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Utilizing Parents to Teach Forensics

By Chris Bily, West Virginia University

I was hired by West Virginia University as a Forensic Science Instructional Coordinator to lead the Next Generation Forensic Science Initiative, a K-12 outreach program. The immediate challenge was to create an interactive forensic science exhibit for the 2013 National Scout Jamboree held at the Bechtel Reserve in southern West Virginia. At the conclusion of the Jamboree, my responsibilities shifted to the development and delivery of forensic science outreach programs for the youth and educators of West Virginia.

Our programs were initially directed toward offering classes in a variety of forensic science disciplines to middle and high school students, and parents would regularly request to attend these classes. I have taught forensic science to youth for many years and without exception I have always had parents who expressed an interest in learning the material being taught to their children. I decided it was time to offer a series of classes for parents and children together.

Developing the Curriculum

Regardless of the age of the audience, there is one universal truth that I always try to follow: Participants would much rather learn how to do something rather than learn how something is done. All activities were chosen to maximize the hands-on experience of the attendees. Three forensic disciplines were chosen: footwear impression evidence, firearm identification, and bloodstain pattern analysis. In the footwear impression evidence class, participants learned how to recover evidence through stone casting and how to compare and

identify crime scene impressions to examples of a suspect's shoes. In the firearm identification class, they learned how to measure and evaluate class characteristics of fired bullets and how to compare bullets from crime scenes to test bullets fired from a suspect's gun. In the bloodstain pattern analysis class, participants created bloodstain patterns employing a variety of different mechanisms.

Program Success

At the conclusion of the first set of classes, I held an informal discussion and distributed an anonymous written survey to assess the effectiveness of the classes. The data gathered from these assessments was powerful and compelling. The consensus was that participants thoroughly enjoyed the content of the classes, as well as the way in which the classes were delivered. Participants said they would join in another set of classes if given the opportunity.

Numerous benefits can be seen or assumed through the inclusion of parents into the learning process.

- **Parent/Child Relationships** — Parents and children were able to build and strengthen relationships through mutual interest in scientific inquiry. Not only did the participants get to learn exciting and interesting science, they forged memories together that will last for many years to come.

- **Vested Interest** — Having parents intimately involved in their children's education is an ideal situation. Parents rarely get to go to school and learn the same material with their children. The class gave

parents a sense of ownership in their child's education and it also gave them confidence in the nature and quality of instruction that their children were receiving.

- **Maintaining Focus** — The majority of our child participants were in middle school, an age group that can be difficult to keep on task. This was not the case when their parents were present and actively engaged in the same environment, instruction and materials.

- **Public Relations** — It's impossible to overemphasize the positive impact that these classes have on the community at large. Parents came from all walks of life. They are valuable assets in growing and developing a program. As individuals of influence in the community, parents will be an excellent source of advertising. It's important to remember that you are doing much more than teaching a class — you are building relationships.

- **Science Isn't Easy** — When presented fundamental topics in a serious and structured academic environment, the participants quickly realized that being a forensic scientist is a difficult job that requires a great deal of education in math and science.

- **A Dose of Reality** — This was a golden opportunity to provide youth with genuine experiences that allow them to make decisions about whether or not they are really interested in forensic science. Watching something done on television and presented in a glamorous environment surrounded by compelling graphics and images is one thing. Rolling up

your sleeves, sitting at a lab bench and doing the work is another thing altogether.

Lessons learned

The first lesson I learned was the importance of having staff that is properly trained and that enjoys working with parents and children. One of the reasons for the success was because of the student workers and their ability to engage and interact with the participants.

The second lesson I want to emphasize is preparation. Good preparation and knowing your audience yields positive experiences.

The third lesson I learned was not to underestimate the importance of take-away items produced during the course of the classes. Several parents and children commented that they really enjoyed being able to take home the exhibits that they made in class. I suspect that these tangible items provided a physical reminder of an enjoyable and stimulating shared learning experience between parent and child.

The value of the Parent/Child Forensic Science Classes were personally and professionally rewarding and a great deal of fun. Their scientific value is substantial and multidimensional. The short- and long-term benefits of holding these classes should not be underestimated. Future social bonding between parent and child is an unanticipated outcome. I hope that you consider offering similar classes yourself.

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Ideal for AP and college environments.

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- Eyepiece: W10XD, 18mm
- For 120V 60Hz

WARRANTY:

Limited lifetime warranty

Cat. No.	Head Style	Price
S01896	Binocular	823.00/Ea
S04751	Monocular with Camera Port	695.00/Ea



Swift™ M3600 Series Compound Microscopes: Monocular

New look and “student proof” design with curved handle, variable LED illumination and rounded stage.

Ideal for high schools and other grade levels.

- One-piece eyetube and illuminator are tamperproof
- Locked-on eyepieces, objectives and spring loaded “one touch” stage clips
- Plastic iris diaphragm shield protects iris
- Slip clutch system protects against over-focusing
- Unique “C-wrench” gives teachers control of focus tension
- Separate coarse and fine focus for easy use, simple servicing and teaching
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- Inward-facing (reversed) nosepiece allows user clear access to stage for slide manipulation
- All-metal internal parts assure long-term durability
- Energy efficient, variable LED provides white light with virtually no heat
- Extra bright LED lasts up to 50,000 hours between replacements for minimum maintenance and downtime
- Rechargeable cordless models allow up to 50 hours of use on a single 8-hour charge
- Optional add-on mechanical stage available for models with standard stage clips
- Lead-free objectives

Specifications

Axis Type	Coarse and fine
Diaphragm	Iris
Eyepiece	10X, 18mm widefield
Head Style	Monocular
Height (Metric)	36.2cm
Lighting Type	Cordless LED with Dimmer Switch
Nosepiece	3-position reversed

WARRANTY:

Limited lifetime warranty on microscopes.
One-year limited warranty on camera.

Cat. No.	Condenser Type	Magnification Power	Voltage	Weight (Metric)	Price
S19617G	1.25 N.A. Abbe Spiral	4xD, 10xD, 40xRD Achromatic	110/220V	23.8kg	459.00/Ea



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CAROLINA



Cat. No.	Description:	Price:
S07279ND	Carolina Crickets	41.00/Pack of 100
S07497ND	Carolina Elodea densa	21.25/Pack of 12
S07654ND	Carolina Terrestrial Isopods	43.00/Pack of 50
S07446ND	Carolina Basic Protozoa Set	28.75/Pack of 3
S07587ND	Carolina Sea Urchin Embryology Set	158.00/Pack of 14
S07705ND	Carolina Painted Lady Butterfly 5-Larvae Culture	28.25/Each
S07453ND	Carolina Drosophila Chromosome 2 Mutants	10.00/Each



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Description	Cat. No.	Price
Swift M3601C	S19617E	401.00

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Swift™ M2250 Series Microscopes

Compound student microscope designed specifically for intermediate-level microscopic applications.

- Monocular head
- Inclined, smooth-moving 360° rotatable body provides comfortable viewing
- Illuminator vents assure “cool” illumination
- Separate coarse and fine focus system is easy to repair
- Hard, all-metal bottom plate protects electrical sources against damage and students’ hands from electrical shock
- Locked-on eyepiece, objectives, and stage clips
- Slip-clutch protects against over-focusing
- Corded models have cord-hanger for neat and easy method of cord containment
- Plastic shield protects delicate iris diaphragm from damage
- LED illumination produces cool, white light that lasts up to 50,000 hours
- 4X, 10X, 40XR DIN objectives assure superior optical clarity

WARRANTY:

Limited lifetime warranty on all defective parts and workmanship

Cat. No.	Diaphragm	Lighting Type	Price
S65202	Disc	Tungsten, Corded	267.24/Ea



Swift™ M10 Series Compound Microscopes

Capture digital still images or real-time video files directly onto an SD card without the need of a computer.

M10B Series

- Binocular head
- Eyepiece: W10XD, 20mm
- Illuminator: corded, LED with dimmer switch
- Variable LED illumination provides cool, bright, white illumination; energy efficient; 50,000 hours
- Coaxial, fine and coarse focusing
- Built-in low-drive mechanical stage
- 1.25 Abbe condenser with iris diaphragm
- 4X, 10XD, 40XRD (sealed), 100XRD (sealed) DIN Semi-plan, Plan and Phase Contrast objectives available
- For 120V

WARRANTY:

Limited lifetime warranty on microscope and one year limited on camera.



Cat. No.	Magnification Power	Head Style	Lighting Type	Price
S95264D	4xD, 10xD, 40xRD, 100xRD Semi Plan	Binocular	Variable, Corded 3w LED with Dimmer Switch	1005.00/Ea

Swift™ M29TZ-SM99CL Advanced Stereo Zoom Microscopes

The Swift™ Optical Advanced Stereo Zoom Microscope offers convenience and versatility of viewing items at 10X magnification then zoom continuously to maximum detail at 40X magnification. It is ideal for educational, laboratory, research and industrial use.

- Viewing head rotates 360°
- Zoom 1X-4X
- Acromatic, color-corrected lenses
- Tension adjustment eliminates focus drift
- Working distance - 80mm
- Large dual focusing knobs with slip clutch to prevent damage to mechanism
- Top and bottom LED illumination
- C-mount port for easy addition of optional video C-mount and SLR cameras
- For 120V 60Hz

Tablet FEATURES:

- Attached camera bracket includes built-in camera to capture still and video clips
- Pre-loaded MotiConnect Apps allow for image capture, annotation and sharing
- USB and WiFi Interfaces
- Built-in MotiHub allows for wireless sharing

Tablet Specifications:

- Screen Size: 20.3cm (8 in.)
- Screen Resolution: 800 × 1280
- Camera Resolution: 5.0MP
- WiFi: 802.11b/g/n
- Ports: CD 5V Power Input, Mini HDMI, Micro SD Card Slot, 3.5mm Audio
- HDMI Output: 1080
- Battery: Rechargeable



INCLUDES:

Accessories: Dustcover, rubber eyeshields, glass stage plate, black and white contrast stage plate

Cat. No.	Description	Model	Price
S23868	Advanced Stereo Zoom Microscope	M29TZ-SM99CL	819.00/Ea
S23870	Digital Screen Stereo Zoom Microscope	M29TZ-SM99CL-BTW1	1540.00/Ea

Uncovering the Effects of Food Preservatives on the Gut Microbiome

By Kylie Wolfe

Food science researchers are taking a closer look at how common preservatives interact with our bodies on a molecular level. While most preservatives are believed to be non-toxic, much is left to learn about their impact on microbiome diversity.

A Digest of Recent Findings

Researchers led by David Sela, nutritional biologist at the University of Massachusetts at Amherst, recently studied the effects of common food additives like epsilon (ϵ)-polylysine on the gut microbiome of mice. The experiment involved a cohort of 40 males and 40 females, splitting each sex into four groups of ten. To serve as the control group, ten male and ten female mice were given a diet containing maltodextrin. The three experimental groups were fed a diet containing either maltodextrin and ϵ -polylysine, maltodextrin and

pectin, or maltodextrin, ϵ -polylysine and pectin.

Over a 15-week period, scientists tested mouse fecal pellets from all four groups, recording data at baseline, five weeks and nine weeks. They found that ϵ -polylysine disturbed the microbiome diversity of the gut, while the presence of pectin mitigated this response. These preservatives are not dissolved or absorbed in the upper gastrointestinal tract, leading researchers to believe that the resulting microbial interactions may occur there.

"The concentrations of gut microbes changed in response to polylysine as we fed the mice throughout the study. Surprisingly, the microbiome snapped back to the original concentrations despite continuous feeding of the polylysine, but we don't understand how or the potential relevance to health," said Sela.

Ultimately, the problem was able to resolve itself and the gut microbiome returned to normal conditions by the end of the study. These results indicate the presence of a dynamic microbiome that is able to adapt to additives in food.

In future studies, researchers plan to further explore this gap in scientific knowledge to uncover more information about these interactions and their possible health benefits. "We think this is going to be of interest to food manufacturers who use food-grade antimicrobial compounds and to people researching anti-microbial resistance," says Sela.

[DISCUSSION QUESTIONS]

What are the pros and cons of food preservatives?

What questions do scientists still need to answer to fill in the knowledge gaps about preservatives? Research and discuss.

Activity: Which types of food contain preservatives and which do not? Have students bring in packaged food items to look for common additives on the lists of ingredients.

[VOCABULARY]

CONTROL GROUP

EXPERIMENTAL GROUP

BASELINE

PRESERVATIVE

MICROBIOME



Swift™ SM100 LED Stereo Microscopes

Durable, versatile binocular design is ideal for high school and college instruction.

- Energy-efficient variable LED illumination with five light-setting options
- Right eyepiece diopter focusing adjustment
- "One-touch" spring-loaded stage clip
- Built-in handle encourages proper handling
- "Slip-clutch" focusing system protects against over-focusing
- Locked-on eyepieces and stage clips assure that the parts remain on the scope
- Unique C-wrench gives teacher sole control over focus tension
- Cord-hanger allows for safe and hassle-free cord storage
- Reversible black-and-white and frosted stage plates are included
- Interlocked eyepiece tubes with diopter for increased focus acuity
- Side magnification changer
- Eyeshields can be used on eyepieces to reduce ambient light
- Synthetic gear lubricant ensures smooth operation of all gears over a wide range of temperatures
- Light settings: turret, top, bottom, simultaneous turret and bottom or simultaneous top and bottom
- Corded stand
- Eyepieces: W10X, 20mm
- For 120V 60Hz

ORDERING INFORMATION:

Dimensions: 12L x 8W x 13 in.H
(30.5 x 20.3 x 33cm)

WARRANTY:

Limited lifetime on all defective parts and workmanship



Cat. No.	Magnification Power	Eyepiece	Product Type	Price
S01977	10x to 30x	W10X, 20mm	Stereo Microscope	576.00/Ea

fisherbrand Advanced StereoZoom Microscope

An exceptional stereozoom microscope at an exceptionally low price. Remarkable optical clarity.

Optical System

- Paired widefield 10X eyepieces are 45° inclined, with left diopter adjustment, interpupillary adjustment from 55mm to 75mm
- Accepts 23mm eyepiece reticle
- Viewing head rotates 360°
- Color corrected lenses

Illumination

- Top light is 12V 10W halogen with reflector with directional lever which puts the light where you need it
- Bottom light is 110V 5W fluorescent for cool operation, greater light efficiency
- Base mounted light controls permit choice of top only, bottom only, or dual illumination
- Heavy duty 3-wire grounded cord and plug

Focusing

- Large dual focusing knobs with slip clutch to prevent damage to mechanism
- Heavy duty rack and pinion focusing
- Tension adjustment eliminates focus 'drift'

Stage

- 80mm stage plate (black plastic contrast)
- 80mm stage plate (translucent white plate)
- Blue filter for transmitted light
- Locked-on stage clips

Frame

- Professional, all-metal frame, gray enamel finish
- Heavy-duty fixed arm with ergonomic design
- Height: 317mm (12 in.)
- Base width: 215mm (8 in.), Base depth: 220mm (8 in.)
- Net weight: 4kg (9 lb.)

WARRANTY:

Lifetime limited warranty excluding bulb, cord and fuse



Cat. No.	Magnification	Price
S71010	10X to 30X Zoom	575.00/Ea

Fisher Scientific™ 160 Series University/Laboratory Compound Microscopes

Superb optical clarity and reliable mechanical engineering assures years of top performance.

- Remarkable optical clarity
- Choice of objective lenses: ASC, semi-plan, plan and phase
- LED energy-efficient illumination
- Large, built-in, low-profile, rackless stage
- Coaxial focusing
- Magnification: 40X, 100X, 400X, and 1000X
- For 120V 60Hz



Cat. No.	Head Style	Objective Types	Price
S23877	Binocular	Super High Contrast	886.00/Ea

Fisher Science Education™ Advanced+ Compound Microscope

Ideal for teaching microscopy to students of varying education levels.

Advanced Biological binocular microscope with precision optics. For use by students or professionals. This model has a Seidentopf head for comfortable viewing, coaxial focusing, low drive mechanical stage and LED illumination with intensity control. LED rated.

- Binocular Siedentopf viewing head
- Quad objective turret
- Coaxial coarse and fine focusing
- For 120V 60Hz

ORDERING INFORMATION:

Replacement bulb for all models: S74018

INCLUDES:

Battery charger, 3 AA NiMH batteries (S71002B, S71002D, S71002F and S71002G only), vinyl dustcover

WARRANTY:

Microscope Warranty Option: Lifetime limited warranty, excluding bulb, cord, fuse and accessory mechanical stage, if any.



Cat. No.	Base Style	Condenser	Magnification Power	Includes	Price
S71002G	Mechanical Stage	Iris	40X, 100X, 400X, 1000X	Pointer; 4 Hole Objective Turret	730.00/Ea

Fisher Science Education™ Intermediate Compound Microscopes

Microscopes that set the standard for middle/high school instruction and include all the most commonly specified features.

- Widefield 10X eyepiece with revolving pointer
- Viewing head rotates 360° for easy repositioning of eyepiece and sharing by more than one student
- Separate low position coarse and fine focusing controls
- Rugged metal construction
- Locked-on parts (student friendly) superior DIN optical system
- Choice of: tungsten, LED, corded, rechargeable

Monocular Optical System

- 45° Inclined head

LED Illumination Option

- LED light rated up to 10,000 hours life
- Cool burning illumination equal to a 20W tungsten bulb
- Base-mounted on/off switch
- Heavy duty 3-wire cord
- Convenient "grabber" clip on plug lets you wrap the cord around microscope and secure in place by pushing cord into clip for easy storage
- No bulky cord hanger needed

INCLUDES:

Vinyl dustcover, battery charger

WARRANTY:

Lifetime limited warranty, excluding bulb, batteries, cord, accessory mechanical stage



Cat. No.	Head Style	Magnification Power	Condenser	Base Style	Lighting Type	Design Type	Price
S71001B	Monocular	40X, 100X, 400X	0.65 N.A.	Stage Clips	LED	Corded	276.00/Ea

Ken-A-Vision™ Comparison Scope 2 Advanced Forensic Microscope

Compare slides side-by-side either separate in full-field or together in split screen.

Used for side-by side comparison in forensics (shell casings, hair samples, etc.) or biology (tissue samples, normal/abnormal cells, etc.). High-quality optics and independent focusing on each microscope base.

- Siedentopf binocular head with 10X widefield eyepieces
- 2X, 4X, 10X and 40XS DIN achromat objectives
- Reverse nosepiece for easy slide insertion and manipulation
- Choice of square floating stage or mechanical stage with Abbe condenser
- Low position, coaxial coarse and fine focus knobs
- Versatile upper and lower lighting system allows viewing of standard microscope slides or opaque macro objects
- Rechargeable for cordless operation

WARRANTY:

10 years limited



Specifications	
Axis Type	Coaxial coarse and fine
Condenser Type	1.25 N.A. Abbe
Depth (English)	8.5 in.
Diaphragm	Iris
Magnification Power	2x, 4x, 10x, 40xS DIN achromatic
Eyepiece	Two 10X widefield with pointer
Head Style	Binocular
Height (English)	21 in.
Lighting Type	LED

Specifications		
Material	Aluminum (Single Cast)	
Nosepiece	4-position reversed	
Voltage	110/120V	
Weight (English)	24.6 lb.	
Width (English)	15.5 in.	
Cat. No.	Design Type	Price
S96789A	Floating	2080.00/Ea

Ken-A-Vision™ CoreScope 2 Cordless Microscopes: Mechanical Stage

Affordable way to introduce students to microscopy.

- 10X widefield eyepiece with pointer
- Easy-to-use, mechanical stage with side clips
- Coaxial coarse and fine focusing knobs
- Humidity and climate protection coating on optics
- Built-in cord storage
- Aluminum single cast body
- Reverse 3-hole nosepiece

Specifications	
Axis Type	Coaxial coarse and fine
Depth (English)	9 in.
Electrical Requirements	110/120V 50/60Hz
Height (English)	15.75 in.
Lighting Type	LED
Material	Aluminum (Single Cast)
Nosepiece	4-position reversed
Voltage	110/120V
Weight (English)	5.1 lb.
Width (English)	12 in.

WARRANTY:

10 years limited on microscope

CERTIFICATIONS:

CE marked, CSA



Cat. No.	Eyepiece	Head Style	Price
S902983	Two 10X Widefield with Pointer	Binocular	434.00/Ea

Ken-A-Vision™ Monocular Digital Microscope

An excellent and affordable way to introduce students to digital microscopy.

The popular 3/4-sized frame features a built-in digital USB camera that captures digital pictures, annotates images, records video, and projects images on a computer screen and interactive whiteboard.

The Digital CoreScope 2 is optimized for use with EduCam, the only mobile app able to stream live images to students smartphones, tablets, and desktops.

- Built-in 2 megapixel digital camera
- 100xS DIN Achromat oil immersion objective
- Built-in, low-positioned mechanical stage
- USB-powered camera and LED Lights
- Humidity and climate protection coating on optics
- Aluminum single cast body

WARRANTY:

10 year limited on microscope; 1 year limited on camera



Specifications	
Image Sensor	2.07 Megapixel CMOS
Output Resolution	1080p HD
Pixel Count	1920x1080
Frame Rate	30 fps at 1080p HD
Head	Monocular, 45° incline, camera, 1 eyepiece
Eyepiece	10x DIN Achromat
Nosepiece	Reverse 4-hole
Objectives	4x, 10x, 40xS 100xS Oil Achromat
Lighting	Bright and cool LED white light

Specifications		
Stage	Mechanical; coated 130 x 120mm, coaxial lower position separate knobs for X and Y movement with rack and pinion; 1.25NA Abbé Condenser and Iris Diaphragm	
Cat. No.	Description	Price
S21548	Monocular Digital Microscope	656.00/Ea

Celestron™ CB2000CF Compound Microscope

Lab-ready compound binocular microscope with 2000x power.

- Full-metal construction with fully mechanical stage
- Coarse and fine focus knobs
- Achromatic objective lenses
- Abbe condenser with iris diaphragm concentrates and focuses lower illumination for viewing



Cat. No.	Description	Price
S13039	CB2000CF Compound Microscope	227.00/Ea

FROM MICROSCOPIC TO ASTRONOMIC

◀ TetraView LCD Touch Screen Microscope

- + Up to 1600x magnification
- + 10x camera sensor eyepiece
- + 5MP CMOS sensor

Cat. No.	Price
S05039	\$341.00

NexStar Evolution 8 Telescope ▶

- + Control your telescope wirelessly with your smartphone or tablet via Wi-Fi.
- + Built-in battery supports up to 10 hours of use without external power
- + Compact, portable 8-inch Schmidt-Cassegrain optical tube

Cat. No.	Price
S28077	\$1,701.00

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WiFi

A Bug's Life: Robots Programmed to Think Like Insects

By Kevin Ritchart

Recent advancements in nanotechnology have allowed engineers to build robots the size of small insects, but getting these minuscule mechanical marvels to behave like their real-life counterparts is proving to be much more of a challenge.

Engineers from Cornell University are working on a new type of programming that mimics the way an insect's brain functions. The amount of computing power needed to perform such a feat would typically require each of these tiny robots to carry a desktop computer with them every time they took to the air, but the emergence of neuromorphic computer chips can significantly lessen a robot's payload.

Unlike traditional chips that utilize binary code, neuromorphic chips process spikes of electrical current that fire in complex combinations, like they do in a human brain. Silvia Ferrari, Professor of Mechanical

and Aerospace Engineering and Director of the Laboratory for Intelligent Systems and Controls at Cornell University, is leading a team of engineers in developing a new class of event-based algorithms that mimic brain activity and can be programmed onto neuromorphic chips. These chips would use less power than traditional processors, allowing engineers to pack more computation into a smaller footprint.

Teaming Up

Ferrari's team of engineers is working with the Harvard Microbiotics Laboratory, which has developed an 80-milligram RoboBee that's been outfitted with vision, optical flow and motion sensors. Currently, the 3-centimeter-wide robots remain tethered to their power source, but researchers from both Harvard and Cornell are hopeful that neuromorphic chips will make the RoboBee more autonomous and

adaptable to different environments without significantly increasing its weight.

"Getting hit by a wind gust or a swinging door would cause these small robots to lose control. We're developing sensors and algorithms to allow RoboBee to avoid the crash, or if crashing, survive and still fly," said Ferrari. "You can't really rely on prior modeling of the robot to do this, so we want to develop learning controllers that can adapt to any situation."

Cornell doctoral student Taylor Clawson, a member of Ferrari's team, created a physics-based simulator model of the RoboBee and the aerodynamic forces it encounters with each wing stroke. The model can accurately predict RoboBee's movements through complex environmental conditions.

The Future

Ferrari plans to help outfit RoboBee

with new micro devices such as a camera, expanded antennae for tactile feedback, contact sensors on the robot's feet, and airflow sensors.

"We're using RoboBee as a benchmark robot because it's so challenging, but we think other robots that are already untethered would greatly benefit from this development because they have the same issues in terms of power," Ferrari said.

[DISCUSSION QUESTIONS]

What can scientists learn from the data collected by RoboBee?

Are there other areas of scientific study where this type of nanotechnology could be useful?

[VOCABULARY]

NANOTECHNOLOGY

NEUROMORPHIC

PAYLOAD

Data Collection

NeuLog™ Panda

Multi-sensor module with 9 built-in sensors. Ideal for younger scientists and students who wish to seamlessly and easily collect data.

- Sensors built into unit: Ambient Temperature, Light Intensity, Sound, Barometer, Altitude, Humidity, Dew-Point, Acceleration, Magnetic Field
- 4 Color Touch Screen with USB Connectivity and built in battery, system can fully integrate with any NeuLog sensor
- USB connecting cable included, Panda can connect to PC or Mac
- Software is free to download at neulog.com
- Rugged plastic ergonomic case
- Temperature (12 bit): -13° to 140° F (can read Celsius or Fahrenheit)
- Light (16 bit): 1000 to 240,000 lux



- Barometer (24 bit): 80 to 110 kPa (Can Read kPa, atm, mmHg)
- Altitude (24 bit): -722 to 2000m
- Sounds (12 bit): 40 to 110 dB
- Humidity (16 bit): 0 to 100%
- Dew-Point (12 bit): 114° to 109° C
- Acceleration (16 bit): 3 Axis -20 to 20 m/s²
- Magnetic Field (16 bit): 3 Axis -200 to 200 microTesla

NeuLog™ WIFI Communication Module

Add convenience and efficiency to your workflow. The EISCO NeuLog WIFI Communication Module allows NeuLog sensor measurements to be performed through any device which uses WIFI technology.

- Intuitive and user friendly
- Allows saving and loading experiments
- Can be operated in client mode through the local router enabling also surfing to other sites
- No need for a USB module; it is part of WIFI module
- Should be connected to a power supply or to a BAT-200 battery module
- The teacher can view student experiments in remote view
- Students can view the teacher's experiment on their table



Cat. No.	Description	Price
S13941	NeuLog Panda	299.00/Ea
S13942	WIFI Unit	161.00/Ea

Cat. No.	Description	Price
S23772	WIFI Communication Module	170.00/Ea

NeuLog™ Anemometer Logger Sensor

Powerful field data collection tool measures wind velocity.

Modular plug-and-play laboratory data collection platform that allows students to electronically collect data while focusing on science.



- Combine with temperature, relative humidity, dew point and barometric pressure sensors for complete weather measurements
- Duration: 1 second to 31 days
- Range: 0.00 to 174 mph (0.00 to 280.00 km/hr)
- ADC resolution: 15 bit
- Resolution: 0.01 mph (0.01 km/hr)
- Rate: 100 S/sec.
- Requires connection hardware, sold separately

Cat. No.	Description	Price
S9824357ND	Anemometer Sensor	135.00/Ea

EISCO Inclined Plane Kit

Use an inclined plane to move an object with a smaller force over a greater distance.

Kit enables students to study:

- Inclined planes in general
- Inclined planes and forces
- Inclined planes and motion

INCLUDES:

- Inclined plane
- Carriage
- Weight holder
- Flag (4 × 4 in. [10 × 10cm])
- Solid and hollow blocks
- Instructions



REQUIRES:

NeuLog™ Force Logger Sensor (S98243-9ND)

Cat. No.	Description	Price
S02110	Inclined Plane Kit	81.00/Ea

EISCO Solar Cell Kit

Photovoltaic cells, of which a solar cell is an example, generate electricity from the irradiation of light.



Uses different light sources (incandescent/fluorescent/sunlight) and color filters to investigate the amount of energy irradiated from a light source, as well as the sensitivity of the solar cell as a function of the color (frequency) of irradiation.

Kit enables students to study:

- Photovoltaic cells
- Light sources
- Color sensitivity of photovoltaic cells

INCLUDES:

- Solar cell
- Three color filters
- Flashlight
- Instructions

REQUIRES: NeuLog™ Voltage Logger Sensor (S98243-7ND)

Cat. No.	Description	Price
S02113	Solar Cell Kit	25.25/Ea

EISCO Electricity Kit

Investigate the mystery of electricity through a series of simple experiments.

Equipment supports exercises such as applying variable voltage to given resistance to generate electrical current and creating light as current (electrons) flows through a circuit.



Kit enables students to study:

- Basic electricity circuits
- Circuits in series and parallel
- Ohm's Law
- Transformation of electric energy to light

INCLUDES:

- 6V cell holder
- Circuit board
- Two mounted resistance (10 and 47Ω)
- Knife switch set
- Two bridges
- Two pairs of cables, red and black (11.8 in. [30cm] long)
- Instructions and predesigned activities

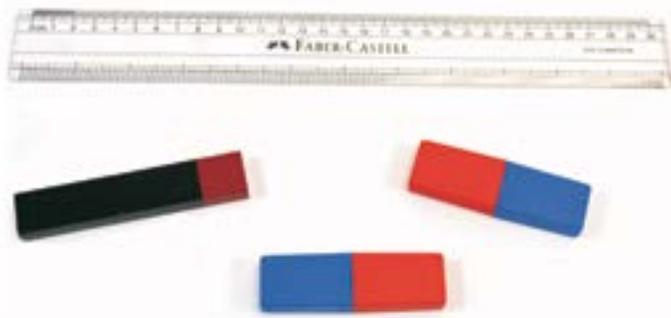
REQUIRES:

NeuLog™ Voltage Logger Sensor (S98243-7ND), Current Logger Sensor (S98243-6ND) and Light Logger Sensor (S98243-20ND)

Cat. No.	Description	Price
S02105	Electricity Kit	73.00/Ea

NeuLog™ Magnet Kit

To investigate magnetic fields. EISCO NeuLog Magnet Kit allows students to compare magnetic field of two different magnets.



- Requires NeuLog field logger sensor, not included

Cat. No.	Description	Price
S23709	Magnet Kit	32.50/Ea

NeuLog™ Sound Kit

The EISCO NeuLog Sound Kit contains equipment to produce sound and measure it through a sound sensor.



It is difficult for students to grasp the relation between generated sound and wave's propagation. With this kit, students measure sound waves generated by tuning forks and a recorder and also isolate sound using different materials

- Study sound isolation through various materials
- Observe 'beat' sounds
- Study sound level
- Study sound waves
- Requires NeuLog Sound Logger Sensor (NOT included)

Cat. No.	Description	Price
S23767	Sound Kit	44.25/Ea

EISCO Tuning Forks Kit

Demonstrates relation between sound and wave propagation. Students produce sound waves generated by tuning forks and measure them using a separate sound sensor.



Kit enables students to study:

- Sound
- Sound waves
- Sound beats

INCLUDES:

- Two wooden resonator boxes
- Two tuning forks
- Sliding weight
- Hammer
- Instructions

REQUIRES:

NeuLog™ Sound Logger Sensor (S98243-22ND)

Cat. No.	Description	Price
S02108	Tuning Fork Device Kit	30.50/Ea

NeuLog™ Mechanics Kit

Includes essential items for learning mechanics. EISCO NeuLog Mechanics Kit is used to understand the concepts of classical mechanics.

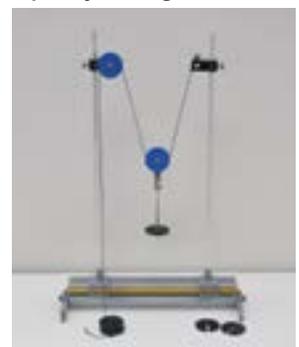


Cat. No.	Description	Price
S23710	NeuLog Mechanics Kit	196.00/Ea

NeuLog™ Pulley Kit

The NeuLog Pulley Kit with the force logger sensor allows students to explore various options of pulley arrangements.

- For use with the force logger sensor
- Explore various options of pulley arrangements



Cat. No.	Description	Price
S23765	Pulley Kit	84.00/Ea



Features:

- High-quality glassware at affordable prices
- Made from borosilicate 3.3 glass
- Superior chemical durability
- Autoclavable at 121°C
- Easy-to-read graduations
- Manufactured and calibrated to quality standards

Description	Cat. No.	Price
Beaker - 50mL	S15437	2.40
Beaker - 100mL	S15438	2.85
Beaker - 250mL	S15439	2.85
Beaker - 500mL	S15441	4.75
Beaker - 1000mL	S15442	8.65

Complete Glassware Line



A full line of ELABGlass from Eisco Scientific is available through Fisher Science Education.

3B Scientific™ Muscle Torso with Head

27-part model of the major muscles.

Hand-numbered features with a corresponding key card.

INCLUDES:

- Fixed head with skull cap
- Brain, six parts
- Removable eyeball with optic nerve, eight parts
- Larynx, two parts
- Removable musculi sternocleido-mastoid and *m. pectoralis* minor
- Breast and belly covering with both superficial and deep musculature
- Two lungs
- Heart with junctions to the major vessels
- Removable front heart wall, two parts
- Diaphragm
- Stomach, two parts featuring the front and rear half
- Liver
- Gallbladder
- Intestinal system with opened appendix
- Front halves of a kidney and the bladder
- Removable gluteus maximus
- Dimensions: 37.5 × 23.5 × 14 in. (95.25 × 59.7 × 35.6cm).



Cat. No.	Description	Price
S17186	Muscle Torso with Head	8422.00/Ea

EISCO Pulley Demonstration Kit

Investigate one of the six “simple machines.”

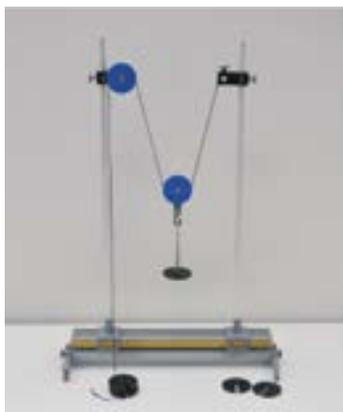
Observe how pulleys can change the direction of an applied force, transmit rotational motion or carry out a mechanical advantage in either linear or rotational system of motion.

Kit enables students to study:

- General properties of pulleys
- Pulley systems

INCLUDES:

- Rail (14.3 in. [36.3cm])
- Two aluminum rods
- Two clamp sliders
- Two boss heads
- Five slotted masses (three 50g, two 100g)
- Weight holder
- Pulley with rod
- Pulley on hook
- Instructions



REQUIRES:

NeuLog™ Force Logger Sensor (S98243-9ND)

Cat. No.	Description	Price
S02104	Pulley Demonstration	52.25/Ea

3B Scientific™ Adult Human Skeleton

Premier line of skeletal models offers educators medical-grade quality.

- Made of durable, unbreakable, washable plastic material
- Natural movements can be demonstrated with detachable arms and legs
- Detachable skull is divisible into three parts: calvarium, base and lower jaw

Life-Size Skeleton

- Measuring 70 in. (170cm) tall, this pelvic-mounted model is an exact reproduction, natural cast from bones of an adult male
- Special mounting of the rib cage allows the skeleton to maintain proper positioning
- All joints are properly articulated and wired, including the lower jaw, which articulates by means of springs
- Comes complete with roller stand and dust protection cover



Cat. No.	Height (English)	Weight (English)	Price
S17133B	69.5 in.	21.1 lb.	449.00/Ea



NEW! Upgraded I.V. Injection Arm

The new I.V. Injection Arm P50/1 comes with an upgraded infusion system that's easier to install, and features a more realistic blood color and closed system to prevent leakage.

The arm is made of 3B SKINlike™ silicone, a high-quality, stain resistant and easy-to-clean soft material. The unique quality and design allows realistic training to teach competence to medical staff.

Catalog Number	Description	Price
S96636	I.V. Injection Arm P50/1	\$949.00

3B Scientific™ Half of Head and Neck

See both internal and external features.

Two-sided, life-size vinyl plastic model shows both internal and external features of the head and neck.

- One side demonstrates musculature and the most important surface arteries, veins and nerves
- The opposite side shows a median section illustrating inner anatomy
- Nondetachable model mounted on stand with base
- Dimensions: 9 × 7 × 18 in. (22.5 × 17.5 × 45cm)



Cat. No.	Description	Price
S171061	Half of Human Head and Neck	582.00/Ea

Viruses Are Capable of Gene Transfers

By Horace Jenkins

A recent study showed that viruses can share genes with cells that are not their typical hosts. As reported in the journal *Frontiers in Microbiology*, this new information contributes to the ever-mounting evidence that viruses are able to interchange genes with a variety of cellular organisms.

The Evolution of Viruses

Viruses have historically been known to infect or interact with organisms within only one of the three taxonomy domains or superkingdoms: Archaea, Bacteria and Eukarya. (The first two include only prokaryotic or single-celled organisms; the latter includes animals, plants, fungi and protists.) While it has long been understood that viruses can move or “jump” between hosts — like HIV, which jumped from chimpanzees to

humans — viruses had not been known to interact with organisms across superkingdoms.

Sharing Genetic Materials

Virus–host affiliations can be studied by observing the cytopathic effects of a viral infection or through the microscopic detection of virions (independent viral particles). In addition to the lytic mode of viral reproduction, whereby the virus replicates within and then ruptures the host cell, viruses can also integrate their genetic material into a cell’s genome.

Dr. Nasir and his colleagues have considered the possibility that leaps between distant species may occur, but they had not entertained the possibility that such leaps might involve viral interactions. “In addition to infecting and killing

cells, viruses can also insert their genes into a cell’s DNA,” Dr. Nasir said. “We therefore hypothesized that viruses might interact in non-harmful ways to exchange genes between distantly related organisms.”

To properly examine this particular type of viral gene exchange, Nasir and his colleagues studied the range of protein structures found in all identified viruses and cellular organisms. By focusing on protein structures that are exclusively linked to viruses or cells, the researchers were able to identify virus-derived genes in cellular organisms and cell-derived genes in viruses. The research team also discovered evidence that suggests viruses and cellular organisms share a massive group of protein structures that support cell functionality.

In time, study author Arshan Nasir, PhD, assistant professor of biosciences at COMSATS Institute of Information Technology, Islamabad, Pakistan, believes that these results may change the way we view virus–host relationships. “We should consider viruses to be a source of new genes that cellular organisms can acquire,” he said, “and not necessarily just as a source of disease.”

[DISCUSSION QUESTIONS]

Discuss virus forms and activities. What other human viral diseases exist because of a “jump” from another host?

[VOCABULARY]

VIRUS

DNA

GENE

3B Scientific™ Advanced Manual Inflate Large Cuff Blood Pressure Monitor

Fast and accurate blood pressure measurement.



- Offers two innovative features, the Pressure Rating Indicator™ and Irregular Heartbeat feature
- Pressure Rating Indicator provides a snapshot of your blood pressure classification based on your measurements and eliminates the guesswork

Cat. No.	Description	Price
S37585	Advanced Manual Inflate Large Cuff Blood Pressure Monitor	52.25/Ea

3B Scientific™ Bandaging Simulator with Ostomy

Simulator with 14 different wounds to practice wound management, cleaning and bandaging techniques.

- Consists of a female torso with flexible, lifelike skin which realistically responds to adhesives and all types of bandaging procedures
- Wound closures feature surgical staples and sutures which cannot be removed
- Supplied in a carrying case

Features the following wounds:

- Thyroidectomy
- Mid-sternal split with chest tube drains (surgical staples)
- Mastectomy with simulated drain
- Cholecystectomy with simulated T-tube
- Laparotomy (surgical staples)
- Appendectomy
- Colostomy
- Ileostomy
- Abdominal hysterectomy (surgical staples)
- Thoractomy (surgical staples)
- Nephrectomy (surgical staples)
- Laminectomy
- Sacral decubitus ulcer (stage II)
- Leg amputation stump (surgical staples)



ORDERING INFORMATION:

Dimensions: 33.1 × 12.0 × 25 in. (84 × 30.5 × 63.5cm);
Weight: 24.25 lb. (11kg)

Cat. No.	Description	Price
S98685	Bandaging Simulator with Ostomy	1326.00/Ea

Life Science

Biology

fisherbrand Soft Glass Rods

With rounded and fire-polished ends.

- Constructed of glass
- A stirring rod is used to mix chemicals and liquids for laboratory purposes
- Sold in packs of 72



Cat. No.	Diameter (Metric)	Length (Metric)	Price
S63450	6mm	250mm	55.00/Pk
S63449	5mm	200mm	33.50/Pk
S63448	5mm	150mm	29.00/Pk
S63447	3mm	125mm	23.25 /Pk

fisherbrand Reusable Glass Media Bottles with Cap

Convenient wide opening.

Ideal for general use.

- Enhanced graduations
- Permanent white enamel marking spot
- GL 45 screw thread
- Clear (natural), drip-free, replaceable polypropylene pour ring
- Linerless
- Autoclavable (to 140°C)
- Borosilicate glass
- Polypropylene cap



Cat. No.	Capacity (Metric)	Price
S35833	100mL	94.00/Cs
S35832	500mL	117.00/Cs
S35831	250mL	105.00/Cs
S35830	1000mL	155.00/Cs

Kimble™ ValueWare™ Culture Tubes with Rubber Lined Phenolic Caps

Mineral-filled cap to withstand repeated autoclaving.

- KIMAX™ KG-33 borosilicate glass
- Uniform wall thickness for maximum heat transfer and chemical resistance
- Screw Thread finish complies with Glass Packaging Institute (GPI) requirements
- Phenolic rubber-lined caps (not attached)
- Reusable

COMPLIANCE:

Designed from ASTM™ Specification E982, Type VI, Class A requirements



Cat. No.	Capacity (Metric)	Outer Diameter (Metric)	Length (Metric)	Price
S00209	50mL	25mm	150mm	236.00/Cs
S00208	30mL	20mm	150mm	263.00/Cs
S00206	20mL	16mm	150mm	188.00/Cs
S00205	16mL	16mm	125mm	171.00/Cs
S00204	12mL	16mm	100mm	183.00/Cs
S00203	8mL	13mm	100mm	139.00/Cs

Kimble™ ValueWare™ Culture Tubes With Marking Spots

With fire-polished top rim and uniform wall for maximum heat transfer and chemical resistance.

- KIMAX™ KG-33 borosilicate glass
- Durable white ceramic enamel marking spot
- Reusable
- Sold in packs of 72

COMPLIANCE:

Designed from ASTM™ Specification E982, Type IV requirements



Cat. No.	Capacity (Metric)	Outer Diameter (Metric)	Length (Metric)	Price
S00197	28mL	18mm	150mm	54.00/Pk
S00194	15mL	16mm	100mm	46.25/Pk

Labmat™ Disposable Bench Liner

Makes cleanups between labs quick and easy.

Safeguards work surfaces from stains, spills and wear.

- Highly absorbent upper surface traps up to 420mL/m² of water, dyes, corrosive chemicals or radioactive solutions
- Flexible polyethylene film backing is non-skid and prevents soak-through of most solutions
- 50.8cm (20 in.) wide by 15.2m (50 ft.) roll
- Cuts easily with the Scienceware Safety Cutter™ (S04476) or scissors while roll is retained in dispenser.



Cat. No.	Description	Price
S41267	Lab Mat Disposable Bench Liner	69.00/Ea

Super Biohazard Disposal Bags

Extra-strength, high-impact, high-temperature bags reduce autoclave time.

- Protect against dangerous tears and leaks
- Orange-red bags have standard biohazard warning symbol and precautionary procedures in four languages: English, French, German and Spanish
- Extra-heavy-duty bags are 2mil-thick blended polymer
- Autoclavable to 121°C (250°F)
- Sterilization indicator patch darkens when exposed to steam sterilization



ORDERING INFORMATION:

Pack of 200 bags

Cat. No.	Length (English)	Width (English)	Price
S90149A	19 in.	14 in.	234.00/Pk
S90149B	23 in.	19 in.	340.00/Pk
S90149C	35 in.	25 in.	630.00/Pk

Space-Saver Vacuum Desiccators

Great Alternative to Heavy-Glass Desiccators



- Strong, shatterproof plastic provides dry storage and protection for sensitive products
- Small size perfect for classroom use
- Lighter and less costly than similarly sized glass models
- Holds a full vacuum (29.9" Hg) at room temperature for 24 hours
- Can also be used with standard disposable or reusable desiccant

Bel-Art
SP SCIENCEWARE™
Prepare to Discover

Find out more at fisheredu.com

Benchtop Biohazard Bag Holder Kit

For collecting pipette tips, microcentrifuge tubes and more, during daily use.

- Rectangular steel wire frame to hold one polyethylene bag of dimensions 8.5 × 11 in. (22 × 28cm)
- Available with epoxy coat in orange color
- Comes with snug fitting polypropylene plastic cover to hold bag securely in place
- Reusable and allows cleaning by hand or in automated dish washers
- Autoclavable
- Also used with Clavies Autoclavable Bags H13182-0812



INCLUDES:

100 Bench Top Biohazard Bags, made of high molecular weight, high-density (HMHD) Polyethylene and printed with Biohazard symbol and sterilization indicator patch that darkens when exposed to steam sterilization.

COMPLIANCE:

When used with lid, provides compliance with 29 CFR 1910.1030(d) (2)(xiii) (A), which requires a cover on any container used to store, transport or ship biohazardous wastes.

Cat. No.	Description	Price
S04788A	Biohazard Bag	24.00/Pk
S04788	Bag Holder Cover	11.50/Ea
S04788B	Bag Holder Kit	49.00/Ea

Biotechnology

Edvotek™ Digital Shaking Water Baths

Offer exceptional temperature control from ambient to 99°C.



Designed for the precise sample incubation when aeration and agitation are required.

- Stainless-steel chamber
- Maximum temperature: 99°C (210°F)
- Accuracy of ±0.5°C
- 10L chamber size: 12 × 9 × 6 in. (30.5 × 22.9 × 15.2cm)
- Shipping weight: 19.4 lb.

Cat. No.	Description	Price
S05876	10L Digital Shaking Water Bath	2015.00/Ea

Edvotek™ Four DNA Electrophoresis LabStation™

Supports up to 32 students.

INCLUDES:

Four M12 horizontal electrophoresis apparatus with 7 × 14cm (2.7 × 5.5 in.) gel trays (S11502); Two Edvotek DuoSource 150 power supply (75/150V) for one to four units (S68648); Four variable micropipets, 5 to 50µL

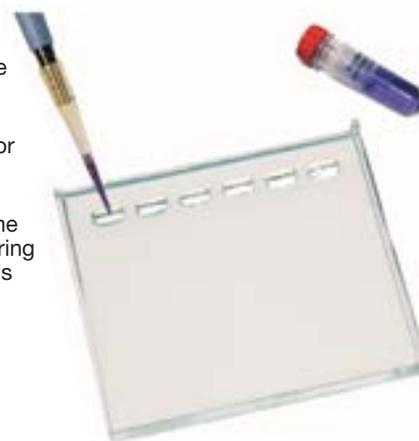


Cat. No.	Description	Price
S94660	DNA Electrophoresis LabStation	2629.00/Ea

Edvotek™ DNA DuraGel™

Designed for students to learn pipetting samples in agarose gels.

- Reusable
- Clear simulation of a gel plus practice gel-loading solution
- Has two sets of different well sizes for pipetting 5 to 35µL of samples
- Save preparation time and expense of pouring agarose practice gels



Cat. No.	Description	Includes	Price
S05711	For 6 Gels (12 to 24 Students)	6 Reusable DNA DuraGel™, 4 FlashBlue™ and 4 Ethidium Bromide gel images, practice gel loading solution and mini-transfer pipets	92.00/Ea
S05712	For 2 Gels (4 to 8 Students)	2 Reusable DNA DuraGel™, 2 FlashBlue™ and 2 Ethidium Bromide gel images, practice gel loading solution and mini-transfer pipets	44.00/Ea

Edvotek™ Variable Micropipets

Automatic tip ejector makes operation fast and convenient.

- Ergonomically designed
- Digital display indicates the chosen volume
- Deliver precise and reproducible volumes with ease
- Utilize standard disposable micropipet tips
- No calibration servicing needed
- Backed by a lifetime warranty and technical support

INCLUDES:

- Service wrench
- Instructions



Edvotek™ Pipet Stand

Pipet stand for new Edvotek pipets.

- Fits all Edvotek pipets purchased after November 2014
- Holds 6 units



Cat. No.	Description	Price
S06686	Pipet Stand	67.75/Ea

Edvotek™ Micropipet Tips

Tips available in a variety of colors and types.



- Includes: Ultra, Yellow, Blue, Fine tip and Jumbo micropipet tips

Cat. No.	Volume (Metric)	Packaging	Price
S06688	0.5 to 10µL	Bulk, 1000 tips	60.50/Ea
S06690	1 to 200µL	Bulk, 1000 tips	61.75/Ea
S06692	200 to 1000µL	Bulk, 1000 tips	67.50/Ea
S06693	1000 to 5000µL	Bag of 100	33.75/Ea

LAB-AIDS™ ABO-Rh Combination Blood Typing Kit

Provides information on several different subjects related to blood typing.

This popular LAB-AIDS product combines all the features of Basic Blood Typing and Rh Blood Typing kits with a specially designed Slide Guide™. Provides information on the history of the blood factors, hereditary determination, individual typing techniques, comparisons of blood types in world populations, and blood typing birth problems.

- Determine ABO blood type and Rh factor
- Correlate agglutination to antigen production
- Observe and study Rh mechanisms and relationships to transfusion and genetics
- Classroom size: 32 students

NOTE:

All sera have been tested for HBs Ag and HTLV-III (AIDS).

INCLUDES:

- 32 Combi-Slide guide
- One of each drop-controlled bottle blood-typing serum, Type Anti-A, Type Anti-B and Type Anti-Rh
- 32 spatulas for Anti-A serum (blue)
- 32 spatulas for Anti-B serum (yellow)
- 32 spatulas for Anti-Rh serum (red)
- 32 pre-saturated alcohol pads
- 32 sterile disposable blood lancets
- 32 student worksheets and guides
- Instruction manual with MSDS



Cat. No.	Description	Price
S67359	ABO-Rh Combination Blood Typing Kit	121.00/Ea

LAB-AIDS™ Osmosis and Diffusion Kit

Dramatically illustrates semipermeability, osmosis and molecular diffusion.

See firsthand how selective permeability allows some substances to pass through a membrane, while others cannot; observe diffusion through a membrane in two directions at the same time.

- Processes are clearly demonstrated using simple color changes
- Easy-to-follow experiments outlined in detail
- Reagent bottles are unbreakable, spillproof and drop-controlled

ORDERING INFORMATION:

Class size: 30 students.

INCLUDES:

- 30 semi-permeable membranes
- Two bottles each of glucose solution and liquid starch
- 30 containers
- 60 glucose testing strips
- 30 individual worksheets and guides



Cat. No.	Description	Price
S19359	Osmosis and Diffusion Kit	111.00/Ea

Peering Inside Living Cells

By Nancy H. Pitts

Think of a living cell as a terrarium: a self-contained, highly efficient environment that sustains life through complex processes. It's fun to look inside. If you have tried to maintain and study a terrarium, you have probably learned that it's very fragile. Simple exterior forces on its self-contained environment (opening it, temperature variations, too much or too little light or water, etc.) can damage the terrarium so that the plants inside die. Similarly, peering inside a living cell used to introduce exterior forces that damaged or killed the cell, until two engineers developed the "Ultrasound Bioprobe."

Complex, invasive, destructive forces traditionally have been used to examine living cells. Staining, fixing, slicing, dicing, etc., either damaged or killed the delicate cell. A dead or damaged cell is not like a living cell. Think about

that unsuccessful terrarium: it's certainly not an example of thriving, on-going life.

Traditional methodologies for studying living cells had other limitations. Fluorescent microscopes offered poor resolution and distortion; electron microscopes were too destructive; light and wave imaging couldn't view anything that small; and scanning probe microscopes couldn't see inside.

Imaging a Living Cell Without Killing It

Gajendra Shekhawat and Vinayak P. Dravid, professors of materials science and engineering at Northwestern University, recently developed a method for looking inside, or 'imaging', living cells without damaging them. Their ultrasound bioprobe uses ultrasound

imaging deep inside the living cell combined with atomic force microscopy for high-sensitivity, high-contrast resolution (wide range of data) images. The result: great pictures of the inside of a living cell.

What makes this exciting to scientists is that they can now examine a living cell in nanometer scale resolution. There are 25 million nanometers in one inch; there are 10 million nanometers in a centimeter.

Here is one result: The ultrasound bioprobe is helping scientists understand the tiny mechanical failures of living lung endothelial cells while they're happening, further advancing the treatment of critically ill patients who develop a serious and deadly lung problem. This can help scientists measure the effectiveness of certain treatments and medications. Understanding

living cell component failures and measuring the effect of treatment agents is a sure road to achieving success. Not bad, just for peeking inside.

[DISCUSSION QUESTIONS]

How do you become a materials science engineer?

What are some other important outcomes of being able to study living cells?

[VOCABULARY]

TERRARIUM

ULTRASOUND

MICROSCOPY

ENDOTHELIAL

LAB-AIDS™ DNA-, RNA-Protein Synthesis Modeling Kit

Build a DNA molecule, replicate it and use half of the “ladder” to construct messenger RNA (mRNA).

- Nucleotides of RNA are first produced following step-by-step directions
- Transcription in the nucleus and the movement of the mRNA molecule are simulated by matching mRNA codons to the transfer RNA (tRNA) and its anticodons
- The amino acids then bond to form a protein molecule
- Discover how the information stored in the DNA is expressed as a finished protein by disconnecting the protein chain from the tRNA
- The tRNAs from the mRNA show their availability to continue
- Depicts: Deoxyribose, Ribose, Phosphate, Hydrogen bonds, Adenine, Thymine, Uracil, Cytosine, Guanine, tRNA, R groups, Covalent bonds, Ribosome

INCLUDES:

12 sets of color-coded parts, teacher manual, background information and 24 student worksheets



Cat. No.	Description	Price
S19376	DNA/RNA-Protein Synthesis Model Kit	214.00/Ea

LAB-AIDS™ Molecular Model of DNA and its Replication

Construct a double helix of the DNA molecule. LAB-AIDS Molecular Model of DNA and its Replication is a basic introduction to the double helix model of DNA using simple components developed exclusively by LAB-AIDS.

Double nitrogen pyrimidine bases are constructed proportionately larger in diameter than the single nitrogen purine bases. Bases are linked by a unique hydrogen bond. The deoxyribose sugar is pentagon-shaped representing its actual molecular structure. Twelve eight-rung models can be constructed with each kit or attach individual models together to form a giant double helix model that will be more than nine feet long.

- Materials to construct 12 models
- Up to 36 students/12 groups
- Requires one 50 minute class period
- Includes teacher's guide and student worksheets that have components of literacy skills

Concepts Illustrated:

- Build a segment of the DNA molecule and see what a double helix is like
- Model can be “unzipped” allowing for replication of DNA segment

ORDERING INFORMATION:

Class size: 12 students.



INCLUDES:

12 color-coded components packets containing: 16 Deoxyribose-sugar groups - black linkage; 16 Phosphate groups - white tubes; 8 Nitrogen (purine) bases: 4 Adenine (A) - orange tubes, 4 Guanine (G) - yellow tubes; 8 Nitrogen (pyrimidine) bases: 4 Cytosine (C) - blue tubes, 4 Thymine (T) - green tubes; 8 Hydrogen bonds - opaque rods. One teacher's guide; 38 student worksheets and guides

Cat. No.	Description	Price
S19379	Molecular Model of DNA/Replication Kit	103.00/Ea

LAB-AIDS™ Food Nutrient Analysis Kit

Test and identify food nutrients.

Learn techniques for easily testing and identifying nutrients.

- Use standard analytical methods to identify sugar, starch, lipid, protein and vitamin C
- Allows students to work in teams
- Indefinite shelf life
- Class size: 30 students

INCLUDES:

- 30 test tubes
- Dropper-controlled bottles of sugar, starch, lipid, protein and vitamin C solutions
- All necessary reagents
- Wax pencil
- 30 student worksheets
- Instruction manual with Safety Data Sheets

REQUIRES:

Hot water bath (for test of simple sugars)



Cat. No.	Description	Price
S19340	Food Nutrient Analysis	112.00/Ea

LAB-AIDS™ Normal Mitosis Kit

Observe nuclear division while perfecting lab techniques.



Observe nuclear division while making a stained microscope slide of a root tip to show mitotic activity in a single laboratory period.

- Observe chromosomes in cells
- Identify the stages of mitosis
- Gain hands-on experience in microtechnique and staining

ORDERING INFORMATION:

Class size: 30 students.

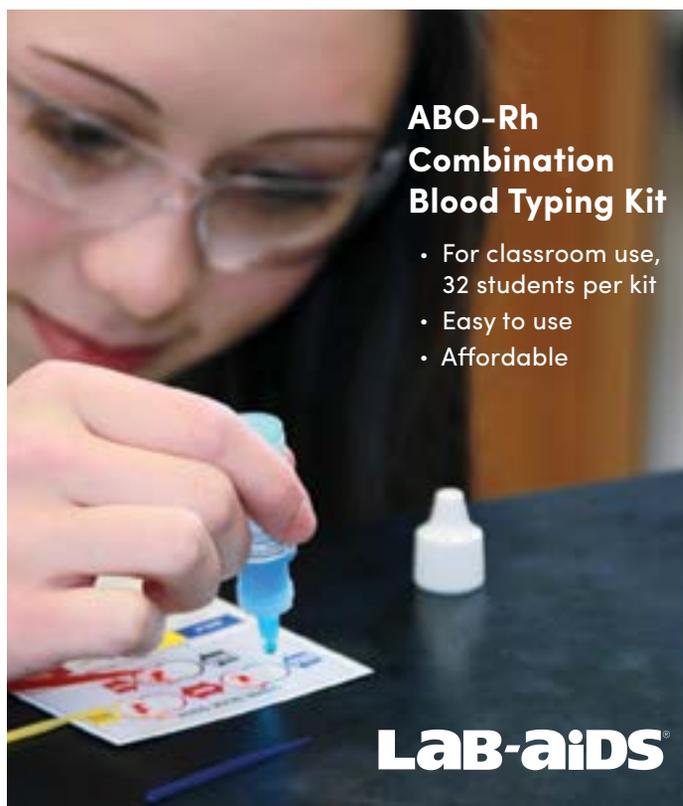
INCLUDES:

- Root tips
- Plastic tissue-treating dishes
- Microscope slides and cover slips
- Four bottles of solution A (alcohol and hydrochloric acid)
- Four bottles of solution B (acetic acid, chloroform, alcohol)
- Tissue-macerating blades
- Four vials aceto-orcein stain
- Tissue transfer brushes
- Student worksheets and guides

REQUIRES:

Microscope

Cat. No.	Description	Price
S19354	Normal Mitosis Kit	171.00/Ea



ABO-Rh Combination Blood Typing Kit

- For classroom use, 32 students per kit
- Easy to use
- Affordable

Lab-aids®

Description	Cat. No.	Price
ABO-Rh Combination Blood Typing Kit	S67359	\$121.00
Basic Blood Typing Kit	S67356	\$91.50

EISCO Class B Volumetric Flasks with Stopper

- Borosilicate glass
- Glass stopper
- Blue markings
- Meet DIN-150-1042



Cat. No.	Capacity (Metric)	Tolerance	Closure Size	Price
S23811	25mL	±0.060mL	Stopper No. 9	3.95/Ea
S23812	50mL	±0.100mL	Stopper No. 13	4.65/Ea
S23813	100mL	±0.160mL	Stopper No. 13	5.50/Ea
S23814	250mL	±0.240mL	Stopper No. 16	7.50/Ea
S23815	500mL	±0.480mL	Stopper No. 19	8.65/Ea
S23816	1000mL	±0.600mL	Stopper No. 22	12.50/Ea

PYREX™ Heavy-Duty Griffin Beakers

Offer the best mechanical strength under harsh conditions, such as mechanized washing machines.

- Borosilicate glass
- ASTM E960
- Double graduated metric scale
- Extra large marking spot
- With spout



Cat. No.	Capacity (Metric)	Price
S63334	4000mL	97.00/Ea
S63330	2000mL	199.00/Pk
S63329	1000mL	146.00/Pk
S63328	600mL	76.00/Pk
S63327	400mL	130.00/Pk
S63326	250mL	100.00/Pk

EISCO Low Form Beakers

These high quality, affordable beakers are perfect for any science classroom or home lab.

- Borosilicate 3.3 glass



Cat. No.	Capacity (Metric)	Spout	Price
S15428	10mL	Without Spout	5.90/Ea
S15430	50mL	Without Spout	9.75/Ea
S15431	100mL	Without Spout	12.50/Ea
S15432	150mL	Without Spout	14.25/Ea
S15433	250mL	Without Spout	17.00/Ea
S15434	400mL	Without Spout	17.50/Ea
S15435	600mL	Without Spout	18.25/Ea
S15436	1000mL	Without Spout	24.75/Ea
S15438	100mL	With Spout	2.85/Ea
S15439	250mL	With Spout	2.85/Ea
S15440	400mL	With Spout	3.95/Ea
S15442	1000mL	With Spout	8.65/Ea
S15443	2000mL	With Spout	14.75/Ea

PYREX™ Erlenmeyer Flasks

Heavy-duty rim and uniform wall thickness.

- Made of Pyrex borosilicate glass
- Designed with heavy-duty rims to reduce chipping
- Provide the proper balance between mechanical strength and thermal shock resistance
- Durable enamel markings with large marking spot
- Nonsterile
- Reusable



Cat. No.	Capacity (Metric)	Price
S63269	50mL	70.50/Pk
S63270	125mL	68.00/Pk
S63271	250mL	66.00/Pk
S63272	300mL	63.75/Pk
S63273	500mL	40.75/Pk
S63275	2000mL	33.25/Ea

PYREX™ Single Metric Scale, Graduated Cylinder, TC, with Funnel Top

With bumper guards and permanent white enamel marking spot.

These PYREX™ graduated cylinders are calibrated "to contain" (TC).

- Type 1 borosilicate glass
- Hex base
- PYREX™
- Permanent, white enamel graduations
- Larger sizes have bumper guards



Cat. No.	Capacity (Metric)	Price
S14281	10mL	15.50/Cs
S14282	25mL	21.75/Cs
S14283	50mL	41.25/Cs
S14284	100mL	26.75/Cs
S14285	250mL	36.75/Cs
S14286	500mL	51.50/Cs
S14287	1L	100.00/Cs
S14288	2L	128.00/Cs

United Scientific™ Supplies Distillation Apparatus

Includes all the materials necessary to construct an inexpensive, versatile distillation apparatus.

- 500mL filtering flask
- 500mL round-bottom borosilicate flask with side tube
- 300mm Graham condenser
- 250mL Erlenmeyer flask
- Glass stopper
- Support stand (6 × 9 in. [15.2 × 22.9cm]) with 24 in. (61cm) rod
- Swivel buret clamp
- Extension clamp
- Clamp holder
- Activity guide



Cat. No.	Description	Price
S04534	Distillation Apparatus	145.00/Ea

Acetone

2-Propanone; CH₃COCH₃

F.W. 58.08

CAS: 67-64-1

Color: Clear

Solubility in Water: Soluble in water

Shelf Life: 5 years

DOT Class 3, II: Flammable Liquid

FLAMMABLE

ACS GRADE		
S25120	500mL	14.75
S25120A	4L	34.00
HISTOLOGY GRADE		
S25904	4L	35.50
REAGENT GRADE		
S25120B	500mL	9.95
S25120C	20L	151.00

Ethyl Alcohol

Ethanol; C₂H₅OH

F.W. 46.07

CAS: 64-17-5

Color: Clear, colorless

Solubility in Water: Slightly soluble

Shelf Life: 5 years

DOT Class 3, II: Flammable Liquid

FLAMMABLE

70% DENATURED WITH MIBK		
S25306	500mL	8.65
S25306A	4L	25.00
95% DENATURED WITH IPA AND METHANOL		
S25309D	500mL	6.30
S25309E	4L	60.00
95% DENATURED WITH MIBK		
S25310	500mL	10.00
S25310A	3.8L	42.25
ANHYDROUS, DENATURED WITH MIBK		
S25307	500mL	7.35
S25307A	1L	17.50
S25307B	4L	38.50
ANHYDROUS, DENATURED, WITH IPA AND METHANOL		
S25308	1L	24.00
S25308A	20L	157.00
LAB GRADE - 95% DENATURED WITH IPA AND METHANOL		
S25309	500mL	6.30
S25309C	1L	11.25
S25309A (SAFE-COTE)	3.8L	85.00
S25309B	4L	29.00

PYREX
A Corning Brand

Even then, you knew.
PYREX®... the right choice.

Hydrogen Peroxide, 30% Solution

Hydrogen Dioxide; H₂O₂

F.W. 34.01

CAS: 7722-84-1

Color: Clear, colorless

Solubility in Water: Soluble

Shelf Life: 1 year

DOT Class 5.1 (8), II: Oxidizer

REACTIVE & OXIDIZING

30%		
S25360	500mL	29.00

Isopropyl Alcohol

Rubbing Alcohol; (CH₃)₂CHOH

Color: Clear, colorless

Solubility in Water: Infinite

Shelf Life: 5 years

DOT Class 3, II: Flammable Liquid

FLAMMABLE

70%		
S25371	500mL	7.90
S25371A	4L	38.00
99%		
S25372	500mL	10.25
S25372A	3.785L	45.00

Fisher Science Education™ Periodic Table of Elements Poster

Offers a large format and easy-to-use display.



- Printed on 10mL indoor/outdoor poster stock material
- Corner grommets for easy display
- Large 48 × 84 in. display
- Tear-resistant

Cat. No.	Description	Price
S07899	Periodic Table Poster	217.00/Ea

Enviro-Safe™ General Purpose Liquid-In-Glass Thermometers

Certified environmentally safe thermometers replace dangerous mercury.



- EnviroKleen™ certified
- Meet education mandates to purchase “Green” products
- Lead-free glass
- Traceable to NIST
- Made in the USA

APPLICATIONS:

Ideal for use in chemical/petrochemical laboratories, universities, scientific institutions, food and beverage processing, pharmaceutical and medical industries, dairies, breweries and distilleries.

ORDERING INFORMATION:

Should you require an individualized Thermometer Calibration Report, factory calibrated thermometers or custom calibration services are available.

COMPLIANCE:

Manufactured and tested by USA quality team.

CERTIFICATIONS:

Include a multi-language (English, French, German, Italian, Portuguese, and Spanish) Statement of Accuracy and Traceability.

Cat. No.	Temperature Range (Metric)	Temperature Range (English)	Immersion Length	Price
200mm (7.9 in.) Length				
S95796	-10° to +110°C	Not Applicable	50mm	17.00/Ea
S95797	-10° to +110°C	Not Applicable	Total	17.00/Ea
S95798	-10° to +150°C	Not Applicable	50mm	18.00/Ea
S95799	-10° to 150°C	Not Applicable	Total	19.00/Ea
S95800	Not Applicable	20° to 230°F	50mm	18.25/Ea
S95801	Not Applicable	20° to 230°F	Total	18.00/Ea
300mm (12 in.) Length				
S95804	-20° to +110°C	Not Applicable	76mm	25.00/Ea
S95805	-20° to +110°C	Not Applicable	Total	16.00/Ea
S95806	-20° to +150°C	Not Applicable	76mm	18.00/Ea
S95807	-20° to +150°C	Not Applicable	Total	17.00/Ea
S95808	Not Applicable	0° to 230°F	76mm	20.00/Ea
S95809	Not Applicable	0° to 230°F	Total	20.00/Ea
S95810	Not Applicable	0° to 300°F	76mm	20.00/Ea
S95811	Not Applicable	0° to 300°F	Total	34.00/Ea
350mm (14 in.) Length				
S95812	-10° to +260°C	Not Applicable	76mm	27.00/Ea
S95813	-10° to 225°C	Not Applicable	Total	27.00/Ea
S95814	Not Applicable	20° to 500°F	76mm	26.00/Ea
S95815	Not Applicable	20° to 440°F	Total	14.00/Ea
420mm (16.5 in.) Length				
S95817	-1° to 61°C	Not Applicable	76mm	74.00/Ea

Easy-Read™ General Purpose Liquid-In-Glass Thermometers

Easy-to-read partial immersion thermometers.

- Lead-free, yellow back glass and black liquid provides easy readability and fewer reading errors
- Contains non-toxic, biodegradable, Enviro-Safe™ liquid
- EnviroKleen™ certified

APPLICATIONS:

Ideal for use in chemical/petrochemical laboratories, universities, scientific institutions, food and beverage processing, pharmaceutical and medical industries, dairies, breweries and distilleries.

ORDERING INFORMATION:

Should you require an individual Thermometer Calibration Report, factory calibrated thermometers or custom calibration services are available.

CERTIFICATIONS:

Manufactured and tested by our USA quality team, these thermometers are traceable to NIST and include a multi-language (English, French, German, Italian, Portuguese, and Spanish) Statement of Accuracy and Traceability.



Cat. No.	Temperature Range (Metric)	Temperature Range (English)	Immersion Type	Price
200mm (7.9 in.) Length				
S95775	-10° to +110°C	Not Applicable	Partial	16.75/Ea
S95776	-10° to +110°C	Not Applicable	Total	16.00/Ea
S95777	-10° to +150°C	Not Applicable	Partial	17.00/Ea
S95778	-10° to +150°C	Not Applicable	Total	21.25/Ea
S95779	Not Applicable	20° to 230°F	Partial	21.00/Ea
S95780	Not Applicable	20° to 230°F	Total	19.50/Ea
S95781	Not Applicable	20° to 300°F	Partial	23.00/Ea
S95782	Not Applicable	20° to 300°F	Total	23.00/Ea
300mm (12 in.) Length				
S95783	-10° to +70°C	Not Applicable	Partial	58.00/Ea
S95784	-20° to +110°C	Not Applicable	Partial	27.00/Ea
S95785	-20° to +110°C	Not Applicable	Total	27.00/Ea
S95786	-20° to +150°C	Not Applicable	Partial	24.00/Ea
S95787	-20° to +150°C	Not Applicable	Total	21.00/Ea
S95788	Not Applicable	0° to 230°F	Partial	22.00/Ea
S95789	Not Applicable	0° to 230°F	Total	22.00/Ea
S95791	Not Applicable	0° to 300°F	Total	22.25/Ea
S95790	Not Applicable	0° to 300°F	Partial	27.00/Ea
350mm (14 in.) Length				
S95792	-10° to +260°C	Not Applicable	Partial	28.00/Ea
S95793	-10° to +225°C	Not Applicable	Total	28.00/Ea
S95794	Not Applicable	20° to 500°F	Partial	26.50/Ea
S95795	Not Applicable	20° to 440°F	Total	27.00/Ea

Stay Connected with the Fisher Science Education Team

Follow us on



Thermo Scientific™ SPECTRONIC™ 200 Spectrophotometer

The new standard for rugged, simple-to-use visible spectrophotometers for teaching and routine applications.

Delivering quick, convenient measurements in the hands of novice users, the SPECTRONIC 200 spectrophotometer is the perfect fit for the teaching lab.



- Modern on-board software provides total control without a computer
- Coarse/fine wavelength setting
- Adjustable tilt screen
- Sealed keys
- Classroom-friendly, adaptable sample compartment
- Convenient cuvet rack compartments
- Sloping surfaces discourage balancing of samples on unit

Specifications

Lamp	Tungsten Halogen
Optical Design	Single Beam
Spectral Bandwidth	≤4nm
Voltage	100 to 240V
Wavelength Accuracy	±2nm
Wavelength Range	340 to 1000nm
Wavelength Repeatability	±1nm

Cat. No.	Description	Price
S06240	SPECTRONIC 200 Spectrophotometer	1490.00/Ea

Thermo Scientific™ GENESYS™ 10S UV-Vis Spectrophotometer

Utilizes a high-intensity xenon lamp and dual-beam optical geometry to deliver unsurpassed data quality.

Firing pulses of light only when the instrument is taking a measurement, the xenon lamp provides strong illumination from the UV to the near-IR region of the spectrum.



- Accelerate through wavelength scans with scan speeds up to 4,200nm/minute
- Dual-beam optics for superior photometric accuracy
- Acquire data from the UV to the near-IR
- Increase sample throughput with the integrated 6-cell changer
- Save data to a USB memory device
- Rely on accurate data with pre-programmed verification methods

Maintenance-Free Instant-on Xenon Lamp

- Perform accurate analysis over the entire wavelength range of 190-1100nm
- Prevent damage to sensitive samples as the lamp only flashes when data is being acquired
- Lamp life guaranteed for 3 years
- Lamp produces no heat so sample compartment temperature remains stable

Cat. No.	Description	Price
S37281	10S UV-Vis; Spectrophotometer	4848.00/Ea
S37282	10S UV-Vis; Spectrophotometer with Printer	5300.00/Ea

Student-friendly Spectrophotometer

The Thermo Scientific™ SPECTRONIC™ 200 Visible Spectrophotometer brings new possibilities to student education:

- Trusted live display supports current experiments
- Full-spectrum scan mode finds peaks in seconds
- Removable sample compartment for easy clean-up
- Measure in square or test tube cuvettes

Visit thermofisher.com/spec200free trial to request a free trial unit for your classroom.



Cat. No.	Price
S06240	\$1,490

thermo scientific

GENESYS™ 30 Visible Spectrophotometer

Perform both basic and complex analyses with the Thermo Scientific™ GENESYS™ 30 Visible Spectrophotometer, an intuitive, reliable solution for education or in the lab.

Intuitive design allows students and teachers to focus on scientific data and concepts rather than on learning how to use the instrument. Results can be reported quickly as digital or printed data.



It is the ideal instrument for any user, whether a novice student or an experienced lab associate.

Product FEATURES:

- Entirely new industrial design for better usability
- High definition 5-inch color screen with rubberized push-button keypad for easy navigation
- Single cell measurement with removable, washable sample compartment liner
- Cell holders for standard cell types including test-tubes
- New onboard software user interface
- USB data export in a text format that's easy to read and process
- Excellent snap-on thermal printer
- Three-year warranty and skilled technical support

Educator benefits:

Meets curriculum requirements for:

- Single wavelength
- Scanning
- Beer's Law
- Colorimetry/colorimetric analysis
- Quantitative analysis

Cat. No.	Description	Price
S28454	GENESYS 30 Visible Spectrophotometer	2421.00/Ea

Thermo Scientific™ Spectrophotometer Bulbs and Cuvets

Avoid getting sidetracked by a burned-out bulb.



Cat. No.	Product Type	Price
S48625ND	Replacement Halogen Bulb	97.00/Ea
S28522	Replacement Tungsten-Halogen Lamp, pre-aligned	81.00/Ea
S42527	Cuvet: 0.5 in. pathlength, Height 100mm	124.00/Pk

Environmental Science

Fisher Science Education™ Junior Barometer

Features a plastic case, dual-scale black markings, white dial and a movable pointer to observe direction and amount of change as it occurs.

- Readings in mbar and mm/Hg
- Range: 715/815mm/Hg and 940/1,070mbar
- Recalibratable
- Complete with keyhole for wall mounting
- Accuracy: 3.5mbar; 3mm/Hg
- Size: 64mm diameter



Cat. No.	Description	Price
S01958	Junior Barometer	39.00/Ea

Durac™ Soil Analysis ASTM Hydrometers

For determining the specific gravity of soil.

Conform to ASTM standards. Tested and calibrated in triple accredited/registered ISO/IEC 17025:2005, A2LA™ accredited laboratory against equipment whose calibration is traceable to NIST™ and DKD/PTB. Temperature of standardization: 68°/68°F.

- Individually serialized and feature a metal ballast
- Length: 11 in. (280mm)

INCLUDES:

Multi-language (English, French, German, Italian, Portuguese and Spanish) Statement of Accuracy

CERTIFICATIONS:

Accuracy traceable to NIST and DKD/PTB



Cat. No.	Accuracy	ASTM Number	Increments	Specific Gravity Range	Price
S04258	0.001	151H	0.001	0.995 to 1.038	37.00/Ea

Durac™ Salt Brine Plain Form Hydrometer

For measuring sodium chloride saturation of salt brines with range from 0 to 100%.

- 300mm (12 in.) long
- Lead free ballast and glass
- Individually serialized
- Temperature standardization: 15°C (60°F)

APPLICATIONS:

Used in various industries including food, fishing, and transportation.

CERTIFICATIONS:

Packaged with a multi-language (English, French, German, Italian, Portuguese, and Spanish) Statement of Accuracy indicating accuracy traceable to NIST. Hand inspected by U.S. quality team in exclusive triple accredited/registered ISO/IEC 17025:2005 and A2LA Accredited Calibration Laboratory; internationally recognized and accepted by the signatory economies of the ILAC /MRA and located in ISO 14001:2004 Environmental Management System registered facility.

ORDERING INFORMATION:

Should you require an individual Thermometer Calibration Report, factory calibrated thermometers or custom calibration services are available.

STORAGE:

Salt Brine hydrometers should be stored in a clean, dry, safe place, and should not be subjected to extreme temperatures.

Cat. No.	Accuracy	Increments	Specific Gravity Range	Price
S04256	±1%	1%	0 to 100%	48.00/Ea



Durac™ Battery Hydrometer with Siphon Set

Used to determine the specific gravity/relative density (g/cm³) of battery acid in the range of 1.150 to 1.300.

- Includes siphon set to collect battery acid
- Rubber parts are made of nitrile, a synthetic rubber that is more chemical resistant and durable than conventional rubber
- 165mm (6.5 in.) long
- Lead free ballast and glass
- Individually serialized
- Temperature standardization: 77°F
- Made in USA

APPLICATIONS:

Automotive and trucking industries.

ORDERING INFORMATION:

Should you require an individual Thermometer Calibration Report, factory calibrated thermometers or custom calibration services are available.

Cat. No.	Accuracy	Increments	Specific Gravity Range	Price
S04257	+/-0.005	0.005	Range: 1.150-1.300	97.00/Ea

STORAGE:

Battery hydrometers should be stored in a clean, dry, safe place, and should not be subjected to extreme temperatures.

CERTIFICATIONS:

Accuracy traceable to NIST and DKD/PTB



Durac™ Specific Gravity/Relative Density (g/cm³) Plain Form Hydrometers

Available in a variety of models measuring specific gravity/relative density (g/cm³) of liquids in various ranges from 0.690 to 3.000.

- Lead free ballast and glass
- Individually serialized
- Temperature standardization: 15°C (60°F)

APPLICATIONS:

Commonly used in industries such as food and beverage, chemical, pharmacology, transportation, refrigeration and more.

CERTIFICATIONS:

Packaged with a multi-language (English, French, German, Italian, Portuguese, and Spanish) Statement of Accuracy indicating accuracy traceable to NIST. Hand inspected by U.S. quality team in exclusive triple accredited/registered ISO/IEC 17025:2005 and A2LA Accredited Calibration Laboratory (Cert 2448.01); internationally recognized and accepted by the signatory economies of the ILAC/MRA and located in ISO 14001:2004 Environmental Management System registered facility.

STORAGE:

Plain form hydrometers should be stored in a clean, dry, safe place. They should not be subjected to extreme temperatures.

ORDERING INFORMATION:

Should you require an individual Thermometer Calibration Report, factory calibrated thermometers or custom calibration services are available.

For Liquids Lighter Than Water

Cat. No.	Specific Gravity Range	Accuracy	Increments	Length (Metric)	Price
S04250	0.900 to 1.000	±0.001	0.001	330mm	35.00/Ea
S04249	0.800 to 0.910	±0.001	0.001	330mm	36.00/Ea
S04248	0.700 to 0.810	±0.001	0.001	330mm	35.00/Ea

For Liquids Heavier Than Water

Cat. No.	Specific Gravity Range	Accuracy	Increments	Length (Metric)	Price
S04252	1.200 to 1.420	±0.002	0.002	300mm	35.00/Ea
S04251	1.000 to 1.220	±0.002	0.002	300mm	36.00/Ea



Durac™ Specific Gravity/Relative Density (g/cm³) Hydrometer Set with EnviroSafe™ Thermometer

Set consists of eight specific gravity/relative density plain form hydrometers and one total immersion thermometer to reference liquid temperature for accurate hydrometer readings.

- Hydrometer Range: 0.700 to 2.000
- Thermometer Range: -30° to +120°F
- Hydrometers length: 300mm (12 in.); lead free ballast and glass
- Temperature standardization: 60°F (15°C)
- Thermometer length: 300mm (12 in.); lead free glass; contains EnviroKleen certified, non-toxic liquid fill
- Packaged in a deluxe storage case



CERTIFICATIONS:

Hydrometers include multi-language (English, French, German, Italian, Portuguese, and Spanish) Statement of Accuracy indicating accuracy traceable to NIST. Thermometer is manufactured and tested by our USA quality team; traceable to NIST and includes a multi-language (English, French, German, Italian, Portuguese, and Spanish) Statement of Accuracy and Traceability.

STORAGE:

Plain form hydrometers should be stored in a clean, dry, safe place. They should not be subjected to extreme temperatures.

INCLUDES:

Set contains hydrometers B61801-4500, B61801-4600, B61801-4700, B61801-7200, B61801-7300, B61801-7400, B61801-7500, B61801-7600; and thermometer B60506-0300.

Cat. No.	Description	Price
S04247	Hydrometer Set (8) plus Thermometer	401.00/Ea

8-Place Hydrometer Storage and Carrying Case

Holds up to eight full-size/length hydrometers.

- Deluxe foam-lined storage case
- Hydrometers sold separately



Cat. No.	Description	Price
S02658	Hydrometer Storage Case	159.00/Ea

Fisher Science Education™ Water Quality Saddle Bag

For study of water pollution and its effects.



- Designed to wear on the side of the individual for safety and ease
- Contains: alkalinity P/T/acidity, alkalinity=1 drop=10ppm/25mL, acidity =0 to 500ppm, hardness (total), 1 drop =2ppm/25mL, dissolved oxygen (0 to 10ppm), nitrate (0 to 50ppm), and pack of 100 pH test strips (2 to 9 range)

ORDERING INFORMATION:

Each test kit has enough materials to perform over 100 tests and can be used by a group of 30 students or more. For grades 6-14.

INCLUDES:

Step-by-step laminated picture instructions, an instructor's manual with background information, reproducible student data sheets and color-coded reagents

Cat. No.	Description	Price
S02645	Water Quality Saddle Bag	258.00/Ea

Kemtec™ Seawater Analysis Kit

Students analyze chloride content of seawater samples.



- Students use volumetric titration technique and analyze samples from the Atlantic Ocean, Pacific Ocean and Gulf of Mexico
- Water from local sources can also be analyzed
- Constant ratio of dissolved substances in sea water allows concentration of salt and other elements to be calculated from chlorine concentration
- Investigate how earth is affected if climate change continues to disrupt the ocean conveyor belt system
- Grades 10 to 12
- Class size: 24 students

INCLUDES:

Silver nitrate, potassium chromate indicator, Atlantic Ocean water, Pacific Ocean water, Gulf of Mexico water, instructor manual, SDS, assessment manual and student data sheets

REQUIRES:

Goggles and 25mL burets.

Cat. No.	Description	Price
S06750	Seawater Analysis Kit	124.00/Ea

Hach 5 in 1 Test Strips

Hach's 5 in 1 test strips are great for quick, on-site evaluations of water quality with reliable results on every test. These multi-parameter test strips test for five water quality measurements on 1 strip. Contains 50 tests.

- Free Chlorine (0-10 mg/L)
- Total Chlorine (0-10 mg/L)
- Total Hardness (as CaCO₃, 0-25 gpg and 0-425 mg/L)
- Total Alkalinity (as CaCO₃, 0-240 mg/L)
- pH (6.2 - 8.4)



Cat. No.	Description	Price
S38951	Hach 5 in 1 Test Strips	26.00/Ea

fisherbrand accumet™ AB150 pH Meter Kit

For laboratories that need basic, accurate, easy-to-use pH/mV meter with exceptionally high accuracy and resolution.

Intuitive, simple operation and high accuracy in a compact, affordable meter.

- Easy-to-understand prompts
- Graphic display with adjustable backlight
- Calibrate with custom pH buffer values
- Date and Time to meet GLP
- Password protection
- Optional calibration reminder and high/low alarm
- 500 point memory – log manually or at intervals
- Easily view calibration data
- 0.001 pH resolution and ± 0.002 pH accuracy

pH Mode

- Range: -2.000 to +20.000 pH
- Resolution: 0.1/0.01/0.001 pH
- Accuracy: ± 0.002 pH + 1 LSD
- Buffer Sets: USA: 2.000, 4.010, 6.997, 10.013, 12.000
- NIST: 1.678, 4.010, 6.865, 9.184, 12.460
- DIN: 1.090, 3.060, 4.650, 6.790, 9.230, 12.750
- FSCI: 1.000, 3.000, 6.000, 8.000, 10.000, 13.000
- CUSTOM: any two to five values, ≥ 1.0 pH unit apart
- Slope Display: up to five different slopes with offset
- Temp. Compensation: automatic or manual (0° to 100°C/32° to 212°F)

Output

- RS-232 (phono plug), mini-B USB, stirrer

Language Selection

- English, French, Spanish, German, Italian, Chinese, Korean, and Portuguese

Memory

- 500 data sets, viewable

Datalogging

- Manual, timed (selectable every 3 to 3600 seconds)
- Printer or CSV format

Cat. No.	Model	Price
S04962	AB150 pH Meter Kit	1183.00/Ea



Cal Due Alarm

- User selectable from 8 hours, 16 hours and 1 to 31 days

High/Low Alarms

- User selectable, visual and audible, parameter based

INCLUDES:

AB150 Kit: Includes meter, TRIS compatible pH/ATC electrode, electrode arm, RS-232 and USB cables, 100/240V power supply, and manual

WARRANTY:

Meter: Three years parts and labor; Electrodes (included with meter kits): One year parts and labor

CERTIFICATIONS:

Select models available with Certificate of NIST Traceability

Warmer, Wetter Climate to Impact Thunderstorm Intensity

By Kylie Wolfe

Researchers recently shared new findings that predict the impact of a warmer climate across the continental United States in the coming years. Simulations revealed that a continued rise in both temperature and precipitation may cause thunderstorms to increase in intensity.

Forecast the Future

A study at Colorado State University produced detailed simulations of future weather patterns using the Weather Research and Forecasting model developed by the National Center for Atmospheric Research (NCAR) in Boulder, Colorado. The model was run at a higher resolution than that of prior studies to provide more detailed information about cloud processes and topographical features. Running the simulations with the natural environment in mind allowed for more accurate results across the entire country.

The first simulation was reflective of actual weather patterns from 2000-2013, including storm movements and correct daily precipitation cycles. The second simulation mirrored global warming conditions, assuming a two- to three-degree average temperature increase and double the amount of atmospheric carbon dioxide.

A Perfect Storm of Interesting Findings

The researchers' forecasts showed that weak-to-moderate thunderstorms will decrease in frequency as intense storm systems become more common. The resulting increases in rainfall, lightning and strong winds are expected to contribute to more flash floods, fires and tornados.

Scientists attribute these projected weather patterns to changing thermodynamic conditions. Warmer,

wetter weather increases the amount of energy in the atmosphere; consistently warmer temperatures will maintain that high level of energy and release it in the form of severe thunderstorms. Maintaining this energy balance is ultimately what drives different weather patterns.

Moving forward, scientists want to continue to assess the physical processes of clouds using high-resolution techniques to better gauge the consequences of climate change. Meanwhile, researchers plan to conduct further simulations to gain more insight on general weather and storm patterns.

[DISCUSSION QUESTIONS]

Define climate and weather and explore how they differ and how they are related. Write a sentence using each word to describe what's happening outside your classroom.

How do changes in temperature impact the weather/climate we experience and the thermodynamics of those systems? Discuss the Laws of Thermodynamics and apply them to variations in weather/climate.

How do topography and geography influence weather/climate? Take time to research and discuss mountain ranges, bodies of water, wind patterns and elevation.

[VOCABULARY]

CLIMATE

WEATHER

CONVECTIVE SYSTEM

TOPOGRAPHICAL FEATURE

THERMODYNAMICS

Thermo Scientific™ Orion Star™ A111 pH Benchtop Meter

Easy to use first time and every time, prepare students for laboratory and research applications using professionally proven benchtop meters.

Thermo Scientific Orion Star A111 pH Benchtop Meters combine simplicity with accuracy. A large LCD displays pH or mV readings along with temperature. Icons provide quick updates on battery life, electrode status and calibration information. Simple button layout and onscreen messages help with calibration and setup menu choices.

- Large, informative screen clearly shows the main information, including pH or mV reading, temperature, meter mode, calibration information and power source
- Don't miss a reading — Auto-Read measurement mode locks in the stable reading on your screen and ready indicator alerts when readings are stable
- Up to three point pH calibration
- Automatic recognition of USA/NIST and DIN buffers
- Easily recall calibration slope data for procedure checks
- Non-volatile memory holds up to 50 data points
- Included electrode arm and newly-designed probe holder make it easier to maintain and place probes into samples
- Plug the meter into almost any power outlet with the included universal power adapter, or use four AA batteries (sold separately) to run the meter on DC power
- The IP54-rated housing can handle splashes and can be wall-mounted if table space is a problem



Specifications

- Accuracy (mV): ± 0.2 mV or $\pm 0.05\%$ of reading whichever is greater
- Accuracy (pH): ± 0.01 pH
- Battery Life: 2000 hours
- Inputs: BNC (pH), 8-pin Mini-DIN (temperature)
- Probe Type: \pm pH electrode, ATC probe, ORP electrode - purchase separately
- Range (mV): 1600.0mV
- Range (pH): -2.00 to 16.00pH
- Relative Humidity Range: 5 to 85%, non-condensing
- Resolution (mV): 0.1mV
- Range (Relative mV): ± 1999.9 RmV
- Resolution (pH): 0.1, 0.01pH
- Temperature (Metric) Operating: 5° to 45°C
- Temperature Range: -5° to +105°C
- Calibration Points (pH): 1 to 3

Cat. No.	Description	Price
S04958	Meter Only	550.00/Ea
S04965	Meter Kit	813.00/Ea
S04963	Meter/Electrode	876.00/Ea

INCLUDES:

Orion Star™ A111 pH Benchtop Meter, Part no. STARA1110, includes electrode arm with redesigned holder and universal power adapter

Orion Star™ A111 pH Benchtop Meter Kit, Part no. STARA1115, includes 9157BNUMD Orion Triode™ 3-in-1 pH/ATC probe; Solution kit (60mL each of pH 4, 7 and 10 buffers; storage solution and cleaning solution); electrode arm with redesigned holder and universal power adapter

Orion Star™ A111 pH Benchtop Meter Kit, Part no. STARA1116, includes GD9156BNWP Orion Green electrode; 927007MD Stainless Steel ATC Probe; electrode arm with redesigned holder and universal power adapter

WARRANTY:

Three-year meter replacement warranty

CERTIFICATIONS:

CE, TÜV, FCC Class A limits, IP-54

fisherbrand accumet™ pH/ATC Electrode

For use with AB, AR and XL Series Meters.



Cat. No.	Description	Price
S04961	pH/ATC Electrode	262.00/Ea

Chemicals for Education

- Value
- Quality
- Safety



SHOP ONLINE
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Ohaus™ Starter Pen Meters

Convenient, accurate results in seconds.

- Portable and compact
- Single-hand operation
- Durable IP67 waterproof design
- With wrist strap for security
- Auto shutdown after four minutes of non-use
- Require four AG13 1.5V microalkaline batteries
- Size/weight: 185 × 45 × 38mm; 110g
- Choose from five models in a variety of calibrations.



Cat. No.	Model	Range	Resolution	Temp. Display	Price
pH Pen Meters					
S05084	ST10	0.0 to 14.0pH	0.1pH	Yes	56.00/Ea
S05085	ST20	0.00 to 14.00pH	0.01pH	No	101.00/Ea
ORP Pen Meters					
S05086	ST10R	-1000 to 1000mV	1mV	No	122.00/Ea
S05087	ST20R	-1000 to 1000mV	1mV	Yes	159.00/Ea
Conductivity Pen Meters					
S05088	ST10C-A	0.0 to 199.9µS/cm	0.1µS/cm	No	76.00/Ea
S05089	ST10C-B	0 to 1999µS/cm	1µS/cm	No	76.00/Ea
S05090	ST10C-C	0.00 to 19.99mS/cm	10µS/cm	No	76.00/Ea
S05091	ST20C-A	0.0 to 199.9µS/cm	0.1µS/cm	Yes	107.00/Ea
S05092	ST20C-B	0 to 1999µS/cm	1µS/cm	Yes	107.00/Ea
S05093	ST20C-C	0.00 to 19.99mS/cm	10µS/cm	Yes	107.00/Ea
Salinity Pen Meters					
S05094	ST10S	0.0 to 10ppt	+/- 2.5% FS	Yes	60.25/Ea
S05095	ST20S	0.0 to 80.0ppt	+/- 1.5% FS	No	107.00/Ea
TDS Pen Meters					
S05096	ST10T-A	0.0 to 100.0mg/L	0.1mg/L	No	84.00/Ea
S05097	ST10T-B	0 to 1000mg/L	1mg/L	No	84.00/Ea
S05098	ST20T-A	0.0 to 100.0mg/L	0.1mg/L	Yes	89.00/Ea
S05099	ST20T-B	0 to 1000mg/L	1mg/L	Yes	89.00/Ea



Scout® STX Touchscreen Portable Balance



The First Touchscreen Portable Balance!

Portable balance operation has never been easier, faster, or more intuitive than the new OHAUS STX!

The next generation of Scout offers a color touchscreen display, and creates a new level of unmatched efficiency and functionality in portable weighing.

Capacity	Read	Model	Cat. No.	Price
8200	1	STX8200	S14516	\$403
6200	0.1	STX6201	S14515	\$778
2200	0.1	STX2201	S14514	\$485
2200	0.01	STX2202	S14511	\$1158
1200	0.01	STX1202	S14510	\$858
620	0.1	STX621	S14513	\$460
620	0.01	STX622	S14509	\$751
420	0.1	STX421	S14512	\$311
420	0.01	STX422	S14508	\$770
220	0.01	STX222	S14507	\$551
220	0.001	STX223	S14506	\$839
120	0.001	STX123	S14505	\$750

Visit fisheredu.com/ohaus to learn more.



EISCO Light Box and Optical Set

For reflection, refraction and color mixing experiments.

Light Box

- Light source produces convergent, divergent or parallel beams
- One end of box constructed with adjustable cylindrical convex lens for parallel beams
- Other end has triple aperture system for color mixing experiments (lateral apertures have an adjustable hinged mirror)
- All apertures designed with vertical channels to hold slit plates and color filters

Optical Set

- Two black plates supplied with three narrow slits at one end and one narrow slit at the other
- Third black plate provides four narrow slits at one end and one wide slit at the other
- Set of seven mounted color filters



INCLUDES:

Light box includes 12V 24W lamp and adjustable cylindrical convex lens triple aperture system with vertical channels. Optical Set supplied with acrylic blocks, three mirrors, three slit black plates and set of color filters

Cat. No.	Description	Price
S96022	Light Box/Optical Set	178.00/Ea

EISCO Pulley Demonstration Set for Students

Simpler pulley set, with fewer components.

INCLUDES:

- **Base:** 7.9 × 5.9 in. (20 × 15cm) wooden base fitted with one vertical rod, 24.0 × 0.5 in. (61cm × 12.5mm) and one horizontal rod, 7.9 × 0.4 in. (20cm × 9.5mm) with clamp
- **Pulleys:** eight single, two double sheave, ball-bearing frictionless pulleys
- **Collars:** six, with hook
- **Weights:** nine total, brass; 1 × 10g, 2 × 20g, 1 × 50g, 1 × 100g, 2 × 200g, 1 × 500g, 1 × 1000g
- Also: one right-angled clamp, wheel and axle, roll cord, tommy bar to tighten vertical rods



Cat. No.	Description	Price
S99358	Pulley Demonstration Set	298.00/Ea

EISCO Linear Air Track

Dramatically demonstrate the field of collisions and conservation of momentum.

Cost-effective, virtually friction-free system for the study of all aspects of dynamics: velocity, force and acceleration, potential energy, kinetic energy, conservation of energy, SHM, motion on level and inclined planes.

- 2m aluminum track made from strong 2.2 × 2.2 in. (56 × 56mm) aluminum extrusion
- With leveling feet
- Gliders designed to accept standard slotted masses for additional loads
- Recommended operating temperature: 10° to 40°C
- Recommended operating humidity: <85%
- Standard light gates and timers are required for measurement of glider speeds.

ORDERING INFORMATION:

Overall dimensions: 80.9 × 8.8 × 7.1 in. (205.5 × 22.4 × 18.0cm). Total weight: 19.8 lb. (9kg). Glider length: 4.7 in. (12.0cm), 9.4 in. (24.0cm). Supplied without air blower.

INCLUDES:

Comprehensive accessory pack to facilitate a variety of demonstrations



Cat. No.	Description	Price
S05827	Linear Air Track	643.00/Ea

EISCO Demo Van de Graaff Generator

Complete self-contained unit with discharger and accessories.

- Generator consists of a conducting sphere (the dome) supported by a Plexiglas™ pillar and rubber belt driven by an electric motor concealed in the metal base
- Static electrical charge produced by friction between belt and two rollers, one polyethylene, the other Plexiglas
- Charge is removed from the belt by a metal gauze and stored in the dome
- Electric motor is driven by line power, using a three-wire cable
- 4mm base socket can support a conducting sphere (fitted with a cranked rod support) or a wire connection to a separate conducting sphere (fitted on a Plexiglas rod)

Specifications

- Diameter of generator dome: 8.7 in. (22.0cm)
- Total height: 25.6 in. (65.0cm)
- Base dimensions (max.): 8.6 × 7.2 × 3.7 in. (21.8 × 18.2 × 9.3cm)
- Operating voltage: 220 to 240VAC (with 5A cartridge fuse)
- Dome capacitance: ~15pF
- Maximum (intermittent) current: ~6ÅμA
- Maximum spark length: ~2.4 in. (6.0cm)
- Diameters of conducting spheres: 3.9 in. (10.0cm)



INCLUDES:

Blue cover is provided to keep the Van de Graaff free from dust when not in use

Cat. No.	Description	Price
S05838	Van de Graaff Generator	401.00/Ea

EISCO Physics Kit: Electricity System 1

Students can explore common experiments such as Ohm's Law, Series and Parallel Resistance Circuits, Kirchhoff's Laws, and RC Circuits.

- Over 50 components for building circuits
- Use to teach 16 activities
- Includes Activity Guides with Student worksheets

Experiments Covered:

- Simple Electric Circuit with Switches
- Voltmeter Use
- The Voltage Divider
- Ammeter Use
- The Potentiometer as a Variable Resistor
- Ohm's Law and the Voltametric Method
- Series Resistance Circuits
- Parallel Resistance Circuits
- Kirchhoff's First Law
- Kirchhoff's Second Law
- Series Capacitance Circuits
- Parallel Capacitance Circuits
- RC Circuits: Charging
- RC Circuits: Discharging
- The Magnetic Field of a Line of Wire
- The Magnetic Field of a Coil



Cat. No.	Description	Price
S13471	Electricity System 1 Physics Kit	399.00/Ea

EISCO Projectile Launcher

Launch a projectile at any angle from -15° to +90° straight up.

Solidly built to withstand the rigors of a hands-on lab and precision machined for reproducible results.

- Clamps to any tabletop, compatible with an electronic timer
- Angle adjusts with launcher mount, then locks into place with auxiliary brace
- Combination of launcher mount and brace means maximum flexibility plus great rigidity
- Measure your angle to within 0.5° accuracy with plumb bob
- Range is up to 10 ft. (3m) and is infinitely adjustable

INCLUDES:

Spring-loaded gun, two balls, instructions with experiments, protractor (not shown), plumb bob (not shown)



Cat. No.	Description	Price
S96174	Projectile Launcher	120.00/Ea

EISCO Wood Dynamics Carts

Ideal for demonstrating Newton's laws of motion.



- Carts made with low-friction ball-bearing wheels
- Top surface can be loaded with additional masses
- One cart in each set is equipped with an "exploder piston," activated by a trigger on top that can be preset to three positions
- Spring-steel hoop bumpers used for collision and energy experiments

ORDERING INFORMATION:

Sold as a set of two carts.

Cat. No.	Description	Price
S96175	With Steel Hoop Bumpers	109.00/Ea
S96176	Without Steel Hoop Bumpers	101.00/Ea

United Scientific™ Newtonian Demonstrator

Illustrates Newton's Third Law of Motion and the principle of Conservation of Momentum.

- Five polished metal balls with thin bifilar suspensions on a unique support design

ORDERING INFORMATION:

Shipping weight: 1.15 lb. (0.5kg);
dimensions: 5.5 × 6 × 7 in.
(14 × 15.2 × 17.8cm).



Cat. No.	Description	Price
S05908	Newtonian Demonstrator	22.50/Ea

United Scientific™ Create-a-Circuit

Handy kit makes it easy to create a circuit.



ORDERING INFORMATION:

Dimensions: 7 × 4 × 2 in. (17.8 × 10.2 × 5.1cm);
shipping weight: 4.6 oz. (130.4g). D-cell battery not included.

INCLUDES:

One D-cell battery holder, one knife switch, two miniature light bulbs, two lamp holders, four connector cords, instructions

Cat. No.	Description	Quantity
S05820	Create-a-Circuit	20.00/Ea

Add some power to STEM labs



Building and Designing Batteries STEM Kit

United's series of STEM-based curriculum kits accent the scientific method and independent inquiry using hands-on learning materials and exciting interactive digital content. This kit contains eight investigative activities that teach students how to construct batteries, assemble electrical circuits, use a multimeter to measure voltage and amplitude, calculate electrical resistance and electrode potentials, and evaluate battery performance.

Description	Cat. No.	Price
Building and Designing Batteries STEM Kit	S13123	\$251.00

Contact your Fisher Science Education™ Sales Representative to order this kit and other United Scientific Supplies hands-on STEM items.

Manufactured by:

UNITED SCIENTIFIC SUPPLIES, INC.

United Scientific™ Deluxe Reflection and Refraction Tank

Effectively demonstrates the laws of reflection and refraction.

- Acrylic disk, 16cm diameter
- Includes a 360° scale and a movable arm carrying a laser activated by a momentary switch
- The sharp beam of light produced by the laser can be adjusted to pass the center of the scale



ORDERING INFORMATION:

Shipping weight: 1.8 lb. (0.8kg).
Dimensions: 12 × 8 × 9 in. (30.5 × 20.3 × 22.9cm).

INCLUDES:

Batteries, instructional manual

Cat. No.	Description	Price
S05909	Deluxe Reflection and Refraction Tank	93.00/Ea

United Scientific™ Ballistics Car with Remote Trigger

Demonstrates independence of vertical and horizontal motions.

- Consists of four-wheeled cart carrying vertical tube with spring-loaded piston inside
- Tube is loaded with ball and cart is set in motion
- During motion, piston is released remotely by wireless signal, projecting ball upwards out of tube
- Both ball and cart share same horizontal velocity, which is unaffected by gravity, so that when ball falls back down, it lands back in tube and does not get left behind by cart



INCLUDES:

Conical rubber catcher, two 0.75 in. steel balls, operating instructions

REQUIRES:

One 9V battery (not included)

Cat. No.	Description	Price
S13064	Ballistics Car with Remote Trigger	97.00/Ea

United Scientific™ Energy Conversion Kit

Economical seven-piece kit demonstrates the conversion among forms of energy.

Four devices for generating electrical energy from:

- Mechanical motion—hand generator
- Chemical energy—batteries
- Light—solar cell
- Wind—windmill



Three devices for using electrical energy to generate:

- Light—LED
- Motion—motor
- Sound—buzzer

INCLUDES:

Set of cables for connecting devices in various combinations, manual

Cat. No.	Description	Price
S05818	Energy Conversion Kit	84.00/Ea

GSC Projectile Launcher

Alter the mass of projectiles and observe the effect on their trajectories. The GSC Projectile Launcher features a built-in clamp to fasten the device securely to tabletops.

- Students can alter the mass of the ball and observe the effect on the ball's trajectory
- The launcher features a spring loaded trigger and easy to use release mechanism that can be adjusted for tension
- A protractor and plumb bob are fixed to the face of the apparatus for determining the angle of inclination
- The built-in clamp is used to secure the apparatus to a tabletop
- Four holes spaced 5cm apart are located at the top and bottom edge and are used for attaching a photogate (not included)
- The kit also included three 25mm balls with a different mass, aluminum, lead and steel



Cat. No.	Description	Price
S13995	Projectile Launcher	98.00/Ea

GSC Inertial Balance Apparatus

Demonstrate Newton's First Law.

- Allows for the measurement of the inertial mass of an object, and is an effective way to demonstrate Newton's First Law
- The Inertial Balance allows for the comparison of both known and unknown masses
- Includes 3 cylindrical masses and one C-clamp



Cat. No.	Description	Price
S13996	Inertial Balance Apparatus	25.75/Ea

GSC Inertia Apparatus

Known as ball and card mass force demonstrator.

- 0.75 in. (1.9cm) ball rests on top of a small cardboard square which rests on an aluminum post
- Spring is positioned alongside the post
- When the spring is released, it shoots the square out from under the ball and the ball falls into a recess on top of the post
- Ball appears to remain at rest on top of the post as if nothing has moved
- Size: 3 × 3 × 4 in. (7.6 × 7.6 × 10.2cm); weight: 0.22 lb. (0.1kg)



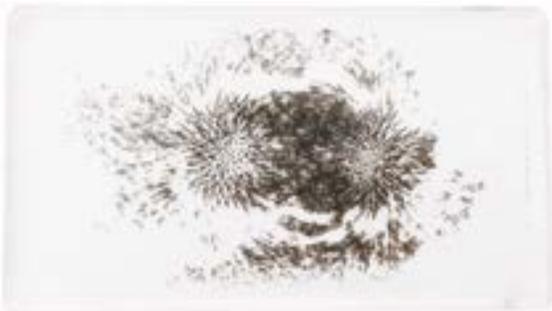
INCLUDES:

Instruction sheet

Cat. No.	Description	Price
S41011A	Inertia Apparatus	20.50/Ea

GSC Magnetic Field Demonstration

Helps students to understand magnetic fields. Iron filings are housed in a plastic case, and when exposed to magnetic fields begin to disperse along the field lines.



- Iron filings show magnetic field lines
- Housed in plastic case
- Show lines with no mess
- Instructions included

⚠ ALERTS:
Not a toy. Product intended for ages 13 and up. Magnets not included

Cat. No.	Description	Price
S28120	Magnetic Field Demonstration	17.00/Ea

GSC Dynamics Cart

A great tool for experiments in conservation, velocity, elastic collision, acceleration and momentum.

The set contains two high impact plastic cars with snap in wheels and two spring steel bumpers with rubber stopper assemblies. Each car has a recession for holding additional weight.



⚠ ALERTS:
Not a toy. Product intended for ages 13 and up.

Cat. No.	Description	Price
S13616	Dynamics Cart	16.00/Pr

Earth and Space

Celestron™ Cometron FirstScope Telescope

Ideal for beginners.

- Tabletop Dobsonian style, portable
- Fast focal ratio offers a wide field of view, perfect for observing comets, star clusters, galaxies, and more
- Lightweight and portable, a great grab-and-go telescope
- Tool-less setup—ready in minutes
- Includes a finderscope and 2 Kellner eyepieces



Specifications

Aperture (mm)	76mm
Finderscope	5x24
Focal Length	300mm (12 in.)
Focal Length of Eyepiece 2	Kellner 10mm (0 in.)
Focal Ratio	3.95
Highest Useful Magnification	180X
Light Gathering Power Comp	118X
Limiting Stellar Magnitude	11.9
Lowest Useful Magnification	11X
Optical Coatings	Aluminum with SiO2
Optical Design	Newtonian Reflector
Optical Tube Length	254mm (10 in.)
Resolution (Dawes)	1.53 arc seconds
Resolution (Rayleigh)	1.83 arc seconds
Total Telescope Kit Weight	4.3 lbs (1.95kg)
Warranty	Two years

Cat. No.	Description	Price
S72019	Cometron FirstScope Telescope	59.95/Ea

New Form of Matter Excites Researchers

By Hamilton Waldron

Researchers at the University of Illinois at Urbana-Champaign were able to demonstrate the existence of a new form of matter called excitonium. Its state of being, originally theorized 50 years ago, has been a scientific puzzle for decades.

What is Excitonium?

Put simply, excitonium is comprised of excitons, which are particles formed from electrons that escape from a crystal and the spaces that they leave behind. When it's empty, each space or hole acts like a particle with a positive charge, which then attracts the escaped electrons. The pairing of the escaped electrons (negative charge) with the positively charged opening forms bosons, or excitons. These composite particles are a sort of condensate that is similar to a superconductor or superfluid.

For a long time, scientists didn't have the tools needed to properly distinguish between various chemical phases in order to confirm the recent discovery. There are other types of phenomena (including Peierls transitions) that act in a similar way and make it more difficult to officially identify the existence of excitonium as a separate entity.

Professor of Physics Peter Abbamonte, PhD, and team received input from colleagues at Illinois and the University of California, Berkeley. University of Amsterdam Physics Professor Jasper van Wezel, PhD, offered theoretical interpretation of the test results.

The team used crystals from a well-studied transition metal, dichalcogenide titanium diselenide (1T-TiSe₂) and were able to replicate

the results five times on other cleaved crystals. To decipher what was indeed excitonium, they created an innovative technique: "momentum-resolved electron energy-loss spectroscopy (M-EELS). Using this new procedure, Dr. Abbamonte and his group were able to measure collective excitations of low-energy boson particles as well as the paired electrons and holes.

What Makes Excitonium Exciting

"This result is of cosmic significance," said Dr. Abbamonte. "Ever since the term "excitonium" was coined in the 1960s by Harvard theoretical physicist Bert Halperin, physicists have sought to demonstrate its existence. Since the 1970s, many experimentalists have published evidence of the existence of excitonium, but their findings weren't definitive proof and

could equally have been explained by a conventional structural phase transition."

In time, this discovery could lead to additional quantum mechanical discoveries, and may also help to further explain the metal-insulator transition in band solids. But, for now, the many potential technological applications of excitonium are merely hypothetical.

[DISCUSSION QUESTIONS]

- What are low-energy boson particles?
- What are some of the other scientific properties of crystals?

[VOCABULARY]

- EXCITON
- SPECTROSCOPY
- BOSON



Celestron™ Cometrone 114AZ Telescope

Designed specifically for viewing comets.

Offers a 114mm parabolic mirror to capture the sharpest views of even dim comets on their journey toward the Sun. Two high-quality Kellner eyepieces are included to enhance your views. The simple Newtonian reflector optical design, altazimuth mount, and included red-dot finderscope make it easy to navigate the night sky. A steel tripod provides stability.

Cometrone 114AZ is also a perfect instrument for viewing objects in our solar system and beyond. Its wide field of view renders the Moon, the Milky Way galaxy, and the rings of Saturn in impressive detail. You'll even be able to observe the moons of Jupiter as well as distant objects like the Orion Nebula.

- Quality optical design--parabolic mirror provides sharp image and eliminates spherical aberration
- Fast focal ratio offers a wide field of view, perfect for observing comets, star clusters, galaxies, and more
- No-tool setup means you are up and observing in no time
- Lightweight and portable, a great grab-and-go telescope
- Large aperture collects more light and provides more detail



Specifications	
Aperture (mm)	114mm (4.49 in.)
Finderscope	StarPointer Red Dot Finder
Focal Length	450mm (18 in.)
Focal Length of Eyepiece 1	20mm Kellner mm (0.79 in.)
Focal Length of Eyepiece 2	10mm Kellner mm (0.39 in.)
Focal Ratio	3.95
Highest Useful Magnification	269X
Light Gathering Power Comp	265X
Limiting Stellar Magnitude	12.8
Lowest Useful Magnification	16X
Mount Height (Max)	46 in. (1168mm)
Mount Height (Min)	29 in. (737mm)
Mount Type	Alt-azimuth with panning handle

Specifications	
Optical Coatings	Aluminum with SiO ₂
Optical Design	Newtonian Reflector
Optical Tube Length	18 in. (457mm)
Optical Tube Weight	3.8 lbs (1.72kg)
Resolution (Dawes)	1.02 arc seconds
Resolution (Rayleigh)	1.22 arc seconds
Secondary Mirror Obstruction	9.05% 8.4 lbs (3.81kg)
Total Telescope Kit Weight	8.4 lbs (3.81kg)
Tripod	Adjustable, stainless steel
Warranty	Two years

Cat. No.	Description	Price
S72020	Inertia Apparatus	179.95/Ea

Celestron™ Cometron 7x50 Binoculars

Affordable entry to binocular skywatching.



Large 50mm objective lenses and multi-coated optics offer amazing light-gathering capabilities that bring celestial objects into bright, sharp focus, making them ideal for comet watching, stargazing, and viewing craters on the Moon. Cometron 7x50's wide field of view lets you explore expansive swaths of the sky to quickly pinpoint exactly the object you want to see, then keeps it in your sights without constant movement.

Cometron 7x50's rubberized aluminum housing is durable, lightweight, and tripod adaptable for extended comfort during long stargazing sessions. The binoculars come with a wide neck strap and a carrying case for security, portability, and grab-and-go convenience.

- Wide field of view reveals a larger portion of the night sky, allowing you to view more of the comet's impressive tail
- Large 50mm objective lenses have tremendous light-gathering ability, ideal for astronomical use
- Multi-coated optics dramatically increase light transmission for brighter images with increased contrast and resolution
- Large exit pupil provides maximum light during nighttime and low-light viewing sessions
- Strong and durable aluminum housing

Specifications	
Angular Field of View	6.8 in.
Close Focus	26.2 ft / 8m
Exit Pupil (mm)	7.1mm
Eye Relief (mm)	13mm
Included Accessories	Neck strap, carrying case, objective lens caps, eyepiece caps, lens cloth, instruction manual
IPD Max	72mm
IPD Min	56mm
Linear Field of View	357 ft/119m @ 1000 yds/m
Magnification (x)	7X
Objective lens diameter	50mm
Optical Coatings	Multi-coated
Prism Glass (Type)	BK7
Relative Brightness	50.41
Twilight Factor	18.7
Waterproof	No
Weight (oz)	27.3 oz. (774g)

Cat. No.	Description	Price
S72021	Cometron 7x50 Binoculars	34.95/Ea

Celestron™ SkyMaster™ Binoculars

Features multi-coated optics and high index BaK-4 prisms for adequate light transmission, increased contrast and resolution.

- Multi-coated optics for sharp, clear views
- Suitable for terrestrial or astronomical viewing
- Protective rubber covering for ultra-firm grip
- Long eye relief ideal for eyeglass wearers

INCLUDES:

Tripod adapter and carrying case

WARRANTY:

No-fault limited lifetime warranty



Cat. No.	Magnification	Lens	Lens Coating	Price
S01917	15X	70mm Binocular	Multi Coated	91.00/Ea
S14066	12X	60mm Binocular	Multi Coated	81.00/Ea
S14068	20-100X	70mm Zoom Binocular	Multi Coated	122.00/Ea
S14069	20X	80mm Binocular	Multi Coated	152.00/Ea
S14070	25-125X	80mm Zoom Binocular	Multi Coated	172.00/Ea
S14072	25X	70mm Binocular	Multi Coated	101.00/Ea
S14074	DX 8X	56mm Binocular	Fully Multi Coated	219.00/Ea

EISCO Sun, Earth & Moon Orbital Model

Multiple moving axis on this gear driven model demonstrate daylight, night, seasons and phases of moon.



- Multiple moving axis on this gear driven model to demonstrate daylight, night, seasons and phases of moon.
- 2-4mm banana terminals on base.
- 12v light bulb inside sun to demonstrate sun light on moon and earth.
- Base has the months of the year along with the season for each hemisphere.
- Power supply required, not included

Cat. No.	Description	Price
S12895	Sun, Earth & Moon Orbital Model	158.00/Ea

EISCO Rocks and Minerals Kits

For use in hands-on exploration of rocks and minerals in classroom setting.



- Average specimen size: 2-3cm

Basic Kit:

- Contains 40 specimens and specimen key
- Average specimen size: 2-3cm
- Contains rocks from inside of volcanoes, bottom of sea floor, from deep within earth's crust and more
- Includes: Pyrite, calcite, garnet, plagioclase, sulfur, granite, basalt, conglomerate, limestone, gneiss, and marble

Igneous Kit:

- Contains 12 specimens and specimen key
- Average specimen size: 2-3cm
- Igneous rocks form from cooling and crystallization of magma or lava
- Includes: Basalt, diorite, gabbro, granite, pegmatite, obsidian, peridotite, pumice, rhyolite, scoria, syenite, and tuff

Metamorphic Kit:

- Contains 12 specimens
- Average specimen size: 2-3cm
- Includes: Anthracite coal, banded gneiss, augen gneiss, fine and coarse marble, phyllite, white and pink quartzite, mica schist, garnet schist, serpentinite, and slate

Sedimentary Kit:

- Contains 12 specimens and specimen key
- Average specimen size: 2-3cm
- Includes: Bituminous coal, breccia, conglomerate, dolostone, rock gypsum, gray and fossiliferous limestone, red and white sandstone, argillaceous and carbonaceous shale, and siltstone

Cat. No.	Description	Price
S24663	Basic Rocks and Minerals Kit	50.00/Ea
S24664	Igneous Rocks Kit	22.00/Ea
S24666	Metamorphic Rocks Kit	24.00/Ea
S24665	Sedimentary Rocks Kit	22.00/Ea

Kemtec™ A Space Farm Kit

Illustrates to young students how we might grow our food in an environment other than earth.



- Young scientists learn the needs of plants as they germinate seeds in nutrient solutions without soil
- After experimenting with space salts and space soils, students may transfer seedlings to real soil from their own environment
- Includes extensive information on hydroponic cultivation
- Grades 4-6
- Class size: 24 students

INCLUDES:

Instructor manual, material safety data sheets, Petri dishes, Ziploc™ bags, plastic cups with lids, sunflower seeds, bean seeds, plastic toothpicks, space soil I, space soil II, pH paper, space salts, hydrochloric acid solution, sodium hydroxide solution

REQUIRES:

Two quart container and distilled water.

Cat. No.	Description	Price
S02080	Space Farm Kit	81.00/Ea

OHAUS™ Scout™ SKX Portable Balances

Offers superior overload protection in a sleek, low profile and stackable design.

- Large, backlit LCD display
- Multiple connectivity options like Bluetooth, Ethernet, USB and more
- Rapid stabilization and high resolution
- Stackable design
- Kensington security slot (cable sold separately)
- Calibration mass included (all models up to 620g)
- 6 different weighing units; g, kg, N, oz, lb, lb:oz
- Powered by AC adapter (included) or by 4 AA batteries (not included)
- Integrated weigh-below hook
- Transportation/storage lock



APPLICATIONS:

Ideal for education-specific weighing applications, density determination and molar mass calculations.

Cat. No.	Model	Capacity	Readability	Stabilization Time	Price
S14535	SKX421	420g	0.1 g	1 sec.	247.00/Ea

OHAUS™ Scout™ STX Portable Balances with Touchscreen Display

The all new Ohaus Scout with intuitive color touchscreen interface offers superior overload protection in a sleek, low profile and stackable design.

- Fast response time and repeatable weighing results
- Rapid stabilization and high resolution
- Five major connectivity options
- Additional software application modes and added weighing units complement the balance and set a new standard in portable weighing technology
- Available with or without draftshield
- Stackable design
- Leveling bubble with adjustable feet
- Kensington security slot cable sold separately
- Calibration mass included (all models up to 620g)
- 12 different weighing units: g, mg, kg, lb:oz, N, ct, Grn, dwt, ozt, custom unit
- Powered by AC adapter (included) or 4 AA batteries (not included)
- Integrated weigh-below hook
- Transportation/storage lock



APPLICATIONS:

Weighing, density determination, molar mass

Cat. No.	Model	Capacity	Readability	Stabilization Time	Price
S14509	STX622	620g	0.01 g	1 sec.	751.00/Ea

Fisher Science Education™ Portable Balances

Superior performance in an affordable, portable balance.

- Excellent shock resistance and overload protection
- Three-button operation
- Draft shield flip top with integrated sample tray, standard for all models
- Integral weigh-below hook, critical for density or specific gravity determination
- Security bracket RS-232 or optional USB snap-in module allows data connection to PC or printer Stackable design
- Shipping load cell lock (overload protection up to 200 lb.)
- 50-hour battery life with auto shutoff

INCLUDES:

AC adapter

REQUIRES:

Three AA batteries, Security bracket cable

WARRANTY:

One year



Cat. No.	Model	Capacity	Readability	Stabilization Time	Price
S94792C	SLF302	300g	0.01g	3 sec.	467.00/Ea

OHAUS™ Compact Scales

Rugged construction, easy operation and great performance make these scales a truly remarkable value.

Size and styling make these scales ideal for field and lab activities.

- Measure in grams or pounds/ounces from 200 to 5000g
- Large weighing surface with full-capacity tare
- Removable stainless-steel pan
- Easy-to-read LCD display
- Weighing units: g, lb.:oz. (S63462 does not have lb.:oz.)
- Zero range: to capacity by subtraction
- Stabilization time: three seconds
- Readabilities from 0.1 to 1g
- Calibration: digital calibration from keypad
- Auto shutoff: five minutes with no activity (battery operation only)
- Removable stainless-steel pan
- Net weight: 1.0 lb. (0.47kg)

INCLUDES:

AC adapter, US postal chart, Stainless Steel pan cover, three AA batteries

WARRANTY:

One year



Cat. No.	Model	Capacity	Readability	Repeatability	Price
S63462	CS-200	200g	0.1g	±0.1g	127.00/Ea



Our prepared microscope slides are made with high-quality materials and specimens. We employ a variety of staining techniques for clear, high-definition viewing. They are offered in the following categories:

- Botany
- Fungi
- General
- Histology
- Monera
- Pathology
- Protist
- Zoology

View our collection of over 300 prepared slides and more by following the link below:
fisheredu.com/slides

S99020PS Zoology		Pediculus Humanus Capitis Whole-mount
S99205PS Histology		Retina and Tapetum Longitudinal Section
S06292PS Pathology		Lung Carcinoma; Section

SKU	DESCRIPTION	PRICE
S99020PS	Pediculus Humanus Capitis, Female; Whole-mount	\$4.25
S99205PS	Retina and Tapetum, Mammalian; Longitudinal Section; H&E Stain; Showing Optic Nerve Entrance	\$13.75
S06292PS	Lung Carcinoma (Human); Section; H&E Stain	\$7.90

Fisher Scientific RT Basic Stirrers

- Analog speeds from 150 to 2500rpm
- Low-profile and lightweight
- Extremely durable
- Chemical-resistant polypropylene top and body
- Detachable plug
- Two-year warranty



Cat. No.	Description	Stirring Capacity	Max Load	Power Consumption	Price
S05260	Fisher Scientific RT Basic 120mm Top	2L	33 lb.	5w	\$171.00
S05261	Fisher Scientific RT Basic 170mm Top/U.S. Plug	4L	44 lb.	6w	\$205.00
S05262	Fisher Scientific RT Basic 220mm Top/U.S. Plug	5L	55 lb.	6w	\$282.00

 **fisher scientific**
part of Thermo Fisher Scientific

Fisher Science Education™ Compact Balances

Economical, dependable and portable.

Rugged housing design provides best overall overload protection and durability in its class. Uniquely designed for a wide variety of applications, these balances feature easy operation, long battery life and great performance.

- Sleek, low-profile design
- Large, high-contrast LCD
- Energy-saving auto shut-off feature
- Two-button keypad
- Stackable, for storage with molded stack ring
- Load cell lock
- Three AA batteries (included) or optional AC adapter
- Over- and underload indicators
- Digital calibration from keypad
- Low-battery indicator



WARRANTY:

One year

Cat. No.	Model	Capacity	Readability	Stabilization Time	Price
S94793A	CLF201	200g	0.1g	3 sec.	119.00/Ea

Fisher Science Education™ Precision™ Balance

Dependable measurements and reliable performance.

- Simple three-button operation
- Weighing units: Grams and Newtons
- Large 7 in. (22.9cm) high weighing chamber and three-door draft shield included with 200g and 400/100g models
- Sealed front panel and molded spill ring for fast, easy cleanup
- Integrated security bracket
- Large, single-line LCD display (not backlit)
- Stainless-steel weighing pan
- RS-232 interface



INCLUDES:

AC adapter

WARRANTY:

Two years

COMPLIANCE:

UL and CSA approved.

Cat. No.	Model	Capacity	Readability	Stabilization Time	Price
S94791B	AMF402 AM	400g	0.01g	3 sec.	975.00/Ea

OHAUS™ Triple Beam Balance

Accurate, rugged and dependable. OHAUS Triple Beam Balances have stainless-steel weighing pans and bearing covers which prevent rust and corrosion.

- Precision-cast poises and deep notches in beams for accurate values every time
- Precision-ground knife edges and self-aligning agate bearings for maximum sensitivity and reproducibility
- Accurate with quick response time
- Magnetic damping minimizes oscillation
- Heavy zinc base won't tip easily like cast aluminum

Specifications

- Capacity: 610g (2610g with attachment weights)
- Readability: 0.1g
- Front Beam: 10 × 0.1g
- Middle Beam: 500 × 100g
- Rear Beam: 100 × 10g
- Vernier Dial (Dial-O-Gram™ Model only): 10 × 0.1g
- Pan size: 6 in. dia. (21.2cm)
- Dimensions: 18L × 12W × 9 in.H (45.7 × 30.5 × 22.3cm)

Specific Gravity Rod and Clamp

- Suspends balance above base of table to measure specific gravity.

Poly Scoop and Counterweight

- Ideal for retaining all of the object being weighed
- Counterweight returns balance to zero when nothing but the scoop is on the platform
- Stainless-steel scoop and counterweight feature heavy-duty construction for long wear

NOTE:

S40028 features a plastic container

WARRANTY:

Five years



Cat. No.	Model	Calibration	Type	Price
S40020	750-S0	10 × 0.1g (front beam), 500 × 100g (middle beam),	Triple Beam Mechanical Balance	115.00/Ea

Fisher Scientific™ Hotplates, Stirrers and Hotplate/Stirrers

Heat from 150° to 590°C (302° to 1094°F); reach maximum temperature in minutes.

Hotplate/Stirrers

- Reflective white ceramic top plate resists alkalis and acids and cleans easily; drip edge guards against spills
- Durable die-cast aluminum base
- Built-in ring stand holder
- Three-wire grounded cord
- HOT TOP indicator light alerts when top plate is too hot to touch For 120V 60Hz
- Variable analog speed control from 100 to 1200rpm — stir up to 0.52 gal. (2L) water
- Instant-on at 100rpm ensures smooth, safe, low-speed operation
- Come with support rod mount and PTFE-coated stir bar



Ceramic-Top Magnetic Stirrers

- Variable speed control from 100 to 1400rpm
- Instant-on feature ensures uniform low-speed stirring at 100rpm
- Quiet-running, direct-drive motor
- Reflective, porcelain-coated stainless-steel top surface with drip edge protects internal components from spillage
- Durable die-cast aluminum housing for durability and long life
- Supplied with three-wire grounded cord and plug and PTFE-coated stir bar
- For 120V 60Hz

COMPLIANCE:
CSA approved

WARRANTY:
Three years

Cat. No.	Dimensions (L × W × H)	Surface Area (English)	Price
Hotplates			
S50462CH	8.25 × 5.25 × 4.38 in. (21 × 13 × 11.1cm)	4 × 4 in.	395.00/Ea
S504631H	11.5 × 8.5 × 4.5 in. (29.2 × 21.2 × 11cm)	7 × 7 in.	420.00/Ea
Hotplates/Stirrers			
S50466CSH	8.25 × 5.25 × 4.38 in. (20.9 × 13 × 11.12cm)	4 × 4 in.	542.00/Ea
S50467CNSH	11.5 × 8.5 × 4.5 in. (29.21 × 21.59 × 11.43cm)	7 × 7 in.	541.00/Ea
Stirrers			
S504503AS	8.5 × 5.25 × 4.38 in. (21.6 × 13.3 × 11.1cm)	4 × 4 in.	320.00/Ea
S504501AS	11.5 × 8.5 × 4.5 in. (29.2 × 21.6 × 11.4cm)	7 × 7 in.	369.00/Ea

fisherbrand Mini-Stirrer

Large diameter top minimizes spill risks, making it ideal for student use.

- Variable speed from 0 to 1650rpm
- Front-mounted, stepless control knob
- Strong aluminum top plate with baked enamel finish
- Large 4.75 in. diameter stirring surface reduces spill risks
- Includes stirring bars and support clamp (for mounting on lattice or other support)



ORDERING INFORMATION:
For 115V

Cat. No.	Description	Price
S50450Q	Mini-Stirrer	318.00/Ea

fisherbrand Glassware Cart

Used to carry glassware and small instruments.

- Ready-to-roll, full factory assembly
- Supports loads up to 400 lbs.
- Ergonomic, extruded rubber handle grips
- Durable Fisherbrand blue, powder-coated 18 gauge welded tubular steel frame
- ID tag
- 5 year warranty
- 2 vinyl-coated wire baskets (18L × 32W × 4 in. H)
- 4 in. diameter casters, 2 with toe locks
- 2 vinyl-coated wire baskets (18L × 32W × 4 in. H)
- Four - 4 in. diameter casters, two with toe locks
- Removable plastic drip pan



Cat. No.	Description	Price
S14241	Glassware Cart	675.00/Ea

Fisher Scientific™ Isotemp™ Digital Dry Baths/Block Heaters

Offers a range of configurations with interchangeable modular blocks for a variety of application needs.

- Digital controls and display of time and temperature
- Advanced internal temperature sensing probe for outstanding temperature accuracy and control
- Precise temperature control with PID circuit
- Temperature calibration enables to offset the temperature to desired value
- Timer allows the user to accurately monitor the heating time
- Wide range of interchangeable aluminum alloy heat blocks provide versatility and allow for easy cleaning and disinfecting
- Powder-coated steel body construction ensures durability
- Built-in over-temperature protection device warrants sample and user safety
- Temperature deviation adjustment
- For 120V 50/60Hz
- Block sold separately



APPLICATIONS:

Sample preparation, enzyme preservation, enzyme-substrate reactions, DNA amplification, electrophoresis gel degeneration and serum coagulation

WARRANTY:

2-year Thermo Fisher Scientific™ standard, limited warranty. Contact your sales representative for details.

Cat. No.	Description	Price
S28681	Single Block	431.00/Ea
S28682	Dual Block	479.00/Ea
S28683	4 Blocks	578.00/Ea

An Emerging Technique for Captured Carbon Conversion

By Hamilton Waldron

A new method of carbon capture could help the nation's coal plants reduce greenhouse gas emissions and take one step closer toward the industry's long-term goal of converting captured carbon into a useable product, but economic obstacles currently impede full implementation of this promising technology.

Rethinking How Carbon is Reused

U.S. Department of Energy scientists at the Idaho National Laboratory (INL) established the process for converting captured carbon dioxide (CO₂) into syngas, a combination of hydrogen (H₂) and carbon monoxide (CO) that can be used to create fuels and chemicals. When the team of researchers recently published its findings, it noted that, "for the first time, it was

demonstrated that syngas can be directly produced from captured CO₂ — eliminating the requirement of downstream separations."

Typically, the method for capturing the carbon from CO₂ involves a reduction step that requires high temperatures and pressures. This is because CO₂ does not stay dissolved in water for a sufficient period to enable capture after its temperature has been lowered. The new process addresses this challenge by using specialized switchable polarity solvents (SPS) that help make the CO₂ more soluble and allow the carbon capture medium to be added to a cell for electrochemical conversion to syngas.

In 2017, the researchers at the INL were granted Laboratory Directed Research and Development funds

to begin their study. Shortly after the first round of experiments, however, they found that too much hydrogen and not enough syngas were being produced. The team then added a supporting electrolyte (potassium sulfate) to increase ionic conductivity, which produced the expected amounts of syngas almost instantaneously.

Next Steps: Improved Industrial Application

Once syngas can be produced competently and consistently from captured CO₂, options for using this new methodology in industrial applications will greatly expand. The SPS-based process proved optimal at ambient temperature (25°C) and 40 psi, after all, in sharp contrast with previous processes that required high temperatures and pressures.

Additionally, the INL has filed for a provisional patent and is discussing its methods with a Boston-based company that specializes in electrochemical technology development. "The problem with CCS (carbon capture storage) has been its economic feasibility. If you can get some extra value out of the CO₂ you are capturing, it's a different story," said Diaz Aldana, a researcher at INL.

[DISCUSSION QUESTIONS]

Discuss why it's important to reduce greenhouse gas emissions.

Discuss how switchable polarity solvents work.

[VOCABULARY]

CARBON

GREENHOUSE GAS

ELECTROLYTE

Labconco™ Protector ClassMate Laboratory Hoods

Designed to meet the needs of instructional laboratories. Labconco Protector ClassMate Laboratory Hoods are fully-featured benchtop hoods with clear back and sides for enhanced visibility for conducting demonstrations or observing students.

Clear back and sides and taller front viewing window provide enhanced visibility for conducting chemistry demonstrations or observing students using the hood. The clear back also does not obstruct visibility when hoods are placed back-to-back in an island configuration.

Fully-featured with baffle and air foil, this high-performance by-pass hood maintains safe airflow while conserving energy.

- SEFA 1 High Performance Hood
- Patented design
- By-pass airflow design
- Glacier white powder-coated steel frame
- Ergonomic air foil with aerodynamic Clean-Sweep airflow openings
- Low-profile, ADA-compliant spill trough
- Clear, 1/4 in. thick, tempered safety glass sides, back and removable baffle
- 5° angled, 1/4 in. thick tempered safety glass stationary viewing panel and 3/16 in. thick chain-driven sash with anti-racking shaft and powder-coated steel frame that provides 37.5 in. high visibility
- Powder-coated sash handle with aerodynamic Clean-Sweep airflow openings
- High-performance, 3-piece glass baffle that pivots for cleaning
- Cord-Keeper slots on left and right side of air foil
- Pre-wired LED lighting, light switch and blower switch
- Powder-coated stainless steel tissue screen located directly below exhaust outlet
- Removable front panel, side panels and interior cover plates for access to plumbing and electrical wiring
- Powder-coated stainless steel 12.81in. ID exhaust connection
- 100/115V

Combination Sash Models Feature

- Combination horizontal-sliding/vertical-rising sashes that allow the operator to use the hood with the sashes half open either horizontally or vertically.
- Sash stop at 14 in. height from work surface (50% vertical opening). Can be field modified to 18 in. from work surface. Fully open sash is 28 in. from work surface

REQUIRES:

Remote blower, Ductwork, Work surface, Base cabinet or stand



4 ft. Wide Hoods

Cat. No.	Includes	Price
S71814	Two pre-plumbed service fixtures, 1 electrical duplex	9685.00/Ea
S71813	Two pre-plumbed service fixtures	9497.00/Ea
S71812	No service fixtures or duplex	8951.00/Ea
S71809	Two pre-plumbed service fixtures, 1 electrical duplex	8987.00/Ea
S71808	Two pre-plumbed service fixtures	8798.00/Ea
S71807	No service fixtures or duplex	8252.00/Ea

5 ft. Wide Hoods

Cat. No.	Includes	Price
S71838	Two pre-plumbed service fixtures, 1 electrical duplex	10374.00/Ea
S71837	Two pre-plumbed service fixtures	10185.00/Ea
S71836	No service fixtures or duplex	9639.00/Ea
S71831	Two pre-plumbed service fixtures, 1 electrical duplex	9588.00/Ea
S71818	Two pre-plumbed service fixtures	9400.00/Ea
S71817	No service fixtures or duplex	8854.00/Ea

6 ft. Wide Hoods

Cat. No.	Includes	Price
S71847	Two pre-plumbed service fixtures	10466.00/Ea
S71848	Two pre-plumbed service fixtures, 1 electrical duplex	10654.00/Ea
S71846	No service fixtures or duplex	9920.00/Ea
S71843	Two pre-plumbed service fixtures, 1 electrical duplex	9869.00/Ea
S71842	Two pre-plumbed service fixtures	9680.00/Ea
S71841	No service fixtures or duplex	9134.00/Ea

Stay Connected with the Fisher Science Education Team

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Labconco™ Basic™ Laboratory Hoods

Basic Laboratory Hoods are designed specifically for laboratories, classrooms and light duty applications where safe ventilation is required. Basic Hoods have smaller overall height and depth than traditional hoods so they fit in areas with low ceilings or narrow aisles.

- By-pass airflow design
- Curved air foil that lifts off for cleaning
- Glacier white powder-coated, 16 gauge steel exterior and interior
- Vapor-proof incandescent lights
- Two-piece adjustable baffle
- Thick tempered safety glass 4.7mm (0.187 in.)
- Vertical-rising sash with epoxy-coated aluminum sash handle
- Removable front panel for access to electrical wiring
- Factory-prepared right side fixture panel for up to three service fixtures, one duplex electrical receptacle and one airflow monitor (fixtures, receptacle and monitor not included)
- Factory-prepared right interior wall for one cupsink and turret (cupsink and turret not included)
- Powder-coated steel 26.1cm (10.3 in.) OD exhaust connection



Cat. No.	Model	Dimensions (L x W x H)	Description	Price
S28126	Basic 47	63.5 x 119.4 x 121.9cm (25 x 47 x 48 in.)	With sash full open, exhausts 720 CFM, static pressure loss does not exceed 0.35" H2O (at 100 fpm)	4346.00/Ea
S51259MF	Basic 47 with Built-in Blower	63.5 x 119.4 x 134.6cm (25 x 47 x 53 in.)	With sash full open, exhausts 720 CFM, static pressure loss does not exceed 0.35" H2O (at 100 fpm)	5601.00/Ea
S28127	Basic 70	63.5 x 177.8 x 121.9cm (25 x 70 x 48 in.)	With sash full open, exhausts 720 CFM, blower is capable of overcoming a maximum external static pressure of 0.25" H2O (at 100 fpm)	5455.00/Ea
S28128	Basic 70 with Built-in Blower	63.5 x 177.8 x 121.9cm (25 x 70 x 48 in.)	With sash full open, exhausts 1120 CFM, blower is capable of overcoming a maximum external static pressure of 0.23" H2O (at 100 fpm)	7370.00/Ea

Protector™ ClassMate™ Fume Hoods



- High-performance fume hood, per SEFA 1
- 360° visibility
- Low-profile, ADA-compliant air foil
- Vertical-rising or combination sash models

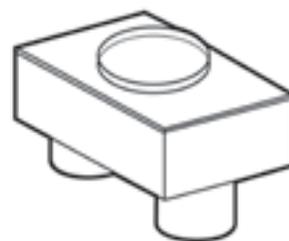
Cat. No.	Description	Price (ea)
S71807	4' Hood, Vertical-Rising Sash 115V	8,252.00
S71817	5' Hood, Vertical-Rising Sash 115V	8,854.00
S71841	6' Hood, Vertical-Rising Sash 115V	9,134.00

LABCONCO

Labconco™ Dual Exhaust Adapter for Protector™ ClassMate™ Laboratory Hoods

Allows two hoods mounted back-to-back to be exhausted from a single 12 in. nominal dia. duct, 12 x 12 x 12 in.

- Type 304 55



Cat. No.	Description	Price
S71878	Dual Exhaust Adapter	1081.00/Ea

Diversified Woodcrafts™ Oak Table with Plain Aprons

Diversified Oak Table with Plain Aprons are made of smoothly machined oak, providing long-lasting usability and easy care.

Solid red oak tables with plain aprons and a chemical-resistant finish. Fitted with 2.25 in. (5.7cm) square oak legs.

- Three tops available: plastic laminate, ChemGuard and 1 in. (2.54cm) epoxy resin
- Legs installed with 0.31 in. (0.79cm) hanger bolts and attached to apron with supplied nuts and washers
- Legs equipped with nonskid adjustable glides for precise leveling
- Legs fashioned with rubber leg boots
- Apron fitted with heavy-duty 13-gauge steel corner braces

ORDERING INFORMATION:

FASTRAK item – ships within five days

Cat. No.	Dimensions (L x W x H)	Case Material	Price
S94734MF	54 x 24 x 30 in. (137.16 x 60.96 x 76.2cm)	Plastic	581.00/Ea
S94735MF	48 x 24 x 30 in. (121.92 x 60.96 x 76.2cm)	ChemGuard	624.00/Ea
S94736MF	54 x 24 x 30 in. (137.16 x 60.96 x 76.2cm)	ChemGuard	626.00/Ea
S94737MF	60 x 24 x 30 in. (152.4 x 60.96 x 76.2cm)	ChemGuard	643.00/Ea
S94738MF	54 x 24 x 30 in. (137.16 x 60.96 x 76.2cm)	ChemGuard	924.00/Ea
S94739MF	60 x 24 x 30 in. (152.4 x 60.96 x 76.2cm)	ChemGuard	975.00/Ea



Expanding the Toolkit to Repair Gene Mutations

By Kylie Wolfe

New CRISPR technology is changing the way scientists fix DNA mutations. Instead of splicing multi-base sections, they now have the opportunity to edit one base at a time. This technology gives scientists the potential to correct simple genetic mutations, hundreds of which take place in our body each day. While most are harmless, 32,000 disease-associated mutations have been identified.

Our Genetic Code

Our genes are spelled out like instructions that tell our body's cells what to do. There are four DNA bases that contribute to our genetic code known as adenine (A), cytosine (C), thymine (T), and guanine (G). A pairs with T, and G with C across DNA's double-

stranded helix to form rungs like a ladder. RNA also has four bases, all of which are the same as in DNA except for T, which is replaced by uracil (U).

New Base Editing Technology

CRISPR technology, which is short for Clustered Regularly Interspaced Short Palindromic Repeats, is used to edit DNA by locating palindromic base sequences. A version of this technology was developed in 2016 based on CRISPR/Cas9 that allows researchers to change G and C pairs into A and T using targeting enzymes that alter the base's chemical structure. A newer version uses a base editor known as TadA attached to Cas9, which yields the ability to do the opposite — changing A and T pairs into G and C pairs. Previous base editors

were only able to change C into T, limiting the tool's abilities. This new development, known as ABE, has proven to be successful in roughly 50 percent of human cells.

A second study redesigned a gene editor called CRISPR/Cas13 to grasp strands of RNA instead of splicing them. To resolve mutations, researchers attached an enzyme that naturally changes A into inosine (I), which is read as G. Other naturally occurring enzymes in RNA can reverse mutations that turn G and C pairs into A and T.

Scientists are now able to rewrite all DNA and RNA bases — and with such advancements in gene editing, researchers plan to further explore potential human applications. So far, scientists have managed to correct a human cell mutation linked

to blood disorders. By allowing for fewer unwanted changes at off-target sites, these new and improved editors are proving safer than traditional splicing.

[DISCUSSION QUESTIONS]

Discuss the pros and cons of base editors and the new versions that have been developed.

How can DNA mutations alter protein production? Explore transcription and translation using the terms amino acid, codon, base, mRNA and tRNA.

[VOCABULARY]

DNA

BASE PAIR

BASE EDITOR

MUTATION



Diversified Woodcrafts™ Shain Drawing Table

Units are finished with an earth-friendly UV finish.

- Unit constructed of solid maple with 2.25 in. maple legs
- One-piece adjustable top
- 36 × 24 × 37 in.
- 80 lb.



Cat. No.	Description	Weight (English)	Price
S01713MF	Drawing Table	80 lb.	594.00/Ea

Diversified Woodcrafts™ Tall Storage Cabinet with Glass Doors



Provide added storage in style with the Diversified Tall Storage Cabinet with Glass Doors. Each is made of oak veneers with solid wood framed glass doors.



Cat. No.	Width (Metric)	Door Type	Price
S14209	61cm	2 Glass Doors	2127.00/Ea
S14212	91.4cm	4 Glass Doors	3047.00/Ea
S14213	122cm	4 Glass Doors	1831.00/Ea

Flexible & Heavy-Duty Fab-Lab Workbench

- Adjustable Height: 25-1/2"H to 35-1/2"H
- 12-Gauge Steel Legs
- Gray Baked Enamel Finish
- Static Weight Capacity: 1400 lbs.
- Optional 5" Locking Casters
- Optional 14 Gauge 12"D Shelf
- 30"D x Three Lengths: 60"W, 72"W or 96"W

ITEM #	PRODUCT	PRICE
S3803	60"W Workbench with Maple Top	\$1739.00
S3804	60"W Workbench with ShopTop*	\$1449.00
S3803	72"W Workbench with Maple Top	\$1739.00
S3804	72"W Workbench with ShopTop*	\$1449.00
S37896	60"W Optional Shelf	\$188.00
S37897	72"W Optional Shelf	\$217.00
S37899	Optional Casters (Set of 4)	\$516.00

*Shown with Optional Shelf & Casters

Diversified Woodcrafts™ Chemical Bookcase

Diversified Chemical Bookcase features open oak shelving, providing users a clear view of chemicals inside.



- Each fixed shelf includes anti-roll lips
- UV chemical-resistant finish on top, back and sides
- Dimensions: 16L × 36 in.W (40.6 × 91.4cm)

Cat. No.	Height (English)	Weight (English)	Price
S94908MF	72 in.	310 lb.	870.00/Ea

Diversified Woodcrafts™ Stainless-Steel Tables

Features a top with integrally welded C channels to prevent sagging.

- Stainless-steel top with two sound deadened integrally welded 12.7cm (5 in.) channels to reinforce and maintain level working surface (prevents sags)
- Material: T-430 18-gauge stainless-steel
- Galvanized legs (4.1cm dia.) with adjustable high impact corrosion resistant feet
- Adjustable under-shelf with two pins per corner provides strength and stability
- 30D × 48W × 35H in.



Cat. No.	Description	Price
S14189	Stainless-Steel Table	288.00/Ea

Diversified Woodcrafts™ Mobile Microscope Storage Cabinet

Share microscopes safely and conveniently.

- 1.25 in. (3.1cm) plastic laminate top
- 4 in. (10cm) ball-bearing, locking, swivel casters
- Removable dividers provide 6 × 11 × 16 in. (15 × 27.5 × 40cm) space for each microscope
- Holds 24 microscopes up to 6 3/4 × 10 × 15 1/2in (W×D×H)
- Ships within five days.
- Dimensions: 48W × 28D × 40 in.H (120 × 70 × 100cm)
- Weight: 202 lb. (91.6kg)



Cat. No.	Description	Price
S94751MF	Microscope Storage Cabinet	1468.00/Ea

fisherbrand Five-Leg Base Wood Chairs

Surprisingly comfortable seating.

- Heavy seven-ply hardwood “waterfall” front seat enhances circulation in the legs
- Backrests are contoured to give proper lumbar support
- Features seat depth adjustment
- Pneumatic seat height adjustment

ORDERING INFORMATION:

Seat: 15.75D × 17.5 in. W (40 × 44cm).

Back: 14.75W × 10 in. H (37.5 × 25.4cm).

Cat. No.	Seating Height	Price
S68906B	18-25 in.	202.00/Ea
S68906	20-28 in.	258.00/Ea
S68906E [†]	22-32 in.	239.00/Ea

[†]Stool (Backless)



fisherbrand Metal Stools

Tough, sturdy stools with durable powder coat finish.

- Constructed of 11-gauge steel
- 13 in. diameter (33cm) steel seat
- Formed flange and sharp edges



Cat. No.	Height (English)	Price
S68908A	18 in.	65.00/Ea
S68908B	24 in.	69.00/Ea
S68908C	30 in.	78.00/Ea

fisherbrand Vinyl Chairs

Molded foam in the seats will withstand years of heavy use.

- Upholstered ergonomic chair with seat depth adjustment
- Molded foam seats withstand years of heavy use
- Pneumatic seat height adjustment
- Five-leg base provides stability
- Easy to clean with mild soap and water



ORDERING INFORMATION:

Seat dimensions:
18.5W x 16.5D x 3 in.H
(47 x 41.2 x 7.6cm).

Backrest dimensions:
16W x 2D x 9.5 in.H
(40.6 x 5.1 x 24.1cm). Casters sold separately.

Cat. No.	Seating Height	Price
S68902	19-22 in.	243.00/Ea
S68902A [†]	20-28 in.	307.00/Ea
S68902C [‡]	22-29 in.	314.00/Ea
S68902B ^{†‡}	22-29 in.	241.00/Ea
S90496	22-32 in.	346.00/Ea

[†] With Foot Ring

[‡] Fixed Foot

Fisher Science Education™ Executive Mesh Desk Chair

Designed to be the ultimate in comfort. Fisher Science Education Executive Mesh Chair, has a high back chair with adjustable lumbar support.

- Ergonomically contoured comfort molded seat and wide range of ergonomic adjustments can be easily customized to fit virtually any executive
- Ergonomic features include 360° swivel rotation control with tilting and tilt-locking function
- 3D adjustable arm rests move up and down, in and out, forward and backward, and twist towards and away from user



Cat. No.	Description	Price
S36484	Executive Mesh Desk Chair	293.00/Ea

fisherbrand Pneumatic Chair

Made to withstand heavy use.

- One-piece molded polypropylene shell with powder-coated base
- Easy to clean
- Pneumatic height adjustment
- Seat: 17W x 15.5 in.H



Cat. No.	Description	Price
S90502	Pneumatic Shell Chair	190.00/Ea

Fisher Science Education™ Pneumatic Vinyl Chair

Armless ergonomic chair with chrome-hooded casters and forward tilt option. Provides mobility on both hard and carpeted floors.

- Forward and backward seat tilt
- Contoured waterfall seat cushion and adjustable backrest with lumbar support
- Highly durable molded polyurethane foam cushioning covered with easily cleaned antibacterial vinyl
- Pneumatic fingertip control
- 360° swivel



Cat. No.	Description	Price
S36646	Pneumatic Vinyl Chair	343.00/Ea

fisherbrand Ambidextrous Powder-Free Nitrile Disposable Exam Gloves

Seal polymer nitrile is powder-free, odorless and 100% latex-free.

- Textured fingers offer exceptional wet and dry gripping
- Beaded cuff resists tears and eases donning
- Ambidextrous
- Single-use
- Length: 9.5 in. (24cm)
- Thickness: 4mil
- Color: Blue



COMPLIANCE:

Manufactured under good manufacturing practice (GMP) and are internationally accepted. 510K approved for medical use. Meet ASTM™ D3578 and D6319 standards.

CERTIFICATIONS:

ISO 9002 certified; 510K approved for medical use

Cat. No.	Size	Price
S04801	Small	25.50/Pk
S04801B	Large	25.50/Pk
S04801C	X-Large	25.50/Pk

Kimberly-Clark™ Professional Purple Nitrile™ Exam Gloves

Offer the best barrier protection against a broad range of chemicals.

- Textured fingertips enhance grip while providing excellent tactile sensitivity
- Latex-free and powder-free with no irritating perfume odor
- Low levels of chemical allergens reduce potential for irritation and Type IV hypersensitivity
- Length: 9.5 in. (24.1cm)
- Thickness: 5.9mil



COMPLIANCE:

Made in accordance with ISO 9002. Meet FDA requirements and quality standards for a Class 1 medical device. Meet or exceed ASTM™ D3578 standard. AQL 1.5.

CERTIFICATIONS:

510K approved for medical use

Cat. No.	Size	Price
S78942	X-Small	22.50/Pk
S78943	Small	22.50/Pk
S78944	Medium	22.45/Pk
S78945	Large	22.50/Pk
S78946	X-Large	22.50/Pk

fisherbrand

Displays MIN/MAX & DATE/TIME temperature readings



S04564

- Triple display shows current temperatures and MIN/MAX temperatures
- Time/date stamp key shows exact time and date for all MIN/MAX readings
- Ideal for ultra-low freezer applications
- Smart-Alarm™ feature offers a visual/audible alarm that continues to alarm even if the unit returns to non-alarm conditions
- Extended Battery life – batteries can last for up to 6 months

Range	Resolution	Accuracy	Cat. No.	Price
-50.00 to 70.00°C (-58.00 to 158.00°F)	0.01°	±0.1°C	S04564	\$132.00
			S04565	\$132.00
-100.00 to 199.99°C (-148 to 199.99°F)			S25096	\$126.00
-100.00 to 70.00°C (-148.00 to 158.00°F)			S25097	\$126.00



fisherbrand Economical Powder-Free Latex Exam Gloves

Provide consistent high quality for outstanding barrier protection, comfort and tactile sensitivity.

- Beaded cuffs provide tear resistance and ease of donning
- Powder free to reduce the drying effects on skin and powder-related transfer of latex protein
- Ambidextrous, single-use
- Length: 9.5 in. (24.1cm)
- Thickness: 5mil
- Color: Natural



COMPLIANCE:

Manufactured under good manufacturing practice (GMP) and are internationally accepted.

CERTIFICATIONS:

Meet ASTM™ D3578 standards, 510K approved for medical use.

⚠️ ALERTS:

These products contain natural rubber latex, a component of which may cause allergic reaction in some users. Use only as directed and in accordance with manufacturer instructions and warnings. Please consult your institution's policies regarding use of these products.

Cat. No.	Description	Price
S04798	Small	30.25/Pk

fisherbrand Economy Impact Goggles



Affordable goggles in impact and chemical-splash styles.

- Clear polycarbonate lens
- Soft, flexible PVC body molds to facial contours for a comfortable fit
- Adjustable headstrap ensures custom fit



Impact Goggles

- Shield eyes from dust, mist and other airborne particles
- Direct vents on goggle top and sides

Chemical-Splash Goggles

- Resist a broad range of chemicals
- Circular vents allow air to flow freely through goggle body

COMPLIANCE:

Meet ANSI™ Z87.1-2003 and CSA standards

Cat. No.	Type	Price
S01824	Impact Goggle	6.00/Ea
S68660A	Chemical Splash Goggles	5.00/Ea

Visorgogs™ Goggles

Designed to protect eyes from flying particles or liquids.

- Offer complete protection from glaring overhead light
- Lenses are one-piece, impact-resistant plastic with a down-angle vision



COMPLIANCE:

Meet ANSI™ Z87.1-2003 (Z87+ High Impact).

Cat. No.	Description	Price
S47619S	Full Vision Goggle	8.15/Ea

Safety Glasses

Make safety a habit with these functional, kid-friendly glasses.

- No uncomfortable straps
- Adjustable arms fit easily over children's eyeglasses
- For lab safety and dramatic play
- Grades PreK+



Cat. No.	Description	Price
S04222	Primary Safety Glasses	5.65/Ea

United Scientific™ Lab Coats

Well fitted and comfortable.

- Made of easy-care white cotton blend fabric (65% polyester, 35% cotton)
- Knee-length
- One upper left breast pocket and two roomy lower pockets
- With side slit openings and adjustable belt
- White



Cat. No.	Closure Type	Size	Price
S04775	Button	X-Small	35.50/Ea
S04776	Button	Small	35.50/Ea
S04777	Button	Medium	35.50/Ea
S04778	Button	Large	35.50/Ea
S04779	Button	X-Large	35.50/Ea
S04780	Button	2X-Large	44.50/Ea
S04781	Snap	3X-Large	56.00/Ea

Fisher Scientific™ PVC Aprons

Reusable blue PVC apron with cotton ties at the waist and neck.



Cat. No.	Size	Measures	Price
S47381A	Small	68.6 × 91.4cm (27 × 36 in.)	9.00/Ea
S47382A	Medium	68.6 × 106.7cm (27 × 42 in.)	12.00/Ea

Hot-Hand™ Protector

Mitt protects hands when handling extremely hot or cold objects, including dry ice.

- Use for handling hot and cold objects from -70° to +500°F (-57° to +260°C)
- Soft and compliant silicone rubber naturally conforms to hand and object
- Gripping surfaces studded with small concave nubs for positive grip and additional protection against temperature extremes
- Easier and faster to use than gloves or tongs for many applications
- Tab with hole for hanging hand protector near work station
- One size fits all hands, left or right



Cat. No.	Description	Price
S47371D	Hot Hand Protector	29.00/Ea

Helping Strangers Builds Confidence in Teens

By Ralph Birch



A recent study has found that adolescents who practiced prosocial behavior toward strangers had higher self-esteem a year later.

The study was spearheaded by Laura Padilla-Walker, a professor in the School of Family Life at Brigham Young University. Padilla-Walker and former student Xinyuan Fu coauthored the study, which was published late last year in the *Journal of Adolescence*.

Being Prosocial

Prosocial behavior toward strangers — such as helping, sharing and comforting — bolstered the self-esteem of teens who participated in the study. Teens who exhibited these behaviors exclusively to friends and family members did not have higher self-esteem.

"This study helps us to understand that young people who help those

with whom they do not have a relationship report feeling better about themselves over time," Padilla-Walker said.

Padilla-Walker has conducted several studies relating to prosocial behavior throughout her career. While she's found that teens who display these positive behaviors tend to stay out of trouble and have stronger relationships with family members, this was the first time she tied prosocial behavior to self-esteem.

By the Numbers

The most recent study examined the behavior of 681 adolescents from ages 11 to 14 in two U.S. cities. The kids were tracked at four different points in time, from 2008 through 2011. Participants responded to 10 statements such as "I feel useless at times" or "I am satisfied with myself" to gauge

self-esteem. Prosocial behavior was measured by self-reporting that examined various aspects of kindness and generosity, such as "I help people I don't know, even if it's not easy for me" or "I go out of my way to cheer up my friends" or "I really enjoy doing small favors for my family."

The Results

"A unique feature of this study is that it explores helping behaviors toward multiple different targets," Padilla-Walker said. "Not all helping is created equal, and we're finding that prosocial behavior toward strangers is protective in a variety of ways that is unique from other types of helping."

For many adolescents, this time can be confusing. In a state of such self-exploration and self-identification, Padilla-Walker suggests that helping your kids

find confidence, self-respect and self-worth can be of monumental importance.

"For teens who sometimes have a tendency to focus on themselves, parents can help by providing opportunities for their children to help and serve others who are less fortunate," Padilla-Walker said. "It is best if teens can directly see the benefit of their help on others."

[DISCUSSION QUESTIONS]

What types of things do you think would be considered prosocial behaviors?

Does performing prosocial acts toward family, friends or strangers make you feel better about yourself?

[VOCABULARY]

PROSOCIAL

SELF-ESTEEM



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With a long history of perfecting glassware for research and industry, DWK Life Sciences puts as much care and diligence into our glassware as you put into your school and students.

And when setting up your classroom, KIMBLE™ Lab Start-Up Packs allow you to order precisely what you need — saving you money and storage space.

Cat. No.	Description	Qty/Case	Price
S32139	KIMAX Class B Cylinders	5	144.00
S30731	KIMAX Griffin Beakers	5	38.75
S43013	KIMAX Erlenmeyer Flasks	5	50.75



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Bulk First Aid Kits

Designed for large facilities.



- Contain economical bulk supplies that can be readily accessed when needed
- Latex-free
- Weatherproof
- Supplies housed in waterproof metal or plastic case

ORDERING INFORMATION:

Rapid refill kits available separately. For complete lists of kit contents, visit fisheredu.com.

COMPLIANCE:

ANSI™ Z308.1-2003 compliant.

Cat. No.	Case	Sufficient For	Price
S98413A	Plastic	10 Persons	31.50/Ea
S98413C	Plastic	50 Persons	81.24/Ea
S98414B	Metal	25 Persons	72.50/Ea
S98414C	Metal	50 Persons	110.00/Ea

Justrite™ Polyethylene Corrosives/Acid Cabinet

Sturdy, completely metal-free poly cabinet for storing acids or bases without the worry of corrosion.

- Holds up to 36, 2.5L (90L) bottles
- Offers chemical resistance against spills or potential damaging vapors when storing acids or bases
- Shelf adjusts on 3-inch (76mm) increments, and has a load capacity of 125 lb. (57kg)
- Removable yet sturdy sump cover, which also serves as a bottom shelf, conceals the fully integrated, leakproof sump with an 8.5 gal (32L) capacity
- Recessed channels in shelf and base help direct spills to the back of the cabinet and down into the sump
- Three application-specific labels identify contents to safely store and segregate incompatible chemicals — ACID, BASE, and CORROSIVE
- Doors open nearly 180° for easy access, engage firmly with the body when closed, and accept a padlock (not included) for added security
- Cabinet can be used for stand-alone storage
- Grooved top work surface
- Recessed toe-kick allows the user to stand closer to the counter for improved ergonomics
- Stackable
- Four pre-formed vent locations at rear provide a guide for an aftermarket vent kit (not included) in the event the application requires a pressurized vapor removal system



⚠ ALERTS:
Research environments using many different types of chemicals have special storage requirements. Whether using acids, bases or solvents, it is critical that incompatible liquids are segregated to avoid disastrous explosions or fire. The SDS (Safety Data Sheet) should be reviewed to determine chemical characteristics and recommended storage practices

Cat. No.	Capacity	Dimensions Interior	Dimensions Exterior	Description	Price
S27960MF	Holds up to 36, 2.5L (90L) bottles	31.25W × 28H × 18D	36W × 35H × 25D	Adjustable Shelf	958.00/Ea

Justrite™ Wood Laminate Storage Cabinet for Corrosives and Acids

Suitable for storing highly corrosive liquids such as phenol, nitric acid and sulfuric acid.

- Long-lasting wood construction provides exceptional strength
- Stainless-steel handles and hinges resist corrosion from harsh acids
- Shelves adjust on 32mm centers to accommodate wide variety of containers
- Sturdy clip system adjusts shelves if required
- Two doors
- Color: blue

Undercounter Model

- Can be used freestanding
- One adjustable shelf
- With removable, easy-to-clean polyethylene work surface top recessed 16mm to help contain incidental leaks

INCLUDES:

Adjustable leg levelers, patent pending Haz-Alert™ reflective labels and double key set for safety and security



Cat. No.	Capacity	Interior Dimensions (D × W × H)	No. of Shelves	Price
S04765MF	36 x 2.5L bottles	20.85 × 34.4 × 29.49 in.	1	969.00/Ea

Justrite™ Polyethylene Red Liquid Disposal Cans

High-density polyethylene offers superior chemical resistance and leak protection.

- For containment of flammable wastes and flammable corrosives
- Large and strategically placed opening offers controlled filling and pouring during disposal
- Fixed position on handle allows lid to stay open for easy pouring
- When closed, cap automatically vents at between 3 and 5psig
- Stainless-steel flame arrester guards against outside ignition



Cat. No.	Capacity (English)	Height (English)	Price
S04779MF	2 gal.	14.75 in.	124.00/Ea
S04778MF	5 gal.	20 in.	112.00/Ea

Adhesive Bandages

Easy handling and application.



- Easy to open, even with gloved hands
- Just pull firmly on the ends to release the outer wrap
- Apply the bandage directly without touching the pad or the wound
- Each bandage individually wrapped and sterile

Cat. No.	Size	Product Type	Price
S47527A	1.9 × 7.6cm (0.75 × 3 in.)	Sheer Bandage	10.50/Pk
S47527B	2.5 × 7.6cm (1 × 3 in.)	Sheer Bandage	11.50/Pk
S47527C	1.9 × 7.6cm (0.75 × 3 in.)	Flex Bandage	13.50/Pk
S47527D	2.5 × 7.6cm (1 × 3 in.)	Flex Bandage	12.50/Pk

fisherbrand Lister Bandage Scissors with Antiglare Coating

Size dressings and remove circumferential bandages.

- They may also be used to cut tougher material such as plastic, fabric, and occasionally umbilical cords
- Surgical grade stainless steel
- Angled blade; upper blade has rounded tip; lower blade is blunt with flattened probe tip
- Antiglare coating with a matte finish to prevent distractions from reflections
- Electronically passivated
- Autoclavable up to 135°
- Can be sterilized by Eto/Gamma radiation
- Rockwell Hardness (HRC): 46-50
- Inspected per U.S Government specifications for surgical instruments
- Produced under ISO 9001, cGMP Guidelines



Cat. No.	Blade Length (English)	Price
S25094	4.5 in.	19.00/Ea

fisherbrand

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pH meters for educating our future scientists

Equip your classroom with easy-to-use pH meters to offer your students the opportunity of hands-on learning. The Fisherbrand FE150 meters were designed with the essential functions needed for routine pH measurements.



Description	Cat. No.	Price
FE150 pH benchtop meter with electrode stand	S35922	\$345.00
Education Set: FE150 pH meter with single junction gel pH electrode, ATC temperature probe and electrode stand	S35923	\$433.00
Bio Set: FE150 pH meter with double junction gel pH electrode, ATC temperature probe and electrode stand	S35924	\$443.00
3-in-1 Set: FE150 pH meter with 3-in-1 single junction gel pH/ATC electrode and electrode stand	S35925	\$450.00

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