

Advancing Science - Activities List grades 5-8

Activity Number	Activity Name	Capsule Description of Activity	Grade Level	Subject Area
2.012	Using The Scientific Method To Study Volume and Weight	Your students will be presented with one or more problems that must be solved. Using the Scientific Method and a variety of beakers, balances, and graduated cylinders, students collect data and solve the problem.	3-6	M,C,P
2.042	Magnet Lab	A series of different activities involving the forces of magnetism, utilizing materials from <i>Advancing Science</i> 's Magnetic Materials Kit. Included: Measuring The Strength Of A Magnet, Seeing Magnetic Fields, and Eddy Currents. MATERIALS LOAN ONLY	3- 5	P
2.051	Rewiring the Brain: An Exercise in Neuronal Plasticity	Students discover how adaptable the brain really is in this simple yet powerful activity. Hitting a target is easy... until students don special "diopter" lenses. Can their brains get straightened out? And what happens once the lenses are removed? Great potential for inquiry learning in this lab.	7-12	B
2.061	Osmosis and the Natural Membrane	Students use decalcified chicken eggs to study the passage of three different solutions through the cell membranes of the egg.	7-12	B
2.062	The Inside Story: Introduction to Anatomy	Students use anatomically correct models of the skeleton, spine, brain and knee joint to learn about their bodies. Also includes posters and notebook with reproducible student handouts and materials for related activities.	K-8	B
2.102	Advanced Simple Machines	Students use materials from K'nex kits to create simple machines, study their uses, and solve problems.	4 - 9	P
2.103	DNA K'Nex - Replication and Transcription	Students use materials from K'nex kits to build DNA and mRNA molecules. This flexible set allows students to build and learn about phosphate groups, deoxyribose and ribose sugars, hydrogen bonds, codons, nucleotides, and more.	7 - 12	B

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2.151	Microbes In The Environment	Students find out "where the germs are" as they swab a number of different choice locations, inoculate agar plates, then use an incubator to see how many microorganisms develop.	3-12	B
2.152	Effectiveness of Hand Washing	Students test their hand washing technique by inoculating agar plates before and after washing, then using an incubator to see how many microorganisms develop.	5-12	B
2.201	Weather Labs	Students can perform up to 10 different weather related activities, including Relative Humidity and The Pressure's On! (Barometric pressure) using equipment from the Science Van's Weather Instruments Kit. MATERIALS LOAN ONLY	2 - 5	E, P
2.202	Measuring and Monitoring the Weather	Students use the Davis Wireless Weather Station and the NOAA Weather Radio to learn weather terms, monitor local forecasts, measure weather at their school and make predictions for daily weather. Students also chart local temperatures, humidity, wind speed and directions as well as barometric pressure.	K-12	E, P
2.230.1	Introduction to the Compound Microscope	Students learn the parts and function of the compound microscopes while looking at a variety of prepared slides on low, medium and high power.	4 - 12	B,E
2.230.2 New	Introduction to Digital Microscopes-What in the Pond	Students will develop skills need manipulate various features of digital microscopy. Using pond water samples they will capture, edit and compare images of protozoa	5 - 12	B, E
2.231	Protozoa Lab	Students explore and record the microscopic world of pond water using the Science Van's compound microscopes.	4 - 12	B

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2.232	The Effect of Drugs on Daphnia	Students use compound microscopes to compare the heart rates of <i>Daphnia</i> before and after exposure to household drugs (alcohol, caffeine, nicotine) or temperature changes.	5 - 12	B, C
2.234	The Effect of Environmental Toxins on Daphnia	Students use compound microscopes to compare the heart rate and behavior of <i>Daphnia</i> before and after exposure to environmental toxins (antifreeze and laundry detergent).	5 - 12	B, C, E
2.241	Static electricity **Demonstration**	Teacher uses Van der Graaff generator to show various effects of static electricity.	K - 12	C, P
2.251	Circuits: Simple, Series, And Parallel	Students use Basic Electricity Kits to study the differences and similarities between three kinds of electrical circuits.	4 - 10	P
2.253	Electrical Resistors	Students will use a multi meter to increase their understanding of resistance, read the colors on a resistor to determine the resistance, compare color coded resistance to actual resistance, understand tolerance and its importance, and review how to change per cent to decimals.	6 - 12	P
2.281	Water Quality Testing	Students use Water Test Kits to measure various water quality parameters such as alkalinity and hardness.	4-12	C
2.282	Stream Study	Students use a variety of equipment from the Science Van, including Microscopes, Flow Meter, and Water Test Kits, to study the physical, biological and chemical aspects of a stream.	K - 12	B, C, E, P
2.283	Dissolved Oxygen Lab	Students compare the amount of dissolved oxygen in different samples of water using the Science Van's Water Test Kits.	5-12	B, C

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2.284	Advanced Stream Study	Students use the LabPro Interface & TI-83+ Calculator with various sensors to make a high-tech examination of water quality. Parameters tested: Flow Rate, Turbidity, Temperature, pH, Nitrate concentration, Ammonium Nitrogen concentration, and Total Dissolved Solids.	7-12	B, C, E, P
2.285	Macroinvertebrates as Stream Health Indicators	Students use kicknets and other materials to collect macroinvertebrates from a stream or pond. Using the <i>Pollution Tolerance Index</i> they will then assess the health of the stream.	5-12	B, E, P
2.301	Where Does the Water Go? **Demonstration**	Teacher uses the Groundwater Simulation System to explain the movement of water beneath the surface of the earth, as well as the dangers of pollution.	3-12	E
2.302	Enviroscape - Wetlands Model **Demonstration**	Teacher uses the Wetlands model to demonstrate how our daily activities, as well as industry and agriculture affect wetlands through runoff.	K - 12	E
2.303 New	Enviroscape-Drinking and Waste water Treatment Model	Teacher uses the Wastewater and Drinking Water Treatment model to demonstrate water sources for cities, rural areas, industrial and recreational areas. Effective treatment methods will be demonstrated as well.	K - 12	E
2.311	Observation and Classification of Mineral Specimens	Students use microscopes and rock identification kits to examine and determine the identity of different mineral samples.	K - 12	E
2.321	Topographic Map Lab	Students use Contour Map Kits to learn how to create a two dimensional topographic Map from a three dimensional model.	4-12	E

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2.322	Topo Map II	Students use rocks, oil-based clay, and Contour Map Kits to create their own topographic map, then exchange maps to try to re-create each others' models. (Designed as a follow up to Topographic Map Lab)	4-12	E
2.331	Earth, Sun, Moon	Students get concrete methods to learn the abstract concepts of rotation, revolution, time, seasons, and moon phases using Sun, Earth, & Moon Models.	5-9	E
2.401	Household Acids and Bases Testing	Students use pH meters and pH test paper to determine the relative acidity of various familiar substances. (Good introduction to the pH meter.)	4-12	B, C
2.403	Acid Rain	Students use pH Meters to explore the neutralizing effectiveness of two soil types. They also use the meters to discover how severe acid rain is in different parts of the country, and how power plants and other polluting facilities cause acid rain.	4-12	B, C, E
2.404	pH, Inc.	Problem solving activity in which students use pH meters to determine the best and most economical way to clean up an acid spill. (Good follow up to Acid Rain.)	4-12	B, C
2.405	Soil Testing	Determine the pH and water retention ability of three different soil types. Add different acidifying fertilizers and measure the pH change as you learn about acid loving plants.	5-12	B, C
2.406	Effect of Temperature on Germination	Students will manipulate the soil conditions to simulate seasonal change and day-night changes. Temperature will be monitored using Vernier Temperature probes.	4-12	B,E,P
2.511	Nature Of Visible Light	Students use prisms, diffraction glasses, spectrometers, and colored filters to study the visible light spectrum. (Good start for spectrophotometry work.)	5 - 8	P,C

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2.512	Bright Line Spectroscopy	Students use hand held spectrometers to observe the bright line spectra of elements such as hydrogen, helium, neon and more. Atoms of these gases are excited using electrical energy from the accompanying power supply.	8-12	C, P
2.531	Introduction to Spectrophotometry	Students view the visible light spectrum produced by the spectrophotometers in a interesting and unconventional way.	4-12	P,C
2.532	Spectral Curve of Food Coloring	Students use spectrophotometers to determine the wavelength at which a colored solution absorbs the most light energy.	6-12	C, P
2.533	The Effect of Concentration on Absorbance	Students use spectrophotometers to explore the relationship between the concentration of a substance and the amount of light energy it can absorb. (Good follow up to Spectral Curve.)	6-12	C, P
2.534	Physical Or Chemical Change?	Students use spectrophotometers to determine whether color changes are physical or chemical in nature. (Students MUST understand concepts of Lab 532, <i>Spectral Curve of Food Coloring</i> before performing this activity.)	7-12	C, P
2.535	Spectral Curve Of Leaf Pigments	Students use spectrophotometers to determine the wavelength at which an extract of leaf or vegetable pigment absorbs the most light energy. (Good "real world" substitute for Lab 532, <i>Spectral Curve of Food Coloring</i> .)	7-12	B, C
2.538	Spectral Curve of Kool-Aid	Students use spectrophotometers to determine if colors separated out in column chromatography are pure or mixtures. (Good follow up to lab 571, <i>Extraction And Identification Of Dyes.</i>)	8-12	C

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2.542	The Effect of Alcohol on Biological Membranes	In this experiment, beet root is used to test the effect of three different alcohols (methanol, alcohol, propanol) on biological membranes. Spectrophotometers are used to quantify the effect of these alcohols and the damage they inflict on the cell membrane.	5-12	B, C
2.571	Extraction And Identification Of Dyes	Students use column chromatography supplies to separate dyes in colored solutions.	5-12	C
2.572	Thin Layer Chromatography	Students use thin layer chromatography sheets (non-polar silica gel) to separate a variety of different commercial food colors and compare them to FD&C standards.	8-12	C
2.573	Paper Chromatography of Candies	Students use paper chromatography strips to separate the colors of the coatings of several candies and compare them to FD&C standard colors.	8-12	C
2.574	Thin Layer Chromatography of Pen Inks	Students use thin layer chromatography to determine which pen was used to leave a prank note.	8 - 12	C
2.651	Newton's Laws of Motion	Students use a kinesthesia cart to study inertia, the acceleration of different masses when propelled by a constant force, equal and opposite actions, and projectile motion. (For older students, a more in-depth look at Newton's second law involves ULI Motion Detectors and Computers.)	K - 12	P
2.721	Computer Graphing	Uses Excel™ Software on the Science Van's Computers to create simple bar, line and pie graphs from data collected by students.	4-12	B, C, E, M, P
2.723	Stream Bottom Profile	Students use Excel™ Software on Computers to create three dimensional maps of stream bottom depth profile data.	5-12	E, M, P

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2.725	EcoBeaker HS	Students use Portable Computers to investigate ecological scenarios in this interactive software. Concepts the software covers include: Population Ecology, Ecosystems, and Conservation Biology.	7-12	B, E
2.726	Science Sleuths	Students use Portable Computers to investigate and solve mysteries with this interactive software. Equipment, videos and other resources are used to determine who's at fault in an accident, what washed ashore, why people got sick or what is causing lawnmowers to explode. Can be used by students working in small groups or as a Teacher - led class project.	5-9	B, C, E, M, P
2.727	Statistics with Microsoft Excel	During this lab, students will not only learn how to edit simple mathematical formulas with Microsoft Excel spreadsheets, but will also learn about the X^2 Statistical Test and how the test can be run using a simple spreadsheet. Students can use their own data or follow instructions for pre-written experiments to gather data for this lab.	6-12	B, C, E, M, P
2.728	Introduction to GIS Analysis	Students will identify the uses and benefits of GIS. While manipulating data layers, students will produce maps and solve problems using the information obtained.	6-12	B, E
2.729	The Three G's: GPS, Geocache and GIS Part 1	Part 1 is an introduction to the use of GPS receivers and how they acquire their data. Students will learn to find latitude and longitude coordinates as an introduction to Geocaching.	6-12	B, E, P
2.730	The Three G's: GPS, Geocache and GIS Part 2	Part 2 Students will manipulate GIS data to produce maps which will be used to solve problems. The focus of the problems are Chesapeake Bay watershed related.	6-12	B, E

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2.731	Geocaching for Knowledge: A Mock Stream Study with GPS Receivers	After an introduction to GPS and Geocaching, students will be given latitude and longitude coordinates to find. Stream quality facts will be in the various caches. Working in teams the students will determine the overall health of the mock stream. Content of the caches can be adjusted to fit subject needs.	4-12	B, E, P
2.735	Basic GIS and Toxic Release	Using ArcView GIS software students will develop skills needed to produced maps showing EPA toxic release sites in Pennsylvania. Students will be asked to determine possible environmental impact form the chemical waste.	6-12	E,C
2.740	Photosynthesis	Students use computerized probes to determine the changes in CO ₂ levels (reflecting rates of respiration and/or photosynthesis) of leaves in both light and dark chambers.	7 - 12	B
2.752	A Good Sock	Smelly or not, socks usually do a good job keeping the heat in. In this activity, students use Laptop Computers and ULI Temperature Probes to discover the effectiveness of cotton and wool socks and the problem with wet socks. (This lab can also be done	4-12	B, C, E, P
2.753	Endothermic And Exothermic Reactions	Students use Computers and ULI Temperature Probes to study the two different reaction types. (This lab can also be done using the LabPro/TI-83+ system.)	5-12	C
2.754	Freezing and Melting of Water	Students use Computers and ULI Temperature Probes to determine and compare the freezing and melting temperatures of water. (This lab can also be done using the LabPro/TI-83+ system.)	5-12	C
2.755	Mixing Warm & Cold Water	Students use Computers and ULI temperature probes to construct a simple calorimeter, mix cold and warm water, then determine heat lost and gained by water. (This lab can also be done using the LabPro/TI-83+ system.)	5-12	C, P

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2.756	Temperature Probe Response Time	Students use Computers and ULI Temperature Probes to determine the response time of the probe. (This lab can also be done using the LabPro/TI-83+ system.)	5-12	B, C, E, P
2.763	The Complexity of Global Warming	Students learn just how difficult it is to fully understand the concept of global warming. In this inquiry based lab, students can choose from a variety of relationships that can either increase or decrease the effect of global warming and test their hypotheses by using Laptop Computers and LabPro interfaces.	6-12	B, C, E
2.764	The Greenhouse Effect	Students use Laptop Computers and LabPro interfaces with temperature probes to investigate the Greenhouse Effect using various models.	6-12	
2.768	What Causes the Seasons?	Students use a simulated sun—a light bulb—to shine on a ULI Temperature Probe attached to a globe. They then study how the tilt of the globe influences warming caused by the lighted bulb.	5-12	P, E
2.771	Matchbox Car Racing	Students use Computers and ULI Photogates to compare the speeds of various matchbox sized cars being released down a ramp.	2-8	M, P
2.781	Effect of Water Type on pH of Acid Rain	Students use Computers and ULI pH probes to compare the effect on pH of dissolving acid into various kinds of water. (This lab can also be done using the LabPro/TI-83+ system.)	5-12	B, C
2.782	Generating Acid Rain	Students use Computers and ULI pH probes to create and analyze the acids that comprise acid rain. (This lab can also be done using the LabPro/TI-83+ system.)	5-12	B, C, E

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2.791	Motion Match	Students will gain a first-hand understanding of graphs and the information they convey through this interactive activity. Students move their bodies back and forth using Laptop Computers and ULI Motion Detectors to match a graph of distance (from the detector) vs. time. If they are successful matching the graph, they can attempt to match a velocity vs. time graph.	3-9	M, P
2.792	Kinetic Potential Energy Transfer	Students use Computers and ULI Motion Detectors to compare energy transfers in two different types of common ball.	5-12	C, P
2.793	Momentum: A Crash Lesson	Students will use computers and ULI motion detectors to measure the velocity of a vehicle and calculate its momentum as it crashes into a moveable barrier. (This lab can also be done using the LabPro/TI-83+ system.)	6-12	P
2.794	Energy of a Tossed Ball	Students use Computers and ULI Motion Detectors to study the energy changes as a ball is tossed straight upward, slows down until it reaches the top of its path and then speeds up on its way back down. (Similar to # 2.792, <i>Kinetic - Potential Energy Transfer</i> .) (This lab can also be done using the LabPro/TI-83+ system.)	5-12	P
2.795	Ocean Floor Mapping	Students use portable computers and ULI Motion Detectors to simulate mapping the floor of the ocean. (Good follow up to lab 321, <i>Topographic Map Lab</i> .)	5-12	P, E
2.803	Enzyme Action: Testing Catalase Activity	Students will use a Computer and ULI Pressure Sensor to measure and compare the initial rates of reaction for the destruction of hydrogen peroxide by the enzyme catalase at various enzyme concentrations, temperatures and pH values.	7-12	B

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2.804	Factors Affecting Transpiration	Students will use a Computer and ULI Pressure Sensor to measure and compare the initial rates of transpiration of a plant subjected to varying environmental pressures such as humidity, light, and heat.	7-12	B
2.805	Get A Grip!	Students use Computers, interfaces and pressure sensors to measure their gripping power. They will see if their gripping power changes as they grip an object for a longer time. They will also compare their gripping power with their classmates.	5 - 9	B, C, P
2.811	Effect of Temperature on Fermentation	Students use Computers and ULI Pressure Sensors to determine how temperature effects the rate at which yeast respire. (This lab can also be done using the LabPro/TI-83+system.)	7-12	B, C, P
2.831	Limitations on Cell Size: Surface Area to Volume	determine the importance of surface area to volume ratios using Computers and ULI Conductivity Probes. (This lab can also be done using the LabPro/TI-83+ system.)	7-12	B
2.832	Diffusion Through Membranes	Students use a portable computer and ULI Conductivity probe to study the effect of temperature, concentration gradients and the presence of a second molecule on diffusion.	7-12	B
2.861	The Effect of Surface on Friction	Students use Computers and ULI Force Probes to compare the amount of friction found on different surfaces.	3-8	P
2.862	Pulleys	Use computerized Force Probes to explore the mechanical advantages of pulley systems.	5-12	P
2.871	Reflectivity of Light	Students compare the amount of light reflected by various surfaces using Computers and ULI Light Sensors. (This lab can also be done using the LabPro/TI-83+ system.)	5-12	P

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2.872	Polaroid Filters	Students use Computers and ULI Light Sensors to measure the intensity of transmitted light and study the transmission of light by Polaroid filters. (This lab can also be done using the LabPro/TI-83+ system.)	5-12	P
2.881	Alpha, Beta, and Gamma	Students use Computers and ULI's with Radiation Detectors to determine the differences in alpha, beta and gamma radiation.	8-12	C, P
2.892	Speed of Sound Lab	Students use Laptop Computers and LabPro interfaces to measure the speed of sound and compare their experimental value to the known value.	8-12	P
2.896	Magnetic Field Explorations	Students use computers and ULI Magnetic Field Sensors to measure, graph and analyze magnetic field strength	5-12	P
2.897	Electromagnets: Winding Things Up	Students use computers and ULI Magnetic Field Sensors to study the relationship between coils of wire and the strength of an electromagnet.	5-12	P
2.898	Seafloor Spreading	Students use Laptop Computers and LabPro interfaces to study one of the major pieces of evidence supporting the Theory of Plate Tectonics. Magnetic Field Sensors are used to observe the changing polarity of simulated bedrock on both sides of a seafloor	5-12	E
2.286	ESI: Watching the Watershed	Students analyze eight prepared water samples using water Test Kits to try to determine from which business/industry particular pollutants have come from.	7-12	B,C,E
2.853	Heart Rate and Exercise	Students use Computers and Vernier Heart Rate Monitors to determine their physical fitness level.	5-12	B
999.069 New	Dichotomous Key	Students will develop skills to understand and use a dichotomous key.	5-12	E, B

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999.236 New	Creature Feature	Students will observe the microscopic world in pond water using simple and compound microscopes along with video.	K-5	B,E
999.874 New	Earth's Reflective Qualities	Using the Vernier LabPros, students will measure the reflective quality of various surfaces and colors found on the Earth's surface.	5-12	E, B
999.741 New	Cellular Respiration with Peas	Using the Vernier LabPros and peas, students will measure the effect of germination on CO2 production during cellular respiration.	5-12	E, B
999.742 New	Respiration and CO2 Production	Using the Vernier LabPros and peas, students will measure the effect of salinity of the soaking solution used to germinate the peas and how this will effect CO2 production during respiration.	5-12	E, B
999.733 New	Hot Spots: Using GPS to Map Temperature Variations	Using Vernier LabPros with TI 83 calculators and GPS units, students will investigate the presence of various microclimates within an area. Can be used in conjunction with the GIS lab # 999.734.	6-12	E
999.734 New	Map your Schoolyard's Hot Spots	Combining data collected from lab # 999.733 with the ArcView GIS software studnets will develop beginner level skills to develop and add data layers to a map of your school campu.	6-12	E