



# NAUTILUSLIVE.ORG

## OCEAN EXPLORATION TRUST

Author: Jason McGee

### Science Lesson: Tools of the Trade

**Objective:** TLW explore various tools utilized by ocean researchers IOT understand how the Nautilus effectively explores the oceans.

**"Look Fors":** TL is using the information presented in the discussion and videos to develop a piece of technology similar to the crane and pulley system utilized by the oceanographers aboard the Nautilus.

### Key

**TTW:** The Teacher (Will)

**TLW:** The Learner (Will)

**WG:** Whole Group work

**SG:** Small Group work

**PPT:** PowerPoint

**IOT:** In Order To

- Popsicle sticks
  - Glue
- 2 Thread spools
- Cereal box, individual package size
  - Scissors
  - Pencil
- Toothpicks
  - Thread
- Paper Clip or Button magnet

### Supplies

- TTW provide the following videos at [nautiluslive.org](http://nautiluslive.org): *ROV Pilot* - <https://nautiluslive.org/career/rov-pilot> and *Behind the Scenes- Launching the ROVs* - <https://nautiluslive.org/video/2012/07/20/behind-science-launching-rovs>
- Using the provided video(s) and informational text, TTW guide the discussion of the ROV and allow TL to provide any questions about Nautilus tools, such as the ROV, that will drive the focus of instruction. This will be a great time to brainstorm new ideas and possible tools TL would like to learn to further drive the focus of instruction as well.

### 1. Engage


- TT and TLW explore the following image portfolio and discuss the AUV being described in the images as a tool that assists researchers aboard the Nautilus: <https://nautiluslive.org/album/2013/08/01/exploring-new-technology#>
- Following, TTW use the additional information to further guide the instruction of the technical uses of the AUV- <https://oceanexplorer.noaa.gov/facts/auv.html>
- TTW use the following video comparing ROVs and AUVs- <https://oceanservice.noaa.gov/facts/auv-rov.html>. TLW discuss similarities and differences of the ROV and the AUV; TL should make the comparison that ROVs are piloted and attached to the ship by cables and the AUV is piloted and free-roaming.


### 2. Explore

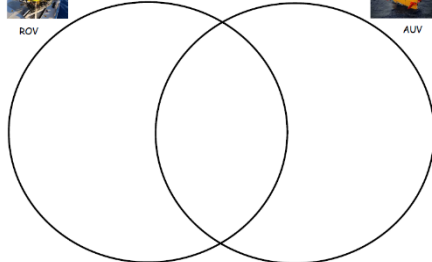
### Student Work

#### Beginner

Name \_\_\_\_\_


 ROV


 AUV

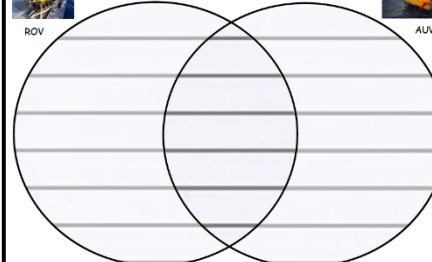


#### Level 2

Name \_\_\_\_\_

 ROV

 AUV



- Using the provided video(s) and image details, TTW guide the discussion of the ROV and the AUV, and how they are both extremely beneficial to the research conducted by oceanographers and marine biologists. Using the information discussed in the video(s) and image details, TLW complete the Venn Diagram comparing the ROV and the AUV.
- TT and TLW explore the following image portfolio and discuss scuba diving in relation to what researchers are capable of with the ROV and AUV vs. scuba diving: <https://nautiluslive.org/album/2013/11/02/champagne-reef-scuba-dive>
- TTW guide the activity and discussion with the supporting essential questions (provided in *evaluate*).

### 3. Explain

- To further explore and analyze tools utilized by oceanographers, TT and TL should explore the following Pinterest link IOT create a crane and pulley system that is similar to the crane used to launch the ROV: [https://www.pinterest.com/pin/244038873537573957/?nic\\_v1=1aTP7%2F5AzCQcgg2EQ15uzyyUzeZk3agTVj3gdE9u5CfKO%2F6%2BjgDeZDpuLqynUwdjYE](https://www.pinterest.com/pin/244038873537573957/?nic_v1=1aTP7%2F5AzCQcgg2EQ15uzyyUzeZk3agTVj3gdE9u5CfKO%2F6%2BjgDeZDpuLqynUwdjYE)
- *Essential Question: "Using your own words, describe how your crane and pulley system would benefit the needs of oceanographers launching an ROV?"*

### 4. Extend

### Supporting essential questions that can be used to evaluate student understanding:

- In your opinion, how could ocean researchers further utilize ROVs and AUVs to progress in their studies?
- How would you describe the purpose of ROV attachments discussed in the video(s)?
- How might researchers adjust ROV Hercules to better suit the needs of the ocean researchers' missions?
- Using your own words, how would you compare the research conducted by each of the following methods: ROV vs. AUV vs. scuba divers?

### 5. Evaluate

**Animal Showcase:** To inspire your young marine biologists, it is suggested to showcase a new ocean animal each class/club meeting. For Day #4, TT may showcase the *Googly-Eyed Stubby Squid* using the provided Nautilus Live link and informational text. This animal was chosen due to the idea that the Googly-Eyed Stubby Squid is one of the many wonders of the ocean floor that has been observed and studied by researchers with the tools of the trade (e.g. ROV).

<https://nautiluslive.org/video/2016/08/12/googly-eyed-stubby-squid>

### Additional Resources and Links

- To compare the ROV and the AUV, reference the following Venn Diagrams: [Beginner](#) and [Level 2](#).
- Check out additional ROV videos and resources at nautiluslive.org- <https://nautiluslive.org/search/node/rovs>