

Appendix B

Experiment Supplies Needed for Each Chapter

In order to do the experiments in this course, you need to have the kit that is discussed on page iv of this book. In addition, you need the following common items:

Chapter 1:

- Five sheets of plain paper
- Tape
- Many books of different thicknesses
- A flat table or desk that is at least as long as four of the sheets of paper laid end-to-end
- Play-Doh or modeling clay
- Aluminum foil
- A toothpick
- Active dry yeast (Yeast for a bread machine will also work.)
- Water
- Ice
- Two smaller (like “snack sized”) plastic bags that can be zipped shut (like Ziploc bags)
- Two larger (like “quart sized”) plastic bags that can be zipped shut (like Ziploc bags)
- A measuring cup
- A measuring tablespoon
- Somewhere outside that you can get messy
- Someone to help you
- M&M candies (You need two each of four different colors. See the photo below.)
- A pan for boiling
- A bowl that holds roughly as much water as the pan (They just need to be close.)
- Two plates that are either metal or ceramic and can sit comfortably on top of the pan and bowl (The closer to white they are, the better.)
- A large serving spoon
- A stove or hotplate

Chapter 2:

- A place in a yard or park where you can dig. (If you don’t have access to such a place, find a potted plant and use some of the soil in the pot, skipping steps 1-3. Soil from outside is better.)
- Two clear, plastic bottles, one of which has a lid (They should both be the size of a standard water bottle – 500 mL. Some sports drink bottles have wide mouths, which make the experiment easier.)
- A hand spade or a strong spoon that you can use to dig
- A raw potato (It doesn’t have to be big. In fact, it could be just a piece of a potato.)
- A sharp or serrated knife
- A cutting board
- Paper towels
- A tall glass
- Water
- Three plastic water bottles (You can also use funnels or a combination of bottles and funnels.)
- Sheer hosiery that can be cut up (A couple of coffee filters will also work.)
- Tape

- Scissors
- A Styrofoam or paper cup
- A small balloon
- A 1-cup measuring cup
- A ½-cup measuring cup
- A ¼-cup measuring cup
- A spoon for stirring.
- A freezer-safe bowl

Chapter 3:

- White vinegar
- A metal paper clip (It must be bare metal, not covered in plastic.)
- A paper towel

Chapter 4:

- A blank white sheet of paper with no lines
- Paper towels
- Cleaning gloves
- A sink that is **not** stainless steel and has a faucet

Chapter 5:

- A pencil
- A small glass, like a juice glass
- Water
- A sewing needle that is strongly attracted to the magnet (most metal ones will be)
- Waxed paper or a plastic sandwich bag
- Scissors
- A casserole dish or a large bowl
- A pair of tongs that are wooden, plastic, or have plastic covers on its ends
- Aluminum foil
- Cellophane tape
- A standard battery (AA or C work best)
- A metal paper clip (It cannot be covered in plastic. It must be bare metal.)
- Someone to help you
- A tall, transparent glass
- Dark food coloring (Blue works best.)
- A rubber band
- A single ice cube
- A sink with a faucet that can deliver both hot and cold water

Chapter 6:

- 20 sheets of paper (They need to be 8.5x11 inches, and they can be blank or already used.)
- A transparent jar with a lid (If you don't have one, use a transparent glass and cover it with plastic wrap that is secured by a rubber band. You just want to limit any water that might spill out.)
- Water
- An empty metal can, like the kind vegetables come in

- A can opener
- Plastic wrap
- Tape
- Pepper
- A sink that can be plugged and filled with water
- Someone to help you
- A quarter or other large coin
- A bowl that is not transparent and doesn't have much of a rim at the top
- A container that will hold enough water to fill the bowl but can be held in one hand (like a pitcher)
- A chair and table

Chapter 7:

- A small glass, like a juice glass
- Vegetable oil (Olive oil or any other liquid cooking oil will work.)
- Active, dry yeast (available in the baking department of any supermarket)
- A $\frac{1}{4}$ -teaspoon measuring spoon
- A spoon for stirring
- A sink
- Water
- A bowl
- An oven
- A baking dish, like a casserole dish
- Toilet paper
- A measuring tablespoon
- A $\frac{1}{2}$ -cup measuring cup
- A spoon for stirring
- Oven mitts or pads

Chapter 8:

- Baking soda
- Water
- Two small glasses, like juice glasses
- A measuring tablespoon
- A measuring teaspoon
- A 1-cup measuring cup
- A $\frac{1}{4}$ -cup measuring cup
- Two spoons for stirring
- An oven
- Oven mitts
- A glass baking dish
- A napkin or paper towel
- 60 coins (You can actually use 60 of any small objects that have two easily-distinguished sides, like M&M candies. When the experiment and text refer to “heads” and “tails,” you can just substitute the two sides of whatever object you are using.)
- A plastic container with a lid that is wider than it is tall and would easily hold hundreds of the items you are using.

- Any kind of carbonated beverage like soda pop, seltzer water, etc.
- A small pot or pan for boiling
- A stove

Chapter 9:

- Vinegar (White is best, because you can see through it, but any will work.)
- Two small glasses, like juice glasses
- A paper towel
- A small pot for boiling (One that has a pour spout is best.)
- A stove
- A freezer
- A teaspoon (not a measuring teaspoon)

Chapter 10:

- Four standard-size metal paper clips (You may want a couple more in case things don't go well at first.)
- Two bowls, like soup bowls
- A couple of squares of toilet paper
- A fork
- Water
- Vegetable oil (Any liquid cooking oil will work.)
- A freezer with enough space for the graduated cylinder from your kit to stand upright inside
- A stick of butter or margarine
- A means by which to melt the butter (a microwave and an appropriate container or a stove and a pan)
- Two small glasses, like juice glasses
- Paper towels
- A serrated knife, like a steak knife
- Two small cups or mugs for hot drinks (Styrofoam cups, for example, or coffee mugs)
- A pan for boiling water
- A stove
- Kitchen tongs
- Ice
- Salt
- Two small slices of raw potato
- Two small containers that can go in the freezer (Ideally, this would be two rectangles in an ice cube tray. Otherwise, two pill bottles or something of that size.)
- A small pot or pan for boiling water
- A pot lid with a handle on top (It doesn't have to fit the pot you are using.)
- A wide bowl that isn't as tall as the pot
- A Ziploc bag
- A measuring tablespoon

Chapter 11:

- Water
- A straw

- A rectangular baking pan that is at least 28 cm (11 in) long and 5 cm (2 in) deep (glass is best)
- Food coloring (Blue works best. The gel-based ones will work, but not as well.)
- A flat, level surface
- Someone to help you
- A pie pan
- The cardboard tube from the center of a roll of toilet paper
- A marble or small ball that easily fits in the tube
- Scissors
- Two paper or Styrofoam cups
- A glass baking dish or bowl that is wide enough for the two cups to sit side-by-side in the dish (The dish shouldn't be wide enough to fit three of the cups side-by-side. See the picture below.)
- Two different colors of food coloring
- A pen or other object that can make a hole in the cups
- Ice
- A small, clear plastic bottle, like the ½-liter bottles water comes in, and its lid (The flimsier the plastic bottle, the better.)
- Matches

Chapter 12:

- A stick that is at least 30 centimeters (1 foot) long and would be easy for you to break in two with your hands (It can be a dead stick from a tree or a thin piece of wood, but it must be much longer than it is wide.)
- Two full sheets from a newspaper, or two of any sheet of paper that is about 60 centimeters x 60 centimeters (23 inches x 23 inches). You can also tape pieces of paper together to make two sheets that size
- A table where the newspaper can be completely spread out
- A balloon
- A plastic bottle (or jug) that has a small enough opening for the balloon to fit over it (see picture on the next page)
- The nail from your kit
- A facial tissue or a couple of squares of toilet paper
- Something to cover your eyes, like safety glasses or goggles
- An empty thin aluminum can with a small opening, like the kind soda comes in (More than one is even better.)
- A stove
- A pan (Make sure it's an old pan, because this experiment can damage its finish.)
- Kitchen tongs
- A bowl
- Water
- Ice
- A plastic bottle, like the kind water comes in
- A bendy straw
- Play-Doh or other soft modeling clay
- Two small glasses, like juice glasses
- Toilet paper
- A small plate

- A spoon for stirring
- Vinegar
- Baking soda
- Ammonia (Sold in supermarkets with the household cleaners. You need only a drop or two.)

Chapter 13:

- Two standard sheets of white copy paper (without any lines)
- A 15-cm (6-inch) length of string that is stronger than thread
- A ruler
- A pencil
- Matches or a lighter
- A plate made out of something that will not catch fire
- Scissors
- A tall glass (It can be plastic, but it must be clear so that you can see through it.)
- An LED flashlight (If you don't have an LED flashlight, use a flashlight app on a smartphone. Ideally, the face of the flashlight should be smaller than the bottom of the glass.)
- Black construction paper, scissors, and tape if the flashlight face is bigger than the bottom of the glass.
- Milk
- Water
- A spoon for stirring

Chapter 14:

- A pan for boiling water. The flatter the bottom of the pan, the better, because the bottom of the pan needs to be evenly heated. Please note that this pan will be heated without anything in it for a while, which can be bad for some pans. Check with your parents to make sure you have a pan that is okay to use in that way. An oiled pan will not work for this experiment.
- A cup
- Water
- A stove
- A plastic bottle, like the kind water or soda comes in (the smaller the better)
- Two small glasses, like juice glasses
- Someone to help you
- Rubbing alcohol (If you have denatured alcohol, that's even better.)
- A balloon
- Clean, dry hair

Chapter 15:

- A length of sewing thread that is about 61 cm (24 in) long
- A small plastic bag, like a sandwich bag (It can be zippered but doesn't have to be.)
- Rice, small beans, or something else made of small grains. (You can use dirt, sand, flour, etc., but there is a possibility that the bag will break, so definitely do the experiment outside if you decide to use something like that.)
- Someone to help you
- A large room with nothing breakable in it or (better yet) an open area outside
- A tall, thin box, like a cereal box

- A CD or DVD that you don't mind ruining
- A serrated knife
- Scissors
- Cellophane tape
- Aluminum foil
- At least two of the following light sources: an incandescent light, a fluorescent light, or an LED light (An incandescent light is a standard bulb that heats up a filament to make light. You can use a light bulb from an uncovered lamp or an incandescent flashlight. There are compact fluorescent light bulbs that fit in a normal lamp, and some camping lanterns use fluorescent bulbs. Most cell phones have a flashlight app that's an LED light, and you can also use an LED flashlight or an LED light bulb made for lamps.)
- A plastic bottle with a lid, like the kind water comes in (The thinner the plastic, the better.)
- A straw
- A glass that is taller than a juice glass (See the picture labeled "B" below.)
- A few paper clips
- Water

Chapter 16:

- A sheet of paper that is roughly 8.5 in x 11 in
- Two colors of marker or crayon (You want to leave thick marks on the paper. I use red and blue in my discussion, but you can use any colors you want.)
- A ruler
- A meterstick or some other long, thin stick
- Tape
- A long hallway or large room
- Someone to help you
- Something you can position at the end of the hallway or room and tape the paper to, like a chair with a flat back.
- A white card, like an index card (It can have lines on it, but it needs to be mostly white.)
- A paper towel
- Vegetable oil (Any plant-based oil will work.)
- A room that is a bit dim when the lights are turned off (It needn't be dark – just dim.)
- Two lamps from which the shades can be removed
- Three bulbs for the lamps, two of which have the same brightness (listed in watts) and one with a different brightness (They should really be either all normal (incandescent) bulbs, all compact fluorescent bulbs, or all LED bulbs. If you use LED bulbs, make sure they all produce the same shade of white light, because some are bluer than others. If you can't find a bulb with a different brightness, use three lamps instead.)