

# How much of an iceberg is on top of water?



Explore the role water temperature plays in the creation of ocean currents.

**Setting:** Indoors

**Time:** Overnight

**Concepts:** Buoyancy, density, icebergs

**Skills:** Collecting data, Mathematics

## Subject(s):

- ✓ Mathematics
- ✓ Physics
- ✓ Earth Sciences

## Ages:

- ✓ 9-11
- ✓ 12-14
- ✓ 15-17

## Materials:

- Balloon
- Plastic zip bag
- Rubber band
- Large bowl, bucket, or fish tank
- Tray of ice cubes
- Ruler
- Calculator



## Safety First!

Provide adult assistance for young children when needed.

## What to do!

1. Fill the balloon with water until it is about the size of a grapefruit. Tie off the end of the balloon and put it in the freezer.
2. Repeat step 1 with the plastic bag. Be careful not to overfill. Use the rubber band to tie off the top.
3. Wait 12-24 hours to fully freeze your "icebergs".
4. Fill the bowl, tank, or bucket with cold water.
5. Add the tray of ice cubes and stir until they have melted.
6. Take your icebergs from the freezer and remove the plastic bag and balloon.
7. Place your icebergs on the sink and measure their height.
8. Place the icebergs in the bowl, bucket, or tank. Measure how much of the iceberg is floating on top of the water.
9. Calculate how much of the iceberg is above the water:
  - $\text{Height above water} \div \text{total height} \times 100 = \text{percentage of iceberg above water.}$

## What's happening?

Density is the amount of weight in a specific volume. An object is buoyant (floats) if its relative density is less than that of the fluid it is resting in. Ice has a slightly lower density than seawater, so we see ice floating above the surface of oceans. However, because the difference in relative

## How much of an iceberg is on top of water?

density between ice and sea water is small, only some of the iceberg floats above the water. In fact, on average only 1/10th of an iceberg is above the surface of the water.

### Why does it matter?

The expression "just the tip of the iceberg" is often used to describe a situation where what you see isn't all you get. The same goes for real icebergs! Icebergs can project 7-9 times more underwater than they do above water. Because most of the underwater iceberg is unseen, it poses a risk for sailors and navigators. One famous crash with an iceberg occurred on the RMS Titanic on April 15, 1912. Since that tragedy, an organization known as the International Ice Patrol was founded to monitor icebergs in the Atlantic Ocean and report their movements for safety reasons.



### Investigate further!

- Add salt or sugar to the water. Does more or less of the iceberg float on top of the surface?
- Try creating icebergs of different sizes. Does a smaller iceberg float more?