Engineering Upcycled Toy Vehicles
Connections to Next Generation Science Standards

NGSS Performance Expectation		In this unit, youth:
3-PS2-2	Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.	Observe the motion of wheels and axles, identifying patterns in how different variables affect rolling distance and stability. They apply their observations to predict and control the distance their vehicle designs travel.
5-ESS3-1	Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.	Read a comic about an entrepreneur who is opening an upcycled toy store to keep trash off the streets in his community. They design their own upcycled toy vehicles and imagine ideas for other types of upcycled toys.
3-5-ETS1-1	Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.	Determine how far their upcycled toy vehicles need to go and what they need to hold (criteria) while only using the materials provided (constraints).
3-5-ETS1-2	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.	Work in groups to imagine several ideas and justify design decisions using evidence from investigations.
3-5-ETS1-3	Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	Test and evaluate their upcycled vehicles against the criteria and constraints and use those findings to improve their designs.

Connections to NGSS

Crosscutting Concept

Systems and System Models

In this unit, youth create upcycled toy vehicles. Youth must consider how the components of their vehicle systems (the wheels, axles, and vehicle bodies) work together to create vehicles that travel certain distances and can carry certain contents.