Lesson Plan Template

Date:

Autumn Alt

Grade: 1st

Subject: Science STEM

Materials: Plastic tub (deep), plastic water bottles (full and empty), straws, duct tape, seran wrap, dixie cups, popsicle sticks, tin foil, pennies, small items to test float/sink, towels

Technology Needed: Students will need computers

Instructional Strategies:

- € Direct instruction
- € Guided practice
- € Socratic Seminar
- € Learning Centers
- € Lecture
- € Technology integration
- € Other (list)
- € Peer teaching/collaboration/perative learning
- € Visuals/Graphic organizers
- € PBL
- € Discussion/Debate
- € Modeling

Guided Practices and Concrete Application:

- € Large group activity
- € Independent activity
- € Pairing/collaboration
- € Simulations/Scenarios
- € Other (list)
- € Hands-on
- € Technology integration
- € Imitation/Repeat/Mimic

Explain:

Standard(s)

K-2-ET1-2 Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Objective(s)

By the end of the lesson, students will identify why objects either sink or float by testing different materials in water.

By the end of the lesson, students will demonstrate their knowledge on sinking and floating by creating a boat that needs to hold at least 15 pennies without sinking.

By the end of the lesson, students will understand how the shape of an object affects its function by testing their creation to see if their boats can hold at least 15 pennies.

Bloom's Taxonomy Cognitive Level:

- **Knowledge**
- **Comprehension**
- **Application**
- **Analysis**

Differentiation

Below Proficiency: These students will be grouped with students who have higher level critical thinking and problem solving skills. Students will repeat vocabulary words after teacher says them.

Above Proficiency: These students will be working with students who have lower problem solving and critical thinking skills to help guide them along the problem solving process.

Approaching/Emerging Proficiency: Students will participate in this lesson mixed in groups with both above and below proficiency students. They will be encouraged to use higher order thinking skills.

Modalities/Learning Preferences:

- **Visual**
- **Physical/Kinesthetic**
- **Social**
- **Logical/Mathematical**
- **Verbal**

Classroom Management- (grouping(s), movement/transitions, etc.)

- Students will not start a task without me showing them what I would like them to do first.
- When we meet at the rug, students are to go to their carpet spots and follow their carpet procedures. Their hands should be in their lap with their eyes on me.
- If students are talking I will say "ready to listen" and they will reply with "ready to learn."
- Students will have a level 0 voice when I am explaining the concept to them.
- Students will be assigned into groups of 2. These groups will be determined before the lesson begins.
- When students are researching and gathering materials, students will walk and have no louder than a level 2 voice.

Behavior Expectations- (systems, strategies, procedures specific to the lesson, rules and expectations, etc.)

- Students are expected to raise their hand when they have a question or after I have asked a question and am looking for an answer
- Students are expected to follow their carpet procedures.
- Students are expected to have their voice at a level 0 when I am talking
- When students are collaborating in their groups, they are expected to have no higher than a level 2 voice.
- Students are expected to listen when I am talking. They should be listening for any directions or for me to say one of the practiced saying (ready to listen, ready to learn or eyes on me, 1, 2, 3).
- I will use love and logic when behavior issues occur.

Minutes	Procedures
	Set-up/Prep: **1. Have all materials (duct tape, straws, deeper plastic tub, full and empty plastic water bottle, seran wrap, aluminum foil, popsicle sticks, pennies, popsicle sticks, pink pong balls, dixie cups) set up and ready to be used for the lesson.** **2. Have different stations set up with different materials in each to allow for easier movement throughout the classroom** **3. Make sure laptops are available**

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	Engage: (opening activity/ anticipatory Set – access prior learning / stimulate interest /generate questions, etc.) 1. **As I am preparing my materials for the lesson, students will each have a computer and will research buoyancy, floating, and sinking on PebbleGo. This will prepare the students for the lesson they will be participating in.** 2. **To begin the lesson, we will meet at the rug. Students will sit in their carpet spots and follow their carpet procedures. I will not start the lesson until the students are following their procedures with their eyes on me.** 3. **I will start this activity with much excitement by telling my students that I have a very important task for them today. Before I can give them their special task, I need to know that they can do it by working together, following directions, and being safe. I will ask the class if they can do these things for this important task. (hopefully students will say they can do it!)** 4. **If the students say they can do these things, I will tell them that today we are going to be engineers! At this time I will tell the students that an engineer is someone who designs and builds things for people to use. In order to be an engineer, we need to put on our protective gear. First, we need to put on our thinking hats. Together we will pretend to reach up on a shelf to grab our thinking hats to put on our head and buckle around our chin. Next we need to put on our boots. Together we will reach down and grab our boots to put them on. We will also need to put on our jackets, goggles, and gloves. Now that we are all dressed and ready to be engineers, we can get ready to learn about and be and engineer!** 5. **Today our task is to build a boat that will float holding 15 pennies.** 6. **We are going to think about, what makes a boat float?** 7. **What causes the boat to sink?** 8. **How will you waterproof your boat?**
	Explain: (concepts, procedures, vocabulary, etc.) **1. As the students are still sitting at their carpet spots, we will be discussing what we will be doing for this special task I have for them. We already discussed that we need to design a boat that will be able to stay afloat while holding 15 or more pennies. Before we begin designing our boats, there are some terms that we need to discuss.** **2. First, we are going to think about what things we know travel in the water.** **a. Some examples could include sticks, cups (plastic), other plastic items, balls, etc.** **b. We will be discussing what makes these different items capable of floating in the water. Force plays a big role in this process. The word we use for it is called buoyancy – vocabulary word; have the students repeat the word after I say it. This was a term that was discussed in the video the students watched. I will ask to see if someone can tell me what buoyancy means.** **c. Buoyancy is the force that pushes back up on an object. The more buoyancy an object has, the higher it floats in the water.** **d. Another vocabulary word we will be discussing is displaces – have the students repeat this word. This word means that an object is pushing away. A larger object will push away or displace more water than a smaller object will. What this does is create more force (or pressure), which makes it harder to keep the object down in the water.** **e. At this time, we will review these terms again. I will have them say the two vocabulary words, and we will repeat what their definitions are. I will also be writing them on the board for something the students can refer to.** **f. We will also test this at the back table using a tub of water with a full and empty water bottle. The students will have the opportunity to hold both under the water to see which one was more difficult to hold. We will then discuss how these vocabulary terms play a role with these two different water bottles. (The empty water bottle should be more difficult to hold under water and the full water bottle will displace more water).** **g. At this time, I will also show the students a couple other materials. We will decide if they will sink or float and discuss the results.** **3. We now have discussed these key vocabulary terms for our lesson. Since we are engineers, we have to come up with a plan.** **a. Our plan will consist of different steps. WORK TOGETHER, Know the materials, Sketch, and Build.** **b. I will tell the students that when engineers solve problems, they try different ideas and learn from their mistakes. We will need to go through the design process to decide what will make a boat float the best, what will be the best design, and how big it will need to be to hold our 15 pennies?** **4. Next, we are going to look at the materials that we have to work with to design our boats. We will need to decide what we are going to use, how we can make our boat waterproof, and how we will balance the pennies on the boat so they don't fall into the water. If the students are unsure if one of the objects will float in the water, they can bring the material to the back table to test the object in the water.** **5. Before we begin to build our boat, we need to sketch out a design. We have to know how we are going to put our boat together. With the materials that you have decided to use, make a sketch to show how you will construct your boat to hold the required number of pennies. How long will it be? Will it be flat or have sides?** **a. The students will be given a certain amount of time to sketch their designs so they have time to build them and test them.** **6. After the sketch of their boat, they will then begin to put their design together using the materials that they chose to use. I will let the students know that it would be a good idea to test their designs as they continue to build to know if**

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	what they planned is going to work. If it doesn't work as planned, that is part of being an engineer. We test and revise or fix if needed.
	Explore: (independent, concreate practice/application with relevant learning task -connections from content to real-life experiences, reflective questions- probing or clarifying questions) **1. The students will be working in groups of 3 with one group of 2. I will have the already split into groups for this assignment. I will again tell the students that it is important that they WORK TOGETHER to build a boat that will hold 15 pennies.** **2. I will have the students follow me with their eyes to see where everything they will need is located within the room. The materials that they have to choose from will be in one area of the classroom. The paper that will be used for their sketches will be in another part of the room. When I dismiss their groups they are to first examine the materials that they will be allowed to use. They need to understand how the materials work before they can begin deciding how they are going to build their boat fulfill their special task.** **3. I will have the steps the students are to follow written on the board.** **a. WORK TOGETHER – probably the most important step.** **b. What will you use?** **c. Sketch or create a blueprint of your design using Minecraft** **d. Create and test throughout** **e. Present design to class and test for all to see** **4. I will guide the students through this process if needed, but I really want to foster that independent practice and get the students to collaborate with one another. I want them to ask questions about their design and the materials they are using.** **5. Students will be allowed approximately 20-25 minutes for this design process so we have time in class to look at everyone's design and test to see if it works.**
	Review (wrap up and transition to next activity): **1. After testing the designs of the different groups, we will discuss what made the boats successful or unsuccessful.** **2. How could we change our design to make it even more effective?** **a. Students will provide input to their peers so they can all think together and hear others' ideas.** **3. We will talk about how the shape of the boat they designed helped it solve the task we had of holding 15 or more pennies.** **4. We will also discuss what part buoyancy, displacement, and force played into their designs as they were testing it.**

Formative Assessment: (linked to objectives, during learning) ● **Progress monitoring throughout lesson (how can you document your student's learning?)** - **The sketches that the students provide to me will be a type of formative assessment that will be used. This will show me how they are going about finding a solution to the problem that they have been handed.** - **With each students design, they will be give me a short reflection on what they would do differently because that is part of being an engineer. We are always reflecting on how we can improve our design.**	**Summative Assessment (linked back to objectives, END of learning)** - **Students will be testing their final creation to see if their boat fulfilled the task that was given. In this assessment, students will understand how the design and shape of an object helps it function for the given problem.**

Reflection (What went well? What did the students learn? How do you know? What changes would you make?):

This lesson was so fun! I was very impressed with how well this lesson went. Students were learning so much through the engineering process that they didn't even realize they were learning. The students were engaged throughout the whole lesson. The second that I stated today we are going to be engineers, the students' faces lit up with excitement. Some of the students have parents who are engineers and were excited to share with the class what their parents do. We came to the conclusion that engineers are people who build things for others to use. Each student listened to the explicit instruction on the large vocabulary words. They were a bit over their head, but we broke it apart and continuously revisited the terms to keep bringing them up for the students to remember. This was just an introduction to the terms buoyancy and displacement.

Throughout the engineering process, students learned how important it is to work together in their groups and have a plan for how they want to construct their boat. The students were given the problem of making pennies (an item that does not float) float by creating a boat that is capable of holding 15 pennies. By going through this design process and through testing their creations, they were able to see how the

shape of an object helps it function to complete a given task. There was only one group of students that I had who did not meet the requirements. All groups though did think of having sides on their boat, how they were going to stabilize their creation, how they were going to waterproof their boat, as well as how they were strategically going to place their cup on their boat to hold their pennies so their boat didn't tip. All students in each group worked together very well to complete this task. At the beginning of the lesson, I did stress how important it is to work together with their group members, and they did just that. There was no arguing with who was doing what. They all did their part and participated.

I know the students learned how the shape of an object helps it function for a certain task by the boats they created. I was also able to tell this through discussion. For the boat that wasn't able to hold the pennies, we brainstormed as a class on how we could take what we learned from this test and make any corrections if we were to do this again. The students were very supportive of their peers and gave great feedback. Some ideas that were discussed was changing the floor of the boat. With the materials that were provided, making a more square floor would be a great option for creating this boat to hold 15 pennies.

To be honest, this lesson went better than I had originally anticipated. The students were very well behaved, they listened to instruction, they followed the correct procedures, they worked well with their group members, and they worked so hard with the time they were given to complete their creations. If I were to teach this lesson again (and I would love to do this again), in testing the boats I would ask each group what corrections they would make, because that is part of being an engineer. We are always creating and revising or trying to improve our creations. Something else I would add would be the vocabulary word density. Buoyancy and density are often talked about together, and I feel it would have been better to add that word into our lesson as an introduction as well. Overall, I thought the lesson went great. I was very impressed with the work that the students created, and I know then enjoyed getting to learn how to build something to solve a given problem.