Aluminum Foil Watercraft Prototype - Vocabulary and Materials

Vocabulary - General	
Term	**Definition**
design flaw	A design that does not meet some of the requirements (design specifications) or serve some of the customer's needs.
design failure	A design that does not meet the essential requirements (design specifications) or serve the customer's critical needs.
Engineering Design Process (EDP)	A sequential and logical process to solve a problem. Many times repeated to get to the best possible solution.
F.A.I.L.	An acronym that stands for **F**irst **A**ttempt **A**t **L**earning. Used to encourage mindful failure toward effective problem-solving.
GRASPS	GRASPS stands for **G**oal, **R**ole, **A**udience, **S**ituation, **P**roduct, and **S**tandards & Criteria for Success. The GRASPS outlines the essentials of a problem-solving scenario for students to establish an authentic performance task. The model was created by education scholars Grant Wiggins and Jay McTighe.
informational/ explanatory writing	Writing that is intended to inform or explain something. The questions of *why* or *how* are addressed.
MYP Design	The MYP Design Cycle (sometimes referred to as the IB Design Cycle) provides students with a sequential framework to guide them to identify and solve a problem for a target audience. The term *MYP* means *Middle Years Program* and serves students from ages 11 to 16. It spans both middle and high school. MYP operates within the International Baccalaureate® (IB) Program which fosters open-minded learners, who strive to be inquisitive, caring, and balanced risk-takers with a global perspective.
Project Based Learning (PBL)	PBL structures a student's learning environment to be focused around an authentic problem. Learning is interdisciplinary and students tend to collaborate and leverage 21st-century skills. Teachers facilitate student inquiry and students have greater control over how they learn.
prototype	A prototype in PBL is the product students create to solve the problem. It can be considered the result of an iteration of EDP.
Science Olympiad	The Science Olympiad is an international nonprofit organization that promotes STEM learning and competition in nearly all 50 U.S. States.

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STEAM	STEAM is an acronym for **S**cience, **T**echnology, **E**ngineering, **A**rt, and **M**ath. It is an interdisciplinary approach to learning that encourages students to think more broadly about real-world problems.
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Vocabulary - Project Specific (GRASPS)	
Term	**Definition**
boatbuilder	A person who builds boats (usually with some skill).
frivolousness	A lack of serious behavior especially at an inappropriate time. Silliness or goofiness.
hull	A hull is the main part of a ship or boat. Much of it is in the water. Some of it is not. It's basically the bottom and sides, not the masts, sails, engines, etc.
watercraft	A boat, ship, barge, raft or another vessel that travels on water such as an ocean, sea, or lake.
seaworthiness/ seaworthy	A measure of how well a watercraft withstands the conditions of being at sea.

Vocabulary - Sketching	
Term	**Definition**
construction lines	Light continuous lines (sometimes temporary) that outline the final elements of a 3D drawing. These lines are usually parallel and/or perpendicular to each other. Drawings made with slightly visible construction lines add an authentic industrial design look to product sketches.
dimension lines	Thin continuous dark lines that indicate the size of the features of an object. They are usually broken in the middle to indicate the dimension value. Arrowheads are typically placed at each end.
hidden lines	Medium weight dashed lines that show the edges of hidden surfaces in 3D sketches.

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orthographic projections	A method to represent a 3D object with 2D views. The most commonly displayed 2D views are top, front, and right side.
Sketchnoting (visual note-taking)	A method of taking notes that goes beyond text. Students leverage text, symbols, doodles, shapes, and other visual elements when note-taking to expand their understanding of concepts.
visible object lines	Thick, dark continuous lines that are used to show the edges of a 3D object. Visible lines outline the visible contours of an object.

Vocabulary - Math	
Term	**Definitions**
average	A number expressing the central or typical value in a set of data. Also known as the mean, which is calculated by dividing the sum of the values in the set of data by the number of values.
bivariate data patterns	Data patterns that look at two sets of variables for relationships. One variable is changed (e.g., area of the base of aluminum foil watercraft) to investigate to what extent the change has on another variable (pennies at failure--i.e., the watercraft sinking).
central tendency	A single value that attempts to describe a set of data by identifying the central position within that set of data. Mean (average), median, and mode are measures of central tendency.
control variables	Anything measurable that can change in a research study but is regulated to be either constant or limited. The control variable may cause an unwanted effect and is therefore not changed during the testing. In the example of the aluminum foil watercraft, the amount of aluminum foil used is a control variable.
data distributions	An organized set of data points. These data are the results of testing in the engineering design process. Organizing data helps reveal patterns that can show relationships between variables.
statistical variability	An indicator of how spread out or dispersed a set of data are. Standard deviation is a common measure of statistical variability and can easily be calculated in a Google Sheet.

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Materials
- aluminum foil - e.g, Kroger brand aluminum foil 12 in wide (30.4 cm)
- 12 in/30 cm ruler
- bowl (5 inch diameter and 3 inch depth or greater)
- 70 to 100 U.S. pennies
- sewing thread (optional)
- clear plastic office tape (optional)

Equipment
- dark permanent marker with a medium point
- scissors
- G Suite
- laptop with a camera (or a computer with any other kind of digital camera)
- image editing/touch-up software (optional)