

PHYSICS CLASS MATERIALS LIST FOR BJ LINC/BJU PRESS DISTANCE LEARNING STUDENTS

Lab activities are expected nationally by colleges for students receiving high school credit in physics. It is our suggestion that if you are unable to provide the appropriate lab materials for the course, you do not offer it to your students. Your students will be frustrated if you attempt to use the BJ LINC program without lab materials. If you do choose to offer a non-lab course, it should be recorded on a transcript as Basic Physics. BJ LINC does not make adjustments on grade sheets for schools that do not offer labs. Contact the Physics instructor if you have questions regarding labs.

Suppliers of lab materials will be eager for your business. We do not suggest suppliers based upon whether or not they are the best, but rather because they are well known and because they have traditionally given reasonably good service. You will need to shop around in order to get the best price. If your order is of significant size, you can send it to several suppliers with a request that they submit a bid. Items listed below with supplier information are simply for the purpose of helping you find a typical item. The suppliers mentioned below have pictures in their catalogues of the item in question. Order a free catalogue, look at the picture of the item, and then compare the same item in catalogues from other suppliers. Order from the company that you feel best meets your needs. Many schools may have laboratory materials that will work in place of these suggested items. When in doubt, please call the class instructor ahead of time so that students will not be confused by unfamiliar equipment during the lab. You will assume the responsibility for instructing the students how to use any equipment that you substitute for the items suggested.

Items are listed in order of use:

Number Per Group	Item description (Listed in Order of Use)	Chapter(s) in Which the Item Is Used	Typical Item – from NASCO ¹⁵ unless specified otherwise
1 ea	Laboratory Balance ²	2, 7, 11, 15, 17	SB21355M
1 set	Specific Gravity Specimen Set (Includes four metal cylinders of identical size – copper, brass, steel, and aluminum) ³	2, 17	SB10371M
1 ea	Graduated Cylinder, 25 ml ¹	2, 15, 17	SB16308M
1 ea	Meter Stick ¹	2-4, 8-10, 12-14, 23	
1 ea	Acceleration Timer, Recording (DC) ⁴	3, 8, 11	SB19009M
1 set	Mass Set, hooked ¹³	3, 6, 10-11	SB37395M
1 ea	Inclined Plane ¹²	5, 6, 9, 11-12	Local
1 ea	Collision-in-Two-Dimension Apparatus ⁸	5	SB16605M
2 sheets	Carbon paper (2 sheets) ¹	5	Local
1 ea	Stopwatch ¹	5, 9, 12	TB14784M
2 ea	Dynamics Carts (with bumpers) ⁹	6, 11	SB26251M
1 ea	Force Table ¹⁰	6	Z19337M
1 ea	Centripetal Force Apparatus ⁷	7	SB16606M
2 ea	Springs ¹⁴	9	Local
2 ea	Double Tandem Pulley ¹	10 optional	SB10812M
1 ea	Spring Scale Metric (20 N x 0.5 N) ¹	10 optional	SB29121M
1 ea	Thermometer, Celsius, Non-Mercury ¹	14-15	SB14147M
1 ea	Boyle's Law Apparatus ⁴	14	SB16604M

Number Per Group	Item description (Listed in Order of Use)	Chapter(s) in Which the Item Is Used	Typical Item – from NASCO ¹⁵ unless specified otherwise
1 pkg	Pith Balls - Aluminum Coated with String; Pkg. of 6 ¹	18	SB29018M
1 kit	Friction Rod Kit ¹¹	18	SB13247M
1 ea	Hard Rubber Rod ¹¹	18	SB10573M
1 ea	Elenco Electronics Playground and Learning Center (No substitutes please) ⁵	20, 22	C & S Sales EP-50
1 ea	Digital Multimeter (DC Voltage, DC Amperage, and Resistance) ⁶	20, 22	C & S Sales M-1000B or better
1 ea	Magnetic Compass ¹	21	SB26081M
2 ea	Bar Magnet ¹	21	SB14309M
1 ea	Horseshoe Magnet ¹	21	SB16497(X)M
1 ea	Flat Mirror ¹	23	Home Training Tools OP-MIRROR4
1 ea	Semicircular Dish	24	Home Training Tools OP-REFRAC3

¹ This specific model is not required. Any model will work equally well.

² Most laboratory balances will work for physics experiments, but it must have sufficient capacity to weigh whatever you are using for dynamics carts.

³ The specific gravity specimen set is also called a specific heat specimen set. It is possible to use substitute items for this, but accuracy is sacrificed in doing so. Substitutes will be suggested by the instructor prior to the lab.

⁴ Substitutions for these items usually requires special instructions on use. If you are not familiar with the operation of substitute equipment, it would be best to order this model.

⁵ Please do not replace this item with substitutes. Students will be confused with other models.

⁶ Any multimeter that will measure DC voltage, DC current, and resistance will work with little or no additional instructions to the students.

⁷ This consists of a 6-inch-long, ¼-inch-diameter glass or plastic tube; a 48-inch string; a rubber stopper; and ten ½-inch washers. A plastic outer tube from a ball point pen works well for the tube. The rubber stopper can be replaced with any object about the size of a 1-inch cube of wood. Instructions will be given on air.

⁸ This can be made with a flexible plastic ruler that has a channel in the middle that will allow a marble to roll down it. The kit contains the channel, a marble, a string, and a weighted object to act as a plumb bob. Instructions will be given on the air.

⁹ Model SB10373M is of higher quality and may be worth the investment for traditional schools. Electric train cars and roller skates work well in place of dynamics carts.

¹⁰ Instructions will be given on the air for constructing a homemade model. It is a ¾-inch-thick piece of wood that is cut into a circle (about 18 inches across). Three pulleys (Nasco SB23793M or equivalent) are required for the home made model. Other parts are found around the home and require very little effort to find. If you order the commercial model of the force table, you do not need to order the mass set or the pulleys.

¹¹ This consists of various materials for static-electricity experiments (wool, fur, silk, rubber rod, plastic rod, glass rod, etc.). Substitute materials will be listed on the air. An additional rubber rod is needed.

¹² This is a length of ¾-inch board about 5 or 6 inches wide (wide enough for the roller skates or dynamics carts to roll down) and about 48 inches in length. Instructions will be given on the air and are also included in the lab book on page 51. This board is useful in several labs. A pulley is needed also. You can use one of the pulleys from the force table.

¹³ You can make your own mass set using plastic “baggies” filled with sand. You will need the balance to determine the proper masses. Instructions will be given on the air about this. The mass set included with the commercial force table is sufficient in place of these masses.

¹⁴ Two different springs are required. Springs are available from hardware or auto parts stores. The best springs should be about 1 to 2 inches in length and should oscillate easily with a suspended 200 g mass. Home Training Tools’ (MCSPRHook) springs work well.

¹⁵ Other suppliers of scientific supplies are listed below.

Items supplied by the student: Graph paper, protractor, metric ruler, and scientific calculator are all needed by each student. The Texas Instruments model *TI-83 Plus* is the preferred scientific calculator and is available from BJU Press [123257]. All of the TI-83 or TI-84 models are acceptable. Any calculator with basic trigonometric functions will work for most applications. However, some graphing and programming functions are covered in the class; and without at least one *TI-83 Plus* per lab group, students will miss out on some important materials. Some schools provide calculators as a part of a student science fee. In such cases, it works well to have at least one calculator per lab group.

Financing your science department: If you choose not to substitute or share equipment, the total cost for each group will be about \$700. Your cost can be as low as \$200 if you maximize your savings. Many of the items on the physics materials list are also for physical science or chemistry. Some parents who are interested in improving the science department of your school may be interested in funding your science supplies. A note to the school family regarding this has been successful for several schools. Most schools charge a student lab fee for advanced science courses to help defray the cost of science materials. Lab fees commonly range from \$50 to \$100 per student. Students often pay that much for basketball shoes! While it may not be possible to cover the cost of all physics supplies the first year, most of these supplies are reusable so that over a period of a couple of years, the cost could be retrieved. A typical lab group is three or four students. Your classroom does not need gas or running water.

Selected Sources of Scientific Supplies:

ARBOR, www.arborsci.com, 1-800-367-6695

CAROLINA BIOLOGICAL, www.carolina.com, 1-800-227-1150

C&S SALES, www.cs-sales.com, 1-800-292-7711

CYNMAR, www.cynmar.com, 1-800-223-3517

DAIGGER, www.daigger.com, 1-800-621-7193

FREY, www.freyscientific.com, 1-800-225-3739

FLINN, www.flinnsci.com, 1-800- 452-1261

HOME TRAINING TOOLS, www.HomeTrainingTools.com, 1-800-860-6272

KELVIN, www.kelvin.com, 1-800-535-8469

NASCO, www.eNASCO.com, 1-800-558-9595

PASCO, www.pasco.com, 1-800-772-8700

SARGENT WELCH, www.sargentwelch.com, 1-800-727-4368

SCIENCE KIT AND BOREAL LABS, www.sciencekit.com, 1-800-828-7777

Student Materials: Egolf, Terrance, Shumate, Linda, *Physics for Christian Schools*, Second Edition, Bob Jones University Press, Greenville, SC, 2004.

Egolf, Terrance, Seeley, Richard, Shumate, Linda, *Physics for Christian Schools, Laboratory Manual*, Second Edition, Bob Jones University Press, Greenville, SC, 2002.

***Teacher Materials:** Egolf, Terrance, Shumate, Linda, *Physics for Christian Schools*, Teacher's Edition, Second Edition, Bob Jones University Press, Greenville, SC, 2004.

Egolf, Terrance, Seeley, Richard, Shumate, Linda, *Physics for Christian Schools, Laboratory Manual*, Teacher's Edition, Second Edition, Bob Jones University Press, Greenville, SC, 2002.

* These materials are needed by both homeschool parents and facilitators. Some homeschool parents prefer to let the student use the Teacher's Edition to the textbook and do not order the student text. While this is not an ideal situation, it is workable.