*Unit 3: Vehicle Design

Content Area: **Technology**
Course(s): **Engineering Design 2**
Time Period: **October**
Length: **15 blocks**
Status: **Published**

Enduring Understandings

Vehicles must be designed strong enough to withstand the stresses that act upon them.

A vehicle's wind resistance is directly related to the amount of surface area perpendicular to the direction of travel.

The efficiency of a transportation device is mainly affected by wind resistance and drag.

The factors that affect a vehicle's efficiency are deeply rooted in scientific and mathematical principles.

Essential Questions

What affect do various types of forces have on vehicles?

What variables are important to consider when designing a vehicle for speed?

How does drag affect vehicle speed?

What makes a vehicle efficient?

How is the design process used when designing and creating new vehicle technologies?

Content

Vocabulary:

drag, drag coefficient, wind resistance, speed, lift, friction, surface area cross-section, acceleration, stress point, fillet

Skills

Design and create a vehicle design using a 3D CAD system.

Test a vehicle created in CAD in a digital wind tunnel.

Analyze the results of digital wind tunnel testing and use the information to justify design changes.

Design and create a vehicle that travels as fast as possible.

Calculate the wind resistance cross-section of a vehicle.

Calculate the average speed of a vehicle over a closed course.

Calculate the drag coefficient of a vehicle.

Conduct physical wind tunnel testing of a vehicle and interpret the results.

Resources

Desktop computers

3D CAD software (Autodesk Inventor or similar)

Digital wind tunnel software

Physical wind tunnel

Calipers

3D printer

Prototyping equipment

Prototyping materials

Standards

TECH.8.1.12.A.2	Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.
TECH.8.1.12.B.CS1	Apply existing knowledge to generate new ideas, products, or processes.
TECH.8.1.12.C.CS2	Communicate information and ideas to multiple audiences using a variety of media and formats.
TECH.8.2.12.C.5	Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
TECH.8.2.12.C.CS2	The application of engineering design.
TECH.8.2.12.D.3	Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.
TECH.8.2.12.D.CS1	Apply the design process.