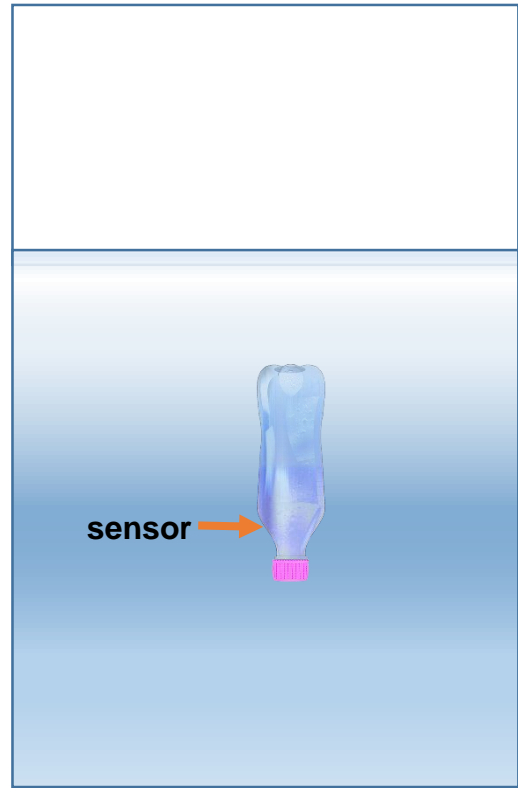


Water Sampling Engineering

Environmental engineers who focus on water will collect samples from various bodies of water, analyze them, and determine the state of health of the water. They build and use special collection devices that have sensors that tests for different pollutants in a river or lake. Working with a teammate, your students are going to design, build, and test their own water sampling device.

What You'll Need:

- 8oz bottle
- Ping pong balls
- Pieces of scrap Styrofoam
- Craft sticks
- Craft foam
- Flat marbles
- String
- Twist ties
- Rubber bands
- Hot glue gun/glue sticks
- 5 gallon bucket (or similar container) filled with water



What To Do:

Begin by either dividing the class into teams of two or three, or allowing them to divide themselves. Then, assign each team the water level from which they're going to be collecting a sample. Assignment cards can be found at the end of this pdf. Each team will build a collection device to collect from the surface of the water, the middle of the water, or the bottom.

Your students are going to use a water bottle as the collection device, but the cap represents the sensor. This is the important part of their device, and it must be nose down in the water to get an accurate reading. In order to successfully achieve this, the students may need to add something to the inside of their bottle as well as the outside. This can be water or some other source of weight. The important thing is that their device is nose down.

Each team will have access to the variety of building materials, but depending on which level of the water they were assigned, they'll need to work to find the perfect balance between weight and buoyancy in their device.

Before they start engineering, ask them to consider what qualities their water collection device will need to successfully gather water from their assigned area. Have them work with their teammate to write down and/or sketch what requirements their device will need to have, and what the first prototype might look like.

After they've built their first design, have them test it at the water basin. Were they able to successfully collect and bring back to the surface a sample of water? If so, great! Now ask them to make their design even better, because of course, perfection doesn't even exist in engineering

How about if their collection device didn't work quite as well as they hoped? Have them reconvene with their teammate, write down some of the problems they encountered, and try rebuilding or changing their device to help solve some of these problems.

You'll likely find that this activity will continue as long as you allow it. When students are empowered with the engineering design process, they often want to continue rebuilding, reimagining, and testing their design for hours. When you are ready for the challenge to be over, collect the entire class back as a group, and invite each team to present to the class their design, what problems they faced, and how they overcame them.

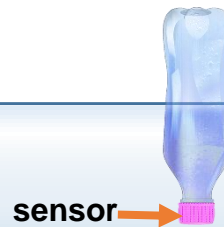
ENGINEERING CHALLENGE CARDS

ENGINEERING DESIGN CHALLENGE

Your company has been working on a project that might affect the water quality of a nearby river.

Your engineering team's job is design and build a water bottle sensor holder that can monitor the water near the **surface** of the river to make sure the project isn't creating pollution.

The sensor is held in the bottle's cap must be completely under the water to work properly.

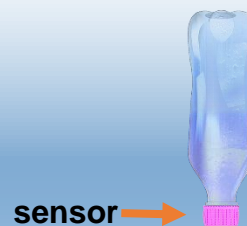


ENGINEERING DESIGN CHALLENGE

Your company has been working on a project that might affect the water quality of a nearby river.

Your engineering team's job is design and build a water bottle sensor holder that can monitor the water near the **middle depth** of the river to make sure the project isn't creating pollution.

The sensor is held in the bottle's cap and must be completely under the water to work properly.



ENGINEERING DESIGN CHALLENGE

Your company has been working on a project that might affect the water quality of a nearby river.

Your engineering team's job is design and build a water bottle sensor holder that can monitor the water near the **bottom** of the river to make sure the project isn't creating pollution.

The sensor is held in the bottle's cap and must be completely under the water to work properly.

