Sally uses Pasteboard for the first time

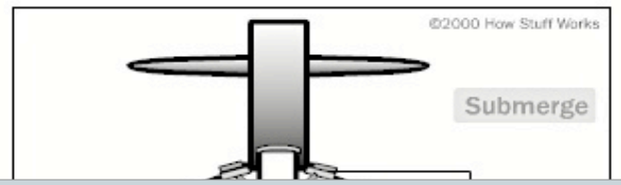
Sally is an 8th grade science teacher who is browsing the web. While planning upcoming class lessons during her prep time she encounters a relevant article around the application of buoyancy for submarines.

Photo courtesy U.S. Navy

Diving and Surfacing

A submarine or a ship can float because the weight of water that it displaces is equal to the weight of the ship. This displacement of water creates an upward force called the **buoyant force** and acts opposite to gravity, which would pull the ship down. Unlike a ship, a submarine can control its buoyancy, thus allowing it to sink and surface at will.

To control its buoyancy, the submarine has **ballast tanks** and auxiliary, or **trim tanks**, that can be alternately filled with water or air (see animation below). When the submarine is on the surface, the ballast tanks are filled with air and the submarine's overall density is less than that of the surrounding water. As the submarine dives, the ballast tanks are flooded with water and the air in the ballast tanks is vented from the submarine until its overall density is greater than the surrounding water and the submarine begins to sink (**negative buoyancy**). A supply of compressed air is maintained aboard the submarine in air flasks for life support and for use with the ballast tanks. In addition, the submarine has movable sets of short "wings" called **hydroplanes** on the stern (back) that help to control the angle of the dive. The hydroplanes are angled so that water moves over the stern, which forces the stern upward; therefore, the submarine is angled downward.



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5. Science Puzzles: Ammonite Fossils

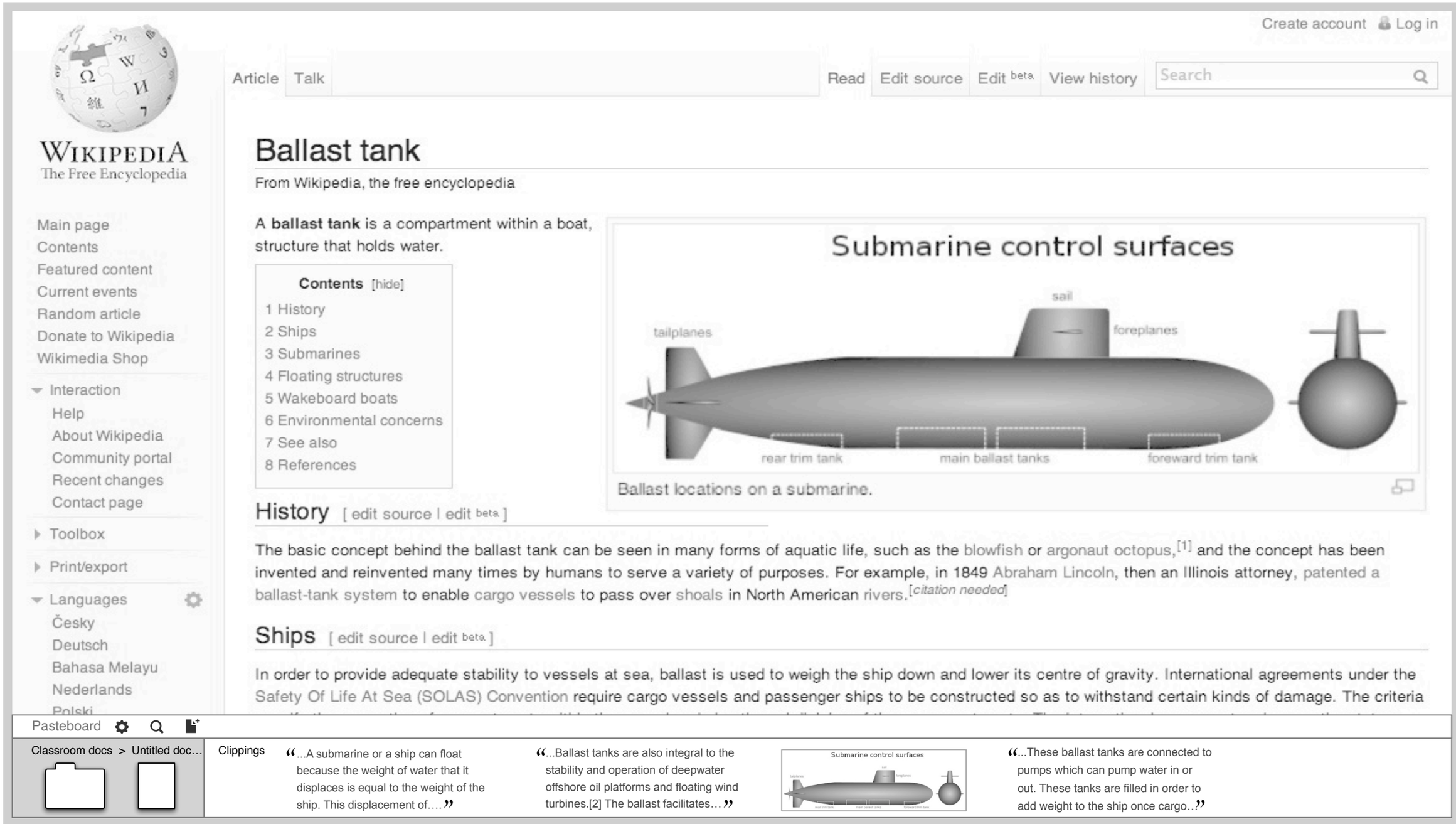
A submarine or a ship can float because the weight of water that it displaces is equal to the weight of the ship. This displacement of water creates an upward force called the buoyant force and acts opposite to gravity, which would pull the ship down. Unlike a ship, a submarine can control its buoyancy, thus allowing it to sink and surface at will.

Pasteboard

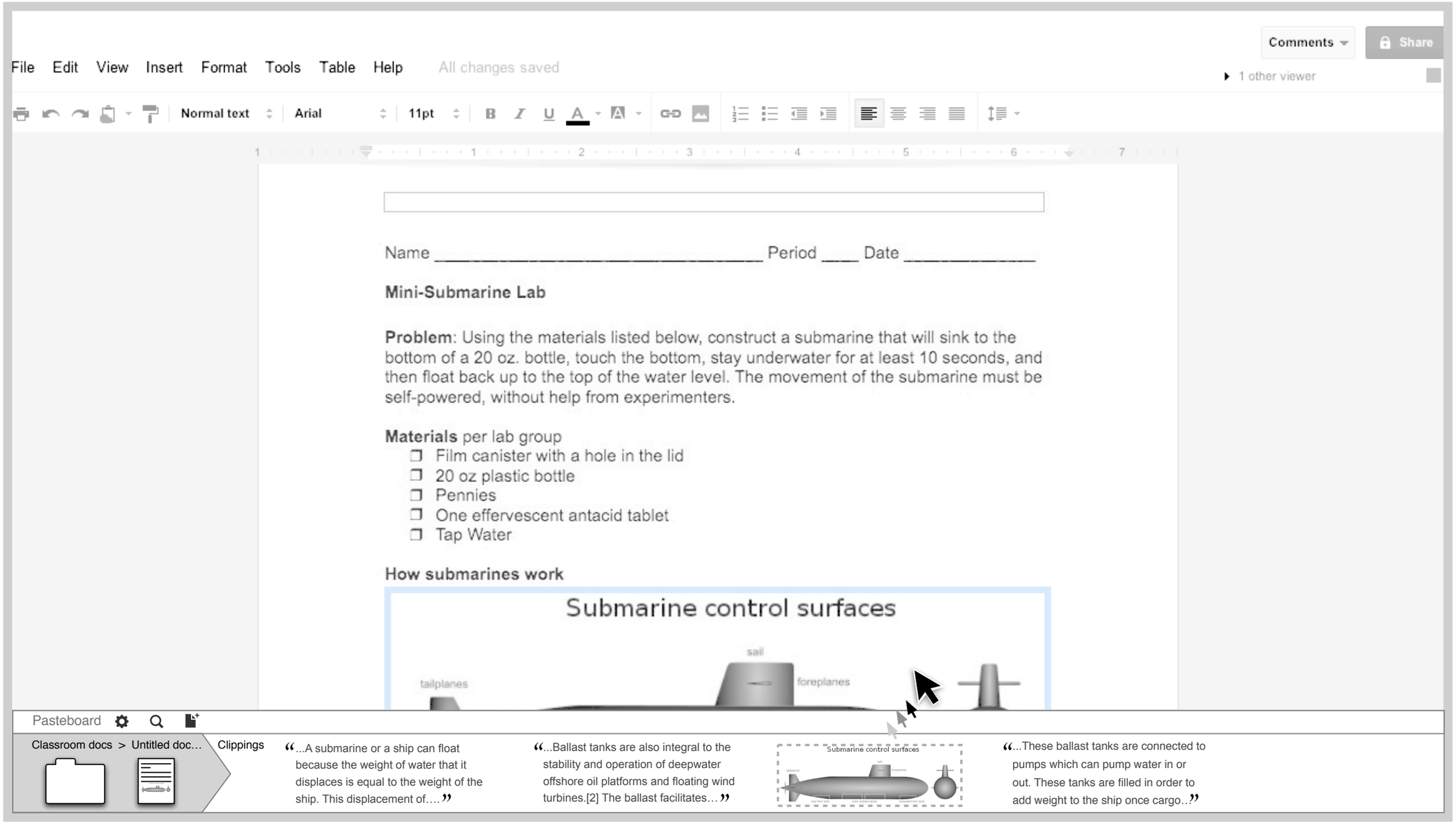
Classroom docs > Untitled doc… | Clippings

Drag and drop your clippings here

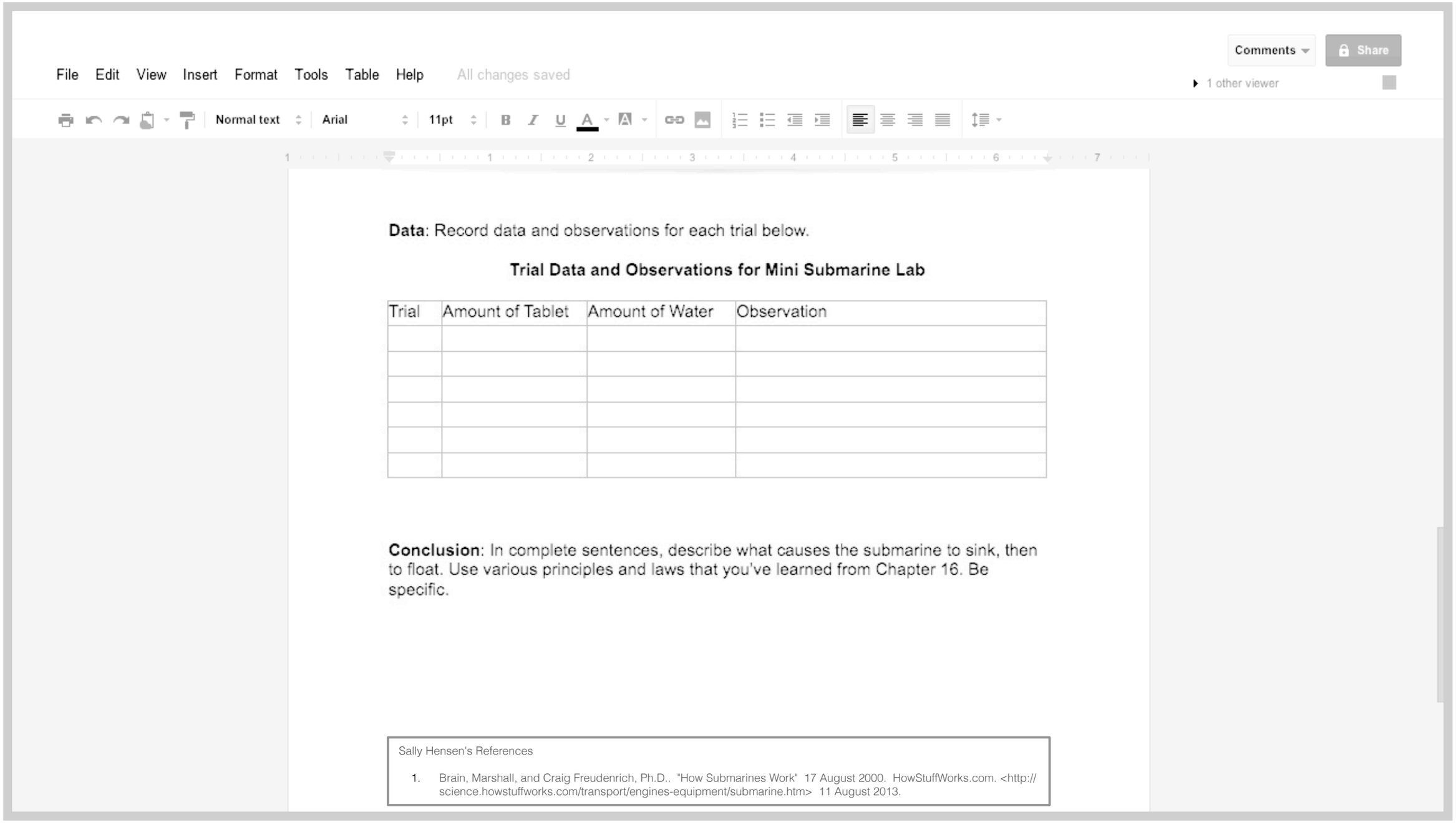
Sally likes the content of the article but notices that she will need more illustrations to use it in class with her students. She decides to highlight and select the portions of the article that she finds relevant and drags them to the bottom left of the browser where the pasteboard tray opens. The dragged content becomes a clipping inside the tray.



Sally then goes Wikipedia in search of an illustration and discovers additional content that is relevant. She repeats the clipping process on a series of paragraphs as well as an image that illustrates buoyancy quite nicely.



With her current clippings in hand inside her pasteboard, Sally goes to Google Docs and creates a new document. She begins writing the outline of her handout, she moves her cursor to the bottom left corner of her browser where the pasteboard tray opens and she drags one of the clippings she previously discovered into the handout. The content that she had clipped gets inserted into her Google document at the cursor location.



Sally notices that a new section was immediately added to her document where a series of links or references appear. She wonders what it's about, and reading more closely she realizes it's an attribution block for the content she just pasted.

Trial	Amount of Tablet	Amount of Water	Observation

Conclusion: In complete sentences, describe what causes the submarine to sink, then to float. Use various principles and laws that you've learned from Chapter 16. Be specific.

Sally Hensen's References

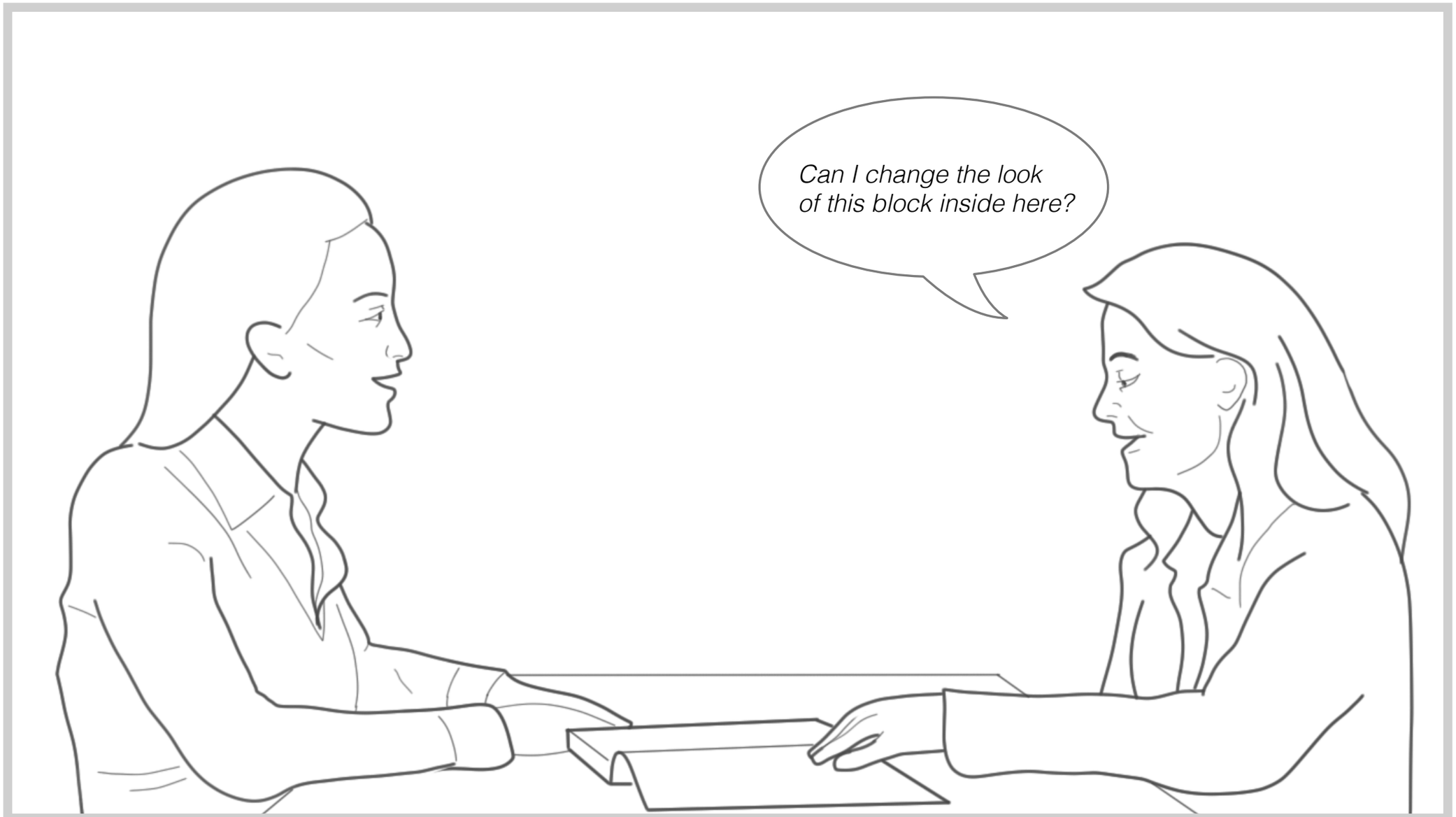
1. Brain, Marshall, and Craig Freudenrich, Ph.D.. "How Submarines Work" 17 August 2000. HowStuffWorks.com. <http://science.howstuffworks.com/transport/engines-equipment/submarine.htm> 11 August 2013.
2. ^ Musial, W.; S. Butterfield, A. Boone (2003-11). "Feasibility of Floating Platform Systems for Wind Turbines". NREL preprint (NREL) (NREL/CP-500-34874): pp. 2–3. Retrieved 2010-05-04.
3. ^ BBC News: Microwaves 'cook ballast aliens'

View all the references

Sally continues to paste the other clippings from her pasteboard tray and edits the document, both tweaking what is there, as well as creating new text sections of her own.
She notices that the ‘attribution block’ gets updated automatically as she drops in more content from her pasteboard tray, which she finds very handy. The handout is ready,
and she plans to share it with her students via the Google Docs built-in share feature.

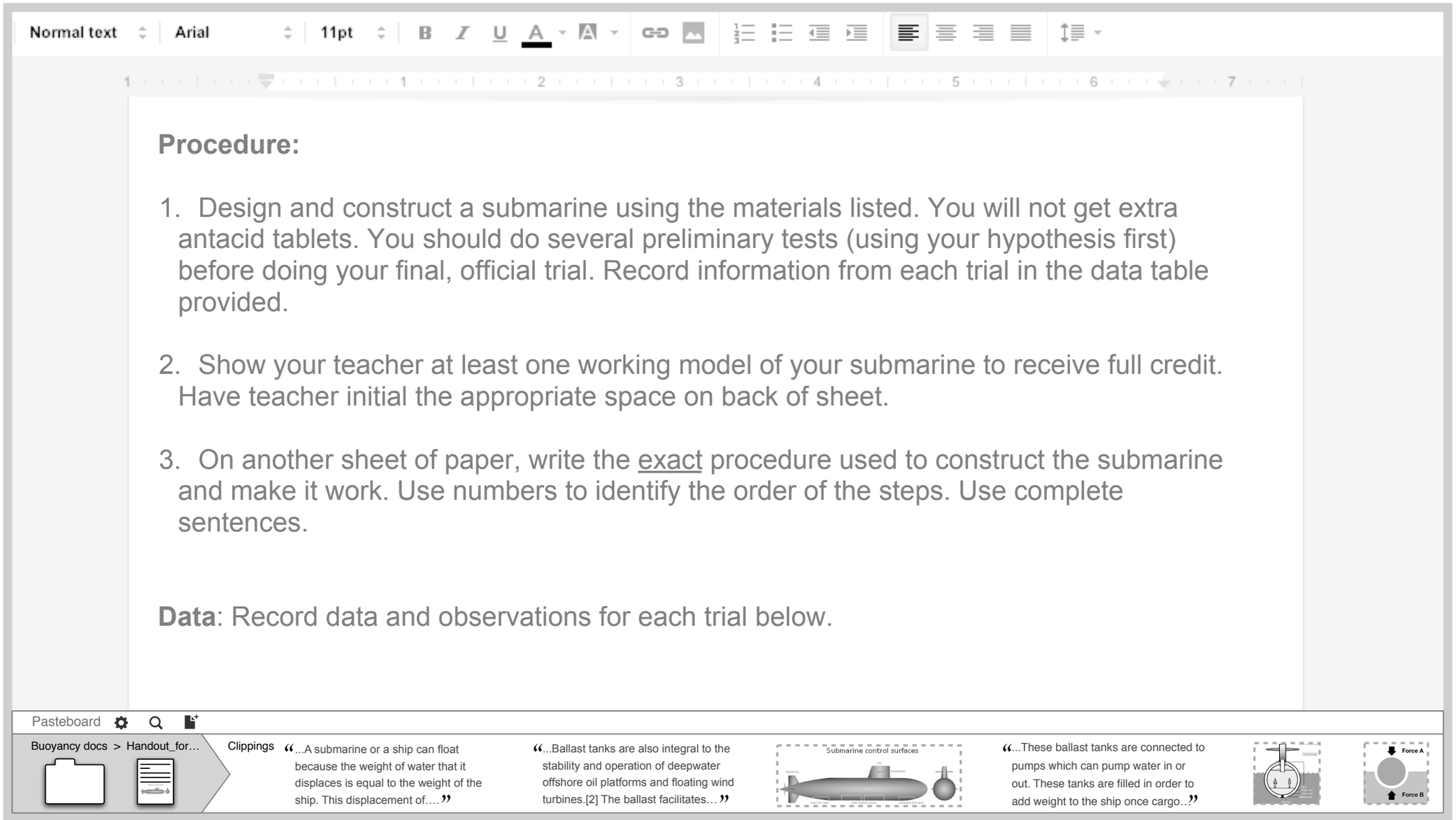
A few days later, after class...

During Sally's office hours, one of the students drops by and mentions to Sally how cool she found one of the source materials that was linked from the ‘attribution block’ inside the handout.



Megan, another 8th grade science teacher, overhears this conversation and asks what this cool link was. Sally then shares the handout with Megan who notices the link is in a references section, and asks Sally how she put together that block. Sally tells her about this new tool she's been trying out to collect and put together her class materials and gives her the name of this service. Megan likes it, but wonders if the location or appearance of the block might be customizable.

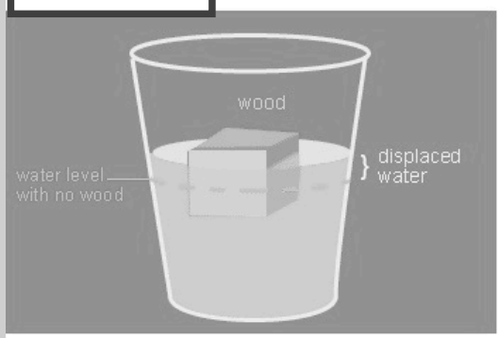
Megan starts building on top of Sally's work



Megan thinks the tool is a cool idea, and signs up to use it. She also has a class on buoyancy coming up soon, and decides to use the handout that Sally put together, but she has a few kids who are more visual learners, so she plans to do a few tweaks of her own to add more visuals. Megan duplicates Sally's handout using Google Docs' "Make a Copy" feature, and and notices that when she moves her cursor to the bottom of her browser the pasteboard tray comes up already pre-filled with the clippings that Sally had put together to create the handout. She is amazed that she is able to take a peek into Sally's research effort simply by opening this document.

1

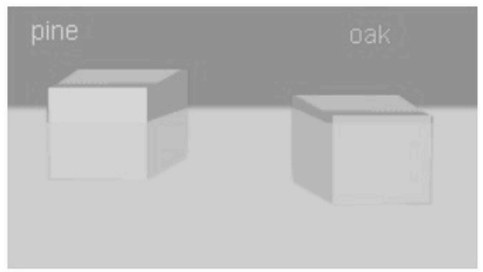
How does Buoyancy work?

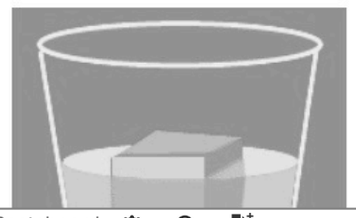


When you place a block of wood in a pail of water, the
block displaces some of the water, and the water level goes up.

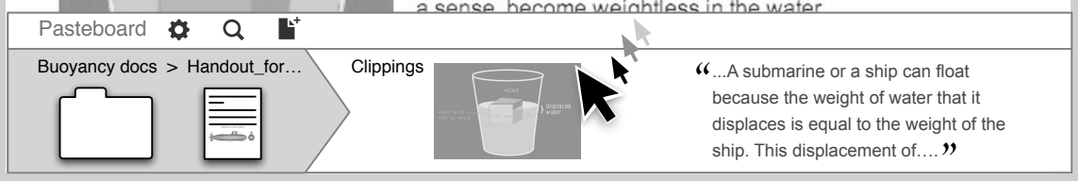
If you could weigh the water that the wood displaces, you would find that its weight equals the weight of the
wood.

This doesn't mean that if you had a few blocks of wood that were exactly the same size and shape, they would each displace the same amount of water. A block of wood made of oak, for example, sits deeper in the water (and therefore displaces more of the water) than does a block of pine.
The reason is that it's heavier for its size, or denser -- in this case, the molecules that make it up are more closely packed together than the molecules that make up the pine.





If you could somehow keep increasing the density of the block, it would sink lower and lower into the water. When its density increased enough to displace an amount of water whose weight was equal to the weight of the block, it would, in
a sense, become weightless in the water.



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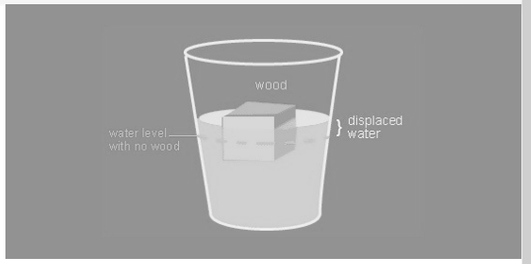

Procedure:

1. Design and construct a submarine
   from each trial in the data table pr
2. Show your teacher at least one wo
   the appropriate space on the back
3. On another sheet of paper, write t
   and use complete sentences to id

Megan Lee's References

1. Olson, Michael "Density Principles" 11 M

Sally Hensen's References

1. Brain, Marshall, and Craig Freudenrich

Megan visits some sites of her own and clips the content she needs, and when she pastes the content into her new handout, she notices that the 'attribution block' is updated to reflect her effort whilst retaining attribution for Sally's previous effort. She finds this pretty amazing, and realizes that this tool is about building on top of each other's work.

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Document name: Handout_for_bouyancy_PHYSICS_89.doc

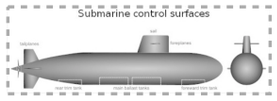
Sally Hensen's References

1. Brain, Marshall, and Craig Freudenrich, Ph.D.. "How Submarines Work" 17 August 2000. HowStuffWorks.com. <http://science.howstuffworks.com/transport/engines-equipment/submarine.htm> 11 August 2013.
2. ^ Musial, W.; S. Butterfield, A. Boone (2003-11). "Feasibility of Floating Platform Systems for Wind Turbines". NREL preprint (NREL) (NREL/CP-500-34874): pp. 2–3. Retrieved 2010-05-04.
3. ^ BBC News: Microwaves 'cook ballast aliens'

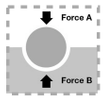
Clippings from 'Handout_for_bouyancy_PHYSICS_89.doc'

"...A submarine or a ship can float because the weight of water that it displaces is equal to the weight of the ship. This displacement of...."

"...Ballast tanks are also integral to the stability and operation of deepwater offshore oil platforms and floating wind turbines.[2] The ballast facilitates..."



"...These ballast tanks are connected to pumps which can pump water in or out. These tanks are filled in order to add weight to the ship once cargo.."



Back to home page