

Grades: 4-5

SciGirls, “Mother Nature’s Shoes”

This series showcases bright, curious real girls putting science and engineering to work as they answer questions and make unexpected discoveries in the world around them. In this episode Nature's designs, from polar bear paws to penguin flippers, inspire Elin and her best friends to design a safer shoe for walking on Minnesota's icy winter streets.

After watching this episode, choose from the following questions and/or tasks to extend your learning

Question Box 1

- What is your opinion about the program? What evidence do you have to support your opinion?
- Using evidence from the TV show, explain why it is a good title for this TV program.
- Identify specific details in the TV Show that focus on the author’s purpose.
- What is this program “saying”? Cite evidence to support your analysis.
- Provide at least two quotes of evidence that support the main claims or reasons.
- Where does this episode take place?
- Why do the girls want to make a safer shoe?
- What examples from nature inspire their shoe design?
- What is friction?

Identify the Problem:

- Describe the type of shoe the girls plan to design?
- What is the first step the girls take in creating their new shoe?
- What information does current technology provide for the girls?
- What are the pros and cons of current technology regarding winter footwear?
- How do the girls plan to improve on current technology?

Research:

- How does watching videos of animals moving on slippery surfaces help the girls?
- What information and evidence do the girls collect while watching the videos?
- How do the girls collect data on live animals?
- What animals do they observe?
- How does this data correlate with the data on the videos? What are the similarities and differences?

Test Materials:

- What material do the SciGirls test?
- What type of data do the girls collect?
- Describe the girls’ prototype.
- Why do the girls want to know pounds of force?

Data Analysis:

- Why is critical thinking an important skill to have in science, technology, engineering

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and math?

- Why is presenting your data in an organized way important?
- What conclusion do the girls come to?

Share and Test Prototypes:

- What do the girls discover about their prototype?

Question Box 2

- What did/do you enjoy about this program?
- What is one thing you particularly want people to notice when they watch this TV program?
- What were some of the most interesting parts to this program? Explain.
- What were some of my most powerful learning moments and what made them so? Explain.
- What surprised you in the program, and why?
- Do you think the title for this program “Mother Nature’s Shoes” is a good title or not? Explain?
- What does it mean that “inspiration can come from anywhere”?
- What is the importance of building a prototype?
- Why is it important to make predictions and test your prototype?
- Why is it important to consider feedback?
- How can you learn from failure?

Box 3 (Tasks)

- Describe how the SciGirls used science to design a safer winter shoe.
- Describe what information the SciGirls used from the natural world, with regards to Polar Bear paws and Penguin flippers, to design safer winter shoes.
- Research and Design the perfect shoe for a particular environment (snow, water, sand, rocks, etc.)
- Draw a diagram.
- Make a list of materials.
- Build a prototype.
- Justify your rationale for materials used.
- Make a magazine advertisement for your new footwear.

Box 4 (Enrichment)

- Compare and contrast the foot bones of Polar Bears and Humans, and the flippers of Penguins by drawing a model of each.
- With the above in mind, describe the difference between analogous structures and homologous structures.
- Click [Mother Nature's Shoes](#) to download the pdf under “Related Links” and complete.

Box 5 (Extend/Real-Life)

- Research and discuss how modern shoemakers use nature's designs and materials to make shoes.
- Describe with evidence, why the flippers of Penguins and the paws of Polar Bears don't get cold when they walk on the ice and snow.