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Using Balloons to Show Concepts about Wind & Water *Green River Community College*

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Intro: Demos can really help with retention and understanding of concepts, as students have an experience that they can relate to throughout the course. Plus, loud popping balloons can be a great attention grabber! I use the heat capacity demo on the first day of class, paired with a discussion of the scientific method, and many students will still mention this experiment on the final exam.

1. Concept: **Water has a high heat capacity.**
* Materials: balloons (white preferred to see the waterline), candle, lighter, tray to “catch water”
* Demo: Introduce the experiment, and ask students to make predictions: 1) What will happen when you hold an air-filled balloon over a candle flame? Why? 2) What happens to a water-filled balloon over the flame? Why? Have students volunteer to blow up a balloon, and fill the 2nd one part-way with water and air to a similar size. Hold each separately over a candle flame (I warn students about a possible loud noise each time). The air-filled one pops immediately due to melting and burning rubber. The water in the 2nd balloon will absorb and dissipate the heat from the flame, and will not pop (unless the flame contacts the side of the balloon without any water!).

* Further notes: I tie this demo more into oceanography with a discussion and diagram of thermal winds (land and sea breezes). I also ask students about their experiences on a windy day at the beach.
* Teaching notes: I preface this with a discussion of the scientific method. I have students work in small groups to come up with a prediction about what will occur and **why**. I also use this to get students used to speaking up in class and presenting their ideas on the first day. If you have time, you can ask students to come up with more specific procedures (how long to hold over the flame, what volume of water to add, etc.). Also, I’ve started using a tray to “catch water,” as one student pointed out that she knew the water-filled balloon wouldn’t pop since I didn’t have anything out to potentially catch the splashing water.
* Misconceptions: many students may correctly predict the outcome, but I’ve found very few able to explain why. One common idea is that the balloon will rise when heated, but will pop if held over the candle because the air expands (really it has more to do with the material). They believe the air will expand more slowly in the water-filled balloon, but are unsure why. If students get stuck, I’ll use an example like coolant fluids in a car engine or boiling a pot of water on the stove to introduce heat capacity of water.

Many other demos using balloons can be found. Use simple demos to spark interest, and then lead in to more complex topics. Some other ideas to peruse:

1. Wind blows from high to low pressure. Blow up a balloon and release into the class.
2. Air pressure. Use the classic “egg in the bottle” experiment with a small water-filled balloon.
3. Temperature and air. Place an inflated balloon in liquid nitrogen, and watch it shrink and then expand again.

There are many resources for these kinds of demos for kids; here is the primary source for the demo that I use:

Meerman, Ruben. 2004. Surfing Scientist - Teacher Demonstrations. ABC Science. [Online] <http://www.abc.net.au/science/surfingscientist/pdf/teachdemos\_7.pdf>