Lesson Time: 15–20 minutes

Velcro or Laces?

Objectives & Outcomes

Lesson Objectives: Students will learn how scientists and engineers get their ideas from nature through a case study.

Lesson Outcomes: *Students will be able to...*

- describe the mechanism behind Velcro
- compare and contrast the benefits and drawbacks of shoelaces and Velcro

Subject Area Connection: Science/Engineering

Getting Ready

Teacher Preparation: To prepare for this lesson, read over the vocabulary and background sections.

Materials Required:

- paper and pencil

Key Vocabulary

biomimicry: using an idea from nature to solve a human problem.

Background

Scientists use ideas from many sources to design and improve things we use each day. How can nature help us solve problems? In this lesson, students will investigate the question: "Where do we get our ideas?" by recognizing that people can learn from nature's designs. The example in this lesson will be Velcro; students will look at the pros and cons of Velcro and shoelaces.

"How can **nature help us solve problems?"**

Introduction and Modeling

Begin by talking to students about things we use every day. Where do people get ideas for the products we use? One example is Velcro, the two-sided sticky, hook system used in many places, especially sneakers. Stimulate student interest by asking students to share what items they have seen that fasten with Velcro. Share with students that Velcro was invented in the 1940s when a Swiss engineer noticed burrs on his dog. When he examined the burrs under a microscope, he saw tiny hooks that caught onto anything with a loop such as clothing fibers or hair.

Procedure

1. Put students into pairs or small groups.
2. Students will create a list of everything they can think of that uses Velcro.
3. Share each list, awarding one point to each unique item. Add up the points to find the team with the most unique list!
4. Have students decide which is better: Velcro or shoelaces, by creating a chart on the board that weighs the advantages and disadvantages of each.

Discussion Questions

- Take a class poll after looking at the pros and cons of shoelaces and Velcro. Which ones are "better"?
- Why would a plant need to produce a burr that attaches to other things?
- What other things do scientists use for inspiration to solve problems?

Evaluation

Ask students to draw a close-up picture of a burr stuck to something that shows the hook and loop mechanism.

Tips for Tailoring this Lesson

For Higher Grade Levels

- Ask students to design a new product using an idea from nature for inspiration.
- Ask students to identify other products that mimic something in nature.

For Lower Grade Levels

- Challenge students to suggest a new use for Velcro.
- Ask students what inspired the design for the following items: airplane, glue.

Alignment to Standards and Frameworks

Common Core State Standards: College & Career Readiness

Anchor Standards for Speaking and Listening

CCRA.SL.1 Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

CCRA.SL.5 Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.

Next Generation Science Standards

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Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.