YES Middle School

Engineering Eco-friendly Slippers
Connections to Next Generation Science Standards

NGSS Performance Expectation		In this unit, students:
MS-PS2-2	Plan an investigation to provide evidence that change in an object's motion depends on the sum of the forces on the object and the mass of the object.	investigate how an object moves when the pulling force is greater than the force of friction acting on the object.
MS-ETS1-1	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.	determine how they will measure whether their slipper outsole provides a safe amount of traction and whether it has a low negative impact on the environment. Students also design within a cost constraint to ensure that their designs are affordable.
MS-ETS1-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.	work with their teams to test and evaluate how well their designs meet the criteria and constraints of the problem. Teams provide each other with peer feedback and use this to guide their next iteration.

Crosscutting Concept

Stability and Change

In this unit, students observe that an object moves when the pulling force is greater than the force of friction acting on the object. Through their investigations, they come to understand that different outsole materials have varying amounts of friction with vinyl flooring. They apply this knowledge to articulate that one criterion of the slippers they are designing is to have a safe amount of friction between their outsoles and common indoor floor surfaces.

Computer Science Module: *Step Counters*
Connections to Standards

CSTA K-12 Computer Science Standard		In this module, students:
2-AP-11	Create clearly named variables that represent different data types and perform operations on their values.	create the variable "steps" to increment when a step is taken.
2-AP-15	Seek and incorporate feedback from team members and users to refine a solution that meets user needs.	test their step counters by having each team member use it and use the data to improve the algorithm.
2-IC-21	Discuss issues of bias and accessibility in the design of existing technologies.	realize that a step counting algorithm will be more accurate for some users than others.

Computer Science Module: *User Reviews Analysis*
Connections to Standards

CSTA K-12 Computer Science Standard		In this module, students:
2-DA-09	Refine computational models based on the data they have generated.	improve a machine learning model by iteratively modifying the training data and testing how accurately the model is able to label user reviews.
2-IC-21	Discuss issues of bias and accessibility in the design of existing technologies.	discuss instances where a computer used information about them to make a recommendation and why that recommendation may or may not have been useful.