

Appendix C: Experiment Supplies by Chapter

Chapter 1

- A paper or Styrofoam cup
- A stepladder or a place someone can safely stand that is high above the floor or the ground
- A pen
- Water
- A large basin to catch water (if you can't do experiments outside)
- Someone to help you
- A rectangular baking pan or a tray with a lip running around the edge
- A marble or small ball, like a golf ball
- A smooth, flat surface
- A circular container that is either glass or plastic (You need to be able to see through the bottom of the container. You don't need to see really clearly – you just need to see.)
- Several hardcover books with different thicknesses (One of them should be the thinnest hardcover book you have.)
- A meterstick or measuring tape
- A stopwatch or any other timing device that can read to at least the tenth of a second

Chapter 2

- A board or another smooth surface you can use to make a ramp (It needs to be about a meter long)
- Several books of different thicknesses
- A marble or other small ball, like a golf ball
- A meterstick or measuring tape
- A stopwatch or any other timing device that can read to at least the tenth of a second
- A hand-held hair dryer
- A ping-pong ball (or another ball that is roughly the same size and weight)
- A small ball that is much heavier than a ping-pong ball, such as a golf ball or a marble
- A flat table or countertop upon which you can roll balls
- Two reasonably heavy balls with different masses (You could use a golf ball and a marble, for example. Don't use a ping-pong ball, however, as it is strongly affected by air resistance.)
- A stepladder or a place someone can safely stand that is high above the floor or the ground
- A stopwatch or any other timing device that can read to at least a tenth of a second

Chapter 3

- A handheld hair dryer (It is best if the hair dryer has at least two settings, like "low" and "high.")
- A ping-pong ball
- A golf ball (A marble will work, but a golf ball is better.)
- A paper or Styrofoam cup (It can't be ceramic or glass, because that's too heavy.)
- String
- A plastic bag, like a sandwich bag
- Tape
- A smooth, flat surface

- 60 or more pennies or other small objects (Dimes or nickels will work as well. So will small marbles. They just have to be small enough for 30 to fit in the cup, and they should be roughly as heavy as or heavier than pennies.)
- Cotton thread (Most sewing thread is cotton. Nylon thread should work, but probably not as easily.)
- A gallon or ½ gallon plastic jug with a smooth handle (see the pictures on the next page)
- A 1-cup measuring cup
- A funnel
- A sink
- Scissors
- A pencil
- Four round balloons that are all the same size (They should be at least 6-inch diameter balloons when fully-inflated, but larger ones will work as well.)
- An 8.5-inch by 11-inch sheet of paper (Any kind will do.)
- Water

Chapter 4

- A lightweight pie pan or plastic plate that has a rim around it (see the picture on the next page)
- Three paper or Styrofoam cups (the bigger the better)
- Two plastic straws
- Tape
- A bathtub
- A protractor
- A ruler
- A pencil

Chapter 5

- Two pennies (or other small coins that are the same denomination)
- A flat table that is not on a carpeted floor (You need to hear the pennies hit the floor when they fall off the table.)
- A plastic 2-liter bottle, like the kind soda comes in
- A bendy straw
- Scissors
- Tape
- A ruler (It will get wet, so a plastic one would be ideal.)
- Water
- A sink
- A pitcher
- A pen, crayon, or marker that you can use to make a mark on the bottle.
- Several hardcover books with different thicknesses (One of them should be the thinnest hardcover book you have.)
- A marble or other small ball, like a golf ball
- A meterstick or measuring tape (A ruler will work, but you will be measuring a long distance.)

Chapter 6

- A string that is 25-30 cm (10-12 in) long
- Tape
- A golf ball (or something with roughly the same mass, such as a plastic bag with 20 pennies in it)
- An automobile
- A licensed driver, preferably an adult
- A parking lot or long, straight road that won't have any traffic for a few minutes at a time
- The book you used as the ramp in Experiments 5.3 and 1.4
- A paper or Styrofoam cup
- 20 pennies or other small objects (Dimes or nickels will work as well. So will other identical small objects. They just have to be small enough for 20 to fit in the cup without filling it more than halfway, and they should be roughly as heavy as or heavier than pennies.)
- A ruler
- A pencil
- A piece of cardboard to which you can tape the pencil (see picture below)
- A quarter (If you don't have U.S. coins, use a denomination larger than the one you used previously.)

Chapter 7

- Two identical rubber bands
- A golf ball
- A marble (You can substitute any two balls for the golf ball and marble, as long as they are very different in mass. They can be similar in size, although they don't have to be.)
- Tape
- An area free of breakable objects
- A sheet of paper
- Scissors
- Cellophane tape
- A pushpin
- A pencil

Chapter 8

- The cardboard tube from a roll of paper towels
- A golf ball (A large marble will work as well.)
- Several books, one of which needs to be heavy
- A ruler
- A small plastic bottle (like the kind water comes in) with a lid
- A ¼-cup measuring cup
- Water
- A smooth counter or tabletop
- A ball that can bounce off a hard surface, like a rubber ball, ping-pong ball, basketball, or golf ball.
- A meterstick or yardstick
- A hard floor or a flat cement surface outside
- A metal paper clip (A large one will be easier to work with, but a normal-sized one will work.)
- A pencil (It is best if it is smooth, but one with flat sides will work enough to see the effect.)

- A CD or DVD that you can ruin (A 12-cm diameter circle of stiff cardboard with a hole in the center will work if you don't have a CD or DVD.)
- About 1 meter (40 inches) of thread
- Scissors
- Play-Doh or another type of modeling clay
- Tape
- A shower curtain rod from which you can hang things or a long stick (like a meterstick) and a helper to hold it

Chapter 9

- A tall glass (or plastic tumbler) that can hold at least 15 cm (6.0 in) of water (The wider the opening, the better.)
- A ruler
- Water
- An egg (You might need more if you aren't careful.)
- A sink
- Two rulers (You can use just a single ruler if it has a thin groove in the center that will act as a track on which marbles can roll.)
- At least five marbles, all the same size and mass
- A flat counter or tabletop
- Two heavy books
- A coffee mug (The experiment is more dramatic if it's breakable!)
- A length of string that is about as tall as you and strong enough to stop the mug when it falls
- Scissors
- A nut (the kind that threads onto a screw)
- A pencil
- The cushion from a couch or a large pillow (not necessary, but encouraged at first)

Chapter 10

- A spring (Go to a hardware store and ask for their extension springs. There will be a lot of them. The numbers that describe them are typically length, followed by the diameter of the coils that form the spring, followed by the diameter of the wire that is used to make the coils. You want one that is about 2 inches long with $\frac{1}{4}$ -inch circles and wire that is somewhere between 0.020 inches and 0.028 inches. The one in the picture shown in the instructions, for example, is $2\frac{1}{4} \times \frac{1}{4} \times 0.020$.)
- A $\frac{1}{2}$ -liter bottle, like the ones water comes in (It needs to have a lid.)
- String
- Scissors
- A $\frac{1}{3}$ -cup measuring cup
- A funnel
- A towel bar or curtain rod that you can easily reach
- A ruler
- Water
- A funnel
- A one-cup measuring cup
- A timer (like a stopwatch)

- 4 nickels or 4 quarters (For other countries, use 4 of your heavier coins)
- Tape

Chapter 11

- A rubber band
- A bowl around which the rubber band can be stretched (see the picture on the next page)

Chapter 12

- A flashlight (an app on a phone works as well)
- A thin piece of cardboard, like what you find on the back of a writing pad (A piece from a corrugated cardboard box won't work well)
- Scissors
- A silverware knife (It needs to be a good reflector, so you should be able to look at it and see a part of your face reflected back at you.)
- A blank piece of paper
- A pen or sharp pencil
- A protractor
- A room that can be dimmed
- A spoon that is shiny enough for you to see your reflection in it.
- A magnifying mirror, like a makeup mirror (The higher the magnification, the better. If the magnification is too low, you might need a helper, as discussed in the instructions.)

Chapter 13

- A small, transparent glass or jar, about the size of a juice glass
- A plastic lid that will fit over the glass or jar (It can be from a completely different container – it just needs to fit over the opening. If it doesn't have one, you will be cutting a hole in its center.)
- A metal paperclip (Anything made of flexible metal will also do, such as thick wire. It cannot be covered in plastic or colored in some way.)
- A small amount of aluminum foil (It is best if the foil isn't heavy duty.)
- Scissors
- A balloon
- Two phones that have different numbers, at least one of which is wireless (The wireless one can be a cell phone or a home phone that doesn't have to be plugged into its base. Both phones can be wireless, but they cannot share the same number.)
- Aluminum foil

Chapter 14

- Steel wool (The kind made of thin, gray strands, such as those shown in the top left picture below. Grade 000 or 00 would be best.)
- Aluminum foil
- A 9-volt battery
- A 1.5-volt battery (The size can be D, C, A, AA, or AAA)
- Cellophane tape
- Scissors
- A small glass, like a juice glass (A small canning jar will work as well.)

- A surface to which you can tape things (It cannot be made of metal. Also, it should not be made of anything flammable.)
- Salt
- Water
- A plastic pill or film container with a lid
- A metal paperclip (It cannot have a plastic coating.)
- A hammer
- A nail
- A balloon
- A hair dryer

Chapter 15

- Two small glasses, like juice glasses
- A 9-volt battery
- Aluminum foil
- Salt
- Water
- Scissors
- Tape
- A $\frac{1}{4}$ -teaspoon measuring spoon
- A 1-cup measuring cup
- A non-metal countertop you can tape things to (or a large glass or plastic tray you can tape things to)

Chapter 16

- Two 9-volt batteries
- Aluminum foil
- Cellophane tape
- A compass
- A non-metal countertop (or a large glass or plastic tray) to which you can tape things
- **Optional:** A strong disk-shaped (or oval) magnet (Craft stores sell them.)
- **Optional:** A copper pipe that is between 30 cm and 1 m long and has a diameter that is large enough to allow the magnet inside but not a lot larger (Most hardware stores sell copper pipes with different lengths and diameters.)
- **Optional:** A plastic pipe with roughly the same diameter and length (Once again, these are sold at most hardware stores.)