

Keep Out!

BRAYNK!
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Build an alarming doormat to keep siblings out of your room.

Most alarm systems are nothing more than a sensor or two connected to a siren or buzzer. Simple alarms consist of a sensor that doubles as a switch. When activated, the sensor completes an electric circuit and electricity flows to the siren, sounding the alarm!



You'll Need (per each small group)

1 Hour

- small electric buzzer (2V) (RadioShack)
- conductive materials (e.g., insulated wire, metal paper clips, or aluminum foil)
- 9 V alkaline battery with snap connector (RadioShack or sparkfun.com)
- switch materials (e.g., large plastic drinking straws, kitchen sponges, or other compressible, nonconductive materials)
- scissors
- mat (e.g., doormat, bath mat, or large towel)
- optional: wire cutter/stripper

1. Introduce circuits. Ask your girls: What is electric current? A circuit? What are batteries used for in a circuit? (In a circuit, current flows in a complete loop, for instance from a battery, along one wire, through a device such as a buzzer or light bulb, then along another wire and back to the battery.)

2. Identify the problem. Ask girls if they have ever wanted to keep a sibling out of their rooms.² Then introduce the **SciGirls Challenge**: Create a room alarm that sounds when someone steps on it.

3. Build a simple circuit. Divide the girls into small groups¹ and hand out the buzzer, conductive materials, and battery. Guide girls to use the materials provided to design and build a circuit that will sound the buzzer. Have them discuss first before digging in.

Watch the SciGirls and their mentor plan and test equipment for their sensor activated camera in **Super Sensors (Plan and Test)**^{6,2}

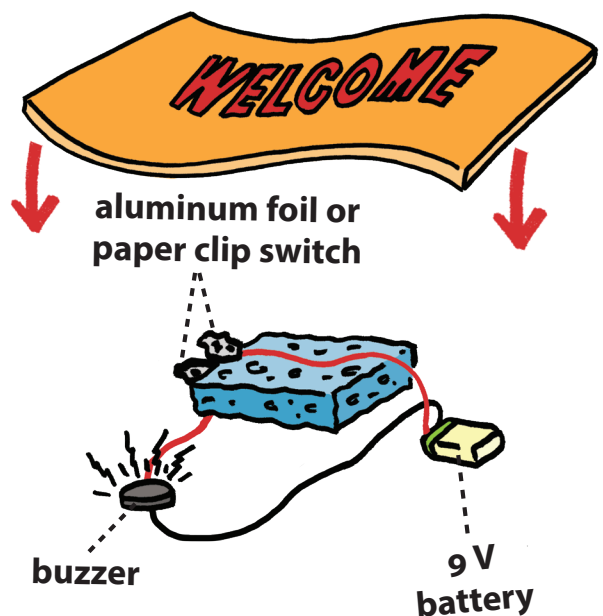


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4. Brainstorm. Once they accomplish building a simple circuit, ask each group to brainstorm ways to build a new circuit. This one should have a switch that closes the circuit when someone steps on it. Think about different ways to design the two parts of the circuit so they touch when the alarm is stepped on, but stay separate when there's no pressure.³ Keep in mind that the circuit will ultimately be used as a room alarm, so it should be long enough to place in front of a door opening, and flat enough so it can be hidden under a mat or rug.

5. Test and redesign. Have girls test their designs by placing the alarm system under a mat or folded towel. If the alarm doesn't work, encourage girls to redesign and make changes.

POINTER: If girls are having problems getting their circuits to work, find something positive about their current design and compliment their efforts before troubleshooting.⁵ Have girls check the connections between the different parts to ensure there is a complete circuit. Also check that the insulation from the ends of the wire (if used) has been stripped where it is attached to the battery poles and buzzer, and that there is no extra wire or other conducting material causing a short circuit.



6. Discuss results. Once all the teams have created a working alarm, discuss the designs. What are the basic parts of the circuit? How does the electrical current flow through it? Did they first try a design that didn't work? What did they do to make it work better?