



# 2014-2015 Science Supply List

Integrated Physics and Chemistry

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## UNIT 1: EXPLORATIONS IN PHYSICAL SCIENCE

Assignment Title	Project Summary	Video Demo	Materials Needed
Experiment: Making Observations	In this laboratory exercise, you will choose one peanut from a bowlful and make "identifying observations" about the peanut.	No	<ul style="list-style-type: none"> <li>bowl of peanuts in their shells - <b>NOTE: if allergic to peanuts substitute with another nut such as pistachios, walnuts, or almonds.</b></li> <li>various measuring tools (metric rulers, string, etc.)</li> <li>paper and pencil</li> </ul>
Experiment: Determining Volume	In this experiment, you will attempt to determine the volume of two objects using the formula method and the water displacement method.	No	<ul style="list-style-type: none"> <li>metric ruler</li> <li>small block of wood</li> <li>string</li> <li>water</li> <li>small rock</li> <li>graduated cylinder</li> </ul>
Experiment: Determining Density	In this lesson, you will determine the density of various coins.	No	<ul style="list-style-type: none"> <li>a few pennies, nickels, and quarters</li> <li>metric ruler</li> <li>metric balance</li> <li>scissors</li> </ul>
*Experiment: Density Column	In this experiment, you will work with several materials to indicate their relative densities.	Yes	<ul style="list-style-type: none"> <li>Karo syrup or molasses</li> <li>cooking oil</li> <li>red solution</li> <li>blue solution</li> <li>piece of paraffin</li> <li>raisin</li> <li>peanut or cashew</li> <li>paperclip</li> <li>small plastic cups</li> <li>eye droppers</li> <li>laboratory balance</li> <li>50-mL graduated cylinder (or larger)</li> </ul>
*Special Project	Special Project assignments are used by teachers to create their own projects if needed.	No	N/A

\*indicates alternate project/experiments

## UNIT 2: THE STRUCTURE OF MATTER

Assignment Title	Project Summary	Video Demo	Materials Needed
Experiment: Atomic Structure	In this experiment, you will have a chance to test the hypothesis that Ernest Rutherford used when determining the size of the nucleus.	No	<ul style="list-style-type: none"> <li>• large box (at least 40 to 50 cm along all sides)</li> <li>• small block of wood (around 6 to 8 cm along all sides)</li> </ul> <ul style="list-style-type: none"> <li>• 100 marbles or pellets (airsoft pellets work well)</li> <li>• ruler</li> </ul>
Experiment: Identifying an Unknown	In this experiment, you will use at least one physical test to try to determine the identity of the one of the elements.	No	<ul style="list-style-type: none"> <li>• metric balance</li> <li>• graduated cylinder</li> <li>• ruler</li> </ul> <ul style="list-style-type: none"> <li>• small paper cup containing one or more metal pieces (Your teacher will supply you with this.)</li> </ul>
Experiment: Separating a Mixture	In this laboratory activity, you will be given a mixture containing various substances. Your goal is to use the physical properties of the substances to separate the mixture into its various components.	No	<ul style="list-style-type: none"> <li>• mixture containing salt, iron filings, sand, gravel, and raisins</li> <li>• screens</li> <li>• funnel</li> </ul> <ul style="list-style-type: none"> <li>• filter paper (see diagram below for directions on use)</li> <li>• beakers</li> <li>• ring stand and ring</li> <li>• magnet</li> </ul>
*Special Project	Special Project assignments are used by teachers to create their own projects if needed.	No	N/A

\*indicates alternate project/experiments

## UNIT 3: MATTER AND CHANGE

Assignment Title	Project Summary	Video Demo	Materials Needed
Experiment: Graphing Changes of State	In this activity, you will observe the changes in water as it transforms from ice to liquid water and then begins to boil.	No	<ul style="list-style-type: none"> <li>coarsely crushed ice (about 8 ice cubes or enough to half fill a 500-mL beaker)</li> <li>string or wire</li> <li>Bunsen burner or hot plate (stove on low setting may be used)</li> <li>Pyrex beaker (use a small metal pan if a stove is used)</li> </ul> <ul style="list-style-type: none"> <li>Celsius thermometer</li> <li>ring stand with ring &amp; supports (see diagram)</li> <li>time piece with second hand</li> <li>digital camera (optional)</li> </ul>
Experiment: The Cabbage Indicator	In this experiment, you will test household substances for their acid-base character.	No	<ul style="list-style-type: none"> <li>sliced red cabbage</li> <li>stainless steel cooking container</li> <li>food strainer</li> <li>collection beaker</li> <li>coffee filter</li> <li>white vinegar</li> <li>baking soda (or ammonia)</li> <li>distilled water (for control)</li> <li>two pieces of notebook paper</li> </ul> <ul style="list-style-type: none"> <li>several small, clear plastic cups (3-oz [90-mL] bathroom cups work well for this purpose)</li> <li>at least 6 household liquids for testing (suggestions: clear soda-pop, clear shampoos or liquid soap solutions, clear or light-colored fruit or vegetable juices, rain from a recent storm, water with soil fertilizer dissolved in it, etc.)</li> </ul>
Experiment: Chemical Changes	In this activity, several changes will be made to samples of matter. Your challenge will be to decide if the change is physical or chemical. You will also have to defend your choice.	No	<ul style="list-style-type: none"> <li>small utility candle and holder</li> <li>matches</li> <li>metric balance</li> <li>3 small sheets of paper</li> <li>watch glass</li> <li>3 test tubes</li> </ul> <ul style="list-style-type: none"> <li>table salt (NaCl)</li> <li>calcium chloride (CaCl<sub>2</sub>)</li> <li>baking soda (NaHCO<sub>3</sub>)</li> <li>magnesium ribbon</li> <li>1M hydrochloric acid (muriatic acid)</li> </ul>
Experiment: Half-Life	In this laboratory activity, you will use candy to simulate the decay of a radioactive isotope. This investigation will demonstrate some of the basic principles of half-lives and radioactive decay.	No	<ul style="list-style-type: none"> <li>100 small candy pieces with printing or design on one side only (M&amp;M<sup>TM</sup>, Reese's pieces<sup>TM</sup>, etc.)</li> <li>resealable plastic bag or clean plastic box with lid</li> </ul> <ul style="list-style-type: none"> <li>sheet of wax paper, approximately 30 cm x 30 cm</li> <li>plastic knife</li> <li>plastic cup</li> <li>graph paper</li> </ul>
*Special Project	Special Project assignments are used by teachers to create their own projects if needed.	No	N/A

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## UNIT 4: STATES OF MATTER

Assignment Title	Project Summary	Video Demo	Materials Needed
Experiment: Comparing Hardness and Density of Solids	In this activity, you will compare several solids to determine if there is a relationship between the hardness of a sample and its density.	Yes	<ul style="list-style-type: none"> <li>at least six of the following solid samples (some are crystals, others amorphous): aluminum, amber, calcite, chalcopyrite, dolomite, feldspar (orthoclase or anorthite), fluorite, galena, gypsum, hematite, ice, iron, magnetite, mica (muscovite or biotite), pyrite, quartz, ulexite</li> <li>your own fingers (fingernails to be precise!)</li> </ul>
Experiment: Viscosity	In this laboratory activity, you will compare the viscosity of several liquids.	No	<ul style="list-style-type: none"> <li>egg carton</li> <li>scissors or nail</li> <li>several straws</li> <li>cardboard (for ramp)</li> <li>tape</li> <li>stopwatch or watch with second hand</li> <li>microwave</li> <li>beaker or measuring cup</li> </ul>
Experiment: Pressure in Gases	In this project, you will determine the air pressure in the tires of a car using an indirect method.	No	<ul style="list-style-type: none"> <li>a car and licensed driver</li> <li>the car manual (for information)</li> <li>air pressure gauge</li> </ul>
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## UNIT 5: MOTION AND FORCES

Assignment Title	Project Summary	Video Demo	Materials Needed
Experiment: Motion Graphs	In the first half of this project, your challenge is to design an experiment to determine the speed of a battery-powered toy car. In the second half of the project, you will do an experiment to determine whether or not a non-powered toy car is accelerating.	No	<ul style="list-style-type: none"> <li>• battery-powered toy car</li> <li>• non-powered toy car</li> <li>• meter stick</li> <li>• books to prop up ramp</li> <li>• long board (at least 2 meters) for ramp</li> <li>• stopwatches (one for each timer) or second hand on clock</li> </ul>
Experiment: Propulsion	In this activity, you will experiment with applications of Newton's third law.	No	<ul style="list-style-type: none"> <li>• balloon</li> <li>• empty soda pop can</li> <li>• sharp nail</li> <li>• hammer</li> <li>• fishing line or strong thread</li> <li>• bowl of water</li> </ul>
*Special Project	Special Project assignments are used by teachers to create their own projects if needed.	No	N/A

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## UNIT 7: WORK AND ENERGY

Assignment Title	Project Summary	Video Demo	Materials Needed
Experiment: Potential and Kinetic Energy	In this project, you will investigate the principles involved in the conversion of potential to kinetic energy due to the force of gravity. In addition, you will verify that the mechanical energy of one object can be transferred to another object.	No	<ul style="list-style-type: none"> <li>• cardboard tube (from gift wrap or paper towels)</li> <li>• box (cut from lightweight cardboard, such as a gift box, using the pattern below)</li> <li>• four marbles of different masses</li> <li>• meter stick</li> <li>• tape</li> <li>• scissors</li> <li>• book</li> <li>• metric balance</li> </ul>
Experiment: Inclined Planes	In this project, you will determine the IMA, AMA, and efficiency for inclined planes with different slopes.	No	<ul style="list-style-type: none"> <li>• smooth board</li> <li>• smooth block or other object to drag up the plane (approximately 200 to 500 grams)</li> <li>• meter stick</li> <li>• spring scale (calibrated in newtons)</li> <li>• string</li> <li>• books or blocks to support the inclined plane</li> </ul>
*Special Project	Special Project assignments are used by teachers to create their own projects if needed.	No	N/A

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## UNIT 8: HEAT FLOW

Assignment Title	Project Summary	Video Demo	Materials Needed
Experiment: Insulators	In this activity, you will compare the heat-retaining ability of several insulators.	No	<ul style="list-style-type: none"> <li>• large Styrofoam cup</li> <li>• small Styrofoam cup</li> <li>• flat piece of Styrofoam</li> <li>• thermometer</li> <li>• hot water</li> <li>• heat source for heating water</li> <li>• clock with second hand</li> </ul> <ul style="list-style-type: none"> <li>• at least two insulating materials (shredded newspaper, sheets of newspaper, bits of cloth, small Styrofoam peanuts, bubble wrap, feathers, aluminum foil, saw dust, etc.)</li> </ul>
Experiment: Heat and Expansion	In this project, you will investigate the phenomenon of thermal expansion.	No	<ul style="list-style-type: none"> <li>• beaker or pan for heating water</li> <li>• medium test tube</li> <li>• one-holed stopper to fit test tube</li> <li>• glass tube to fit through stopper</li> <li>• grease pencil</li> </ul> <ul style="list-style-type: none"> <li>• food coloring</li> <li>• hot plate for heating water</li> <li>• large round balloon</li> <li>• marker</li> <li>• tape measure</li> <li>• freezer</li> </ul>
*Special Project	Special Project assignments are used by teachers to create their own projects if needed.	No	N/A

\*indicates alternate project/experiments



**UNIT 9: ELECTRICITY AND MAGNETISM**

Assignment Title	Project Summary	Video Demo	Materials Needed
Experiment: Electrostatic Investigations	In this laboratory activity, you will investigate the principles of electrostatics using adhesive tape.	No	<ul style="list-style-type: none"> <li>clear adhesive tape</li> <li>plastic straw</li> </ul>
Experiment: Diverting a Magnetic Field	In this experiment, you will collect data to determine what materials are useful in diverting magnetic fields.	No	<ul style="list-style-type: none"> <li>strong disk magnet</li> <li>plastic drinking straw</li> <li>tape</li> <li>double-stick tape or glue</li> <li>paperclips</li> <li>cardboard from cereal or cake mix box</li> <li>test materials such as pennies, aluminum foil, an iron or steel nail, cardboard, crayons, a table knife, or a popsicle stick</li> <li>compass</li> <li>paper</li> </ul>
*Special Project	Special Project assignments are used by teachers to create their own projects if needed	No	N/A

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**UNIT 10: WAVES**

Assignment Title	Project Summary	Video Demo	Materials Needed
Experiment: Changing the Speed of a Wave	In this experiment, you will recognize the relationship between stiffness and density of the medium and the speed of a wave.	No	<ul style="list-style-type: none"> <li>plastic box</li> <li>paperclips</li> <li>2 sturdy rubber bands, large enough to stretch around the plastic box</li> </ul>
Experiment: Using Vibrations to Produce Sound	In this project, you will investigate how small changes in the structure of a sound-producing object can affect the pitch of the sound produced.	No	<ul style="list-style-type: none"> <li>a tuning fork</li> <li>wooden ruler</li> <li>plastic bowl (for water)</li> <li>3 test tubes (or 3 identical glass bottles with narrow mouths)</li> </ul>
Experiment: Law of Reflection	This activity will allow you to verify the law of reflection. In addition, you will learn a technique with which to analyze your results scientifically.	No	<ul style="list-style-type: none"> <li>laser pointer</li> <li>small rectangular or square plane mirror</li> <li>block of wood to support mirror</li> <li>sharp pencil</li> <li>protractor</li> <li>unlined paper</li> </ul>
*Special Project	Special Project assignments are used by teachers to create their own projects if needed.	No	N/A

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## UNIT 11: CHEMISTRY AND PHYSICS IN OUR WORLD

Assignment Title	Project Summary	Video Demo	Materials Needed
Experiment: Carbon Dioxide and Water Acidity	In this project, you will learn how carbon dioxide can affect the pH of water.	No	<ul style="list-style-type: none"> <li>• three 12-inch balloons</li> <li>• measuring tape</li> <li>• twist tie</li> <li>• bicycle tire air pump</li> <li>• CO<sub>2</sub> cartridge bicycle tire pump</li> </ul> <ul style="list-style-type: none"> <li>• one-hole stopper with glass tube inserted</li> <li>• four 100-mL beakers</li> <li>• 100-mL graduated cylinder</li> <li>• pH paper, acid range</li> </ul>
Experiment: Water Acidity and the Environment	In this project, you will test how acid affects a variety of materials.	No	<ul style="list-style-type: none"> <li>• sand paper</li> <li>• vinegar</li> <li>• fresh water</li> <li>• small jar with lid</li> <li>• several small paper or plastic cups or small beakers</li> </ul> <ul style="list-style-type: none"> <li>• materials to test:                             <ul style="list-style-type: none"> <li>• a raw egg</li> <li>• small sea shell</li> <li>• piece of coral</li> <li>• a penny (use sand paper to remove any surface build-up)</li> <li>• an iron or steel nail (use sand paper to remove any surface build-up)</li> <li>• chips of marble, concrete, brick</li> <li>• various rock samples (slate, limestone, quartz)</li> <li>• piece of chalk</li> <li>• small glass bead or other piece of glass</li> <li>• small plastic bead or other piece of plastic</li> </ul> </li> </ul>
Experiment: Kepler's Second Law	In this laboratory activity, you will use actual data from observations made of the orbit of Mercury to test Kepler's second law, also known as the law of equal areas.	No	<ul style="list-style-type: none"> <li>• centimeter graph paper</li> <li>• scissors</li> <li>• poster board</li> </ul> <ul style="list-style-type: none"> <li>• triple beam balance</li> <li>• centimeter ruler</li> <li>• tape</li> </ul>
*Special Project	Special Project assignments are used by teachers to create their own projects if needed.	No	N/A

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