more at vernier.com/kw-sgen

Solar Energy Exploration Kit

Explore solar energy with this innovative science kit designed to help students investigate energy transformations. Experiment with basic circuits and learn about important factors in photovoltaic systems.

KW-SEEK $89

Learn more at vernier.com/kw-seek



KidWind GENPack

Using the parts in the GENPack, students can construct their own electrical generator and perform experiments with electricity and magnetism. Changing variables in the generator design affects current and voltage output.

KW-GP $64

Learn more at vernier.com/kw-gp

Featured Products

Go Direct Sensors

Sensor		Order Code	Price
Go Direct® CO_2 Gas		GDX-CO2	$225
Go Direct Colorimeter		GDX-COL	$129
Go Direct Conductivity		GDX-CON	$119
Go Direct Current		GDX-CUR	$89
Go Direct Energy		GDX-NRG	$98
Go Direct Ethanol Vapor		GDX-ETOH	$165
Ion-Selective Electrodes			
Go Direct Ammonium Ion-Selective Electrode		GDX-NH4	$279
Go Direct Calcium Ion-Selective Electrode		GDX-CA	$279
Go Direct Chloride Ion-Selective Electrode		GDX-CL	$279
Go Direct Nitrate Ion-Selective Electrode		GDX-NO3	$279
Go Direct Light and Color		GDX-LC	$89
Go Direct O_2 Gas		GDX-O2	$205
Go Direct Optical Dissolved Oxygen		GDX-ODO	$359
pH Sensors			
Go Direct pH		GDX-PH	$109
Go Direct Tris-Compatible Flat pH		GDX-FPH	$134
Go Direct SpectroVis® Plus		GDX-SVISPL	$449
Temperature Probes			
Go Direct Surface Temperature		GDX-ST	$99
Go Direct Temperature		GDX-TMP	$78
Go Direct Voltage		GDX-VOLT	$79
Go Direct Weather System		GDX-WTVA	$138

See all our products for environmental science at vernier.com/environmental-science

Go Direct Accessories

Accessory		Order Code	Price
Go Direct Charge Station		GDX-CRG	$89
Go Direct Sensor Clamp		GDX-CLAMP	$14

LabQuest Sensors

Sensor		Order Code	Price
Conductivity Probe		CON-BTA	$115
Flow Rate Sensor		FLO-BTA	$129
pH Sensor		PH-BTA	$99
Tris-Compatible Flat pH		FPH-BTA	$124
Salinity Sensor		SAL-BTA	$139
Soil Moisture Sensor		SMS-BTA	$129
Turbidity Sensor		TRB-BTA ⁂	$124

Digital Microscopes

Equipment	Order Code	Price
Celestron® Digital Microscope Imager	CS-DMI ⁂	vernier.com/cs-dmi
USB Digital Microscope	BD-EDU-100	$119

Lab Equipment

Equipment	Order Code	Price
KidWind Advanced Wind Energy Kit	KW-AWX	$174
KidWind Basic Wind Energy Kit	KW-BWX	$134
Primary Productivity Kit	PPK	$44
Solar Energy Exploration Kit	KW-SEEK	$89
Water Depth Sampler	WDS	$94
Water Quality Bottles	WQ-BOT	$28

Lab Books

Book Title	Order Code	Price
Investigating Environmental Science through Inquiry	Printed book + download: ESI Download only: ESI-E	$52 $44
Water Quality with Vernier (LabQuest sensors only)	Printed book + download: WQV Download only: WQV-E	$52 $44
Renewable Energy with Vernier	Printed book + download: REV Download only: REV-E	$52 $44
Climate and Meteorology Experiments (Go Direct sensors only)	Download only: HSB-CM-E	$22

Looking for Replacement Parts?

Visit vernier.com/replacements

See all our products for environmental science at vernier.com/environmental-science

⁂ For California Proposition 65 warning, see pp. 142–143.

HIGH SCHOOL

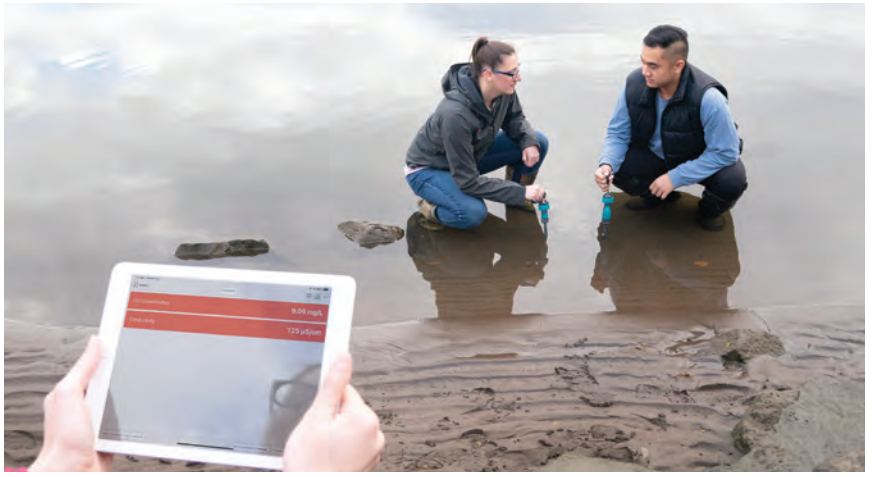
Earth Science

When you use Vernier technology to teach Earth science, you can count on our affordable sensors, intuitive software, and creative solutions to help your students understand key Earth science concepts.

vernier.com/earth-science

Earth Science Helps Students Understand Their World

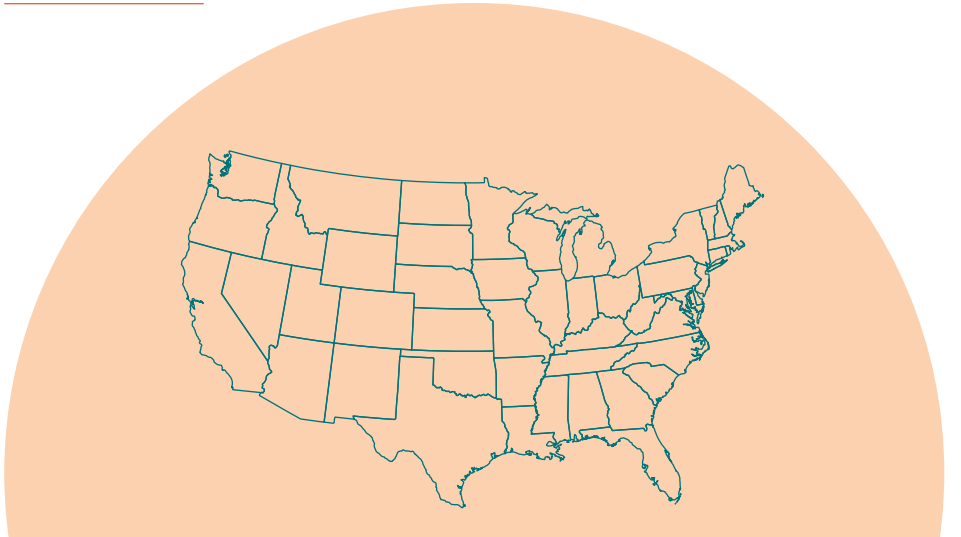
The study of Earth science helps you give students a means to understand the world around them. Your students can explore sea floor spreading, the effect of acid rain on soil, the changing of the seasons, and more with Vernier sensors, software, and experiments.



Professional Development

We are here to help. Our webinars, workshops, and personalized training options offer innovative ways to engage students with STEM in a traditional classroom or virtual environment.

vernier.com/training

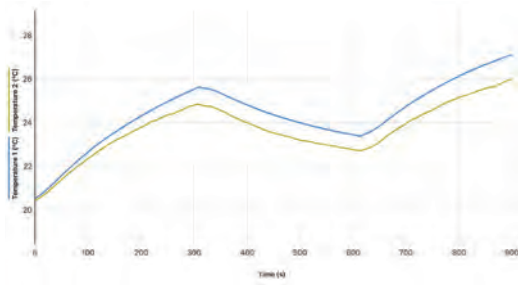


Weather and Climate

EXPERIMENT 4

Greenhouse Effect

Students use temperature probes to measure temperatures in a model greenhouse, then they analyze collected data to make conclusions about the greenhouse effect.



Sensor Used

Go Direct Surface Temperature

This sensor has an exposed thermistor that results in an extremely rapid response time, making it perfect for use in air and water.

GDX-ST $99

Experiment Source

Climate and Meteorology Experiments

Download only: HSB-CM-E $22

Learn more at vernier.com/hsb-cm-e-4

Climate and Meteorology Experiments

11 EXPERIMENTS INCLUDED IN E-BOOK

This lab book is packed with interactive investigations that challenge students to use data-collection technology to explore storm systems and other important weather-related topics.

Some topics covered in this e-book include

- Greenhouse effect
- Dew point
- Microclimates

Learn more at vernier.com/hsb-cm-e

Download only

HSB-CM-E $22

Climate and Meteorology Experiments Go Direct Package

This package includes all the sensors needed to do the activities in the book.

- Go Direct® Surface Temperature (2)
- Go Direct Light and Color
- Go Direct Weather System

GDP-CM $425

Buy 8 or more packages at $412 and save $104.

Learn more at vernier.com/gdp-cm

Go Direct Weather System

Easily monitor a wide variety of environmental factors with just one sensor. Go Direct Weather System includes an affordable, wireless handheld sensor used to measure ambient temperature, humidity, wind speed, and more. The included Go Direct Weather Vane accessory is required to report wind direction.

GDX-WTVA (sensor and vane) $138

Learn more at vernier.com/gdx-wtva

Earth Science

EXPERIMENT 29

Seasons and Angle of Insolation

In this experiment, students model how the angle of light from the sun striking various places on Earth is one factor that causes seasons.

Sensor Used

Go Direct Temperature

This rugged probe measures the temperature of a variety of substances including air, soil, and water.

GDX-TMP $78

Experiment Source

Earth Science with Vernier

Download only: ESV-E $44
Printed book + download: ESV $52

Learn more at vernier.com/esv-29

INCLUDES 33 EXPERIMENTS

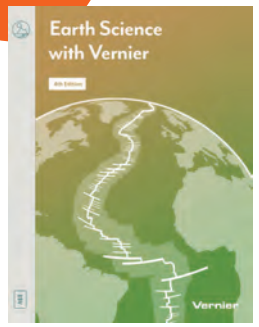
Earth Science with Vernier

In addition to the 33 experiments in *Earth Science with Vernier*, the six projects in this book engage students as they learn about the world around them.

Topics include

- Geology
- Soil analysis
- Water quality tests
- Hydrology/Oceanography
- Meteorology
- Energy

Learn more at vernier.com/esv



Download only
ESV-E $44

Printed book + download
ESV $52

Go Direct 3-Axis Magnetic Field

Useful for topics in geology, this sensor can determine the magnitude and direction of a magnetic field at any point in space.

GDX-3MG $75

Learn more at vernier.com/gdx-3mg

Featured Products

Looking for Replacement Parts?

Visit vernier.com/replacements

Go Direct Sensors

Sensor	Order Code	Price
Go Direct® 3-Axis Magnetic Field	GDX-3MG	$75
Go Direct CO_2 Gas	GDX-CO2	$225
Go Direct Conductivity	GDX-CON	$119
Go Direct Current	GDX-CUR	$89
Go Direct Energy	GDX-NRG	$98
Go Direct Light and Color	GDX-LC	$89
Go Direct Motion	GDX-MD	$114
Go Direct O_2 Gas	GDX-O2	$205
Go Direct Optical Dissolved Oxygen	GDX-ODO	$359
pH Sensors		
Go Direct pH	GDX-PH	$109
Go Direct Tris-Compatible Flat pH	GDX-FPH	$134
Temperature Probes		
Go Direct Surface Temperature	GDX-ST	$99
Go Direct Temperature	GDX-TMP	$78
Go Direct Voltage	GDX-VOLT	$79
Go Direct Weather	GDX-WTHR	$109
Go Direct Weather System	GDX-WTVA	$138

Go Direct Accessories

Accessory	Order Code	Price
Go Direct Charge Station	GDX-CRG	$89
Go Direct Sensor Clamp	GDX-CLAMP	$14

LabQuest Sensors

Sensor	Order Code	Price
Anemometer	ANM-BTA	$109
Barometer	BAR-BTA	$79
Flow Rate Sensor	FLO-BTA	$129
Magnetic Field Sensor	MG-BTA	$69
Salinity Sensor	SAL-BTA	$139
Soil Moisture Sensor	SMS-BTA	$129
Stainless Steel Temperature Probe	TMP-BTA	$40
Tris-Compatible Flat pH Sensor	FPH-BTA	$124
Turbidity Sensor	TRB-BTA »	$124

Accessories & Lab Equipment

Product	Order Code	Price
Davis® Weather Stations		vernier.com/weather
Electrode Support	ESUP	$10
KidWind 2V/400mA Solar Panel	KW-SP2V	$21
KidWind Basic Wind Experiment Kit	KW-BWX	$134
Solar Energy Exploration Kit	KW-SEEK	$89
Vernier Resistor Board	VES-RB	$19

Lab Books

Title	Order Code	Price
Earth Science with Vernier	Printed book + download: ESV Download only: ESV-E	$52 $44
Water Quality with Vernier (LabQuest sensors only)	Printed book + download: WQV Download only: WQV-E	$52 $44
Climate and Meteorology Experiments (Go Direct sensors only)	Download only: HSB-CM-E	$22

See all our products for Earth science at vernier.com/earth-science

» For California Proposition 65 warning, see pp. 142–143.

HIGH SCHOOL

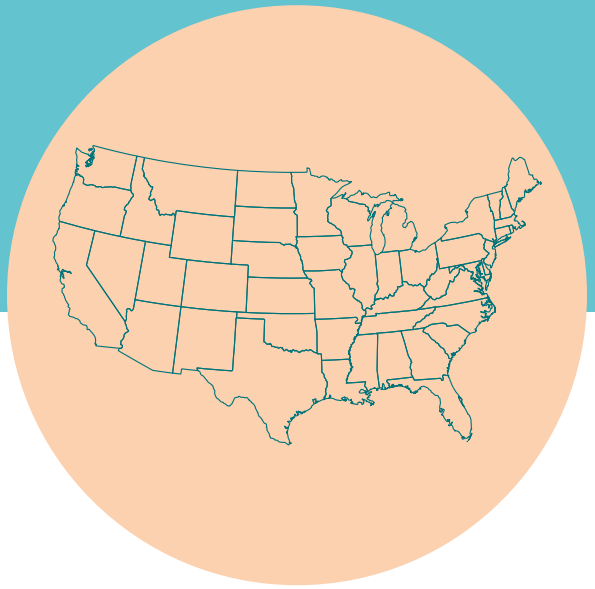
Chemistry

Vernier chemistry resources cover an array of key concepts to help prepare your students for what lies ahead. From gas laws to spectroscopy, our products are backed by an extensive collection of experiments and unparalleled technical support.

vernier.com/chemistry

Topics

Explore a sampling of our featured experiments by topic to learn how Vernier technology helps your students engage with data-collection technology and deepens their understanding of key chemistry concepts.



Make Your Chemistry Classes More Elemental

Whether you are teaching Beer's law or exploring how humans use food for energy, Vernier technology and investigations help your students better understand important chemistry concepts. Give your students insight into this vital subject with interactive learning opportunities from Vernier.

Professional Development

We are here to help. Our webinars, workshops, and personalized training options offer innovative ways to engage students with STEM in a traditional classroom or virtual environment.

vernier.com/training

** AP and Advanced Placement Program are registered trademarks of the College Board, which was not involved in the production of and does not endorse this product.*

For more information, and to see all our products, visit vernier.com

General Chemistry

36 Experiments Available

EXPERIMENT 2

Freezing and Melting of Water

Students measure the temperature of water as it changes from a liquid to a solid. Students analyze the data to make predictions about the freezing patterns of other substances.

Sensor Used

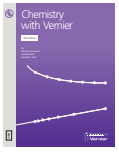
Go Direct Temperature

Students can use this rugged, general-purpose sensor to monitor temperature.

Range: –40 to 125°C

GDX-TMP $78

Experiment Source



Chemistry with Vernier

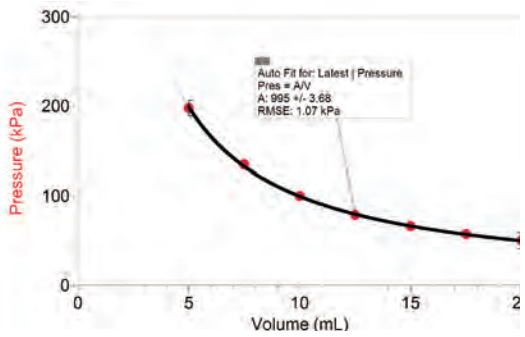
Download only: CWV-E $44
Printed book + download: CWV $52

Learn more at vernier.com/cwv-2

EXPERIMENT 6

Boyle's Law: Pressure-Volume Relationship in Gases

Determine the mathematical relationship between pressure and volume of a gas.



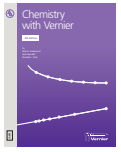
Sensor Used

Go Direct Gas Pressure

Explore pressure changes and gas laws with this sensor that measures the absolute pressure of a gas.

GDX-GP $99

Experiment Source



Chemistry with Vernier

Download only: CWV-E $44
Printed book + download: CWV $52

Learn more at vernier.com/cwv-6

EXPERIMENT 21

Household Acids and Bases

Students investigate the pH scale by measuring the pH of household solutions using different methods.

Sensor Used

Go Direct pH

This general-purpose pH sensor is used to monitor pH of aqueous solutions.

GDX-PH $109

Accessories Used

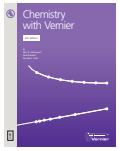
Electrode Support

ESUP $10

Stir Station

STIR $139

Experiment Source



Chemistry with Vernier

Download only: CWV-E $44
Printed book + download: CWV $52

Learn more at vernier.com/cwv-21

INCLUDES 36 EXPERIMENTS

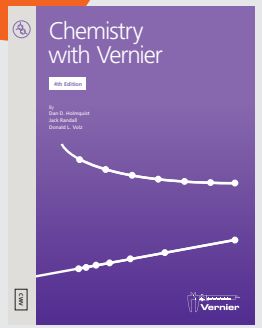
Chemistry with Vernier

Combine *Chemistry with Vernier* with the Starter Package (shown below) to teach students the essentials of chemistry. This lab book contains ready-to-use student experiments and instructor information, including sample data.

Topics include

- Thermochemistry
- Gas laws
- Acid-base reactions
- Equilibrium
- Electrochemistry
- Electrolytes
- States of matter

Learn more at vernier.com/cwv



Download only
CWV-E $44

Printed book + download
CWV $52

Chemistry Go Direct Starter Package

This package includes four sensors that work with Vernier Graphical Analysis™ Pro and LabQuest® 3.

- Go Direct® Temperature (2)
- Go Direct Gas Pressure
- Go Direct pH

GDP-CH-ST $364

Learn more at vernier.com/gdp-ch-st

Standard package also available (see page 86)

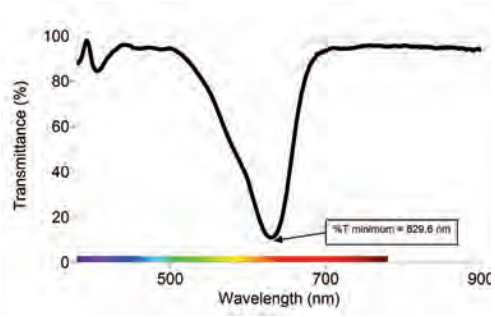
AP* Chemistry

16 Investigations Available

INVESTIGATION 1

Investigating Food Dyes in Sports Beverages

Use spectroscopy to examine the relationship between percent transmittance and concentration of a solution to determine the amount of food dye in a sports drink.



Sensor Used

Go Direct® SpectroVis® Plus

This spectrophotometer quickly measures a full-wavelength spectrum (380 to 950 nm).

GDX-SVISPL $449

Recommended Accessories

100 Plastic Cuvettes (Visible Range)

CUV $24

Cuvette Rack

CUV-RACK $9

Investigation Source

Vernier Chemistry Investigations for Use with AP* Chemistry

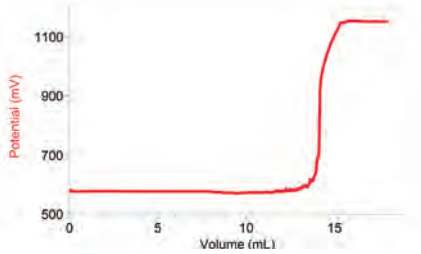
Download only: APCHEM-E $44
Printed book + download: APCHEM $52

Learn more at vernier.com/apchem-1

INVESTIGATION 8

Determining the Percent Hydrogen Peroxide in a Commercial Product

Test a bottle of commercial hydrogen peroxide and determine the concentration using a potentiometric titration.



Sensors Used

Go Direct ORP

Measure the ability of a solution to act as an oxidizing or reducing agent.

GDX-ORP $119

Go Direct Drop Counter

As an alternative to using a buret, the drop counter precisely records the number of drops of titrant added during a titration and then automatically converts it to volume.

GDX-DC $109

Accessory Used

Stir Station

STIR $139

Investigation Source

Vernier Chemistry Investigations for Use with AP* Chemistry

Download only: APCHEM-E $44
Printed book + download: APCHEM $52

Learn more at vernier.com/apchem-8

INVESTIGATION 9

Investigating the Components of a Commercial Tablet

A pain medication tablet chips and cracks due to contamination or an incorrect tablet formula. Students use melting point to investigate these two theories.

Sensor Used

Go Direct Melt Station

Accurately determine the melting temperature of solid substances.

GDX-MLT» $594

Recommended Accessory

Melt Station Capillary Tubes

MLT-TUBE $24

Investigation Source

Vernier Chemistry Investigations for Use with AP* Chemistry

Download only: APCHEM-E $44
Printed book + download: APCHEM $52

Learn more at vernier.com/apchem-9

INCLUDES 16 INVESTIGATIONS

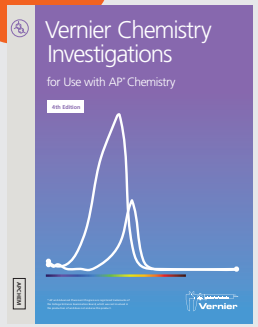
Vernier Chemistry Investigations for Use with AP Chemistry*

This lab book provides AP* Chemistry students with 16 inquiry-based laboratory experiments aligned with the investigations published by the College Board.

Topics include

- Spectroscopy
- Titrations
- Intermolecular forces and properties

Learn more at vernier.com/apchem



Download only
APCHEM-E $44

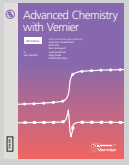
Printed book + download
APCHEM $52

Chemistry Lab Books with AP* Correlations

Vernier Chemistry Investigations for Use with AP* Chemistry

Download only: APCHEM-E $44
Printed book + download: APCHEM $52

16 Investigations



Advanced Chemistry with Vernier

Download only: CHEM-A-E $44
Printed book + download: CHEM-A $52

35 Experiments

Investigating Chemistry through Inquiry

Download only: CHEM-I-E $44
Printed book + download: CHEM-I $52

25 Investigations

To see all AP correlations, visit vernier.com/ap-correlations

** AP and Advanced Placement Program are registered trademarks of the College Entrance Examination Board, which was not involved in the production of and does not endorse this product.*

» For California Proposition 65 warning, see pp. 142–143.

Advanced Chemistry

35 Experiments Available

EXPERIMENT 10

The Determination of an Equilibrium Constant

Determine the concentration of ions present in an equilibrium system using spectroscopy. Students calculate the equilibrium constant, K_{eq}, for the reaction.

Sensor Used

Go Direct® SpectroVis® Plus

This spectrophotometer quickly measures a full-wavelength spectrum (380 to 950 nm).

GDX-SVISPL $449

Recommended Accessories

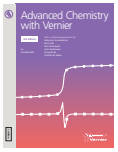
100 Plastic Cuvettes (Visible Range)

CUV $24

Cuvette Rack

CUV-RACK $9

Experiment Source



Advanced Chemistry with Vernier

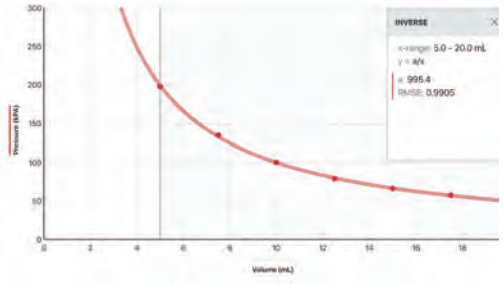
Download only: CHEM-A-E $44
Printed book + download: CHEM-A $52

Learn more at vernier.com/chem-a-10

EXPERIMENT 30

Exploring the Properties of Gases

Students conduct a set of experiments, each of which illustrates a gas law such as Boyle's law, shown here. They use the results to derive a single mathematical relationship that relates pressure, volume, temperature, and number of molecules.



Sensors Used

Go Direct Gas Pressure

Explore pressure changes and gas laws with this sensor that measures the absolute pressure of a gas.

GDX-GP $99

Go Direct Temperature

Students can use this rugged, general-purpose sensor to monitor temperature.

Range: −40 to 125°C

GDX-TMP $78

Accessories Used

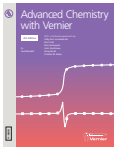
Electrode Support

ESUP $10

Stir Station

STIR $139

Experiment Source



Advanced Chemistry with Vernier

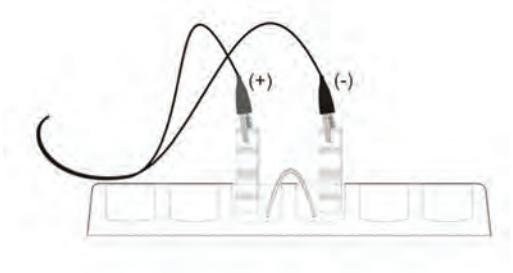
Download only: CHEM-A-E $44
Printed book + download: CHEM-A $52

Learn more at vernier.com/chem-a-30

EXPERIMENT 20

Electrochemistry: Voltaic Cells

Construct voltaic cells to explore oxidation-reduction reactions. Use the measured potentials to identify unknown metal electrodes and create concentration cells for understanding the Nernst equation.



Sensor Used

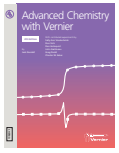
Go Direct Voltage

This sensor has a wide input voltage and high precision, making it an excellent choice for investigating the basic principles of electrochemical cells.

Range: ±20 V

GDX-VOLT $79

Experiment Source



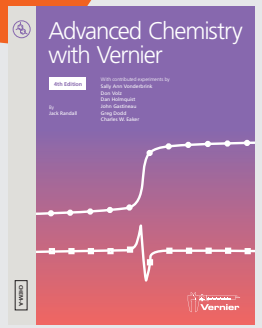
Advanced Chemistry with Vernier

Download only: CHEM-A-E $44
Printed book + download: CHEM-A $52

Learn more at vernier.com/chem-a-20

INCLUDES 35 EXPERIMENTS

Advanced Chemistry with Vernier



The *Advanced Chemistry with Vernier* lab book expands students' skills with experiments appropriate for second year, honors, and AP* Chemistry students.

Topics include

- Redox reactions
- Colligative properties
- Equilibrium

Learn more at vernier.com/chem-a

** AP and Advanced Placement Program are registered trademarks of the College Entrance Examination Board, which was not involved in the production of and does not endorse this product.*

Download only
CHEM-A-E $44

Printed book + download
CHEM-A $52

Chemistry Go Direct Standard Package

This package includes 8 sensors that work with Vernier Graphical Analysis™ Pro and LabQuest® 3.

- Go Direct Temperature (2)
- Go Direct Gas Pressure
- Go Direct pH
- Go Direct Voltage
- Go Direct Conductivity
- Go Direct Colorimeter
- Go Direct Drop Counter

GDP-CH-DX $800
Buy 8 or more packages at $776 and save $192.

Learn more at vernier.com/gdp-ch-dx

Starter package also available (see page 86)

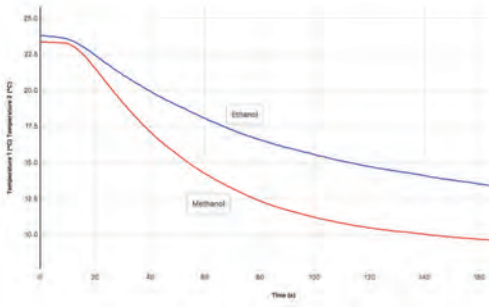
Inquiry Chemistry

25 Investigations Available

INVESTIGATION 8

Evaporation and Intermolecular Attractions

Students study temperature changes caused by the evaporation of different liquids and relate the temperature changes to the strength of intermolecular forces of attraction.



Sensor Used

Go Direct Temperature

Students can use this rugged, general-purpose sensor to monitor temperature.

Range: –40 to 125°C

GDX-TMP $78

Investigation Source

Investigating Chemistry through Inquiry

Download only: CHEM-I-E $44
Printed book + download: CHEM-I $52

Learn more at vernier.com/chem-i-8

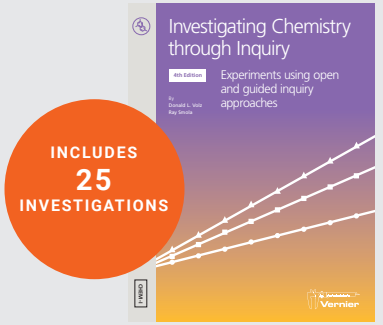
Investigating Chemistry through Inquiry

The *Investigating Chemistry through Inquiry* lab book supports both open and guided inquiry experiments. Instructors can help students devise their own researchable questions or choose from a list provided in each experiment.

Topics include

- Chemical kinetics
- Acids and bases
- Thermochemistry

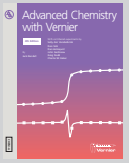
Learn more at vernier.com/chem-i



Download only
CHEM-I-E $44

Printed book + download
CHEM-I $52

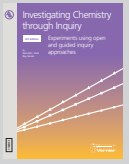
Chemistry Lab Books with IB† Correlation



Advanced Chemistry with Vernier

Download only: CHEM-A-E $44
Printed book + download: CHEM-A $52

35 Experiments



Investigating Chemistry through Inquiry

Download only: CHEM-I-E $44
Printed book + download: CHEM-I $52

25 Investigations

To see all IB correlations, visit vernier.com/ib-correlations

† The IB Diploma Program is an official program of the International Baccalaureate Organization (IBO) which authorizes schools to offer it. The material available here has been developed independently of the IBO and is not endorsed by it.

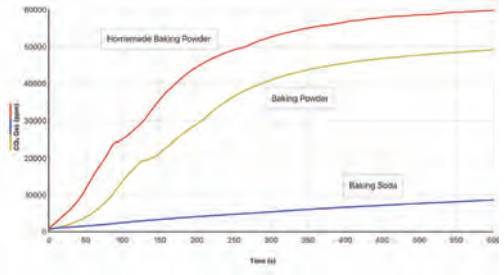
Food Chemistry

14 Experiments Available

EXPERIMENT 1

What's the Difference Between Baking Soda and Baking Powder?

Using data-collection technology, students examine the chemical changes that occur when water is added to baking soda and baking powder.



Sensor Used

Go Direct pH

This wireless sensor monitors the pH of aqueous solutions and is perfect for lab and field experiments alike.

GDX-PH $109

Go Direct CO_2 Gas

Go Direct® CO_2 Gas measures gaseous carbon dioxide concentration levels, air temperature, and relative humidity.

GDX-CO2 $225

Investigation Source

Food Chemistry Experiments

Download only: HSB-FOOD-E $33
Printed book + download: HSB-FOOD $41

Learn more at vernier.com/hsb-food-1

Food Chemistry Experiments

This lab book is filled with experiments that use food as a means to explore crucial chemistry concepts. Students are more likely to engage with science when they see concepts applied to the real world. These experiments use Vernier sensors such as spectrophotometers, temperature probes, and CO_2 gas sensors to investigate complex questions involving food.

Learn more at vernier.com/hsb-food

Download only
HSB-FOOD-E $33

Printed book + download
HSB-FOOD $41

Key Products for *Food Chemistry Experiments*

Go Direct SpectroVis® Plus
GDX-SVISPL $449

Go Direct Polarimeter
GDX-POL $545

Go Direct Gas Pressure
GDX-GP $99

Go Direct Conductivity
GDX-CON $119

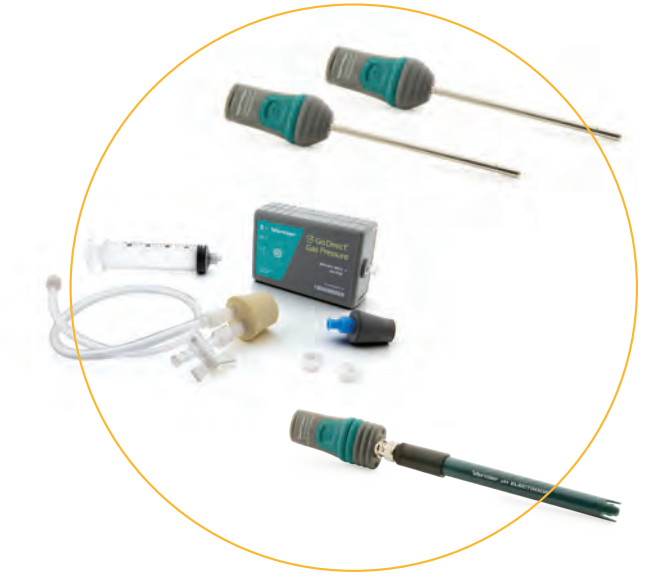
Go Direct Temperature
GDX-TMP $78

Go Direct Ethanol Vapor
GDX-ETOH $165

Go Direct ORP
GDX-ORP $119

Chemistry Go Direct Starter Package

4 Sensors • GDP-CH-ST • $364



This package includes

Go Direct Temperature (2)

Go Direct Gas Pressure

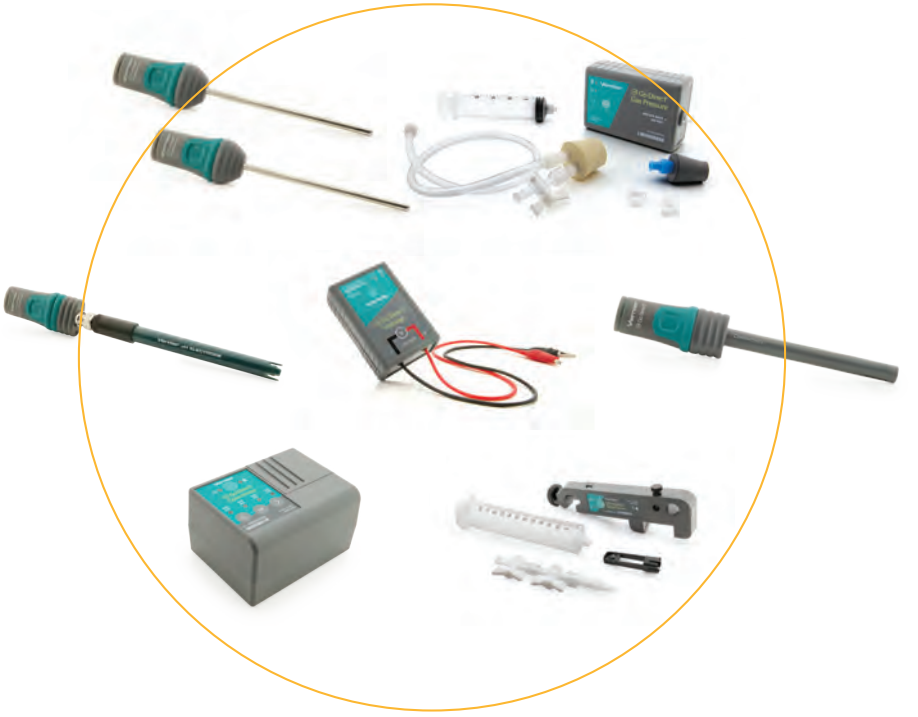
Go Direct pH

All sensors work with Vernier Graphical Analysis™ Pro and LabQuest® 3.

Learn more at vernier.com/gdp-ch-st

Chemistry Go Direct Standard Package

8 Sensors • GDP-CH-DX • $800
Buy 8 or more packages at $776 and save $192.



This package includes

Go Direct Temperature (2)

Go Direct Gas Pressure

Go Direct pH

Go Direct Voltage

Go Direct Conductivity

Go Direct Colorimeter

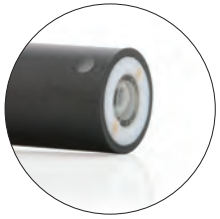
Go Direct Drop Counter

All sensors work with Vernier Graphical Analysis Pro and LabQuest 3.

Learn more at vernier.com/gdp-ch-dx

Featured Products

pH Sensor Comparison

Sensor	Features
Go Direct pH GDX-PH $109 	**Recommended for General Use** Go Direct® pH is an important and versatile sensor for lab and field activities alike. Conduct acid-base titrations, monitor pH changes during chemical reactions, and investigate household acids and bases. The wireless connection makes it easier to do field-based studies such as testing the pH of surface water. **Go Direct pH Teacher Pack** GDX-PH-TP $933 Includes 8 Go Direct pH Sensors and a Go Direct Charge Station
Go Direct Tris-Compatible Flat pH GDX-FPH $134 	Go Direct Tris-Compatible Flat pH is a double-junction electrode for measuring pH in Tris buffers and solutions containing proteins or sulfides. The flat glass shape makes it easy to clean and is useful for measuring the pH of semisolids such as soil slurries and certain foods.
Go Direct Glass-Body pH GDX-GPH $159 	Go Direct Glass-Body pH can be used with non-aqueous solutions and solutions containing solvents, strong acids, and strong bases.

Learn more at vernier.com/ph-sensors

Temperature Sensor Comparison

Sensor	Features and Applications
Go Direct Temperature GDX-TMP $78 **Range** –40 to 125°C 	**Recommended for General Use** • Explore endothermic and exothermic reactions. • Determine the physical properties of water. • Measure the energy content of foods. • Investigate intermolecular forces. **Go Direct Temperature Teacher Pack** GDX-TMP-TP $692 Includes 8 Go Direct Temperature Probes and a Go Direct Charge Station
Go Direct Surface Temperature GDX-ST $99 **Range** –25 to 125°C 	• Use this sensor in situations in which low thermal mass or flexibility is required. • The exposed thermistor provides an extremely rapid response to temperature changes. • Use this sensor in air and water only.
Go Direct Wide-Range Temperature GDX-WRT $128 **Range** –20 to 330°C 	• Determine the melting point of caffeine or the boiling point of different vegetable oils. • RTD (Resistance Temperature Detector) technology establishes a ±0.5°C accuracy.
Go Direct Thermocouple GDX-TC $118 **Range (Type-K)** –200 to 1,400°C 	• Collect reliable data during experiments in which there are extreme temperatures, such as making ice cream with dry ice or testing different elements of a flame. • Compatible with Type-K (included), Type-T, and Type-J thermocouple wires

Learn more at vernier.com/temperature-sensors

Featured Products

Go Direct Constant Current System

Determine Avogadro's number and perform various electroplating and electrolysis experiments. This system combines a DC power source with a built-in current sensor to eliminate the need for a separate power supply. It can deliver up to 0.6 A at 5 V DC.

GDX-CCS $80

vernier.com/gdx-ccs

Go Direct Melt Station

Teach students the visual detection capillary method of melting point determination with Go Direct® Melt Station. It accurately measures melting temperatures of a solid (up to 260°C), and real-time graphing provides a unique perspective of the melting process.

GDX-MLT» $594

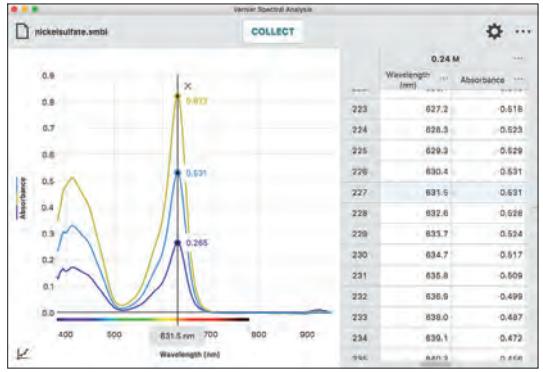
vernier.com/gdx-mlt

Go Direct SpectroVis Plus

Introduce your students to spectroscopy with the affordable Go Direct SpectroVis® Plus Spectrophotometer. With a range of 380 to 950 nm, students can easily collect a full-wavelength spectrum (absorbance, percent transmittance, fluorescence, or intensity), study absorbance *vs.* concentration (Beer's law), or monitor rates of reaction (kinetics). Collect and analyze data using Vernier Spectral Analysis® or LabQuest® App.

GDX-SVISPL $449

vernier.com/gdx-svispl



Absorbance spectra of green food coloring at different concentrations

Vernier Spectral Analysis App

Our free Vernier Spectral Analysis app makes it easy to incorporate spectroscopy into your chemistry experiments. Using the app, students can collect a full spectrum and explore topics such as Beer's law, kinetics, and fluorescence.

The user-friendly software includes analysis features such as curve fitting and data interpolation.

vernier.com/spectral-analysis

» For California Proposition 65 warning, see pp. 142–143.

Spectrometer Comparison

Spectrometer	Go Direct SpectroVis Plus	Go Direct UV-VIS Spectrophotometer	Go Direct Fluorescence/UV-VIS Spectrophotometer
			
Description	The Go Direct SpectroVis Plus Spectrophotometer quickly measures a full-wavelength spectrum. Connect it directly to your device via Bluetooth® wireless technology or USB.	The Go Direct UV-VIS Spectrophotometer connects to your device via Bluetooth wireless technology or USB to generate full spectra, Beer's law data, and kinetic traces of ultraviolet and visible-absorbing samples such as aspirin, DNA, proteins, and NADH.	This spectrophotometer measures the fluorescence and absorbance spectra of samples such as chlorophyll, tonic water, energy drinks, and fluorescent proteins, all while connecting to your device via Bluetooth wireless technology or USB.
Wavelength Range	380 to 950 nm	220 to 850 nm	220 to 850 nm
Light Source	Visible: LED-boosted tungsten Fluorescence: built-in LEDs for excitation at 405 nm and 500 nm	Visible: LED-boosted tungsten UV: Deuterium	Visible: LED-boosted tungsten UV: Deuterium Fluorescence: exchangeable LEDs for excitation at 375 nm, 450 nm, and 525 nm (additional wavelengths sold separately)
Warranty	5 years (1 year on battery, 3 years on lamp, none on consumables)	5 years (1 year on lamp, none on consumables)	5 years (1 year on lamp, none on consumables)
More Information	Innovative use ideas available at vernier.com/gdx-svispl	Download free experiments at vernier.com/gdx-spec-uv	Download free experiments at vernier.com/gdx-spec-fuv
Order Code & Price	GDX-SVISPL $449	GDX-SPEC-UV $2,499	GDX-SPEC-FUV $2,999
Optical Fiber Accessory	Vernier Spectrophotometer Optical Fiber This is an optical fiber accessory designed exclusively for emission spectrum experiments with the Vernier-branded spectrophotometers listed above. It has a wavelength range from 350 to 900 nm. VSP-FIBER $79		

Learn more at vernier.com/spectrometers

Lab Equipment

OHAUS Balances

It is easy to collect mass data from an OHAUS® balance using our popular LabQuest® App. Simply connect a supported balance to the USB port using the OHAUS Scout® USB Cable, start the software, and collect real-time data as if the OHAUS balance were just another Vernier sensor!

OHAUS Scout 120 g

0.001 g precision
OHS-123 ⌃⌃

OHAUS Scout 220 g

0.01 g precision
OHS-222 ⌃⌃

OHAUS Scout 420 g

0.01 g precision
OHS-422 ⌃⌃

All three balances require an OHAUS Scout USB Cable for data collection.

OHAUS Scout USB Cable
OHS-USB

For pricing and to learn more, see vernier.com/ohaus

Electrode Support

Our Electrode Support is a great complement to the Vernier Stir Station, as well as a perfect holder for many sensors. It is built to connect to all standard ring stand posts and its large-handled locking nut keeps your sensors firmly in place.

ESUP $10

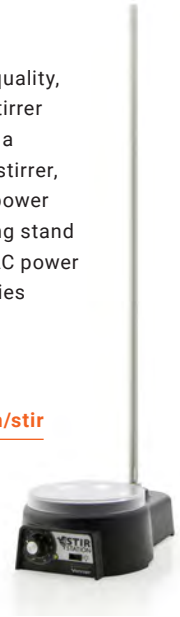
Learn more at vernier.com/esup

Stir Station

The Stir Station is a high-quality, multi-function magnetic stirrer and ring stand. It includes a Stir Station, Vernier Microstirrer, magnetic stirring bar, AC power adapter, and removable ring stand post. It can be used with AC power (included) or four C batteries (not included).

STIR $139

Learn more at vernier.com/stir



Organic Chemistry

Go Direct Mini GC

Teach students chromatography with an affordable, portable gas chromatograph that detects polar and nonpolar compounds. With the easy-to-use Go Direct® Mini GC™ and the free Vernier Instrumental Analysis® app, students can separate, analyze, and identify substances contained in a volatile liquid or gaseous sample. Go Direct Mini GC connects to your device via Bluetooth® wireless technology or USB.

GDX-GC $3,599

Learn more at vernier.com/gdx-gc

FREE DOWNLOAD

***Chromatography Experiments with the Go Direct Mini GC* e-book**

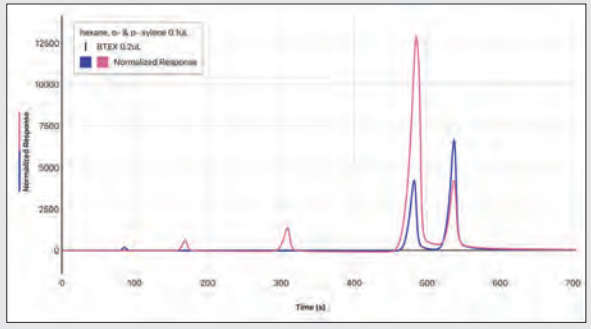
Free with purchase of Go Direct Mini GC

Vernier Instrumental Analysis App

With our free Vernier Instrumental Analysis app, students can collect and analyze data from our Go Direct Mini GC and other advanced instrumentation using computers, Chromebooks, or other mobile devices.

FREE DOWNLOAD

Learn more at vernier.com/ia



Comparing chromatograms of a BTEX mixture with hexane and xylene isomers

Organic Chemistry

Polarimeters

Our polarimeters measure chiral properties of optically active samples such as sugars and amino acids. Students no longer have to determine the optical maximum with their eyes but have a graph that shows a clear change in the light's polarization.

Go Direct Polarimeter

GDX-POL $545

Polarimeter*

CHEM-POL » $559

Learn more at vernier.com/polarimeters

Melt Stations

Melting point is a physical method of analysis to identify an unknown and its purity by the melting temperature. The melt stations accurately measure melting temperatures of a solid (up to 260°C), and the real-time graphing provides a unique perspective of the melting process.

Go Direct Melt Station

GDX-MLT » $594

Melt Station*

MLT-BTA » $599

Learn more at vernier.com/melt-stations

Wide-Range Temperature Probes

The wide-range temperature probes are designed to be used as you would use a thermometer for experiments such as the recrystallization of benzoic acid, simple and fractional distillations, determination of boiling points, the synthesis and analysis of aspirin and other organic compounds, and more.

Go Direct Wide-Range Temperature

GDX-WRT $128

Wide-Range Temperature Probe*

WRT-BTA $119

Learn more at vernier.com/wr-temp-probes

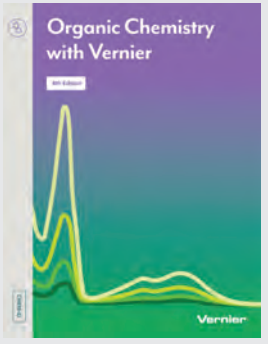
Organic Chemistry with Vernier

Organic Chemistry with Vernier contains experiments that represent a broad range of topics and techniques taught in most college organic chemistry lab courses. The experiments in this book build upon prior knowledge, laboratory techniques, and skills that students have learned in general chemistry courses.

Topics include

- Distillation
- Chromatography
- Synthesis
- Polarimetry

Learn more at vernier.com/chem-o



Download only

CHEM-O-E $44

Printed book + download

CHEM-O $52

*Requires an interface

» For California Proposition 65 warning, see pp. 142–143.

Featured Products

Go Direct Sensors

Sensor		Order Code	Price
Go Direct® CO_2 Gas		GDX-CO2	$225
Go Direct Colorimeter		GDX-COL	$129
Go Direct Conductivity		GDX-CON	$119
Go Direct Platinum-Cell Conductivity		GDX-CONPT	$180
Go Direct Constant Current System		GDX-CCS	$80
Go Direct Current		GDX-CUR	$89
Go Direct Drop Counter		GDX-DC	$109
Go Direct Electrode Amplifier		GDX-EA	$79
Go Direct Ethanol Vapor		GDX-ETOH	$165
Go Direct Gas Pressure		GDX-GP	$99
Go Direct Melt Station		GDX-MLT ⌃⌃	$594
Go Direct Mini GC™		GDX-GC	$3,599
Go Direct ORP		GDX-ORP	$119
pH Sensors			
Go Direct Glass-Body pH		GDX-GPH	$159
Go Direct pH		GDX-PH	$109
Go Direct Tris-Compatible Flat pH		GDX-FPH	$134
Go Direct Polarimeter		GDX-POL	$545
Go Direct Radiation Monitor		GDX-RAD	$199
Spectrometers			
Go Direct Emissions Spectrometer		GDX-SPEC-EM	$950
Go Direct Fluorescence/UV-VIS Spectrophotometer		GDX-SPEC-FUV	$2,999
Go Direct SpectroVis® Plus		GDX-SVISPL	$449
Go Direct UV-VIS Spectrophotometer		GDX-SPEC-UV	$2,499
Go Direct Visible Spectophotometer		GDX-SPEC-VIS	$1,899
Temperature Probes			
Go Direct Surface Temperature		GDX-ST	$99
Go Direct Temperature		GDX-TMP	$78
Go Direct Thermocouple		GDX-TC	$118
Go Direct Wide-Range Temperature		GDX-WRT	$128
Go Direct Voltage		GDX-VOLT	$79

Go Direct Charge Station

Accessory	Order Code	Price
Go Direct Charge Station	GDX-CRG	$89

LabQuest® Sensors

Sensor	Order Code	Price
Colorimeter	COL-BTA	$128
Conductivity Probes		
Conductivity Probe	CON-BTA	$115
Platinum-Cell Conductivity Probe	CONPT-BTA	$170
Current Probes		
Constant Current System	CCS-BTA	$70
Current Probe	DCP-BTA	$49
Drop Counter	VDC-BTD	$109
Electrode Amplifier	EA-BTA	$55
Gas Pressure Sensor	GPS-BTA	$94
Instrumentation Amplifier	INA-BTA	$89
Melt Station	MLT-BTA ⁂	$599
ORP Sensor	ORP-BTA	$115
pH Sensors		
Glass-Body pH Electrode BNC (requires Electrode Amplifier)	GPH-BNC	$95
pH Sensor	PH-BTA	$99
Tris-Compatible Flat pH Sensor	FPH-BTA	$124
Polarimeter (Chemical)	CHEM-POL ⁂	$559
Radiation Monitor	VRM-BTD	$199
Temperature Probes		
Stainless Steel Temperature Probe	TMP-BTA	$40
Surface Temperature Sensor	STS-BTA	$34
Thermocouple	TCA-BTA	$79
Wide-Range Temperature Probe	WRT-BTA	$119
Voltage Probes		
Differential Voltage Probe	DVP-BTA	$49
Voltage Probe	VP-BTA	$14

Balances

Sensor	More Info
OHAUS Scout® (120 g) ⁂	vernier.com/ohs-123
OHAUS Scout (220 g) ⁂	vernier.com/ohs-222
OHAUS Scout (420 g) ⁂	vernier.com/ohs-422

Spectrometers

Spectrometer	Order Code	Price
Go Direct Emissions Spectrometer	GDX-SPEC-EM	$950
Go Direct Fluorescence/ UV-VIS Spectrophotometer	GDX-SPEC-FUV	$2,999
Go Direct SpectroVis Plus	GDX-SVISPL	$449
Go Direct UV-VIS Spectrophotometer	GDX-SPEC-UV	$2,499
Go Direct Visible Spectophotometer	GDX-SPEC-VIS	$1,899

Gas Chromatograph

Gas Chromatograph	Order Code	Price
Go Direct Mini GC™	GDX-GC	$3,599

Lab Equipment and Accessories

Accessory	Order Code	Price
Cuvette Rack	CUV-RACK	$9
Electrode Support	ESUP	$10
Melt Station Capillary Tubes	MLT-TUBE	$24
Plastic Cuvettes (100)	CUV	$24
Stir Station	STIR	$139

Lab Books†

Book Title	Order Code	Price
Chemistry with Vernier	CWV	$52
Advanced Chemistry with Vernier	CHEM-A	$52
Vernier Chemistry Investigations for Use with AP Chemistry*	APCHEM	$52
Investigating Chemistry through Inquiry	CHEM-I	$52
Food Chemistry Experiments	HSB-FOOD	$41
Organic Chemistry with Vernier	CHEM-O	$52

† Books listed here include printed book and download; also available as a download only

** AP and Advanced Placement Program are registered trademarks of the College Entrance Examination Board, which was not involved in the production of and does not endorse this product.*

See all our products for chemistry at vernier.com/chemistry

Looking for Replacement Parts?

Visit vernier.com/replacements

⁂ For California Proposition 65 warning, see pp. 142–143.

HIGH SCHOOL

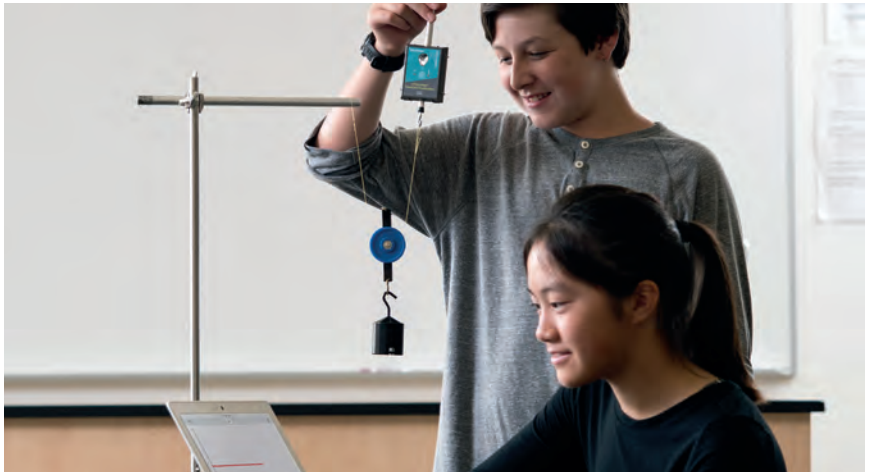
Physical Science

From matter and energy to motion and forces, Vernier offers the support you need and the technology your students can use to investigate physical science.

vernier.com/physical-science

Physical Science Sets Learning in Motion

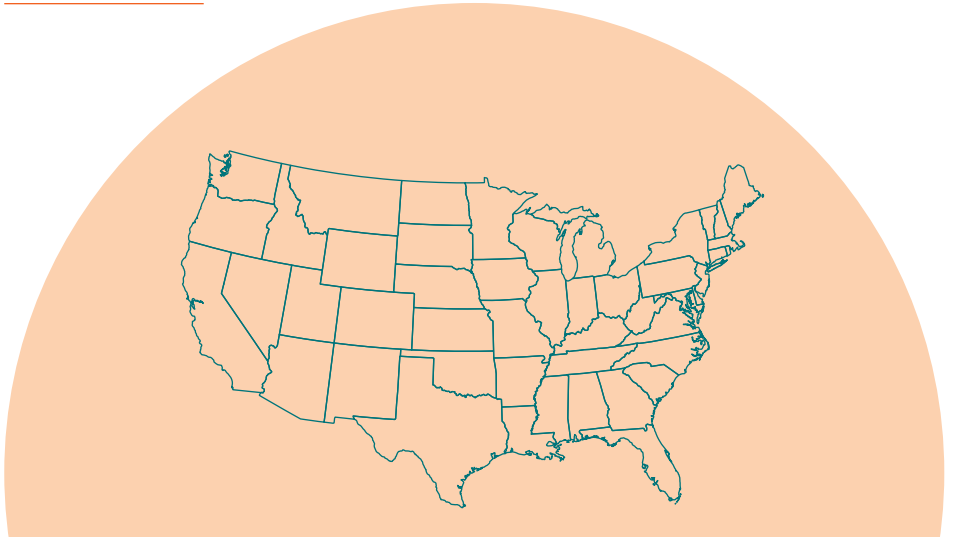
Our hands-on physical science investigations help students understand scientific concepts such as energy transfer during phase changes, the cooling effect of evaporation, and principles of simple machines.



Professional Development

We are here to help. Our webinars, workshops, and personalized training options offer innovative ways to engage students with STEM in a traditional classroom or virtual environment.

vernier.com/training



Physical Science

Physical Science with Vernier

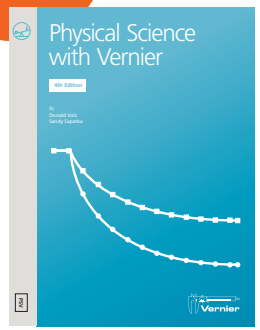
INCLUDES 40 EXPERIMENTS

Physical Science with Vernier contains 40 ready-to-use experiments for physical science. Experiments are included for nine Vernier sensors and cover a variety of topics in chemistry and physics.

Topics include

- Structures and properties of matter
- Forces and interactions
- Waves and electromagnetic radiation
- Chemical reactions

Learn more at vernier.com/psv



Download only
PSV-E $44

Printed book + download
PSV $52

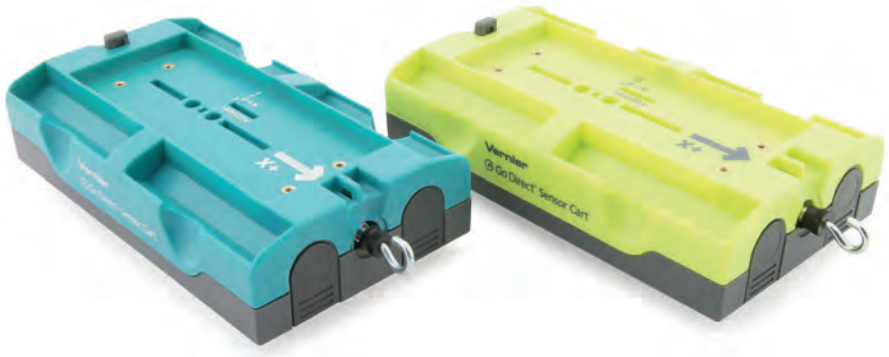
Go Direct Sensor Carts

With our Go Direct® Sensor Carts, students can explore force, position, velocity, and acceleration directly on their devices via Bluetooth® wireless technology—no wires or additional equipment required. Each cart features built-in sensors to simplify experiment setup.

Go Direct Sensor Cart (Green)
GDX-CART-G $189

Go Direct Sensor Cart (Yellow)
GDX-CART-Y $189

vernier.com/gdx-cart



EXPERIMENT 23

Reflectivity of Light

After comparing the amount of light reflected from different colors of paper, students answer questions about planetary albedo.

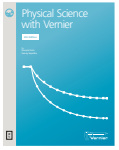
Sensor Used

Go Direct Light and Color

Students use this sensor to measure the brightness of a light bulb or the reflectance of light from various objects. They can also measure UV light and relative amounts of red, blue, and green light.

GDX-LC $89

Experiment Source



Physical Science with Vernier

Download only: PSV-E $44
Printed book + download: PSV $52

Learn more at vernier.com/psv-23

Physical Science

40 Experiments Available

EXPERIMENT 3

Freezing and Melting of Water

Students measure the temperature of water as it changes from a liquid to a solid. They analyze data to make predictions about the freezing patterns of other substances.

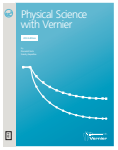
Sensor Used

Go Direct Temperature

This is a rugged, general-purpose sensor that students can use to monitor temperature.

GDX-TMP $78

Experiment Source



Physical Science with Vernier

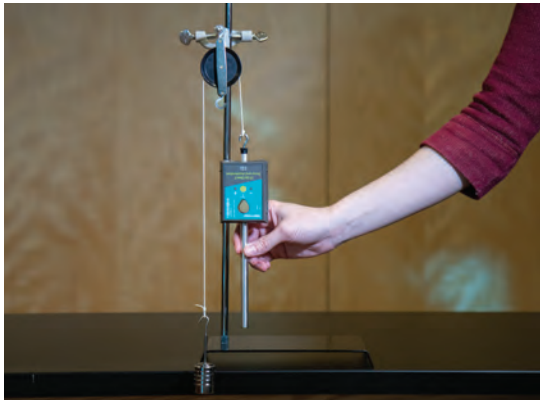
Download only: PSV-E $44
Printed book + download: PSV $52

Learn more at vernier.com/psv-3

EXPERIMENT 21

Pulleys

By comparing the effort force to the resistance force required to lift a mass, students determine the mechanical advantage of different pulley systems.



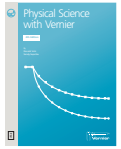
Sensor Used

Go Direct Force and Acceleration

Students can use this sensor to measure forces of up to 50 N. The included 3-axis accelerometer makes it a versatile sensor for many topics in physical science.

GDX-FOR $119

Experiment Source



Physical Science with Vernier

Download only: PSV-E $44
Printed book + download: PSV $52

Learn more at vernier.com/psv-21

Featured Products

Go Direct Sensors

Sensor	Order Code	Price
Go Direct® 3-Axis Magnetic Field	GDX-3MG	$75
Go Direct Acceleration	GDX-ACC	$109
Carts and Tracks		
Dynamics Cart and Track System with Go Direct Sensor Carts	DTS-GDX	$619
Go Direct Sensor Cart (Green)	GDX-CART-G	$189
Go Direct Sensor Cart (Yellow)	GDX-CART-Y	$189
Go Direct Conductivity	GDX-CON	$119
Go Direct Current	GDX-CUR	$89
Go Direct Energy	GDX-NRG	$98
Go Direct Force and Acceleration	GDX-FOR	$119
Go Direct Gas Pressure	GDX-GP	$99
Go Direct Light and Color	GDX-LC	$89
Go Direct Motion	GDX-MD	$114
Go Direct pH	GDX-PH	$109
Go Direct Photogate	GDX-VPG	$95
Go Direct Sound	GDX-SND	$95
Go Direct Structures & Materials Tester	GDX-VSMT	$1,199
Temperature Probes		
Go Direct Surface Temperature	GDX-ST	$99
Go Direct Temperature	GDX-TMP	$78
Go Direct Thermocouple	GDX-TC	$118
Go Direct Voltage	GDX-VOLT	$79

Go Direct Charge Station

Accessory	Order Code	Price
Go Direct Charge Station	GDX-CRG	$89

LabQuest Sensors

Sensor	Order Code	Price
Accelerometers		
3-Axis Accelerometer	3D-BTA	$105
25-g Accelerometer	ACC-BTA	$110
Low-g Accelerometer	LGA-BTA	$99
Conductivity Probe	CON-BTA	$115
Current Probes		
Current Probe	DCP-BTA	$49
High Current Sensor	HCS-BTA	$89
Energy Sensor	VES-BTA	$99
Force Sensors		
Dual-Range Force Sensor	DFS-BTA	$120
Force Plate	FP-BTA	$319
Gas Pressure Sensor	GPS-BTA	$94
Light Sensor	LS-BTA »	$69
Magnetic Field Sensor	MG-BTA	$69
Microphone	MCA-BTA	$55
Motion Detector	MD-BTD	$99
pH Sensor	PH-BTA	$99
Photogate	VPG-BTD	$55
Sound Level Sensor	SLS-BTA	$69
Temperature Probes		
Go!Temp® (USB Sensor)	GO-TEMP	$49
Stainless Steel Temperature Probe	TMP-BTA	$40
Surface Temperature Sensor	STS-BTA	$34
Thermocouple	TCA-BTA	$79
Voltage Probes		
30-Volt Voltage Probe	30V-BTA	$59
Differential Voltage Probe	DVP-BTA	$49
Voltage Probe	VP-BTA	$14

Accessories & Lab Equipment

Product	Order Code	Price
Balances		
OHAUS Scout® (120 g) »	vernier.com/ohs-123	
OHAUS Scout (220 g) »	vernier.com/ohs-222	
OHAUS Scout (420 g) »	vernier.com/ohs-422	
Electrode Support	ESUP	$10
pH Storage Solution	PH-SS	$20
pH Buffer Capsules Kit	PH-BUFCAP	$34
Stir Station	STIR	$139
Vernier Circuit Board 2	VCB2 »	$145
Cart Guide (pkg. of 10)	CGUIDE-10	$99

Lab Books

Title	Order Code	Price
Physical Science with Vernier	Printed book + download: PSV Download only: PSV-E	$52 $44
Chemistry with Vernier	Printed book + download: CWV Download only: CWV-E	$52 $44
Physics with Vernier	Printed book + download: PWV Download only: PWV-E	$52 $44

Looking for Replacement Parts?

Visit vernier.com/replacements

See all our products for physical science at vernier.com/physical-science

» For California Proposition 65 warning, see pp. 142–143.

Physics

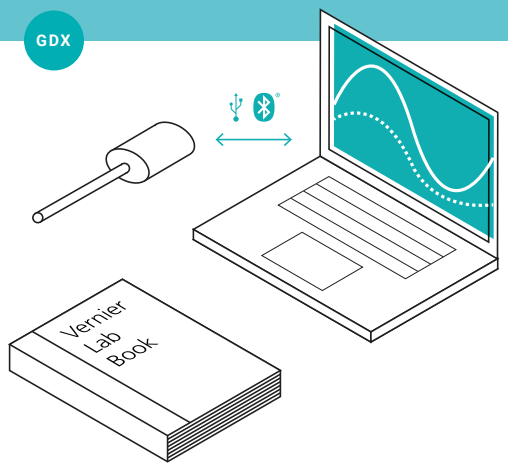
From kinematics to optics, Vernier technology helps your students connect the dots between the classroom and the real world. Our physics products enable student and educator success so that you can spend less time troubleshooting and more time teaching your students about the scientific principles of the world around them.

vernier.com/physics

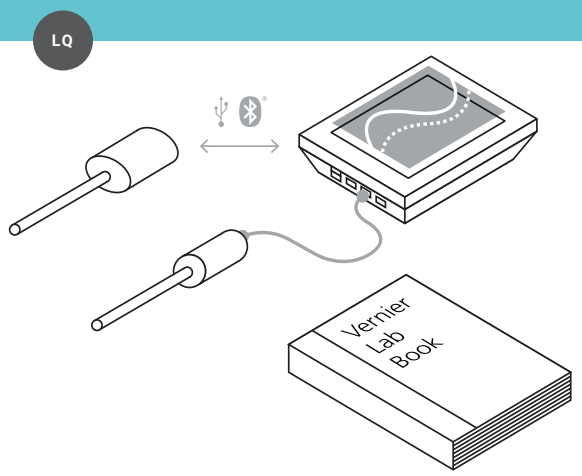
Topics

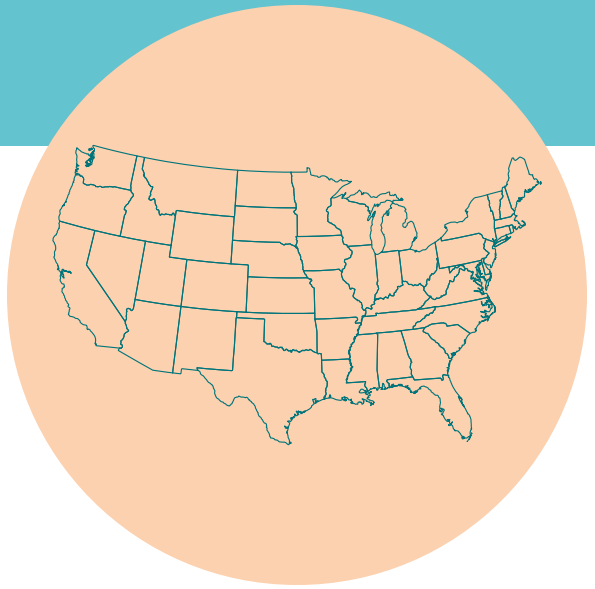
Explore a sampling of our featured experiments by topic to learn how Vernier technology helps your students engage with data-collection technology and deepens their understanding of key physics concepts.

GDX



LQ





A Guide to Vernier Data Collection

GDX

Our Go Direct® technology connects directly to compatible student devices—computers, Chromebooks, LabQuest® 3, and iOS, iPadOS,® and Android™ devices. Its ease of use maximizes valuable lab time so you can focus on teaching.

LQ

With over 80 sensors to choose from, our LabQuest family of sensors offers a wide variety of experiments to integrate into your existing curriculum. Connect LabQuest sensors with an interface to your device, or use LabQuest 3 as a standalone device in the field or lab.

Professional Development

We are here to help. Our webinars, workshops, and personalized training options offer innovative ways to engage students with STEM in a traditional classroom or virtual environment.

vernier.com/training

1D Motion and Force

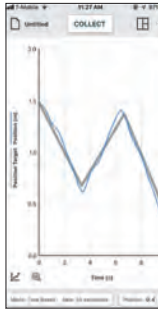
Featured Experiments

EXPERIMENT 1

Graph Matching

Watch a video

Kinesthetic experience coupled with real-time graphing helps cement student understanding of the relationships between motion, position *vs.* time graphs, and velocity *vs.* time graphs.



Sensor Used

GDX

Go Direct Motion

Go Direct® Motion uses ultrasound to measure the position, velocity, and acceleration of moving objects.

GDX-MD $114

Can also be done with

LQ

Motion Detector

MD-BTD $99

Go! Motion® (USB motion detector)

GO-MOT $119

Experiment Source

Physics with Vernier

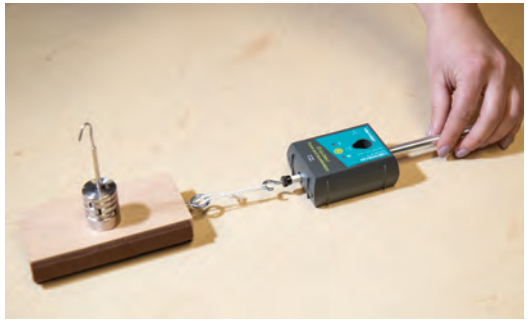
Download only: PWV-E $44
Printed book + download: PWV $52

Learn more at vernier.com/pwv-1

EXPERIMENT 12

Static and Kinetic Friction

Make investigating friction easy with a digital force sensor. Students re-create the friction graph from their textbook while determining coefficients of static and kinetic friction.



Sensor Used

GDX

Go Direct Force and Acceleration

Measure forces as small as ±0.1 N and up to ±50 N with this sensor that couples a 3-axis accelerometer with a stable and accurate force sensor. Use it to measure pushes and pulls in the classroom or outdoors.

GDX-FOR $119

Can also be done with

LQ

Dual-Range Force Sensor

DFS-BTA $120

GDX

Go Direct Sensor Cart (green or yellow)

GDX-CART-G $189 (green)
GDX-CART-Y $189 (yellow)

Experiment Source

Physics with Vernier

Download only: PWV-E $44
Printed book + download: PWV $52

Learn more at vernier.com/pwv-12

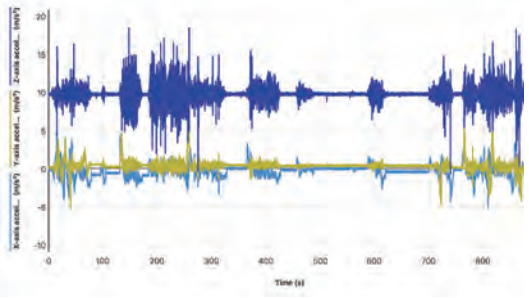
GDX GoDirect Sensors

LQ LabQuest Sensors

EXPERIMENT 21

Accelerations in the Real World

In this inquiry activity, students take an acceleration sensor out of the classroom and into different situations, whether it be in cars, elevators, amusement parks, or elsewhere.



Sensor Used

GDX

Go Direct Acceleration

Collect acceleration, rotation, and altitude data in the classroom or in the field.

GDX-ACC $109

Can also be done with

LQ **3-Axis Accelerometer**

3D-BTA $105

GDX **Go Direct Force and Acceleration**

GDX-FOR $109

Experiment Source

Physics with Vernier

Download only: PWV-E $44
Printed book + download: PWV $52

Learn more at vernier.com/pwv-21

EXPERIMENT 14

Pendulum Periods

Take a classic experiment to the next level with precision measurement of pendulum period. Students test three variables to discover which factors influence the period.

Sensor Used

GDX

Go Direct Photogate

This double-gate sensor includes two photogates built into the arms of the sensor. It accurately measures velocity and acceleration.

GDX-VPG $95

Can also be done with

LQ **Vernier Photogate**

VPG-BTD $55

Experiment Source

Physics with Vernier

Download only: PWV-E $44
Printed book + download: PWV $52

Learn more at vernier.com/pwv-14

Dynamics Cart and Track Systems

One Dynamics System—Three Ways to Collect Data

Depending on your budget and your needs, we offer three ways to collect motion data.

1 Go Direct Sensor Cart GDX

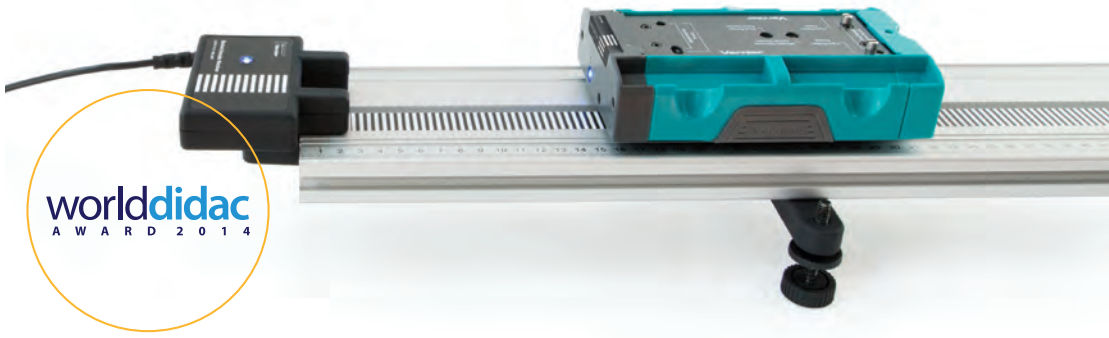
The wireless Go Direct® Sensor Cart includes an optical encoder on a wheel to sense the displacement of the cart, on or off the track. No interface is needed to use this system with the Vernier Graphical Analysis™ Pro app. Students can perform impulse and momentum experiments with the built-in force sensor, and the 3-axis accelerometer means you can take your Sensor Cart off campus to investigate accelerations on a swing or merry-go-round.

2 The Motion Encoder* LQ

VERNIER EXCLUSIVE

For classrooms already equipped with data-collection interfaces, the Motion Encoder dramatically improves data quality and simplifies experiment setup over the traditional ultrasonic Motion Detector. An optical sensor under the dynamics cart senses the passage of the cart over a striped decal on the track. The displacement information is sent as an encoded IR signal to a receiver at the track's end. This optical-only system provides excellent, repeatable, and noise-resistant data.

** U.S. Patent No. 9,488,503*



3 A Traditional Motion Detector GDX LQ

The Motion Detector is the classic method for collecting position data. Use a Motion Detector bracket to measure cart motion for the entire length of the track. You can even use two Motion Detectors at once to study cart collisions.

Unlike the Motion Encoder or Go Direct Sensor Cart, the Motion Detector can be used for dynamics experiments other than cart-on-track experiments. Students can graph their own walking motion, study a simple pendulum, or graph a ball toss with a Motion Detector. If you want to use a Motion Detector for all motion experiments, get the Dynamics Cart and Track System without the Motion Encoder or Go Direct Sensor Cart.

Dynamics Cart and Track System with Go Direct Sensor Cart

BUILT-IN SENSORS = LOWER TOTAL COST

The Dynamics Cart and Track System with Go Direct Sensor Cart includes essential laboratory equipment for teaching dynamics and kinematics. With our Go Direct Sensor Cart, students can explore force, position, velocity, and acceleration directly on their device using Bluetooth® wireless technology. There are no wires to create drag, and no additional equipment is required! Each cart features built-in sensors that simplify experiment setup and make this system the best choice for studying dynamics and kinematics.

with 1.2 m Track DTS-GDX $619 vernier.com/dts-gdx

with 2.2 m Track DTS-GDX-LONG $728 vernier.com/dts-gdx-long

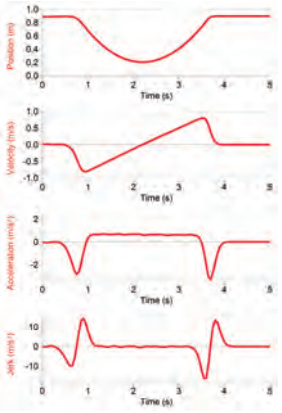
Dynamics Cart and Track System with Motion Encoder

RECOMMENDED OPTION FOR USE WITH LOGGER *PRO*® 3

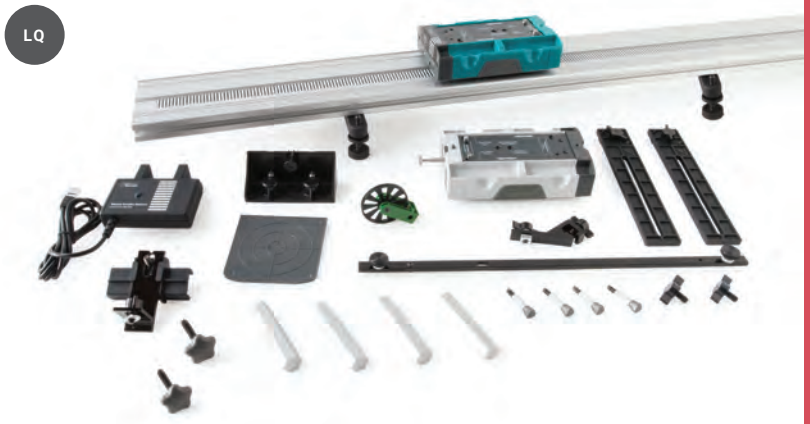
The Dynamics Cart and Track System with Motion Encoder includes an optical position sensing system to record cart motion.

with 1.2 m Track DTS-EC $513 vernier.com/dts-ec

with 2.2 m Track DTS-EC-LONG $622 vernier.com/dts-ec-long



Motion encoder data are so pristine that you can usefully graph jerk vs. time.



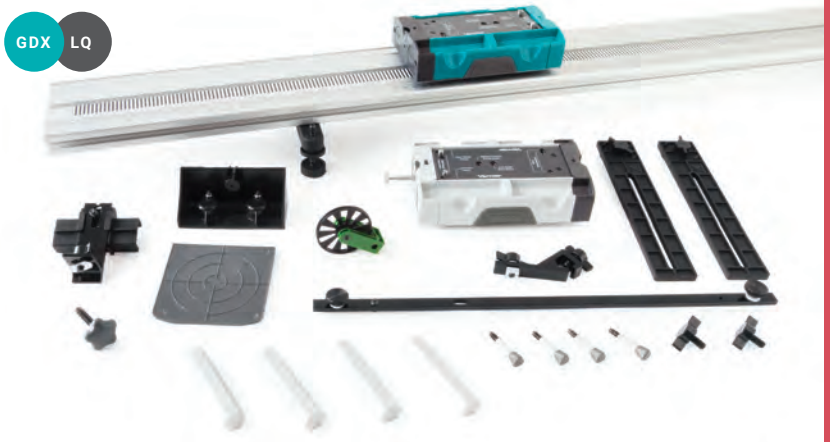
Dynamics Cart and Track System

USE WITH SENSORS YOU ALREADY OWN—SENSORS ARE NOT INCLUDED

The Dynamics Cart and Track System features the Combination Track/Optics Bench, two low-friction plastic carts (one standard and one with an adjustable plunger), and attachment accessories.

with 1.2 m Track DTS $349 vernier.com/dts

with 2.2 m Track DTS-LONG $458 vernier.com/dts-long



Dynamics Cart and Track Systems

EXPERIMENT 4

Determining *g* on an Incline

Watch a video

Students mimic Galileo's seminal experiment with modern tools using a low-friction setup to determine the acceleration of gravity on Earth.

Sensor Used

GDX

Dynamics Cart and Track System with Go Direct Sensor Cart

This completely wireless system simplifies experiment setup and allows basic experiments to be conducted with or without the track.

DTS-GDX $619

Can also be done with

LQ **Dynamics Cart and Track System with Motion Encoder**

DTS-EC $513

LQ **Motion Detector and Dynamics Cart and Track System**

MD-BTD $99
DTS $349

GDX **Go Direct Motion and Dynamics Cart and Track System**

GDX-MD $114
DTS $349

Experiment Source

Physics with Vernier

Download only: PWV-E $44
Printed book + download: PWV $52

Learn more at vernier.com/pwv-4a

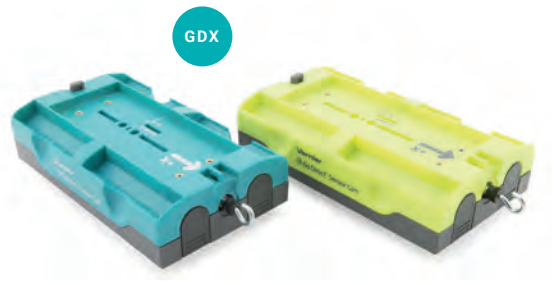
Go Direct Sensor Carts

We've added wireless sensors to our popular dynamics cart. Each cart includes an encoder wheel to report position, velocity, and acceleration. Conduct basic physics investigations with or without a track.

Go Direct® Sensor Cart (Green)
GDX-CART-G $189

Go Direct Sensor Cart (Yellow)
GDX-CART-Y $189

GDX



vernier.com/gdx-cart

INCLUDES 21 EXPERIMENTS

Sensor Cart Physics

Download only
HSB-SCP-E $40

Dynamics Cart and Track Systems—Featured Kits and Accessories

Fan Cart

The Fan Cart works with a motion detector and the Vernier Dynamics Cart and Track System. Study Newton's second law using variable fan thrust and included mass bars.

CART-F $119

vernier.com/cart-f

GDX LQ

Encoder Fan Cart

Use the Encoder Fan Cart with the Motion Encoder System. Study Newton's second law using variable fan thrust and included mass bars.

CART-FEC $235

vernier.com/cart-fec

LQ

Friction Pad DTS

Add a Friction Pad to any of our plastic dynamics carts to study the effect of consistent friction on the motion of the cart.

DTS-PAD $32

vernier.com/dts-pad

GDX LQ

Motion Encoder Cart and Receiver

This kit includes a fully assembled Motion Encoder Cart, as well as the Motion Encoder Receiver and Motion Encoder Long Track Strip.

DTS-MEC $255

vernier.com/dts-mec

LQ

Eddy Current Brake

Eddy current brakes are used as a braking system for high-speed trains and roller coasters. Recreate this unusual braking system in your classroom or laboratory by installing our Eddy Current Brake into the end cap of a plastic Vernier dynamics cart. As the cart moves over the track, the magnets in the Eddy Current Brake create an electromagnetic drag on the cart that is proportional to the cart's speed.

DTS-ECB $19

vernier.com/dts-ecb

GDX LQ

Bumper and Launcher Kit

With the Bumper and Launcher Kit, students can use the Dynamics Cart and Track System to perform Hooke's law experiments or study momentum and impulse.

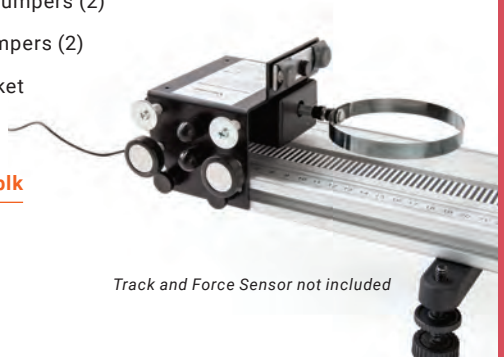
The kit includes

GDX LQ

- Clay (~20 grams)
- Clay holders (2)
- Dual-magnet bumper
- Force sensor mounting screw
- Hoop bumpers (2)
- Magnetic bumpers (2)
- Rubber bumpers (2)
- Track bracket

BLK $99

vernier.com/blk



Track and Force Sensor not included

Featured Products

Motion Detectors

Go Direct Motion

GDX

Go Direct® Motion uses ultrasound to measure the position, velocity, and acceleration of moving objects. It connects via Bluetooth® wireless technology or USB to your device.

GDX-MD $114

Motion Detector

LQ

The Motion Detector uses ultrasound to measure the position of carts, balls, people, and other objects. It can be used with interfaces from the LabQuest® family, LabPro,® and CBL 2.™ It is not supported with Go! Link® or EasyLink.®

MD-BTD $99

Go! Motion

Go! Motion® is our motion detector that connects directly to a computer or Chromebook™ USB port—eliminating the need for an additional data-collection interface. This USB motion detector works with Vernier Graphical Analysis™ Pro.

GO-MOT $139

vernier.com/motion-detectors

Photogates

Go Direct Photogate

GDX

Go Direct Photogate is a double-gate sensor that includes two photogates built into the arms of the sensor, which accurately measures velocity and acceleration without needing to know anything about the geometry of the object. Go Direct Photogate also includes a single laser gate for use with objects passing outside of the arms of the sensor (required visible light laser not included). The sensor can be used to study free fall, rolling objects, collisions, and pendulums.

GDX-VPG $95

Photogate

LQ

Study free fall, rolling objects, collisions, and pendulums with the Vernier Photogate. Use the built-in laser detector to create a photogate through which you could drive a truck. It includes an accessory rod for attaching to a ring stand or for adding the Ultra Pulley Attachment (sold separately).

VPG-BTD $55

Picket Fence

GDX LQ

PF $10

Ultra Pulley Attachment

GDX LQ

SPA $24

vernier.com/photogates

Featured Products

Accelerometers

Go Direct Acceleration

GDX

Collect acceleration, rotation, and altitude data in the classroom or in the field. This 3-axis acceleration sensor has two acceleration ranges plus an altimeter and a 3-axis gyroscope.

Acceleration ranges: ±157 m/s², ±1960 m/s²
Gyroscope: 3 axis, ±35 rad/s
Altimeter: –1,800 to 10,000 m

GDX-ACC $109

Low-g Accelerometer

LQ

Use the Low-g Accelerometer to study the one-dimensional motion of a car (real or toy), a pendulum bob, an elevator, or an amusement park ride.

Range: ±50 m/s²

LGA-BTA $99

3-Axis Accelerometer

LQ

Range: ±50 m/s²

3D-BTA $105

25-g Accelerometer

LQ

Range: ±250 m/s²

ACC-BTA $110

vernier.com/accelerometers

Force Sensors

Go Direct Force and Acceleration

GDX

Go Direct Force and Acceleration includes a ±50 N force sensor, a 3-axis accelerometer, and a 3-axis gyroscope. Take it on an amusement park ride, mount it on a dynamics cart, or attach a string and whirl it in a horizontal or vertical circle—in wireless mode, your imagination is the only limiting factor!

Force: ±50 N
Acceleration: 3 axis, ±16 *g*
Gyroscope: 3 axis, ±35 rad/s

GDX-FOR $119

Dual-Range Force Sensor

LQ

Using our Dual-Range Force Sensor, students can test Newton's third law of motion, explore Hooke's law, or graph the transition from static friction to kinetic friction.

Ranges: ±10 N, ±50 N

DFS-BTA $120

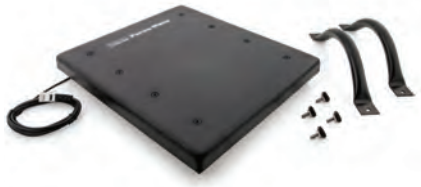
Force Plate

LQ

The Force Plate—a force sensor about the size of a bathroom scale—is tough enough to jump on. Two handles are included for pushing or pulling.

Ranges: –850 to +3500 N
–200 to +850 N

FP-BTA $319



vernier.com/force-sensors

2D Motion and Force

Featured Experiments

EXPERIMENT 8B

Projectile Motion

Predict the landing point of a projectile based on the launch velocity and initial height. With precision photogate timing, success depends on student understanding.

Sensor Used

GDX

Go Direct Projectile Launcher

Use the Go Direct® Projectile Launcher to investigate important concepts in two-dimensional kinematics. Launch steel balls at angles between 0 and 90 degrees and over distances up to 2.5 m.

GDX-PL $489

Can also be done with

LQ

Vernier Projectile Launcher

VPL $440

Experiment Source

Physics with Vernier

Download only: PWV-E $44
Printed book + download: PWV $52

Learn more at vernier.com/pwv-8b

EXPERIMENT 12A

Centripetal Acceleration

Students explore the relationships among force, speed, and radius through reliable data collection using sensors.

Sensors Used

GDX

Go Direct Centripetal Force Apparatus

This is an ideal combination to explore rotational dynamics when combined with Go Direct Force and Acceleration (not included).

GDX-CFA $325

GDX

Go Direct Force and Acceleration

This couples a 3-axis accelerometer with a stable and accurate force sensor that measures forces as small as ±0.1 N and up to ±50 N. Measure angular rotation using the 3-axis gyroscope.

GDX-FOR $119

Experiment Source

Advanced Physics with Vernier—Mechanics

Download only: PHYS-AM-E $44
Printed book + download: PHYS-AM $52

Learn more at vernier.com/phys-am-12a

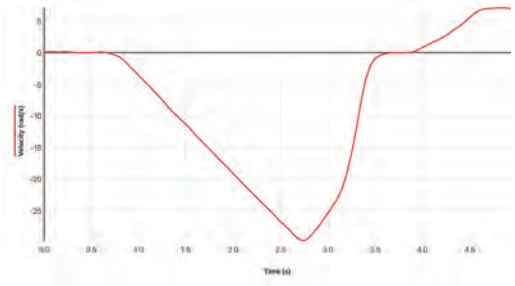
GDX GoDirect Sensors

LQ LabQuest Sensors

EXPERIMENT 13

Rotational Dynamics

Apply a torque and measure an angular acceleration. Students explore the version of Newton's second law that applies to rotation.



Sensor Used

GDX

Go Direct Rotary Motion

Measure angular displacement, angular velocity, and angular acceleration easily and precisely.

GDX-RMS ⌃⌃ $189

Can also be done with

LQ **Rotary Motion Sensor**

RMV-BTD ⌃⌃ $189

Accessories Used

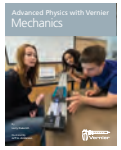
GDX LQ

Rotational Motion Accessory Kit

Used with a rotary motion sensor to study the motion of a physical pendulum; the rotational inertia of disks, rings, and point masses; and the conservation of angular momentum.

AK-RMV ⌃⌃ $120

Experiment Source



Advanced Physics with Vernier—Mechanics

Download only: PHYS-AM-E $44
Printed book + download: PHYS-AM $52

Learn more at vernier.com/phys-am-13

Featured Products

Centripetal Force Apparatus Accessories

Moment of Inertia Kit

Expand the capabilities of a Vernier centripetal force apparatus to investigate moments of inertia of different geometries.

CFA-MIK $199

vernier.com/cfa-mik

GDX LQ

Motor Accessory Kit

Control the rotational rate of the Go Direct Centripetal Force Apparatus so students can focus on a single variable.

GDX-CFA-MAK $199

vernier.com/gdx-cfa-mak

GDX

Projectile Launcher Accessories

GDX LQ

Independence of Motion Accessory

The Independence of Motion Accessory enables students to use the Vernier Projectile Launcher to perform the classic experiment where one ball is dropped as another is projected horizontally. The balls strike the floor simultaneously.

IOM-VPL $59

vernier.com/iom-vpl

Time of Flight Pad

The Time of Flight Pad is used with a projectile launcher or photogate (not included) to precisely measure how long a projectile has been in motion.

TOF-VPL $84

vernier.com/tof-vpl

⌃⌃ For California Proposition 65 warning, see pp. 142–143.

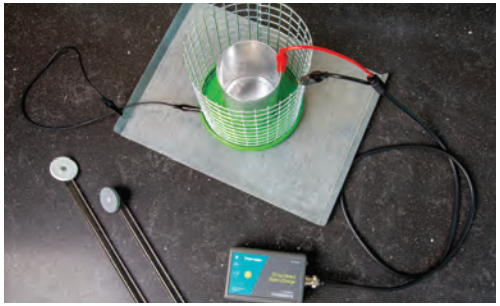
Electricity and Magnetism

Featured Experiments

EXPERIMENT 6

Electrostatics

Using Go Direct® Static Charge (essentially a digital electroscope), students explore charging by friction, conduction, and induction.



Sensor Used

GDX

Go Direct Static Charge

With Go Direct Static Charge, students can easily measure and analyze static charges. Designed with affordability and ease of use in mind, this sensor ensures enhanced performance so that students can collect accurate data.

GDX-Q $109

Can also be done with

LQ **Charge Sensor**

CRG-BTA
$89

Accessory Used

GDX LQ

Electrostatics Kit

Students use the Electrostatics Kit to perform a range of experiments in electrostatics with Go Direct Static Charge.

ESK-CRG $129

Experiment Source

Advanced Physics with Vernier—Beyond Mechanics

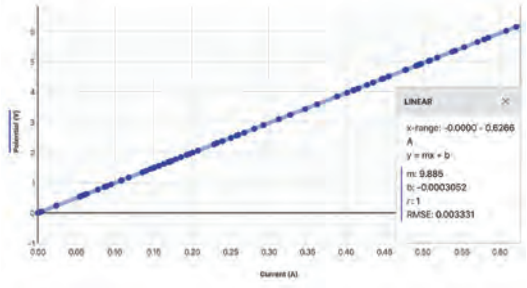
Download only: PHYS-ABM-E $44
Printed book + download: PHYS-ABM $52

Learn more at vernier.com/phys-abm-6

EXPERIMENT 22

Ohm's Law

Students compare the potential *vs.* current graphs for resistors and for a light bulb in this exploration of Ohm's law.



Sensors Used

GDX

Go Direct Voltage

This sensor combines a wide input voltage range and high precision, making it an excellent choice for investigations of both AC/DC circuits and electromagnetism.

GDX-VOLT $79

GDX

Go Direct Current

Measure electric currents in circuits with this versatile sensor.

GDX-CUR $89

Can also be done with

LQ **Differential Voltage Probe**

DVP-BTA $49

LQ **Current Probe**

DCP-BTA $49

Accessory Used

GDX LQ

Vernier Circuit Board 2

VCB2 » $145

Experiment Source

Physics with Vernier

Download only: PWV-E $44
Printed book + download: PWV $52

Learn more at vernier.com/pwv-22

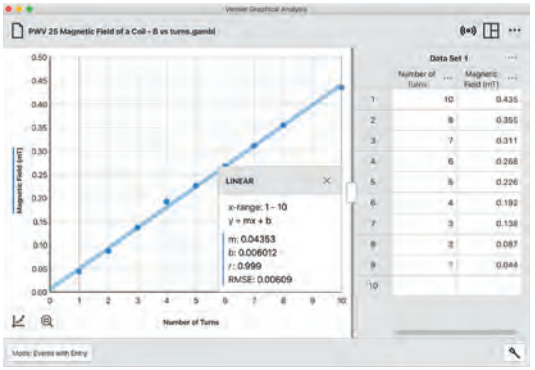
GDX GoDirect Sensors

LQ LabQuest Sensors

EXPERIMENT 25

Magnetic Field of a Coil

How do different factors affect the magnetic field in the center of a coil of wire? Students investigate the number of turns and the amount of current in a wire coil.



Sensor Used

GDX

Go Direct 3-Axis Magnetic Field

Determine the magnitude and direction of a magnetic field at any point in space with this 3-axis sensor.

GDX-3MG $75

Can also be done with

LQ **Magnetic Field Sensor**

MG-BTA
$69

Accessory Used

Extech® Digital Power Supply

This power supply provides constant current or constant voltage for physics activities that require DC power.

EXPS $259

Experiment Source

Physics with Vernier

Download only: PWV-E $44
Printed book + download: PWV $52

Learn more at vernier.com/pwv-25

Featured Products

Additional LabQuest Voltage and Current Probes

LQ

Sensor	Range	URL
Current Probe	±0.6 A	vernier.com/dcp-bta
High Current Sensor	±10 A	vernier.com/hcs-bta
Instrumentation Amplifier	±1 V	vernier.com/ina-bta
Differential Voltage Probe	±6 V	vernier.com/dvp-bta
Voltage Probe	±10 V	vernier.com/vp-bta
30-Volt Voltage Probe	±30 V	vernier.com/30v-bta

Power Amplifier

LQ

Use this as a power supply for DC and AC circuit investigations or to drive devices such as speakers, lamps, and small DC motors.

PAMP $249

High-Voltage Electrostatics Kit

LQ

Investigate the distribution of charge on a sphere, transfer of charge on contact between two spheres, and charging by induction with this kit.

HVEK-CRG $299

Electrostatic High-Voltage Genecon

LQ

A great addition to the High Voltage Electrostatics Kit, the Electrostatic High-Voltage Genecon generates both positive and negative charges and reliably creates charge differences in high humidity.

HVEK-GEN $229

Vernier Circuit Board 2

GDX LQ

Use this convenient platform to study basic series and parallel circuits as well as RLC circuits. Many components for experimentation are provided.

VCB2 » $145

Optional Breadboard Kit

for the Vernier Circuit Board 2

Install this small breadboard to easily conduct experiments using additional electronic components that are not permanently mounted on the Vernier Circuit Board 2.

VCB2-OBBK $29

» For California Proposition 65 warning, see pp. 142–143.

Thermodynamics

Featured Experiments

GDX GoDirect Sensors

LQ LabQuest Sensors

EXPERIMENT 1

Behavior of a Gas

Students collect pressure and temperature data to discover kinetic molecular theory and the iconic expression *PV* = *nRT*.

Sensors Used

GDX

Go Direct® Gas Pressure

Measure the absolute pressure of a gas.

GDX-GP $99

GDX

Go Direct Temperature

This is a rugged, general-purpose sensor that students can use to monitor temperature.

GDX-TMP $78

Can also be done with

LQ **Gas Pressure Sensor**

GPS-BTA $94

LQ **Stainless Steel Temperature Probe**

TMP-BTA $40

Experiment Source

Advanced Physics with Vernier—Beyond Mechanics

Download only: PHYS-ABM-E $44

Printed book + download: PHYS-ABM $52

Learn more at vernier.com/phys-abm-1

INNOVATIVE USE

Radiant Energy with FLIR ONE

Visible light interacts with matter in different ways, depending on the color of the matter. Students use a thermal camera to measure the invisible infrared light that results.

Sensor Used

FLIR ONE Pro Thermal Camera for iOS

Reveal the hidden world of infrared vision. When used with our Vernier Thermal Analysis® Plus app, students can also collect temperature vs. time data for up to four spots or regions, along with a thermal image video.

FLIRPRO-IOS » $399

Can also be done with

FLIR ONE Pro LT

FLIRLT-IOS » $299

FLIR ONE

FLIRONE3-IOS » $199

Software Used

Vernier Thermal Analysis Plus App for FLIR ONE

Students can easily observe temperature changes on the skin, illustrate convection, detect heating due to friction, compare heat conduction in different materials, and analyze the transparency of materials in infrared light.

Download on the App Store

Experiment Source

FREE DOWNLOAD

vernier.com/radiant-energy

Featured Products

FLIR ONE Thermal Cameras

Using a FLIR ONE® Thermal Camera, students can observe temperature changes on the skin, illustrate convection, track heating due to friction, compare heat conduction in different materials, analyze the transparency of materials in infrared compared to visible light, and so much more.

FLIR ONE Pro

FLIRPRO-IOS» $399

FLIR ONE Pro LT

FLIRLT-IOS» $299

FLIR ONE Gen 3

FLIRONE3-IOS» $199

vernier.com/flir

Vernier Thermal Analysis Plus App

The Vernier Thermal Analysis® Plus app makes it possible to analyze temperatures of up to four spots or regions and collect temperature data as a function of time. Examine the in-app graph, select different points or regions to examine, collect time-lapse videos for longer experiments, or export data to the Graphical Analysis™ GW app for further analysis.

vernier.com/thermal-analysis

Download on the App Store

Gas Pressure Sensors

Go Direct Gas Pressure

Range: 0 to 400 kPa

GDX-GP $99

Gas Pressure Sensor

Range: 0 to 210 kPa

GPS-BTA $94

vernier.com/gas-pressure-sensors

Temperature Probes

Go Direct Surface Temperature

Range: –25 to 125°C

GDX-ST $99

Go Direct Temperature

Range: –40 to 125°C

GDX-TMP $78

Surface Temperature Sensor

Range: –25 to 125°C

STS-BTA $34

Stainless Steel Temperature Probe

Range: –40 to 135°C

TMP-BTA $40

vernier.com/temperature-sensors

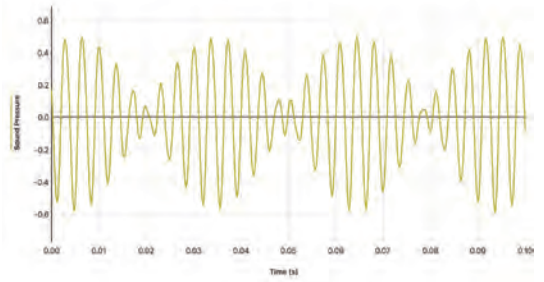
» For California Proposition 65 warning, see pp. 142–143.

Waves and Sound

Featured Experiments

EXPERIMENT 32

Sound Waves and Beats



Compare data from sound waves with sinusoidal functions. What information is contained in each parameter? Students also observe sound wave interference.

Sensor Used

GDX

Go Direct® Sound

Use this sensor to easily capture and evaluate waveforms.

GDX-SND $95

Can also be done with

LQ

Microphone

MCA-BTA $55

Experiment Source

Physics with Vernier

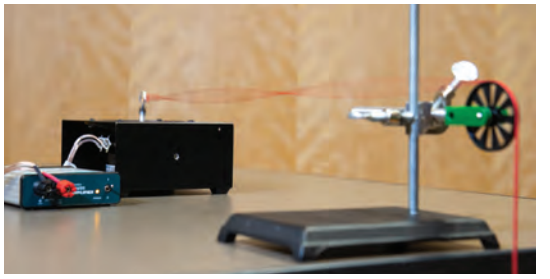
Download only:
PWV-E $44

Printed book + download: PWV $52

Learn more at vernier.com/pwv-32

EXPERIMENT 3

Standing Waves on a String



Students explore waves on a string that is fixed at both ends, create harmonics, and relate string tension and wave speed.

Products Used

Power Amplifier

Drive devices such as speakers, lamps, and small DC motors.

PAMP $249

Power Amplifier Accessory Speaker

Study mechanical waves on strings and springs.

PAAS-PAMP ⁂ $135

Experiment Source

Advanced Physics with Vernier—Beyond Mechanics

Download only:
PHYS-ABM-E $44

Printed book + download:
PHYS-ABM $52

Learn more at vernier.com/phys-abm-3

⁂ For California Proposition 65 warning, see pp. 142–143.

Featured Products

Frequency Generator

Easily connect the Frequency Generator to the Power Amplifier to create sine, square, sawtooth, and triangle waves at a wide range of frequencies. It also outputs DC voltage.

FGEN-PAMP $189 www.vernier.com/fgen-pamp

Microphone

LQ

Display and study the waveforms of sounds from voices and musical instruments. This sensor is also appropriate for speed of sound experiments.

MCA-BTA $55 vernier.com/mca-bta

Sound Level Sensor

LQ

Use the Sound Level Sensor to easily measure sound level in decibels (dB) in a variety of experiments.

Range: 55 to 110 dB

SLS-BTA $69 vernier.com/sls-bta

Light and Optics

Featured Experiments

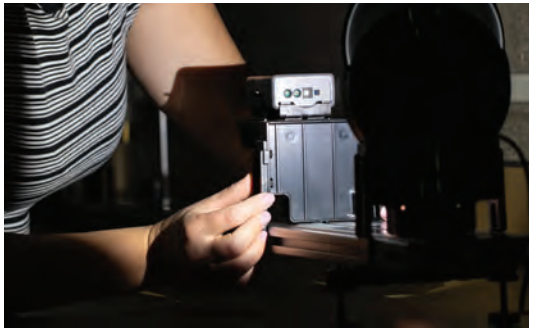
GDX GoDirect Sensors

LQ LabQuest Sensors

EXPERIMENT 29

Light, Brightness, and Distance

Illuminate the inverse square law for light intensity in this experiment, which requires a dark room and a point source of light in addition to a light sensor.



Sensor Used

GDX

Go Direct Light and Color

Measure light intensity in the visible to ultraviolet electromagnetic spectrum. An RGB color sensor detects relative contributions of primary colors in light.

GDX-LC $89

Can also be done with

LQ **Light Sensor**

LS-BTA ≪ $69

Accessories Used

GDX LQ

Optics Expansion Kit

OEK $199

Combination 1.2 m Track/ Optics Bench

TRACK $155

Experiment Source

Physics with Vernier

Download only: PWV-E $44
Printed book + download: PWV $52

Learn more at vernier.com/pwv-29

EXPERIMENT 16

Thin Lenses and Real Images

The number 4 has no symmetry, making it an ideal shape for examining real, inverted images. Students measure object and image distances and sizes to determine focal length and magnification.

Accessories Used

GDX LQ

Optics Expansion Kit

Add this kit to your Dynamics Cart and Track System to conduct optics experiments, such as image formation with lenses and light intensity *vs.* distance. You can even use the kit to build a basic telescope.

OEK $199

Combination 1.2 m Track/Optics Bench

TRACK $155

Experiment Source

Advanced Physics with Vernier—Beyond Mechanics

Download only: PHYS-ABM-E $44
Printed book + download: PHYS-ABM $52

Learn more at vernier.com/phys-abm-16

Light and Optics

Featured Experiments

EXPERIMENT 15

Curved Mirrors and Images

Students focus real images on a half screen and use parallax to locate a virtual image in this standard optics experiment.

Accessories Used

Optics Expansion Kit

Add this kit to your Dynamics Cart and Track System to conduct optics experiments, such as image formation with lenses and light intensity vs. distance. You can even use the kit to build a basic telescope.

OEK $199

Mirror Set for Optics Expansion Kit

This set extends the kit so students can easily study image formation by concave and convex mirrors.

M-OEK $69

Combination 1.2 m Track/Optics Bench

TRACK $155

Experiment Source

Advanced Physics with Vernier—Beyond Mechanics

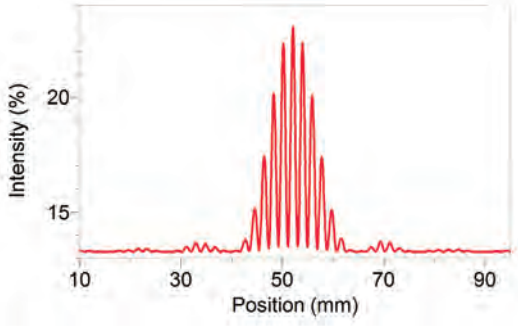
Download only: PHYS-ABM-E $44
Printed book + download: PHYS-ABM $52

Learn more at vernier.com/phys-abm-15

EXPERIMENT 19

Interference

Explore the wave nature of light with the classic double-slit experiment for light. Students can vary slit width and separation. In addition, they can study single-slit diffraction.



Sensors Used

LQ

Diffraction Apparatus

This set extends the kit so students can easily study image formation by concave and convex mirrors.

DAK $669

Combination 1.2 m Track/Optics Bench

TRACK $155

Green Diffraction Laser *(optional)*

Add this to your Diffraction Apparatus to study the effect of wavelength on a diffraction pattern.

GDL-DAK $250

Experiment Source

Advanced Physics with Vernier—Beyond Mechanics

Download only: PHYS-ABM-E $44
Printed book + download: PHYS-ABM $52

Learn more at vernier.com/phys-abm-19

Featured Products

Light Sensors

Go Direct Light and Color

GDX

This sensor combines the power of visible light, UV, and RGB sensors to measure source emission, transmittance, and reflection of light in the visible light to ultraviolet electromagnetic spectrum.

GDX-LC $89

Light Sensor

LQ

Investigate polarizers, reflectivity, and solar energy with this sensor that approximates the human eye in spectral response. It's great for inverse square law experiments.

LS-BTA ⁂ $69

vernier.com/light-sensors

Optics Expansion Kit

GDX LQ

Use the Optics Expansion Kit with your dynamics track (not included) to conduct optics experiments, such as image formation with lenses and light intensity *vs.* distance. You can even use the kit to build a basic telescope.

Kit includes

- 3 lenses (100 mm converging lens, 200 mm converging lens, −150 mm diverging lens)
- Screen
- Combination luminous and point light source
- Light Sensor Holder*
- Aperture screen
- Power supply

The Optics Expansion Kit is used in *Physics with Vernier* and *Advanced Physics with Vernier—Beyond Mechanics* experiments.

OEK $199

Download free sample experiments at vernier.com/oek

See website for replacement parts.

Combination Dynamics Track and Optical Bench

GDX LQ

The Combination Dynamics Track and Optical Bench is aluminum and includes a metric scale. Extremely rigid, this 1.2 (or 2.2) meter track will not sag under use. The track includes two Adjustable Two Foot Levelers.

with 1.2 m Track TRACK $155 vernier.com/track

with 2.2 m Track TRACK-LONG $264 vernier.com/track-long

** The Light Sensor Holder can be used with any style Vernier light sensor.*

Polarizer/Analyzer Set

GDX LQ

Using the Polarizer/Analyzer Set, students can study light polarization and do experiments such as Malus's law. The set consists of three adjustable linear polarizers, one of which includes attachment points for either of our rotary motion sensors. It requires components from the Optics Expansion Kit and either a LabQuest® Light Sensor or Go Direct® Light and Color for use.

PAK-OEK $89

vernier.com/pak-oek

Mirror Set

GDX LQ

The Mirror Set extends the Optics Expansion Kit so students can easily study image formation by concave and convex mirrors. The set includes a concave mirror, a convex mirror, and a half screen. It requires components from the Optics Expansion Kit for use.

M-OEK $69

vernier.com/m-oek

Light source not included

Color Mixer

GDX LQ

The Color Mixer accessory can be used to study the mixing of red, blue, and green light by additive and subtractive mixing. It requires a Combination Track/Optics Bench (not included).

CM-OEK $179

Download a free sample experiment at vernier.com/cm-oek

See website for replacement parts.

⁂ For California Proposition 65 warning, see pp. 142–143.

Modern Physics

Featured Experiments

GDX GoDirect Sensors

LQ LabQuest Sensors

EXPERIMENT 21

The Spectrum of Atomic Hydrogen

Compare the spectrum of an incandescent lamp with the few lines of the hydrogen spectrum.

Sensor Used

Go Direct Emissions Spectrometer

This emissions spectrometer connects to your device via Bluetooth® wireless technology or USB to give precise measurements over a range of 350–900 nm.

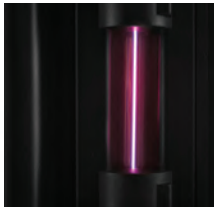
GDX-SPEC-EM $950

Accessories Used

Spectrum Tube Single Power Supply

These power supplies feature an ultra-safe design for electrifying spectrum tubes.

ST-SPS » $279



Spectrum Tube (Hydrogen)

ST-H » $49

Vernier Emissions Fiber

VSP-EM-FIBER $94

Experiment Source

Advanced Physics with Vernier—Beyond Mechanics

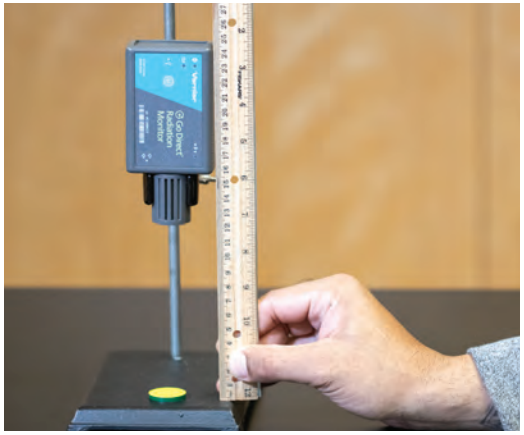
Download only: PHYS-ABM-E $44
Printed book + download: PHYS-ABM $52

Learn more at vernier.com/phys-abm-21

EXPERIMENT 2

Distance and Radiation

Students use a gamma emitter and radiation monitor to determine the relationship between radiation counts and distance. This is a great follow-up to our "Light, Brightness, and Distance" experiment (see page 115)!



Sensor Used

GDX

Go Direct Radiation Monitor

Use this sensor to detect alpha, beta, gamma, and X-ray radiation.

GDX-RAD $199

Can also be done with

LQ **Vernier Radiation Monitor**

VRM-BTD $199

Experiment Source

Nuclear Radiation with Vernier

FREE DOWNLOAD vernier.com/nrv

Featured Products

Go Direct Emissions Spectrometer

This emissions spectrometer connects to your device via Bluetooth wireless technology or USB to give precise measurements over a range of 350–900 nm. Use it with or without an optical fiber (not included) to examine spectra of light bulbs, spectrum tubes, or the sun.

GDX-SPEC-EM $950

vernier.com/gdx-spec-em

Vernier Emissions Fiber

VSP-EM-FIBER $94

vernier.com/vsp-em-fiber

Spectrum Tube Single Power Supply

These power supplies feature an ultra-safe design for electrifying spectrum tubes.

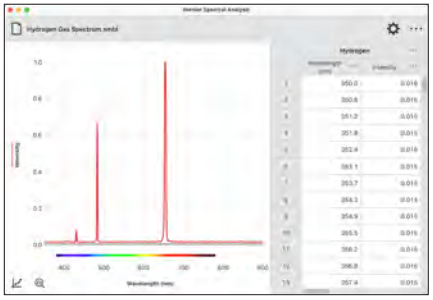
ST-SPS » $279

vernier.com/st-sps

Vernier Spectral Analysis App

Our free Vernier Spectral Analysis® app makes it easy to incorporate spectroscopy into your physics lab. Using the app, students can analyze spectra from diverse sources such as spectrum tubes, light bulbs, and the sun.

vernier.com/spectral-analysis

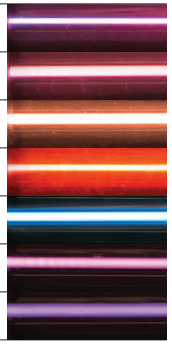


Spectrum Tubes

Spectrum Tubes

Spectrum Tubes are permanently enclosed in protective plastic carriers, with no exposed high voltage.
All Spectrum Tubes are sold separately:

Hydrogen	ST-H »	$49
Nitrogen	ST-N »	$49
Helium	ST-HE »	$49
Neon	ST-NE »	$49
Carbon Dioxide	ST-CO2 »	$49
Air	ST-AIR »	$49
Argon	ST-AR »	$49



vernier.com/spectrum-tubes

Spectrum Tubes carry a two-year warranty (hydrogen tube: two years or 40 hours, whichever comes first; all other tubes: two years or 100 hours, whichever comes first).

Radiation Monitors

Go Direct Radiation Monitor GDX

Explore radiation statistics, measure the rate of nuclear decay, and monitor radon progeny. Go Direct® Radiation Monitor detects alpha, beta, gamma, and X-ray radiation, and it includes LED and audible indicators.

GDX-RAD $199

Vernier Radiation Monitor LQ

The Vernier Radiation Monitor detects alpha, beta, gamma, and X-ray radiation and can be used for experiments in nuclear counting statistics, shielding, and decay rate measurements.

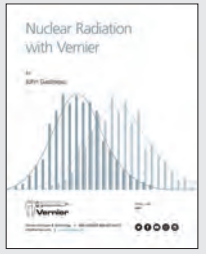
VRM-BTD $199

vernier.com/radiation-monitors

Nuclear Radiation with Vernier

This free e-book includes six experiments for data collection with a radiation monitor:

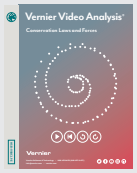
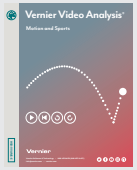
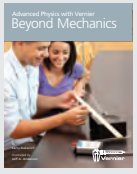
- Distance and Radiation
- Counting Statistics
- Lifetime Measurement
- Background Radiation Sources
- Radiation Shielding
- Alpha, Beta, and Gamma



FREE DOWNLOAD
vernier.com/nrv

» For California Proposition 65 warning, see pp. 142–143.

Lab Books

	Title	Description	Download Only	Printed Book + Download
	***Vernier Video Analysis: Conservation Laws and Forces***	This e-book features 12 investigations dealing with topics such as conservation of energy and momentum using the Vernier Video Analysis® app.	HSB-VVACLF-E $28	—
	***Vernier Video Analysis: Motion and Sports***	This e-book features 12 investigations using the Vernier Video Analysis app covering common concepts such as velocity and acceleration, as well as analysis of sports activities.	HSB-VVAMS-E $28	—
	***Sensor Cart Physics*** (Go Direct sensors only)	Students use the Vernier Go Direct® Sensor Cart to complete the 21 investigations in this e-book—providing a stimulating structure to explore introductory through AP* physics concepts.	HSB-SCP-E $40	—
	***Physics with Vernier***	This book features 35 experiments in mechanics, sound, light, electricity, and magnetism, using Vernier motion detectors, force sensors, light sensors, and more.	PWV-E $44	PWV $52
	***Physics Explorations and Projects***	*Physics Explorations and Projects* is a collection of investigations aligned to the NGSS. These investigations invite students to explore phenomena without extensive instructions. The guided-inquiry format involves students having some choice in what they measure and analyze.	PEP-E $44	PEP $52
 	***Advanced Physics with Vernier—Mechanics*** and ***Advanced Physics with Vernier—Beyond Mechanics***	*Advanced Physics with Vernier—Mechanics* and *Advanced Physics with Vernier—Beyond Mechanics* is a two-volume set of experiments for more in-depth introductory physics courses, such as college physics, AP* Physics, and IB‡ Physics.	PHYS-AM-E $44 PHYS-ABM-E $44	PHYS-AM $52 PHYS-ABM $52

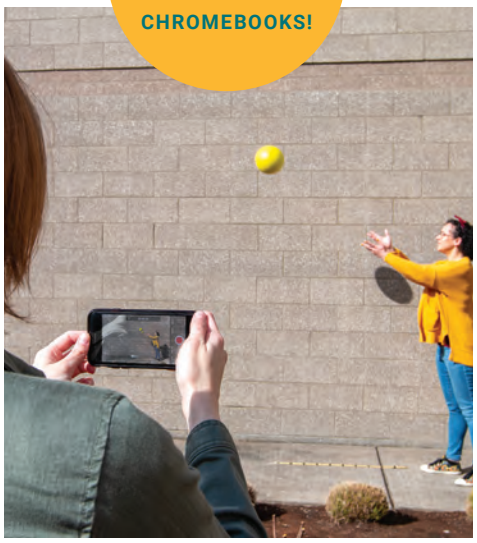
Learn more at vernier.com/lab-books

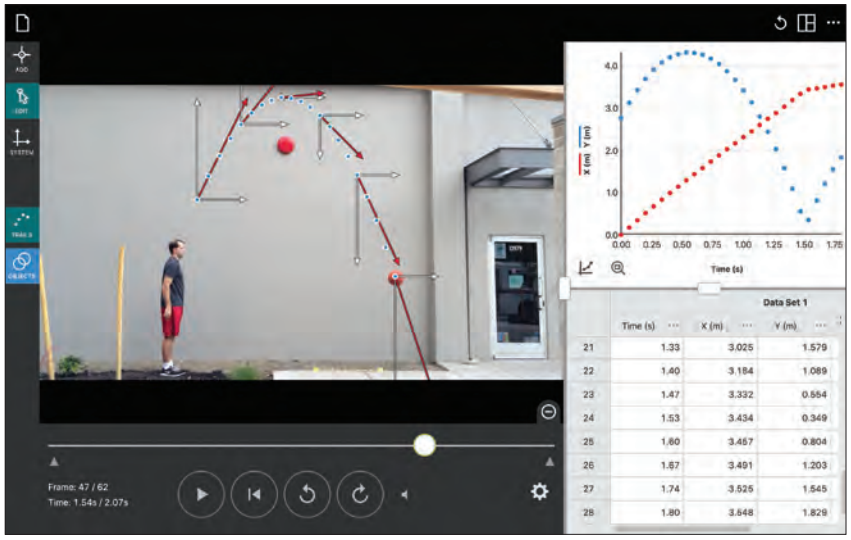
** AP and Advanced Placement Program are registered trademarks of the College Entrance Examination Board, which was not involved in the production of and does not endorse this product.*

‡ The IB Diploma Program is an official program of the International Baccalaureate Organization (IBO) which authorizes schools to offer it. The material available here has been developed independently of the IBO and is not endorsed by it.

Vernier Video Analysis

WORKS ON CHROMEBOOKS!





Investigate projectile motion.

Study Motion Everywhere

The Vernier Video Analysis app brings video analysis to your students in an easy-to-use, streamlined application. Students can design their own scientific investigations, record videos, and then analyze the motion. This app gives your students the opportunity to observe and study hard-to-replicate phenomena regardless of device—it even works with Chromebooks!

Free 30-Day Trial

Get a 30-day free trial and learn about site license options and e-books at vernier.com/video-analysis

Features

- Vernier Video Analysis app is compatible with multiple devices and platforms: macOS,® iPadOS,® iOS, Windows,® ChromeOS,™ and Android.™
- Students can use prepared videos, found videos, or their own videos for analysis.
- The app makes it possible to do experiments that cannot be done with sensors, such as analyzing the motion of a basketball in flight—objects can be tracked automatically by the app.
- Analysis is easy with multiple graphing options, so students are able to think critically about the collected data—they can even analyze the motion of multiple objects in a single video.
- With this app, you can apply vectors and vector components over the video after tracking a moving object, illuminating changes in position, velocity, and acceleration.
- When multiple objects have been marked, just enter their masses and the app can automatically calculate and display the center of mass location.
- Annual site-licensing makes purchasing and renewing quick and easy.

Vernier Video Analysis: Motion and Sports

Download only
HSB-VVAMS-E
$28

The *Vernier Video Analysis: Motion and Sports* lab book features 12 investigations using Vernier Video Analysis. In addition to traditional physics concepts such as velocity and acceleration, its investigation of sports activities expands learning opportunities and further connects the study of motion to students' daily lives.

Vernier Video Analysis: Conservation Laws and Forces

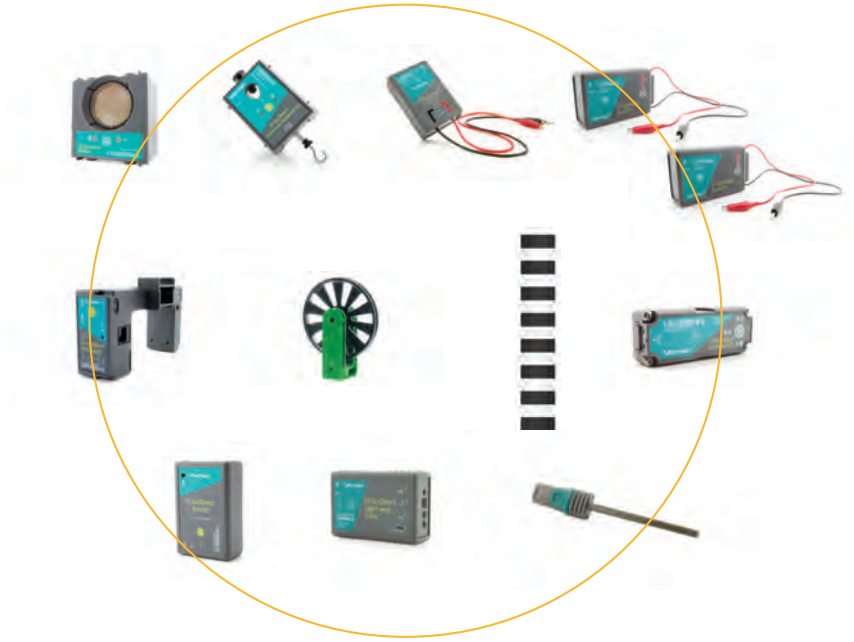
Download only
HSB-VVACLF-E
$28

Vernier Video Analysis: Conservation Laws and Forces examines mechanics topics beyond basic motion. Students explore conservation of energy, momentum, conservative forces, and more.

Physics Go Direct Package

GDX

12 Products • GDP-PHY-DX • $987
Buy 8 or more packages at $957 and save $240.



This package includes

- Go Direct Motion
- Go Direct Force and Acceleration
- Go Direct Voltage
- Go Direct Current (×2)
- Go Direct Photogate
- Ultra Pulley Attachment
- Picket Fence
- Go Direct Acceleration
- Go Direct Sound
- Go Direct Light and Color
- Go Direct 3-Axis Magnetic Field

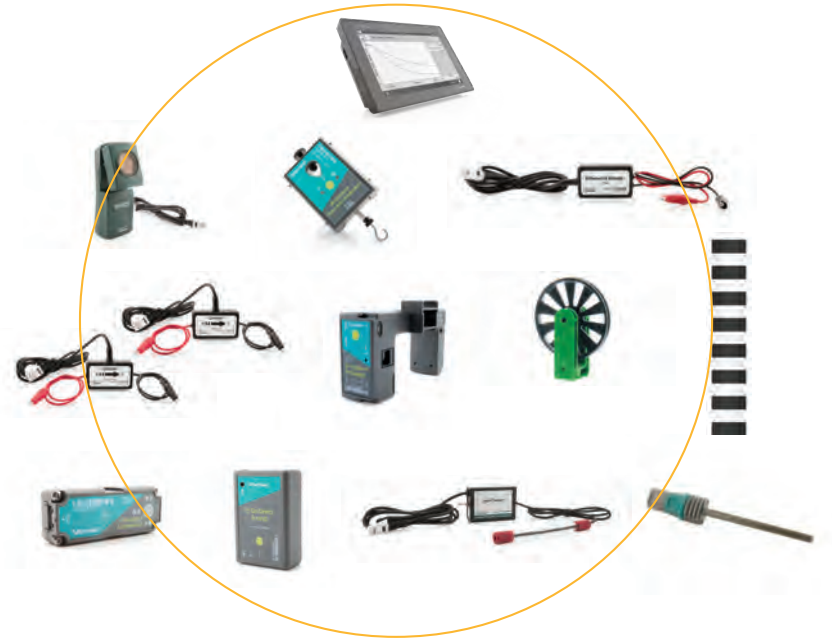
All sensors work with Vernier Graphical Analysis™ Pro and LabQuest® 3.

Learn more at vernier.com/gdp-phy-dx

LabQuest 3 Physics Standard Package

GDX LQ

13 Products • LQ3-PHY-DX » • $1,241
Buy 8 or more packages at $1,204 and save $296.



This package includes

- Vernier LabQuest 3 Interface
- Motion Detector
- Go Direct Force and Acceleration
- Differential Voltage Probe
- Current Probe (×2)
- Go Direct Photogate
- Ultra Pulley Attachment
- Picket Fence
- Go Direct Acceleration
- Go Direct Sound
- Light Sensor »
- Go Direct 3-Axis Magnetic Field

All sensors work with Vernier Graphical Analysis Pro and LabQuest 3.

Learn more at vernier.com/lq3-phy-dx

More packages available online at vernier.com/physics-packages

Featured Products

Go Direct Sensors

Sensor	Order Code	Price
Go Direct® 3-Axis Magnetic Field	GDX-3MG	$75
Go Direct Acceleration	GDX-ACC	$109
Carts and Tracks		
Dynamics Cart and Track System with Go Direct Sensor Carts	DTS-GDX	$619
Go Direct Sensor Cart (Green)	GDX-CART-G	$189
Go Direct Sensor Cart (Yellow)	GDX-CART-Y	$189
Go Direct Centripetal Force Apparatus	GDX-CFA	$325
Go Direct Current	GDX-CUR	$89
Go Direct Force and Acceleration	GDX-FOR	$119
Go Direct Gas Pressure	GDX-GP	$99
Go Direct Light and Color	GDX-LC	$89
Go Direct Motion	GDX-MD	$114
Go Direct Photogate	GDX-VPG	$95
Go Direct Projectile Launcher	GDX-PL	$489
Go Direct Radiation Monitor	GDX-RAD	$199
Go Direct Rotary Motion	GDX-RMS ⁂	$189
Go Direct Sound	GDX-SND	$95
Go Direct Static Charge	GDX-Q	$109
Temperature Probes		
Go Direct Surface Temperature	GDX-ST	$99
Go Direct Temperature	GDX-TMP	$78
Go Direct Voltage	GDX-VOLT	$79

Go Direct Charge Station

Sensor	Order Code	Price
Go Direct Charge Station	GDX-CRG	$89

LabQuest Sensors

Sensor	Order Code	Price
Accelerometers		
3-Axis Accelerometer	3D-BTA	$105
25-g Accelerometer	ACC-BTA	$110
Low-g Accelerometer	LGA-BTA	$99
Carts and Tracks		
Dynamics Cart and Track System with Motion Encoder	DTS-EC	$513
Encoder Fan Cart	CART-FEC	$235
Current Sensors		
Current Probe	DCP-BTA	$49
High Current Sensor	HCS-BTA	$89
Electricity and Magnetism Sensors		
Charge Sensor	CRG-BTA	$89
Magnetic Field Sensor	MG-BTA	$69
Force Sensors		
Dual-Range Force Sensor	DFS-BTA	$120
Force Plate	FP-BTA	$319
Gas Pressure Sensor	GPS-BTA	$94
Light Sensors		
Diffraction Apparatus	DAK	$669
Light Sensor	LS-BTA ⁂	$69
Motion Detectors		
Go!Motion® (USB sensor)	GO-MOT	$139
Motion Detector	MD-BTD	$99
Photogate	VPG-BTD	$55
Power Amplifier	PAMP	$249
Projectiles		
Projectile Launcher	VPL	$440
Time of Flight Pad	TOF-VPL	$84
Radiation Monitor	VRM-BTD	$199
Rotary Motion Sensor	RMV-BTD ⁂	$189
Sound Sensors		
Microphone	MCA-BTA	$55
Sound Level Sensor	SLS-BTA	$69
Temperature Probes		
Stainless Steel Temperature Probe	TMP-BTA	$40
Surface Temperature Sensor	STS-BTA	$34
Voltage Probes		
30-Volt Voltage Probe	30V-BTA	$59
Differential Voltage Probe	DVP-BTA	$49
Instrumentation Amplifier	INA-BTA	$89
Voltage Probe	VP-BTA	$14

Emissions Spectrometer

Spectrometer	Order Code	Price
Go Direct Emissions Spectrometer	GDX-SPEC-EM	$950

Infrared Cameras

Camera	URL
FLIR ONE® Thermal Cameras ⁂	vernier.com/flir

Looking for Replacement Parts?

Visit vernier.com/replacements

See all our products for physics at vernier.com/physics

⁂ For California Proposition 65 warning, see pp. 142–143.

HIGH SCHOOL

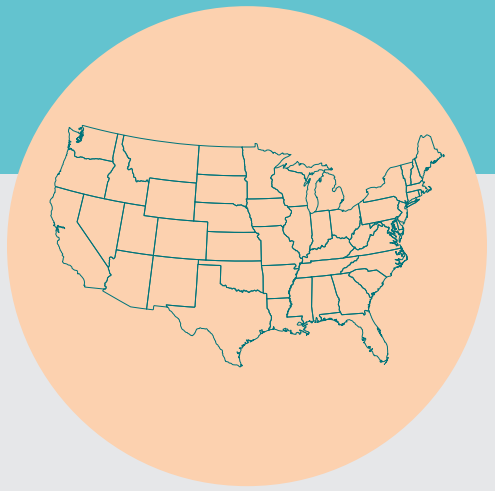
Engineering and Coding

Encourage curiosity, build confidence, and spark an interest in STEM careers in your students. Vernier solutions give your students practical ways to learn engineering design principles and integrate sensor data into computer science concepts.

vernier.com/engineering

Topics

Explore a sampling of our featured experiments and investigations by topic to learn how Vernier technology helps your students use data-collection technology to deepen their understanding of key engineering, computer science, and STEM concepts.



Professional Development

We are here to help. Our webinars, workshops, and personalized training options offer innovative ways to engage students with STEM in a traditional classroom or virtual environment.

vernier.com/training

Engineering

PAGE 126

- **Bridge and Structure Testing**
- **Renewable Energy**

Our solutions help your students understand the engineering design process, think critically, and work as a team. Your students learn to build and design bridges, wind turbines, and more. Plus, our world-class technical support ensures success in the classroom.

Coding with Sensors

PAGE 128

- **Scratch**
- **Python® and VPython**
- **JavaScript™**
- **Arduino®**
- **LabVIEW™**

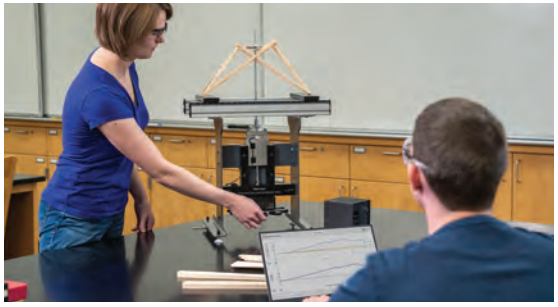
Coding introduces problem solving, nurtures creativity, increases critical thinking, and builds confidence. We have added coding support to Vernier sensors so that your students can develop computational thinking skills as they learn to code.

Bridge and Structure Testing

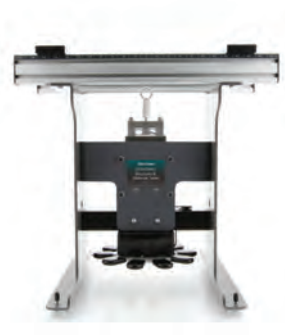
FEATURED ACTIVITY

Bridge Competition

In this team competition, students use the engineering design process to design a bridge with the highest efficiency, that meets a set of constraints and design requirements.



Equipment Used



Go Direct Structures & Materials Tester

Use our Go Direct® Structures & Materials Tester to evaluate the strength of model bridges and engineered structures by measuring the applied load. Utilizing both load and displacement sensors, your students can evaluate the properties of materials.

Benefits

- Force and displacement sensors connect via Bluetooth® wireless technology or USB
- Uses Vernier Graphical Analysis® Pro app to collect and analyze data
- Exact force and displacement for bends and breaks
- Accurate positioning for center and off-center loading
- Free software simplifies bridge-building contests
- Includes *Materials Testing: Beams to Bridges* e-book

GDX-VSMT $1,199

Activity Source

Materials Testing: Beams to Bridges with Go Direct Structures & Materials Tester

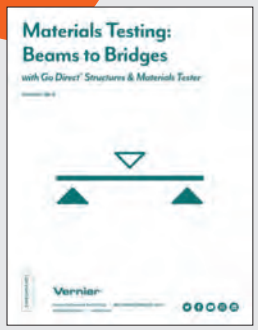
GDXVSMT-BB-E $22*

**Free with purchase of Go Direct Structures & Materials Tester*

Learn more at vernier.com/gdxvsmt-bb-e

Materials Testing: Beams to Bridges with Go Direct Structures & Materials Tester

INCLUDES 5 ACTIVITIES



With the activities in this e-book, students use the Go Direct Structures & Materials Tester to investigate materials and structures.

Topics include

- Beams: Investigate the relationship between dimensions and flexibility.
- Trusses: Explore why trusses fail and how to compensate for weaknesses.
- Bridges: Use the engineering design process to build and test bridges.

vernier.com/gdxvsmt-bb-e

GDXVSMT-BB-E $22†

†Free with purchase of Go Direct Structures & Materials Tester

Truss Tester Accessory

The Truss Tester Accessory attaches to the Go Direct Structures & Materials Tester, holds a single truss upright, and allows the load to be applied in a variety of locations.

VSMT-TRUSS $128

vernier.com/vsmt-truss

Go Direct Bridge Competition Software

Make data collection easy and seamless for bridge-building competitions with our free Go Direct Bridge Competition Software. This software provides real-time graphing to give students immediate feedback on bridge performance and displays side-by-side comparisons for the entire class.

FREE DOWNLOAD

vernier.com/godirect-bridge-competition-software

Renewable Energy

FEATURED EXPERIMENT

Project: Maximum Energy Output

Challenge your students to design their own wind turbines following the provided design requirements, constraints, and deliverables.

Sensor Used

Go Direct Energy

Use Go Direct Energy with Vernier Graphical Analysis Pro to determine the power output of a renewable energy system. Connect a source, such as KidWind solar panels or wind turbines, and students can quantitatively evaluate the effects of their design changes.

GDX-NRG $98

Accessory Used

Vernier Variable Load

The Vernier Variable Load provides a range of resistive loads for projects with wind turbines or solar panels. This accessory is used in our *Renewable Energy with Vernier* lab book.

VES-VL $74

Experiment Source

Renewable Energy with Vernier

Download only: REV-E $44
Printed book + download: REV $52

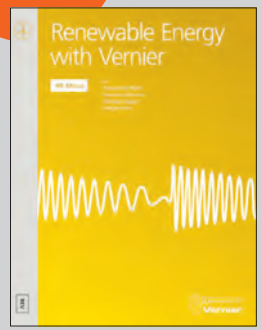
Learn more at vernier.com/rev-15

Renewable Energy with Vernier

INCLUDES 26 EXPERIMENTS

The *Renewable Energy with Vernier* lab book features 26 experiments in wind and solar energy. The book contains a combination of explorations, classic experiments, inquiry investigations, engineering projects, and more.

Learn more at vernier.com/rev



Download only
REV-E $44

Download + printed book
REV $52

Additional Products

KidWind Advanced Wind Experiment Kit

Discover advanced aspects of wind turbine technology. Test different blade designs, gear ratios, generators, and devices to measure electrical and weightlifting power.

KW-AWX $174

More KidWind renewable energy products can be found at vernier.com/kidwind

PLTW Engineering

PLTW Engineering (9–12) empowers students to step into the role of an engineer and adopt a problem-solving mindset, inspiring students to believe in their own potential and see themselves in a career that improves communities.

Learn more at vernier.com/pltw

Coding with Vernier Sensors

Coding with Vernier Sensors

Vernier offers a range of coding solutions—from entry-level to advanced instrument-control programming. With Vernier technology and an appropriate coding application, your students can create code to visualize scientific data, incorporate sensor input, and create sensor-controlled projects.

Learn more at vernier.com/hs-engineering

Entry Level

Scratch

Use block-based programming with the Go Direct® Force and Acceleration Sensor to introduce students to coding.

Learn more at vernier.com/scratch

Intermediate

Arduino

Help students build confidence in their coding skills through Arduino® projects with Vernier sensors.

Learn more at vernier.com/arduino

JavaScript

Use JavaScript™ to integrate Go Direct sensor data into your students' custom web applications.

Learn more at vernier.com/javascript

Python and VPython

Help students create interesting data and modeling programs by integrating Vernier sensors with Python® and VPython.

Learn more at vernier.com/python

Advanced

LabVIEW

Improve students' knowledge of NI LabVIEW™ and gain valuable experience using data-collection technology.

Learn more at vernier.com/ni-labview

PLTW

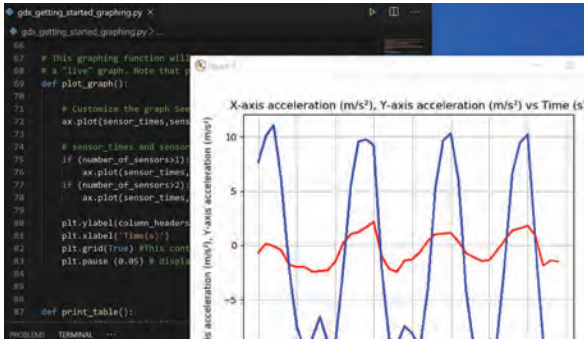
PLTW Computer Science

PLTW Computer Science (9–12) engages students in real-world activities and projects that challenge them to apply computational thinking and logic to solve big problems.

Learn more at vernier.com/pltw

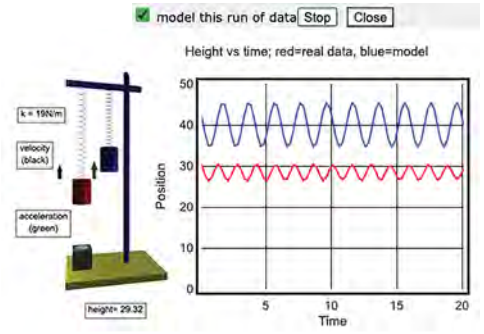
Vernier Sensors + Python = Student Engagement and Innovation

Unleash the power of Vernier technology and Python in your computer science, engineering, or science classroom. Give students the opportunity to code beyond the screen by integrating sensor data collection into their activities. This cross-curricular approach engages students with hands-on programming projects using sensors.



Python and VPython with Go Direct Sensors

Our guide and examples that make it easy to start using our Go Direct family of sensors with Python and VPython. We offer USB and Bluetooth® wireless technology support for Windows® 10, macOS,® and Linux (including Raspberry Pi).



Web VPython with Go Direct Sensors

We have created a guide and examples that make it easy to start using our Go Direct family of sensors with Web VPython. Go Direct sensors can connect via USB or Bluetooth wireless technology. Web VPython requires no software installation. Additionally, Go Direct sensors and Web VPython are compatible with a Chrome™ browser on Windows, macOS, Linux, and Chromebooks.

Python with LabQuest Sensors

Your students can communicate in Python to LabQuest sensors that are connected to a LabQuest interface—combining a powerful data-acquisition device and sensor input with Python. For LabQuest and Python, we offer support for Windows and macOS.

Available resources for using Python with Vernier sensors include a GitHub® repository, an introductory guide, and sample programs and activities.

vernier.com/python

Arduino

FEATURED PROJECT

Functions

This activity uses Arduino® to introduce students to the concept of functions. Students explore how functions can make their Arduino code more efficient and easier to understand. Students use formatting for creating and calling a function and learn how to distinguish between local and global variables.

Products Used

Gas Pressure Sensor

Use the Gas Pressure Sensor with an Arduino microcontroller to introduce the basics of sensor technology.

GPS-BTA $94

Vernier Arduino Interface Shield

The Vernier Arduino Interface Shield provides a convenient way to make connections from Arduino microcontrollers to Vernier LabQuest sensors.

BT-ARD $29

SparkFun RedBoard with Cable

The SparkFun® RedBoard is an Arduino-compatible board, which is perfect for use with the Vernier Arduino Interface Shield.

ARD-RED $25

Project Source

Vernier Coding Activities with Arduino: Analog Sensors

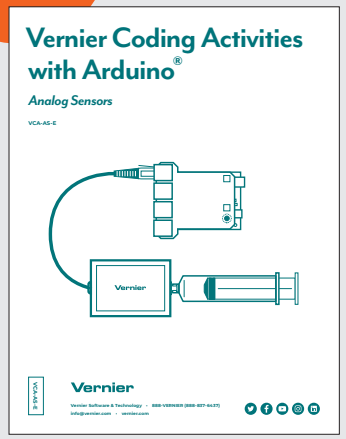
VCA-AS-E $22*

**Free with the purchase of the Vernier Coding with Arduino—Analog Sensor Package or the Vernier Arduino Interface Shield*

Learn more at vernier.com/arduino

INCLUDES 8 ACTIVITIES

Vernier Coding Activities with Arduino: Analog Sensors



The activities in this e-book provide an introduction to coding and sensor technology using Vernier sensors and Arduino microcontrollers. Teaching students about microcontrollers and sensors opens the door for them to explore how technology and coding affect the world beyond the screen. This e-book is available for individual purchase or is free with the purchase of the Vernier Interface Shield. It is also included with the purchase of the Vernier Coding with Arduino—Analog Sensor Package.

VCA-AS-E $22†

†Free with purchase of the Vernier Coding with Arduino—Analog Sensor Package or the Vernier Arduino Interface Shield

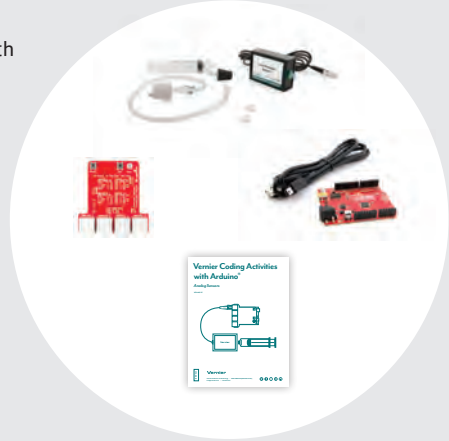
vernier.com/arduino

Vernier Coding with Arduino—Analog Sensor Package

This package has all the equipment and activities you need to get students started using Vernier sensors with Arduino microcontrollers. The package includes the new *Vernier Coding Activities with Arduino: Analog Sensors* e-book at no additional cost.

This package includes

- Gas Pressure Sensor
- Vernier Arduino Interface Shield
- SparkFun RedBoard with Cable
- *Vernier Coding Activities with Arduino: Analog Sensors*



VCA-AS-PKG $148

Learn more at vernier.com/vca-as-pkg

Featured Products

Bridge and Structure Testing

Product		Order Code	Price
Go Direct® Structures & Materials Tester		GDX-VSMT	$1,199
Truss Tester Accessory		VSMT-TRUSS	$128
Materials Testing: Beams to Bridges with the Go Direct Structures & Materials Tester lab book		GDXVSMT-BB-E	$22†

Arduino

Product		Order Code	Price
Gas Pressure Sensor		GPS-BTA	$94
SparkFun RedBoard with Cable		ARD-RED	$25
Vernier Arduino Interface Shield		BT-ARD	$29
Vernier Coding Activities with Arduino: Analog Sensors lab book		VCA-AS-E	$22‡

†*Free with purchase of product. See page 126.*
‡*Free with purchase of product. See page 130.*

Coding with Go Direct Sensors

Product		Order Code	Price
Go Direct 3-Axis Magnetic Field Sensor		GDX-3MG	$75
Go Direct EKG Sensor		GDX-EKG	$169
Go Direct Force and Acceleration Sensor		GDX-FOR	$119
Go Direct Hand Dynamometer		GDX-HD	$119
Go Direct Light and Color Sensor		GDX-LC	$89
Go Direct Motion Detector		GDX-MD	$114
Go Direct Temperature Probe		GDX-TMP	$78
Go Direct Weather Sensor		GDX-WTHR	$109

See all of our products for engineering at vernier.com/engineering

Renewable Energy

Product		Order Code	Price
Go Direct Energy		GDX-NRG	$98
Vernier Variable Load		VES-VL	$74
KidWind Advanced Wind Experiment Kit		KW-AWX	$174
KidWind Balsa Blade Sheets (10 Sheets)		KW-BBS10	$12
KidWind Wind Turbine Generator with Wires		KW-GEN	$7
KidWind Tower and Base Set		KW-TBS	$29
KidWind Basic Turbine Building Parts		KW-BTPART	$16
Renewable Energy with Vernier lab book		Printed book + download: REV Download only: REV-E	$52 $44

Texas Instruments Data Collection

vernier.com/texas-instruments

TI-Nspire CX II Handheld

TI-Nspire™ CX II handheld is the latest in learning technology from Texas Instruments. The handheld includes an easy-glide touchpad that works like a computer with a mouse.

- Recommended for algebra, geometry, trigonometry, and precalculus
- Includes T-Nspire CX II handheld, rechargeable battery, slide cover, and unit-to-computer USB connectivity and charging cable

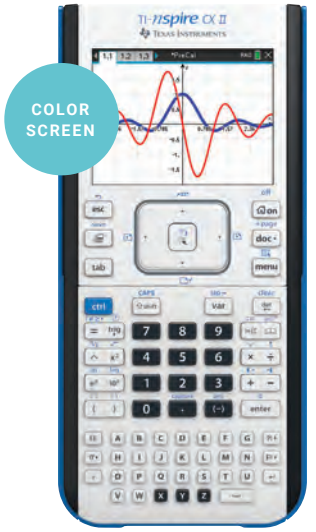
TI-NSCX2 $139

TI-Nspire CX II Teacher Pack

Includes 10 TI-Nspire CX II EZ-Spot handhelds with the words "School Property" on the keypad, 10 rechargeable batteries, and a 10-unit docking station

TI-NSCX2-TPK $1,512

Learn more at vernier.com/ti-nscx2



CBR 2

The CBR 2™ connects directly to a TI calculator. This motion detector collects distance, velocity, and acceleration data.

CBR2 $109

Learn more at vernier.com/cbr2

TI-Nspire CX II CAS Handheld

TI-Nspire CX II CAS handheld has all the features of the TI-Nspire CX II handheld plus a built-in Computer Algebra System (CAS) for factoring and expanding expressions, solving for common denominator, and performing symbolic calculations.

- Recommended for geometry, trigonometry, precalculus, and calculus
- Includes TI-Nspire CX II CAS handheld, rechargeable battery, slide cover, and unit-to-computer USB connectivity and charging cable

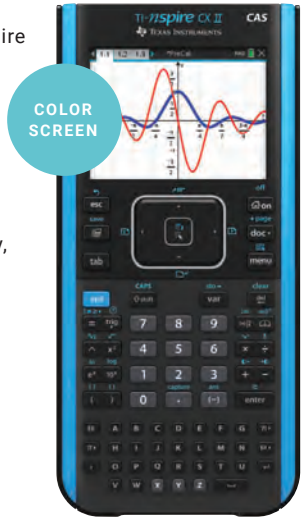
TI-NSCXCAS2 $142

TI-Nspire CX II CAS Teacher Pack

Includes 10 TI-Nspire CX II CAS handhelds, 10 rechargeable batteries, and a 10-unit docking station

TI-NSCXCAS2-TPK $1,542

Learn more at vernier.com/ti-nscxcas2



Vernier EasyTemp

EasyTemp® is a temperature probe designed for use with TI-84 Plus calculators and TI-Nspire handhelds.

Range: –20 to 115°C

EZ-TMP $48

Learn more at vernier.com/ez-tmp

Vernier EasyLink

EasyLink® is a single-channel sensor interface that plugs into the USB port of a TI-84 Plus calculator or TI-Nspire handheld. It supports any one of over 60 Vernier sensors.

EZ-LINK $74

Learn more at vernier.com/ez-link

TI-84 Plus CE Python

The TI-84 Plus CE Python has a full-color, high-resolution, backlit screen, making it easy to read. The calculator comes with a rechargeable battery, so there is never a need to buy AAA batteries. Students can code using Python® or TI Basic with this calculator.

- Supported USB sensors: CBR 2 and EasyTemp
- Supported interface: EasyLink

Includes TI-84 Plus CE Python calculator, rechargeable battery, unit-to-computer connectivity and charging cable, and slide cover

TI-84PCE $132

TI-84 Plus CE Teacher Pack

Includes 10 TI-84 Plus CE Python EZ-Spot calculators, 10 rechargeable batteries, and a 10-unit charging station

TI-84PCE-TPK $1,377

Learn more at vernier.com/ti-84pce

TI-84 Plus

The TI-84 Plus is a lower-price alternative to the TI-84 Plus CE calculator. The TI-84 Plus supports data collection with 78 Vernier sensors, including microphones, photogates, and drop counters, when used with a CBL 2™ sensor interface.

- Supported USB sensors: CBR 2 and EasyTemp
- Support interfaces: EasyLink and CBL 2
- Collect data from multiple sensors simultaneously with CBL 2.

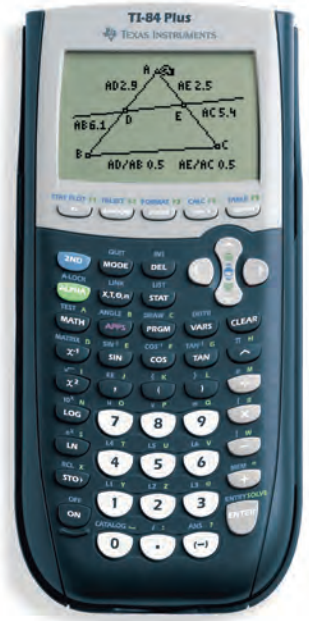
TI-84PL $111

TI-84 EZ-Spot Teacher Pack

Includes 10 TI-84 Plus EZ-Spot calculators and 40 AAA batteries

TI-84PL-TPK $1,100

Learn more at vernier.com/ti-84pl



Calculator Products

Product		Order Code	Price
Books	*Real-World Math with Vernier* (download only)	RWV-E	$44
Calculators	TI-84 Plus CE Python	TI-84PCE	$132
	TI-84 Plus CE Python Teacher Pack (10 EZ-Spot calculators & charging station)	TI-84PCE-TPK	$1,377
	TI-84 Plus Calculator	TI-84PL	$111
	TI-84 Plus EZ-Spot Teacher Pack (10 EZ-Spot calculators)	TI-84PL-TPK	$1,100
	TI-Nspire CX II Handheld	TI-NSCX2	$139
	TI-Nspire CX II Teacher Pack (10 EZ-Spot handhelds & docking station)	TI-NSCX2-TPK	$1,512
	TI-Nspire CX II CAS Handheld	TI-NSCXCAS2	$142
	TI-Nspire CX II CAS Teacher Pack (10 handhelds & docking station)	TI-NSCXCAS2-TPK	$1,542
Charging/ Docking Station	TI-84 Plus CE Charging Station	TI-84PCE-CS	$70
	TI-Nspire CX Docking Station	TI-NSCX-DS	$125
Data Collection	CBL 2*	CBL2	$166
	EasyLink	EZ-LINK	$74
	EasyTemp	EZ-TMP	$48
	CBR 2	CBR2	$109
Emulator Software/ Online Calculators	TI-SmartView™ Emulator software for TI-84	vernier.com/ti-software	
	TI-84 Plus CE Online Calculator		
	TI-Nspire CX Online Calculator		
	TI-Nspire CX Student Software		
	TI-Nspire CX CAS Student Software		
	TI-Nspire CX Premium Teacher Software		
Miscellaneous Accessories	Easy to Go! USB Adapter	MINI-USB	$17
	Go! to Easy USB Adapter	USB-MINI»	$9
TI Navigator™ System	30-User TI-Nspire CX Navigator System	TI-NAV-CX30	$2,075
	10-User TI-Nspire CX Navigator System	TI-NAV-CX10	$1,199
	10-User TI-Nspire CX Navigator Add-on†	TI-NAV-10ADDON	$775

TI products purchased in the United States are covered by a one-year warranty based on the date of purchase. Units are warranted against defective materials or workmanship.

**** Cannot be used with TI-84 Plus CE or TI-Nspire handhelds***

† Requires purchase of a Navigator system

» For California Proposition 65 warning, see pp. 142–143.

Sensors & Accessories

The Vernier Sensor Advantage

Outstanding Performance

With over 40 years of experience developing technology for education, we design our sensors for active, hands-on experiments. Vernier sensors are rugged, classroom-proven technology that are well supported and easy to use. The sensors provide consistent, high-quality results for the demands of the classroom.

Connect & Collect

Simply connect, and you're ready to collect. All Vernier sensors on the following pages are automatically detected and set up for data collection when used with Vernier software.

Go Direct Sensors

Our Go Direct® sensors connect directly to a computer, Chromebook,™ or a mobile device via Bluetooth® wireless technology or USB connection. Most sensors include a rechargeable battery to power the sensor when used wirelessly.

LabQuest Sensors

Our LabQuest® sensors require an interface from the LabQuest family, such as LabQuest 3, LabQuest Stream,® or LabQuest Mini. The interface sends information from the sensor to the data-collection and analysis software on a device such as a computer, Chromebook, or mobile device.

For more information on sensor compatibility, visit vernier.com/sensors

Generous Warranty

Buy with confidence. Most Vernier sensors are covered by a 5-year limited warranty. During the warranty period, Vernier will repair or replace the item if there is a defect in materials or workmanship. Outside the warranty, Vernier will attempt to repair most products, often at no charge.

Go Direct Sensors

Sensor	Order Code	Price
Go Direct 3-Axis Magnetic Field	GDX-3MG	$75
Go Direct Acceleration	GDX-ACC	$109
Go Direct Blood Pressure	GDX-BP	$125
Carts and Tracks		
Dynamics Cart and Track System with Go Direct Sensor Carts	DTS-GDX	$619
Go Direct Sensor Cart (Green)	GDX-CART-G	$189
Go Direct Sensor Cart (Yellow)	GDX-CART-Y	$189
Go Direct Centripetal Force Apparatus (requires Go Direct Force and Acceleration)	GDX-CFA	$325
Go Direct CO_2 Gas	GDX-CO2	$225
Go Direct Colorimeter	GDX-COL	$129
Conductivity Probes		
Go Direct Conductivity	GDX-CON	$119
Go Direct Platinum-Cell Conductivity	GDX-CONPT	$180
Go Direct Constant Current System	GDX-CCS	$80
Go Direct Current	GDX-CUR	$89
Go Direct Cyclic Voltammetry System	GDX-CVS	$999
Go Direct Drop Counter	GDX-DC	$109
Go Direct EKG	GDX-EKG	$169
Go Direct Electrode Amplifier	GDX-EA	$79
Go Direct Energy	GDX-NRG	$98
Go Direct Ethanol Vapor	GDX-ETOH	$165
Go Direct Force and Acceleration	GDX-FOR	$119
Gas Pressure Sensors		
Go Direct Gas Pressure	GDX-GP	$99
Go Direct Wide Range Pressure	GDX-WRP	$219
Go Direct Hand Dynamometer	GDX-HD	$119
Heart Rate Monitors		
Go Wireless® Exercise Heart Rate	GW-EHR	$79
Go Wireless Heart Rate	GW-HR	$98
Go Direct Ion-Selective Electrode Amplifier	GDX-ISEA	$79
Ion-Selective Electrodes (ISE)*		
Go Direct Ammonium ISE	GDX-NH4	$279
Go Direct Calcium ISE	GDX-CA	$279
Go Direct Chloride ISE	GDX-CL	$279
Go Direct Nitrate ISE	GDX-NO3	$279
Go Direct Potassium ISE	GDX-K	$279
Go Direct Light and Color	GDX-LC	$89
Go Direct Melt Station	GDX-MLT »	$594
Go Direct Mini GC	GDX-GC	$3,599
Go Direct Motion	GDX-MD	$114
Go Direct O_2 Gas	GDX-O2	$205
Go Direct Optical Dissolved Oxygen	GDX-ODO	$359
Go Direct ORP	GDX-ORP	$119
pH Sensors		
Go Direct Glass-Body pH	GDX-GPH	$159
Go Direct pH	GDX-PH	$109
Go Direct Tris-Compatible Flat pH	GDX-FPH	$134
Go Direct Photogate	GDX-VPG	$95
Go Direct Polarimeter	GDX-POL	$545
Go Direct Projectile Launcher	GDX-PL	$489
Go Direct Radiation Monitor	GDX-RAD	$199
Go Direct Respiration Belt	GDX-RB	$109
Go Direct Rotary Motion	GDX-RMS »	$189
Go Direct Sound	GDX-SND	$95
Spectrometers		
Go Direct Emissions Spectrometer	GDX-SPEC-EM	$950
Go Direct Fluorescence/UV-VIS Spectrophotometer	GDX-SPEC-FUV	$2,999
Go Direct SpectroVis® Plus	GDX-SVISPL	$449
Go Direct UV-VIS Spectrophotometer	GDX-SPEC-UV	$2,499
Go Direct Visible Spectrophotometer	GDX-SPEC-VIS	$1,899
Go Direct Spirometer	GDX-SPR	$219
Go Direct Static Charge	GDX-Q	$109
Go Direct Structures & Materials Tester	GDX-VSMT	$1,199

** Ion-Selective Electrodes require excellent chemical technique and careful calibration to obtain accurate results; they are not recommended for elementary or middle school students.*

Temperature Probes		
Go Direct Surface Temperature	GDX-ST	$99
Go Direct Temperature	GDX-TMP	$78
Go Direct Thermocouple	GDX-TC	$118
Go Direct Wide-Range Temperature	GDX-WRT	$128
Go Direct Voltage	GDX-VOLT	$79
Go Direct Weather	GDX-WTHR	$109

LabQuest Sensors

Sensor	Order Code	Price
Accelerometers		
3-Axis Accelerometer	3D-BTA	$105
25-g Accelerometer	ACC-BTA	$110
Low-g Accelerometer	LGA-BTA	$99
Anemometer	ANM-BTA	$109
Barometer	BAR-BTA	$79
Blood Pressure Sensor	BPS-BTA	$120
Charge Sensor	CRG-BTA	$89
CO_2 Gas Sensor	CO2-BTA	$299
Colorimeter	COL-BTA	$128
Conductivity Probes		
Conductivity Probe	CON-BTA	$115
Platinum-Cell Conductivity Probe	CONPT-BTA	$170
Constant Current System	CCS-BTA	$70
Current Probes		
Current Probe	DCP-BTA	$49
High Current Sensor	HCS-BTA	$89
Diffraction Apparatus	DAK	$669
Digital Control Unit	DCU-BTD	$69
Drop Counter	VDC-BTD	$109
EKG Sensor	EKG-BTA	$179
Electrode Amplifier	EA-BTA	$55
Energy Sensor	VES-BTA	$99
Ethanol Sensor	ETH-BTA	$129
Flow Rate Sensor	FLO-BTA	$129
Force Sensors		
Dual-Range Force Sensor	DFS-BTA	$120
Force Plate	FP-BTA	$319
Gas Pressure Sensors		
Gas Pressure Sensor	GPS-BTA	$94
Pressure Sensor 400	PS400-BTA	$219
Goniometer	GNM-BTA ⁂	$169
Hand Dynamometer	HD-BTA	$124
Heart Rate Monitors		
Exercise Heart Rate Monitor	EHR-BTA	$99
Hand-Grip Heart Rate Monitor	HGH-BTA	$129
Instrumentation Amplifier	INA-BTA	$89
Ion-Selective Electrodes (ISE)*		
Ammonium ISE	NH4-BTA	$278
Calcium ISE	CA-BTA	$278
Chloride ISE	CL-BTA	$278
Nitrate ISE	NO3-BTA	$278
Potassium ISE	K-BTA	$278
Light Sensor	LS-BTA ⁂	$69
Magnetic Field Sensor	MG-BTA	$69
Melt Station	MLT-BTA ⁂	$599
Microphone	MCA-BTA	$55
Motion Detectors		
Dynamics Cart and Track System with Motion Encoder	DTS-EC	$513
Motion Detector	MD-BTD	$99
O_2 Gas Sensor	O2-BTA	$210
ORP Sensor	ORP-BTA	$115
PAR Sensor	PAR-BTA	$249
pH Sensors		
Glass-Body pH Electrode BNC (requires Electrode Amplifier)	GPH-BNC	$95
pH Sensor	PH-BTA	$99
Tris-Compatible Flat pH Sensor	FPH-BTA	$124
Photogate	VPG-BTD	$55
Polarimeter (Chemical)	CHEM-POL ⁂	$559
Power Amplifier	PAMP	$249
Projectile Launcher	VPL	$440
Pyranometer	PYR-BTA	$259
Qubit Sensors	vernier.com/qubit	
Radiation Monitor	VRM-BTD	$199
Relative Humidity Sensor	RH-BTA	$79
Respiration Monitor Belt (requires Gas Pressure Sensor)	RMB	$63
Rotary Motion Sensor	RMV-BTD ⁂	$189
Salinity Sensor	SAL-BTA	$139
Soil Moisture Sensor	SMS-BTA	$129
Sound Level Sensor	SLS-BTA	$69
Spirometer	SPR-BTA	$240
Temperature Probes		
Extra-Long Temperature Probe	TPL-BTA	$99
Stainless Steel Temperature Probe	TMP-BTA	$40
Surface Temperature Sensor	STS-BTA	$34
Thermocouple	TCA-BTA	$79
Wide-Range Temperature Probe	WRT-BTA	$119
Turbidity Sensor	TRB-BTA	$124
UV Sensors		
UVA Sensor	UVA-BTA	$118
UVB Sensor	UVB-BTA	$119
Voltage Probes		
30-Volt Voltage Probe	30V-BTA	$59
Differential Voltage Probe	DVP-BTA	$49
Voltage Probe	VP-BTA	$14

USB-Only Sensors

Sensor	Order Code	Price
Go! Motion®	GO-MOT	$139
Go!Temp®	GO-TEMP	$49
OHAUS® Balances ⁂	vernier.com/ohaus	
Vernier Flash Photolysis Spectrometer	VSP-FP	$5,899

⁂ For California Proposition 65 warning, see pp. 142–143.

Accessories & Replacement Parts

Sensors

Part Name	Order Code	Price
Blood Pressure Sensors		
Small Blood Pressure Cuff	CUFF-SM	$32
Standard Blood Pressure Cuff	CUFF-STD	$30
Large Blood Pressure Cuff	CUFF-LG	$35
CO_2 and/or O_2 Gas Sensors		
250 mL Nalgene® Bottle (1 opening)	CO2-BTL	$5
BioChamber 250 (250 mL) (2 openings)	BC-250 »	$9
BioChamber 2000 (2000 mL) (2 openings)	BC-2000 »	$22
Colorimeters		
Cuvette Lids (pkg. of 100)	CUV-LID	$9
Cuvette Rack	CUV-RACK	$9
Plastic Cuvettes (Visible Range) (pkg. of 100)	CUV	$24
Conductivity Probes		
Conductivity Low Standard (500 mL)	CON-LST	$20
Conductivity Middle Standard (500 mL)	CON-MST	$20
Conductivity High Standard (500 mL)	CON-HST	$20
Dissolved Oxygen Probe (Go Direct,® order code GDX-ODO)		
Go Direct Optical Dissolved Oxygen Replacement Cap	GDX-ODO-CAP	$79
Optical DO Probe Metal Guard	ODO-GRD	$55
Dissolved Oxygen Probe (Non-optical, order code DO-BTA)		
DO Calibration Solution (60 mL)	DO-CAL	$5
DO Filling Solution (130 mL)	FS	$6
DO Polishing Strips	PS	$4
DO Probe Membrane Cap	MEM	$15
Drop Counters		
Microstirrer	MSTIR	$9
Reagent Reservoir, 2 Valves, and Tip	VDC-RR	$10
Stopper Stem	PS-STEM	$1
Plastic 2-Way Valve	PS-2WAY	$2
EKG Sensors		
EKG Electrodes (100)	ELEC	$19
Electrode Amplifier (Go Direct, order code GDX-EA)		
Go Direct pH Electrode BNC	GDX-PH-BNC	$50
Go Direct Glass-Body pH Electrode BNC	GDX-GPH-BNC	$94
Go Direct Flat pH Electrode BNC	GDX-FPH-BNC	$83
Go Direct ORP Electrode BNC	GDX-ORP-BNC	$59
Electrode Amplifier (LabQuest®, order code EA-BTA)		
pH Electrode BNC	PH-BNC	$48
Glass-Body pH Electrode BNC	GPH-BNC	$95
Flat pH Electrode BNC	FPH-BNC	$84
ORP Electrode BNC	ORP-BNC	$58
Energy Sensors		
Vernier Resistor Board	VES-RB	$19
Vernier Variable Load	VES-VL	$74
Ethanol Sensors		
Ethanol Cap Assemblies (pkg. of 3)	ETH-CAPS	$10
Ethanol Stopper	ETH-STOP	$4
Ethanol Tape	ETH-TAPE	$3
Force Sensors		
Reflex Hammer Accessory Kit	RFX-ACC	$29
Replacement Accessory Rod	ACC-ROD	$4
Springs Set	SPRINGS	$18
Dual-Range Force Sensor Replacement Parts Kit	DFS-RPK	$24
Bumper Launcher Kit	BLK	$99
Hoop Bumpers for Bumper and Launcher Kit	HOOPS-BLK	$19
Gas Chromatographs		
GC Septa (pkg. of 4)	GC-SEP	$34
GC Syringe, 1 µL Hamilton	GC-SYR-MIC	$99
Gas Pressure Sensors		
Gas Pressure Sensor Bulb (1)	GPS-BULB1	$6
Gas Pressure Sensor Bulb (set of 4)	GPS-BULB4	$21
Pressure Sensor Accessories Kit	PS-ACC	$12
#1 1-Hole Rubber Stopper	PS-STOP1	$1
#5 2-Hole Rubber Stopper	PS-STOP5	$1.50
Luer-Lock Connector	PS-LUER	$1
Plastic 2-Way Valve	PS-2WAY	$2
Plastic Tubing	PS-TUBING	$1
Plastic Tubing Clamps (pkg. of 100)	PTC	$49
Stopper Stem	PS-STEM	$1
Syringe (20 mL, plastic)	PS-SYR	$2
Syringe (20 mL, plastic) (pkg. of 10)	PS-SYR10	$18
Heart Rate Sensors		
Heart Rate Hand Grips	HR-GRIP	$41
Exercise Heart Rate Strap	HR-STRAP	$21
Polar Transmitter Module	HR-TRANS	$58
Ion-Selective Electrodes		
ISE Ammonium Replacement Module†	NH4-MOD	$89
ISE Calcium Replacement Module†	CA-MOD	$89
ISE Nitrate Replacement Module†	NO3-MOD	$89
ISE Potassium Replacement Module†	K-MOD	$89
ISE Ammonium Low Standard (500 mL)	NH4-LST	$20
ISE Ammonium High Standard (500 mL)	NH4-HST	$20
ISE Calcium Low Standard (500 mL)	CA-LST	$20
ISE Calcium High Standard (500 mL)	CA-HST	$20
ISE Chloride Low Standard (500 mL)	CL-LST	$20
ISE Chloride High Standard (500 mL)	CL-HST	$20
ISE Nitrate Low Standard (500 mL)	NO3-LST	$20
ISE Nitrate High Standard (500 mL)	NO3-HST	$20
ISE Potassium Low Standard (500 mL)	K-LST	$20
ISE Potassium High Standard (500 mL)	K-HST	$20
Melt Stations		
Melt Station Capillary Tubes (pkg. of 100)	MLT-TUBE	$24
Motion Detectors		
Go! Motion® to Computer Cable	GMC-USB	$5
Motion Detector Cable	MDC-BTD	$5
Motion Detector Clamp	MD-CLAMP	$15
pH and ORP Sensors		
Microstirrer	MSTIR	$9
pH Buffer Capsules (10 each of pH 4, 7, 10)	PH-BUFCAP	$34
pH Storage Bottles (pkg. of 5)	BTL	$10
pH Storage Solution (500 mL)	PH-SS	$20
Photogates		
Cart Picket Fence	PF-CART	$6
Go Direct Photogate Timing Cable	VPG-CB-GDX »	$8
Go Direct Time of Flight Pad Cable	TOF-CB-GDX »	$8
Laser Pointer	LASER	$24
Laser Pointer Stand	STAND	$14
Photogate Bar Tape Kit	TAPE-VPG »	$17
Picket Fence	PF	$10
Pulley Bracket	B-SPA	$12
Ultra Pulley Attachment	SPA	$24
Polarimeters (Chemical)		
Polarimeter Sample Cells (pkg. of 4)	CELLS-POL	$69

† ISE modules have a life expectancy of 1 to 2 years. We recommend that you do not purchase ISE replacement modules too far in advance of their expected time of use; degradation occurs while replacement modules are stored on the shelf.

Power Amplifier		
Accessory Speaker	PAAS-PAMP ⌃⌃	$135
Projectile Launchers		
Goggles (set of 2)	GGL-VPL	$6
Time of Flight Pad	TOF-VPL	$84
Steel Balls (set of 6)	STB-VPL	$7
Projectile Stop	PS-VPL	$40
Independence of Motion Accessory	IOM-VPL	$59
Wax Tape (300 ft.)	WXT-VPL	$18
Rotary Motion Sensors		
Rotational Motion Accessory Kit	AK-RMV ⌃⌃	$120
Rotary Motion Motor Kit	MK-RMV ⌃⌃	$12
Rotary Motion Sensor Replacement Pulley	RMV-PULLEY	$5
Rotary Motion Sensor Replacement Parts Kit	RMV-RPK	$25
Salinity Sensors		
Salinity Standard (500 mL)	SAL-ST	$20
Spectrophotometers/Spectrometers		
Cuvette Lids (pkg. of 100)	CUV-LID	$9
Cuvette Rack	CUV-RACK	$9
Plastic Cuvettes (visible) (pkg. of 100)	CUV	$24
Plastic Cuvettes (UV-VIS) (pkg. of 100)	CUV-UV ⌃⌃	$169
Quartz Cuvettes (pkg. of 2)	CUV-QUARTZ	$229
Fluorescence/UV Quartz Cuvette (pkg. of 1)	CUV-QUARTZ-FUV	$199
Spectrophotometer Optical Fiber (for GDX-SVISPL, GDX-SPEC-UV, GDX-SPEC-FUV)	VSP-FIBER	$79
Vernier Emissions Fiber (for GDX-SPEC-EM, GDX-SPEC-VIS)	VSP-EM-FIBER	$94
Spirometers		
Disposable Bacterial Filter (pkg. of 10)	SPR-FIL10	$45
Disposable Bacterial Filter (pkg. of 30)	SPR-FIL30	$129
Disposable Mouthpiece (pkg. of 30)	SPR-MP30	$17
Disposable Mouthpiece (pkg. of 100)	SPR-MP100	$39
Noseclip (pkg. of 10)	SPR-NOSE10	$10
Noseclip (pkg. of 30)	SPR-NOSE30	$25
O_2 Gas Sensor to Spirometer Adapter	O2-SPR	$8
Structures & Materials Testers		
Truss Tester Accessory	VSMT-TRUSS	$128
Turbidity Sensor (order code TRB-BTA)		
Turbidity Accessories Replacement Kit	TRB-ACC	$39
Turbidity Bottles (pkg. of 6)	TRB-BOT	$34
Voltage and Current Probes		
Inductor	IND	$40
Large Capacitor	VCB2-CAP	$30
Miniature Alligator Clips for Vernier Circuit Board	VCB-GATOR	$15
Optional Breadboard Kit for the Vernier Circuit Board 2	VCB2-OBBK	$29
Replacement Lamps for Vernier Circuit Board	VCB-BULB	$12
Resistivity Rods	RRS ⌃⌃	$69
Vernier Circuit Board 2	VCB2 ⌃⌃	$145

Dynamics Cart and Track System

Part Name	Order Code	Price
For any Cart		
Cart Guide (pkg. of 10)	CGUIDE-10	$99
For any Cart and Track System		
Adjustable Two Foot Leveler	AL-VDS	$10
Adjustable End Stop	AS-VDS	$8
Anti-Roll Pegs	VDS-ARP10	$3
Axles and Wheels for Cart	WHEELS-VDS	$15
Cart Picket Fence	PF-CART	$6
Cart—Plunger Cart (plastic)	DTS-CART-P	$84
Cart—Standard Cart (plastic)	DTS-CART-S	$73
Motion Detector Bracket	DTS-MDB	$11
Optics Accessories	pages 116–117	
Photogate Bracket	PGB-VDS	$5
Pulley Bracket	B-SPA	$12
Vernier Dynamics System Replacement Parts Kit	VDS-RPK ⌃⌃	$29
For Dynamics Cart and Track Systems Only (Plastic Carts)		
DFS/Accelerometer Fasteners	DTS-ACC	$9
Eddy Current Brake	DTS-ECB	$19
Friction Pad DTS (for plastic carts)	DTS-PAD	$32
Mass DTS (hexagonal bars)	DTS-MASS	$16
Motion Detector Reflector Flag	DTS-FLAG	$9
For Vernier Dynamics Systems Only (Metal Carts)		
Friction Pad (for metal carts)	PAD-VDS	$35
Mass for Dynamics Carts (500 g block)	MASS	$12

Go Direct

Part Name	Order Code	Price
Go Direct Charge Station	GDX-CRG	$89
Go Direct Sensor Cart Charge Station	GDX-CART-CRG	$149
Go Direct Sensor Clamp	GDX-CLAMP	$14
Go Direct USB Radio	GDX-RADIO	$35
Vernier Micro USB Cable	CB-USB-MICRO	$5
Vernier USB Type C to Micro USB Cable	CB-USB-C-MICRO	$9

LabQuest 3, LabQuest 2, and Original LabQuest

Part Name	Order Code	Price
LabQuest Battery Boost 3	LQ-BOOST3	$119
LabQuest Power Supply	LQ3-PS	$11
Vernier Mini USB Cable	CB-USB-MINI	$5
Vernier USB Type C to Mini USB Cable	CB-USB-C-MINI	$9
For LabQuest 3 Only		
LabQuest 3 Battery	LQ3-BAT	$34
LabQuest 3 Lanyard	LQ3-LAN	$9
LabQuest 3 Charging Station	LQ3-CRG	$149
LabQuest 3 Stand	LQ3-STN	$5
For LabQuest 2 and Original LabQuest Only		
LabQuest Tether (pkg. of 5)	LQ-TETH-5	$5
LabQuest Lanyard	LQ-LAN	$5
LabQuest SD Card	LQ-SD	$12
LabQuest Stylus (pkg. of 5)	LQ2-STYL-5	$5
For LabQuest 2 Only		
LabQuest 2 Lab Armor	LQ2-ARMOR	$15
LabQuest 2 Stand	LQ2-STN	$5
LabQuest 2 Battery	LQ2-BAT	$23
For Original LabQuest Only		
Original LabQuest Battery	LQ-BAT	$19

Cables/Adapters/Power Supplies

Part Name	Order Code	Price
BTA/BTD Cables and Adapters		
Analog Bare Wire Cable	CB-BTA	$5
Digital Bare Wire Cable	CB-BTD	$5
Analog Breadboard Cable	BB-BTA	$12
Digital Breadboard Cable	BB-BTD	$11
Analog Protoboard Adapter	BTA-ELV	$12
Digital Protoboard Adapter	BTD-ELV	$12
Analog Sensor Extension Cable (2 m)	EXT-BTA	$12
Digital Sensor Extension Cable (2 m)	EXT-BTD	$12

Additional Replacement Parts Available Online
Visit vernier.com/replacements

⌃⌃ For California Proposition 65 warning, see pp. 142–143.

Index

Q

R

S

T

U

V

W

Satisfaction Guarantee

Vernier has been selling science education software and data-collection hardware since 1981. We pride ourselves on the quality and affordability of our products and our service to our customers. If at any time you are unhappy with any of our products or service, please get in touch.

Vernier Science Education
13979 SW Millikan Way
Beaverton, OR 97005-2886
vernier.com • info@vernier.com
Toll Free: 888-VERNIER (888-837-6437)
Fax: 503-277-2440

Product Usage

Vernier products are designed for educational use. Our products are not designed nor are they recommended for any industrial, medical, or commercial process, such as life support, patient diagnosis, control of a manufacturing process, or industrial testing of any kind. We design our products with the specifications and features that educators and students need to be successful. In our effort to keep our products affordable and easy to use, we may not meet the specifications or include the features that an industrial scientist or medical professional might want.

Equipment Return

Any product that does not meet your needs may be returned within 30 days for a full refund. Equipment returned after 30 days may be subject to a restocking fee.

A Return Merchandise Authorization, available from Vernier, is required for any product return. Equipment returned for exchange or credit must be in new condition and in its original packaging.

Prices and Shipping

Prices are effective January 1, 2023 and supersede previously published prices. Prices are in US dollars and are FOB shipping point. Shipping charges may vary, depending on method of shipment. Increased shipping charges for heavier or bulkier items may apply due to weight or dimensions. Applicable sales tax may be charged. Prices are for US educational institutions only and are subject to change without notice.

International Sales

All Vernier orders for use outside of the US and Canada are handled by our worldwide network of Vernier dealers. Contact us for more information.

Sales of Vernier products in Canada are handled by

Vernier Canada
7030 Woodbine Ave. Suite 500
Markham, Ontario L3R 6G2
Canada
verniercanada.ca • info@verniercanada.ca
Phone: (800) 376-4210 • Local: (705) 915-3656

Preview Policy

Most Vernier products are available for a 30-day preview (or longer, if requested) to US educational institutions.

Warranties

Most Vernier-branded products carry a five-year limited warranty. Product-specific details can be found under the Support tab on each product's web page. Product-specific details can be found under the Support tab on each product's web page. During the warranty period, Vernier will repair or replace the item if there is a defect in materials or workmanship. Outside the warranty, Vernier will attempt to repair most products. The Vernier warranty covers products when used by educational institutions only. Products manufactured by anyone other than Vernier are subject to the conditions of the warranty supplied by the manufacturer.

Additional exclusions and limitations can be found at vernier.com/warranty

Privacy Policy

Vernier Science Education does not sell, lease, or loan our mailing list or portions thereof to anyone at any time. We do not store credit card information on our online store or in our accounting system. For more information on our privacy policy, see vernier.com/privacy-policy

If you wish to be removed from our mailing list, simply write to us at updates@vernier.com, and we will remove you immediately.

Software Licenses

Vernier Graphical Analysis, Vernier Spectral Analysis, and Vernier Instrumental Analysis are available as free downloads from our website or distributed through the appropriate web store. Vernier Graphical Analysis Pro is available as a subscription service. Vernier Video Analysis is available as a subscription service and is distributed as a progressive web app. Video Physics and Thermal Analysis Plus are available for purchase through the App Store. Apps for iOS, iPadOS, Android, and ChromeOS are distributed through their respective stores. Terms and licensing are thus determined entirely by these stores.

Other Software

Software from Texas Instruments, Davis Instruments, and Bodelin Technologies are licensed under separate agreements by their respective companies.

Trademarks

Logger *Pro* 3, LabQuest, LabQuest Stream, SpectroVis, Vernier and caliper design, Go Direct, Go Wireless, Go!, Go! Link, Go!Temp, Go! Motion, LabQuest Viewer, Vernier Spectral Analysis, Vernier Thermal Analysis, Vernier Video Analysis, Vernier Instrumental Analysis, Vernier EasyLink, and Vernier EasyTemp are our registered trademarks. Vernier Science Education, vernier.com, BlueView, Video Physics, Vernier Graphical Analysis, Vernier Graphical Analysis Pro, and Vernier Connections are our trademarks or trade dress.

Apple, the Apple logo, iPhone, iPad, iPadOS, and macOS are trademarks of Apple Inc., registered in the United States and other countries. App Store is a service mark of Apple Inc.

Arduino® and are trademarks of Arduino SA.

CBL 2, CBR 2, TI Navigator, SmartView, and TI-Nspire are trademarks of Texas Instruments.

National Instruments, NI, and LabVIEW are trademarks or trade names of National Instruments Corporation.

Raspberry Pi is a trademark of Raspberry Pi Trading.

The Bluetooth® word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by Vernier Science Education is under license.

All other marks not owned by us that appear herein are the property of their respective owners, who may or may not be affiliated with, connected to, or sponsored by us.

Technical Support

We are readily available to help you with individual questions about our software and hardware—simply email support@vernier.com, chat with us live on vernier.com, or call us at our toll-free number: 888-VERNIER (888-837-6437).

Our email newsletter makes it easy to access new ideas, learn about new products, and get inspired by fellow educators. Sign up at vernier.com/newsletter

How to Order

Website

vernier.com/how-to-order

Call

888-VERNIER
(888-837-6437)

Email

orders@vernier.com

California Proposition 65 Warning

PROP 65—For more information, go to P65Warnings.ca.gov

Vernier Products Affected	WARNING
BioChamber 2000	⚠ WARNING: This product can expose you to chemicals, including bisphenol A (BPA), which are known to the State of California to cause cancer, and methyl isobutyl ketone (MIBK), which is known to the State of California to cause birth defects or other reproductive harm.
BioChamber 250	⚠ WARNING: This product can expose you to chemicals, including methyl isobutyl ketone (MIBK), which are known to the State of California to cause cancer and birth defects or other reproductive harm.
Biology Go Direct® Standard Package	⚠ WARNING: This product can expose you to chemicals, including bisphenol A (BPA), which are known to the State of California to cause cancer, and methyl isobutyl ketone (MIBK), which is known to the State of California to cause birth defects or other reproductive harm.
BlueView Transilluminator	⚠ WARNING: This product can expose you to chemicals, including ethyl acrylate, which are known to the State of California to cause cancer.
Celestron® Digital Imager 5MP	⚠ WARNING: Cancer and Reproductive Harm—P65Warnings.ca.gov
Celestron Digital Microscope Imager	⚠ WARNING: Cancer and Reproductive Harm—P65Warnings.ca.gov
FLIR ONE® Gen III Camera (iOS)	⚠ WARNING: This product can expose you to chemicals, including nickel, which are known to the State of California to cause cancer.
FLIR ONE Pro Camera (iOS)	⚠ WARNING: This product can expose you to chemicals, including nickel, which are known to the State of California to cause cancer.
FLIR ONE Pro LT	⚠ WARNING: This product can expose you to chemicals, including nickel, which are known to the State of California to cause cancer.
Go Direct Melt Station	⚠ WARNING: This product can expose you to chemicals, including nickel, which are known to the State of California to cause cancer.
Go Direct Photogate Timing Cable	⚠ WARNING: This product can expose you to chemicals, including Di(2-ethylhexyl) phthalate (DEHP), which are known to the State of California to cause cancer and birth defects or other reproductive harm.
Go Direct Rotary Motion Sensor	⚠ WARNING: This product can expose you to chemicals, including chromium, which are known to the State of California to cause cancer and birth defects or other reproductive harm.
Go Direct Time of Flight Pad Cable	⚠ WARNING: This product can expose you to chemicals, including Di(2-ethylhexyl) phthalate (DEHP), which are known to the State of California to cause cancer and birth defects or other reproductive harm.
Go To Easy Adapter	⚠ WARNING: This product can expose you to chemicals, including Di(2-ethylhexyl) phthalate (DEHP), which are known to the State of California to cause cancer and birth defects or other reproductive harm.
Human Physiology Go Direct Standard Package	⚠ WARNING: This product can expose you to chemicals, including methyl isobutyl ketone (MIBK), which are known to the State of California to cause cancer and birth defects or other reproductive harm.
LabQuest® 3 Physics Standard Package	⚠ WARNING: This product can expose you to chemicals, including antimony, which are known to the State of California to cause cancer
Light Sensor	⚠ WARNING: This product can expose you to chemicals, including antimony, which are known to the State of California to cause cancer.

P65Warnings.ca.gov

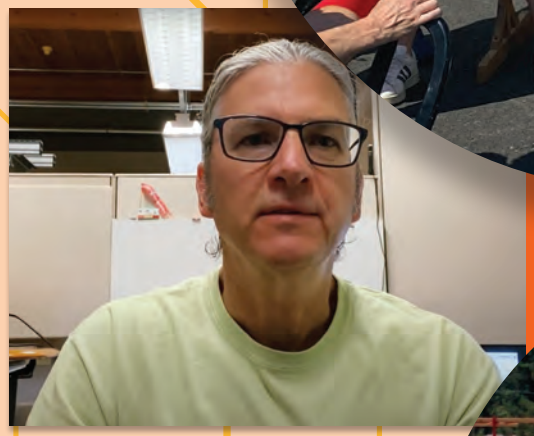
PROP 65—For more information, go to P65Warnings.ca.gov

Vernier Products Affected	WARNING
Melt Station	⚠ WARNING: This product can expose you to chemicals, including nickel, which are known to the State of California to cause cancer.
OHAUS Scout® 120 g	⚠ WARNING: This product can expose you to chemicals, including Di(2-ethylhexyl) phthalate (DEHP), which are known to the State of California to cause cancer and birth defects or other reproductive harm.
OHAUS Scout 220 g	⚠ WARNING: This product can expose you to chemicals, including Di(2-ethylhexyl) phthalate (DEHP), which are known to the State of California to cause cancer and birth defects or other reproductive harm.
OHAUS Scout 420 g	⚠ WARNING: This product can expose you to chemicals, including Di(2-ethylhexyl) phthalate (DEHP), which are known to the State of California to cause cancer and birth defects or other reproductive harm.
Photogate Bar Tape Kit	⚠ WARNING: This product can expose you to chemicals, including formaldehyde, which are known to the State of California to cause cancer.
Plastic Cuvettes (UV-VIS)	⚠ WARNING: This product can expose you to chemicals, including Di(2-ethylhexyl) phthalate (DEHP), which are known to the State of California to cause cancer and birth defects or other reproductive harm.
Polarimeter (Chemical)	⚠ WARNING: This product can expose you to chemicals, including chromium, which are known to the State of California to cause cancer and birth defects or other reproductive harm.
Power Amp Accessory Speaker	⚠ WARNING: This product can expose you to chemicals, including chromium, which are known to the State of California to cause cancer and birth defects or other reproductive harm.
Resistivity Rod Set	⚠ WARNING: This product can expose you to chemicals, including nickel, which are known to the State of California to cause cancer.
Rotary Motion Motor Kit	⚠ WARNING: This product can expose you to chemicals, including formaldehyde, which are known to the State of California to cause cancer.
Rotational Motion Accessory Kit	⚠ WARNING: This product can expose you to chemicals, including chromium, which are known to the State of California to cause cancer and birth defects or other reproductive harm.
Spectrum Tube Power Supply	⚠ WARNING: This product can expose you to chemicals, including nickel, which are known to the State of California to cause cancer.
Spectrum Tubes (Air, Argon, Carbon Dioxide, Hydrogen, Helium, Neon, Nitrogen)	⚠ WARNING: This product can expose you to chemicals, including nickel, which are known to the State of California to cause cancer.
Turbidity Sensor	⚠ WARNING: This product can expose you to chemicals, including formaldehyde, which are known to the State of California to cause cancer.
Turbidity Accessories Replacement Kit	⚠ WARNING: This product can expose you to chemicals, including formaldehyde, which are known to the State of California to cause cancer.
Vernier Circuit Board 2	⚠ WARNING: This product can expose you to chemicals, including nickel, which are known to the State of California to cause cancer.
Vernier Dynamics System Replacement Parts Kit	⚠ WARNING: This product can expose you to chemicals, including nickel, which are known to the State of California to cause cancer.
Vernier Rotary Motion Sensor	⚠ WARNING: This product can expose you to chemicals, including chromium, which are known to the State of California to cause cancer and birth defects or other reproductive harm.

Thank you, from our hearts to yours.

You've shared a passion with us for inspiring students and furthering their interest in STEM careers, and for this we are so grateful. Watch as our team members share what they love most about the educators they serve.

Watch now at
vernier.com/employee-spotlights



Vernier Volunteers

As a company, we volunteer for organizations such as Habitat for Humanity, The Humane Society, Oregon Museum of Science & Industry, Portland Symphony, Oregon Public Broadcasting, LEGO® Robotic Tournaments, Meals-on-Wheels, The Nature Conservancy, Oregon Food Bank, and many other organizations.

Vernier employees are encouraged to volunteer for non-profit organizations of their choice on company time and receive four hours of pay each month for their volunteer time. Vernier employees regularly volunteer at schools—teaching children to read, teaching art literacy, and helping with field trips and other school functions.

Vernier®
SCIENCE EDUCATION

Vernier Science Education
13979 SW Millikan Way
Beaverton, OR 97005-2886

888-VERNIER
(888-837-6437)
fax 503-277-2440

vernier.com
info@vernier.com

Vernier Science Education is dedicated to providing holistic, high-quality, reliable solutions for today's STEM classrooms.

Recipient not at your school?
Please send updates to
updates@vernier.com