

Master Materials and Equipment List

Italicized entries indicate items not available from PASCO. The quantity indicated is per student or group. NOTE: Some activities also require protective gear for each student (for example, safety goggles, gloves, apron, or lab coat).

Teachers can conduct some lab activities with sensors other than those listed here. For assistance with substituting compatible sensors for a lab activity, contact PASCO Teacher Support (800-772-8700 inside the United States or <http://www.pasco.com/support>).

Act	Title	Materials and Equipment	Qty
Life Science			
1	Acid Rain and Seed Germination Use a pH sensor to determine the effect of acid rain on the germination of bean seeds.		
	Teacher Demonstration	<i>Distilled water</i> <i>Permanent marker</i> <i>Plastic cups, 250-mL</i> <i>Pipet</i> <i>Small pieces of chalk, ~5 cm</i> <i>White vinegar</i> <i>Nail, galvanized</i>	~2.5 L 1 4 1 4 90 mL 1
	Student or Group	<i>Data Collection System</i> <i>PASPORT pH Sensor</i> <i>Bean seeds</i> <i>Distilled water</i> <i>Permanent waterproof marker</i> <i>Simulated acid rain samples, 100 mL</i> <i>Plastic cups, 250 mL</i> <i>Resealable small plastic bags</i> <i>Stirring rod or plastic spoon</i> <i>Ruler</i> <i>Paper towels</i>	1 1 15 100 mL 1 2 3 3 1 1 6

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Act	Title	Materials and Equipment	Qty
2	Acid's Effect on Teeth Use a pH sensor as a means of quantitatively describing the acidity of various beverages.	Teacher Demonstration <i>Beaker, glass, 400-mL or Mason jar, pint</i> <i>Vinegar, white</i> <i>Raw eggs in their shells</i> <i>Chicken thigh bones, cleaned</i> <i>Plastic wrap to cover the beakers, ~6 in. x 6 in. (optional)</i> <i>Water, distilled</i>	4 800 mL 2 2 4 200 mL
		Student or Group Data Collection System PASPORT pH Sensor <i>Beaker, 250-mL</i> <i>Beakers, 100-mL or paper cups</i> <i>Graduated cylinder, 50-mL</i> <i>Vinegar, white</i> <i>Orange juice</i> <i>Soda pop (3 different kinds)</i> <i>Water, distilled</i> <i>Labeling materials (such as marking pen, tape)</i> <i>Wash bottle with distilled water</i>	1 1 1 4 1 50 mL 50 mL 50 mL each 50 mL Several 100 mL
3	Air Pressure and the Lungs Use an absolute pressure sensor to measure the change in air pressure within a model "chest cavity" while causing the syringe "diaphragm" to change its volume.	Data Collection System PASPORT Absolute Pressure Sensor Quick-release connector Tubing <i>1-hole rubber stopper, #6 (2)</i> <i>Syringe, 60 mL</i> <i>Balloon, at least 12" diameter</i> <i>Tape</i> <i>Marker</i>	1 1 1 1 1 1 1 1 1

Act	Title	Materials and Equipment	Qty
4	Introduction to Acids and Bases Use a pH sensor to measure the pH of several different household chemicals		
	Teacher Demonstration	Data Collection System PASPORT pH Sensor <i>Head of red cabbage,</i> <i>Large pot</i> <i>Hot plate or burner</i> Buffer solution pH 4 Buffer solution pH 10 <i>Distilled water</i> <i>Beakers, 1000-mL, or clean glass</i> <i>quart jars</i> <i>Isopropyl alcohol (70%) (optional)</i> <i>Household chemical products,</i> <i>including white vinegar (enough for</i> <i>50 mL each per lab group)</i>	1 1 1 1 1 25 mL 25 mL 1 gallon 4 100 mL 4 different samples
	Student or Group	Data Collection System PASPORT pH Sensor <i>Red cabbage indicator</i> Pipet <i>Beakers, 250-mL</i> <i>Distilled water in wash bottle</i> <i>Household chemical samples, 50 mL</i> <i>each</i>	1 1 100 mL 1 5 200 mL 4
5	Muscle Fatigue Use a force sensor to investigate and observe changes in the muscular movement of bones during a prolonged period of sustained exertion.	Data Collection System PASPORT Force Sensor with rubber bumper attached	1 1
6	Photosynthesis Use a light sensor and absolute pressure sensor to measure the change in light and pressure in an aquatic ecosystem as an <i>Elodea</i> or other aquatic plant undergoes photosynthesis.	Data Collection System PASPORT Light Sensor PASPORT Absolute Pressure Sensor with quick release connector and plastic tubing PASPORT Sensor Extension Cable <i>Beaker, 400 to 600 mL</i> <i>Clear or translucent funnel</i> <i>Clay, modeling (golf ball-sized piece)</i> <i>Baking soda</i> <i>Elodea (sometimes called Anacharis)</i> <i>Measuring spoons</i> <i>Water, distilled</i>	1 1 1 1 1 1 1 1 1/4 tsp. 3 to 4 sprigs 1 set 400 mL

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7	Recovery Heart Rate Use a heart rate sensor to determine students' resting heart rate, their heart rate with exercise, and their recovery heart rate.			
		Teacher Demonstration	<i>Clock or timer with seconds displayed</i>	1
		Student or Group	Data Collection System	1
			PASPORT Heart Rate Sensor, hand-grip <i>Comfortable foot attire and exercise clothing</i> <i>Clock or timer with seconds displayed</i> <i>Damp paper towel (2)</i>	1 1 1 2
8	Seasonal Pond Exploration Use a pH sensor and temperature sensor to measure temperature and pH over the course of a day in a vernal pond.			
		Teacher Demonstration	Mobile Data Collection System	1
			PASPORT pH Sensor	1
			PASPORT Temperature Sensor*	1
			Buffer solution pH 4	25 mL
Buffer solution pH 10	25 mL			
Student or Group	Mobile Data Collection System	1		
	PASPORT pH Sensor	1		
	PASPORT Temperature Sensor*	1		
	<i>Hand lens</i>	1		
9	Sunlight and Photosynthesis in Aquatic Plants Use a pH sensor to collect pH data to demonstrate the relationship between photosynthesis and light.	Data Collection System	1	
		PASPORT pH Sensor	2	
		<i>Plastic bags, 500-mL or 16-oz, sealable</i>	2	
		<i>Graduated cylinder, 250-mL</i>	1	
		<i>Aquatic snails</i>	2	
		<i>Aquatic plants such as Elodea</i>	2	
		<i>Fluorescent lamp</i>	1	
		<i>Aluminum foil, 15 in. x 15 in.</i>	2	
		<i>Stream or pond water</i>	500 mL	
		<i>Marking pen</i>	1	
10	Thermoregulation of Body Temperature Use a fast response temperature sensor to observe that different parts of the body are at different temperatures and these differences are related to their distance from the heart.			
		Teacher Demonstration	Data Collection System	1
			PASPORT Fast Response Temperature Sensor	1
		Student or Group	Data Collection System	1
			PASPORT Fast Response Temperature Sensor	1
<i>Chair (for ankle temperature reading)</i>	1			

* Either the PASPORT Fast Response Temperature Sensor or the PASPORT Stainless Steel Temperature Sensor can be used for this activity.

Act	Title	Materials and Equipment	Qty
11	Transpiration Use a weather sensor to measure the change in humidity and temperature of a small potted plant over a 24-hour period.		
	Teacher Demonstration	Data Collection System PASPORT Weather Sensor PASPORT Sensor Extension Cable <i>Gallon size self-sealing bag</i> <i>Small potted plant</i> <i>Aluminum foil, 12 in. x 18 in.</i> <i>Tape</i>	1 1 1 1 1 1 1 roll
	Student or Group	Data Collection System PASPORT Weather Sensor PASPORT Sensor Extension Cable <i>Gallon size self-sealing bag, 1 or 2 depending on plant size</i> <i>Small potted plant</i> <i>Aluminum foil, 12 in. x 18 in.</i> <i>Water, tap (for moistening plant soil)</i> <i>Tape</i>	1 1 1 1 or 2 1 1 ~100 mL 1 roll
12	Venous Blood Flow Use a heart rate sensor to measure students' heart rate while standing, lying flat, and lying flat with both legs raised.		
	Teacher Demonstration	Data Collection System PASPORT Heart Rate Sensor, hand grip PASPORT Sensor Extension Cable	1 1 1
	Student or Group	Data Collection System PASPORT Heart Rate Sensor, hand grip PASPORT Sensor Extension Cable <i>Long, sturdy table or athletic board</i> <i>Pillows or thick books</i> Meter stick	1 1 1 1 2 1
13	Yeast Growth Use a temperature sensor and absolute pressure sensor to measure the change in pressure inside a flask of fermenting yeast cells at two different temperatures.	Data Collection System	1
		PASPORT Absolute Pressure Sensor	1
		PASPORT Temperature Sensor*	1
		PASPORT Sensor Extension Cable	1
		<i>Beaker, 200 mL</i>	1
		<i>Erlenmeyer flask, 250 mL,</i>	2
		Plastic tubing with quick-release and barbed connectors	1
		Balance	1 per class
		<i>Rubber stopper with one hole</i>	1
		<i>Yeast</i>	1 tsp
		<i>Sugar</i>	2 tsp
		<i>Tap water</i>	~200 mL
		<i>Apron</i>	1
<i>Glycerin</i>	1 drop		

* Either the PASPORT Fast Response Temperature Sensor or the PASPORT Stainless Steel Temperature Sensor can be used for this activity.

Calibration materials

If you want to calibrate various sensors, you will need the following:

pH Sensor

Item	Quantity	Where Used
Buffer solution, pH 4	25 mL	13
Buffer solution, pH 10	25 mL	
Beaker, small	3	
Wash bottle with deionized or distilled water	1	

Activity by PASCO Sensors

This list shows the sensors and other PASCO equipment used in the lab activities.

Items Available from PASCO	Qty	Activity Where Used
Data Collection System	1	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13
Mobile Data Collection System	1	8
PASPORT Absolute Pressure Sensor	1	3, 6, 13
PASPORT Fast Response Temperature Sensor	1	10
PASPORT Force Sensor	1	5
PASPORT Heart Rate Sensor	1	7, 12
PASPORT Light Sensor	1	6
PASPORT pH Sensor	1	1, 2, 4, 8, 9
PASPORT Temperature Sensor*	1	8, 9
PASPORT Weather Sensor	1	11
PASPORT Sensor Extension Cable	1	6, 11, 12, 13

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