

Take it Further #1 – Great Pour Challenge

What You Need:

- 1 one liter bottle
- Pitcher or bucket
- Water
- Stopwatch

Great Pour Challenge Instructions:

1. Fill the soda bottle to the top with water.
2. Here's the challenge: How long will it take to empty all of the water in the bottle into the pitcher on the table? Record your prediction on a piece of paper.
3. Without squeezing the sides of the bottle, time how long it takes to empty all of the water. You might want to repeat this several times to validate your time.
4. Then, fill the bottle to the top with water just as you did before. However, this time swirl the water by moving the bottle in a clockwise or counter-clockwise motion while the water is pouring out. Keep swirling the water until you see the formation of what looks to be a tornado! The water begins to swirl in the shape of a vortex and flows out of the bottle. Record your time.
5. Compare your times. Was one method quicker than the other? If so, why do you think you got these results?

Take it Further #2 – Twist of Color

What You Need:

- 2 empty one liter bottles
- Tornado Tube OR washer with duct tape
- 2 ounces of lamp oil
- Water

Twist of Color Instructions:

Repeat the original instructions, but this time try adding 2 ounces of colored lamp oil to the water. Lamp oil is available at most department stores where oil lamps are sold. The oil will float on the surface of the water since oil is less dense than water. When the oil and water swirl together, the less dense oil travels down the vortex first and creates a "colored" tornado effect.

Take it Further #3 – Flying Objects

What You Need:

- 2 empty one liter bottles
- Tornado Tube OR washer with duct tape
- An assortment of small objects
- Water

Flying Objects Instructions:

What would happen if you put an assortment of small objects in the bottle with the water? Will the objects that you put in spin to the center of the vortex or to the outside of the vortex? Make your predictions, then follow the original directions but add in some small objects to the bottle with the water and try it to find out.

Take it Further #4 – Styrofoam Bead Timer

What You Need:

- 1 empty one liter bottle
- 1 one liter bottle filled with Styrofoam beads
- Tornado Tube OR washer with duct tape
- Water

Styrofoam Bead Timer Instructions:

1. Carefully open the bottle with the beads.
2. Twist on the large connector.
3. Twist on a dry 1 liter soda bottle. Turn it upside down to make your own soda bottle timer.
4. Now, check and see if this timer is accurate. Is this a good way to measure time? Why or why not? How can we test this?

To take it one step further, you may want to add water and see how this timer compares to the dry timer you have right now!

1. Move as many of the beads to one bottle as possible.
2. Over the sink, add water to the bottle without beads. Fill to the brim.
3. Add water *slowly* to the bottle with the beads. You are filling in all of the little spaces in between the beads. As the beads start to push themselves out of the bottle, slow the water and finish filling to the brim.
4. This is where it gets tricky – you have to connect the bottles. Carefully attach the Tornado Tube to one bottle then connect the remaining bottle. We suggest doing so over a sink until you get the hang of it.
5. Now, check and see if the this new water filled timer is an accurate timer? Is this an accurate way to measure time? Why or why not? How can we test this? Is it more accurate or less accurate than the dry timer? Why do you think you are seeing these results?