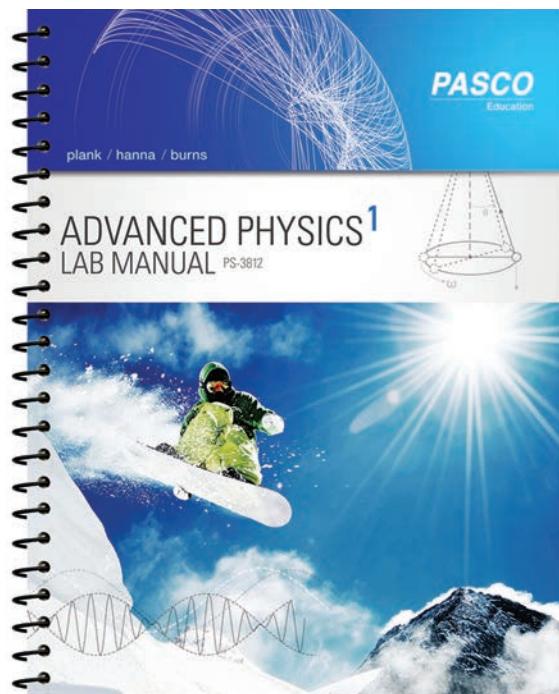


The background of the cover is split into two main sections by a large white curved line. The left section is white with faint, large-scale patterns of dots and stylized leaves. The right section is a solid blue color with a fine, repeating dot pattern and a molecular structure graphic consisting of interconnected circles and lines. The text 'IB SCIENCE LAB SOLUTIONS' is positioned in the white section, and 'PASCO' is in the blue section.

IB SCIENCE
LAB SOLUTIONS

PASCO

Advanced Physics 1 Lab Manual



Prepare your students for inquiry investigations in the physics lab. Each lab is presented three ways:

- Structured
- Guided inquiry
- Student designed

You decide which level of inquiry is appropriate for each lab.

Each lab includes teacher resources:

- Pre-lab discussion and questions
- Procedural overview
- Teacher tips
- Sample data
- Assessment and synthesis questions
- Extended inquiry suggestions

**Advanced Physics 1
Lab Manual**

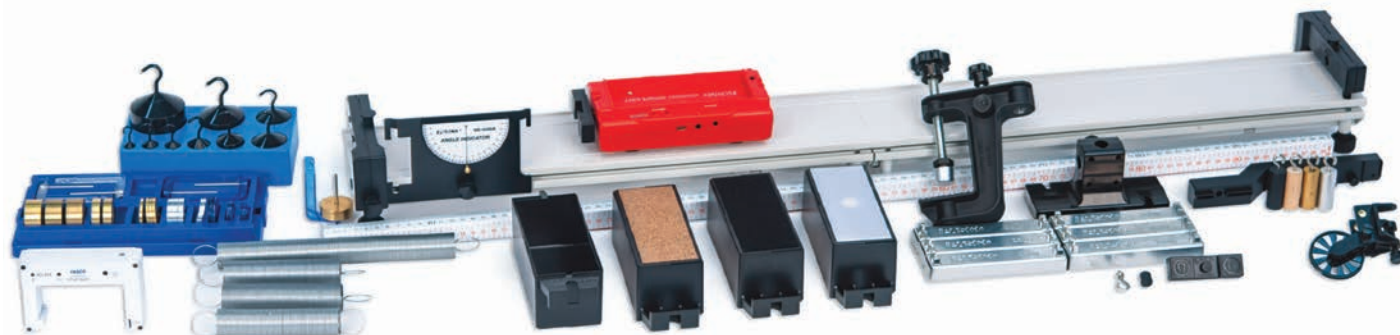
PS-3812

Advanced Physics 1 Lab Experiments	PS-3813 Equipment kit	PS-3813 + Expansion Kit (PS-3814A)	Targeted IB® Topics*
1. Graphing Motion	●	●	A.1
2. Newton's Second Law	●	●	A.2
3. Atwood's Machine	●	●	A.2
4. Coefficients of Friction	●	●	A.2
5. Two Dimensional Motion: Projectiles		●	A.1
6. Conservation of Mechanical Energy	●	●	A.3
7. Work and Kinetic Energy	●	●	A.3
8. Conservation of Momentum		●	A.2
9. Momentum and Impulse	●	●	A.2
10. Rotational Dynamics		●	A.4
11. Rotational Statics		●	A.4
12. Periodic Motion: Mass and Spring	●	●	C.1
13. Simple Pendulum	●	●	C.1
14. Resonance and Standing Waves**			C.4
15. DC Circuits**			B.5

*IB is a registered trademark of the International Baccalaureate, which was not involved in the production of, and does not endorse, this product.

**Additional equipment required. See buying guide on website.

Advanced Physics 1 Equipment Kit



PS-3813

Equipment

Smart Cart (Red)
Smart Cart Rod Stand Adapter
Cart Mass (Set of 2)
PAStack
Discover Friction Accessory
Stainless Steel Rod, 45 cm
Stainless Steel Rod, 90 cm
Photogate Pendulum Set
Dynamics Track End Stop (2 pack)
Stainless Steel Rod, 60 cm Threaded
Mass and Hanger Set
Aluminum Table Clamp

Part #	Qty.
ME-1240	1
ME-1244	1
ME-6757A	3
ME-6960	1
ME-8574	1
ME-8736	1
ME-8738	1
ME-8752	1
ME-8971	1
ME-8977	1
ME-8979	1
ME-8995	1

Equipment

Super Pulley Kit
Angle Indicator
Pendulum Clamp
Track Rod Clamp
Demonstration Spring Set
Black Thread (3 pack)
Bumper Accessory Set
Wireless Smart Gate
Four Scale Meter Stick
Hooked Mass Set
Right Angle Clamp

Part #	Qty.
ME-9433	1
ME-9495A	1
ME-9506	1
ME-9836	1
ME-9866	1
ME-9875	1
ME-9884	1
PS-3225	1
SE-8695	1
SE-8759	1
SE-9444	1

Advanced Physics 1 Expansion Kit



PS-3814A

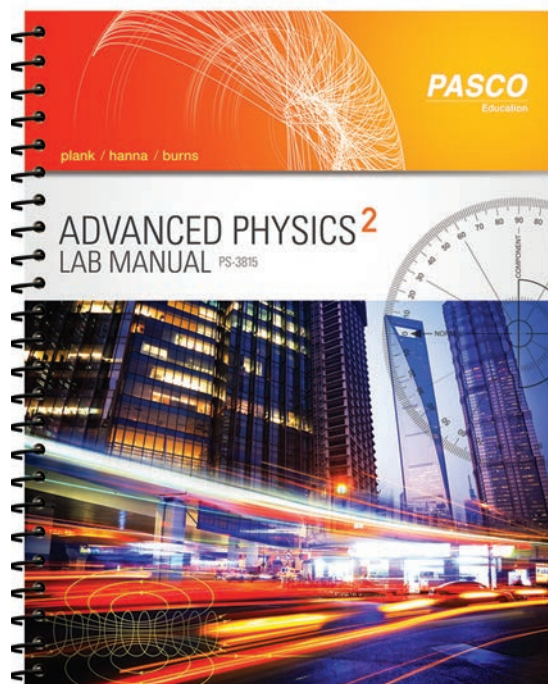
Equipment

Smart Cart (Blue)
Photogate Mounting Bracket
Mini Projectile Launcher
Tension Protractor
Pendulum Accessory
Stainless Steel Rod, 60 cm Threaded
Aluminum Table Clamp
Wireless Rotary Motion Sensor
Carbon Paper (100 Sheets)
Digital Calipers

Part #	Qty.
ME-1241	1
ME-6821A	1
ME-6825B	1
ME-6855	2
ME-8969	1
ME-8977	1
ME-8995	1
PS-3220	1
SE-8693	1
SE-8710	1

For complete kit contents, go to pasco.com or call your PASCO Education Specialist at 800-772-8700.

Advanced Physics 2 Lab Manual



Prepare your students for inquiry investigations in the physics lab. Each lab is presented three ways:

- Structured
- Guided inquiry
- Student designed

You decide which level of inquiry is appropriate for each lab.

Each lab includes teacher resources:

- Pre-lab discussion and questions
- Procedural overview
- Teacher tips
- Sample data
- Assessment and synthesis questions
- Extended inquiry suggestions

**Advanced Physics 2
Lab Manual**

PS-3815

Advanced Physics 2 Lab Experiments	PS-3816 Equipment kit	PS-3816 + Expansion Kit (PS-3817)	Targeted IB® Topics*
1. Hydrostatic Pressure**			B.3
2. Buoyant Force**			B.3
3. Fluid Dynamics**			B.3
4. Boyle's Law**			B.3
5. Spherical Mirror Reflection	●	●	C.3
6. Snell's Law	●	●	C.3
7. Focal Length of a Converging Lens	●	●	C.3
8. Interference and Diffraction	●	●	C.3
9. Electric Field Mapping		●	D.2
10. Magnetic Fields		●	D.2
11. Magnetic Field Strength		●	D.2
12. Electromagnetic Induction	●	●	D.4
13. Capacitor Fundamentals **			N/A
14. Series and Parallel Capacitors		●	N/A
15. RC Circuits		●	N/A
16. Planck's Constant		●	E.2

*IB is a registered trademark of the International Baccalaureate, which was not involved in the production of, and does not endorse, this product.

**Additional equipment required. See buying guide on website.

Advanced Physics 2 Equipment Kit

PS-3816

Equipment

Neodymium Magnets (16 Pack)
Stainless Steel Rod, 45 cm
Aluminum Table Clamp
Diffraction Slits
Concave/Convex Mirror
Basic Optics Viewing Screen
Basic Optics Ray Table
Geometric Lens Set
Basic Optics Light Source

Part #	Qty.
EM-8648B	1
ME-8736	2
ME-8995	2
OS-8442	1
OS-8457	1
OS-8460	1
OS-8465A	1
OS-8466A	1
OS-8470	1

Equipment

Adjustable Lens Holder
Optics Track, 1.2 m
Wireless Voltage Sensor
Digital Calipers
Three-Finger Clamp
Red Diode Laser Pointer
0.5 in Rigid Plastic Tubing, 12"
22-Gauge Magnet Wire

Part #	Qty.
OS-8474	1
OS-8508	1
PS-3211A	1
SE-8710	1
SE-9445	2
SE-9716C	1
	1
	1



Advanced Physics 2 Expansion Kit



PS-3817

Equipment

AC/DC Electronics Laboratory
Field Mapper Kit
Wireless Current Sensor
Wireless Magnetic Field Sensor
Magnaprobe

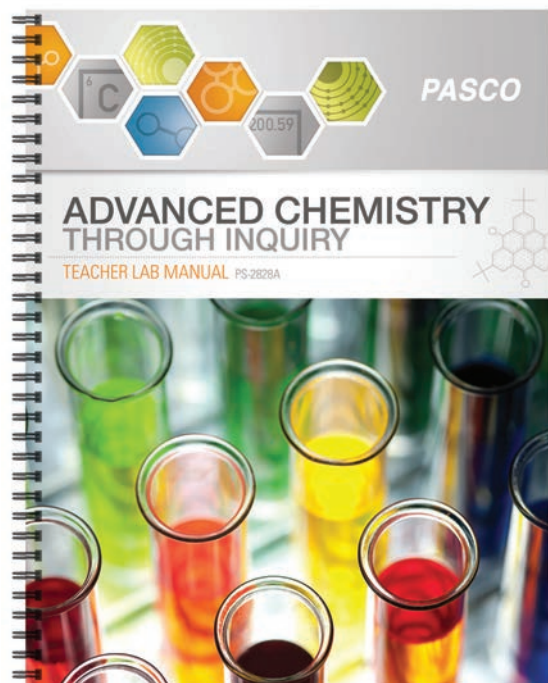
Part #	Qty.
EM-8656	1
PK-9023	1
PS-3212	1
PS-3221	1
SE-7390	1

Equipment

Student Power Supply (18 VDC, 3 A)
Right Angle Clamp
Banana Plug Cord-Red (5 Pack)
Basic Digital Multimeter
Single-color Bar Magnets

Part #	Qty.
SE-8828	1
SE-9444	1
SE-9750	2
SE-9786A	1
SE-7726	1

For complete kit contents, go to pasco.com or call your PASCO Education Specialist at 800-772-8700.



Advanced Chemistry Lab Manual

PASCO technology makes IB® Chemistry data collection, analysis, evaluation, and synthesis easier.

Challenge your students with ambitious chemistry concepts, not temperamental tools. PASCO's technology aids the pursuit of practical and investigational skills, without adding unnecessary layers of complexity. When students feel well-supported, they have the determination to use their creative and rational thinking to develop models and better understand the world around us.

Our Advanced Chemistry solution includes:

- Editable lab manual with 16 lab activities
- Wireless sensor bundles
- Innovative modeling and demonstrative equipment
- Student-friendly, cost-effective, multi-platform software for data analysis
- Extended inquiry suggestions

Advanced Chemistry Through Inquiry
Lab Manual - PS-2828B

Experiments	PS-3302 Starter Bundle	PS-3302 + Extension Bundle (PS-3303C)	Targeted IB® Topics*
1. Analysis of Food Dyes in Sports Drinks		●	S1.3; S1.4; S2.2; S3.1; R2.2
2. Investigating the Copper Content of Brass		●	S2.1; S3.1; R2.1; R2.3; R3.2
3. How Hard is Your Tap Water?		●	S3.1
4. How Much Acid is in Your Fruit Juice?		●	S2.3; S3.1
5. Separating Food Dyes Using Chromatography		●	R2.2
6. A Chemistry Mystery: Name That Unknown	●	●	S1.2; S2.1; S2.2; S2.3; S2.4
7. Stoichiometry in Solutions		●	S1.5; S2.1; R2.3
8. Percentage of H ₂ O ₂ in Your Drugstore Hydrogen Peroxide		●	R3.2
9. Investigating Physical and Chemical Changes of Matter	●	●	R1.4; R2.1; R2.2; R2.3
10. What Does Acid Rain Do To Coral Reefs?	●	●	S1.3; S3.1; R3.1
11. Kinetics of Crystal Violet Fading		●	S1.3; S1.4
12. Building a Better Hand Warmer	●	●	S1.1; R1.1; R1.2; R1.4
13. Applications of Le Chatelier's Principle		●	R1.4; R2.3
14. Investigation of Acid-Base Titrations		●	S1.3; S3.1; R2.3; R3.1
15. Introduction to Buffers	●	● **	R3.1
16. Evaluation of Lemonade as a Buffer		● **	R3.1

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** The ORP Probe requires a pH sensor.

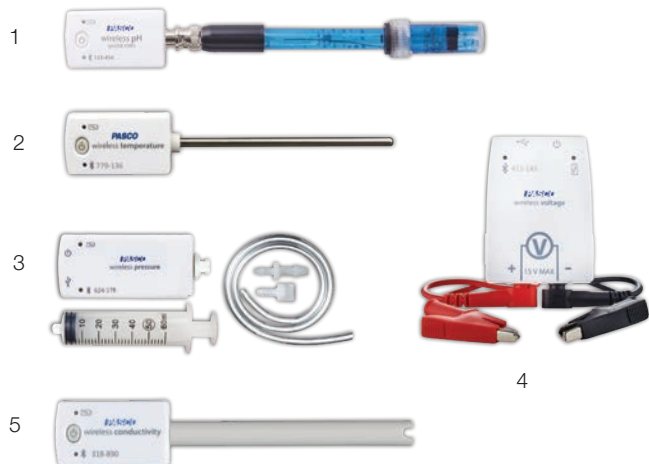


Wireless Chemistry Starter Bundle

PS-3302



1. Wireless pH PS-3204
2. Wireless Temperature PS-3201
3. Wireless Pressure PS-3203
4. Wireless Voltage PS-3211
5. Wireless Conductivity PS-3210

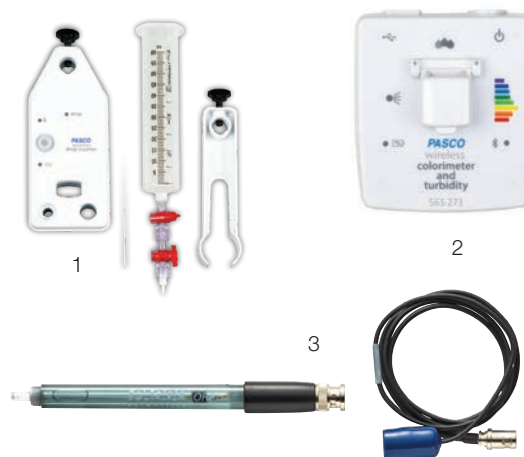


Wireless Chemistry Extension Bundle

PS-3303C

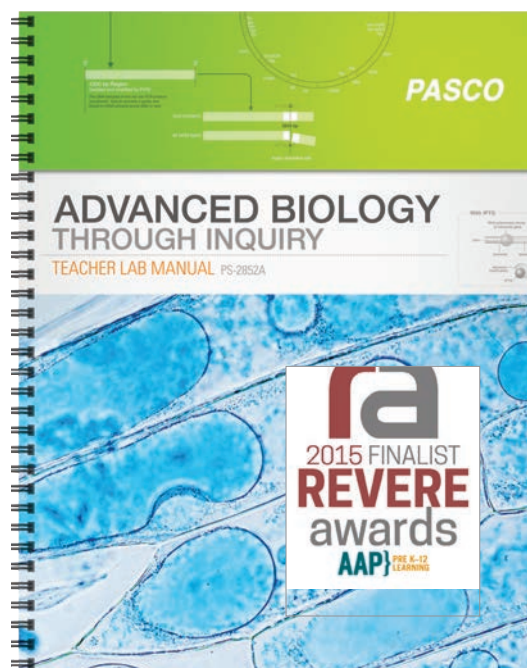


1. Wireless Drop Counter PS-3214
2. Wireless Colorimeter and Turbidity PS-3215*
3. ORP Probe PS-3515



* **WARNING!** This product can expose you to chemicals including Formaldehyde, which is known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

Advanced Biology Lab Manual



Advanced Biology Lab Manual

PASCO technology streamlines data collection and analysis for IB® Biology students.

Nurture your students' curiosity in the complexities of life forms. PASCO's advanced lab manual is the sturdy foundation for students in their IB Biology inquiry and research. Whether they wish to investigate enzymes, photosynthesis, animal behavior, or any concept in-between, PASCO provides the structure and equipment needed to help develop their skills.

Our Advanced Chemistry solution includes:

- Editable lab manual with 18 lab activities
- Multiple options for wireless sensor bundles
- Innovative modeling and demonstrative equipment
- Student-friendly, cost-effective, multi-platform software for data analysis
- Extended inquiry suggestions

Advanced Biology Through Inquiry
Lab Manual - PS-2852A

Experiments	PS-7614A Starter Bundle	PS-7614A + Extension Bundle (PS-7615B)	Targeted IB® Topics*
1. Enzyme Activity	●	●	C1.1; C1.2; C1.3; D1.3; D2.2; D3.2
2. Diffusion	●	●	A1.1; B2.1; B2.3; C2.2
3. Osmosis		●	A1.1; B2.1; D2.3
4. Plasmolysis		●	D2.3
5. Cell Size		●	A2.1; B2.3
6. Homeostasis	●	●	A2.2; D3.3
7. Cellular Respiration	●	●	C1.2
8. Photosynthesis	●	●	B2.2; B4.2; C1.1; C1.3; C4.2
9. Plant Pigments		●	C1.3
10. Transpiration	●	●	B3.1; B3.2; D4.2
11. Mitosis		●	B2.2; C3.2; D2.1; D2.2; D3.1
12. Meiosis	<i>No sensors required</i>		B2.2; D2.1; D2.2; D3.1; D3.2
13. Energy Dynamics	●	●	A4.2; B4.1; C4.1; C4.2; D4.2; D4.3
14. Artificial Selection		●	D4.1
15. BLAST Bioinformatics	<i>No sensors required</i>		N/A
16. Population Genetics			A2.3; A3.1; D3.2; D4.1
17. Mathematical Modeling of Evolution			A3.2; A4.1; C4.1
18. Animal Behavior			A4.1; D1.3; D4.1

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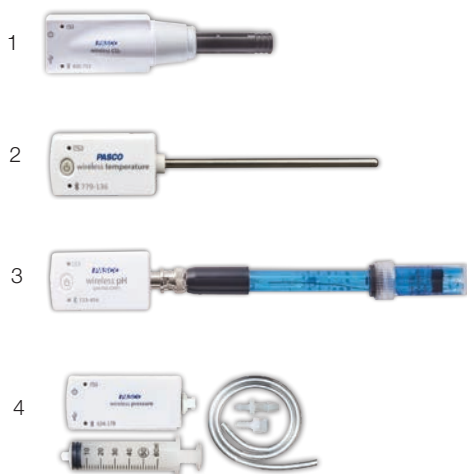


Wireless Biology Starter Bundle

PS-7614A



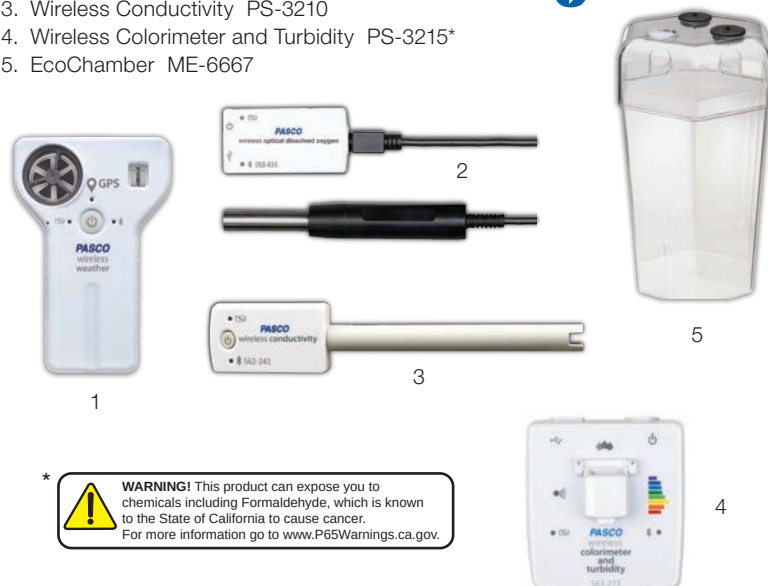
1. Wireless CO₂ PS-3208
2. Wireless Temp PS-3201
3. Wireless pH PS-3204
4. Wireless Pressure PS-3203



Advanced Biology Extension Bundle

PS-7615B

1. Wireless Weather with GPS PS-3209
2. Wireless Optical Dissolved Oxygen Sensor PS-3246
3. Wireless Conductivity PS-3210
4. Wireless Colorimeter and Turbidity PS-3215*
5. EcoChamber ME-6667

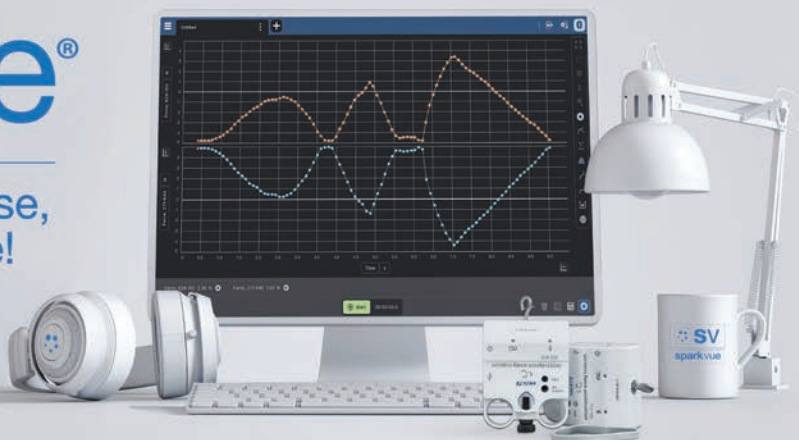


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& accessibility of **sparkvue**!



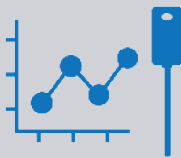
Sparkvue's intuitive design has made it an award-winning tool for collecting and analyzing experimental data. The user-friendly and accessible platform optimizes data collection and provides tools for in-depth analysis within a compact yet powerful workspace. Sparkvue also features Blockly coding, allowing students to use block-based code for sense and control of PASCO devices, including any of our sensors.

Student Data Collection and Sharing...**MADE EASY!**



Student-Entered Data & Graphing

Choose manual data collection to record values with the click of a button. Make a mistake? No problem! Simply select a data point to replace it.



Collecting & Graphing Sensor Data

Compatible with all PASCO Wireless and PASPORT (wired) sensors, students can pair and go to explore phenomena right away. You and your students will be up and running in minutes.



Open an Experiment File

Open a pre-configured PASCO experiment file or a Spark file saved locally. Build your own custom experiment.



Data Streaming

Stream live sensor data to multiple devices. Students can easily connect to a live data streaming session to receive shared data.

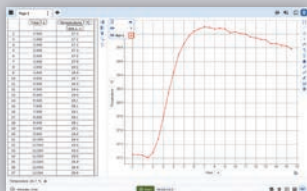
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and Microsoft Edge browsers

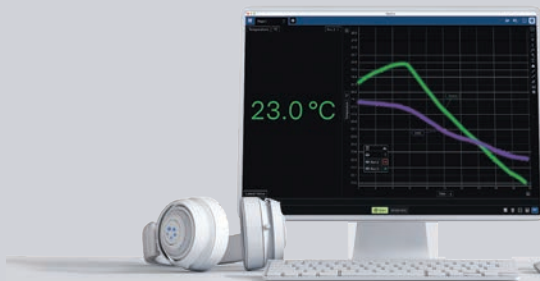


Sparkvue 5 - Whether you're teaching K-8, high school, or college students, Sparkvue has the displays and tools you need to collect and analyze data. The basics you expect (such as digits, meter, graph, and table) are all included, but you will also find FFT, bar graphs, map display, embedded assessment questions, video playback, image capture and analysis, as well as space for rich text and images. The labs you can build are only limited by your time and creativity.



Highly Accessible

With the latest update, Sparkvue version 5 brings great improvements to accessibility and user experience, such as modernized displays, screen reader compatibility, keyboard accessibility, high contrast ratios, and more. This software update is designed to be compliant with the Web Content Accessibility Guidelines (WCAG), version 2.2, level AA, designated by the World Wide Web Consortium (W3C).



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We're excited to announce SPARKvue is now available **FREE** of charge on all your devices as a browser-based application. This new version of our software as a Progressive Web Application (PWA) means you have free access to all the features of SPARKvue from Google Chrome and Microsoft Edge browsers. That's right: No download fees, subscription fees, or update fees, even for Windows® and Mac®. Plus, the app is always updated to the latest version automatically, so you never have to worry about it.

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