



# LESSON PLAN

## ELECTRICITY AND CIRCUITS GRADES 6-8

### SUMMARY

Students develop and use a model to describe how birds can land on high-voltage power lines without getting electrocuted.



**MS-PS2-3.** Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.

Science & Engineering Practices	Connections to Classroom Activity
Developing and Using Models	<ul style="list-style-type: none"> <li>Students develop, revise, and use a model to describe how birds can land on power lines without getting shocked.</li> </ul>
Disciplinary Core Ideas	Connections to Classroom Activity
<p><b>PS2.B: Types of Interactions</b></p> <p>Electric and magnetic (electromagnetic) forces can be attractive or repulsive, and their sizes depend on the magnitudes of the charges, currents, or magnetic strengths involved and on the distances between the interacting objects.</p>	<ul style="list-style-type: none"> <li>Students use their understanding of electric currents to explain why birds can land on high-voltage power lines without being shocked.</li> </ul>
Cross Cutting Concepts	Connections to Classroom Activity
Systems and System Models	<ul style="list-style-type: none"> <li>Students develop a scientific model of the system and interactions between the components of that system, which can be used to describe the phenomenon of birds sitting on high-voltage power lines without getting shocked</li> </ul>

## DURATION

45 min.

## MATERIALS

- Paper or science notebook
- Pen or pencil



## ENGAGE

Show a short segment from the [“Can Birds Get Electrocuted When Sitting on Electric Wires?” video](#) of birds perching on high-voltage wires (1:30–1:60 min.). Ask students if they ever wondered why birds don’t get shocked when they land on the wire?



## EXPLORE

Have students individually develop an initial model to explain why the birds are not shocked. Remind them that a scientific model includes the most important components with respect to the phenomenon, labels those components, and shows relationships/interactions between those components. Next, have students share their models in small groups and revise them to include any additional ideas that might help explain the phenomenon of birds landing and perching on high-voltage wires. Chart students’ questions about the phenomenon.



## EXPLAIN

Tell the students that to help answer their questions and consider/revise their explanatory models of birds landing on a high-voltage wire, they are going to watch the Generation Genius video about electricity and circuits. Based on your observations of the students’ initial models and their questions, use some of the Before Discussion questions to elicit additional ideas and questions.



### AS A GROUP, WATCH THE GENERATION GENIUS VIDEO: ELECTRICITY AND CIRCUITS

After watching the video, allow students to make revisions to their initial model as needed.



Share this picture showing a cross section of a high-voltage wire, which students may have questions about. Remind students to use what they learned from the video about circuits, conductors, insulators, and voltage potential difference in their revised models/explanations.

Students should reach the conclusion that because the birds are sitting on one wire, the circuit is incomplete; there is no potential difference along the single wire, which would cause the current to change its path. The current will travel through the copper wire because it has less resistance than the bird’s body.



## ELABORATE

Have students revise their models to show how a power company could provide additional protection and/or prevention of shock for birds and other animals. (Students might show a bird's wing touching another wire or the pole or show the bird with one foot on one wire and the other foot on a different wire, which would complete the circuit and allow the current to travel through the bird. So power companies could provide additional protection and/or prevention by increasing the distance between power lines, burying power lines, or putting protective devices around power lines.



## EVALUATE

There are multiple ways to assess your students' understanding of this topic.

- Genius Challenge
- Quiz Game
- Exit Ticket

Students can do these activities in digital or print form.



## EXTENSION

Power companies estimate that more than 1 million birds are electrocuted each year. Larger birds of prey such as eagles, hawks, and owls are more likely to get electrocuted because of their greater wingspan. How might power companies modify their power lines to prevent electrocution of these birds?

