PASCO

2018 Primary Science

Life, Earth, and Physical Science

NEW!
Wireless Weather GPS

Wirelessly collect and map Weather and GPS data! (page 3)

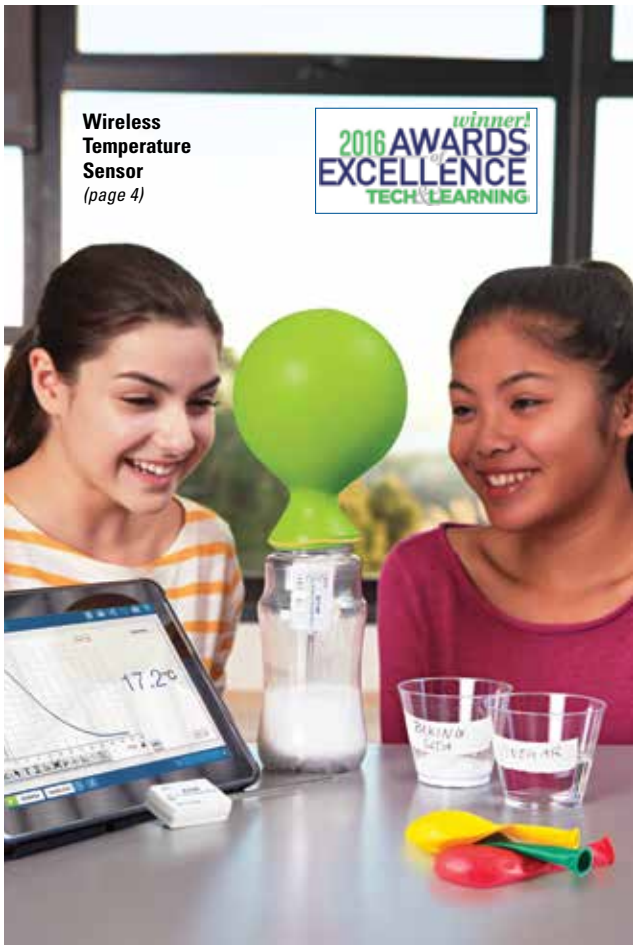
NEW!
Wireless Exercise Heart Rate Sensor

A fun and easy way to do a physiology lab. Measure heart rate wirelessly! (page 5)

Modular Circuits

Take the tangle and confusion out of circuit studies. (page 22)

2017 AWARDS of EXCELLENCE
TECH & LEARNING



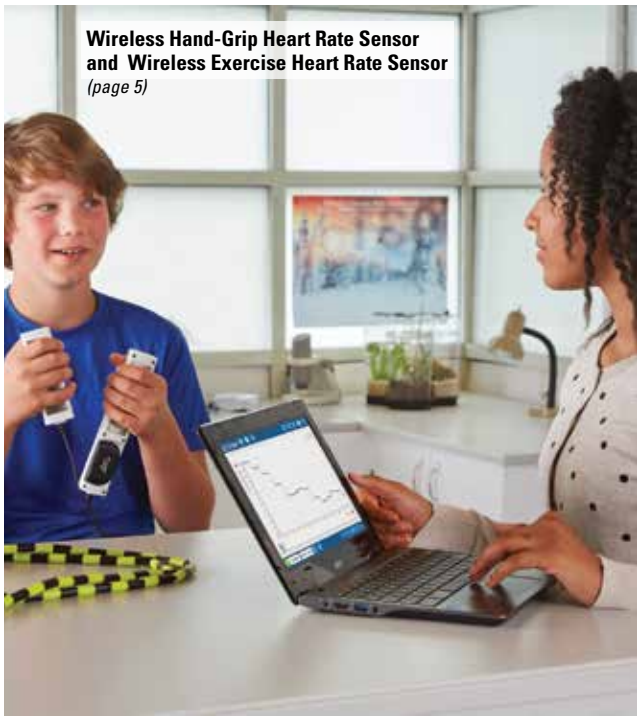


Table of Contents

Let's give them the tools to make a difference.

Try our award-winning SPARKvue software for FREE!

Get Started Today

The full and complete version of SPARKvue is now available as a FREE app for iOS and Android™ tablets and Chromebooks™, as well as free apps for iPhone and Android phones.

Download on the App Store | ANDROID APP ON Google play | available in the chrome web store

We also offer free 60-day trials for PC and Mac®* at **pasco.com**

Smart Phones: Android phone, iPhone

Tablets: Android tablet, iPad

Laptops/Desktops/2-in-1s: Windows tablet, Chromebook, PC, Mac

Most computing devices will connect directly to PASCO Bluetooth® 4.0 wireless products. Please go to pasco.com/compatibility to determine your direct-connect compatibility. PASCO offers the PS-3500 USB Bluetooth® Adapter for computing devices that do not support direct-connect.

AirLink
PS-3200

Includes one PASPORT sensor port, USB and Bluetooth® connectivity, and USB cable.

USB Bluetooth® 4.0 Adapter
PS-3500

10-port USB Charging Station
PS-3501

877.373.0300 (inside US) 916.462.8383 (outside US)

NEW

Wireless Weather Sensor with GPS

PS-3209

Includes USB charging cable.

The Wireless Weather Sensor is an all-in-one instrument for monitoring environmental conditions. By incorporating several sensing elements into a single unit, the sensor provides up to **17 different measurements!** Use the sensor in logging mode with the Weather Vane Accessory for long-term monitoring, or use it as a hand-held instrument to study microclimates and record weather conditions relevant to Earth Science phenomena.

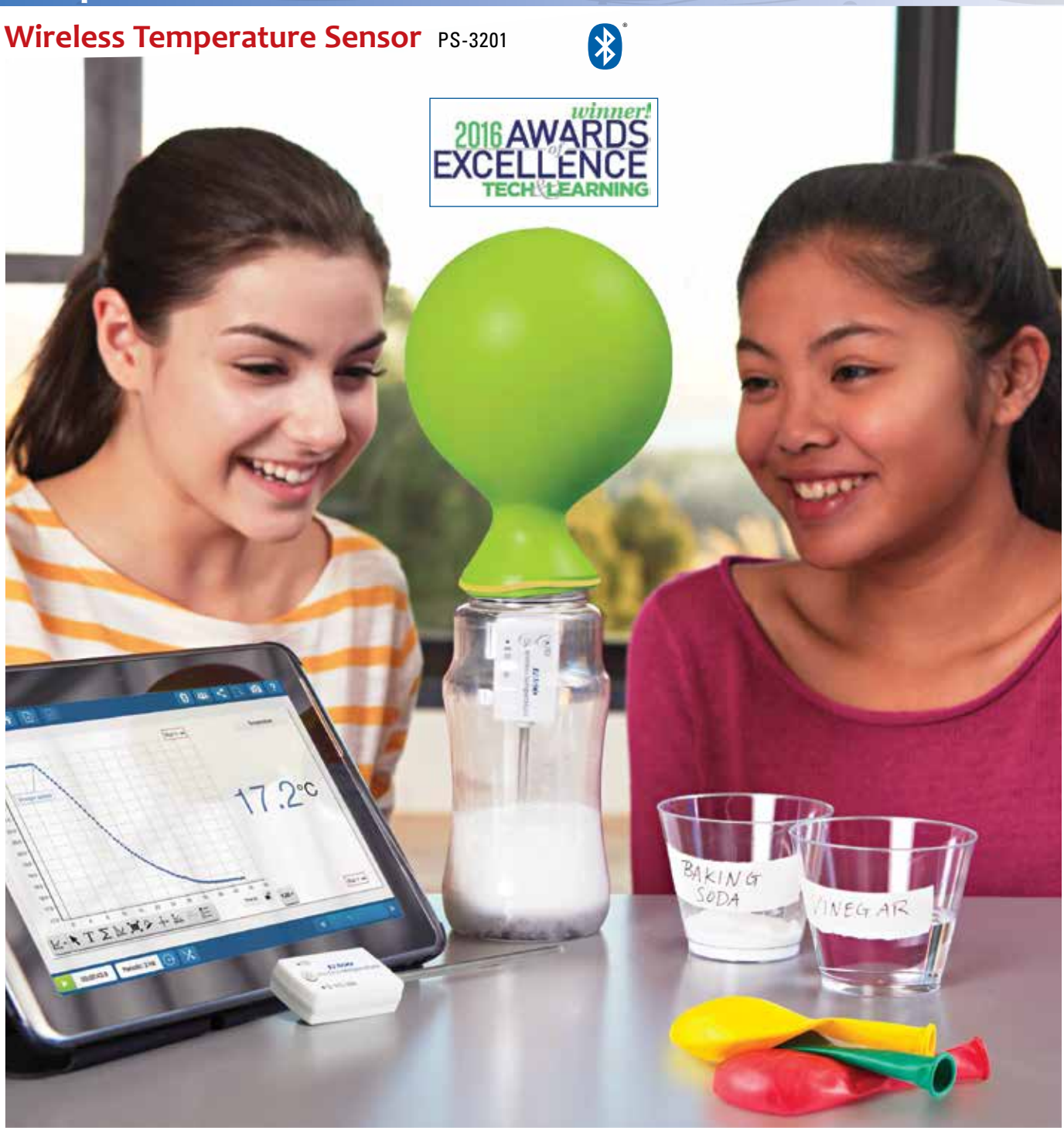
Measurements

Weather
1. Ambient Temperature
2. Barometric Pressure
3. Wind Speed
4. Wind Direction (true)
5. Relative Humidity
6. Absolute Humidity
7. Dew Point
8. Wind Chill
9. Heat Stress Index

Light
10. Ambient Light (lux)
11. UV Index

GPS
12. Latitude
13. Longitude
14. Altitude
15. Speed
16. Magnetic Direction
17. True Direction

Wireless Temperature Sensor PS-3201



This durable, high-resolution sensor covers many temperature experiments. The Wireless Temperature Sensor measures small but significant temperature changes produced by chemical reactions, convection currents, and even skin temperatures.

The Teaching Advantage

- Includes fast sampling rate for small temperature changes such as convection or skin temperature.
- No calibration required: just connect and measure.
- Features convenient Bluetooth® wireless connectivity and long-lasting coin cell battery.
- Logs temperature data directly onto the sensor for long-term experiments.

NEW Wireless Exercise Heart Rate Sensor

PS-3207

NEW Wireless Hand-Grip Heart Rate Sensor

PS-3206

Using the new wireless Hand-Grip Heart Rate Sensor, it's easier than ever before to conduct physiology labs on the cardiovascular system or homeostasis. Use this sensor for a quick and easy way to acquire wireless measurement for either continuous monitoring or initial vs. final data points. When the activity requires students to use their hands, the Wireless Exercise Heart Rate Sensor has a chest strap and will transmit data wirelessly up to 10 m away!

Wireless Temperature Sensor PS-3201

Includes 1 coin cell battery.

winner! 2016 AWARDS OF EXCELLENCE TECH & LEARNING

Use this sensor to investigate:

- Heating and cooling
- What is the temperature?
- Phase changes
- Insulators and conductors

This wireless sensor is long-lasting and easy to use. Use it to explore temperature changes, to observe the property of temperature, and to learn that temperature is a measure of how hot or cold something is compared to a standard scale.

Wireless Light Sensor

PS-3213

Includes 1 coin cell battery.

Use this sensor to investigate:

- Properties of light
- Light and heat
- Night and day
- Seasons

Students can use this durable and easy-to-use light sensor to compare how organisms, including humans, are able to see. Then they can compare that information to what an electronic light sensor can detect.

See all our FREE Elementary Science labs in the PASCO Digital Library at pasco.com

NEW

Wireless Weather Sensor with GPS

PS-3209

Includes USB charging cable.

Use this sensor to investigate:

- Water cycle
- Weather
- Humidity
- Barometric pressure

Students can use this durable and easy-to-use weather sensor to show that clouds in the sky have properties that can be observed and described. Then they learn to associate cloud formations with specific weather conditions such as temperature and humidity.

Also available:

Weather Vane Accessory PS-3553

MatchGraph Kit

UI-5822A

Includes MatchGraph software, a Motion Sensor, and an AirLink.

MatchGraph!™

Use this kit to investigate:

- Position
- Direction
- Speed and velocity
- Force and motion

Engage your students with a hands-on experience that is centered on studying motion. Give them a deeper understanding of graphing and interpreting motion, while they see their own motion graphed in real time and scored!

Download the free app

for Mac®, Android™, and Windows® computers at pasco.com. Or download the free iPad app on the App Store.

Download on the App Store

Wireless CO_2 Sensor

PS-3208

Use this wireless sensor to measure the concentration of CO_2 gas in a closed system or open environment. Study core topics (including photosynthesis, respiration, and carbon cycling) with this versatile probe. CO_2 data can be logged directly on the device for long-term life science and environmental science studies.

Looking for more teacher resources?

Our collection of Middle School Life Science Teacher Resources is fully electronic and ready for download. It includes lab preparation information, teacher tips, assessment, an editable Word® version of student handouts, answer key, and much more. And the student version is FREE!

Middle School Life Science Teacher Resources

PS-3850

The electronic content includes lab preparation information, teacher tips, assessment, an editable Word® version of student handouts, answer key, and much more.

What Life Science topics would you like to measure?

Topic	Sensor or Kit	Pages
Biomes and Ecosystems		
Biomes	Weather with GPS	3, 7, 27
*Ecosystems**	*Weather with GPS, pH, CO_2, O_2, EcoZone*	*3, 7, 27, 19, 17, 23, 24*
Body Systems		
*Body Temperature**	*Temperature*	*4, 6, 27*
Digestion	Conductivity, Colorimeter & Turbidity	17-18
*Heart Rate**	*Heart Rate*	*5, 19, 21*
Kidney Function	Conductivity, Colorimeter & Turbidity	4, 6, 27
*Lungs**	*Pressure*	*25*
*Muscles**	*Pressure*	*25*
Reflexes	Motion	22-23
Venous Blood Flow*	Heart Rate, Blood Pressure	15, 19, 21, 16
Cell Structure and Function		
Cells and Cell Components	Digital Microscope	21
Diffusion	Colorimeter	17
*Fermentation**	*Temperature, Pressure, CO_2*	*4, 6, 17, 25, 27*
Microorganisms	Digital Microscope	21
*Photosynthesis**	*Light, Pressure, pH, CO_2, O_2, Photosynthesis Tank*	*6, 22, 24, 17, 23, 25*
Respiration	pH	24
Tissues	Digital Microscope	21
Diversity of Life		
Bacteria	Digital Microscope	21
*Effects of Acid Rain**	*pH*	*24*
Fungi	Digital Microscope	21
Plants	Digital Microscope	21
Protists	Digital Microscope	21
*Transpiration**	*Weather with GPS*	*3, 7, 27*
Human Health		
*Effects of Acid on Teeth**	*pH*	*24*
Exercise	Heart Rate, Breath Rate	15, 19, 21, 16
Interaction of Living Things		
Adaptations	Temperature	4, 6, 27
Matter & Energy in the Environment		
Abiotic Factors	Weather with GPS, Colorimeter & Turbidity	3, 7, 27, 17
Carbon Cycle	CO_2	17
Composting	Temperature, CO_2	4, 6, 17, 27
*Condensation and Evaporation**	*Weather with GPS*	*3, 7, 27*
Water Quality	pH, CO_2, O_2, Conductivity, Flow Rate, Colorimeter & Turbidity	17, 18, 20, 24

The topics with an asterisk (*), at left, are FREE labs available in the PASCO Digital Library.

For more information go to pasco.com

Wireless Life Science Starter Bundle *(Use to perform 11 of the digital labs on opposite page.)*

PS-3304A

1. Wireless pH PS-3204
2. Wireless Pressure PS-3203
3. Wireless Hand Grip Heart Rate PS-3206
4. Wireless Temperature PS-3201
5. Wireless Light PS-3213

What Earth Science topics would you like to measure?

Topic	Sensor or Kit	Page
Atmosphere		
*Atmosphere**	*Weather with GPS, CO_2, O_2*	*3, 7, 17, 27*
Convection	Temperature, Density Circulation Model	4, 6, 18, 27
Dynamic Earth		
*Seismic Waves**	*Light, Density Circulation Model*	*6, 18, 22*
Earth–Moon–Sun System		
*Night and Day**	*Light*	*6, 22*
Seasons*	Light, Temperature	4, 6, 18, 22, 27
Earth's Structure		
*Soil**	*pH, Conductivity*	*18, 24*
Human Impact on the Environment		
Water Quality	pH, CO_2, O_2, Conductivity, Flow Rate, Colorimeter & Turbidity	17, 18, 20, 24
Rocks and Minerals		
*Effects of Acid Rain**	*pH*	*24*
Water and Oceans		
*Condensation and Evaporation**	*Weather with GPS*	*3, 7, 27*
*Mapping the Ocean Floor**	*Light*	*6, 22*
Salinity	Conductivity	18
Weather and Climate		
*Climate**	*Temperature*	*4, 6, 27*
*Cloud Conditions**	*Weather with GPS*	*3, 7, 27*
Greenhouse	Temperature, EcoZone	4, 6, 19, 27
Landforms	Temperature	4, 6, 27
*Weather Conditions**	*Weather with GPS*	*3, 7, 27*

The topics with an asterisk (*), at left, are FREE labs available in the PASCO Digital Library.

For more information go to pasco.com

Wireless Earth Science Starter Bundle *(Use to perform 11 of the digital labs on opposite page.)*

PS-3305A

1. Wireless pH PS-3204
2. Motion Sensor* PS-2103A
3. Wireless Light PS-3213
4. Wireless Weather Sensor with GPS PS-3209
5. Wireless Temperature PS-3201
6. AirLink PS-3200

**For wireless connectivity, this sensor requires the AirLink (included in the bundle).*

Looking for more teacher resources?

Our collection of Middle School Earth Science Teacher Resources is fully electronic and ready for download. It includes lab preparation information, teacher tips, assessment, an editable Word® version of student handouts, answer key, and much more. And the student version is FREE!

Middle School Earth Science Teacher Resources

PS-3851

The electronic content includes lab preparation information, teacher tips, assessment, an editable Word® version of student handouts, answer key, and much more.

What Physical Science topics would you like to measure?

Topic	Sensor or Kit	Page
Chemistry		
*Boyle's Law**	*Pressure*	*25*
*Reaction Rates**	*Temperature, Pressure*	*4, 6, 25, 27*
Electricity and Magnetism		
Batteries	Voltage	27
Circuits	Circuit Kit	22
Conductors and Insulators	Voltage, Circuit Kit	22, 27
Current	Voltage, Circuit Kit	22, 27
Electromagnetism	Voltage	27
Magnets	Force	20
Static Electricity	Voltage	27
*Voltage**	*Voltage, Circuit Kit*	*22, 27*
Energy		
Conservation of Energy	Motion	23
*Convection**	*Temperature, Density Circulation Model*	*6, 18, 22*
*Endothermic Reactions**	*Temperature, Pressure*	*4, 6, 25, 27*
*Evaporative Cooling**	*Temperature*	*4, 6, 27*
*Exothermic Reactions**	*Temperature, Pressure*	*4, 6, 25, 27*
*Heat Transfer**	*Temperature*	*4, 6, 27*
*Light Intensity**	*Light*	*6, 22*
*Radiation**	*Temperature*	*4, 6, 27*
*Solar Energy**	*Light, Temperature*	*4, 6, 22, 27*
*Temperature**	*Temperature*	*4, 6, 27*
*Thermal Conductivity**	*Temperature*	*4, 6, 27*
Light		
Electromagnetic Spectrum	Light	6, 22
*Light Intensity**	*Light*	*6, 22*
Light Refraction	Light	6, 22
Light Scattering	Light	6, 22
Vision	Human Eye Model	21

Topic	Sensor or Kit	Page
Matter		
Chemical Changes	Temperature, Pressure	4, 6, 25, 27
*Conservation of Matter**	*Temperature, Pressure*	*4, 6, 25, 27*
*Freezing Point Depression**	*Temperature*	*4, 6, 27*
*Phase Changes**	*Temperature*	*4, 6, 27*
Motion and Forces		
*Acceleration**	*Motion + Force or Smart Cart*	*20, 23, 26*
Air or Fluid Pressure	Pressure	25
*Buoyancy**	*Force*	*20*
Distance vs. Time	Motion or Smart Cart	23, 26
Force	Force or Smart Cart	20, 26
Gravity	Motion or Smart Cart	23, 26
*Inertia**	*Motion or Smart Cart*	*23, 26*
*Newton's First Law**	*Motion + Force or Smart Cart*	*20, 23, 26*
Newton's Second Law	*Motion + Force or Smart Cart*	*20, 23, 26*
*Newton's Third Law**	*Motion + Force or Smart Cart*	*20, 23, 26*
*Speed**	*Motion or Smart Cart*	*23, 26*
*Velocity**	*Motion or Smart Cart*	*23, 26*
Solutions, Acids, and Bases		
*Changes in pH**	*pH*	*24*
Concentration	Colorimeter	17
*Effects of Acid Rain**	*pH*	*24*
Oxidation	Temperature, pH, Light	4, 6, 17, 24, 27
Salts	pH, Conductivity, Colorimeter & Turbidity	17, 18, 24
Solubility	Colorimeter & Turbidity, Temperature, Conductivity	4, 6, 17, 18, 27
*Solutions**	*Conductivity, pH, Colorimeter & Turbidity*	*17, 18, 24*
Sound		
Echoes	Sound Level	26
Sound Energy	Sound Level	26
Sound Speed	Sound Level	26
Waves		
Frequency	Motion	23
*Harmonic Motion**	*Motion*	*23*
Wavelength	Motion	23
Waves	Motion	23
Work, Energy, and Machines		
Compound Machines	Force	20
Kinetic Energy	Motion + Force or Smart Cart	20, 23, 26
*Mechanical Advantage**	*Force*	*20*
Mechanical Energy	Motion	23
Power	Motion + Force or Smart Cart	20, 23, 26
Pulleys	Force	20
*Simple Machines**	*Force*	*20*
*Work**	*Force*	*20*

The topics with an asterisk (*), at left, are FREE labs available in the PASCO Digital Library.

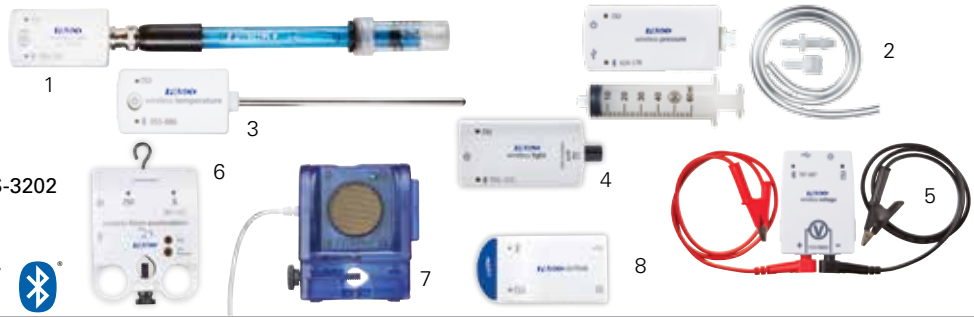
For more information go to pasco.com

Wireless Physical Science Starter Bundle *(Use to perform all digital labs on opposite page.)*

PS-3306

1. Wireless pH PS-3204
2. Wireless Pressure PS-3203
3. Wireless Temperature PS-3201
4. Wireless Light PS-3213
5. Wireless Voltage PS-3211
6. Wireless Force Accelerometer PS-3202
7. Motion Sensor* PS-2103A
8. AirLink PS-3200

**For wireless connectivity, this sensor requires the AirLink (included in the bundle).*



Wireless Sensors

PASPORT Sensors

Make all your sensors wireless!

AirLink

PS-3200

Includes one PASPORT sensor port, USB and Bluetooth® connectivity, and USB cable.

Other Equipment

Blood Pressure Sensor

Measure blood pressure simply and accurately. Wrap the cuff around the arm of a student and pump air into the cuff with the inflation bulb. Release the bulb and within seconds see systolic (maximum) and diastolic (minimum) pressures alongside heart rate. Cuff pressure also reported (see meter display in screen at right).

When students measure their own blood pressure the concept becomes much more exciting and productive.

The meter and digits displays provide a clear and easy way to observe heart rate plus systolic and diastolic blood pressure.

Blood Pressure Sensor

PS-2207

Includes a sensor and a standard-size arm cuff with inflation bulb.

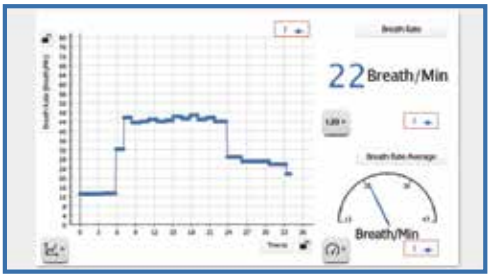
Also Available:

Standard-size Cuff Only PS-2532
Small Cuff Only PS-2531
Large Cuff Only PS-2533

Breath Rate Sensor

Measuring breath rate is as easy as breathing. Study physical fitness by measuring breath rate before, during, and after exercise. Add our Hand-Grip Heart Rate Sensor and Blood Pressure Sensor for a more complete study of exercise physiology.

Determine breath rate while exercising.



A graph showing a student's breath rate before, during, and after exercise.

Breath Rate Sensor

PS-2187

Includes Masks (10) and Clips (10).

Also available:

Replacement Masks (10 Pack) PS-2567
Replacement Clips (10 Pack) PS-2568

AirLink

PS-3200

Includes one PASPORT sensor port, USB and Bluetooth® connectivity, and USB cable.

USB Bluetooth® 4.0 Adapter

PS-3500

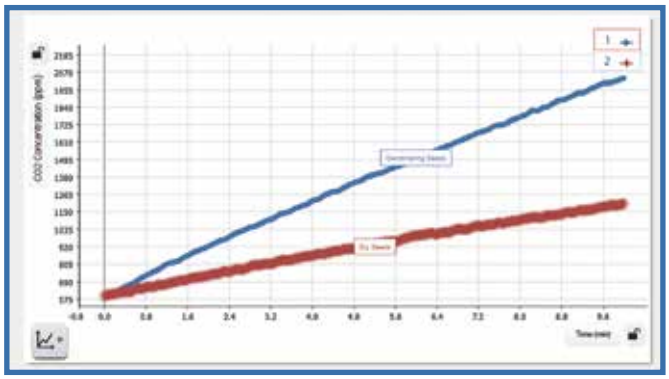
10-port USB Charging Station

PS-3501

Wireless CO_2 Sensor

2017 AWARDS of EXCELLENCE TECH & LEARNING

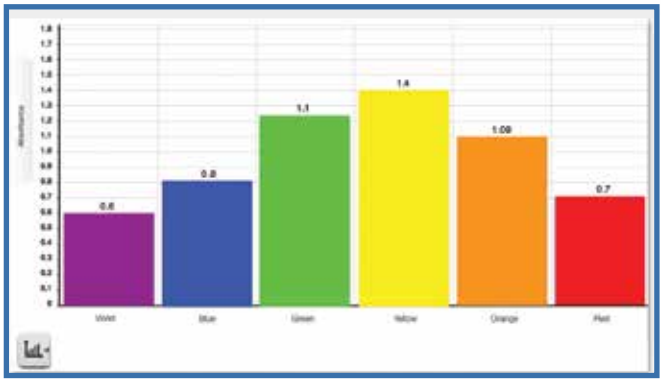
Use this wireless sensor to measure the concentration of CO_2 gas in a closed system or open environment. Study core topics (including photosynthesis, respiration, and carbon cycling) with this versatile probe. CO_2 data can be logged directly on the device for long-term life science and environmental science studies.



Directly compare separate controlled environments.

NEW Wireless Colorimeter and Turbidity

The Wireless Colorimeter can measure absorbance and transmittance at six different wavelengths. Each wavelength represents a region of the ROYGBV color wheel. Measure the colors of a solution to introduce the principles of spectroscopy, relate absorbance to concentration, and study reaction rates. The colorimeter also functions as a turbidimeter for water quality analysis by measuring the scattering effect of suspended particles.



Measure the absorbance and transmittance of a solution at six different wavelengths... simultaneously!

Wireless CO_2 Sensor

PS-3208

Includes 250-ml sampling bottle and USB charging cable. Wireless sensors connect directly to most classroom devices. *See page 9 for details.*

Also available:
Dissolved CO_2 Waterproof Sleeve PS-3545

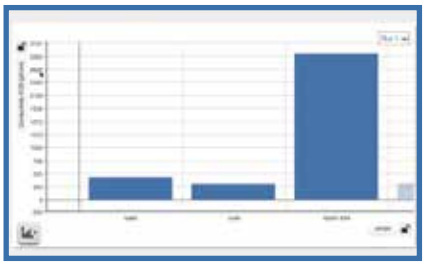
Wireless Colorimeter and Turbidity

PS-3215

Includes USB charging cable, 9 cuvettes, cuvette holder, and 100 NTU calibration cuvette.

Wireless Conductivity Sensor

Use the Wireless Conductivity Sensor to measure the electrical conductivity of a water solution. With this wireless sensor you can investigate the properties of solutions, as well as model and measure water quality.



Measure the conductivity of water and water-based solutions.

Features

- Measure both conductivity and total dissolved solids
- Automatic temperature compensation
- Dust- and sand-proof and water-resistant (1 meter for 30 minutes)
- Battery life >1 year

Wireless Conductivity Sensor

PS-3210

Includes 1 coin cell battery. Wireless sensors connect directly to most classroom devices.
See page 31 for details.

Density Circulation Model

The PASCO Density Circulation Model helps students understand the complex density-driven circulation associated with heat transfer through convection.

With this model and a temperature sensor, students can investigate:

- Vertical ocean currents
- Upwelling
- Tropical vs. polar water bodies
- Thermocline and halocline
- Convection
- Inversions

As students open the valves, convection-driven circulation begins and the water types begin to layer—even for very small temperature/density differences.

Density Circulation Model

ME-6816

EcoZone™ System

The PASCO EcoZone System consists of three chambers that can be interconnected or used independently. Because the system remains closed and is designed to accommodate PASPORT sensors, students will collect accurate data with minimal impact on the ecosystem.

A basic lab activity uses two of the chambers separately to measure O_2 and CO_2 levels, one chamber containing plants and one containing plants and crickets. Students see how the presence of animals affects the concentration of oxygen and carbon dioxide in the system.

Use the traditional terrestrial, aquatic, and decomposition arrangement to create your unique biome space and collect the data you want. The openings within the chambers allow air to circulate between the chambers, and the included cord efficiently wicks water and ions between the chambers.

No more cutting up plastic bottles! With the EcoZone System, you can easily create isolated ecosystems or interconnect up to three ecosystems.

- Connect three different environments together (terrestrial, aquatic and decomposition) and observe the interaction.
- Add animals (crickets) to an environment and measure effect of respiration.

EcoZone™ System

ME-6668

Includes 3 EcoChambers, tray, rubber stoppers, syringe, tubing and wicking cord.

Also available:

EcoChamber
ME-6667

NEW Wireless Exercise Heart Rate Sensor

Exercise Heart Rate Sensor

PS-3207

Includes Bluetooth® Heart Rate Module with one coin-cell battery and chest strap (M-XXL).

EKG Sensor

Take the mystery out of that old medical show staple by letting students measure and record the electrical signals produced by the heart. Students can use it to measure their heart rate, and then explore the effects mild exercise has on heart rate.

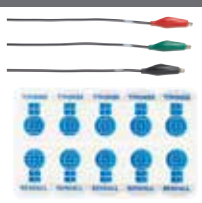
The Teaching Advantage

- Three-electrode design is easy to use.
- Electrodes are contained in disposable stick-on pads, eliminating the need for messy gels.

EKG Sensor

PS-2111

Includes 100 self-adhesive electrode patches.



Also available:

EKG Sensor Electrode Patches (100-pack; one-year shelf life) CI-6620

Flow Rate/Temperature Sensor

Measure the temperature and flow rate of streams, rivers, and other flowing bodies of water. Explore how geographic features can affect water flow, determine sediment transport rate, or map out flow rates and temperatures at different locations and depths in a stream.

The built-in temperature sensor is located next to the impeller to better correlate temperature and flow rate data.

Flow Rate/Temperature Sensor

PS-2130

AirLink

PS-3200

Includes one PASPORT sensor port, USB and Bluetooth® connectivity, and USB cable.

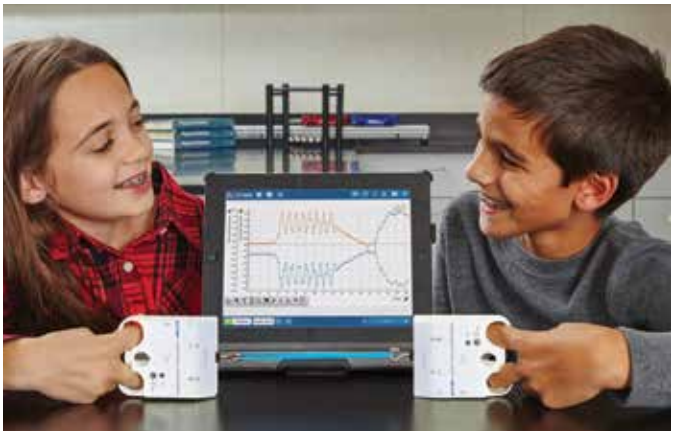
PASCO's 5-Year Warranty

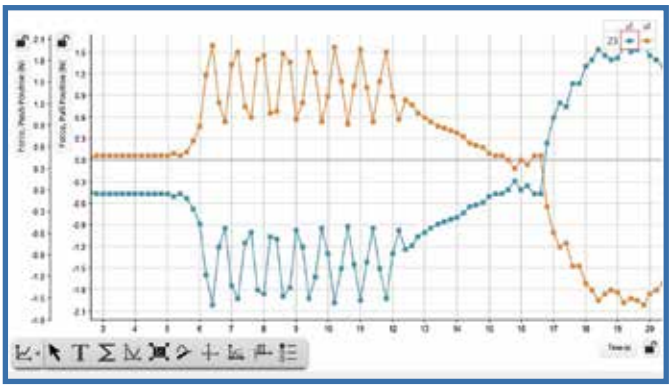
To withstand the rigors of student use, PASCO products are made of the highest quality materials.

They are designed and manufactured by our team of education researchers and engineers in Roseville, California. And we back up our products with a 5-year warranty, so you can be completely confident about buying PASCO solutions.

Wireless Force Acceleration Sensor

Capable of measuring force, acceleration, and rotation, this sensor is ideal for experiments involving Newton's Laws. The wireless design offers improved measurements without a cable affecting experiment outcome. Finger-holes support handheld applications, or mount it onto a cart or rod.





The Wireless Force Acceleration Sensor can also be mounted on a cart.

Wireless Force Acceleration Sensor

PS-3202

Includes 1 eye bolt, 1 thumb screw, 1 bumper, a lithium-ion battery, and a USB connector. Wireless sensors connect directly to most classroom devices.
See page 31 for details.

NEW Wireless Hand-Grip Heart Rate Sensor

Using the new wireless Hand-Grip Heart Rate Sensor, it's easier than ever before to conduct physiology labs on the cardiovascular system or homeostasis. Use this sensor for a quick and easy way to acquire wireless measurement for either continuous monitoring or initial vs. final data points. When the activity requires students to use their hands, the Wireless Exercise Heart Rate Sensor has a chest strap and will transmit data wirelessly up to 10 m away!

Wireless Hand-Grip Heart Rate Sensor

PS-3206

Includes hand-grips and Bluetooth® Heart Rate Module with one coin-cell battery.

Human Eye Model

PASCO's 3-D Human Eye Model is a great tool to use to study optics. It includes two lenses (the crystalline eye lens and the corneal lens) that are used to form images on the retina. The sealed tank holds water to simulate the vitreous humor. And the size and orientation of illuminated objects can be easily measured.

With the Human Eye Model you can:

- Study the optics of normal vision and vision correction.
- Change the crystalline lens so the eye can focus on both near and far objects.
- Use the movable retina to demonstrate near-sightedness, far-sightedness, and normal vision with the movable retina.
- Vary the pupil size so students can observe the change in brightness and clarity of an image as the pupil size is reduced.

The Human Eye Model can image any illuminated picture.

Human Eye Model

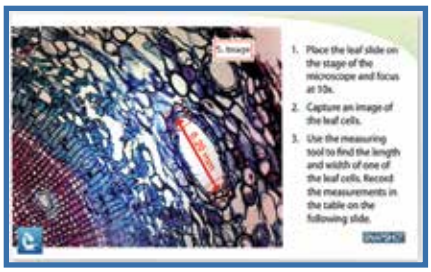
OS-8477A

Includes molded plastic eyeball, plastic lenses (two sets of 6), pupil aperture, adjustable focal lens, retina screen, optics caliper (1), syringe, and experiment manual.

SPARKvue supports digital microscopes on Mac® and Windows® computers

SPARKvue's digital imaging capabilities support a wide variety of USB imaging devices, including most modern digital microscopes and webcams. So your students can collect sensor data and capture and analyze images, all in your SPARKvue software.

The kena® Digital Microscope performs in the classroom or the field. The removable camera/magnification head fits snugly in your hand or onto the sleek, sturdy metal base. The USB-powered LED lighting on top and the battery-powered LED light on the bottom increase clarity for viewing slide specimens. The silicone non-slip stage pad eliminates the need for stage clips. This is an ideal digital microscope for your middle school science program!



With a simple calibration, the measurement tool can make on-screen measurements to make microscopy quantifiable.

kena® Digital Microscope

SE-7236

Includes a removable camera/magnification head, touch tube (for placing the microscope flush against specimens), sturdy metal base, and convenient carry/storage bag. Magnification: 20x, 40x, 100x.

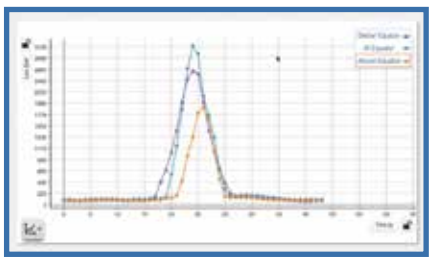
For use with SPARKvue:
Requires a Mac or Windows computer that has SPARKvue version 1.3 or later.

Wireless Light Sensor

This wireless sensor is a great tool for explorations in Earth, Life, and Physical sciences. With its ambient light detector for illuminance and UV, and its directional detector for colors, your students can explore the electromagnetic spectrum, model planetary motion, and relate photosynthesis to light color and intensity.

Makes all these measurements:

- Illuminance (lux)
- UVA, UVB, and UV Index
- RGB color detection
- Battery life >1 year



Wireless Light Sensor

PS-3213

Includes 1 coin cell battery.

Modular Circuits

2017 AWARDS of EXCELLENCE TECH & LEARNING

These circuit modules are designed specifically for introductory circuits labs. For students who have never wired a circuit, this modular system makes it easy for them to see the layout because it ends up looking like a circuit diagram.

Basic Modular Circuits Kit

EM-3535

This kit comes in a Gratnells® case with a tray that organizes the modules.

Required:

2 AA Batteries
SPARKvue Software See page 5

Also available separately:

Wireless Current Sensor Module EM-3534
Wireless Voltage Sensor PS-3211

MatchGraph Kit

With this state-of-the-art graphing kit, you can engage your students with a hands-on experience that is centered on motion. Give them a deeper understanding of graphing and interpreting motion graphs as they see motion graphed in real time!

MatchGraph!™

Download the free app

for Mac®, Android™, and Windows® computers at pasco.com.
Or download the free iPad app on the App Store.

Download on the App Store

MatchGraph Kit

UI-5822A

Includes MatchGraph software, a Motion Sensor, and the latest AirLink.

Also available separately:

Motion Sensor PS-2103A
AirLink PS-3200

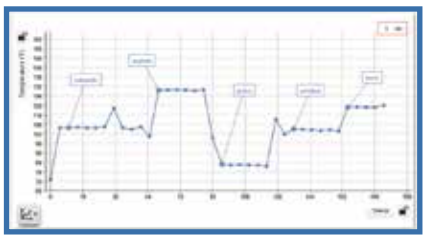
Non-Contact Temperature Sensor

This sensor detects infrared light and records the temperature of objects without having to touch them. Compare different surfaces and compare the temperature results based on composition and amount of direct sunlight, even record the temperature as ice warms and melts.

The Teaching Advantage

- Quick-response time speeds data collection
- Wide temperature range and 0.5°C resolution allows a wide variety of surfaces to be studied

Students can create a temperature profile of a surface or building with the Non-Contact Temperature Sensor.



Temperature profile provides a great foundation for discussion of insulation, energy conservation, and more.

Non-Contact Temperature Sensor

PS-2197

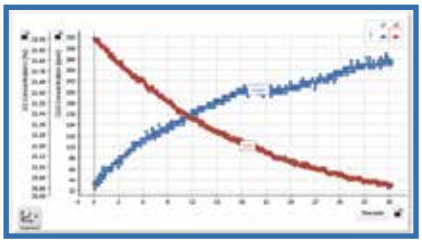
Oxygen Gas Sensor

Use this sensor for any experiment requiring the measurement of oxygen levels, such as the study of photosynthesis, animal and insect respiration, and gas production during chemical reactions. Combine with our CO_2 Sensor to also monitor conditions within a terrarium or perform simple physiological studies.

The Teaching Advantage

- Automatically compensates for temperature
- Calibrates in one step with the touch of a button

Include the Oxygen Gas Sensor with the Ethanol Sensor to fully investigate fermentation.



Analyze oxygen gas consumption and carbon dioxide gas production of the pea seeds.

Oxygen Gas Sensor

PS-2126A

Includes integrated rubber stopper and 250 ml sampling bottle with cap.

Ohaus Electronic Balances

Ohaus Scout SKX digital electronic balances combine range, resolution, and low cost, making them ideal for the student lab.

Simple two-button operation and visual menu prompts allow students to begin weighing with minimal instruction. The large, crisp display is easily viewed from any angle, so teachers can quickly check student results.

A sealed front panel, molded spill ring, and removable stainless steel platforms provide protection from spills and make these balances easy to keep clean.

Ohaus Scout SKX Balances

SE-8823A (220 g)
SE-8756B (420 g)
SE-8757B (2200 g)
SE-8758B (8200 g)

Specifications available at pasco.com

Optical Dissolved Oxygen Sensor

PASCO's Optical Dissolved Oxygen Sensor makes it easier than ever before to measure dissolved oxygen in the field or in a lab environment. The luminescent technology has several advantages over a galvanic dissolved oxygen sensor including:

- There is no warm-up time.
- No calibration is required
- It is low maintenance (no filling solution and electrode polishing).
- There is a built-in temperature and pressure compensation

Specifications:

Cable Length: 3 m
Response Time: 90% in 25 sec
Operating Temperature: 0–50°C
Operating Pressure: 375–825 mmHg
Range: 0–20 mg/L or 0–300% saturation
Accuracy: ±0.6 mg/L or ±3.0% out of box ±0.1 mg/L or ±1.0%, whichever is greater after calibration
Above 200% ± 10%

Optical Dissolved Oxygen Sensor

PS-2196

Also available:

Optical Dissolved Oxygen Sensor Metal Guard

The metal guard protects the probe tip from damage and weighs down the probe for making measurements at depth. It is made of stainless steel and resists corrosion.

PS-2588

Optical Dissolved Oxygen Sensor Cap

This replacement sensor cap for optical dissolved oxygen sensor has a 12-month warranty.

PS-2587

Wireless pH Sensor

Using PASCO's Wireless pH Sensor, students can measure the pH of different juices without the hassle or mess of indicator solutions or pH paper. And the results are incredibly accurate and readable, making it easy to compare the acidity of different samples.

The advantage of using PASCO sensors and SPARKvue software is that the ease of data collection means that there's plenty of additional time for further investigation or classroom discussion.

Students measure the pH of different juices using the pH probe of the Chemistry Sensor.

Display pH in digits, graphs, tables, or bar charts, so your students can get the most out of their measurements.

Wireless pH Sensor

PS-3204

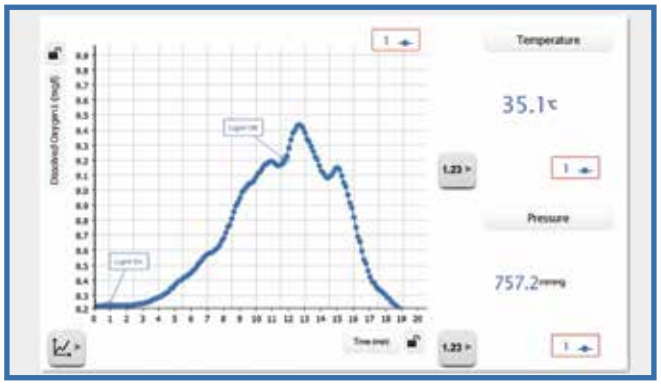
Includes 1 coin cell battery and a direct-connect pH probe with storage bottle.

Photosynthesis Tank

No inferred measurements or messy indicators needed! Students make direct measurements of dissolved oxygen and investigate the photosynthetic activity of an aquatic plant. With the Photosynthesis Tank and sensors, it is easy to collect accurate data and investigate a complex process.

Turning the light on and off creates an easily analyzed graph in real-time, showing the relationship between light and the rate of oxygen production. No longer will you have to tell students: "what you should have seen was. . ." SPARKvue illustrates the plant's activity with light on and off on a graph that is easily analyzed.

The Photosynthesis Tank has two concentric Plexiglas® chambers. This unique design allows students to control the environment without interfering with the measurements.



Dissolved oxygen increases when light shines on the plant and decreases when it is turned off.

Photosynthesis Tank

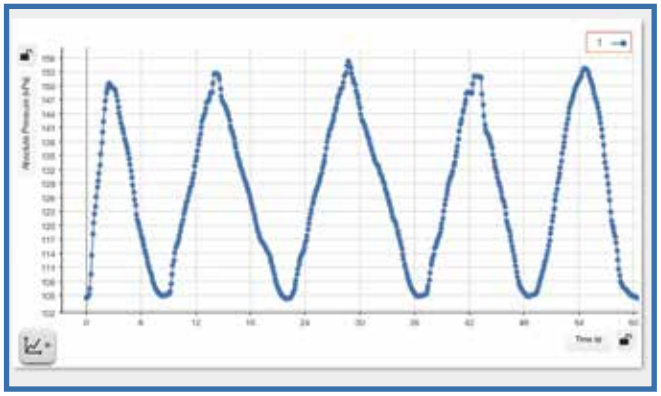
PS-2521B

Includes Photosynthesis Tank, large #14 stopper with sensor ports, and 2 small #3 stoppers.

Wireless Pressure Sensor

In this activity, students create a model of a lung by attaching a syringe to the Metabolism Chamber. Pushing or pulling on the syringe changes the volume of the model's "chest cavity". Using a Wireless Pressure Sensor, students can measure the changes in air pressure inside the model's "lung" and create a graph of their results to fully explore how we breathe.

Students examine how air pressure and changes in air pressure allow us to breathe.



The graph demonstrates that as the pressure in the chest cavity decreases, the air volume in the lung increases.

Wireless Pressure Sensor

PS-3203

Includes 2 feet of polyurethane plastic tubing, 1 tube connector, 2 male barb connectors, 1 female barb connector, 1 60cc syringe, a lithium-ion battery, and a USB connector.

Recommended for use with:

Metabolism Chamber ME-6936

Smart Cart

ME-1240 (Red)

ME-1241 (Blue)

PASCO brings Bluetooth® technology to the study of dynamics! The wireless PASCO Smart Cart is designed to measure its own movement and the forces that are pushing or pulling on it. It is a dynamics cart with integrated motion, force, acceleration, and rotation sensors that connect wirelessly through a single Bluetooth connection to a computer, tablet, or Chromebook™.

PASCO's Smart Cart connects to SPARKvue like any other PASCO wireless sensor.

Our patent pending Smart Cart has already been named as a finalist for the GESS Innovative Product Award. Get the full details on the Smart Cart at **www.pasco.com/smartcart/tpt**

Smart Cart

ME-1240 (Red)

ME-1241 (Blue)

Wireless sensors connect directly to most classroom devices. *See page 31 for details.*

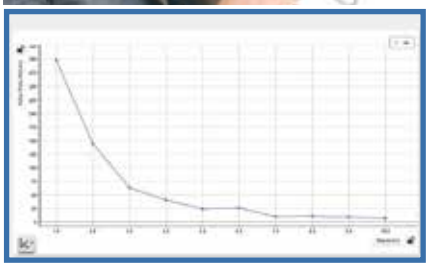
Sound Level Sensor

How loud is too loud? Study noise pollution, explore the difference between loudness and intensity, and determine how distance from a sound source affects loudness.

The Teaching Advantage

- Three ranges allow data collection from quiet whispering to the loudness of a jet aircraft
- Measures sound in dB, with the dBA scale for quieter sounds and the dBC scale for louder sounds
- Measures both level (loudness in dB) and intensity (energy over a given area in microwatts per square meter)

Use a musical instrument to distinguish between sound level and pitch.



A graph of sound level shows minimal change even though the pitch slides up and down the scale.

Sound Level Sensor

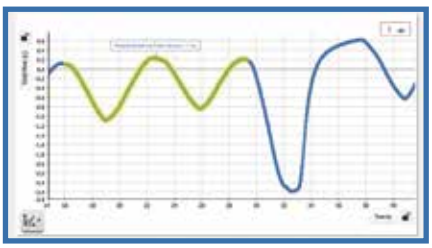
PS-2109

Spirometer Sensor

With the Spirometer Sensor, you can test your lung power and learn about the respiratory system.

With this sensor students can collect accurate airflow data from a pulmonary function test and create graphs to measure airflow, pressure, duration, and lung volume. The mouth piece and sensor are designed for safely and accurately measuring both airflow out (expiration) and airflow in (inspiration). Compare airflow before and after exercise or even determine total lung capacity.

A student uses the spirometer to measure his lung volume. He observes the difference in the volume of his lungs when breathing normally vs. forced breathing.



The volume of the lungs increases when inhaling air into the lungs.

Spirometer

PS-2152

Includes 2 disposable mouth pieces

Wireless Temperature Sensor

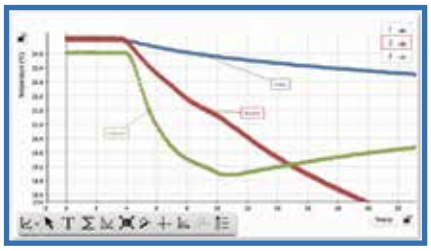
This durable, high-resolution sensor covers many temperature experiments. The Wireless Temperature Sensor measures small but significant temperature changes produced by chemical reactions, convection currents, and even skin temperatures.

The Teaching Advantage

- Includes fast sampling rate for small temperature changes such as convection or skin temperature.
- No calibration required: just connect and measure.
- Features convenient Bluetooth® wireless connectivity and long-lasting coin cell battery.
- Logs temperature data directly onto the sensor for long-term experiments.

Specifications:

Range: -40°C to 125°C
Resolution: 0.01°C
Accuracy: 0.5°C
Battery: Coin cell
Logging: Yes
Bluetooth: BT 4.0



Wireless Temperature Sensor

PS-3201

Includes 1 coin cell battery. Wireless sensors connect directly to most classroom devices. See page 9 for details.

Wireless Voltage Sensor

Explore energy and energy transformations with this Wireless Voltage Sensor. Use the sensor to:

- Measure the voltage of student constructed batteries and see how chemical energy can turn into electrical energy.
- Look at renewable energy by connecting to a wind turbine
- Track the flow of energy by creating simple circuits.

Wireless Voltage Sensor

PS-3211

Includes 1 coin cell battery. Wireless sensors connect directly to most classroom devices. See page 21 for details.

AirLink

PS-3200

Includes one PASPORT sensor port, USB and Bluetooth® connectivity, and USB cable.

NEW Wireless Weather Sensor with GPS

Use this multimeasure sensor to monitor 17 different measurements including common weather, location, and light. Study microclimates, monitor environmental conditions during indoor or outdoor labs, or place the sensor outside for extended monitoring, because of its durable, water-resistant design and internal memory.

Wireless Weather Sensor with GPS

PS-3209

Includes USB charging cable.

Also available:

Weather Vane Accessory PS-3553

Middle School Bundles

Wireless Life Science Starter Bundle *(Use to perform 11 of the digital labs on opposite page.)*

PS-3304A

1. Wireless pH PS-3204
2. Wireless Pressure PS-3203
3. Wireless Hand-Grip Heart Rate PS-3206
4. Wireless Temperature PS-3201
5. Wireless Light PS-3213

Wireless Earth Science Starter Bundle *(Use to perform 11 of the digital labs on opposite page.)*

PS-3305A

1. Wireless pH PS-3204
2. Motion Sensor* PS-2103A
3. Wireless Light PS-3213
4. Wireless Weather Sensor with GPS PS-3209
5. Wireless Temperature PS-3201
6. AirLink PS-3200

**For wireless connectivity, this sensor requires the AirLink (included in the bundle).*

Wireless Physical Science Starter Bundle *(Use to perform all digital labs on opposite page.)*

PS-3306

1. Wireless pH PS-3204
2. Wireless Pressure PS-3203
3. Wireless Temperature PS-3201
4. Wireless Light PS-3213
5. Wireless Voltage PS-3211
6. Wireless Force Accelerometer PS-3202
7. Motion Sensor* PS-2103A
8. AirLink PS-3200

**For wireless connectivity, this sensor requires the AirLink (included in the bundle).*

Wireless Middle School Science Standard Sensor Bundle *(Use to perform all Life, Earth, and Physical Science digital labs.)*

PS-3307A

1. Wireless pH PS-3204
2. Wireless Temperature PS-3201
3. Wireless Pressure PS-3203
4. Wireless Voltage PS-3211
5. Wireless Light PS-3213
6. Wireless Force Accelerometer PS-3202
7. Wireless Hand-Grip Heart Rate PS-3206
8. Wireless Weather Sensor with GPS PS-3209
9. Motion Sensor* PS-2103A
10. AirLink PS-3200
11. Wireless Conductivity PS-3210

**For wireless connectivity, this sensor requires the AirLink (included in the bundle).*

877.373.0300 (inside US) 916.462.8383 (outside US)

A whole team behind you

Serving educators isn't just what we do, it's who we are.

PASCO is a proud recipient of the 2016 Tech & Learning Stellar Service Award!

From the production line to our shipping department, from our marketing team to our Professional Development group, we are a company of science teachers, education experts, and other professionals who are committed to making a difference in science education. We succeed by helping you succeed.

If you have PASCO products in your classroom or lab, we want you to know that we are always here if you have questions or challenges or need direction.

Need help getting started? Our Education Consultants are the best first point of contact and in a position to understand your needs, whether you are a classroom teacher, a district supervisor, or head of a ministry of education.

Our Customer Support Team can also answer any questions about products or orders. And our Teacher Support Staff is always ready with answers to your questions or they can walk you through any issues. They have a vast knowledge of all PASCO products and can mirror your exact setup to help find solutions.

In short, just tell us what you need and we will do everything we can to help. And remember, ***we stand behind the products we make with our five-year warranty.***

Once our solutions are in your hands, we want you to have the training you need to use them as effectively as possible. Our Professional Development team hosts hands-on workshops around the country. They can also do personalized trainings at your school, or your teachers can come to PASCO for training seminars. And our teacher support does not stop there: We also offer free online trainings and we have an extensive library of free help videos.

Terms and Conditions

The PASCO Promise of Learning (90-day Satisfaction Guarantee)

We are confident that PASCO solutions will help your students achieve more in science. Within the first 90 days, if you are not satisfied that your students are more engaged and learning more effectively, return your purchase for a refund. We don't want you spending precious budget dollars on something you don't use. (We are sorry but we must exclude non-PASCO software that has been opened, radioactive products and products that contain perishables.) See instructions for Returns below.

PASCO 5-Year Limited Warranty for Education

PASCO products are built to survive. PASCO-manufactured products are covered by a limited warranty for a period of 5 years from delivery date against defects in material and workmanship. This warranty is valid for educational institution customers and only for educational use of these products. The PASCO warranty does not extend to any product, including touch screens, which have been subject to abuse, neglect, accident, improper installation or application, or products that have been repaired or altered outside of our factory. Consumables and limited-life products (such as pH probes, membranes, fast response temperature probes, batteries, chemical solutions, printed materials, etc.) are excluded.

Other Warranty Terms

Products manufactured by anyone other than PASCO are subject to the conditions of the warranty supplied by the manufacturer (generally 1 year). Additional warranty information on our products is available upon request.

Free Teacher and Technical Support

We want teachers to be successful with PASCO solutions. Please contact our support team with any questions via phone or email. We are here to help. See our contact information below.

Contact PASCO

Mail:
PASCO Scientific
10101 Foothills Blvd.
Roseville, CA 95747-7100 U.S.A.

Customer and Order Support:
+1 916-462-8383
sales@pasco.com
custserv@pasco.com

Technical and Teacher Support:
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support@pasco.com

Fax:
+1 916-786-7565

Web Site:
pasco.com

Business Hours:
Monday — Thursday: 7:00 a.m. — 4:30 p.m.
Friday: 7:00 a.m. — 2:00 p.m. Pacific Time

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PASCO Capstone may be purchased as a Single License for use with one computer, or as a Site License for use on all computers on a primary and secondary campus or in a college/university department.

Shipping

Items in stock will normally be shipped in less than seven working days from receipt of the order. Specific request for air shipments or special carriers will be honored at additional cost.

Returns

Please contact the authorized PASCO representative in your country for assistance in returning equipment for repair. PASCO's International Customer Service team can be reached at +1-916-462-8383 or at custserv@pasco.com. Out-of-Warranty products must be shipped prepaid, door-to-door. Returns for credit or exchange must be in new condition and packaged in original shipping cartons or packaging sufficient to prevent damage during international transport.

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More Product Information

Designed for education.

PASCO products are designed for education; they are not intended for use in graduate research or industry, and should not be used in any apparatus involved with life support, patient diagnosis, or industrial control.

PASCO reserves the right to change the specifications of any product without prior notice. If a product is no longer available, PASCO reserves the right to substitute a product of equal, or higher, value and functionality.

FCC

Where appropriate, electrical products are marked to indicate that they conform to Federal Communications Commission (FCC) standards. Most commonly, FCC Part 15, Class A.

CE MARK

Where appropriate, products carry the CE marking which indicates that they conform to the applicable European standards. This almost exclusively applies to products that are designed to meet the following applicable directives:

2004/108/EC	for electromagnetic compatibility (EMC)
2006/95/EC	for low voltage electrical equipment

Other Regulations May Apply

Local, national, and international regulations may restrict the purchase, storage, transport, use or disposal of certain products such as chemicals, radioactive sources, and specialty products and wireless transmission devices. Please consult your local regulations to ensure compliance.

Unless Otherwise Specified:

- Operating Temperature Range: 0°C – 40°C (32°F to 104°F).
- Maximum Altitude (Operational): 10,000 feet
- Recommended Storage Temperature: 10°C to 27°C (50°F to 80°F)

Quality

PASCO Scientific meets the highest quality standards, and our quality management system is registered to ISO 9001.

PASCO and the Environment

PASCO is committed to be in compliance with all laws and requirements in the countries in which our products are sold. PASCO is a responsible steward of the environment and as such, continually seeks to minimize the impact that our manufacturing, distribution, and consumption practices make on the planet's natural resources.

Miscellaneous

The European Union (EU) WEEE (Waste Electrical and Electronic Equipment) symbol (left) and on the product or on its packaging indicates that this product must not be disposed of in a standard waste container.

RoHS All applicable products supplied by PASCO Scientific to the EU meet the requirements as specified in the RoHS directive either by substance limits or by product exemptions.

The battery or batteries used in PASCO products are marked with the European Union symbol for waste batteries (left) to indicate the need for separate collection and recycling.

PASCO

Since 1964

The Global Leader in 21st Century Science Education

Supporting educators in over 100 countries around the world

When you have questions or need service, you want someone who understands your local needs. We carefully select, train, and support local Science Education Partners to serve our customers in each country.

When you work with a PASCO Science Education Partner, have confidence that the entire company here in California is ready to assist our Partner, and you, our Customer.

Designed in California.
Guaranteed by PASCO.
Supported locally.
Serving science educators.

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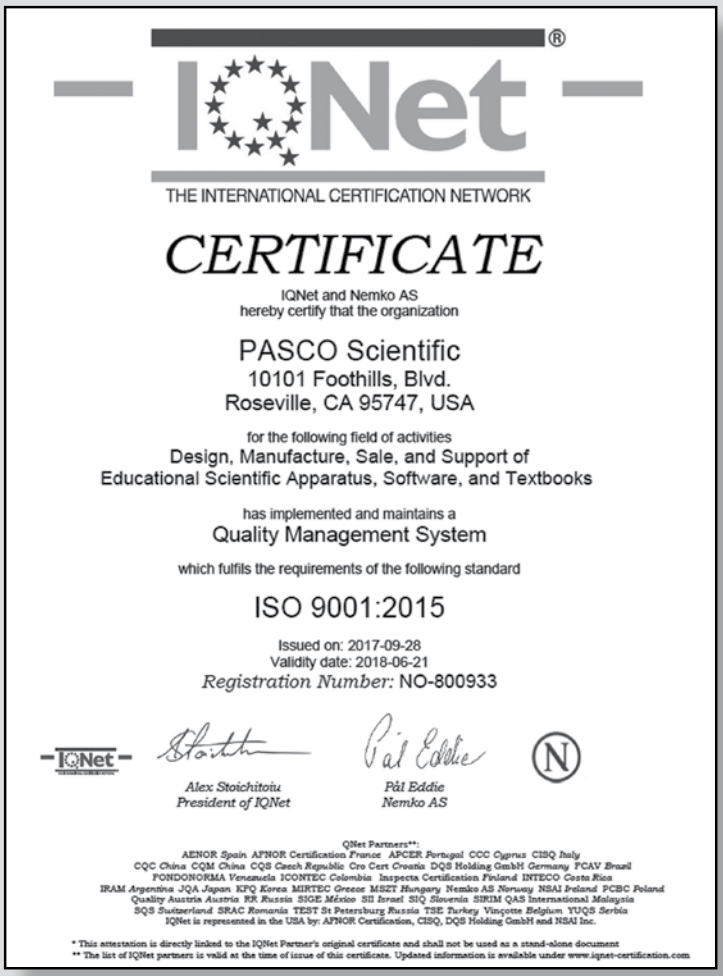
ISO 9001 Certified



IQNet®

THE INTERNATIONAL CERTIFICATION NETWORK

CERTIFICATE

IQNet and Nemko AS
hereby certify that the organization

PASCO Scientific
10101 Foothills, Blvd.
Roseville, CA 95747, USA

for the following field of activities
Design, Manufacture, Sale, and Support of
Educational Scientific Apparatus, Software, and Textbooks

has implemented and maintains a
Quality Management System

which fulfils the requirements of the following standard

ISO 9001:2015

Issued on: 2017-09-28
Validity date: 2018-06-21
Registration Number: NO-800933

Alex Stoichitoiu
President of IQNet

Pål Eddie
Nemko AS

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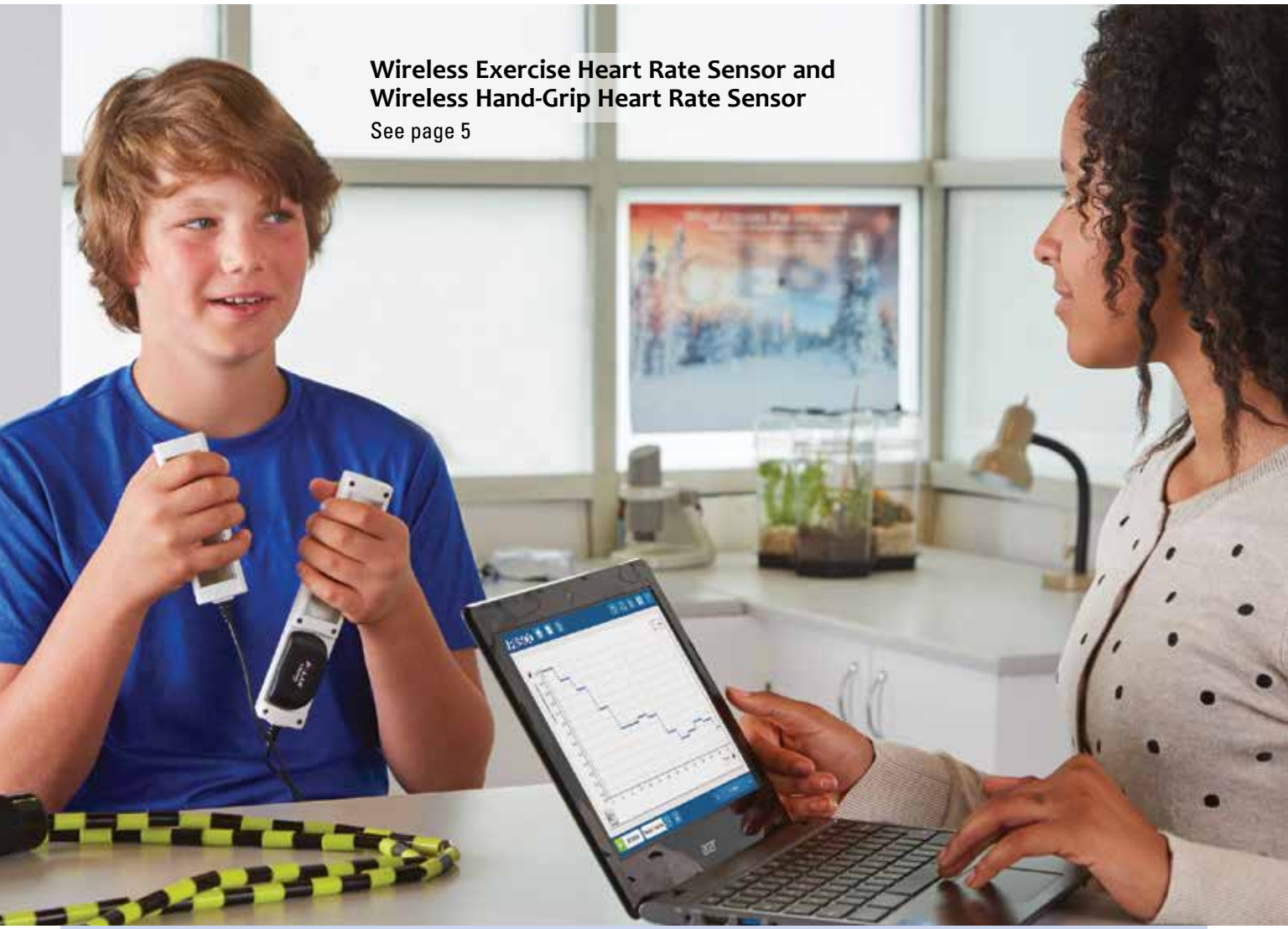
* This attestation is directly linked to the IQNet Partner's original certificate and shall not be used as a stand-alone document
** The list of IQNet partners is valid at the time of issue of this certificate. Updated information is available under www.iqnet-certification.com

Two NEW Sensors to Measure Heart Rate



Wireless Exercise Heart Rate Sensor and Wireless Hand-Grip Heart Rate Sensor

See page 5

Index

The PASCO Support Team: Dedicated to Science Education

Make informed decisions on what equipment best meets your needs! PASCO has fully trained Science Education Partners all around the world who are ready to work with you on equipping your lab in the most cost-effective manner. If you would like an introduction to the Science Education Partner in your country, please contact the sales director below for more information.

John Wayne
Senior Director
International Sales
wayne@pasco.com
+1 916.462.8212

Chris Wilhelm
Sales Director
Western Europe
wilhelm@pasco.com
+1 916.462.8259

Mark Kotlyar
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medina@pasco.com
+1 916.462.8223

PASCO Mission

Providing educators worldwide with innovative solutions for teaching science

Teacher and Technical Support

Melissa Pytlak

BS in Biology from State University of New York Geneseo and an MS in Plant Biology from University of California Davis

Scott Sukrapanna

BS in Physics and an MS in Plant Biology from University of California Davis

Mike Paskowitz

BS in Mechanical Engineering and Materials Science and an MS in Chemical Engineering and Materials Science from UC Davis

Matthew Bannerman

BS in Zoology, MAT in Science Education, and M.Ed in Education Administration from Iowa State University

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