

# Materials List

## Chapter 1: Finding Your Way...

Measuring tape or meter stick  
Graph paper (see attached)  
Pencil  
Masking, electrical, or duct tape

## Chapter 2: Rollin', Rollin', Rollin'... Part 1 of 2

Two (2) wooden boards of 2+ meter length each or a single grooved section of paneling of similar length  
Measuring tape or meter sticks  
Marble, Ping Pong ball, etc  
Book  
Metronome (Many free versions can be found online at the time of this writing.)  
Camera (optional)

## Chapter 3: Rollin', Rollin', Rollin'... Part 2 of 2

Ramp from the previous lab  
Tape  
Stopwatch

## Chapter 4: Challenge Lab: Harmonious Washers

Metal plate, pan, or bowl  
3-5m string  
6-7 metal washers  
Measuring tape/ruler

## **Chapter 5: Extremes are easy. Strive for BALANCE!**

Meter stick

Two (2) 1000g/10N spring scales\*

Two (2) tables or chairs

Two (2) 20cm pieces of string

Dowel rod (to support the hanging spring scales)

Two sealable baggies containing 80 US pennies and one with 160 pennies

\*Educational Innovations has been the best place I have worked with over the years for equipment. I highly recommend that you check them out: [www.teachersource.com](http://www.teachersource.com)

## **Chapter 6: Internal Friction of Fluids**

3-4 "thick" and transparent liquids such as corn syrup, honey, glycerin, light molasses, etc.

One smooth-sided water bottle (~500mL or larger) for each of the liquids you will be using

One glass marble for each liquid

Marker

Ruler

Stopwatch

## **Chapter 7: Newtonian Rocketry**

Drinking straw

Heavy weight fishing/nylon line

Paper lunch bag

Balloon

Stopwatch

Tape

Measuring tape or meter stick

## Chapter 8: Modeling Trajectory

10 large washers

String

10 Paper clips

Meter stick

Masking tape

Clothes pin or other small clamp

Braided elastic band

\* Check out the sewing aisle of your local store; you will need a ~0.75m length of band with a thickness of ~1/4")

## Chapter 9: Challenge Lab: Calculate Momentum and Impulse

3-4 books

Ruler with grooved center

Glass marble

Ping Pong Ball

Stopwatch

Scissors

Tape

Cardstock

Smooth countertop

## Chapter 10: Marble Momentum

7-8 similar sized marbles or other balls

Two rulers with grooved centers or pieces of grooved paneling

Book

Tape

Split timer\*

\*Many versions can be found free online. Once this timer is running the user can mark and record individual times while the stopwatch continues to run. At the time of this writing you can find one at <https://www.online-stopwatch.com/split-timer/>

## **Chapter 11: Powering Up the Stairs**

Bathroom scale (optional)

Meter stick

Stopwatch

Access to stairs

## **Chapter 12: Conservation and the Pendulum**

Stopwatch

Tape

~3m fishing line or string

Meter stick

Protractor

10 pennies (~25g) taped together

## **Chapter 13: Newton's Solo Cup**

Clear plastic cup or Mason jar

String

Scissors

## **Chapter 14: Searching for the COG**

Scissors

3-4 index cards

String

Paper clip

Thumb tack or nail

Marker

Metal coat hanger

Pliers

Modeling clay

## **Chapter 15: Rotational Momentum and Water Bottles**

1-3 Plastic water bottles

Water

Table

## **Chapter 16: Shedding Light on the Inverse Square Law**

Mini Maglite flashlight

Ruler

Index card

Scissors

Binder clip

Graph paper (see attached)

Cardboard box

Tape

## **Chapter 17: Charged Up for Induction**

Aluminum pie pan

Piece of wool

Styrofoam plate

Styrofoam cup

Tape

Aluminum foil

Paper clip

## **Chapter 18: Faraday Cages and Electric Shielding**

Aluminum foil

Two cell phones

Envelope (large enough to completely surround a cell phone)

Tape

Metal kitchen strainer or metal animal cage (optional)

## **Chapter 19: Resistance is Futile...**

Digital multimeter

\* A ~\$10 model is sufficient and can be found in most hardware or home improvement store

Pencil

Paper

## Chapter 20: Homemade Circuit Board

Two Christmas tree lights with 5-7cm wire remaining (last 2cm stripped)

Two AA alkaline (dry cell) batteries

Electrical tape

Wooden board ~14cm x 23cm

Wire strippers

Six screws

Four washers

Screwdriver

16 mini alligator clips (Hardware stores and online sources are your friend!)

Four sections of copper wire ~15cm long

## Chapter 21: Short Circuits and Hand Rules

5-6 Inexpensive magnetic compasses

Circuit board, jumper wires, and batteries from Chapter 20 lab

~30-40cm length of straight metal coat hanger wire or other similar wire

~30cm Square cardboard box

~30cm Square piece of flat cardboard

Scissors

Oven mitts or kitchen towels

Tape

Goggles

## Chapter 22: Motoring through a Magnetic Field

AAA alkaline (dry cell) battery

Compass

20-200 et solid uncoated copper wire

\* Thin, inexpensive, easy to bend...

Cylindrical item ~0.5" diameter

\* The handle of a wooden spoon works well.

Four rare earth neodymium disk magnets 0.5" diameter (~13mm)

\* Can be found at [www.teachersource.com](http://www.teachersource.com) Item #M-150

\* These magnets are very powerful. As long as you have only one, you are reasonably safe. But two of them attracting together can pinch your skin between them quite painfully. Two of these magnets stuck to each other are almost impossible to get apart. Also, keep the magnets away from your credit cards and embedded chip keys - it will erase them!

## Chapter 23: "Magnetizing" Aluminum

Multimeter

Empty 7.5fl oz. soda can

Paper clip

~10m copper wire

Electrical tape

String

Pillow (optional)

Four rare earth neodymium disk magnets (from the previous lab)

## Chapter 24: Generators 101: Shake on it!

Electrical tape

Scissors or wire cutters

Two cotton balls

Glue or rubber cement

Sandpaper (optional)

10mm LED

\* There are plenty of options for purchasing these online. The cheaper the better...

~60 meters of #30 gauge magnet wire

\* If you purchase this by weight a 1/4lbs spool will work fine.

One large rare earth neodymium magnet (~0.875 in. OD x 1 in. high)

\* I would recommend purchasing this item from [www.teachersource.com](http://www.teachersource.com) Item M-195

\* I would also recommend storing this magnet in an old tennis ball. Simply make a small cut on its outer surface and insert the magnet. This item is unbelievably powerful. There are a number of practical uses for this magnet when your lab is done. Check them out online!

Old film canister OR empty prescription bottle

\* The diameter of the canister must be a little larger than the diameter of magnet being used

## Chapter 25: Challenge Lab: Gravity ala Pendulums

Stopwatch

Tape

~3m fishing line or string

Meter stick

10 pennies (~25g) taped together

## **Chapter 26: Gummy Waves: Part 1 of 2**

75 Wooden BBQ skewers

150 Gummy bears

Duct tape (~10m)

Heavy weights (optional)

Meter stick

Stopwatch

## **Chapter 27: Gummy Waves: Part 2 of 2**

Gummy bear wave device from previous lab

Video recording device (optional)

## **Chapter 28: Binder Clips and Resonance**

One manila folder or card stock

Five binder clips

Scissors

Duct tape

Two ~30cm long boards

Smooth surface (Careful! It may become scratched!)

## **Chapter 29: Syrupy Sweet Polarization**

Small clear Mason jar

Corn syrup

Windowsill

Clear glass baking dish

Two supportive containers

Battery powered light source

Two polarizing filters

\* You can use two lenses from old polarized sunglasses for this activity. They can also be purchased online (I recommend [www.teachersource.com](http://www.teachersource.com))

## **Chapter 30: Gelatinized Refraction: Part 1 of 2**

Binder clip

Laser pointer (red)

Protractor

Graph paper

Wax paper

Tape

One packet each of the following:

Knox gelatin (clear)

Red dessert gelatin (optional)

Yellow dessert gelatin (optional)

## **Chapter 31: Where did the flame come from?**

Two tea candles

Lighter

Transparent CD case

Black construction paper or black fabric

Ruler

## **Chapter 32: Gelatinized Refraction: Part 2 of 2**

Two binder clips

~15cm square piece of cardboard

Scissors

Bright flashlight

Round cookie cutter or empty tin (steel) can

Graph paper

Knife

Wax paper

Tape

Dessert gelatin

\* If the gelatin from the Chapter 30 lab has gone bad you will only need one color for this activity.