**DESIGN LAB: ELECTRICAL INVENTIONS**

**Electrical Inventions Workshop**

- [2] 22 GA. Wire, Black, 100 ft. Roll
- [2] 22 GA. Wire, Red, 100 ft. Roll
- [300] Drinking Straws, 19/64 in. dia. x 7-3/4 in. L
- [500] Jumbo Craft Sticks
- [50] Clothespins, Spring Type
- [1] Aluminum Foil sheet, 12 in. wide, 75 ft. Roll
- [200] Brass Paper Fasteners, 2 in. L
- [3] Jumbo Paper Clips, 100/box
- [24] Brass Strips, 0.016 x 2 x 12 in.
- [24] Tin Sheets, 4 x 10 x 0.008 in.
- [1] Cotton Twine 300 ft. long Roll
- [1] Velcro, 3/4 in. x 3 ft. long Strip
- [2] Flat Washers, 1/2 in. ID 100/box
- [1] Perforated Steel Pipe Strap, 3/4 in. W x 50 ft. long Roll

**Project Parts Kit**

- [1] Electrical Inventions Workshop Guide
- [1] DesignLab Frisbee
- [3] SPST Slide Switch
- [1] AA Battery Holder, 2-Cell with Leads
- [2] AA Battery
- [2] 3V Lithium Coin Cell Battery, CR2032
- [2] Coin Cell Holder for CR2032
- [1] Alarm Horn, 5-10 V DC
- [1] Extra Large LED, Red
- [1] Extra Large LED, Green
- [1] Extra Large LED, Yellow
- [1] Ceramic Block Magnet, 1.875 x 0.875 x 0.387 in.

**Spare Parts Kit**

- [2] DesignLab Frisbee
- [3] SPST Slide Switch
- [3] AA Battery Holder, 2-Cell with Leads
- [6] AA Battery
- [3] 3V Lithium Coin Cell Battery, CR2032
- [3] Coin Cell Holder for CR2032
- [2] Alarm Horns, 5-10V DC
- [2] Extra Large LEDs, Red
- [2] Extra Large LEDs, Green
- [2] Extra Large LEDs, Yellow
- [6] Ceramic Block Magnets, 1.875 x 0.875 x 0.387 in.

**Complete Classroom Pack**

Includes: [12] Project Parts Kit (#021291), a Workshop Materials Pack (#021292), and a Spare Parts Kit (#021293).

021292 .................................................................. $335

021294 .................................................................. $695

**Electrical Inventions Workshop Guide**

652563 Booklet ................................................... $15.95

**Electrical Inventions Workshop Guide**

652563 Booklet ................................................... $15.95

**Electrical Inventions Workshop**

Wood, balsa and foam blanks require shaping with tools and sanding. Kits may require soldering and advanced assembly. Adult supervision required.

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Design & Test Generators & Gearboxes

Build a wind turbine with a motor/generator or advanced students can wind their own motor/generator using magnet wire.

Test rotor and blade designs by varying the rotor sweep, blade size and blade shape to change the electrical output of the generator. Test rotor output with the included multimeter or see how many LEDs are lit.

Students can also fold a cardstock model house and create their own LED circuit to plug into the wind turbine generator. A box fan or similar fan on a stand is required but not included.

**KELVIN® Experimental Wind Turbine with Toy Motor Generator**

Includes: motor/generator, gearbox parts, hub, corrugated plastic for blades, PVC stand with sturdy base, multimeter, LEDs, breadboard, printed house layout, wire, terminals, and instructions. Available as a kit or assembled and complete with stand.

- **842267 Kit w/Stand** ........................................ $125
- **842268 Assembled w/Stand** .............................. $199

**Toy Motor Generator Kit Only**

Build your own! Comes with motor/generator, gearbox parts and hub. Does not come with blades. PVC stand or wind turbine class parts.

- **851924 Kit- No Stand** ............................................. $85 or $75 ea./5+

**KELVIN® Experimental Wind Turbine with Transformer and Wind-Up Generator**

Build your own motor generator. Includes: generator parts, hub, corrugated plastic for blades, PVC stand with sturdy base, multimeter, LEDs, breadboard, printed house layout, wire, terminals, and instructions. Requires motor/coil winding and assembly.

- **842258 Kit w/Stand** ............................................ $139.95
- **842257 Assembled w/Stand** .............................. $295

**Transformer Generator Kit Only**

Build your own! Includes motor generator parts and hub. Requires motor/coil winding and assembly. Does NOT include blades, PVC stand or wind turbine parts.

- **851925 Kit- No Stand** ............................................. $99 or $89 ea./5+

**KELVIN® Wind Turbines & Wind Farm Data Interfaces**

Add Data Collection to your project these economical interfaces. Graph display on your computer. For best results, use with KELVIN® motor #851363.

**KELVIN® WinData® Data Collection Interface**

Monitors 3 or 6 motors and generators. Displays the voltage.

- **Win Data™ 3 - Up to 3 Motors** .......................... $145
- **Win Data™ 6 - Up to 6 Motors** .......................... $225

**KELVIN® Wind Farm™ Data Collection Interface**

Monitors 3 motors / generators as well as load consumption. Displays voltage AND current.

- **842099 USB, IBM - Up to 3 Motors** .................. $295

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KELVIN® Kre8® Wind Generator
Experiment with wind power - a renewable energy source. The solar motor is powered by the wind and can provide energy to other projects - like powering up the included LED. Take the kit apart and build it again in the next class.

Adjust the gearing and you can increase the motor speed. Students can also experiment with the number, angle, size and shape of the blades. If there is no wind, you can use the orange finger spinner for testing purposes. Requires a blower for use with indoor experiments.

283733 Kit .................$19.95 or $17.95 ea./10+
283740 Bulk Pack for 20 Students ......................... $295

As low as $14.75 per student!

KELVIN® Basic Wind Turbine Parts Bulk Pack
Students design blades out of corrugated cardboard. Pack includes: hub, motor, motor holder, and LED. Requires scrap cardboard, wood for base and blower.
842353 Bulk Pack for 20 ..................................$79

As low as $3.95 per team!

KELVIN® Economy Wind Turbine
See how wind can be used to light an LED using a Box Fan (NOT included). Comes with: 2- and 3-bladed propellers, KELVIN® 50LE Meter, LED and alligator clips. Measures 7 in. tall.
841958 ……………………..$32.95 or $29.95 ea./2+

KELVIN® Wind Farm Lab
Join three wind turbines in series or parallel and measure current and voltage for each generator or the total output of the wind farm as the load is varied. Lab includes base, analog display, wind blower and instructions.
842100 Lab ..................................................$295

Lab (#842100) plus Computer with LCD Screen and Software with Data Collection Interface (#842099)
842099 Lab with Computer .....................................$1,495

Wind Turbine Designer’s Kit
Gearbox & bracket ONLY (No Base).
842097 ……………………..$29.95 or $27.95 ea./5+

KELVIN® Wind Turbine Lab
Produce, store and use energy.
Individual pack includes:
Adjustable Gearbox System, Turbine, Meter, LEDs, Super Capacitor, and Super Capacitor Dragster Kit (charge it and run it).

Individual Pack
841984 No Box Fan .......................... $49.95
841960 Lab–Box Fan & [5] Individual Packs .......................... $245
390442 Box Fan, 20 x 20 in. .......................... $29.95

KELVIN® Eco-Power Wind Turbine
You provide the material for the blades and we’ll provide the gearbox and instructions.

Gearbox Only (No Stand, No Blades)
842068, $34.95 or $29.95 ea./10+
Gearbox WITH a Stand
842146, $39.95

As Low As $3.95 Per Student

KELVIN® Wind Turbine Junior Design Challenge
Design, build and test a wind turbine generator that will light an LED. Works with The Wind Farm (left). Each kit has enough materials to make either a vertical or horizontal axis wind turbine. Kit includes: plastic bottle, cap, DC motor, LED, predrilled acrylic mounting base, wire, wood hub, motor mount, rotor design materials and instructions.
842139 Kit…………………………..$9.95 or $9.45 ea./10+

Find COMPUTER INTERFACE in this chapter on pg. PE2.

As low as $9.99 per team!

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KELVIN® Wood Economy Motor Generator
Economically priced, this DC motor kit will bring hours of learning and fun to your students. Made from precut quality plywood, this motor features two magnets and a unique coil winding assembly. Its operation is whisper smooth. Requires 2 AA batteries.

- 842084 Kit: $12.95 or $10.95 ea./10+
- 842086 Bulk Pack of 25: As Low As $4.80 Per Kit

842086 Bulk Pack of 25......As Low As $4.80 Per Kit $120

KELVIN® Plastic Economy Motor Generator
Made from high quality molded plastic, this motor kit features the same unique coil winding assembly as used in our wood DC motor kit. Help your students understand the fundamental operation of DC motors. Wind and assemble the coils, brushes, magnets, rotor and commentator. Learn about inductance, magnetic fields, electromagnets and much more. Requires 9V battery.

- 842305 Kit: $9.95 or $8.95 ea./10+
- 842337 Bulk Pack of 30: As Low As $3.85 Per Kit
- 842338 Assembled Model: $74.95

KELVIN® Reed Switch Motor
Project involves a simple motor with automatic interrupter. As one of the 2 fixed magnets passes the reed switch, it is closed and the magnet coil is engaged. The interaction of the electro-magnet and permanent magnet produce an incredibly fast revolution of the rotor. Requires a AA battery.

- 283287: $9.95 or $9.45 ea./10+

30x30x30 MDF Base

**SCIENCE** POWER & ENERGY

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**KELVIN**® Sturg DC Motor Kit

Named after William Sturgeon, who invented the first direct-current electric motor capable of a practical application in 1832.

- Kit ..............$12.95 or $9.95 ea./6+
- 842408 Bulk Pack of 10 Kits ..............$89.50

As Low As

**$8.95**

Per Team

**KELVIN**® Spinning Motor Kit

This super smooth motor kit includes a precut acrylic base and parts for ease of assembly. The motor utilizes four magnetic contacts and a reed switch to create KELVIN™’s fastest spinning DC motor kit. Requires [2] AA batteries.

- Kit.............$14.95 or $12.95 ea./6+ or $11.95 ea./20+

As Low As

**$11.95**

Each Per 20+

**KELVIN**® Advanced Motor Kit

This metal and acrylic motor kit challenges your student’s ability to precisely layout and drill mounting holes and assemble this elegantly working DC motor. Designed for the older student, this kit teaches the fundamental operation of DC motors, coils, armature and contacts. Requires [2] AA batteries.

- Kit.........................$14.95 or $12.95 ea./6+ or $11.95 ea./20+

Kits may require soldering and advanced assembly. Adult supervision required.

Wood, balsa and foam blanks require shaping with tools and sanding. Prices in this catalog represent discounted pricing for educational institutions.
**KELVIN® Build Your Own® Telegraph**

Wind coil, connect wires and learn to operate and communicate with this system. Have your students take an interdisciplinary journey into the world of telecommunications. Your students will also discover the history of the telegraph, the science of magnetism and electrical circuits and the technology of sending data over wires. The activities culminate with the construction of a real, working telegraph sender and receiver.

Included in the kit are materials and instructions for experiments: magnetize a nail using a rare earth magnet, build an electromagnet, levitate ceramic magnets, and investigate circuits. Batteries are included.

- 841978 Individual Kit ........................................ $39.95 or $36.95 ea./6+
- 283119 Bulk Pack for 10 Students ........................................ $350

**KELVIN® Investigating Generators, Transformers and Turbines**

Bring the production of electrical power to a scale your students can understand. Using this kit students will build their own generator. After testing the generator students are challenged to design, build, install and test a wind turbine to spin the generator shaft. To increase the voltage going to an LED circuit, students will add a step up transformer to their turbine generator design. How many LED’s can your student designed turbine generator light?

- 842140 .............................................................................................. $39.95

**KELVIN® Build Your Own® Fuel Cell Racer**

Provide students with the mathematical, science and technical background needed to enter the World of Motion Design Challenge. After assembling a racer kit students will have a working fuel cell vehicle that can use for experimentation, data gathering and further design development. Batteries required (see choices below).

- Fuel Cell Racer Kit 842118 ........................................ $79.95 or $75.95 ea./5+ or $67.95 ea./10+
- ‘AA’ Ni-MH Batteries (4) w/ 1-Hour Quick Charger 220155 .............................................. $29.95
- ‘AA’ Alkaline Battery 220016 .............................................. $80¢ or 75¢ ea./10+

**KELVIN® Bell Kit**

Building a bell project in the class is fun and educational. The kit includes [3] AA batteries and basic instructions.

- 280577, $8.95 or $7.95 ea./10+

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**KELVIN® Investigating Electricity Lab**

KELVIN™’s Investigating Electricity Lab takes a unique approach to teaching basic DC electricity concepts. The experiment board and components use a Velcro like technique to mount parts when assembling circuits. The lab has been designed to teach students the basic fundamentals and concepts behind DC electricity and circuits. The lab provides background information on many topics and activities that allow the students to apply their knowledge. The activities include Measuring Voltage, Assembling Simple Electric Circuits, Assembling Circuits Using Schematic Diagrams, Series and Parallel Circuits, Using a Meter to Measure Electricity in a Circuit and The Effects of Voltage, Current and Resistance in a Circuit.

360029 Lab ................................................................. $99.95

**KELVIN® Making Wet Cells & Batteries Lab**

Design, build, test and experiment with electro-chemistry. Students will create wet cells and batteries using a variety of different electrode and electrolytic solutions while gathering and analyzing output data. This lab kit is the perfect companion to author Harry Roman’s booklet, Making Wet Cells and Batteries. Includes: detailed instructions, electrodes (copper, zinc, tin, aluminum, iron), Safe chemicals for creating electrolytic solutions, measuring containers and tools, cell containers, multimeters and alligator leads.

842300 Enough for 24 Students ....................................................... $195

**KELVIN® Hydroelectric Turbine Generator**

Hydroelectricity is a clean and renewable source of energy that supplies electricity to many parts of the United States. Assembling this kit gives your students an opportunity to produce a working model of a hydroelectric generator that will light an LED. The design element of this activity challenges your students to produce turbine blades that provide the most efficient use of the moving water. Measure output with a multimeter. Running water is needed; some tools are needed for drilling. Red acrylic base is included.

842339 Kit ........................................ $29.95 or $27.95 ea./5+  
842340 Bulk Pack of 10 .......................... $250

As low as $25 per student!

**Making Wet Cells and Batteries**

The chemistry and materials in wet cells and batteries are all around us. Understanding how wet cells work, helps us understand rust and corrosion; and why batteries behave the way they do and eventually need replacement. Includes fun information and simple experiments. Wait until you see what you can use to make wet cells and batteries!

652656 Booklet .................. $14.95 or $13.95 ea./10+

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**KELVIN® Solar Energy Houses**

These kits will guide your students through activities focused on the conversion of light into electrical energy as well as heat transfer and storage for the purpose of space and water heating. Requires a light source.

**KELVIN® Advanced Solar Energy House**

The illustrated guide begins with a brief history of the use of solar energy. The Advanced Energy House allows students to compare different combinations of passive and active solar heating. Using the information, students can then go on to using solar cells to generate electricity to power the house, a fan, electric vehicle or wind-generated electricity. Requires a light source and a fan blower.

### Simple Solar Living DVD

This video presents the basic concepts of solar voltaic energy in easy to understand language and great videography. The narrator takes the viewer on a tour of a solar powered home and workshop. Each essential part of the solar voltaic system is shown and its function explained. See how the designer retrofitted older solar technology with new technology to create an affordable and functional system.

### Alternative Energy Houses

- **Name**
  - Simple Solar Living DVD
- **Price**
  - **$19.95**

### Solar Energy House Template

- **Stock #** 841748
- **Level** Beginner
- **Material Provided** Template Only for 1-Room House
- **Thermometer** Stick-On
- **Solar Cell** 1
- **Motor** 1
- **Propeller** 1
- **Aluminum Sheet** √
- **Instructions** √
- **Acrylic Square** √
- **Alligator Leads** √
- **Ceramic Tile** √
- **Water Pump** NA
- **Socket & Lamp** NA
- **50 LE Multimeter** NA
- **KELVIN® Car Kit** NA
- **Add. Tools & Materials Inc.** Foam board cutter, knife switch, beaker, battery holder, tubing, LEDs, clothespins, and wood.
- **Size** 7 x 7 x 8 in.
- **Price $** 19.95 or 18.95 ea./3+

### Solar Energy House Kit

- **Stock #** 841635
- **Level** Intermediate
- **Material Provided** Template & Foam Board for 1-Room House
- **Thermometer** Stick-On
- **Solar Cell** 1
- **Motor** 1
- **Propeller** 1
- **Aluminum Sheet** √
- **Instructions** √
- **Acrylic Square** √
- **Alligator Leads** √
- **Ceramic Tile** √
- **Water Pump** NA
- **Socket & Lamp** NA
- **50 LE Multimeter** NA
- **KELVIN® Car Kit** NA
- **Add. Tools & Materials Inc.** Foam board cutter, knife switch, beaker, battery holder, tubing, LEDs, clothespins, and wood.
- **Size** 7 x 7 x 8 in.
- **Price $** 29.95 ea./3+

### Solar Energy House Lab

- **Stock #** 841603
- **Level** Advanced
- **Material Provided** Template & Foam Board for 1-Room House
- **Thermometer** Stick-On and Liquid
- **Solar Cell** 1
- **Motor** 2
- **Propeller** 2
- **Aluminum Sheet** √
- **Instructions** √
- **Acrylic Square** √
- **Alligator Leads** √
- **Ceramic Tile** √
- **Water Pump** NA
- **Socket & Lamp** NA
- **50 LE Multimeter** NA
- **KELVIN® Car Kit** NA
- **Add. Tools & Materials Inc.** Foam board cutter, knife switch, beaker, battery holder, tubing, LEDs, clothespins, and wood.
- **Size** 7 x 7 x 8 in.
- **Price $** 69.95 ea./3+

### Advanced Solar Energy House Lab

- **Stock #** 841602
- **Level** Advanced
- **Material Provided** Template & Foam Board for Multi-Room House
- **Thermometer** Stick-On and Liquid
- **Solar Cell** 3
- **Motor** 2
- **Propeller** 2
- **Aluminum Sheet** √
- **Instructions** √
- **Acrylic Square** √
- **Alligator Leads** √
- **Ceramic Tile** √
- **Water Pump** NA
- **Socket & Lamp** NA
- **50 LE Multimeter** NA
- **KELVIN® Car Kit** NA
- **Add. Tools & Materials Inc.** Foam board cutter, knife switch, beaker, battery holder, tubing, LEDs, clothespins, and wood.
- **Size** 7 x 14 x 8 in.
- **Price $** 119.95 ea./3+

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KELVIN® Power Grid Electrical Distribution Grid Lab
Help students explore how electrical energy arrives at its final destination, as well as introduce alternative sources of energy.

Each student will construct a model home from the pattern provided. The students will then assemble a simple LED and resistor light circuit that is installed into the model house.

The model then snaps into the power grid base and picks up current from overhead wires. Students can take measurements using a multimeter. Students can then take their house off the grid and supply electrical energy with solar voltaic cells and even the optional wind turbine generator.

Lab includes: grid base, preprinted house patterns on cardstock, all electronic parts, solar cells and multimeter. Requires assembly.

Can be powered by [4] AA batteries (sold separately), wind, or by solar. Wind turbine generator (shown) not included.

842082 Lab for 24 Students ....................................................................................

As Low As $6.45 Per Student $175 or $155 ea./3+

KELVIN® Power Grid Mini Model Homes Bulk Pack
For use with #842082 above. After the activity, students can keep their model homes and power them with a battery. Comes with pre-printed cardstock, special LED, LED holder, wires, connector, and alligator clips.

Bulk Pack for 10 Students
652520 ........................................$29.50

As Low As $2.95 Per Student

KELVIN® Solar Energy Farm
Teach your students the basics of solar voltaic energy! The kit consists of six 0.5 volt encapsulated solar cells mounted to a movable arm. Jumpers are used to connect the cells in series or parallel. Also included in the kit are ten LEDs, breadboard, motor, fan prop, protractor to measure the cell angle, experiments and instructions. Assembly required. Works with the Power Grid.

842035 Kit ..........................................................$49.95 or $44.95 ea./3+

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**SCIENCE**

**POWER & ENERGY**

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**NEW**

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**Features NEW 2V, 200mA Solar Cell**

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**2V, 200mA Solar Cell w/ Alternative Energy Battery Charger**
Includes 2V, 200mA solar cell, AA battery holder and insulated alligator clips with leads. Measures 2 x 2 inches. Requires [1] AA Ni-Cad battery (not included).

- **220163 [A]** ................................................................. $7.95 or $6.95 ea./10+
- **AA Ni-Cad Battery Only**
  - **220025** 2V, 500mAh ................................................................. $1.35 or $1.25 ea./6+

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**Solar Panel with AA & 9V Battery Chargers**
Has switch to select 3, 6, 9 & 12VDC. 600mW. Measures 165 x 89 x 25 mm. Includes adapters to charge two AA or a 9V battery.

- **280202** ................................................................. $19.95

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**NEW**

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**Features NEW 2V, 550mA Solar Cell**

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**2V, 550mA Solar Cell**
Comes with 10 in. long red and black stranded wires. Measures 4 x 4 inches. Shown above.

- **260197** ................................................................. $10.75 or $9.75 ea./3+

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**3V DC, 100 mA Solar Cell**
Comes with 10 in. long red and black stranded wires. Measures 2 x 2 inches.

- **220103** ................................................................. $4.95 or $4.75 ea./10+

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**NEW**

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**Features NEW 2V, 200mA Solar Cell**

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**2V, 200mA Solar Cell with Solar Motor**
Comes with 2V, 200mA Solar Battery Charger and Solar Motor #851105.

- **842411 [A & B]** ................................................................. $12.95 or $11.65 ea./6+

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**Solar Motors Only**

- **851105 [B]** 0.7-5 V, 18mA, 2200 RPM ...... $2.95 or $2.65 ea./10+ or $2.45 ea./100+
- **851363 [C]** 1.5 V, 140mA, 6900 RPM ...... $2.45 or $2.20 ea./10+ or $2.10 ea./100+

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**KELVIN® Solar Backup Power Kit**
Convert your solar racer to battery power for indoor rainy day testing. Includes battery holder, slide switch, wire and AA batteries.
- **840694** Shown Left ................................................................. $1.95 or $1.75 ea./12+

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**Rechargeable Light Source 10,000,000 Candle Power**
Perfect for performing solar activities indoors. Charger included.
- **260204** Shown Right ................................................................. $79.95

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The ClassView™ System Includes a Master Controller for Race Start and a Reaction Controller for Each Lane

**KELVIN® ClassView™ Timer Features:**

- **TIME:** 1/1000 Second
- **RESPONSE TIME:** Dual
- **SPEED:** MPH, KPH
- **CLASS VIEW:** Large super bright 7 segment 1” character height LED displays. Ideal for whole class to view the competition results.
- **MONITOR:** 1- or 2-lane monitoring. Display speed, race time, response time and distance simultaneously.
- **REACTION PRACTICE MODE:** 2 modes - normal (racing mode) and practice (test response time). Manual/automatic racing modes.
- **CONTROLS:** Master controller for race start. Two other individual hand-held controllers for each lane.
- **CHRISTMAS TREE Display:** High-power LED based: A true random Christmas tree sequencer. Time: display time is 1/1000 sec.
- **SPEED:** Selectable MPH and Km/H speed calculations and display. User selectable distance setting.
- **SENSORS:** Optical infrared, non-contact sensors for start/finish gates.
- **CAR STAGING:** Built-in car staging and testing.
- **TWO WINNER MODES:** Select winners by race time only or race time and response time.
- **USB INTERFACING:** Built-in USB port for connecting to PC computer and download the results of each race (future optional software).
- **SENSOR CABLE:** Can be used for a 90 foot long race track.
- **POWER SUPPLY:** With UL approved wall adapter.
- **HOUSING:** Strong metal enclosure with baked paint finish. 15.5” wide x 11 3/4” x 2” deep.
- **STAND:** A tripod stand (height adjustable) is also included.

**KELVIN® Kel-Air™ Electronic No CO2 Dragster Launcher System with Class View™ Timer**

This package includes a ClassView™ Timer with Power Supply, No CO2 Electronic Launching System, Start and Finish Sensor Gates, a 24 ft. long Track (3 sections of 8 ft. long), Compressor and [50] Bulk Pack Car Kits. Sensors and wiring are pre-mounted.

841564 ★ Allow $350 for Oversized Shipping ........................................... $2,295

**KELVIN® E-Road Package with Class View™ Timer**

This package includes a ClassView™ Timer with High Current Power Supply, a Master Controller for Race Start, a Reaction Controller for each lane, 72 ft track (in 8 ft sections) and [50] Bulk Pack Car Kits.

841566 ★ Allow $350 for Oversized Shipping ........................................... $2,195

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**KELVIN® Kel-Timer™ Deluxe**

Although similar to the Kel-Timer™, the “Deluxe” model incorporates an additional feature that allows for measuring acceleration in a single lane (like the Kel-Accel™).

Four infrared sensors can be positioned to measure acceleration in one lane. Enter the distance between each sensor so the timer can compute and display the speed and acceleration for your vehicle. Input distance in feet or meters and results are displayed as Time, Mi/h or Km/h. Use with dragsters, maglev vehicles, water channel testers, and more.

The Kel-Timer™ Deluxe includes: [4] 50 ft. long sensor cables that can be used with a track up to 100 feet long and a DC wall adapter (or use [4] AA batteries). Available options listed below. Interfaces with Moving Sign Display (see below) and Super-Vision (listed far right).

841807 Kel-Timer™ Deluxe.......................... $345

Additional Options Available:
841005 Sensor Holder (Height Adj., 1-Lane)....... $49.95
121768 Download Cable/Software, Win 7, Serial... $79.95

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**KELVIN® Kel-Timer™ Motion Timer**

Portable, ideal for field testing—no computer required. Use with dragsters, maglevs, water channel testers, etc. Make your own sensor holder or buy ours (listed below). Includes: 4-Digit, Bright Red LED Display, Accurate to 1/1000 of a second, Small Size (4-1/2 x 1-3/4 x 1 in.), Cable set with Infrared Start/Finish, Gates that open to 100 ft. and 9V DC Adapter (or use a 9V battery).

841089 KELVIN® Kel-Timer Jr.®.................... $195
841005 Sensor Holder (Height Adj., 1-Lane)....... $49.95
780061 Sensor Cable (1-Lane up to 100 ft.)....... $99.95

---

**KELVIN® Kel-Timer™ Deluxe**

Although similar to the Kel-Timer™, the “Deluxe” model incorporates an additional feature that allows for measuring acceleration in a single lane (like the Kel-Accel™).

Four infrared sensors can be positioned to measure acceleration in one lane. Enter the distance between each sensor so the timer can compute and display the speed and acceleration for your vehicle. Input distance in feet or meters and results are displayed as Time, Mi/h or Km/h. Use with dragsters, maglev vehicles, water channel testers, and more.

The Kel-Timer™ Deluxe includes: [4] 50 ft. long sensor cables that can be used with a track up to 100 feet long and a DC wall adapter (or use [4] AA batteries). Available options listed below. Interfaces with Moving Sign Display (see below) and Super-Vision (listed far right).

840978 Kel-Timer™ Deluxe.......................... $345

Additional Options Available:
841005 Sensor Holder (Height Adj., 1-Lane)....... $49.95
121768 Download Cable/Software, Win 7, Serial... $79.95

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**KELVIN® Super-Vision™**

Use this device with KELVIN® Timers in areas where there is too much light. This is an add-on for all of the KELVIN® Timers that use light sensors as triggering devices such as the Kel-Timer™, Kel-Accel™, ClassView™ Timer, etc.

Features include:
- Enhanced ambient light rejection: Eliminates problems when performing races in areas with strong ambient light or outdoors.
- Accommodates up to four sensors.
- Works with all KELVIN® timers that use light sensors (A.Q. Data Acquisition Device™, Kel-Accel™, Kel-Timer, Kel-Timer Jr.™, Kel-Timer Deluxe™).
- Shares power supply with the host (no additional power supply is needed).

841849 KELVIN® Super-Vision .................... $199
KELVIN® Educational

Original Ideas From Kelvin

Data Acquisition

And The Winner Is...®

Kelvin

Wood, balsa and foam blanks require shaping with tools and sanding. Kits may require soldering and advanced assembly. Adult supervision required.

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Features Include:

- 2-line LCD display, menu-driven software
- 4 channel, 12-bit A/D converter
- Retains collected data for years
- Var. data acquisition speed (sample rate)
- Store data or transmit it to your computer
- Built-in motion timer for 1-lane; collect data for time, mph & kph (motion timer cables/sensors sold separately)

KELVIN® A.Q.® Data Acquisition

This portable, microcontroller-based data collection device is easy to operate – use for technology or science classes. Areas of application include: Physiology (i.e. heart rate), Physiology (i.e. heart rate), Physics (i.e. motion, voltage, current, sound, light), Environmental (temperature, humidity, light, PH, barometric pressure), Biology and Chemistry. View collected data on location and then graph it in class with your computer. Interfaces with KELVIN®’s Moving Sign Display.

Includes interface, cables (can extend up to 100 ft.), comprehensive Windows plotting software for post data processing, and [5] popular external sensors: Temperature, Light Intensity, Sound Level, Voltage and Current.

841273 A.Q.® Device, Win XP-7, Serial ........... $395
870061 Start/Finish Gates w/Cables/Sensor ........ $99.95

KELVIN® Kel-Accel™
Data Acquisition Device

Accurately time the speed of a model vehicle, boat or moving object! Position four sensors along the track. Enter the distance between the sensors and the computer will measure the travel time between sensors, calculate speeds and accelerations, then plot them graphically on the screen for motion analysis. View the results directly on the computer or store for later use.

Includes 2 sets of sensor cables (4 total) open up to 100 ft., DC power supply, start/finish gates sensor cables (state-of-the-art infrared sensors set), interface and IBM Windows software. A sensor holder is also available (#841005). All Grades.

841806 Kel-Accel, Windows XP-7, USB ........... $245

KELVIN® Kel-Sonar™
Ultrasonic Motion Timer

Ideal for timing any slow moving objects. Students capture motion data of continuous moving objects with sonar up to 30 ft. Graphs on the computer show changes in speed as a function of time. Displays time and speed (MPH or KPH). Stores race results on the computer. Includes software, USB interface and AC power adapter. Win XP, USB.

840873 ............................................. $195

KELVIN® Kel-PowerPole™ Timer

Times speed, distance and revolutions your model plane flies around the PowerPole™.

Find the POWERPOLE™ TIMER in the AIR TRANSPORTATION chapter on pg. 11.

KELVIN® Multi-Lane Timer (1 to 6 Lanes)

Ideal for competition and timing from 1 to 6 lanes (with the 2 add-on units). The bright LED displays are large enough for the whole class to view. Starter unit includes: multi-lane controller, 2-lane display, power supply, 50 ft. long cables and display mounting.

841393 Starter Unit ........................................ $295
841394 Add. 2-Lane Display ................................ $195

KELVIN® Kel-Accel™ Data Acquisition Device

Accurately time the speed of a model vehicle, boat or moving object! Position four sensors along the track. Enter the distance between the sensors and the computer will measure the travel time between sensors, calculate speeds and accelerations, then plot them graphically on the screen for motion analysis. View the results directly on the computer or store for later use.

Includes 2 sets of sensor cables (4 total) open up to 100 ft., DC power supply, start/finish gates sensor cables (state-of-the-art infrared sensors set), interface and IBM Windows software. A sensor holder is also available (#841005). All Grades.

841806 Kel-Accel, Windows XP-7, USB ........... $245

KELVIN® Kel-Sonar™
Ultrasonic Motion Timer

Ideal for timing any slow moving objects. Students capture motion data of continuous moving objects with sonar up to 30 ft. Graphs on the computer show changes in speed as a function of time. Displays time and speed (MPH or KPH). Stores race results on the computer. Includes software, USB interface and AC power adapter. Win XP, USB.

840873 ............................................. $195

KELVIN® Magic Pulley™
Interface and Software

Measure Velocity, Acceleration, Distance and Time-Traveled with this unique computerized pulley. Can also be used to pull prototypes (land or water) into action. Use the included software to illustrate the recorded data. Grades 6-College. XP-Vista, USB.

841557 ................................................ $175
Wood, balsa and foam blanks require shaping with tools and sanding. Kits may require soldering and advanced assembly. Adult supervision required.

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### KELVIN® Multi-Color Moving Sign Display

View the results of a race or experiment in real time!

Features 15 special effects, 14 fonts, 12 colors and 11 graphics. Special effects allow the message to be rolled in from the top/bottom or left/right, scroll, snow, spray, starburst, twinkle and many more. Graphics include “Welcome”, “No Smoking,” “Don’t Drink And Drive,” News Flash Animation, Trumpet Animation, Party Balloons Animation and Fireworks.

Program with a wireless remote keyboard. Messages can be password protected, only changed by authorized personnel. A built-in clock displays different messages at different times and days.

RS-232 interface can be used with optional cable and software to program the sign. Built in test verifies that all the dots work properly.

The graphic display size is 24 in. L x 2 in. H. Includes mounting brackets to attach to wall or ceiling, programming instructions, AC wall adapter and wireless keyboard. Works with KELVIN® Kel-Timer™, KELVIN® P.D.E.™, KELVIN® A.Q. Data Acquisition™ products.

**281863 Moving Sign Display .............................................................................................................................................................................................. $395**

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### Radar Speed Check Devices

- **Radar Gun**
  - Measure the speed of most moving objects. Gives speed in MPH or KPH. Continuous or trigger mode with large digital readout. Hand-held radar gun can be tripod mounted. Requires [2] 9V batteries or adapter.
  - **281917 $295**

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### Timers

- **60-Minute Mechanical Timer**
  - **450076 [A] $14.95**

- **100-Minute Digital Timer**
  - Times minutes and seconds with a large LCD display and loud alarm. Includes a AAA battery, clip and magnet mount.
    - **450080 [B] $17.95**

- **20-Hour Digital Timer**
  - Times hours and minutes with a large LCD display and loud alarm. Timer includes a AAA battery, clip and magnet mount.
    - **450079 [C] $17.95**

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### Stopwatches

- **Economy Stopwatch**
  - 282363 [D] $3.95

- **Stopwatch**
  - Features: daily alarm, hour chime, 12/24 hr., clock and 1/100 sec. up to 24 hours.
  - Displays lap time, hrs., min., sec., mo., date and day of week. Black.
  - **150034 [E] $9.95**

- **Multi-Function Stopwatch**
  - Daily alarm, hourly chime, 12/24 hr. user-selectable, 1/1000 sec. chronograph, count-down timer with 1 second resolution, and a pace setter for 65-185 bpm.
  - Displays hours, minutes, seconds, AM/PM, months, date and day.
  - **150035 [F] $20.95**

- **Water Resistant Stopwatch**
  - Features a curved lens, daily alarm, 12/24 hour clock and 10-lap memory. Displays lap time, hours, minute, second, month, date and day of week.
  - **150036 [G] $28.95**

- **Speedometer**
  - Add to your project vehicle, etc. Measures speed, trip and total distance, ride time, average speed.
  - **851158 [H] $39.95**

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Intro Electronics: Security Systems

This is an introduction to circuits and electronics set in the context of creating a building security system. The simplest system consists of switches, a power supply, and a buzzer. A variety of switches will be introduced, including magnetic, optical and thermal ones. You'll gain familiarity with interpreting schematics, using breadboards, using meters, and debugging circuits. You will also build a power supply used later. Physics concepts include electrical terms, power, an introduction to solid state and experimental skills. This kit includes the parts needed to build a Low-Voltage Power Supply to use in this and other H.O.P. Units. Grades 9 through College.

840994   H.O.P. Electronics Kit .................................................$29.95

Intro Optics: Haze

The amount of haze in the atmosphere is increasing for reasons that are not fully understood. In this unit, you build optical sensors that can be used to infer haze levels and contribute your data to an international haze monitoring network.

This work involves understanding the physics of light with an emphasis on wavelengths, absorption, scattering, and photon energy. The unit introduces an amplifier and the concept of amplification. Investigate LEDs as lights. Measure the forward voltage for red, yellow, green, and blue LEDs. Look at the spectrum and polarization of the sun, LEDs, flames, other sources, and of scattered light using different kinds of scattering.

This kit includes all the parts needed to build a Sun Photometer. Grades 9 through College.
840995   H.O.P. Haze Kit .........................................................$29.95

Intro Mechanics: Aircart

The study of motion is motivated in part by the human desire to move things from one place to another. Designing any transportation system requires an understanding of some basic ideas of physics. In this unit you will build an aircart, decide what attributes of the cart are pertinent, and what variables are important for the description of motion. Determining a set of variables and the relationships between them is the primary work of creating a model. A good model can be generalized and extended. With a good model in hand, design work can proceed. What transportation problems could an aircart solve? What are its drawbacks?

This kit includes the parts needed to build a propeller-driven cart and a force/thrust gauge. Recommended for Grades 9 through College.
840996   H.O.P. Aircart Kit .........................................................$23.95

Intro to Sound Waves

These extensions involve measurements of sound intensity. For these sound investigations you will need to build a Sound Level Meter. You will also need a sound source. The tone generator you build in the Core project will serve quite well if you add a speaker. All parts need for extensions are included.

841334   H.O.P. Sound Kit ..........................................................$29.95

Digital Sound Meter

- 35–130dB measurement
- 3 ranges
- 3-1/2 in. digit LCD display
- Fast (200msec.) response
- Over and under range indicator
- Data hold
- Includes owners manual
- Requires 9V battery
- Resolution: 0.1dB
740100 ..........................$199.95

H.O.P. Tool Box

An assortment of tools and supplies for use with the H.O.P. experiments.
840997 .................................................................$125

Find more OPTICS & PRISMS in this chapter on pg. GS21.

Hands-on investigations that help students build sophisticated experiments out of inexpensive parts.
Wood, balsa and foam blanks require shaping with tools and sanding. Kits may require soldering and advanced assembly. Adult supervision required.

- Integrate science, technology, engineering and math skills through hands-on activities.
- Learning by doing, the most effective teaching strategy for addressing Core Curriculum.
- Detailed instructions for teachers and students including student evaluation.
- Created for teachers as well as science and technology specialists.
- Seven to fifteen 45-min. instructional periods depending on grade level and content.
- Labs includes all the specialty tools and materials you need for multiple activities.
- Each lab contains enough materials for a class of thirty students working in teams of two.
- Reusable, as well as replaceable, consumable supplies.

KELVIN® STEM Lab: Motors

- magnet wire
- [45] magnets
- [30] batteries
- [18] motors
- [15] motor car kits
- [15] wood stand
- [3] meters
- [4] long nose pliers
- cool melt glue gun
- glue slugs
- jumper cables

Also, detailed teacher instructions and student response sheets.

842368 .................................. $299

KELVIN® STEM Lab: Advanced Motors

- [30] motor generator kits
- [15] sturg motors
- [5] KELVIN® 50LE multimeters

842376 .................................. $245
KELVIN® STEM Mechanical Tool Pack
The STEM Mechanical Tool Pack includes Awl, Hole Punch, Plastic Ruler, Utility Knife, Scissor, Mini Cool Glue Gun with Slugs, and Safety Edge Cutting Guide.
842312 ........................................................ $29.95

Take a flashlight apart to learn about product structure, circuits, optics and mechanics.

KELVIN® Reverse Engineering: Flashlight Bulk Pack
Reverse engineer an everyday product and discover its designer’s ideas and concepts. The activity includes step by step instructions for the student and teacher along with probing questions that direct the students’ investigation of the product.
Includes: Flashlights, Student Study Guides and a Teacher Resource Guide. *NOTE: Actual project contents are subject to change.
841828 Bulk Pack for 10 ................................. $89.95
As lows $8.99 per student!

KELVIN® Simple Machines Lab
Learn about:
- GEARs: Mechanical advantage, Direction of rotation Multiple gears Gear pitch
- PULLEYS: Multiplying force, Changing direction of force, Multiple pulleys friction belts
- WHEELS: Reducing friction, Circumference and diameter
- LEVERS (First, Second and Third Class): Increase lifting loads, Fulcrum length weight and force
- INCLINED PLANES and WEDGES: Mechanical advantage, Angle and force
Lab includes enough materials for one student to complete experiments for the Simple Machines Lab: Simple Machines Acrylic Experiment Board, Gears Pulleys String, Rubberband, Spring scale Protractor Screws and Instruction Book.
841743 Complete Lab w/ Laser Cut Plastic Work Board................. $32.95
Economy Kit w/Template (NO EXPERIMENT BOARD)
Make your own experiment board out of cardstock.
841752 ................................................................ $19.95 or $17.95 ea./10+
Class Pack without Work Board
282198 .............................................................. $125 or $115 ea./3+

Change rotary motion into linear and reciprocating motion using linkages, cam shafts, cranks and gear trains.

Wood, balsa and foam blanks require shaping with tools and sanding. Kits may require soldering and advanced assembly. Adult supervision required.
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GS18

Wood, balsa and foam blanks require shaping with tools and sanding. Kits may require soldering and advanced assembly. Adult supervision required.

KELVIN® Kel-Wind™ Wind Tunnel
The air intake for this wind tunnel provides smooth laminar air flow, allowing students to accurately measure lift and evaluate their airfoil design with 41 knots of wind speed.

Includes activity manual, airfoil holding fixture, scale package, and built-in, variable DC fan blower motor with speed controller. Chamber measures 18 in. Lx8 in. Wx8 in. H. Overall dimensions are 69 in. L x 26 in. W x 21 in. H. Assembled; durable construction. Optional Kel-Lift & Drag Sensor™, Interface and Software are also available below. Grades 6-College.

840614 Kel-Wind™ II Wind Tunnel ★ Allow $395 for Oversized Shipping .................................................................$4,995

KELVIN® Kel-Lift & Drag Sensor™
Measure the lift and or drag properties of wings, vehicle bodies, boat hulls and other shapes using this simple device. Attach the test item to the sensor rod and turn on the wind tunnel. The unit uses a USB cable (included) to interface with a computer. View, store, graph and compare test data. With modifications, this unit can be retrofitted to wind tunnels other than KELVIN® made. Includes Interface with USB Port, Windows compatible software, digital wind speed meter and USB cable. Requires computer for display. Recommended for Grades 5 and up.

841410 Windows XP-7, USB (Shown Left) ......................................................................................$995

KELVIN® Stand-Alone Kel-Lift & Drag Sensor w/ LCD Display
View the data acquired from each test on the 2-line LCD display. This unit does not have the capability of storing data but can connect to a computer via USB connection. Power supply is included.

841722 (Shown Right) ........................................................................................................$1,250

KELVIN® Kel-Wind™ Wind Tunnel Complete Package
Package includes:
• Kel-Wind™ Wind Tunnel
• Kel-Lift & Drag Sensor
• Computer with display
• Pre-Loaded Software for Lift & Drag Interface

841697 ★ ..........................$6,795
★ Allow $395 for Oversized Shipping.

An economical choice for your lab!
**KELVIN® EDUCATIONAL**

**KELVIN® Flight Dynamic Wind Tunnel**
Features absolutely straight air flow which is ideal for showing air currents. The wind speed can reach over 30 mph. A large window allows for easy viewing. This wind tunnel includes an air indicator, objects for testing and instructions. Wind tunnel is 56 x 18 in. with a test chamber 6 x 12 in.

841786 ★ Allow Shipping Charges Apply

**OPTIONAL ITEMS:**
- **Scale Sensor**
  Measure drag on a car placed in the wind tunnel. Package includes scale, test tray and all necessary accessories. Shown with #841786 (sold separately)
  841787 .................................................................$250

**KELVIN® Kel-Thruster™ Propeller Tester with Computer Interface**
Includes a rugged force sensor, a motor, computer interface with USB connection, motor power supply, assorted propellers plus software and instructions. Attach a propeller with a 2mm hole, turn the motor on and read your propeller’s thrust on the computer screen. Requires variable speed power supply.

841601 Windows XP+, USB ..............................................$495
841051 Variable DC Power Supply ....................................$125

**KELVIN® Kel-Thruster™ Propeller Tester with Digital Scale**
The Kel-Thruster™ can be used for testing the thrust capabilities of toy propellers. You simply attach a propeller with a 2mm hole, zero the scale and turn on the motor. Thrust readings can be in grams or ounces. The Kel-Thruster™ can be used to test commercial or student made propellers.

841610 (See pg. GS16 for a des.) ..........................................$995

**Fog Maker**
Demonstrate how air flows in wind tunnels and explore aerodynamics.

280569 .................................................................$149.95
280570 Liquid Fog, Gallon .............................................$39.95

**KELVIN® Power Generator Station**

840859 .................................................................$125

**Wood, balsa and foam blanks require shaping with tools and sanding. Kits may require soldering and advanced assembly. Adult supervision required.**

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COMMUNICATING WITH LIGHT

In this pilot module, Communicating with Light: From Smoke Signals to Fiber Optics, students become familiar with the elements of communications systems as well as with basic electronics, coding schemes, and the properties of light. Students master a limited number of powerful technology and science concepts, sense the excitement and challenge of technology, and develop critical thinking and reasoning skills that can be transferred to all disciplines. This instructive modular lab, supplemented with electronic, electro-optical, electrical and mechanical components, is recommended for grades 6-10 science and technology classes.

The key components are five electronic circuit boards (or modules) which accompany the written material. Modules 1 and 2 are very simple; Modules 3 and 4 are more advanced. The five Assembled Modules include: Light Sensor Module, Light-Emitting Diode (LED) Module, Voltage to Frequency Converter Module, Audio Modulator Module and Amplifier Module.

The written material, approximately 178 pages in length, describes a number of activities addressing light communication technology. Starting with simple low-technology flashing light communication systems and codes, students progress through voice-modulated signals employing optical fiber.

Technical topics covered include: signal codes, properties of light, transducers and simple circuitry. Sensory feedback is provided throughout the experiments with flashing lights, attractive colors, vibrating transducers, and interesting sounds.

This modular lab includes: (5) Assembled Modules, Lab Manual, Batteries, Fiber Cable, Light Bulbs, Speakers, Hookup Wire, Alligator Clips, and Plastic Parts for Light Devices. Other material will need to be supplied by the teacher in order to conduct activities (such as a c-clamp, milk, water, ruler, etc.). Grades 6-10 science and technology classes.

841284 Project ComTech™ Modular Lab .................................................................................................................. $195
841306 Project ComTech™ Class Pack of 4 Sets ........................................................................................................ $775
651567 Project ComTech™ Lab Manual .................................................................................................................. $29.95

Reflection, Refraction and Diffraction Kit

The hands-on experiments in this kit reveal the mystery of how light travels. Includes instructions for reflecting and refracting lights, including light theories. A variety of translucent opaque objects and a teacher’s guide are also included. Grades 4-8.

360008 Kit ................................................................................................................................................................. $145

Basic Spectroscope

An excellent hand held spectroscope for viewing the spectra of many different light sources. Durable construction with compound prism and converging high quality glass lenses

550124 Basic Spectroscope ................................................................................................................................. $39.95

Mind’s Eye Kit

Find your blind spot and watch things disappear. Use the special glasses to detect the errors in a counterfeit bill. Spot the blood vessels in your eye. Make a curved line look straight. Turn cardboard transparent. See the world shrink. Make white by mixing red, green and blue, and see colors in black and white! Learn how your eye and brain work together to perceive color, light, depth, perspective, size, shape and motion.


283045 Kit ........................................................................................................................................................ $75

Optics Discovery Class Kit


790053 Class Kit for Grades 6-9 ......................................................................................................................... $395

Optical Systems Sample Pack

Includes designs for a magnifier, periscope, kaleidoscope, and fiber optics link for signaling and control. The pack comes with fiber optic cable, lenses, mirror material, phototransistors, filament bulbs.

281708 Sample Pack ........................................................................................................................................ $115

GS20 Wood, balsa and foam blanks require shaping with tools and sanding. Kits may require soldering and advanced assembly. Adult supervision required.

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Lenses

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Prisms

For experiments in diffraction, dispersion, and spectrum.

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<td>Equilateral</td>
<td>B</td>
<td>Glass</td>
<td>27 x 150</td>
<td>7.95</td>
</tr>
<tr>
<td>550087</td>
<td>Equilateral</td>
<td>B</td>
<td>Glass</td>
<td>25 x 25</td>
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<tr>
<td>550088</td>
<td>Equilateral</td>
<td>B</td>
<td>Glass</td>
<td>42 x 32</td>
<td>8.95</td>
</tr>
</tbody>
</table>

Glass Lens Set

Experiment with optics and engineering principles. Set of six lenses includes: double convex, plano-convex, concave-concave, double concave, plano concave, and convex-concave lens.

<table>
<thead>
<tr>
<th>STOCK #</th>
<th>FIG.</th>
<th>MATERIAL</th>
<th>SIZE cm</th>
<th>$ 1-2</th>
<th>$ 3+</th>
</tr>
</thead>
<tbody>
<tr>
<td>550033</td>
<td>Acrylic</td>
<td>38 mm</td>
<td>5 cm</td>
<td>$11.95</td>
<td></td>
</tr>
<tr>
<td>550038</td>
<td>Acrylic</td>
<td>50 mm</td>
<td>5 cm</td>
<td>$12.95</td>
<td></td>
</tr>
<tr>
<td>150007</td>
<td>Acrylic</td>
<td>50 mm</td>
<td>5 cm</td>
<td>$14.95</td>
<td></td>
</tr>
</tbody>
</table>

Lens and Prism Sets

Seven different lenses and prisms for a wide range of optical experiments.

<table>
<thead>
<tr>
<th>STOCK #</th>
<th>FIG.</th>
<th>MATERIAL</th>
<th>SIZE mm</th>
<th>$ 1-2</th>
<th>$ 3+</th>
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<tr>
<td>550094</td>
<td>Acrylic Set</td>
<td>………….</td>
<td>$29.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>550095</td>
<td>Glass Set</td>
<td>………….</td>
<td>$59.95</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Find FIBER OPTICS & HOLOGRAPHY in the COMM. chapter on pgs. C6-11.

Mirrors

<table>
<thead>
<tr>
<th>STOCK #</th>
<th>TYPE</th>
<th>FIG.</th>
<th>MATERIAL</th>
<th>SIZE</th>
<th>$ 1-4</th>
<th>$ 5+</th>
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</thead>
<tbody>
<tr>
<td>550096</td>
<td>Flat</td>
<td>A</td>
<td>Glass</td>
<td>38 mm</td>
<td>.85</td>
<td>.75</td>
</tr>
<tr>
<td>550097</td>
<td>Flat</td>
<td>A</td>
<td>Glass</td>
<td>100 x 100 mm</td>
<td>1.15</td>
<td>.95</td>
</tr>
<tr>
<td>550098</td>
<td>Flat</td>
<td>A</td>
<td>Glass</td>
<td>75 x 75 mm</td>
<td>1.15</td>
<td>.95</td>
</tr>
<tr>
<td>550099</td>
<td>Flat</td>
<td>A</td>
<td>Acrylic</td>
<td>4 x 6 in.</td>
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<td>1.75</td>
</tr>
<tr>
<td>550100</td>
<td>Flat</td>
<td>A</td>
<td>Acrylic</td>
<td>4-1/2 x 3 in.</td>
<td>1.95</td>
<td>1.75</td>
</tr>
<tr>
<td>550101</td>
<td>Flat</td>
<td>A</td>
<td>Acrylic</td>
<td>1-1/2 x 1-1/2 in.</td>
<td>.50</td>
<td>.45</td>
</tr>
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</table>

Refractive Blocks

<table>
<thead>
<tr>
<th>STOCK #</th>
<th>FIG.</th>
<th>SIDES</th>
<th>MATERIAL</th>
<th>SIZE cm</th>
<th>$ 1-2</th>
<th>$ 3+</th>
</tr>
</thead>
<tbody>
<tr>
<td>550090</td>
<td>K</td>
<td>All Clear Glass</td>
<td>75 x 50 x 20</td>
<td>8.95</td>
<td>8.45</td>
<td></td>
</tr>
<tr>
<td>150020</td>
<td>L</td>
<td>1-Side Frosted Acrylic</td>
<td>100 x 75 x 20</td>
<td>14.95</td>
<td>13.95</td>
<td></td>
</tr>
</tbody>
</table>

KELVIN® Build Your Own Optical Bench

<table>
<thead>
<tr>
<th>STOCK #</th>
<th>FIG.</th>
<th>SIDES</th>
<th>MATERIAL</th>
<th>SIZE cm</th>
<th>$ 1-2</th>
<th>$ 3+</th>
</tr>
</thead>
<tbody>
<tr>
<td>550090</td>
<td>K</td>
<td>All Clear Glass</td>
<td>75 x 50 x 20</td>
<td>8.95</td>
<td>8.45</td>
<td></td>
</tr>
<tr>
<td>150020</td>
<td>L</td>
<td>1-Side Frosted Acrylic</td>
<td>100 x 75 x 20</td>
<td>14.95</td>
<td>13.95</td>
<td></td>
</tr>
</tbody>
</table>

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www.kelvin.com • KELVIN® . 280 Adams Blvd. • New York 11735. USA • Coownsht © Kelvin L.P. • Prices in this catalog represent discounted pricing for educational institutions.
Master Set of Zoology Models
Introduce students to animal anatomy with seven dissection models shown in raised relief. Each of these remarkable models is constructed of durable vinyl and illustrates internal structures in graphic detail. All seven of the models are 18 x 24 in. and are accompanied by a 3-ring notebook which includes background information, student basic understandings, activities, a glossary, color transparencies, blackline master and a key to model structures. Gr. 5-12.
360150 Zoology Models ............................................................... $575

Plant and Animal Cell Model Sets
Explore plant and animal cell structures with 8 in. diameter cell models. Includes background info, basic understandings, blackline master, two full-color overhead transparencies, key structure and a glossary. Grades 5-12.
360124 Activity Set ................................................. $145
360125 Plant Cell Model Only ............... $75
360126 Animal Cell Model Only ........... $75

Multi-Use Glass Cage
Features a high strength angle iron frame, durable finish, and screen top with securing clips. It is ideal for small mammals, reptiles and plants. Includes one disposable cage liner.
18 x 10 x 10 in. Glass Cage
360163 ................................................. $165

Aquariums with Glass Covers
6 Gallons, 18 x 10 x 10 in. Aquarium
360151 ................................................. $139.95

10 Gallons, 20 x 12 x 12 in. Aquarium
360152 .................................................. $174.95

Classification of Living Things Lab
Introduction to the Kingdoms of Life through the process of classification. Students will view illustrations of various life forms and use a simple, dichotomous key to determine the appropriate kingdom and phylum of each. In the process, they’ll gather valuable summary information regarding what each life form “does for a living”! Gr. 6-12.
282244 Lab for 40 .............................................. $82.95

Investigating Food Webs with Owl Pellets Lab
Provide your class with an unforgettable, hands-on lesson on ecology and the food chain. Your students will dissect owl pellets to study the skeletal remains of this raptor’s prey and, using a dichotomous key, identify the species consumed. Using their findings, they will construct a food web, compiling a summary of the owl’s diet in order to estimate the diversity of the prey available in the ecosystem. Gr. 7-10.
282256 Lab for 40 ........................ $70.95

Microbe Scavenger Hunt Lab
Hunt for various kinds of microorganisms— including bacteria, fungi and protists— in water, air, soil and even food, employing a ready-to-use growth media. The specially formulated gel, which requires no autoclaving or special equipment, makes it easy for students to design experiments that explore the subvisible world around them, collecting and identifying a wide variety of microbes. This investigation also includes a dichotomous key to molds, bacteria, and protists; a specially formulated dried Microlife Mix that allows you to explore the diversity of pond organisms; and a guide to appropriate viewing techniques. For grades 7-10.
282258 Lab for 40 .................................................. $75
282259 Refill for Add’l Classes .................. $49.95

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GS23

Leaf Structure Model
Durable, plastic 45X model of a lima bean leaf with detail of the transverse and longitudinal sections. The mesophyll includes palisade parenchyma and spongy parenchyma. Surfaces are shown with stomas and guard cells and additional detail of the xylem, phloem, and vascular veins. Includes a key.
360216 .................................................... $49.95

Monocotyledon Stem Model
Modeled after a corn stem to show the general anatomy of a monocot in longitudinal and cross section. Features such as cuticle layer, epidermis, closed vascular bundles, paren-chymatous tissue, and several others are nicely shown. Includes a detailed key. 16x16.5x5 in.
360214 .................................................... $49.95

Germination Model Activity Set
3-D monocot and dicot plant germination is shown on this markable 24 x 18 in. model. Activities support hands-on learning of seed development. Includes Teacher’s Guide with full-color overhead transparency, blackline master, student activities, key and glossary. Grades 5-12.
360129 Germination Set .................................. $115

Applications of Biotechnology to Medicine Concept Set
This module introduces some of the concepts of biotechnology and their applications to modern medicine. Activities and laboratory experiments cover topics which include the study of bacterial infections, the genetic basis of disease, as well as initial screening tests for viral infections, such as HIV. Other topics included in the module focus on gene therapy and the Human Genome Project.
860047 ........................................ $145

Perfume Science
The science, history and art of making perfumes, including the biology, chemistry and techniques behind fragrance design. Includes a complete perfumer’s laboratory with 8 high-quality perfume oils, decorative flacons (small bottles) for storing your perfume creations and important tools of the trade. Ages 10 and up.
283441 .................................................... $59.95

Food Biotechnology Concept Set
Experiments examine microbes and their role in food preservation or spoilage. It also explores the use of foods as science tools to determine the acidic or basic nature of various household items. Activities involving the extraction of DNA from onions and other vegetable or fruit sources are also included, as well as a look at some of the bioethical issues surrounding the use of biotechnology in the production of food.
860036 .................................................... $159.95

Dicotyledon Stem Model
Modeled after a sunflower. Shows the epidermis, cork layer, phloem region, cambium, xylem region, pith, and other vital structures. This model displays anatomy in cross, radial, and tangential sections. Includes a detailed key. 13.5 x 7 x 6 in.
360215 .................................................... $49.95

Plant Cell Model
This model displays the three essential parts of a plant cell: the cell wall, cytoplasm, and the nucleus. Also shows the nature and position of the vacuole and nucleus. Includes a key. 12.5 x 4.5 x 1.5 in.
360217 .................................................... $39.95

Root-Stem-Leaf Model Activity Set
3D model shows structures within a seed-bearing woody plant. Illustrates plant anatomy using cross, traverse and longitudinal sections. Includes 24 x 18 in.W model, activity guide, transparency.
360127 Root-Stem-Leaf Activity Set ................. $99.95

Leaf Structure Model
Durable, plastic 45X model of a lima bean leaf with detail of the transverse and longitudinal sections. The mesophyll includes palisade parenchyma and spongy parenchyma. Surfaces are shown with stomas and guard cells and additional detail of the xylem, phloem, and vascular veins. Includes a key.
360216 .................................................... $49.95
Growing plants without using soil seems impossible but it is becoming necessary to feed a growing world population that has limited land use, limited sunlight and extreme weather conditions (such as the deserts and poles).

Control inputs of light, water and nutrients so that the output is a healthy, fresh crop. Students use problem-solving to determine best conditions for growing plants. Includes pallets, bucket, lettuce seeds, plant food and instructions. Does not include workstation table shown. Some assembly will be required. Grades 4-12.

840691 Class Hydroponics System™ .................... $375
650688 Hydroponics Booklet, 24 pgs ................ $5.95

Grow Plants Without Soil!

KELVIN® Moisture Sensing Device

Moisture sensors are placed in each bucket. It works by activating the pump which draws water from the lower (drain) bucket when it is nearly full and transferring water to the upper bucket. The sensor in the upper bucket turns the unit off in the event that it has become too full.

841788 Moisture Sensing Device ...................... $195
450074 Pump .................................................. $95

Soy Biodiesel Chemistry Kit


283502 Kit .......................................................... $369

NOTE: Liquid chemicals needed are not included but can be found in your school’s chemistry lab. You may use vegetable oil to make diesel fuel.

Plant Life Cycle Lab

Students will plant seeds and follow the life cycle of a plant to study the stages of seed germination, seedling development and plant growth. Additionally, your class will study the anatomy of the plant embryo, root and stem. Further investigations will allow your students to explore the effects of light, temperature, pH and environmental pollutants on seed germination and seedling development. Grades 7-10.

282260 Lab for 40 ................................................ $49.95

Seed Germination and Plant Growth Kit


360130 Kit - Gr. 3-8 .............................................. $34.95
360131 Class Pack for 20 Students ................... $79.95

Environmental Ecology Kit

Students observe the effects of three doses of gamma irradiation on seeds and compare with control seeds. The effects of ionizing radiation can be seen within 48 hours and the experiment can be completed within 2 weeks. Kit contains enough material for 30 students working individually, comprehensive Teacher’s Guide and reproducible student worksheets. Grades 6-12.

360036 Kit ...................................................... $79.95
360037 Irradiated Seeds Refill ......................... $35.95

Plant Systematics

Taxonomy and systematics are included in most biology and botany courses but are not generally supported by activities. Use this kit to explore those concepts.

Includes: complete instructions, Mixed Seeds of many types, Seeds from six taxa of related plants, Fertilizer, Pots for Planting, Potting Medium for Planting, Magnifying Glasses, Plastic beakers and trays, Plant stakes (toothpicks), and Labels. Some components require refrigerator storage.

860040 For 10 Groups ........................................ $70

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860040 For 10 Groups ........................................ $70

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283502 Kit .......................................................... $369

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KELVIN® EDUCATIONAL

Wide Range pH Test Papers
A vial of approximately 100 wide-range pH papers that includes a color comparison chart to accurately read the pH factor on a scale from 1 to 14.

Lettuce Seeds
1 Year Supply. Actual seeds may vary.

Roots & Cutting Concentrate

20-6-16 Plant Nutrient
1 lb. Actual brand may vary

Grow Light Fixture
340134, $39.95

Hydroponic Timer
Automate the watering schedule of your greenhouse.

Box Fan
Use to circulate air in the growing environment to maintain constant humidity and temperature.

Rockwool Growing Medium
Rockwool is a natural stone wool product made with melted diabase rock. It can hold large amounts of nutrient solution and air for the best growth. Does not decompose.

Leach Tray
This heavy-duty plastic tray is ideal for holding growing medium such as rockwool cubes or slabs. Includes drainage elbows.

Rockwool

20-6-16 Plant Nutrient
1 lb. Actual brand may vary

Fertilizer Analyzer
Measures nitrogen, phosphorous, and potash.

Moisture and Light Analyzer
Measures water and light level.

pH Analyzer
Determines the acid and alkaline composition.

Soil Analyzers

KELVIN® Hydroponics Engineering Mini Lab
Students learn the basics of hydroponics by designing and building their own growing unit as well as maintaining a classroom growing system. This lab includes enough materials for three classes to design their own hydroponic system.

Includes:
- drip emitters
- tubing
- flow valves
- wicking material
- seed starters
- starting trays with hoods
- growing medium
- nutrients
- seeds
- lamp
- instructions

This lab also includes materials to build three raft style classroom growing units.

A
B
C
D
E
F
G
H

450075 .................................................. $19.95

160012 [A] ................................................ $12.95

160002 [B] 16 oz ....................................... $19.95

160011 [C] ................................................ $27.95

160005 [D] 1.5 in. Cubes, 98/pkg .................. $13.95

160010 6 x 3 36 in., 16/pkg ........................ $99.95

160013 [E] 4pkg. ...................................... $27.95

160002 [B] 16 oz ....................................... $19.95

841681 ELM, MS, HS .................................. $795

$1.95

$36.95

$34.95

$34.95

A
B
C
D
E
F
G
H

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**KELVIN® Investigation Groundwater Pollution Lab**
The content of this lab is devoted to the study of groundwater and aquifers as a resource for domestic water. Students will take part in five activities that explore soil science, surface contamination of water, purifying raw water, measuring particulate, and modeling groundwater and aquifers. The lab includes detailed student resource materials and a teacher’s guide.

282231 Lab ................................................................. $99.95

**KELVIN® Oil Spill Cleanup Activity Lab**
The tragic events taking place in the Gulf of Mexico the last few months will have both environmental and economic impacts that will last for years. Introduce your students to the technologies and terminology that have become part of the media coverage and our everyday language: skimming, absorbents, dispersants, separation and biological agents.

The new KELVIN® Oil Spill Cleanup Activity Lab provides a series of activities and design challenges focused on environmental cleanups resulting from oil spillage. Students will conduct a variety of experiments using the above techniques, use actual oil spill remediation processes, make observations, gather data and make decisions regarding the appropriateness of each process. Students will then use this information to help design their own cleanup remediation materials and processes.

Lab includes oil absorbent matting material, biological oil absorbing materials, absorbing powder, dispersants, instructions and much more. Each kit provides enough materials for a class of 20 students.

282232 Lab ................................................................. $99.95

**KELVIN® Exploring Water, Soil & Air Lab**
Ecology is the study of our natural environments and the interdependency of each of its parts. Air, water, soil, plants, animals and living organisms combine to create the ecosystem we live in. The KELVIN® Ecology Lab provides information and hands-on activities for students that will help them learn about this fragile relationship. The lab is divided into five activities each focusing on a different aspect of ecology. Students will explore: Hard/Soft Water, Pollution of Ground Water Systems, Acid Rain, Water PH, Soil Nutrients and Particulate in the Air.

281910 .............................................................................................. $99.95

**Detection of Pollution in Seawater**
The toxicological effect of pollution in seawater is determined by using Artemia franciscana in this experiment which has been adapted from a water quality test. A simulated “toxicant” is provided to simulate pollution.

Experiment includes: complete instructions, Artemia Franciscana Diapause Cysts, Artificial Sea Salt for Culture, Fluorescent Detection Substrate, Simulated Toxicant Concentrate, 1 molded Exposure Chamber (note: 10 required), 10 Wide bore Plastic Pipets, 10 Calibrated Plastic Pipets, and 15 ml tube.

860044 For 10 Groups ................................................................. $90

**Quality of Water Test Kit**
Conduct qualitative tests on samples of water from various sources and identify pH, dissolved oxygen, odor, color, turbidity and coliform bacteria. Enough materials are included to complete these six water quality tests. Students also learn to distinguish between ground, surface, drinking and waste water. Teacher’s Guide and reproducible student worksheet included. Grades 6-12. MSDS included.

360038 .............................................................................................. $79.95

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KELVIN® Educational

Air Pollution Kit
Using a controlled environment and a common air pollutant, students observe the direct effect sulfur dioxide has on plants. Squash and marigold plants are germinated and then placed in an SO2 saturated environment where growth is monitored and recorded.

Kit includes a special glove bag to be used as an environmental chamber and all materials needed for a classroom demonstration. Teacher’s Guide and reproducible student worksheets are also included.

Grades 6-12.

360039 Air Pollution Kit............................ $79.95
360040 Air Pollution Consumables.............. $29.95

Water Treatment Activity Model
Model a sewage treatment plant. Graphically demonstrate the key concepts of water treatment. Your class will get a firsthand view of the physical, chemical and biological processes comprising sewage remediation. They’ll build their own water treatment plant, complete with filtration, aeration and bioremediation capabilities.

The durable plastic model is accompanied by everything needed to test and treat water, including filter paper, simulated pollutants, bioremediation agents, air pump and test materials. Also includes a comprehensive student’s and teacher’s guides. Enough for 40 Students.

282196 Water Treatment Model .................. $245
282197 Refill for Additional Classes ............ $41.95

Investigating Water Pollutants
and Water Analysis Lab
Using safe, easy-to-use chemical tests, students analyze the water samples provided or local water samples for a variety of common pollutants including chlorine, copper, hardness, dissolved oxygen, nitrogen, phosphate and pH. Your class will also learn how to quantify the concentration of pollutants and determine the pollution level that poses a danger to wildlife and man. Grades 7-10.

282230 Class Pack for 40............................ $79.95

KELVIN® Waste Management and Recycling Lab
Learn about the environment and damage that results from poor management of discarded waste products. This lab also focuses on some of the important things that people can do every day to protect the environment.

These programs are important for several reasons. Recycling reduces the amount of trash taken to a landfill or burned. Recovered materials can be made into new materials and finished products. Recycled newspaper can be made into cardboard and recycled plastic bottles can be made into new containers & even clothing. Recycling saves energy. It takes much less energy to produce aluminum, paper and glass products from recycled materials than it does from raw materials.

Lab includes:
- Water Quality Kit
- Cleaning Up Oil Spills Kit
- Exploring Groundwater Contamination Kit
- Ecology Book
- Waste Away Document
- Technology: Science and Math in Action, Book Two
- Creative Recycling Materials
- Thermometer
- White Glue
- Blender
- Bowl
- Spoon
- Measuring Cup
- 12 in. Square Screen
- Rolling Pin
- Workstation Sign

841688 Waste Management and Recycling Lab................................. $495

Exploring Groundwater Contamination Lab
Construct mini-ground water simulation models showing the movement of a simulated, colored pollutant. Determine under what conditions contamination occurs from a variety of sources such as spills, farms, and buried tanks and how polluted ground water eventually reaches the drinking water supply. In the process, students learn about the water cycle, water quality, ppm and ppb pollutant contamination, porosity of soils, and other related concepts. Grades 6-10.

282231 Class Pack for 40............................ $99.95

How Clean Is the Water We Drink
& the Air We Breathe?
Learn about the microbes that are present in everyday environments. Bacterial concentrations referred to as the bacterial counts vary depending on the source of water or air. As an independent inquiry-based study, students will test and compare bacterial counts from various air and water sources. Includes:
- complete instructions, ReadyPour® Agar, Petri Plates, 10 ml Pipets, 1 ml Pipets and Sterile Water.

280633 For 10 Groups................................. $99.95

Lead in Water Test Kit
A complete lead test system to screen for lead in potable water. This kit contains all of the materials required to provide and easy to use, sensitive and specific test for lead at 15ppb or greater.

280138 Single Test................................. $19.95

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The Biology & Chemistry of Soil Lab
While your students will quickly recognize some forms of subterranean life such as plants, fungi and earthworms, they will be amazed by the diversity of microlife which inhabits the tiny air spaces between soil particles. The class will explore the relationship between the environmental conditions of the soil (such as moisture, acidity, and alkalinity) and the existing microbial population. Using a Berlese apparatus which they construct, the students will also extract and identify various, small arthropods present. Grades 7-10.
282229 Class Pack for 40............................$102.95

Rock Formation & ID Lab
What is a rock? What is the rock cycle? How do rocks form? How are they classified? Your students will answer these essential questions as they conduct a series of hands-on activities. Using the set of rock specimens included, they will observe the distinct characteristics of each type of rock and explore the igneous, sedimentary and metamorphic processes of rock formation.
282228 Class Pack for 40............................$92.95

Washington School Fossil Collection
Includes specimens such as rock-forming minerals, ore-forming minerals, industrial minerals and igneous, sedimentary & metamorphic rocks. [40] specimens, 2 x 1-1/2 in. Comes in a compartmented container. Suitable for Grades 5-12.
360089 ..................................................$44.95
W.S. Fossil Collection Companion
[40] unlabeled chips in a zip-lock storage bag.
360090 ..................................................$6.45

Investigating The Rock Cycle
A graphic representation of how the major families of rocks form the dynamic process called the rock cycle. Igneous, sedimentary and metamorphic rock specimens are mounted on this enlarged 18 x 24 in. multi-color chart that comes complete with a wood frame.
360091 Grades 6-12 ......................................$145
Additional Student Charts and Rock Samples
360092 10/pkg. ..........................................$34.95

Crystal Pro Kit
Budding scientists and mineralogists can learn about the structure and geometry of crystals by growing their own large, beautiful specimens with complex shapes and spectacular colors. Grow deep blue rhomboids, brilliantly clear prisms and pale violet octahedrons. Contemplate the natural order of the universe as you discover why crystals form and how atoms fit together to make these ultra-organized structures. Build a balance scale to take measurements like real research scientists.
283052 Kit ..................................................$69.95

Mineral Hunt Kit
Identify 12 common minerals by observing and testing physical properties. Kit contains 1 lb. bag of mineral chips, forceps, streak plate, magnet and magnifier. 3 rock samples show how rocks are composed of small mineral chips. Includes Teacher's Guide and storage box. Grades 6-12.
360086 Mineral Hunt Kit ..............................$24.95

Fossil Dig
Capture all of the excitement of a fossil dig! Uncover and identity four actual fossils up to 500 million years old. Carefully unearth your discoveries and identify them with the handy eight page guide. Kit includes [2] fossil-bearing clay rocks, excavation tools and a study guide. Grades 4-10.
360073 Fossil Dig ........................................$24.95

GS28 Wood, balsa and foam blanks require shaping with tools and sanding. Kits may require soldering and advanced assembly. Adult supervision required.
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Rock Tumbler & Jewelry Activity

This activity includes:
- Gemstone rocks (8 oz.)
- Coarse grinding powder (Step 1)
- Fine grinding powder (Step 2)
- Polishing powder (Step 3)
- Silver tone necklace chain (18 in. Long)
- Adjustable rings
- Key chains
- Pairs hanging earring wires
- Setting holders in 2 styles
- Jump ring connectors and Glue.

360087 Advanced Fossil Collection $44.95

Density Flow Models

This unique, visually dramatic device lets you simulate numerous Earth processes that involve movement of fluids due to variations in density. The large illuminated glass tank is partitioned, with fluids of different colors and densities in each section. You can also control the temperature of each fluid. When the partitions are removed, students can easily see the interaction and movement of the fluids.

The Density Flow Junior is a scaled down version of the Density Flow and comes with a 55-page manual.

The Density Flow Model includes: Density Flow Tank, CSA-approved Shoplite, (6) medium suction cups, (8) small suction cups, (3) thermometers, metric ruler, battery powered air pump, (4) D-batteries, (2) sections of chain, (2) acrylic partitions, glass flask, (2) plastic beakers, stir stick, red food coloring, bluing solution, (2) wooden stands, rubber stoppers, sea salt, drain hose assemblage, a 24-page teacher’s resource booklet and a reproducible 16-page student booklet. Grades 5-12.

281882 Density Flow Model Jr., 22 in. L x 3-1/2 in. W x 6 in. H ........................................................................ $185
281883 Density Flow Model, 44 in. L x 3-1/2 in. W x 6 in. H ........................................................................ $385

Stream Table Kit

This economical stream table will give your students the chance to create their own landforms and follow the changes in the stream as it ages. This kit includes a plastic tray, drain trough, tray support, siphon tube and a Teacher’s Guide. Can be used indoors or outdoors. Grades 3-12.

360074 Stream Table Kit $74.50
360075 Stream Table Pack of 4 Kits $229.95

Economical Stream Table For Land Form Demos

General Fossil Collection

Selection of 15 fossils to illustrate the major life forms present throughout geologic history. A descriptive key sheet and geologic time chart introduce students to the basic fossils and match the fossil to the era.

360088 Grades 6-12 $24.95

Advanced Fossil Collection

This comprehensive collection of 30 fossils contains demonstration specimens of animal phyla and plants from the Paleozoic, Mesozoic and Cenozoic periods. Complete with a descriptive key sheet and geologic time chart.

360087 Advanced Fossil Collection $44.95

Mineral Formation & ID Lab

Provide your class with a hands-on lesson in the formation and characteristics of minerals. Using the set of specimens provided, students observe the distinct characteristics of minerals and perform a variety of tests to classify them with respect to hardness, streaking, color, luster, specific gravity and reaction to acids. They’ll also grow their own microcrystals to understand how crystals form beneath the earth’s surface and what environmental conditions are required. Grades 7-10.

282226 Class Pack for 40 $114.95
282227 Refill for Additional Classes $21.95

Mineral Identification

Using the set of specimens provided, students observe the distinct characteristics of minerals and perform a variety of tests to classify them with respect to hardness, streaking, color, luster, specific gravity and reaction to acids. They’ll also grow their own microcrystals to understand how crystals form beneath the earth’s surface and what environmental conditions are required. Grades 7-10.

282226 Class Pack for 40 $114.95
282227 Refill for Additional Classes $21.95

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**Vantage Vue Wireless Weather Station**

A compact station that’s easy to install, set up and use. Includes a sleek but tough outdoor sensor array and a distinctive LCD console. Its unique Weather Center function provides additional information on each weather variable. In addition, it is radio-compatible with the Vantage Pro2 weather stations so you can mix-and-match most components.


With the supplied U-bolt, the ISS can be mounted on a pole or rod having an outside diameter ranging from 1 in. to 1.75 in. (25 to 44 mm). Grades 4-12.

280079 ...............................................................$568.95

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**WeatherLink Software**

The WeatherLink data logger stores data until it is transferred to your computer. Create graphs, calculate totals and averages, generate summaries, analyze trends, and more! Data may be exported to most popular database, spreadsheet, and word-processing packages. Store data every 1 to 120 minutes (vary interval); the data logger will store 1 to 120 days worth of data, depending upon the storage interval.

Includes software, WeatherLink data logger with 8’ (2.4m) cable, appropriate adapters and detailed instruction booklet. Requires Perception II, Weather Wizard III, or Weather Monitor II.

120332 WeatherLink 4.0, IBM/Windows .................................................. $237.95
120333 WeatherLink 4.0, Macintosh ........................................................... $199.95

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**Rain Collector**

Self-emptying tipping-bucket design is exceptionally accurate. Used to display daily and accumulated rainfall on Weather Monitor II (plus rate of rainfall on GroWeather, Energy EnvironMonitors, and Health EnvironMonitors). Comes with 40 ft. (12 m) standard cable. Can be user-calibrated for 0.01 in. or 0.2mm.

280080 ..............................................................$108

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**External Temperature/Humidity Sensor**

Measure outside temperature, relative humidity, and dew point. Use with Weather Monitor II (replaces external temperature sensor), GroWeather, Energy EnvironMonitor and Health EnvironMonitor. Includes 40’ (12m) standard cable.

280099 ..............................................................$125

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**Mounting Pole Kit**

Poles and hardware for mounting sensors. Two poles join with connector to make a single 37-1/2 in. (95cm) long pole with 1-5/16 in. diameter.

390428 ...............................................................$41.95

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**Weather Watch Board**

The 35 x 45 in. vacuum-formed board includes 14 study prints that help interpret observable weather conditions. Includes NOAA Weather Radio for up-to-date weather information, Teacher’s Guide. Requires batteries and a local map. Grades 5-12.

360066 ..............................................................$299

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**Weather Kit**

Reusable kit includes background info and technical guidance, supplemental activities, illustrations, equipment and a Teacher's Guide.

360017 ..............................................................$120

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**Water Cycle Model Activity Set**

Make rain in your classroom! Students duplicate the individual processes of the water cycle (evaporation, condensation and precipitation) with this ingenious model. Includes a set of ten 8-1/2 x 11 in. full color study prints. Grades 4-12.

360064 Activity Set .........................................................$95
360065 Model Only ...........................................................$95

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Find Answers to Your Questions About Weather!

Introduction to Weather Lab

Weather study, or meteorology, is a fascinating topic that affects everyone. Students will find the answers to many of their questions about rain, snow and other weather phenomena with this lab.

This start-up package features the Weather Monitor, a computerized data monitor/interface that helps students learn about scientific research and data collection. Hands-on activities include tracking and recording weather data. The Weather Board provides students with a visual record of their weather data. Recommended for Grades 7-12.

Lab includes:
- Weather Monitor II
- WeatherLink Software
- Weather Station Experiment Kit
- Weather Board
- DesignGrid® Paper
- Seasons Software
- Weather & Climate Book
- 39 Easy Meteorology Experiments Book
- Lesson Guide
- Workstation Sign

840785 Lab ................................................................. $1,995
841693 Complete Lab with PC, 17 in. LCD Monitor & Pre-Loaded Software ........................................ $2,995

KELVIN® Weather Station Lab

Measuring and recording local weather data is an important aspect of understanding climate. With the KELVIN® Weather Station young geologists can take weather readings like barometric pressure, wind speed and direction, minimum and maximum temperatures and rainfall. This information can be recorded and analyzed to study weather conditions and, possibly, to predict changes in weather. Students learn about weather instruments, data collection/recording and analysis of data.

Lab includes: Barometer, M in/M ax Thermometer, Wind Vane, Compass, Hand Held Anemometer, Housing and Mount, Data Recording Sheets, and Instructions.

841899 Lab ............................................................................................ $285

Weather Model

Combined with a detailed Teacher’s Guide, this 16 x 12 x 3 in. 3-D model helps students understand weather fronts and other meteorological concepts. Conduct detailed studies of airmass structures, cloud types, precipitation, temperatures, pressure and warm and cold fronts. Direction and speed of fronts can be measured. Grades 4-12.

360054 Weather Model ................................................................. $79.95

Weather Meter

This instrument includes six instruments in one! Includes a rain gauge, wind direction indicator, wind chill chart, total rain indicator and thermometer.

150013 ................................................................. $12.95 or $12.30 ea./3+

The Weather Machine: Build Your Own Weather Sensing Activities

Combining electronics and meteorology, this workbook gives teachers the unique chance to have their students learn about the weather as they make their own weather tools.

The chapters cover: sensors, circuits, humidity, pressure, temperature, wind direction, wind speed, sunlight, acidity, precipitation, detecting lightning and 9V power supply. Grades 8 and up.

650889 Booklet ................................................................. $9.95

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Investigating Force Kit
Students measure the force of gravity and power with this complete kit! Nine experiments allow students to use the scientific method to understand principles of force, friction, pressure, work and power. Students enjoy relating physical science topics to the world around them. Grades 6-12.
360024 Force Kit .......................................................................................$99.95
360025 Force Workbooks, 10/pkg. .........................................................$32.95

Investigating Force and Motion Kit
Discover the key principles of physical science: force and motion, friction and gravity, action and reaction, work and power. Your Students will explore variable inertia and use the mini-dynamics carts included to study basics of elastic vs. inelastic collisions. Grades 7-10.
282199 Force and Motion Class Kit for 40 ........................................$125

Force Table
Includes dual scale to take readings clockwise or counterclockwise, [4] complete weight sets with hanger, [4] pulleys with clamps, tow set strings to investigate forces, a bubble level to help with set up, and a durable cast iron table. 16 x 15 in.
281691 ..................................................................................................$175

Spring Slinky
Ideal for a variety of projects. 150mm x 75mm.
990222 ..........................$11.95 or $10.95 ea./3+

Air Table Projection
Simulates particle motion such as Brownian motion, motion of gas & liquid molecules, gas diffusion, the isothermal process, scattering of particles, and circular motion. Requires air supply.
710171 ..................................................................................................$199

Wheels and Mechanisms Kit
This kit explores some different possibilities for creating simple pulley, gear, wheel and axle mechanisms and how to increase the efficiency of forces when applied to do work. Includes materials for 12 activities and an 18 page Teacher’s Guide.
360016 Grades 6-9 ...............................................................................$125

Air Track
5 ft. long (150cm)
Ideal for experiments involving linear motion. Includes accessories and a precision-designed, high quality aluminum track. Requires air tank.
710169 Air Track ................................................................................$375

Air Tank
Great for air tracks, air tables, etc. Very quiet operation. Comes with a 1-1/8 in. dia. hose. 110 V AC
710170 Air Tank ....................................................................................$225
**KELVIN® Biometrics & Forensics ID Lab**

Many societies are faced with homeland security and the fear of terror as well as concerns about crime and criminal identification. Today, modern technology can help us identify individuals. It is used at airport entrances, police, military and sensitive facilities (nuclear). The finger printing and face recognition technology as well as DNA and other biometric techniques are used in this growing field. Grades 6-10.

841690 Biometrics & Forensics ID Lab ................................................................. $2,995

**KELVIN® Introduction to Forensic Laser Fingerprinting**

Forensic science enables the police to answer two important questions about a crime: “who did it” and “how was it done?” The activities in this module are designed to introduce students to the basic scientific concepts and methods used by criminalist, the people who investigate crime scenes, and how this information is used to convict criminals in a court of law. The learning experiences in this module will focus on the specialty area of fingerprinting. Using a simulated laser, students will develop and view prints with fluorescent powders, learn about light as a tool for criminalist and investigate the science of light energy.

281688 .................................................................................................................$595

**KELVIN® Biometrics Lab**

Biometrics is the science of gathering and comparing information about an individual’s physical features. These features are unique to each human and can be used for purposes of identification and recognition. Fingerprints, the iris, the human voice and even vein structures are distinctive to each person. Biometrics are now used: in conjunction with time clocks; for national border security; for access to workplaces and for factory machine control.

Using Microsoft®’s Fingerprint Reader, this lab will provide students an opportunity to investigate this fascinating field through hands-on Activities in Finger Printing, Automatic Fingerprint Recognition, Facial Recognition (how it works, what we look for) and Voice Recognition.

Labs include: Fingerprint Reader, Voice Recognition Kit, Electronics Kit (students assemble) and a Digital Camera. The Advanced Lab also includes a Hand-Reading System similar to the ones used at airports and workplaces.

841830 Fingerprint Reader Lab ................................................................. $895
841831 Fingerprint Reader Lab w/ PC, 19 in. Monitor, Pre-Loaded Software ................................................................. $1,295
841832 Handprint Reader/Fingerprint Reader Lab ................................................................. $2,895
841833 Handprint/Fingerprint Lab w/ PC, 19 in. Monitor, Pre-Loaded Software ................................................................. $3,395

**Crime Scene Tape**

Keep nosey people out of crime scenes. Can be tied, stapled or nailed in place to quickly establish a highly visible barrier. Warning repeats every 31 in.

283259 [A] 3 in. W x 1000 ft. Roll.........................$39.95

**Manila Evidence Bags**

Actual evidence envelopes used for the cataloging of evidence and recording Chain of Custody.

283256 [B] 10/pkg. ........................................$7.99

**Crime Scene Template**

Handy 1/4 = 1 in. scale drawing aid with pre-cut templates lets you quickly and accurately record the scene. Template includes cutouts for different rooms, furniture, appliances- even weapons and bodies! Includes a 1/10 = 1 in. scale section. 8-1/2 x 11 in.

283262 ................................................................. $24.95

**Fingerprint Taking Kit**

Accepted by most law enforcement, this kit is ideal for creating an accurate fingerprint record of people. Each kit comes with [25] 8 x 8 in. fingerprint cards printed on 110 lb. stock and a BlackMagic® inkpad.

283260 Kit ................................................................. $49.95
283261 Fingerprint Cards, 25/pkg. ........................................$29.95

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Detective’s Casebook Lab
Develop problem-solving skills while solving a mystery! Junior detectives can hone their crime-solving skills by investigating the mysteries surrounding a fictitious crime scenario. To solve it, they perform hands-on toxicology testing, chromatography, fingerprinting, document analysis & simulated blood typing. Gr. 7-10.

282201 Class Lab for 40 ......................................$73.95

The Mystery of the Bloody Stain
Identify whether or not a stain is “actual” blood by looking for simulated red blood cells under a microscope. Then, solve the crime by performing simulated ABO and Rh typing of the stain as well as of samples from the crime scene and several suspects.

282237 Lab for 40 Students - Gr. 7 to 10 .................$25.95
282238 Refill for Additional Classes ....................$48.95

ABO-Rh Blood Typing
Using actual blood typing procedures, your students will classify four unknown samples of simulated Neo/BLOOD®. The Neo/BLOOD® will realistically simulate agglutination—without the hazards. Learn about Rh incompatibilities and other blood testing techniques, such as blood smearing, blood cell counts and much more! Gr. 7-10.

282239 Lab for 40 ...............................................$55.95
282240 Refill for Add’l Classes ...............................$48.95

What Does DNA Look Like?
Use this kit to visualize spooled DNA. Experiment includes: Chromosomal DNA, Concentrated Buffer, Methylene Blue Plus® Solution, Transfer & Calibrated Transfer Pipets, Spooling Rods, and Plastic Beakers for Spooling. Also includes complete instructions. 860027 For 10 Groups ........................................$59.95
★ Requires Electrophoresis Apparatus (#860105), Thermal Cycler (#860407), Mini Power Pack (#820636), Micropipette (#860114) and Micropipette Tips (#860121 or #860122) - Find at www.kelvin.com.

Extracting DNA Lab
Most of your class may think that it is impossible to see DNA with the naked eye. With a little help, though, they can actually do just that! Your students will use a simple and quick method to isolate DNA and observe its physical characteristics using a variety of sources, including onion, liver, thymus gland, wheat germ and others.

282262 Lab for 40 - Grades 7-10 .........................$65.95

Teaching DNA Kit
Reveal a double strand of DNA and duplicate the gene. Synthesize normal blood, then mutate it to produce sickle-cell blood. Comes with 30 x 40 in. Demo Board, mounting legs and a Teacher’s Guide with detailed lesson plans plus student worksheets. 360146 Kit - Grades 6-12 ..................................$225

PCR-based VNTR Human DNA Typing
Isolate your DNA from cheek cells and perform PCR to fingerprint their DNA at the D1S80 locus. Includes: complete instructions, Primers, PCR bead containing polymerase, 4 dNTPs and buffer, Chelating agent, Tris Buffer, 200 bp Ladder, Control DNA for PCR, PBS (10x), UltraSpec-Agarose® powder, 10x Gel Loading Solution, Electrophoresis buffer (50x), InstaStain™ Ethidium Bromide, and 100 ml Graduated Packaging Cylinder. 860081 For 10 gels - 6 lanes each ..................$135

RT-PCR: A Model for the Molecular Biology of HIV Replication
A specific mRNA provided in this experiment is reverse transcribed to double-stranded DNA. This DNA product is then amplified by PCR. The reaction is a sequential duplication of a DNA fragment or gene by repeated synthesis using a set of two primers, one for each DNA strand. Kit includes: complete instructions, background information, study questions, PCR beads, DNA Template and Primers, DNA Size ladder, Ultrapure water, Wax beads, 10x Gel Loading Solution, UltraSpec-Agarose® powder, Electrophoresis buffer (50x), InstaStain™ Ethidium Bromide, and 100 ml Graduated Packaging Cylinder. 860083 For 6 gels ..............................................$140

A DNA Murder Mystery
Using this reusable kit, the class solves a murder by simulating each step of DNA fingerprinting protocol. Learn the basics of DNA fingerprinting and become familiar with DNA structure and extraction. Students can then draw conclusions based on the results.

282265 Lab for 40 Students - Gr. 7 to 10 .............$159.95

Principles and Practice of Agarose Gel Electrophoresis
Demonstrate the basic procedures of agarose gel electrophoresis, including gel casting, sample application and separation using a selected set of colored dyes. Includes: instructions, Ready-to-load™ Dye Samples, UltraSpec-Agarose® powder, Practice Gel Loading Solution, Concentrated 50x Electrophoresis buffer, 1 ml Pipet, 100 ml Graduated Packaging Cylinder, and Microtipped transfer pipets. 860031 For 10 groups - 6 lanes per gel ..............................................$79.95

The Molecular Biology of DNA Amplification by PCR
In this Polymerase Chain Reaction (PCR) experiment, the reaction is a sequential duplication of a DNA fragment or gene by repeated synthesis using a set of two primers, one for each DNA strand. Kit includes: complete instructions, background information, study questions, PCR beads, DNA Template and Primers, DNA Size ladder, Ultrapure water, Wax beads, 10x Gel Loading Solution, UltraSpec-Agarose® powder, Electrophoresis buffer (50x), InstaStain™ Ethidium Bromide, and 100 ml Graduated Packaging Cylinder. 860081 For 10 gels - 6 lanes each ..................$135

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GENERIC SCIENCE

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GENERIC SCIENCE

**Wood, balsa and foam blanks require shaping with tools and sanding. Kits may require soldering and advanced assembly. Adult supervision required.**

**Why Do People Look Different?**

Students explore basic principles of molecular genetics by using color dyes which represent the simulated genetic traits. This experiment includes Ready-to-load™ Dye Samples, UltraSpec-Agarose™ powder, Practice Gel Loading Solution, Concentrated 50x Electrophoresis buffer, 1 ml Pipet, 100 ml Graduated Packaging Cylinder, 10 and Micropipette transfer pipettes and instructions.

280629  For 10 groups - 6 lanes per gel  $75

**What Size Are Your Genes?**

Predict the size of unknown molecules based on a set of standard dye markers. Experiment includes: complete instructions, Ready-to-load™ Dye Samples, UltraSpec-Agarose™ powder, Practice Gel Loading Solution, Concentrated 50x Electrophoresis buffer, 1 ml Pipet, 100 ml Graduated Packaging Cylinder, and Microtipped transfer pipettes.

860032  For 10 groups - 6 lanes per gel  $75

**Diagram:**

- **Gene of Fortune Game**
  - This novel set of "Bingo" games is an excellent resource which can be used to introduce concepts of the genetic code. Two types of games, which can be played over several class periods, use a Gene Wheel™ and colorful game chips. Concepts highlighted include the genetic code, single and three letter amino acid abbreviations, as well as the characteristics of amino acids.

860030  Genetic Dice™ Game  $79.95

**Diagram:**

- **DNA Model Kit**
  - Build a segment of the DNA consisting of Adenine, Thymine, Cytosine and Guanine. Different color-coded pieces designate certain modules making up the four nucleotides present in DNA. Kit includes 12 packets of model parts, each with enough material to construct a segment of 6-paired bases. Instructions and reproducible student worksheets are also included. Gr. 7-12.

360149  Teaching Genetics Kit  $225

860103  22 Layer DNA Model Kit  $149

860104  Ten DNA Base Pairs, A/T & G/C  $44.95

860142  DNA Model Mini Pack of 12  $22.95

860149  DNA Model Kit  $225

860079  For up to 30 spoolings  $59.95

860080  For 8 Groups  $44.95

860081  For 5 Groups  $59.95

**Diagram:**

- **Do Onions Have DNA?**
  - Introduce to the structure and characteristics of DNA by first constructing a DNA model and then a teacher demonstration of spooling chromosomal DNA out of solution. Students will participate in extracting DNA from fresh onion tissue. Includes: complete instructions, DNA Extraction Buffer, DNA Sample in Capped Test Tube, Transfer pipets, MiniLinks, Glass Rod, DNA spooling rods, Test tubes, and Salt.

280631  For 5 Groups  $44.95

**Diagram:**

- **DNA Models**
  - Basic 3D DNA Activity Model
    - Easy to assemble. Color-coded plastic parts feature specially shaped ends to ensure proper base pair alignment and can be unzipped to demonstrate DNA replication. Includes illustrated student and teacher guides. Model also includes a sturdy, metal base for easy rotation and classroom display. 19 x 7 1/2 in.

282264  DNA Models  $75.95

860102  DNA Models  $75.95

860103  22 Layer DNA Model Kit  $149

860105  DNA Models  $75.95

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**DNA-Based Screening for Smallpox BioDefense**

A bioterrorism scenario is presented with students examining a simulated DNA fingerprinting test for the detection of smallpox. Experiment includes: complete instructions, Ready-to-load® Predigested DNA samples, UltraSpec-Agarose® powder, Practice Gel Loading Solution, Electrophoresis buffer (50x), 1 ml Pipet, 100 ml Graduated Cylinder, Microtipped transfer pipets, InstaStain™ Methylene Blue. This experiment does NOT contain smallpox.

860089 For 6 Groups $99.95

**BioDefense Against Anthrax: The Biology of Bacterial Sporulation**

In this experiment, students grow a related harmless laboratory non-pathogenic bacterium in the Bacillus family to investigate the conditions that allow the bacterium to sporulate and germinate. Experiment includes: Background information with complete instructions, Bacterial culture media and reagents, Microbiological-staining dyes, Sterile loop for plating bacteria, Petri plates, Transfer pipets, Microscope slides with coverslips. This experiment does NOT contain Anthrax.

860090 For 6 Groups $115

**What is an Epidemic & How Does An Infection Spread?**

Solutions demonstrate how an infection is spread in a population through contact with simulated body fluids. Students also develop skills for accurately transferring solutions using pipets. Experiment includes: instructions, HCl Solution, NaOH, Color Indicator, Test Tubes and caps, and Transfer pipets.

860045 For 10 Groups $61.95

**Transformation of E. Coli with Fluorescent Proteins**

In this experiment, transformed cells are selected based on antibiotic resistance. The colonies which express gfp or bfp protein are visibly green and pale blue, and will fluoresce when exposed to long wave UV light commonly known as black light.

Each experiment includes enough supplies for ten transformations including: instructions, Transformation Cells, Plasmid DNA, IPTG, Ampicillin Antibiotic, Calcium Chloride, ReadyPour™ Luria Broth Agar, Luria Broth Media for Recovery, Petri plates, 60 mm and 100 mm, Wrapped 10 ml Pipets, Sterile Calibrated Transfer Pipets, Sterile Inoculating Loops, Micotest tubes with attached caps, and Toothpicks.

860085 With Green (gfp) Proteins $99.95

860084 With Green (gfp) & Blue (bfp) Proteins $110

**Detection of Mad Cow Disease**

Bovine spongiform encephalopathy (BSE), better known as mad cow disease, is a neurodegenerative, fatal condition in cattle that can devastate the beef industry. In this experiment, students examine simulated PCR products from several feed mills, to determine any possible violations of the 1997 ban.

The experiment includes: complete instructions, Ready-to-load® Predigested DNA samples, UltraSpec-Agarose® powder, Practice Gel Loading Solution, Electrophoresis buffer (50x), 1 ml Pipet, 100 ml Graduated Cylinder, Microtipped transfer pipets, InstaStain™ Methylene Blue and Methylene Blue Plus, and InstaStain™ Ethidium Bromide.

860077 For 6 gels - 6 lanes each $99.95

860078 For 12 gels - 6 lanes each $135

**Vaccination Readiness for Biological Warfare**

Determine the impact and potential risks of vaccination and vaccination boosters for protection against infectious agents. Experiment includes: instructions, background info, study questions, Serum from Simulated vaccinated individual, Serum from Simulated unvaccinated individual with booster, Serum from Simulated unvaccinated individual, Substrate Solution, Phosphate Buffered Saline, Blocking Agent, Stop Solution, Microtiter plates, Transfer pipets, microtubes and plastic tubes (15 ml & 50 ml).

860091 For 10 Groups $125

**Detection of Simulated Infectious Agents as a Biological Weapon**

Students transmit and document a simulated infectious agent (a chemical dye) between classmates. The simulated infectious agent is only visible under a UV light. Experiment includes: instructions, reagents for simulating an infectious agent (fluorescent dye indicator and negative sample), test tubes/caps, transfer pipets, a long UV mini-light, gloves, petroleum jelly and cotton swabs.

860092 For 10 Groups $99.95

**Antigen-Antibody Interaction: The Ouchterlony Procedure**

Introduce the principles of antigen-antibody interactions by using the Ouchterlony procedure. This binding interaction results in the formation of a white precipitate after diffusion in agarose.

Experiment includes: Animal Serum Antigens and Antibodies, Practice Gel Loading Solution, UltraSpec-Agarose® Powder, Powdered Buffer, Transfer Pipets, Petri Plates, Well Cutters, Template for Cutting Wells, and Microtubes. Also includes instructions, background information, and study questions.

860088 For 10 Sets of Reactions $125

**How Does a Doctor Test for AIDS?**

A procedure called Enzyme Linked Immunosorbent Assay (ELISA) is used as a screening for HIV infection, which can later develop into AIDS. Students will perform a simulated ELISA test to identify infected patient samples and compare them to control samples. No human blood is used in this experiment.

This experiment includes: complete instructions, HIV Antigens, Negative control, Positive control, Donor 1 Serum, Donor 2 Serum, Secondary Antibody (2° Ab), Substrate, HIV Detection Strips, Small Transfer Pipets, Large Transfer Pipets, and Microtubes.

280632 For 10 Groups $99.95

**Fruitfly Genetics Kit**

Simple activities designed to teach basic fruit fly genetics without using live flies. Drosophila melanogaster is used without the inconvenience of maintaining live fruit fly cultures. Students can perform crosses using plastic pieces printed with features allowing them to observe and simulate sex determination, single factor inheritance, double factor inheritance, sex linkage, dominance and recessiveness. Includes 15 sheets each, with snap-apart features showing male and female, for 4 types of fruit flies. Teacher’s Guide and student instruction master included. Grades 7-12.

360145 KIT $79.95

★ Requires Electrophoresis Apparatus (#860105), Thermal Cycler (#860407), Mini Power Pack (#280636), Micropipette (#860114) and Micropipette Tips (#860102 or #860122) - Find at www.kelvin.com.
**Survey of Protein Diversity**
Demonstrate the separation and electrophoretic profiles of bacterial, plant, serum and milk proteins. Includes instructions, Denatured LyphoProtein Samples, Standard Protein Markers, Tris-Glycine-SDS Buffer, Protein Plus ‘Stain, Protein InstaStain’, Practice Gel Loading Solution, and Transfer Pipets.
860087 For 6 Groups Sharing 3 Gels ★...$89.95

**Molecular Weight Determination of Proteins**
Determine subunit molecular weights using a horizontal electrophoresis apparatus (not included). Includes instructions, Prestained LyphoProtein Samples, Practice Gel Loading Solution, Protein Agarose Powder, Concentrated Electrophoresis Buffer, Protein Plus ‘Stain, SDS Solution, 1 ml Pipet, 100 ml Graduated Cylinder (packaging for samples), 10 M icrotipped Transfer Pipets, and Semi-Log Graph Paper Template.
860086 For 4 Gels - 4 lanes per gel ★...$99.95

**Principles and Practice of Thin Layer Chromatography**
Introduces chromatographic theory and methods of thin layer chromatography. A mixture of dyes are separated on a cellulose-based TLC plate using two different solvent systems. Includes instructions, samples, reagents, solvents, Cellulose Thin Layer Plate, and 5 µl Glass Capillary Pipets.
860042 For 8 Separations .........................$85

**Principles of Gel Filtration Chromatography**
Experiment introduces gel exclusion chromatographic separation of dyes of different colors on the basis of their size and shape. This experiment contains materials for dye separation which include dye sample, elution buffer and plastic disposables. Columns may be rinsed and reused. Experiment includes: complete instructions, Sample Mixture, Chromatography Columns, Dry Matrix for Columns, Concentrated Elution Buffer, Plastic Transfer Pipets, and Plastic Microtest Tubes with Attached Lids.
860041 For 10 Separations .........................$85

**Urinalysis and Disease Id Lab**
Test and observe the physical and chemical characteristics of simulated urine, relating the results to a variety of diseases which can be diagnosed through urinalysis. The kit includes a unique formulation of safe, simulated urine which looks and acts like the real thing.
Students will gain a basic understanding of urinalysis and the important role it plays in the diagnosis of medical disorders as they test the simulated urine for pH, protein, sugar, crystals and simulated blood cells, which can be viewed under a microscope. Grades 7-10.
282243 Lab for 40 .................................$76.95

**Osmosis Simulation Model**
Quick & easy demo provides an understanding of osmosis and how it occurs. Students gain insight into this critical process as water diffuses across a semipermeable membrane from an area of higher to lower concentration. Includes display stand.
6-1/2 in. L x 1-1/2 in. W x 7 in. H.
282263 Model for Grades 6 to 12 ..............$94.95

**Modeling Kidney Function Lab**
Students can construct a model of a kidney using a semipermeable membrane to filter a completely safe solution which simulates blood. The simulated blood solution contains simulated cells which can not cross the semipermeable membrane, remaining in the kidney model. The resulting filtrate resembles urine, which students test for salt and other waste products. The simulated blood cells can also be seen and counted under a microscope—just like real blood!
Grades 7-10.
282241 Lab for 40 .................................$58.95
282242 Refill for Add’l Classes ...................$39.95

★ Requires Electrophoresis Apparatus (#860105), Thermal Cycler (#860407), Mini Power Pack (#280636), Micropipette (#860114) and Micropipette Tips (#860121 or #860122) - Find at www.kelvin.com.

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Lab 1: The Principles and Practice of Diffusion and Osmosis
Materials and dialysis tubing are provided to perform procedures involving diffusion, dialysis, water potential and to determine osmotic potential. Includes complete instructions, background information and study questions, Orange Indicator Dye, Violet Dye, 1 M Sucrose - 1 M NaCl solution, Powdered Sucrose, and Dialysis Tubing.
860048 For 10 Groups $106.95

Lab 1 Replenishers
Orange Indicator Dye, Violet Dye, and Powdered Sucrose, 1 M Sucrose - 1 M NaCl solution.
860049 For 10 Groups $59.95

Lab 2: Principles of Enzyme Catalysis
Perform an enzyme assay and determine rate of enzymatic reaction, explore catalysis, enzyme action and protein structure-function relationships. Includes Instructions, background information study questions, Catalase solution, 1.2% hydrogen peroxide, stabilized, Phosphate buffer, pH 7.2 (20x), Assay reagent, potassium iodide, concentrate, Acidification solution, 0.1 M HCl, Color enhancer, concentrate, Color developer, concentrate, 15 ml plastic tube. Some components need refrigeration upon receipt.
860050 For 10 Groups $99.95

Lab 2 Replenishers
Catalase Solution & Stabilized Hydrogen Peroxide.
860051 For 10 Groups $34.95

Lab 3: Analysis and Determination of Cell Mitosis and DNA Extraction
Mitosis stages are compared to events of mitosis in plants & animal cells. Onion root tips are stained to identify various stages and duration of mitosis. Purified DNA is spooled for visualization. Includes: Instructions, background information w/study questions, Onion DNA Extraction Buffer, Toluidine Blue O Stain, 35mm Onion Root Tip Slide, 35mm Whitefish Blasula Slide, 15ml Conical Test Tubes, and 10x Gel Loading Solution.
860052 For 10 Groups $120

Colored Beads
[5] colored beads (150 each color) that can be designated to represent the Watson-Crick DNA bases (A, T, G, C) and the fifth to represent mutations in DNA.
860054 750 Beads $34.95

Lab 3 Replenishers
Includes Onion DNA Extraction Buffer and Toluidine Blue O Stain.
860053 For 10 Groups $34.95

Lab 4: Plant Pigment Chromatography and Photosynthesis
The chromatographic separation of carotene, xanthophyll and chlorophylls are performed on thin layers. The reformulated solvent systems minimize toxicity. Key reagents are included to demonstrate photosynthesis. Includes: complete instructions, background information and study questions, Chloroplast Extraction Buffer, Reducing Reagent, Chloroplast Dilution Buffer, DCIP, Standard Pigments, Chromatography Solvent, Sarkosyl, Thin Layer Cellulose Chromatography Plate, Microliter Capillary Pipets, 4 Plastic Transfer Pipets, 24 Microtest Tubes, 15 ml Centrifuge Tubes, and Distilled water.
860055 For 10 Groups $99.95

Lab 4 Replenishers
860056 For 10 Groups $79.95

Lab 5: Cell Respiration Kit
Small respirometers are used and O2 consumption is determined by measuring changes in H2O levels in the respirometer using germinating or non-germinating seeds. Includes: complete instructions, background information and study questions, 1 ml Pipets, Glass Beads, Peas, Potassium Hydroxide Solution, Cork Stoppers, Absorbent Cotton, Non-absorbent Cotton, Vials, and Parafilm.
860057 For 10 Groups $79.95

Lab 5 Replenishers
Peas, Potassium Hydroxide Solution, Absorbent Cotton and Non-absorbent Cotton.
860058 For 10 Groups $34.95

Lab 6a: Transformation of E.Coli with pGAL® (Blue Colony)
In using this experiment, the transformants acquire antibiotic resistance and exhibit a blue color due to the incorporation & expression of ß-galactosidase and ampicillin resistance genes. Includes: complete instructions, LyphoCells®, Plasmid DNA, Control Buffer, Induction buffer, Reconstitution Media, Ampicillin Antibiotic, X-Gal in solvent, ReadyPour™ Luria Broth Agar, Luria Broth Media for Recovery, Petri plates, 60 mm, Wrapped 10 ml Pipets, Sterile Calibrated Transfer Pipets, Sterile Inoculating Loops, and Microtest tubes with attached caps. Some components require -20°C freezer storage upon receipt.
860059 For 10 Transformations $125

Lab 6b: Analysis of Eco RI Cleavage Patterns of Lambda DNA
This experiment introduces the use of restriction enzymes as a tool to digest DNA at specific nucleotide sequences. Bacteriophage lambda DNA has a linear structure and 6 Eco RI recognition sites. Separation by agarose gel electrophoresis of an Eco RI digest of lambda DNA will yield 6 bands (5 distinct bands, two are very close in size) corresponding to the DNA fragments. Includes instructions, Ready-to-load™ Predigested DNA samples, UltraSpec-Agarose® powder, plus Practice Gel Loading Solution, Electrophoresis buffer (50x), InstaStain® Methylene Blue, Methylene Blue Plus™, 1 ml Pipet, 100 ml Graduated Cylinder and Microtipped transfer pipets.
860060 For 6 Gels - 3 lanes each $94.95

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Lab 7: The Science of Drosophila Genetics
Drosophila provides a lesson in manipulation of genetic crosses. Students collect data from several generations and compare several crosses.
Experiment includes: complete instructions, background information and study questions, Acetocarmine Stain, EDVOTEK Bugout Solution, Instant Drosophila Growth Media, Drosophila Culture Tubes, Foam Lids, 35 mm Slide - Salivary Gland Chromosome, and Drosophila (Wild type - red eye, Sepia eye, White eye, and Vestigial wing).
860061 For 10 Groups $99.95

Lab 7 Replenishers
Instant Drosophila Growth Media, Drosophila: wild, sepias eye, white eye and vestigial wing.
860062 For 10 Groups $84.95

Drosophila Genotyping Using PCR
In this experiment, students learn about DNA polymorphisms by amplifying DNA regions that vary between various Drosophila. Amplified DNA from wild-type and white-eyed flies are separated by agarose gel electrophoresis and analyzed.
Includes: complete instructions, PCR beads (Taq polymerase, dNTPs, buffer, MgCl2), Primers, DNA extraction buffer, 200 base pair ladder, Proteinase K, Drosophila flies: Wild type, White eye, Vestigial wing, Microtest tubes, UltraSpec-Agarose™ powder, Electrophoresis buffer (50x), 10x Gel loading solution, InstaStain™ Ethidium Bromide, 1 ml pipet, and Microtest tubes. Some components require -20°C freezer storage.
860063 For 10 Groups $175

Lab 10: Physiology of the Circulatory System
Pulse rate and blood pressure under different physiological conditions are measured and correlated to physical fitness. The Q10 of a Daphnia magna can be determined from the relationship between temperature and heart rate.
Experiment includes: complete instructions, background information and study questions, Daphnia magna, Large Bore Transfer Pipets, 9 inch Pasteur Pipets, and Petri Plates.
860072 For 10 Groups $99.95

Lab 8: Population Genetics and Evolution
Application of the Hardy-Weinberg law of genetic equilibrium demonstrates that mutations, genetic drift and natural selection have dramatic effects on gene frequency in a population. Includes: complete instructions, background information and study questions, PTC Taste Paper, and Control Taste Paper.
860069 For 10 Groups $37.95

Lab 9: Principles of Transpiration
The principles of diffusion and osmosis are applied to the movement of water within plants. Emphasis is given to water potential transport and the effect of the plant environment on transpiration.
Experiment includes: complete reagent use instructions, Bush Bean Seeds, Toluidine Blue O Stain, Parawax, Vinyl Tubing, 10 Micrometers, Petri Plates, and Pipets.
860070 For 10 Groups $99.95

Lab 9 Replenishers
Includes Toluidine Blue O Stain, Bush Bean Seeds and parawax.
860071 For 10 Groups $45

Lab 11: Animal Behavior
The objective of this experiment is to introduce students to the concept of distribution of organisms in a resource gradient and to learn the difference between kinesis and taxis.
Experiment includes: complete instructions, background information and study questions, either Pillbugs or Sowbugs (depending upon availability), Drosophila Wild Type, Petri Plates, EDVOTEK BugOut Solution, Culture Tubes, Foam Lids, EDVOTEK Instant Drosophila, and Growth Media.
860073 For 10 Groups $99.95

Lab 12: Dissolved Oxygen and Aquatic Primary Productivity
The experiment measures dissolved oxygen concentration in water samples using the Winkler technique and primary productivity of an ecosystem.
This experiment includes: complete instructions, background information and study questions, Sodium Iodide, Sodium Hydroxide, Manganese Sulfate, Starch Solution, Sodium Thiosulfate, Nitrogen Enrichment Solution Concentrate, and Phosphorous Enrichment Reagents.
860074 For 10 Groups $99.95
Spine Model w/ Nerves
Vertebral column with occipital bone is great to illustrate parts such as: vertebrae with discs, sacrum, coccyx, pelvic bones, spinous and transverse processes, vertebral notch and spinal canal. Shows all nerve branches and a herniated disc. 28 in. high. Includes a detailed key and a heavy cast iron base.
360221 [A] ................................................. $99.95

42cm Skeleton
Shows basic skeletal anatomy and made of unbreakable plastic. The lower jaw is spring-mounted for opening and closing. Arms and legs are moveable and the calvaria is cut and removable. Includes a display stand and detailed key card.
360205 [B] .............................................. $24.95

85cm Skeleton
Demonstrate basic anatomical features of the human skeleton. Carpals and tarsals are fused but the rest of the skeleton has natural movement in the joints. Heavy metal base adds an extra measure of stability while the skeleton is constructed of rugged plastic. Features include unbreakable ribs, stainless steel screws, brackets and springs. Includes detailed key.
360211 [C] ............................................. $44.95

Skull Model
Life size unit shows excellent detail with a removable molar, incisor and canine tooth for study of the tooth roots. Mandible is spring mounted and sectioned calvaria is detachable. Includes detailed key.
360209 [D] ............................................. $49.95

Brain Model
Life-size brain model is an excellent for study of human brain anatomy. Model is dissectible into three parts to show both internal and external structures. Hand painted to bring out many intricate details. Sits on a sturdy base. Detailed key card included.
360219 [E] ............................................. $34.95

Torso System Model
This highly interactive model will allow students to conduct activities on the functions of the:
- Nervous System (registers sensory responses),
- Digestive System (effectively illustrates the passage of food through the body),
- Circulatory System (latex heart can be pumped, forcing fluid through transparent tubes representing blood vessels),
- Urinary Systems (functioning of kidneys, bladder and urethra are demonstrated),
- Respiratory System (demonstrates inhalation and exhalation).
360107 [F] Gr. 3-9 ......................................... $425

Torso Model
Constructed of high-impact plastic, this 28 in. model is perfect for everyday classroom use. The exterior depicts superficial muscular and skeletal features of a young boy. Torso opens to expose respiratory, circulatory, digestive, urinary and nervous systems. Internal organs are removable for closer study.
Set includes 54-page Teacher’s Guide with extensive background information, numerous activities, observation and data sheets. Gr. 3-12.
360104 [G] Torso Model .................................. $295
360105 Torso Model & 4 Model Activity Sets ...... $595

25cm Male Torso
Shows all of a male human's major systems: respiratory, circulatory, nervous and digestive, as well as urinary and musculature systems. The lungs, heart, liver, stomach and intestines are easily removable for further examination. A detailed instruction key is included. Made of durable plastic.
360220 [H] ................................................ $39.95

42cm Male Torso
Illustrates the circulatory, respiratory, digestive, nervous and urinary systems. The right side of the face shows eyeball, teeth and muscle. The head, lungs, liver, stomach, and intestines are removable for detailed study. Mounted on a finished wooden base and includes a detailed key.
360208 [I] ................................................. $99.95

Anatomy Sets with Stands
360224 [J] 8 Pc. Anatomy Set, 10 in. tall ........... $24.95
360223 11 Pc. Anatomy Set, 20 in. tall ............... $99.95

Early Childhood Science Exploration
Explore physical science concepts and encourage creativity investigating scientific ideas such as light, color, magnetism, motion, air, plants and water. Simple experiments will entice the youngest students and encourage group interaction. Grades K-3.
360098 Kit with Teacher’s Guide ...................... $165

Digesto-Rama
This hands-on activity makes learning about the digestive system fun! Contains two plastic replicas of the digestive tract plus an activity guide written especially for kids. Younger students will learn about basic anatomical information, while older students expand on the activities. Grades 3-12.
360106 [K] ................................................ $15.95

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Kidney Model
2X life-size kidney model is sectioned longitudinally to show the renal artery and vein, pyramids, pelvis calyces, cortexes and interlobar vessels. Hand painted to bring out intricate details and made of heavy duty plastic. Includes detailed key card.
360206 ................................................. $29.95

Heart Model
Life sized and dissectable into two parts. It is constructed of heavy duty plastic and shows all of the main arteries and veins. A detailed key is included.
360210 .................................................. $29.95

Oral Hygiene Model
Show the proper technique for brushing teeth and gums. Hinged upper and lower palates simulate the normal opening and closing of the mouth. Includes an oversized (3 in. long) soft bristle toothbrush and a detailed key.
360207 .................................................... $49.95

Teeth Model Activity Set
The composition of teeth is easily illustrated with this three-dimensional model. A side view of upper and lower teeth makes this a “three models in one” teaching tool. The model together with the activity guide and transparency incorporates a series of activities. Ideal for Grades 3-12.
360112 .................................................. $125

Eye Model Activity Set
Illustrates details of the eye with three removable pieces: the body of the eye, the lens and a multi-colored transparent cover which depicts the venation, sclera and cornea. A separate diagram panel also shows components of the retina. Includes 18 x 24 in. model and activity guide. Grades 3-12.
360110 .................................................. $195

Ear Model Activity Set
A unique three-dimensional model of the complete human ear incorporates a removable eardrum, semicircular canals and cochlea. Magnified structures facilitate hands-on learning as they are correlated to full-color overhead transparency with overlay. Includes study guide and transparency. Gr. 3-12.
360113 .................................................. $195

Skin Model Activity Set
Students will understand the importance of skin with this Model Activity Set. A cross-sectional enlargement of the human skin illustrates the skin layers, hair follicles, sweat glands, nerve endings, blood vessels and more. Includes study guide and transparency.
360111 Grades 3-12 ..................................... $125

Exploring Your Senses Kit
Encourage creativity and explore the wonders of human senses. Hands-on experiments with tactile and visual accessories facilitate interaction & make learning fun. Includes a teacher’s guide. Gr. K-3.
360101 Kit .................................................. $199

Heart and Circulation Lab
Add a tactile dimension to anatomical studies. Activity guide includes: a model measuring 24 x 18 in., background information, basic understandings, color transparency, as well as a blackline master.
360097 ................................................. $125

Sight and Sound Lab
Investigate how a lens affects vision, measure field of vision and capture sound waves. Kit contains vision disk, pinhole viewer, lenses, eye chart, masks, flashlight, rubber balls, activities packet and a Teacher’s Guide. Gr. 3-9.
360116 Lab ................................................ $79.95

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## Heart Fitness Lab
Learn about the function of the heart and importance of physical fitness with this lab. By monitoring heart rates, recovery times and collecting data, students measure the effects of exercise and impact of added weight to their heart rate. Lab includes a stethoscope, weight backpack and Teacher’s Packet. Grades 3-9.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Price</th>
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<tr>
<td>360114</td>
<td>Heart Fitness Lab</td>
<td>$99.95</td>
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<tr>
<td>360115</td>
<td>Stethoscope Only</td>
<td>$19.95</td>
</tr>
</tbody>
</table>

## Lung Volume Kit
Lung capacity is a significant indicator of physical fitness. The lung volume kit gives students the opportunity to understand their own physiology more thoroughly. The kit includes 4 durable plastic bags calibrated to 6 liters, mouthpiece and mouthpiece holder. Grades 3-9.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>360118</td>
<td>Lung Volume Kit</td>
<td>$34.95</td>
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<tr>
<td>360120</td>
<td>Set of 4 Mouthpiece Holders</td>
<td>$6.45</td>
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<tr>
<td>360119</td>
<td>Set of 8 Mouthpieces</td>
<td>$6.95</td>
</tr>
<tr>
<td>360121</td>
<td>Set of 4 Bags</td>
<td>$22.95</td>
</tr>
</tbody>
</table>

## Breath Volume Kit
Students measure tidal volume and respiratory minute volume with the plastic bag and mouthpiece. Aids in demonstrating the effects of conditioning. Includes instruction guide. Gr. 3-9.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Price</th>
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<tbody>
<tr>
<td>360122</td>
<td>Breath Volume Kit</td>
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</tr>
</tbody>
</table>

## Effects of Smoking Kit
Kit includes 25 filters, filter holder with durable plexiglas base, aspirator bulb, color chart for quantitative determination of tar content and instructions for 5 complete activities. Cigarettes are not included. Grades 4-12.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
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<tr>
<td>360102</td>
<td>Effects of Smoking Kit</td>
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<tr>
<td>360103</td>
<td>Filter Refill</td>
<td>$22.95</td>
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</tbody>
</table>

## Reaction Timer
This battery-operated digital timer measures reaction time in 100ths of a second. Response switch can be used to measure reactions to light, sound and touch stimuli. For Grades 3-9.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Price</th>
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<tbody>
<tr>
<td>360123</td>
<td>Reaction Timer</td>
<td>$139.95</td>
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</tbody>
</table>

## Grip Tester
Measure physical grip strength and discover the relationship between exercise and muscle development. May be adjusted for different strength levels. Grade 3-9.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Price</th>
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<tbody>
<tr>
<td>360117</td>
<td></td>
<td>$79.95</td>
</tr>
</tbody>
</table>

## Introduction to Fitness Lab
The top-of-the-line home fitness bike includes: 4 Heart Rate Training programs to help you achieve maximum efficiency in your workouts, four custom programs that allow you to design your own workouts, and the challenging Sprint 8 program for a great anaerobic workout. The award-winning bike also comes equipped with our ECB-Plus™ magnetic resistance system, Quiet-Glide™ drive technology, Comfort Arc seat, contact and telemetric heart rate and multi-position handlebars with armrests.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
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<tr>
<td>841769</td>
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**Measurements and Density Kit**
Explore measurement of length, area, volume, temperature and mass using the scientific method of observations and hypothesis.


<table>
<thead>
<tr>
<th>Item Number</th>
<th>Description</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>360026</td>
<td>Measurements &amp; Density Kit</td>
<td>$99.95</td>
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<tr>
<td>360027</td>
<td>Measurement Workbooks, 10/pkg.</td>
<td>$29.95</td>
</tr>
<tr>
<td>360028</td>
<td>Density Workbooks, 10/pkg.</td>
<td>$29.95</td>
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</tbody>
</table>

**KELVIN® Egg Drop Design Challenge™**
In this activity, students apply the principles of physics and engineering by designing and testing a container to protect an egg that is dropped from a given height. Mathematical principles will also be used, incorporated in calculating the efficiency of the unit. Kit includes: cardstock, craft sticks, balsa wood strips, high-density foam, bubble wrap, graph paper, isometric paper and instruction guide. Eggs not included.

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Description</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>841339</td>
<td>..................................................</td>
<td>$7.95</td>
</tr>
</tbody>
</table>

**KELVIN® Geodesic Dome Kit**
In utilizing the Geodesic Dome Kit, the children can build structures and arrange them to build spheres or a model station for an alien planet. Students learn about the construction of geodesic domes as well as the shapes that go into their development. Architectural concepts are also studied.

This kit includes heavy pre-printed cardstock that students can use to build and decorate their geodesic dome according to the criteria and constraints from the teacher.

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Description</th>
<th>Price</th>
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<tbody>
<tr>
<td>841321</td>
<td>..................................................</td>
<td>$2.95</td>
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</table>

**KELVIN® Shapes in Paper Kit**
The Shapes in Paper Kit enables students to build a pyramid, a cylinder, a cube and a prism. They learn how these 3-D shapes can be constructed from flat materials, similar to what an engineer might do in designing ductwork or metal cabinetry for industry. The finished products can be used as samples for practicing shading and 3-D renderings.

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Description</th>
<th>Price</th>
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<tbody>
<tr>
<td>841318</td>
<td>..................................................</td>
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**Primary School Balance**
Multi-purpose balance features 500 mL (half liter) removable containers with convenient spouts. The container bottoms are cone-shaped, but sit flat on the counter top when not in use. Has a built-in handle and simple balance adjustment.
850837 $27.95

**Bucket and Pan Balance**
For elementary grades. Introduce your students to the concepts of balancing and mass. Includes (2) buckets, (2) pans and (20) hanging masses. Shown with pans.
850836 $44.95

**Spring Scales**
Quality scales at affordable prices! Used to measure force and mass. Calibrated in Newtons and grams with a beveled top for use on inclined planes.

<table>
<thead>
<tr>
<th>STOCK # TYPE COLOR</th>
<th>G</th>
<th>N</th>
<th>$ 1-2</th>
<th>$ 3+</th>
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<tbody>
<tr>
<td>850634 Tubular Blue</td>
<td>250</td>
<td>2.5</td>
<td>2.95</td>
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<td>850635 Green</td>
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<tr>
<td>850636 Brown</td>
<td>1000</td>
<td>10</td>
<td>2.95</td>
<td>2.75</td>
</tr>
<tr>
<td>851220 Red</td>
<td>2000</td>
<td>20</td>
<td>2.95</td>
<td>2.75</td>
</tr>
<tr>
<td>851221 White</td>
<td>3000</td>
<td>30</td>
<td>2.95</td>
<td>2.75</td>
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<tr>
<td>851222 Yellow</td>
<td>5000</td>
<td>50</td>
<td>2.95</td>
<td>2.75</td>
</tr>
</tbody>
</table>

**Tubular Spring Scales**

<table>
<thead>
<tr>
<th>STOCK # TYPE COLOR</th>
<th>G</th>
<th>N</th>
<th>$ 1-2</th>
<th>$ 3+</th>
</tr>
</thead>
<tbody>
<tr>
<td>851224 Flat Clear</td>
<td>100</td>
<td>1</td>
<td>3.95</td>
<td>3.45</td>
</tr>
<tr>
<td>851225 Clear</td>
<td>200</td>
<td>2</td>
<td>3.95</td>
<td>3.45</td>
</tr>
<tr>
<td>851226 Clear</td>
<td>500</td>
<td>5</td>
<td>3.95</td>
<td>3.45</td>
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<tr>
<td>851228 Clear</td>
<td>2000</td>
<td>20</td>
<td>3.95</td>
<td>3.45</td>
</tr>
</tbody>
</table>

**Brass Weights Set**
Eight weights include: 1g, [2] 2g, 5g, [2] 10g, [2] 20g and 50g.
710713 [A] $17.95

**Chrome Plated Weights Set**
500g, [2] 200g, 100g, 50g, [2] 20g, 10g, 5g, [2] 2g, and 1g weights, tweezers, storage case.
850690 [B] $89.95

**Intermediate Digital Scale**
400g capacity; +/- 0.1g accuracy (0.01 oz), and 0.1g graduation (0.01 oz.). Includes four weighing modes, gram to ounce conversion, auto-zero/off, tare function, and keypad calibration. Includes AC adapter (or use 9V battery), low battery and overload-underload indicators.
850672 400g Digital Scale $175

**Basic Digital Scale**
4000g (4kg) capacity and 1g graduation. With gram to ounce conversion, auto-zero/off, tare function, keypad calibration. Includes AC adapter (or use a 9V battery) and low battery indicator.
850671 4000g Digital Scale $195

**Advanced Digital Scale**
200g capacity; +/- 0.01g accuracy (0.001 oz), and 0.01g graduation (0.0001 oz.) and parts counting. Features gram to ounce conversion, auto-zero function, auto-off function, tare function, audio function, and easy keyboard calibration. Includes AC adapter (or use 9V battery), stainless steel platter, low battery and over/under indicators plus 100g calibration weight.
850673 200g Digital Scale $299

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Wood, balsa and foam blanks require shaping with tools and sanding. Kits may require soldering and advanced assembly. Adult supervision required.

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Dropper Pipets
Standard 4 in. long eye-droppers are a must for making microscope slides as well as experiments.
$1.95

Variable Automatic Micropipets
Digital display indicates chosen volume.

<table>
<thead>
<tr>
<th>STOCK #</th>
<th>VOLUME µl</th>
<th>$ ea.</th>
</tr>
</thead>
<tbody>
<tr>
<td>860112</td>
<td>0.5 - 10</td>
<td>195.00</td>
</tr>
<tr>
<td>860113</td>
<td>2 - 20</td>
<td>195.00</td>
</tr>
<tr>
<td>860114</td>
<td>5 - 50</td>
<td>195.00</td>
</tr>
<tr>
<td>860115</td>
<td>10 - 100</td>
<td>195.00</td>
</tr>
<tr>
<td>860116</td>
<td>20 - 200</td>
<td>195.00</td>
</tr>
<tr>
<td>860117</td>
<td>50 - 200</td>
<td>195.00</td>
</tr>
<tr>
<td>860118</td>
<td>100 - 1000</td>
<td>195.00</td>
</tr>
<tr>
<td>860119</td>
<td>200 - 1000</td>
<td>195.00</td>
</tr>
<tr>
<td>860120</td>
<td>1000 - 5000</td>
<td>195.00</td>
</tr>
</tbody>
</table>

Micropipet Tips

<table>
<thead>
<tr>
<th>STOCK #</th>
<th>COL.</th>
<th>VOL. µl</th>
<th>DESC.</th>
<th>QTY</th>
<th>$ ea.</th>
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</thead>
<tbody>
<tr>
<td>860121</td>
<td>1-200</td>
<td>1-200 w/2 Racks</td>
<td></td>
<td>192</td>
<td>14.95</td>
</tr>
<tr>
<td>860122</td>
<td>1-200</td>
<td>1-200 Tips Only</td>
<td></td>
<td>1000</td>
<td>49.95</td>
</tr>
</tbody>
</table>

Pipettor Rack
860123 For 6 micropipets .........................$39.95

Beaker Tongs
Jaws open to 7 in. wide. 9.5 in. long.
$3.95 or $3.75 ea./5+
710164 [H] Coated jaws .........................$3.95 or $3.75 ea./5+
710165 Uncoated jaws .........................$3.75 or $3.65 ea./5+

Crucible Tongs
Tapered, serrated tips for better gripping. 10 in. long.
$6.95 or $6.45 ea./5+
710166 [I] Stainless Steel .....................$6.95 or $6.45 ea./5+
710167 Nickel Plated .........................$4.45 or $3.95 ea./5+

Hand Pump/Vacuum
This combination hand pump and vacuum pump is designed to evacuate small amounts of air. Ideal for physics lab. 13oz. Actual style may vary.
$29.95

Wood, balsa and foam blanks require shaping with tools and sanding. Kits may require soldering and advanced assembly. Adult supervision required.
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GSI 45
Wood, balsa and foam blanks require shaping with tools and sanding. Kits may require soldering and advanced assembly. Adult supervision required.

**Disposable Test Tubes [A]**
Plastic test tubes with caps for single use.
282190 12/pkg. $14.95

**Test Tubes [B]**
282177 10mm ...$1.50
282178 13mm ...$1.95
282179 20mm ...$2.95

**Project Corks**
851152 [C] 1/2 in. dia., 5/pkg. .................99¢

**Test Tube Racks**
Economical, durable plastic test tube racks are stackable and can be completely autoclaved. Racks are easy to assemble for use and disassemble for storage.
710124 [G] 6 Tubes ...$2.95 or $2.75 ea./5+
710125 [H] 40 Tubes ...$5.95 or $5.45 ea./5+

**Rubber Test Tube Stoppers**

<table>
<thead>
<tr>
<th>STOCK #</th>
<th>TYPE</th>
<th>FIG.</th>
<th>BRISTLE</th>
<th>D in.</th>
<th>L in.</th>
<th>1-4</th>
<th>5+</th>
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</thead>
<tbody>
<tr>
<td>710086</td>
<td>D</td>
<td>0</td>
<td>Natural</td>
<td>1/2</td>
<td>8</td>
<td>7.95</td>
<td>7.75</td>
</tr>
<tr>
<td>710087</td>
<td>D</td>
<td>1</td>
<td>Natural</td>
<td>3/4</td>
<td>9</td>
<td>8.95</td>
<td>8.45</td>
</tr>
<tr>
<td>710088</td>
<td>D</td>
<td>2</td>
<td>Natural</td>
<td>1-3/8</td>
<td>11</td>
<td>9.95</td>
<td>9.45</td>
</tr>
<tr>
<td>710089</td>
<td>D</td>
<td>3</td>
<td>Natural</td>
<td>3/4</td>
<td>9</td>
<td>9.95</td>
<td>9.45</td>
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<tr>
<td>710090</td>
<td>D</td>
<td>4</td>
<td>Natural</td>
<td>1</td>
<td>8</td>
<td>8.25</td>
<td>8.25</td>
</tr>
<tr>
<td>710091</td>
<td>D</td>
<td>5</td>
<td>Natural</td>
<td>1-1/4</td>
<td>11</td>
<td>10.25</td>
<td>8.25</td>
</tr>
<tr>
<td>710092</td>
<td>D</td>
<td>6</td>
<td>Natural</td>
<td>1-7/64</td>
<td>18</td>
<td>12.25</td>
<td>8.25</td>
</tr>
<tr>
<td>710093</td>
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<td>7</td>
<td>Natural</td>
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<td>11</td>
<td>12.25</td>
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<td>710094</td>
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<td>8</td>
<td>Natural</td>
<td>1-3/8</td>
<td>11</td>
<td>10.25</td>
<td>8.25</td>
</tr>
<tr>
<td>710095</td>
<td>D</td>
<td>9</td>
<td>Natural</td>
<td>1-7/6</td>
<td>11</td>
<td>9.25</td>
<td>8.25</td>
</tr>
</tbody>
</table>

**A** Beaker Brush
For cleaning beakers, cylinders, jars, etc.
710120 [I] 3 in. dia. x 6 in. ..$3.45 or $2.95 ea./5+

**B** Pipette Brush
For cleaning burette, pipettes, and long tubing.
710122 [J] 3/4 in. dia. ..........1.45 or 1.25 ea./5+

**C** Test Tube Brushes
The stiff bristles are mounted in twisted galvanized wire. Rounded tuft at the tip facilitates cleaning of test tubes and small glassware.
12/pkg.

<table>
<thead>
<tr>
<th>STOCK #</th>
<th>FIG.</th>
<th>BRISTLE</th>
<th>D in.</th>
<th>L in.</th>
<th>1-4</th>
<th>5+</th>
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<tbody>
<tr>
<td>710116</td>
<td>K</td>
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<td>7.75</td>
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<tr>
<td>710117</td>
<td>L</td>
<td>Natural</td>
<td>3/4</td>
<td>9</td>
<td>8.95</td>
<td>8.45</td>
</tr>
<tr>
<td>710118</td>
<td>M</td>
<td>Natural</td>
<td>1-3/8</td>
<td>11</td>
<td>9.95</td>
<td>9.45</td>
</tr>
<tr>
<td>710119</td>
<td>N</td>
<td>Nylon</td>
<td>3/4</td>
<td>9</td>
<td>9.95</td>
<td>9.45</td>
</tr>
</tbody>
</table>

**D** Tuning Forks
Aluminum tuning fork produces lengthy vibrations for sound studies.
850855 256hz Frequency ...............$17.95
851223 512hz Frequency ...............$14.95
### Burette Clamps

<table>
<thead>
<tr>
<th>STOCK #</th>
<th>FIG.</th>
<th>JAW TYPE</th>
<th>COATED?</th>
<th>OPEN W in.</th>
<th>FITS d. in.</th>
<th>$ 1-4</th>
<th>$ 5+</th>
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<tbody>
<tr>
<td>710148</td>
<td>A</td>
<td>Standard</td>
<td>No</td>
<td>.5 - 1.75</td>
<td>1/2</td>
<td>7.45</td>
<td>6.95</td>
</tr>
<tr>
<td>710149</td>
<td>A</td>
<td>Standard</td>
<td>Yes</td>
<td>.5 - 1.75</td>
<td>1/2</td>
<td>7.95</td>
<td>7.75</td>
</tr>
<tr>
<td>710150</td>
<td>B</td>
<td>V-Shape</td>
<td>No</td>
<td>6 - 36</td>
<td>1/2</td>
<td>7.95</td>
<td>7.45</td>
</tr>
<tr>
<td>710151</td>
<td>B</td>
<td>V-Shape</td>
<td>Yes</td>
<td>6 - 36</td>
<td>1/2</td>
<td>8.45</td>
<td>7.95</td>
</tr>
<tr>
<td>710152</td>
<td>C</td>
<td>Dual</td>
<td>Yes</td>
<td>—</td>
<td>—</td>
<td>10.95</td>
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<tr>
<td>710198</td>
<td>D</td>
<td>Lincoln</td>
<td>No</td>
<td>7-1/4</td>
<td>3/4</td>
<td>6.95</td>
<td>6.45</td>
</tr>
</tbody>
</table>

### Test Tube Clamps

Hold test tubes in place on a stand or when moving them around.

- **710137** Opens 1.25 in. W (32 cm), 5 in. L ...........................................
- **710138** Opens 1.25 in. W (32 cm), 5 in. L ..........................................
- **710139** Opens 1.25 in. W (32 cm), 5 in. L ..........................................
- **710140** Opens 1.25 in. W (32 cm), 5-1/2 in. L. With Grips ........

### Thermometer Clamp

Features a rotating jaw.

- **710153** [F] ............$7.95 or $6.95 ea./5+

### Clamp Holder

Attaches up to 1/2 in., horiz. or vert. Fits rod up to 3/4 in. Actual style may vary.

- **710147** [G] ............$2.75 or $2.55 ea./5+

### Right Angle Holder

For rods up to 3/4 in. diameter.

- **710144** [H] ............$4.69 or $4.45 ea./5+

### Clamp & Support Rod

Clamps horizontally or vertically. 3/8 in. dia. x 20 in. long.

- **710154** [I] ............$7.75 or $7.45 ea./5+

### Hook Collars

Attach cords, pulleys, etc. For 1/2 in. dia. rod.

- **710145** ............$4.29 or $3.95 ea./5+

### Magnifier Glasses

Binocular style. 2.5X. Adjustable.

- **240002** ............$19.95 or $18.95

### Fluorescent Magnifier Lamp

Precision magnifying lens (up to 3X). Sturdy spring balance arm has extended reach of 45 in. long. Includes 22 W fluorescent circline bulb.

- **210101** (Not Luxo brand) ............$59.95 or $54.95 ea./3+

### Equipment Stands

Stands consist of a heavy, stamped steel base that are easy to handle or rugged, cast iron stands for extra stability. Both types feature black baked-on chemical resistant finish and a chrome plated rod.

### Immersion Lab Thermometers

For science experiments, etc. Includes a plastic storage case.

### Pocket-Size Lab Thermometers

Use to measure Fahrenheit or Celsius. Round tube is filled with mercury. Calibrated for total immersion. Includes a storage case.

### Digital Probe Lab Thermometer

Measures Fahrenheit and Celsius from -50° F to 150° C. Auto power off. 8 in. long stainless steel probe. 0.5 second sample rate. Includes a storage sheath and LR44 battery.
Wood, balsa and foam blanks require shaping with tools and sanding. Kits may require soldering and advanced assembly. Adult supervision required.

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Cover Slips
Includes more than 140 thin 22mm x 22mm glass cover slips. Does not include box shown.
710136 Plain, 72/pk. .......... $4.95 or $4.50 ea./10+
710135 Frosted End, 72/pk. .......... $4.95 or $4.50 ea./10+
710134 1 Concave, 12/pk. .......... $4.95 or $4.50 ea./10+
710133 2 Concaves, 12/pk. .......... $4.95 or $4.50 ea./10+

Micro Trek Microscope Kit
Examine two prepared slides and then take off on a guided investigation of plant and animal specimens you gather and prepare yourself. Learn professional procedures for preparing specimens to make your own slides. Use the included projector attachment to trace images and record them with film.
283054 ........................................$103.95

Maxscope Set
360231 ..................$38.95

The Most Economical!
Microscope Set
360231 ...............$38.95

Two Way Zoom Microscope Set
View specimens at up to 1000x magnification either through the standard microscope monocular or project the image on a near-by screen or wall!
99.95

100x to 900x
Wood, balsa and foam blanks require shaping with tools and sanding. Kits may require soldering and advanced assembly. Adult supervision required.

Disposable Dust Masks [D]  
50/pkg, 520280, $6.95

Hearing Protector [E]  
21 dB noise reduction rating. The adjustable headband is cushioned and reinforced. Actual style may vary.  
280184, $19.95

Rubberized Cloth Apron  
Made of a chemical resistant PVC coated cloth which stays flexible. Reinforced. Cloth ties at the neck and waist. 27 x 42 in.  
710123 [F] $7.95 or $7.45 ea./5+

Blue Denim Apron  
Two pockets. 36 in. L. Cloth ties at the neck and waist.  
710200. ...$9.95 or $9.65 ea./5+

Waterproof Nylon Rain Suit  
For working with chemicals.  
760050 [G] ..........$39.95

First Aid Kit  
240057 [H] ..........$48.95

Heavy-Duty Gloves  
Neoprene gloves lined with jersey.  
851164 [I] 1 pair ..............$6.95

Eyewash Station  
Where hazards require an eyewash system to provide a minimum fifteen minutes of immediate, continuous care. The wall mountable 16-gallon station has an easy pull-down activation and comes with liquid antibacterial additive, drain hose and mounting bracket.  
280186 [K] ........................................................................$249.95

Power Supply for Spectrum Discharge Tubes  
Specially designed power supply to safely run spectrum discharge tubes of length approximately 10-1/4 in. (260mm). Encased in a metal body. Spring loaded with clips to connect the tubes securely. Dual voltage capability (110V / 220V) by the flip of a switch! RoHs and CE certified! Tubes are not included and are sold separately (see complete list below).  
283799 .................................................................$188.95

Spectrum Tubes  
283783 Air  ..................$18.95 283789 Helium  ..................$18.95 283784 Neon  ...............$18.95 283794 $18.95

283784 Argon  ..................$18.95 283790 Hydrogen  ..................$18.95 283795 Nitrogen  ..................$18.95

283785 Bromine  ..................$26.95 283791 Iodine  ..................$20.95 283796 Oxygen  ..................$18.95

283786 Carb. Dioxide  ..................$18.95 283792 Krypton  ..................$18.95 283797 Water Vapor  ..................$18.95

283788 Deuterium  ..................$23.95 283793 Mercury  ..................$18.95 283798 Xenon  ..................$18.95

Waterproof Nylon Rain Suit  
For working with chemicals.  
760050 [G] ..........$39.95

Latex Gloves  
Disposable, 100/pkg.  
851156 [J] ..........$8.95

Non-Fogging Goggles  
240001 [B] ..........$1.95 or $1.75 ea./6+

Visitor’s Glasses  
240047 [C] ..........$2.45 or $2.25 ea./6+

Eyeglass Storage Case  
Clear, acrylic safety eyewear case holds 20 safety glasses or goggles. Keeps your glasses neat and organized. Dimensions 15 in. x 12”, 20 cubbie holes measuring 2 7/8 in. wide. Can be wall-mounted. Door keeps glasses secure and dust-free.  
280185 [A] ........................................................................$149

Hearing Protector [E]  
21 dB noise reduction rating. The adjustable headband is cushioned and reinforced. Actual style may vary.  
280184, $19.95

First Aid Kit  
240057 [H] ..........$48.95

Heavy-Duty Gloves  
Neoprene gloves lined with jersey.  
851164 [I] 1 pair ..............$6.95

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283785 Bromine  ..................$26.95 283791 Iodine  ..................$20.95 283796 Oxygen  ..................$18.95

283786 Carb. Dioxide  ..................$18.95 283792 Krypton  ..................$18.95 283797 Water Vapor  ..................$18.95

283788 Deuterium  ..................$23.95 283793 Mercury  ..................$18.95 283798 Xenon  ..................$18.95

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Soda Science
Children can make up their own soda recipes while practicing the mathematical operations of ratio and proportion. Then, they analyze a real soda to compare how the ingredients in the commercial version compare with theirs.
652285 .......... $9.95 or $8.95 ea./20+

Heating a House & an Oven
By finding different ways to insulate a cardboard “house” warmed by a 40W light bulb, children explore the difference between the heat and temperature. Using a 100W bulb, they turn the house into an “oven” that can bake cookies.
652282 .......... $9.95 or $8.95 ea./20+

Wiring a House
Children discover some of the principles of practical wiring and electrical circuitry by installing lights and switches in the rooms of a cardboard house. They follow electrical “pathways” to explain why some light bulbs shine differently.
652286 .......... $9.95 or $8.95 ea./20+

Exploring Food
Marooned on a desert island with a limited food supply, children investigate the properties and make-up of common foods. Investigations of water, fat and the roles of starch and gluten in flour contribute to the overall question of what is a “balanced” diet.
652280 .......... $9.95 or $8.95 ea./20+

Cake Chemistry
What are the ingredients in a recipe that cause a cake to rise? Is the same gas produced when using baking powder, baking soda, or yeast? These are some questions pursued in this exploration while, at the same time, getting to eat experiments!
652279 .......... $9.95 or $8.95 ea./20+

Bubbles
Floating giant bubbles (3 feet in diameter), small bubble domes on a table top, and soap film in frames are ways to observe some of the more obvious properties of bubbles (such as their round shapes) as well as subtle properties (such as surface tension).
652278 .......... $9.95 or $8.95 ea./20+

Permanent Magnets and Electromagnets
Children explore the properties of permanent magnets, such as how to make their magnetic fields visible. Making fun gadgets help determine the properties of electromagnets.
652281 .......... $9.95 or $8.95 ea./20+

Sinking & Floating
Children explore the buoyancy of common objects and make boats from a variety of materials, gaining a sense of the contribution of the material and shape will sink or float. They repeat their experiments with other solutions to see how the type of liquid makes a difference in how things float.
652283 .......... $9.95 or $8.95 ea./20+

Measuring Ourselves
Children measure their own bodies in a variety of ways to learn more about their basic physical make-up and to observe both the consistency and variation of body shape, size, and strength among their peers.
652287 .......... $9.95 or $8.95 ea./20+

Siphon Systems
Using an arrangement of plastic tubing and a special connector, children transform a soda bottle into an interesting device for exploring how water flows through a closed or open system. Connecting multiples of bottles allows analyzing what happens to the air and water pressure.
652284 .......... $9.95 or $8.95 ea./20+

Balancing Toys
Children transform a pool noodle into a model of a person, a plane, and a boat, and then manipulate them to see how they balance. They also build simple mobiles to explore other kinds of balancing arrangements to understand about equilibrium.
652275 .......... $9.95 or $8.95 ea./20+

Balloons
Different sizes and shapes of inflated balloons can be launched in a variety of ways with the result being different trajectories and different distances traveled. Children learn about the phenomena of action-reaction and the properties of air pressure.
652276 .......... $9.95 or $8.95 ea./20+

Implementation Guide
Designed to serve as an introduction to the Explore It! series, this guide covers aspects of managing and structuring each exploration by providing suggestions for effective practices that engage the children in a productive and satisfying experience.
652345 .......... $9.95 or $8.95 ea./20+

Complete Explore It! Series Set
652562 .................. $139.95
Cardboard Constructions
How strong a stool can students construct from a small cardboard box? Will it support an adult? Building on this experience, students build a bed using a large piece of cardboard supported by small boxes. In the final activities, large modular houses are constructed from refrigerator boxes. 651814 ...............................$9.95 or $8.95 ea./10+

Sand & Water Clocks
Students use flowing sand and water in connected soda bottles to try to make accurate and consistent sand and water clocks that measure out 30-second, 60-second, or even longer time intervals. 651669 ...................$9.95 or $8.95 ea./10+

Blinking Lights
Your students are challenged to design a flashlight from a soda can, cardboard, battery and wires. A rotary switch can also be designed, which is used to control a model traffic light system. 651658 .........................$9.95 or $8.95 ea./10+

String Telephones
Using paper cups & string, discover principles that govern the simplest form of a string telephone. Refine this model with other materials and get messages to go around corners. 651817 .......................$9.95 or $8.95 ea./10+

Rubber Band Powered Cars
Using cardboard, dowels, plastic plates, and rubber bands, students can build their own cars, and learn in a direct way the engineering concept of optimization by testing different sized rubber bands and different diameter plates as wheels. 55 pg. Guide. 651663 .......................$9.95 or $8.95 ea./10+

Cranes
Using a cardboard box as the body, yardstick as a boom, and small electric motor as the power source, students make a working model of a crane. Use different ways of attaching string to the shaft of the motor so that it can lift varying amounts of nails in a cup. 651813 .......................$9.95 or $8.95 ea./10+

Balloon Powered Cars
There is more to this project than just making an inflated balloon move a car. Engineering involves designing a way to support the balloon and get it to work consistently. Match the power requirements of the car with the right balloon. Nozzles can be designed and tested. 651659 .......................$9.95 or $8.95 ea./10+

Pinball
Build pinball games complete with bumpers, traps, flippers and plungers. Students assign their own numbers to their traps and decide where they should be, and test different methods of launching the ball. 61 pg. Guide. 651660 ...................$9.95 or $8.95 ea./10+

Paper Bridges
Make strong structures with limited materials. Students perform more and more difficult challenges to uncover many simple principles of bridge building. 67 pg. Guide. 651668 .......................$9.95 or $8.95 ea./10+

Straw Rockets
Launch the outer straw like a toy rocket by blowing. By using a sandwich bag propulsion system, students test different kinds of fins while trying to refine their toy rockets so that they will hit targets consistently. 651816 .......................$9.95 or $8.95 ea./10+

Giders
Construct simple planes from paper. After testing designs for tails, bodies and wings, construct a rubber band launcher. This allows for a more consistent way of evaluating all of the variables. 64 pg. Guide. 651661 .......................$9.95 or $8.95 ea./10+

Spinning Toys
Plates, dowels, rubber washers, and tuna fish cans become homemade tops and yo-yos. Uncover the principles of balance and spin to make long spinning tops and regular or “sleeper” yo-yos. 651815 .......................$9.95 or $8.95 ea./10+

Desgin It! Implementation Guide
An introduction to the Design It! series and a resource for teachers using the program for the first time. The guide covers managing and structuring an effective classroom environment and gives a sense of context and procedures needed to effectively engage students. 651665 Implementation Guide, 32 pages......................................................$6.95

Complete Design It! Series Set
All 14 projects (Balls and Tracks, Pinball, Trebuchets, Gliders, Paper Bridges, Rubber Band-Powered Cars, Balloon Powered-Cars, Cardboard Constructions, Cranes, Blinking Lights, String Telephones, Straw Rockets, Spinning Toys, Sand and Water Clocks) plus a FREE Implementation Guide. 651916 Complete Set of 14 Lesson Guides + Implementation Guide ............$139.95
Models in Technology & Science

**An Integrated Engineering Investigation of HOUSES, BRIDGES & TOWERS**
Working with drinking straws and paper clips students meet the challenge of building a model house with drinking straws and paper clips. They test their houses to determine how much weight it can hold before it collapses. The findings from this first challenge are applied to building bridges and towers with same kind of materials. An inquiry is carried out on different truss designs. These projects provide a context for introducing the concepts of force, tension, compression and static equilibrium.

652494 Booklet .................................................................$9.95 or $8.95 ea./10+

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**An Integrated Engineering Project Investigating HOW WORK AND POWER ARE GENERATED**
Given plastic plates and cups, buckets, and a few other materials students construct model water wheels to see how much weight their model can lift when water is poured on the cups attached to the wheel. Students will carry out a systematic inquiry of how different variables associated with the model determines its lifting capacity. This experience is used to introduce the concepts of work, power, momentum, torque, potential & kinetic energy.

652496 Booklet .................................................................$9.95 or $8.95 ea./10+

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**An In-Depth Investigation of HOW IMAGES ARE FORMED**
Students first explore ways that different objects cast shadows with different kinds of light sources. Then they explore in a systematic manner the relationship of the shape of the object and the shadow it creates. Glass jars and then lenses are used to observe how light bent to form images. These explorations can be used to introduce the concept of refraction and the properties of lenses.

652493 Booklet .................................................................$9.95 or $8.95 ea./10+

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**An In-Depth Investigation of RHYTHMIC MOTION**
The focus of this investigation is on mechanical waves. Students explore how waves can be made in tanks of water, with frames of soap film, with Slinkies, and a vibrating doorbell. A model for studying wave motion is made from dowels and tape to investigate wave movement in a more systematic manner. Plus, various characteristics and properties of waves are introduced as students move through these explorations.

652490 Booklet .................................................................$9.95 or $8.95 ea./10+

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**Inks, Food Colors and Papers**

**Investigating the PHYSICAL / CHEMICAL PROPERTIES OF MATERIALS**
Water based pens are tested with water and then other kinds of liquids by placing these liquids on marks made on paper. Chromatography is used to refine these observations. A similar process is carried out with permanent pens. These experiences are used to introduce the concept of solubility and physical change. Bleaching of the inks and the changing of the inks of special pens is used as a context for introducing chemical change.

652488 Booklet .................................................................$9.95 or $8.95 ea./10+

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**Salad Dressing Physics**

**Investigating the DENSITY OF LIQUIDS AND SOLIDS**
The movement of different liquids is observed in a set of mystery bottles. Students carry out solubility tests and weigh equal volumes of the liquids to identify what the liquids are. These experiences are used to introduce the concept of density. A second set of bottles each having a liquid and several balls of different densities is also investigated. The densities of the liquids compared to those of the balls are determined. A homemade Lava Lamp is made from mineral oil and two kinds of rubbing alcohol.

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An In-Depth Investigation of THE REFLECTION OF LIGHT
Regular mirrors are first investigated through several kinds of challenges and games. The tracing of reflected light rays is carried out to help students understand how images are formed. Pieces of plexiglass are used to investigate the transmission and reflection of light. Flexible Mylar is used to investigate how curved surface reflect light. These experiences provide the context for introducing properties of light such as reflection, transmission as well as a way of modeling what happens to light in these situations.
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An In-Depth Investigation of the FORCES AND MOTION OF ROTATING OBJECTS
A set of tops is made from plastic plates and dowels are first launched with a special rubber band device as well as a mixer. A systematic inquiry is then carried out to determine what characteristics of the tops affect how long they spin. A similar process is carried out with yo-yos made from the same materials.
These explorations provide the experiential context for introducing the concepts of rotational motion, torque, rotational inertia, potential and kinetic energy.
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An In-Depth Investigation of PATTERNs OF FLUID MOTION
Students map air currents outdoors and indoors. Then they explore the patterns made when different shaped objects are moved through water having a special liquid that makes these patterns visible. These explorations provide the experiential context for helping students understand phenomena such as cloud movement, currents in rivers and oceans as well as the design of planes and cars.
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Meet the KELVIN® Author: Bernie Zubrowski
Bernie Zubrowski has spent much of his professional life devising ways to educate young people about science, both while they’re at school and when they are out in the world, away from the classroom. He has contributed to many of EDC’s landmark science curricula, including Elementary Science Study and the African Primary Science Program. He is currently directing several projects, including Explore It! Science Investigations in Out-of-School Programs.
In his years with Boston’s Children’s Museum, Bernie designed exhibits that traveled to science centers across the United States. His 16 books—with titles like Siphons and Water Pumps and Blinkers and Buzzers—and 12 curriculum guides have influenced museum designers, educators, and parents throughout the world.

An In-Depth Investigation of BALANCING TOYS AND STATIC EQUILIBRIUM
Students first balance their body and models of a human body. They experiment with balancing pieces of different shaped cardboard in a vertical and then a horizontal orientation. They end up constructing mobiles that provide a context for introducing and discussing static equilibrium and the concept of torque.
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Enable students to carry out virtual fieldwork on a stretch of simulated river and then use the skills learned in their actual fieldwork projects. On-screen help gives a detailed step-by-step guide to practical techniques and methods of data collection and analysis.
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Meet the KELVIN® Author: Harry T. Roman

Experience the world of creativity, invention, technology education and engineering through the eyes of a nationally recognized engineer, inventor, and technology educator. Harry T. Roman’s books will help you bring the excitement of these topics to your classroom. His easy-to-read books are loaded with real-world experiences, classroom exercises, plus design challenges; and have been time-tested through many in-service seminars he has given to teachers in grades 6-12. Harry helped implement the technology education movement in New Jersey.

How the Electric Utility System Works
This booklet brings the interest and diversity of utility activities to life for those who want to know how it all works. Learn how electricity is generated, transmitted, and distributed. Also covers how the electric industry started, how we use energy, and where the industry is going.

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Contents include: detailed instructions, electrodes (copper, zinc, tin, aluminum, iron), Safe chemicals for creating electrolytic solutions, measuring containers and tools, cell containers, multimeters and alligator leads.

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Making Wet Cells and Batteries
The chemistry and materials in wet cells and batteries are all around us. Under-standing how wet cells work, helps us understand rust and corrosion; and why batteries behave the way they do and eventually need replacement. Includes fun information and simple experiments. Wait until you see what you can use to make wet cells and batteries!

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