Simple Machines with Fantastic Physics

MATERIALS LIST

Books and Tools used in this course:

| The Way Things Work by David Macauley | K'NEX building kits: |
| The New Way Things Work by David Macauley | 1) Levers & Pulleys, 2) Gears, 3) Wheels, Axles & Inclined Planes |
| Can You Feel the Force? by Richard Hammond | Various household supplies for physics explorations (Scientific American) |
| Usborne: Energy, Forces & Motion | The Way Things Work board game |
| Usborne: Light, Sound & Electricity | Kano computer building kit OR Canakit with raspberry pi |

Supplies and Materials List for Explorations
as listed on the lesson plans

Term 1

K'Nex 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

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