

MASTER MATERIALS AND EQUIPMENT LIST

Items available from PASCO include a part number. The quantity indicated is per student group. Materials required to complete Extension activities are not included as material lists are meant to be student-designed. The activities may also require protective gear for each student (for example, safety goggles, gloves, apron, or lab coat). Protective gear is not included in this list.

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

Lab	Title	PASCO Part #	Materials and Equipment	Qty
1A	ENZYME ACTION (PRESSURE SENSOR)	PS-3203	Data collection system	1
			PASCO Wireless Pressure Sensor with included accessories: connectors, tubing, one-hole stopper, and sampling bottle	1
			Pipet, 1-mL	1
			Graduated cylinder, 25-mL	1
			1.5% Hydrogen peroxide	40 mL
	Catalase suspension (yeast solution)	2.0 mL		
1B	ENZYME ACTION (OXYGEN SENSOR)	PS-3217	Data collection system	1
			PASCO Wireless Oxygen Gas Sensor with included sampling bottle	1
			Graduated cylinder, 25-mL	1
			Pipet, 1-mL	1
			1.5% Hydrogen peroxide (H ₂ O ₂)	20 mL
	Catalase suspension prepared from dried bakers' yeast	2 mL		
2	MEMBRANE PERMEABILITY	PS-3204	Data collection system	1
			PASCO Wireless pH Sensor	1
			Beaker, 250-mL	1
			Graduated cylinder, 10-mL	1
			Graduated cylinder, 25-mL	1
			Graduated cylinder, 100-mL	1
			ME-9355 Ring stand or base and support rod	1
			PS-3505 Test tube clamp or electrode support	2
			SE-7700 Magnetic stirrer with magnetic stir bar	1
			Lugol's iodine	25 drops
			0.1 M Hydrochloric acid (HCl)	15 mL
			0.1 M Sodium hydroxide (NaOH)	15 mL
			10% Starch solution	5 mL
			Dialysis tubing, 1" diameter, 15-cm length	2
			Rinse bottle filled with distilled water	1
	Distilled water	250 mL		
	Binder clip	1		
	String, 10-cm length	2		

Lab	Title	PASCO Part #	Materials and Equipment	Qty
3	ORGANISMS AND PH	PS-3204	Data collection system PASCO Wireless pH Sensor Beakers, 50-mL Graduated cylinder, 25-mL Stirring rod Disposable pipets Wash bottle filled with distilled water Lemon juice Detergent solution Distilled water Buffer solution Liver suspension Marking pen	1 1 6 1 1 2 1 10 mL 10 mL 50 mL 50 mL 50 mL 1
4	Osmosis	PS-3203 PS-3203 SE-8823A ME-9355 SE-9445	Data collection system PASCO Wireless Pressure Sensor Connector with 2" piece of tubing attached Balance (Readability: 0.01 g) Beaker, 400-mL Graduated cylinder, 10-mL Graduated cylinder, 100-mL Funnel Ring stand or base and support rod Test tube clamp or three-finger clamp Dialysis tubing, 1" diameter, 15-cm length Thread or dental floss, 10-cm length Syrup (maple or corn) Distilled water Wash bottle filled with distilled water Paper towels	1 1 1 1 1 1 1 1 1 1 2 4 10 mL 650 mL 1 As needed
5	Plant Respiration and Photosynthesis	PS-3208	Data collection system PASCO Wireless Carbon Dioxide Gas Sensor with sampling bottle CFL or LED light source (800 lumens) Aluminum foil, 30 cm × 30 cm sheet Fresh spinach leaves	1 1 1 1 1-2
6	Respiration of Germinating Seeds	PS-3208	Data collection system PASCO Wireless Carbon Dioxide Gas Sensor with sampling bottle Beaker or cup, 250-mL Ice Zip seal sandwich bag Dry, dormant seeds (such as beans or peas) Soaked, germinating seeds (room temperature) Soaked, germinating seeds (chilled)	1 1 1 1 cup 1 ~25 mL ~25 mL ~25 mL

Lab	Title	PASCO Part #	Materials and Equipment	Qty
7	BUFFERS IN BIOLOGICAL SYSTEMS	PS-3204 ME-9355 PS-3505 SE-7700	Data collection system PASCO Wireless pH Sensor Beaker, 250-mL Graduated cylinder, 10-mL Graduated cylinder, 100-mL Ring stand or base and support rod Test tube clamp or electrode support Magnetic stirrer with magnetic stir bar Club soda Vinegar (5% acetic acid) Distilled water Wash bottle filled with distilled water	1 1 1 1 1 1 1 1 100 mL 20 mL 100 mL 1
8	ACID RAIN	PS-3204	Data collection system PASCO Wireless pH Sensor Graduated cylinder, 25-mL Beaker or cup, 50-mL Beaker, 500-mL Stirring rod Disposable pipets, 1-mL Storage containers for "acid rain", ~500 mL Wash bottle filled with distilled water Baking soda (NaHCO ₃) Sodium bisulfite (NaHSO ₃) 0.025 M Sulfuric acid (H ₂ SO ₄) Vinegar (5% acetic acid) Distilled water Small potted plants (such as daisies, petunias, philodendrons, bean plants, and similar-sized plants) Scissors Marking pen Tape or labels	1 1 1 1 1 1 6 2 1 Small container Small container 15 mL Small container 400 mL As needed 1 1 As needed
9	CELLULAR RESPIRATION IN YEAST	PS-3224 PS-3222 PS-3401	Data collection system PASCO Wireless Optical Dissolved Oxygen Sensor PASCO Wireless Temperature Link with Fast Response Temperature Probe Beakers, 250-mL Beaker, 1-L Graduated cylinder, 25-mL Graduated cylinder, 100-mL Stirring rod Hot plate Activated yeast suspension (3 packets of active dry yeast and 5 g of sugar dissolved in 450 mL of warm distilled water) Distilled water Ice Marking pen Wash bottle filled with distilled water	1 1 1 3 1 1 1 1 1 1 45 mL 600 mL 300 mL 1 1

Lab	Title	PASCO Part #	Materials and Equipment	Qty
10	ENERGY CONTENT OF FOOD	PS-3222 ME-9355 SE-9445 SE-8823A	Data collection system	1
			PASCO Wireless Temperature Link with Fast Response Temperature Probe	1
			Graduated cylinder, 100-mL	1
			Ring stand or base and support rod	1
			Test tube clamp or three-finger clamp	1
			Balance (Readability: 0.01 g)	1
			Distilled water	100 mL
			Wooden splints	4
			Matches or lighter	As needed
			Large steel paper clips	2
			Aluminum cans, 12-oz	2
			Cardboard, 10 cm × 10 cm	1
			Tape	As needed
			Whole nut such as a cashew or peanut	1
Large marshmallow	1			
11	METABOLISM OF YEAST	PS-3208 SE-8823A	Data collection system	1
			PASCO Wireless Carbon Dioxide Gas Sensor with sampling bottle	1
			Balance (Readability: 0.01 g)	1
			Beaker, 250-mL	1
			Graduated cylinder, 10-mL	1
			Graduated cylinder, 100-mL	1
			Scoopula	1
			Stirring rod	1
			Weighing dish	1
			Sodium sulfite (Na ₂ SO ₃)	0.15 g
			Active yeast suspension	10 mL
			Sugar water	150 mL
Wash bottle filled with distilled water	1			
12	PHOTOSYNTHESIS OF AQUATIC PLANTS	PS-3224 PS-2521B SE-7700	Data collection system	1
			PASCO Wireless Optical Dissolved Oxygen Sensor	1
			Photosynthesis tank or similar setup	1
			Magnetic stirrer with magnetic stir bar	1
			Lamp with CFL or LED 100-W equivalent bulb	1
			Heavy cloth, 50 cm × 50 cm	1
			Leafy freshwater aquatic plant such as <i>Elodea</i> sp. or hornwort, in dechlorinated water	Several sprigs
13	SOIL PH	PS-3204	Data collection system	1
			PASCO Wireless pH Sensor	1
			Beakers, 250-mL	3
			Graduated cylinder, 100-mL	1
			Stirring rod	1
			Tablespoon	1
			Digging tool such as a hand trowel	1
			Zip seal plastic sandwich bags	3
			Soil samples, 6 Tbsp. each	3
			Distilled water	200 mL
			Marking pen	1
			Wash bottle filled with distilled water	1
			Paper towels	As needed

Lab	Title	PASCO Part #	Materials and Equipment	Qty		
14	TRANSPIRATION		Data collection system	1		
		PS-3203	PASCO Wireless Pressure Sensor with tubing and sensor connector	1		
		PS-3203	Syringe with tubing and connector	1		
		ME-9355	Ring stand or base and support rod	1		
		SE-9445	Utility clamps or three-finger clamps	2		
			Test tube clamp or thermometer clamp	1		
			Large tub or bucket	1		
			Fan	1		
			Scissors	1		
			Metric ruler	1		
			Round toothpick	1		
			Modeling clay (if using test tube clamp)	1		
			Petroleum jelly	~3 g		
			Glycerin	1 mL		
	Plant sample containing numerous leaves	1				
15	WATER AND PH		Data collection system	1		
		PS-3204	PASCO Wireless pH Sensor	1		
		PS-3210	PASCO Wireless Conductivity Sensor	1		
			Beakers, 250-mL	5		
			Graduated cylinder, 100-mL	1		
			Stirring rod	1		
			Disposable pipet	1		
			Drink bottles with screw-top caps, ~250-mL	3		
		SC-2321	Buffer solution, pH 4 and pH 10	1 of each		
			Dilute vinegar solution	200 mL		
			Distilled water	200 mL		
			Freshwater samples, 250 mL of each	3		
			Marking pen	1		
			Rinse bottle filled with distilled water	1		
16	WATER PURIFICATION		Data collection system	1		
		PS-3204	PASCO Wireless pH Sensor	1		
		PS-3210	PASCO Wireless Conductivity Sensor	1		
			Erlenmeyer flask, 250-mL	1		
			Beakers, 250-mL	3		
			Funnel with short stem to fit flask	1		
			Stirring rod	1		
			Coffee filters	2		
		SC-2321	Buffer solution, pH 4 and pH 10	1 of each		
			Egg whites	5 mL		
			Polluted water sample	600 mL		
			Wash bottle filled with distilled water	1		
		17	WEATHER IN A TERRARIUM		Data collection system	1
				PS-3209	PASCO Wireless Weather Sensor	1
	Beaker, 250 mL			1		
	Terrarium or suitable alternative			1		
18	EKG: FACTORS THAT AFFECT THE HEART		Data collection system	1		
		PS-3200	PASCO interface such as a Wireless Airlink	1		
		PS-2111	PASCO PASport EKG Sensor	1		
		PS-2111*	Electrode patches*	3		
			Rubbing alcohol	As needed		
	Paper towels	As needed				

*Single-use; limited supply included with sensor. The part number for ordering is found in the Activity by PASCO Sensors and Equipment table.

Lab	Title	PASCO Part #	Materials and Equipment	Qty
19	EXERCISE AND HEART RATE	PS-3206	Data collection system	1
			PASCO Wireless Hand Grip Heart Rate Sensor	1
			Paper towels	As needed
20	EXERCISE AND BLOOD PRESSURE	PS-3218	Data collection system	1
			PASCO Wireless Blood Pressure Sensor	1
21	MUSCLE STRENGTH	PS-3203	Data collection system	1
			PASCO Wireless Pressure Sensor with connectors, tubing, and syringe	1
22	REGULATION OF BODY HEAT	PS-3222	Data collection system	1
			PASCO Wireless Temperature Link with Fast Response Temperature Probe	2
			Standard alcohol thermometer	1
			Large bowl or shallow pan	1
			Adhesive bandages or medical tape	2, or 4 cm
			Fan	1
			Ice	As needed
Paper towels	As needed			
23	VOLUME OF BREATH	PS-3200 PS-2152 PS-2152*	Data collection system	1
			PASCO interface such as a Wireless Airlink	1
			PASCO PASport Spirometer	1
			Spirometer mouthpiece*	1
			Stopwatch or timer	

*Single-use; limited supply included with sensor. The part number for ordering is found in the *Activity by PASCO Sensors and Equipment* table.

ACTIVITY BY PASCO SENSORS AND EQUIPMENT

This table indicates which lab activity uses the sensors or special equipment listed. Consumable PASCO item replacement information is also listed. The quantity indicated is per student group, and the second table identifies each lab investigation by activity number.

PASCO Part #	PASCO Sensor or Equipment Name	Qty	Activity # Where Used
PS-3200	PASCO Wireless Airlink Interface*	1	18, 23
PS-3218	PASCO Wireless Blood Pressure Sensor	1	20
PS-3208	PASCO Wireless Carbon Dioxide Gas Sensor	1	5, 6, 11
PS-3210	PASCO Wireless Conductivity Sensor	1	15, 16
PS-2111	PASCO PASPort EKG Sensor* (includes 100 electrode patches)	1	18
CI-6620	Replacement EKG Sensor Electrode Patches (100-pack)		
PS-3206	PASCO Wireless Hand Grip Heart Rate Sensor	1	19
PS-3224	PASCO Wireless Optical Dissolved Oxygen Sensor	1	9, 12
PS-3217	PASCO Wireless Oxygen Gas Sensor	1	1B
PS-3204	PASCO Wireless pH Sensor	1	2, 3, 7, 8, 13, 15, 16
SC-3507	Replacement pH Sensor Electrode Storage Solution (500 mL)		
SC-2321	pH Buffer Capsule Kit (for pH sensor calibration solutions)		
PS-2521B	PASCO Photosynthesis Tank	1	12
PS-3202	PASCO Wireless Pressure Sensor	1	1A, 4, 14, 21
PS-2152	PASCO PASPort Spirometer* (includes 2 mouthpieces)	1	23
PS-2522	Replacement Spirometer Mouthpieces (10-pack)		
PS-3222	PASCO Wireless Temperature Link & Fast Response Temperature Probe	1	9, 10
PS-3222	PASCO Wireless Temperature Link & Fast Response Temperature Probe	2	22
PS-3209	PASCO Wireless Weather Sensor	1	17

* A PASCO interface such as the Wireless Airlink (PS-3200) is required for use with the PASPort EKG sensor (PS-2111) and the PASPort Spirometer (PS-2152).

Activity #	Title	Activity #	Title
1A	Enzyme Action (Pressure Sensor)	12	Photosynthesis of Aquatic Plants
1B	Enzyme Action (Oxygen Sensor)	13	Soil pH
2	Membrane Permeability	14	Transpiration
3	Organisms and pH	15	Water and pH
4	Osmosis	16	Water Purification
5	Plant Respiration and Photosynthesis	17	Weather in a Terrarium
6	Respiration of Germinating Seeds	18	EKG: Factors that Affect the Heart
7	Buffers in Biological Systems	19	Exercise and Heart Rate
8	Acid Rain	20	Exercise and Blood Pressure
9	Cellular Respiration in Yeast	21	Muscle Strength
10	Energy Content of Food	22	Regulation of Body Heat
11	Metabolism of Yeast	23	Volume of Breath