

## Grade 3 Design Challenge Quick Guide: Designing Clay Boats– Cycle 1

**Lesson Objective(s):** Students will be able to describe a means to make a material that is denser than water (modeling clay) float.

**Materials:**

*For all teams*

- 1 design log per student
- 1/2 stick (about 2 ounces or 50-60 grams) of modeling clay (non-hardening) per team of 3
- 1 tub of water, at least six inches deep, per team
- 100+ equally-sized, washers, marbles, or pennies for each team (teacher discretion)
- Paper towels
- 1 roll of wax paper
- tape (masking or transparent)
- Butcher or poster paper, 2 per group
- 21<sup>st</sup> Century Skill rubric for grading the project
- Handouts
  - “My Research Notes”
  - “Observations”
  - “Testing your Clay Boat”

**Websites**

- <http://www.eslgamesplus.com/question-words-what-where-who-why-when-which-how-grammar-activity/>
- <http://www.boatsafe.com/kids/022298hulls.htm>
- [http://www.fish.state.pa.us/anglerboater/1999/julaug99/boat\\_hull.htm](http://www.fish.state.pa.us/anglerboater/1999/julaug99/boat_hull.htm)
- <http://pbskids.org/designsquad/parentseducators/resources/watercraft.html>
- <http://pbskids.org/dragonflytv/show/sailboat.html>
- <http://pbskids.org/dragonflytv/show/milkcartonboat.html>
- <http://www.brainpopjr.com/science/forces/sinkorfloat/draganndrop/>
- <http://www.brainpop.com/science/motionsforcesandtime/buovancy/>
- <http://www.brainpop.com/educators/community/lesson-plan/sink-or-float-background-information-for-teachers-and-parents/>
- <http://www.brainpopjr.com/science/forces/sinkorfloat/>

**TEKS:**

*Science*

\*SCI 3.5A Measure, test, and record physical properties of matter, including temperature, mass, magnetism, and the ability to sink or float.

PS SCI 3.2B Collect data by observing and measuring using the metric system and recognize differences between observed and measured data.

PS SCI 3.4A Collect, record, and analyze information using tools, including microscopes, cameras, computers, hand lenses, metric rulers, Celsius thermometers, wind vanes, rain gauges, pan balances, graduated cylinders, beakers, spring scales, hot plates, meter sticks, compasses, magnets, collecting nets, notebooks, sound recorders, and Sun, Earth, and Moon system models; timing devices, including clocks and stopwatches; and materials to support the observation of habitats of organisms such as terrariums and aquariums.

*Math*

PS MATH 3.1C Select tools, including real objects, manipulatives, paper/pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems.

PS MATH 3.1D Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate.

ELPS	CCRS Science	CCRS Math	CCRS Cross-Disciplinary
C3E, C5B	3A1B, 4A1A	8C3A, 10B1C	1C1C, 1E2C

**Engineering Design Loop:** *For more details, refer to the overview page.*

**Identify the Need:** Teams of students will be challenged to design a boat out of clay.

**Research the Problem:** Teams will conduct research on boat designs using kid-friendly websites.

**Develop Possible Solutions:** Teams will use their research and videos to decide on two possible clay boat designs.

**Select the Most Promising Solution:** Teams will decide which one of the clay boat designs to build and use for testing.

**Construct a Prototype:** Teams will build their clay boats according to their established procedures.

**Test & Evaluate (Math Connection):** Teams will graph the amount of cargo their clay boat holds to test their design.

**Communicate their Design:** Teams will share their design and details of their design process in a presentation.

**Redesign:** Teams will try to generate ideas of design changes that could help them to improve their clay boat.