TEACHER INSTRUCTIONS

TORPEDO BAY
NAVY MUSEUM

Challenge: Operation Float

You will need:

- **Weights** – e.g. coins, marbles or counters. They need to be waterproof and countable.
- **Container of water** – plastic storage tub half filled with water would work for this (27 L works well). The challenge needs 20 cm depth.
- **Heavy object to drop** – e.g. a rubber ball, a full water bottle or any other heavy waterproof object. This is to drop into the water to generate a large wave in Challenge 2.
- **Aluminium foil rectangle** – cut into 15 x 30 cm pieces, enough for each group/challenge.
- Teacher Slides

The ship that holds the most weights wins!

Overview:

- For each challenge use the same shape and size rectangle of foil (15 cm x 30 cm)
- Each challenge needs a new foil rectangle so make sure to prep the correct number.
- The class could share one container of water if needed, or have one each.
- After Challenge One, students may want to experiment with a different hull shape.

Example boat with paperclip weights

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Challenge one:

1. Start by showing the students the video of HMNZS Wellington in rough seas.
2. Split the class into groups and hand out equipment
3. Show them the container of water that they will test their ships in and the weights they will be adding as load to the ship.
4. Give the students time to construct a ship. About five minutes is enough.
5. You could allow groups to test their ship before the class challenge or wait until everyone is ready to do it together.
6. Gather the students around the container of water and test each ship one at a time. Students place their own ship in the water and add the weights themselves so they can decide how to distribute the weight.
7. Count the number of weights added to each ship before it sinks and record this number. The winner is the group whose ship takes the highest number of weights.

Challenge two:

1. Give groups a new foil rectangle and explain to them that a heavy object will be dropped next to the ship in the water, to simulate a large wave. The ship needs to be loaded with weights before the wave is made. The students can decide how many weights to put on.
2. When they have made their new ship gather at the water. Place the first ship in the water and allow students to add weights, counting as they go.
3. When they feel they have added enough weight allow them to drop the heavy object to make the wave. They may want to position the ship so that the wave will hit the bow (front) of the ship. It is also important that the ship is not touching the sides of the container as this will give extra stability.
4. The same object must be used to create the wave for each group.
5. The ship that stays afloat with the most weights is the winner.