MASTER MATERIALS AND EQUIPMENT LIST

This Master Materials and Equipment List shows the equipment required to perform the *Structured* version of each lab activity from the *Advanced Physics 1 through Inquiry* lab manual. Italicized entries indicate items not available from PASCO. The quantity indicated is per student or group.

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 Teacher Support (800-772-8700 inside the United States or http://www.pasco.com/support).

Lab	Title	Materials and Equipment	PASCO Part Number	Qty
1	GRAPHICAL ANALYSIS: MOTION Students use a motion sensor to measure the position and velocity of a cart on a track to determine the graphical relationship between position, velocity, and acceleration versus time graphs.	FOR EACH STUDENT STATION Data Collection System PASPORT Motion Sensor PASCO PAStrack PASCO PAScar Four Scale Meter Stick Thick Text Book	PS-2103A ME-6960 ME-6950 SE-8695	1 1 1 1 1
2	Newton's Second Law Students use a motion sensor to determine the relationship between a system's mass, acceleration, and the net force being applied to the system.	FOR EACH STUDENT STATION Data Collection System PASPORT Motion Sensor PASCO PAStrack PASCO PAScar PASCO Dynamics Track End Stop PASCO Super Pulley with Clamp* PASCO 250-g Compact Cart Mass PASCO Mass and Hanger Set Thread FOR THE ENTIRE CLASS Ohaus Scout Pro Balance 2,000-g	PS-2103A ME-6960 ME-6950 ME-8971 w/ME-9433 ME-6755 ME-8979 ME-9875	1 1 1 1 1 2 1 1 m
3	ATWOOD'S MACHINE Students use a photogate and pulley system to determine the mathematical relationship between the acceleration of an Atwood's machine, the difference between its two masses, and the sum of those two masses.	FOR EACH STUDENT STATION Data Collection System PASCO Smart Gate PASCO Super Pulley with Mounting Rod* PASCO Mass and Hanger Set PASCO Aluminum Table Clamp 60-cm Stainless Steel Rod Right Angle Clamp Thread Scissors	PS-2180 w/ME-9433 ME-8979 ME-8995 ME-8977 SE-9444 ME-9875	1 1 1 1 1 1 1 m 1

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Lab	Title	Materials and Equipment	PASCO Part Number	Qty
4	COEFFICIENTS OF FRICTION	FOR EACH STUDENT STATION		
	Students use a motion sensor and	Data Collection System		1
	a force sensor to determine the static and kinetic friction	PASPORT Motion Sensor	PS-2103A	1
	coefficients between two	PASPORT High Resolution Force Sensor w/hook	PS-2189	1
	contacting surfaces.	PASCO Discover Friction Accessory tray	ME-8574	1
	g	PASCO 250-g Cart Mass* Thread	w/ME-6950	5
		Inread	ME-9875	1 m
		FOR THE ENTIRE CLASS		
		Ohaus Scout Pro Balance 2,000-g	SE-8757A	1
5	TWO DIMENSIONAL MOTION:	FOR EACH STUDENT STATION		
	PROJECTILES	Data Collection System		1
	Students use a photogate and mini	PASCO Smart Gate	PS-2180	1
	launcher to measure the variables	PASCO Photogate Mounting Bracket	ME-6821A	1
	that affect the two-dimensional motion of a projectile launched	PASCO Mini Launcher w/bracket	ME-6825A	1
	horizontally, and then use those	Mini launcher loading rod*	w/ME-6825A	1
	variables to accurately predict and	Steel ball, 1.6-cm diameter*	w/ME-6825A	1
	test the projectile's horizontal	Large C Clamp	SE-7285	1
	range.	Four Scale Meter Stick	SE-8695	1
		Carbon Paper	SE-8693	3 sheets
		White Paper, sheet		1 sheet
		Cardboard, 10"x10" Square		1
6	CONSERVATION OF MECHANICAL	FOR EACH STUDENT STATION		
	ENERGY	Data Collection System		1
	Students use a photogate and	PASCO Smart Gate	PS-2180	1
	dynamics system to explore how a	PASCO Photogate Bracket-IDS	ME-9806	1
	cart's kinetic energy, gravitational potential energy, and total	PASCO PAStrack	ME-6960	1
	mechanical energy changes as it	PASCO PAScar	ME-6950	1
	rolls down an inclined track.	PASCO Pivot Clamp-IDS	ME-9810	1
		PASCO Cart Picket Fence-IDS	ME-9804	1
		PASCO Angle Indicator	ME-9495A	1
		PASCO Dynamics Track End Stop	ME-8971	1
		PASCO Aluminum Table Clamp	ME-8995 ME-8736	1
		Rod, 45-cm Four Scale Meter Stick	ME-8736 SE-8695	1 1
		Four Scale Meter Stick	SE-9099	1
		FOR THE ENTIRE CLASS		
		Ohaus Scout Pro Balance 2,000-g	SE-8757A	1
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S d r k e c c d o e r	dynamics system to investigate the relationship between the change in scinetic energy of an object experiencing a non zero net conservative force and the work done by that net force on the object, and then use their data to establish a measurement-based	FOR EACH STUDENT STATION Data Collection System PASCO Smart Gate PASCO Photogate Bracket-IDS PASCO PAStrack PASCO PAScar PASCO Pivot Clamp-IDS PASCO Cart Picket Fence-IDS PASCO Angle Indicator PASCO Dynamics Track End Stop	PS-2180 ME-9806 ME-6960 ME-6950 ME-9810 ME-9804 ME-9495A	1 1 1 1 1 1
d r k e c d o e	dynamics system to investigate the relationship between the change in kinetic energy of an object experiencing a non zero net conservative force and the work done by that net force on the object, and then use their data to establish a measurement-based relationship between work and	PASCO Smart Gate PASCO Photogate Bracket-IDS PASCO PAStrack PASCO PAScar PASCO Pivot Clamp-IDS PASCO Cart Picket Fence-IDS PASCO Angle Indicator	ME-9806 ME-6960 ME-6950 ME-9810 ME-9804	1 1 1 1
r k e c d o e	relationship between the change in stinctic energy of an object experiencing a non zero net conservative force and the work done by that net force on the object, and then use their data to establish a measurement-based relationship between work and	PASCO Photogate Bracket-IDS PASCO PAStrack PASCO PAScar PASCO Pivot Clamp-IDS PASCO Cart Picket Fence-IDS PASCO Angle Indicator	ME-9806 ME-6960 ME-6950 ME-9810 ME-9804	1 1 1
k e c d o e	experiencing a non zero net conservative force and the work done by that net force on the object, and then use their data to establish a measurement-based relationship between work and	PASCO PAStrack PASCO PAScar PASCO Pivot Clamp-IDS PASCO Cart Picket Fence-IDS PASCO Angle Indicator	ME-6960 ME-6950 ME-9810 ME-9804	1 1 1
e d o e	experiencing a non zero net conservative force and the work done by that net force on the object, and then use their data to establish a measurement-based relationship between work and	PASCO PAScar PASCO Pivot Clamp-IDS PASCO Cart Picket Fence-IDS PASCO Angle Indicator	ME-6950 ME-9810 ME-9804	1 1
d o e	conservative force and the work done by that net force on the object, and then use their data to establish a measurement-based relationship between work and	PASCO Pivot Clamp-IDS PASCO Cart Picket Fence-IDS PASCO Angle Indicator	ME-9810 ME-9804	1
d o e r	done by that net force on the object, and then use their data to establish a measurement-based relationship between work and	PASCO Cart Picket Fence-IDS PASCO Angle Indicator	ME-9804	
o e r	object, and then use their data to establish a measurement-based relationship between work and	PASCO Angle Indicator		1
r	relationship between work and		ME-9495A	-
	erationship between work and	PASCO Dynamics Track End Stop	ME 0071	1
k	kinetic energy.	DACCO Alaminam Table Clama	ME-8971 ME-8995	1 1
J		PASCO Aluminum Table Clamp Rod, 45-cm	ME-8995 ME-8736	1
		Four Scale Meter Stick	SE-8695	1
		Four Scale Meter Stick	SE-8099	1
		FOR THE ENTIRE CLASS		
		Ohaus Scout Pro Balance 2,000-g	SE-8757A	1
	Conservation of Momentum	FOR EACH STUDENT STATION		
	Students use a motion sensor and	Data Collection System		1
	dynamics system to demonstrate	PASPORT Motion Sensor	PS-2103A	2
	hat linear momentum and kinetic energy are conserved in an elastic	PASCO PAStrack	ME-6960	1
	collision, and linear momentum is	PASCO PAScar	ME-6950	2
C	conserved but kinetic energy is not conserved in an inelastic collision.	PASCO 250-g Cart Mass*	w/ME-6950	2
		FOR THE ENTIRE CLASS		
		Ohaus Scout Pro Balance 2,000-g	SE-8757A	1
		, ,		
	MOMENTUM AND IMPULSE	FOR EACH STUDENT STATION		
		Data Collection System		1
	orce sensor, and dynamics system	PASPORT Motion Sensor	PS-2103A	1
	o investigate the relationship	PASPORT High Resolution Force Sensor	PS-2189	1
	between the change in momentum of a cart undergoing a collision and	PASCO PAScar	ME-6950	1
	he impulse imparted to the cart to	PASCO PAStrack	ME-6960	1
	change its momentum, and then	PASCO Pivot Clamp-IDS	ME-9810	1
	use their data to establish a	PASCO Discover Collision Bracket	ME-8973	1
		PASCO Aluminum Table Clamp	ME-8995	1
	between change in momentum and mpulse.	Rod, 45-cm	ME-8736	1
		FOR THE ENTIRE CLASS		
		Ohaus Scout Pro Balance 2,000-g	SE-8757A	1

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Lab	Title	Materials and Equipment	PASCO Part Number	Qty
10	ROTATIONAL DYNAMICS	FOR EACH STUDENT STATION		
	Students use a rotary motion	Data Collection System		1
	sensor to determine the	PASPORT Rotary Motion Sensor	PS-2120	1
	mathematical relationship	PASCO Pendulum Accessory	ME-8969	1
	between torque, rotational inertia, and angular acceleration of a	PASCO Super Pulley with Clamp*	w/ME-9433	1
	rotating object.	PASCO Mass and Hanger Set	ME-8979	1
	lotating object.	PASCO Aluminum Table Clamp	ME-8995	1
		60-cm Stainless Steel Rod	ME-8977	1
		Four Scale Meter Stick	SE-8695	1
		Thread	ME-9875	2 m
		Stainless Steel Calipers	SF-8711	1
		Scissors		1
		FOR THE ENTIRE CLASS		
		Ohaus Scout Pro Balance 2,000-g	SE-8757A	1
11	ROTATIONAL STATICS	FOR EACH STUDENT STATION		
	Students use a force sensor and	Data Collection System		1
	tension protractor to demonstrate that the sum of the forces acting	PASPORT High Resolution Force Sensor w/rubber bumper	PS-2189	1
	on an object in static translational	PASCO Tension Protractor	ME-6855	2
	equilibrium is equal to zero, and	PASCO Aluminum Table Clamp	ME-8995	2
	the sum of the torques acting on	90-cm Stainless Steel Rod	ME-8738	1
	an object in static rotational equilibrium is equal to zero.	60-cm Stainless Steel Rod	ME-8977	2
	equilibrium is equal to zero.	Right Angle Clamp	SE-9444	2
		Hooked Mass Set	SE-8759	1
		Four Scale Meter Stick	SE-8695	1
		Thread	ME-9875	2 m
		Tape		1 roll
		AA-cell Battery or similar cylindrical object Scissors		1
12	PERIODIC MOTION: MASS AND	FOR EACH STUDENT STATION		
	SPRING	Data Collection System		1
	Students use a motion sensor to	PASPORT Motion Sensor	PS-2103A	1
	determine the physical properties	PASCO Demonstration Spring Set	ME-9866	1
	of a hanging mass and spring	PASCO Aluminum Table Clamp	ME-8995	1
	system that affect its period of oscillation, and then use their data	90-cm Stainless Steel Rod	ME-8738	1
	to support a mathematical model	Rod, 45-cm	ME-8736	1
	relating period, mass, and spring	Right Angle Clamp	SE-9444	1
	constant.	Hooked Mass Set	SE-8759	1
		Four Scale Meter Stick	SE-8695	1
		Tape		1 roll
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Lab	Title	Materials and Equipment	PASCO Part Number	Qty
13	SIMPLE PENDULUM Students use a photogate and pendulum to determine the physical properties of a simple pendulum that affect its period, and then use their data to support a mathematical model relating period to pendulum arm length.	FOR EACH STUDENT STATION Data Collection System PASCO Smart Gate PASCO Photogate Pendulum Set PASCO Pendulum Clamp PASCO Aluminum Table Clamp 90-cm Stainless Steel Rod Four Scale Meter Stick Thread Scissors FOR THE ENTIRE CLASS Ohaus Scout Pro Balance 2,000-g	PS-2180 ME-8752 ME-9506 ME-8995 ME-8738 SE-8695 ME-9875	1 1 1 1 1 1 2 m 1
14	RESONANCE AND STANDING WAVES Students use a resonance air column, tuning forks, and the principles of resonance and standing waves for a pipe with one closed end to experimentally determine a value for the speed of sound in air.	FOR EACH STUDENT STATION PASCO Resonance Air Column Tuning Fork Set Four Scale Meter Stick	WA-9606 SE-7342 SE-8695	1 1 1
15	DC CIRCUITS Students use a voltage—current sensor and an AC/DC electronics laboratory to construct simple resistor circuits with resistors in series or in parallel, or both (with at most one parallel loop of resistors), to demonstrate the validity of Kirchhoff's loop rule (conservation of energy), and Kirchhoff's junction rule (conservation of charge).	FOR EACH STUDENT STATION Data Collection System PASPORT Voltage Current sensor PASCO AC/DC Electronics Lab Kit 4-mm Banana Plug Patch Cord* 4-mm Banana Plug Alligator Clip* Resistor, 4.7-Ω* Resistor, 33-Ω* Resistor, 10-Ω* D-cell Battery	PS-2115 EM-8656 w/PS-2115 w/PS-2115 w/EM-8656 w/EM-8656	1 1 2 4 1 1 1

^{*} These items are included with the specific kit, apparatus, or sensor used in the experiment.

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ACTIVITY BY PASCO ITEM

This table indicates which lab activities use the PASCO scientific sensors or special equipment listed. The quantities shown indicate the number of each item required to complete all the activities that require the specified item.

Items Available from PASCO	PASCO Part Number	Qty	Activity Where Used			
PASCO SENSORS						
PASPORT High Resolution Force Sensor w/hook	PS-2189	1	4, 9, 11			
PASPORT Motion Sensor	PS-2103A	2	1, 2, 4, 8, 9, 12			
PASPORT Rotary Motion Sensor	PS-2120	1	10			
PASCO Smart Gate	PS-2180	1	3, 5, 6, 7, 13			
PASPORT Voltage Current sensor	PS-2115	1	15			
PASCO LABWARE	·					
PASCO 250-g Cart Mass*	w/ME-6950	5	4, 8			
PASCO 250-g Compact Cart Mass	ME-6755	2	2			
PASCO AC/DC Electronics Lab Kit	EM-8656	1	15			
PASCO Angle Indicator	ME-9495A	1	6, 7			
PASCO Aluminum Table Clamp	ME-8995	2	3, 6, 7, 9, 10, 11, 12, 13			
PASCO Cart Picket Fence-IDS	ME-9804	1	6, 7			
PASCO Demonstration Spring Set	ME-9866	1	12			
PASCO Discover Collision Bracket	ME-8973	1	9			
PASCO Discover Friction Accessory tray	ME-8574	1	4			
PASCO Dynamics Track End Stop	ME-8971	1	2, 6, 7			
PASCO Mass and Hanger Set	ME-8979	1	2, 3, 10			
PASCO Mini Launcher w/bracket	ME-6825A	1	5			
PASCO PAScar	ME-6950	2	1, 2, 6, 7, 8, 9			
PASCO PAStrack	ME-6960	1	1, 2, 6, 7, 8, 9			
PASCO Pendulum Accessory	ME-8969	1	10			
PASCO Pendulum Clamp	ME-9506	1	13			
PASCO Photogate Bracket-IDS	ME-9806	1	6, 7			
PASCO Photogate Mounting Bracket	ME-6821A	1	5			
PASCO Photogate Pendulum Set	ME-8752	1	13			
PASCO Pivot Clamp-IDS	ME-9810	1	6, 7, 9			
PASCO Resonance Air Column	WA-9606	1	14			
PASCO Super Pulley Kit	ME-9433	1	2, 3, 10			
PASCO Tension Protractor	ME-6855	2	11			
OTHER LABWARE						
45-cm Rod	ME-8736	1	6, 7, 9, 11, 12			
60-cm Stainless Steel Rod	ME-8977	2	3, 10, 11			
90-cm Stainless Steel Rod	ME-8738	1	11, 12, 13			
Carbon Paper	SE-8693	3 sheets	5			

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Items Available from PASCO	PASCO Part Number	Qty	Activity Where Used
Four Scale Meter Stick	SE-8695	1	1, 5, 6, 7, 10, 11, 12, 13, 14
Hooked Mass Set	SE-8759	1	11, 12
Large C Clamp	SE-7285	1	5
Ohaus Scout Pro Balance 2,000-g	SE-8757A	1	2, 4, 6, 7, 8, 9, 10, 13
Right Angle Clamp	SE-9444	2	3, 11, 12
Stainless Steel Calipers	SF-8711	1	10
Thread	ME-9875	9 m	2, 3, 4, 10, 11
Tuning Fork Set	SE-7342	1	14

^{*} These items are included with the specific kit, apparatus, or other sensor.

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