

Shopping List for Unit #10: Electricity

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Don't be afraid of this shopping list! The materials are broken down by availability and expense, and you can order most online from Radio Shack. The items in the first list are low-cost materials you already have or can easily add to your next grocery store list. The next lists include mid-priced equipment for more in-depth projects, and the last list of items is appropriate for upper grades.

We'll be re-using these items for Units 11 and 12 (like motors, lights, battery packs, wires, and electrical components). The materials listed here are for building five different robots (with remote control), six burglar alarms, and a handful of sensor circuits.

Basic Electricity

Regular sized latex balloon
1 sheet of tissue paper
Fluorescent bulb (borrow the long 'tube' kind from your house, or get a burnt out one from the recycling)
Plastic grocery bag
Wool sweater, socks, or mittens to wear
Wire coat-hanger (not insulated)
Packing peanuts (about 20)
Yard stick (AKA meter stick)
Soup spoon (bigger is better)
2 tablespoons dill
Vegetable oil (or mineral oil)
Lid from a jar (jam, pickle, mayo...)
Bubble solution (store-bought, or use our recipe:
(12 c cold water + 1 c clear Ivory dish soap)

Electric Circuits & Burglar Alarms

2 wire coat-hangers (not insulated)
1 sheet of tissue paper
3 shiny copper pennies
25 large popsicle sticks (tongue depressor size)
Brass (use brass fasteners, wood screws or keys)
Iron (find two uncoated nails if you can)
Silver ('real' silverware)
Zinc (find two galvanized nails)
Graphite (from a mechanical pencil)
Baking soda (2 tablespoons)
Film canister (or other small container with lid)
2 pcs cardboard (or 6"x 4"x 2" wood scrap)
4' length aluminum foil (used for several experiments)
1" square sponge square of squishy foam (or thin sponge) that reforms into shape when released
10 small paper clips
12 large paper clips
12 brass fasteners
2 wooden spring-type clothespins
5 unpainted steel thumbtacks
Thin bare wire (28g) or rip open an alligator clip
2 index cards

Salt (about 8 tablespoons)
Skillet and stove
2 clean glass jars (pickle, jam, mayo...)
8 [AA battery packs](#) (RS #270-408)
LEDs (Radio Shack part #[276-026](#), [276-012](#), [276-016](#), [276-311](#), or similar
[Neon Lamp](#) (RS #272-712)
[Buzzer](#) (Radio Shack #273-053) or siren (#273-079)
[3VDC motor](#) (RS #273-223)
10-20 [alligator clip leads](#) (RS #278-1157)
[SPST](#) push-button switch (RS #275-646) or similar
[1K or 5K-ohm potentiometers](#) (RS #271-1714)
OR [25-Ohm Rheostat](#) (RS #271-0265)
[CdS cell](#) (RS #276-1657)
Red laser pointer (from Unit 9) or flashlight
AA batteries for your battery case (Cheap dollar-store "heavy duty" type are perfect. Alkaline batteries are NOT recommended.)

Robotics & Remote Controls

You'll need the parts from 'Electric Circuits' and these items:

6 [3VDC motors](#) (RS #273-223)
7 wheels (tops from film canisters, small yogurt containers, milk jugs, orange juice, etc.)
4 straws
1 long bolt (2" or longer) with nut
2 toothbrushes or plastic spoons
2 blocks of foam (2" x 4" x 6" or larger)
1 wooden spring-type clothespin
20 wooden skewers (for 3 different robots)
1 propeller** that fits onto the motor shaft
2 gears** or cork
Plastic soap container (optional)
Basic tools (scissors, tape, hot glue gun, and drill with bit the size of the motor shaft)

**If you have trouble finding these parts (ones with ** next to them) just send us an email.

For Grades 9-12:

You'll need the parts from the lists above and these items:

Digital Multimeter - You'll need one of these for the rest of your projects. Find one in your price range from Radio Shack.

Air Battery

Paper towel

[Activated charcoal](#) (from a fish store)

Aluminum foil

Alien Detector

[LED](#) (any regular LED works fine)

[MPF 102](#) from Radio Shack (RS #276-2062) – buy 2, because these are the first things to burn out in your circuit

[9V battery clip](#) and a 9V battery (RS #270-325) – you should have a spare from the *Laser*

Communicator project in Unit 9 you can use

Tools:

Wire strippers

Pliers, scissors

Soldering iron, solder, stand

Superfast Bug Bot

1 large paper clip

1 round bead that fits onto the large paperclip

2 small paperclips

Soda can (empty and clean)

[AA battery holder](#) with AA's

2 [momentary switches](#) (RS #275-0016)

2 [hobby motors](#) with gear (RS# 273-0258)

2 [3/16" female spade connectors](#) (RS # 64-3132)

[Heat shrink tubing](#) (RS# 278-1610)

Optional: [slide switch](#) (RS #275-0407)

Insulated wire (you can also use the wire from your battery holder, as you'll snip most of it off anyway)

Tools:

Wire strippers

Pliers, scissors

Soldering iron, solder, stand

Underwater Remotely Operated Vehicle

The underwater robot (R.O.V.) is a much larger-scale project than usual. Expect to spend at least 14 hours on building this ultra-cool remotely operated underwater vehicle that swims in lakes and pools.

½" PVC pipe (6 pieces: 1.5" long, 4 pieces 2.5" long, 4 pieces 3" long, 2 pieces 4" long, 2 pieces 4.5" long, and 2 pieces 12" long... total length is roughly 6 feet of pipe.)

2" diameter (two pieces 6" long each)

Four 2" PVC end caps

Four ½" PVC tees (slip-slip-slip)

Ten 90 deg. Elbow (slip-slip)

Coarse sand paper

Three 1" pipe clamps (U-shape with 2 mounting holes)

Three propellers that fit onto the motor shaft

Three 12VDC motors (Radio Shack part #273-256)

Three film canisters (black Kodak canisters work great)

Three DPDT switches with a center OFF (RS#275-1533)

30 ft. of "CAT-3" (or "CAT-5") telephone/network cable (8-conductor or 4-pair, AWG 24)

Project box (you'll need a plastic box: tupperware, soap dishes, or project boxes from Radio Shack)

6-10 zip ties

Wire (or plastic) mesh screen, 12" x 8" piece

Tools:

Soldering iron with solder

Pliers, screwdriver

Drill with drill bits

Silicone or toilet seal wax (and old mug to liquefy it in)

Vaseline

Power supply (12VDC car battery or car charger)