**Course Data**

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6th Grade

Technology/Engineering

50 minutes

**Standards**

GLE 0607.T/E.2 Know that the engineering design process involves an ongoing series of events that incorporate design constraints, model building, testing, evaluating, modifying, and retesting.

GLE 0607.Inq.1 Design and conduct open ended investigation

CHK 0607.T/E.1 Use appropriate tools to test for strength, hardness, and flexibility of materials

**Objectives**

TSWBAT construct a boat that tests strength.

TSWBAT construct a boat that tests hardness.

TSWBAT construct a boat that tests flexibility.

TSWBAT apply the engineering design process to solve a problem.

**Materials**

Ball of modeling clay (1.5-2 inches in diameter)

Large bins or buckets filled with 3+ inches of water

A couple of dollars worth of pennies

**Anticipatory Set/Focus**

***ABK-*** Ask the students to think of one of the steps in the Engineer Process that was previously learned.

***IA-*** Go around the room and ask random students to name off all of the steps until you have all six. Write them on the board so that they are clear to students.

***RRL-*** Can you think of a time you had to use these six steps in your life to solve a problem?

***IA-*** Have students share with their neighbor.

***LL-*** Today we are going to implement the 6 engineering steps in a classroom experiment!

**Instruction**

1. Review previously learned material. (see set/focus)
2. State objectives. (see set/focus)
3. Present new material.
4. Hand back out the Engineering Design Process worksheet to students so that they can refer to their previous work.
5. Hand out the balls of clay for students, make sure you say that they do not need to throw or play with them.
6. Provide these directions for students:
   1. The Objective of this activity is to construct a boat that (a) will float, and (b) will hold a large number of pennies—the more, the better!
   2. Have students work individually or with a partner.
      * **Identify the Problem:** To construct a boat that will float and will hold a large number of pennies!
      * **Explore:** Discuss the shape of existing boats: they typically have flat or slightly rounded bottoms with high side. Why? What would happen if boats had different shape?
      * **Design:** Have students sketch the boat they plan to make, or verbalize to a partner.
      * **Create:** Students create boats.
      * **Try it Out:** Students can test their boats in the buckets or bins of water. If a boat floats, students can add one penny at a time until the boat sinks.
      * **Make it Better:** Let students reshape boats and try again!
7. Have students share with the class.
8. Have students write a paragraph restating what they did using the engineer design process. Have them reflect on struggles.

**Closure**

Learning Verbalized.

Have students return to their desk and share some of their solutions with the class.

Ask them what they learned today.

**Assessment**

Take up paragraphs.