

# 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.	<b>FOR EACH STUDENT STATION</b> Data Collection System PASPORT Motion Sensor PASCO PAStrack PASCO PAScar Four Scale Meter Stick <i>Thick Text Book</i>	   PS-2103A ME-6960 ME-6950 SE-8695	   1 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.	<b>FOR EACH STUDENT STATION</b> 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  <b>FOR THE ENTIRE CLASS</b> Ohaus Scout Pro Balance 2,000-g	    PS-2103A ME-6960 ME-6950 ME-8971 w/ME-9433 ME-6755 ME-8979 ME-9875  SE-8757A	    1 1 1 1 1 1 2 1 1 m  1
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.	<b>FOR EACH STUDENT STATION</b> 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 <i>Scissors</i>	   PS-2180 w/ME-9433 ME-8979 ME-8995 ME-8977 SE-9444 ME-9875	   1 1 1 1 1 1 1 m 1

Lab	Title	Materials and Equipment	PASCO Part Number	Qty
4	COEFFICIENTS OF FRICTION Students use a motion sensor and a force sensor to determine the static and kinetic friction coefficients between two contacting surfaces.	<b>FOR EACH STUDENT STATION</b> Data Collection System PASPORT Motion Sensor PASPORT High Resolution Force Sensor w/hook PASCO Discover Friction Accessory tray PASCO 250-g Cart Mass* Thread  <b>FOR THE ENTIRE CLASS</b> Ohaus Scout Pro Balance 2,000-g	  PS-2103A PS-2189 ME-8574 w/ME-6950 ME-9875  SE-8757A	  1 1 1 1 5 1 m  1
5	TWO DIMENSIONAL MOTION: PROJECTILES Students use a photogate and mini launcher to measure the variables that affect the two-dimensional motion of a projectile launched horizontally, and then use those variables to accurately predict and test the projectile's horizontal range.	<b>FOR EACH STUDENT STATION</b> Data Collection System PASCO Smart Gate PASCO Photogate Mounting Bracket PASCO Mini Launcher w/bracket Mini launcher loading rod* Steel ball, 1.6-cm diameter* Large C Clamp Four Scale Meter Stick Carbon Paper <i>White Paper, sheet</i> <i>Cardboard, 10"x10" Square</i>	  PS-2180 ME-6821A ME-6825A w/ME-6825A w/ME-6825A SE-7285 SE-8695 SE-8693	  1 1 1 1 1 1 1 1 3 sheets 1 sheet 1
6	CONSERVATION OF MECHANICAL ENERGY Students use a photogate and dynamics system to explore how a cart's kinetic energy, gravitational potential energy, and total mechanical energy changes as it rolls down an inclined track.	<b>FOR EACH STUDENT STATION</b> 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 PASCO Aluminum Table Clamp Rod, 45-cm Four Scale Meter Stick  <b>FOR THE ENTIRE CLASS</b> Ohaus Scout Pro Balance 2,000-g	  PS-2180 ME-9806 ME-6960 ME-6950 ME-9810 ME-9804 ME-9495A ME-8971 ME-8995 ME-8736 SE-8695  SE-8757A	  1 1 1 1 1 1 1 1 1 1 1 1 1

Lab	Title	Materials and Equipment	PASCO Part Number	Qty
7	<b>WORK AND KINETIC ENERGY</b> Students use a photogate and 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 kinetic energy.	<b>FOR EACH STUDENT STATION</b> 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 PASCO Aluminum Table Clamp Rod, 45-cm Four Scale Meter Stick  <b>FOR THE ENTIRE CLASS</b> Ohaus Scout Pro Balance 2,000-g	  PS-2180 ME-9806 ME-6960 ME-6950 ME-9810 ME-9804 ME-9495A ME-8971 ME-8995 ME-8736 SE-8695  SE-8757A	  1 1 1 1 1 1 1 1 1 1 1 1 1
8	<b>CONSERVATION OF MOMENTUM</b> Students use a motion sensor and a dynamics system to demonstrate that linear momentum and kinetic energy are conserved in an elastic collision, and linear momentum is conserved but kinetic energy is not conserved in an inelastic collision.	<b>FOR EACH STUDENT STATION</b> Data Collection System PASPORT Motion Sensor PASCO PASTrack PASCO PAScar PASCO 250-g Cart Mass*  <b>FOR THE ENTIRE CLASS</b> Ohaus Scout Pro Balance 2,000-g	  PS-2103A ME-6960 ME-6950 w/ME-6950  SE-8757A	  1 2 1 2 2  1
9	<b>MOMENTUM AND IMPULSE</b> Students use a motion sensor, force sensor, and dynamics system to investigate the relationship between the change in momentum of a cart undergoing a collision and the impulse imparted to the cart to change its momentum, and then use their data to establish a measurement-based relationship between change in momentum and impulse.	<b>FOR EACH STUDENT STATION</b> Data Collection System PASPORT Motion Sensor PASPORT High Resolution Force Sensor PASCO PAScar PASCO PASTrack PASCO Pivot Clamp-IDS PASCO Discover Collision Bracket PASCO Aluminum Table Clamp Rod, 45-cm  <b>FOR THE ENTIRE CLASS</b> Ohaus Scout Pro Balance 2,000-g	  PS-2103A PS-2189 ME-6950 ME-6960 ME-9810 ME-8973 ME-8995 ME-8736  SE-8757A	  1 1 1 1 1 1 1 1 1 1

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Lab	Title	Materials and Equipment	PASCO Part Number	Qty
13	<b>SIMPLE PENDULUM</b> 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.	<b>FOR EACH STUDENT STATION</b> 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 <i>Scissors</i>  <b>FOR THE ENTIRE CLASS</b> Ohaus Scout Pro Balance 2,000-g	  PS-2180 ME-8752 ME-9506 ME-8995 ME-8738 SE-8695 ME-9875  SE-8757A	  1 1 1 1 1 1 1 2 m 1  1
14	<b>RESONANCE AND STANDING WAVES</b> 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.	<b>FOR EACH STUDENT STATION</b> PASCO Resonance Air Column Tuning Fork Set Four Scale Meter Stick	 WA-9606 SE-7342 SE-8695	 1 1 1
15	<b>DC CIRCUITS</b> 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).	<b>FOR EACH STUDENT STATION</b> 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- $\Omega$ * Resistor, 33- $\Omega$ * Resistor, 10- $\Omega$ * <i>D-cell Battery</i>	  PS-2115 EM-8656 w/PS-2115 w/PS-2115 w/EM-8656 w/EM-8656 w/EM-8656	  1 1 1 2 4 1 1 1 1

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

## 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
<b>PASCO SENSORS</b>			
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
<b>PASCO LABWARE</b>			
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
<b>OTHER LABWARE</b>			
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

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.