monarch

Curriculum Catalog

Physics

Table of Contents

UNIT 1: KINEMATICS

Assignment	Summary	Video Demo	Supplies
Experiment: Making A Soda Straw Balance	In this experiment, you will experiment with using materials from around the house to make a fairly accurate instrument!	Yes	• 1 screw • 1 paper straw • 2 microscope slides • 1 needle • 1 ruler • 1 razor blade or scissors • 1 small wood block • 1 tongue depressor • 1 clothespin • paper
Experiment: Making a Simple Model of the Solar System	In this experiment, you will make a simple model of the solar system by using a roll of adding machine tape and a ruler or meter stick.	No	• 1 roll of adding machine tape • 1 ruler or meter stick • a pen or pencil
*Project: Tutorial for Making a Scatter Plot Using an Electronic Spreadsheet Program	In this project you will be designing a scatter plot (a type of line graph) based on information given to you in a data table.	No	• Microsoft© Excel©
Experiment: Determining Reaction Time	In this experiment, you will determine your reaction time for catching a free-falling object.	No	• a partner • metric ruler or meter stick
*Special Project	Use this Special Project template to create your own assignment for this unit.	No	N/A

UNIT 2: DYNAMICS

Assignment	Summary	Video Demo	Supplies
*Report: Isaac Newton	In this report, you will prepare a report on the life of Sir Isaac Newton.	No	• research resources
Project: Virtual Lab — Newton's Laws	Write a brief essay describing how Newton's Laws explain how a rocket in space can move objects.	V-Lab	N/A
Project: Virtual Lab — Circular Motion	In stand-alone loops on a roller coaster, the loops are teardrop shaped and not one complete circle. Write a brief essay as to why you think they are constructed that way.	V-Lab	N/A
Experiment: Circular Motion	In this experiment, you will test how well theory fits results as predicted by equations for centripetal motion, make and interpret graphs, and make valid conclusions concerning the data.	Yes	• glass or plastic tube (the barrel of a used stick pen can be used for this part) • string • 2 stoppers • alligator clip • paper clip • 10 washers • stopwatch
Project: Virtual Lab — Conservation of Momentum	Write a brief essay on the uses of momentum collisions in the sport of curling	V-Lab	N/A
*Experiment: Collisions	In this experiment, you will plan and implement an investigative procedure to verify the validity of the conservation of momentum laws, analyze data and present findings for peer review, research and compare to previous findings using similar mechanisms, and communicate results	No	• 2 carts (one with a spring) • 2 clamps • table, 1 1/2 m. long • 2 boards • meter stick • assorted standard masses
*Report: Solar System	Prepare an 800-word detailed report of the life and times of Johannes Kepler and the steps taken that led him to each of his planetary laws of motion.	No	• research resources
*Experiment: Kepler's Law	In this experiment, you will determine the validity of Kepler's Second Law.	No	• sharp pencil • small ruler
*Special Project	Use this Special Project template to create your own assignment for this unit.	N/A	N/A

UNIT 3: WORK AND ENERGY

Assignment	Summary	Video Demo	Supplies
*Report: Nuclear Energy	In this report, you will evaluate the impact of scientific research and technology on society and the environment and describe connections between the various branches of science involved in the nuclear question (physics, chemistry, and biology)	No	• research resources
Project: Virtual Lab — Simple Machines	Write a brief essay explaining why the efficiency of a complex machine decreases as more simple machines are used. Be sure to include a discussion on the Conservation of Energy in your explanation.	V-Lab	N/A
Experiment: Simple Machines	In this investigation you will use a lever as a simple machine and calculate its mechanical advantage and efficiency.	Yes	• meter stick • string • weights
Project: Virtual Lab — Projectiles	In this V-Lab you used a complex machine to launch a projectile with the ultimate goal of hitting a target. Assume you built a really big machine that could launch the projectile a “significant” distance; for instance, several hundred miles. Write a brief essay discussing the issues that would need to be accounted for with a projectile with that type of range.	V-Lab	N/A
*Experiment: Latent Heat	In this investigation you will determine an experimental value for the latent heat of fusion of water.	No	• aluminum calorimeter (or an aluminum tumbler and a Styrofoam cup) • analytical balance • paper towel • crushed ice • Celsius thermometer • cardboard lid
*Special Project	Use this Special Project template to create your own assignment for this unit.	N/A	N/A

UNIT 4: INTRODUCTION TO WAVES

Assignment	Summary	Video Demo	Supplies
Experiment: Wave Speeds	In this experiment, you will investigate the effect of the medium on wave speeds.	No	• Slinky® • stopwatch or sweep second hand • meter stick
*Experiment: Pulses	In this experiment, you will formulate a testable hypothesis concerning how pulses transfer energy, make qualitative observations, analyze and predict trends from data, and communicate conclusions	No	• Slinky®
Experiment: Waves	In this investigation you will observe the reflection of waves from a barrier in a ripple tank.	Yes	• ripple tank with dampers • high intensity light source • white paper • protractor • electrical wave generator • paraffin blocks • thick wooden dowel
* Experiment: Bending Waves	In this experiment, you will observe the bending of waves across the boundary between "different media" by using a submerged glass plate in the ripple tank to change the depth of the water.	No	• ripple tank • light source • white paper • wave generator • glass plate • washers • paraffin blocks
Project: Virtual Lab — Sound	From your experience in this lab on building your own musical instrument, write a brief essay on the purpose of these “boxes”.	V-Lab	N/A
Project: Virtual Lab — Doppler Effect	Write a brief essay describing how the Doppler effect explains why some stars are “blue shifted” and others are “red shifted.”	V-Lab	N/A
* Experiment: Doppler Effect	In this investigation you will observe the Doppler effect with water waves.	No	• ripple tank • light source • white paper • wave generator
*Special Project	Use this Special Project template to create your own assignment for this unit.	N/A	N/A

UNIT 5: LIGHT

Assignment	Summary	Video Demo	Supplies
Experiment: Light Angles	In this investigation you will study the angles that light makes as it is incident on a mirror.	Yes	• small purse-sized rectangular or square mirror • pencil • flashlight • sheet of paper • ruler • protractor • ball bearing
*Experiment: Water Refraction	In this investigation you will examine the refraction of light through water.	No	• semicircular plastic dish • ruler • protractor • 15 pins • sheet of graph paper • corrugated cardboard
Experiment: Convergence	In this investigation you will observe convergence of waves, using a ripple tank.	Yes	• ripple tank • rubber hose • wooden dowel • light source
Project: Virtual Lab — Light	Write a brief essay describing at least three ways the “Brownie” was made easier to use for the average citizen.	V-Lab	N/A
*Experiment: Light Observations	In this investigation you will observe light through a single narrow slit and measure the width of the slit and the frequency of light.	No	• razor blade • lamp • red filter • blue filter • meter stick • stand • liquid graphite • 2 glass slides
*Special Project	Use this Special Project template to create your own assignment for this unit.	N/A	N/A

UNIT 7: STATIC ELECTRICITY

Assignment	Summary	Video Demo	Supplies
*Experiment: Static Electricity	In this classic experiment you will actually witness the transfer of electrons from one object to another for yourself.	No	• glass wand • Bakelite (or hard rubber) wand • silk cloth • stand • pith ball • silk thread • wool cloth (or cat's fur)
*Special Project	Use this Special Project template to create your own assignment for this unit.	N/A	N/A

UNIT 8: ELECTRIC CURRENTS

Assignment	Summary	Video Demo	Supplies
*Project: Research and Report	In this project, you will research and describe the impact of early electrical theorists on the development of society, economics and technology	No	• research resources
*Special Project	Use this Special Project template to create your own assignment for this unit.	N/A	N/A

UNIT 9: MAGNETISM

Assignment	Summary	Video Demo	Supplies
*Experiment: Magnetic Fields	In this experiment you will be able to answer three questions about magnetic field lines.	No	• 2 bar magnets • 3 sheets of stiff cardboard • iron filings
*Experiment: Induced Magnetic Fields	In this investigation, you will determine the shape of the magnetic field around a long, straight wire.	No	• copper wire, about 1 m long • small porcelain lamp socket and bulb • wire cutter or 8-inch scissors • drycell • compass
*Special Project	Use this Special Project template to create your own assignment for this unit.	N/A	N/A

UNIT 10: ATOMIC AND NUCLEAR PHYSICS

Assignment	Summary	Video Demo	Supplies
*Report: Early Atomic Physics	In this report, you will research and describe the impact of early atomic theorists on the development of society, economics and technology	No	• research resources
*Special Project	Use this Special Project template to create your own assignment for this unit.	N/A	N/A

* indicates an alternative assignment