

Simple Machines with Fantastic Physics

MATERIALS LIST

Books and Tools used in this course:

The Way Things Work by David Macauley
The New Way Things Work by David Macauley
Can You Feel the Force? by Richard Hammond
Usborne: Energy, Forces & Motion
Usborne: Light, Sound & Electricity

K'nex building kits:
1) Levers & Pulleys, 2) Gears, 3) Wheels, Axles & Inclined Planes
Various household supplies for physics explorations (Scientific American)
The Way Things Work board game
Kano computer building kit OR CanaKit with raspberry pi

Supplies and Materials List for Explorations

as listed on the lesson plans

Term 1

K'nee Kits: Simple Machines

- Levers and Pulleys
- Gears
- Wheels, Axles and Inclined Planes

Gyroscope Toy

Items with Springs

- stapler
- click pen
- wind up toy that can be dissected (these can be found inexpensively in the party favor section of a store)

Phone Book Friction

- Two equal-size books (does not have to be a phone book) or two thick magazines, notepads or tablets of sticky notes

Explore Friction by Launching Stuff

- Rubber band
- Stack of five or six quarters
- Scotch tape
- Smooth wooden surface, such as a table or floor (if you do not have a wooden surface, you can use any other type of smooth countertop or table.)
- Rough carpeted surface (if you do not have access to carpet, you can tape down several paper towels on top of your smooth surface.)
- Ruler (optional)

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Term 2

Build a Hot Air Balloon

- Aluminum foil (for the basket)
- Birthday candles (for the fuel)
- Scissors
- ultra-thin garbage bag (like those lining office trash cans and those that dry cleaners use*)
- Plastic straws (for the frame)
- Clear tape
- Lighter
- Adult supervision and common sense
- Plenty of indoor space
- String (if flying your balloon in a space where it can travel beyond your reach)

Build a Paper Rocket

- Two pieces of paper
- Scissors
- Pencil
- Drinking straw
- Scotch tape
- Ruler
- Clear space in which to launch your "rockets," such as a large room, hallway or outdoor area with no wind
- Measuring tape (optional)

The Aerodynamics of a Flying Frisbee

- A Frisbee
- Long string or hose
- Large open area in which to toss a Frisbee
- Tape measure
- A helper (optional)
- A piece of paper and a pen or pencil (optional)

A Really Long Straw

- A package of plastic straws (at least one dozen), preferably those with a bendable part
- Scissors
- Ruler
- Tape
- Drinking glass filled with water
- Level surface that can get wet (or if not, something to protect it)
- Sturdy chair or table on which to stand

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How Does Temperature Affect a Rubber Band?

- Two-liter soda bottle
- Permanent marker
- Scissors
- Pencil
- Small, thin rubber band
- About 20 to 25 quarters
- Tape (any kind will work)
- Paper clip
- Hot tap water
- Ice cubes
- Large shallow bowl or pan
- Work area where it's easy to clean spills
- Dish towel or paper towels

Half Life Coins

- About 120 coins (this can be a mix of pennies, nickels, dimes and others)
- Resealable plastic bag
- Flat table top for counting coins
- Paper or notepad
- Pencil

Sound Science: Do, Re, Mi With Straws

- At least two plastic or paper drinking straws
- Scissors
- Piano, electronic keyboard or other musical instrument that can produce a scale of notes (optional)

Block Radio Waves

- Radio-controlled car and its corresponding remote control (both with working batteries)
- Cotton (such as a piece of clothing made from cotton)
- Aluminum foil
- Plastic wrap
- Wax paper
- Rubber glove
- A smooth, wide open space to test drive your radio-controlled car

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Term 3

Bend Water With Static Electricity

- Three small Styrofoam cups (alternatively, you can use two paper cups to hold the water and an inflated balloon to provide the static charge)
- Toothpick
- Water
- Someone with a head of clean, dry hair

Generate Electricity With a Lemon Battery

- At least two pennies
- Water
- A few drops of dishwashing soap
- Paper towels
- Aluminum foil (at least nine by 60 centimeters)
- Scissors
- Ruler
- At least one lemon (preferably with a thin skin)
- Plate
- Knife (and an adult's help when using it)
- At least two plastic-coated paper clips

Get the Iron Out of Your Breakfast Cereal

- Breakfast cereal that contains iron, such as fortified cornflakes (check the label to see how much iron each serving contains—the more the better!)
- Bowl and spoon (or mortar and pestle)
- Magnet (as strong as possible)
- White piece of paper
- Resealable zip-top bag (optional)
- Water (optional)

Centripetal Force Using Marbles and Jello

- Transparent plastic cups, at least four
- Scissors or one-hole puncher
- Duct tape or electrical tape
- String
- Cooking pot
- Measuring cup
- Stove
- Jell-O, two packages, each of a different color
- Refrigerator
- Marbles, at least three
- An open area outside
- Flashlight