



DaNel Hogan and Sherrie Dennis – STEMAZing.org



Sciencing and Engineering with TheSTEMAZingPro - Bernoulli's Principle

Full Length Video: (<https://www.youtube.com/watch?v=1fo7WQOV2oY>)

Join TheSTEMAZingPro, DaNel Hogan, for three pun (physicist's spelling) Bernoulli's Principle experiments you can do at home. There is also an engineering design challenge at the end to keep students busy for days, maybe even weeks! These experiments use #STEMontheCheap supplies you either already have or you can source easily and inexpensively.

Supplies needed: piece of paper, scissors, spoon, two coffee mugs, aluminum beverage can

Best Practices:

Regardless of which approach you use below, **students should always be given ample time to experiment, notice, and wonder before they are**

provided an explanation. Resist the urge to answer any questions during this time.

Respond with questions back to students. Sample prompts: What do you think? That is a testable question, why don't you try to experiment and figure it out? Have you tried the experiment at least five times? What patterns emerged? What could you change about the experiment to see if it impacts how it works? When you made a change to the setup of the experiment, what impact did it have? What data could you collect to support your idea? What research could you find to support your data?

Notice, Wonder, Learn Journals in Google Classroom or Printed Out

Students have the opportunity to download or create a Google Classroom version of the Notice, Wonder, Learn Journal. You can push the link out into the classroom or make a copy of the journal and put it in your Google classroom making sure you make a copy for each student to complete for EACH of the three experiments.

You can find both versions of the Notice, Wonder, Learn Journal here:

<https://stemazing.org/notice-wonder-learn-journal/>

NOTE: For the PDF printable version, be sure to print it double sided and flipped along the SHORT EDGE.



Three Approaches for Using Sciencing and Engineering Video:

1) Have students watch the video, pausing to set up and perform the experiments. Let students tackle the engineering design challenge and try to figure out how to consistently get Experiment 3 to work!

Estimated time: Self-paced by students. This could keep them busy for a day or weeks!

2) Teachers/Parents can watch the video and then facilitate the experiments and engineering design challenge themselves either online or in person without ever showing the video to students directly.

Estimated Time: Depends on your pace.

RECOMMENDED APPROACH

3) Use the individual video segment links below to share one experiment at a time with your students and then debrief it the next time you see them using the explanation segment. Make sure they are recording their answers to the two most important questions in science: What do you notice? What do you wonder? using the Notice, Wonder, Learn Journals while they are conducting the experiments. Finally, share the engineering design challenge with them.

Remember, students are not engineering unless they are iterating through the design process at least five times. This means they have tried at least five different solutions or modified solutions to attempt to solve the challenge. If they think they have met the challenge, ask them if there is any way the demonstration could be even quieter!

Estimated Time: If you do one experiment one session, followed by a session for the discussion and showing the explanation video segment, this could take about eight 40-minute sessions.

Using Individual Experiments, Explanations, and Extensions:

For each experiment below, you will find a link to a video segment for the experiment, a short description, and a link for a video segment which explains (and sometimes extends) the science behind the experiment. Remember, best practice would have you engage the students with an experiment and then allow them significant time to explore and investigate while filling out their Notice, Wonder, Learn Journals (one copy recommended for EACH experiment). This would then be followed by a discussion where students share, either in small groups or as a class, the things they noticed and wondered. Finally, once students have shared how they have made sense of the experiment, you can show them the explanation segment. After you have engaged the students with the three Bernoulli's Principle experiments, you can put their problem solving skills to work using the Engineering Design Challenge - Quiet Down! using the video segment provided.

Experiment 1: Strip of Paper

(<https://www.youtube.com/embed/1fo7WQOV2oY?start=108&end=203>)

Description: Hands-on demonstration to introduce Bernoulli's Principle using air.

Experiment 1 Explained:

(<https://www.youtube.com/embed/1fo7WQOV2oY?start=208&end=297>)



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Experiment 2: Spoon and Faucet

(<https://www.youtube.com/embed/1fo7WQOV2oY?start=298&end=340>)

Description: Hands-on demonstration to show Bernoulli's Principle works with liquids. Bernoulli's Principles works with fluids = gases (air) and liquids (water).

Experiment 2 Explained:

(<https://www.youtube.com/embed/1fo7WQOV2oY?start=344&end=480>)

Experiment 3: Jumping Can

(<https://www.youtube.com/embed/1fo7WQOV2oY?start=481&end=605>)

Description: Using Bernoulli's Principle, attempt to jump an aluminum can from one coffee mug to another without touching it!

Experiment 3 Explained and Extended (must watch both parts to get full explanation):

Part 1: (<https://www.youtube.com/embed/1fo7WQOV2oY?start=609&end=825>)

Part 2: (<https://www.youtube.com/embed/1fo7WQOV2oY?start=934>)

Engineering Design Challenge: Quiet Down!

(<https://www.youtube.com/embed/1fo7WQOV2oY?start=741&end=884>)

Description: The engineering design challenge is for students to modify this demonstration so it is not so annoying.

How to Share Solutions to Engineering Design Challenge:

(<https://www.youtube.com/embed/1fo7WQOV2oY?start=884&end=934>)

If you want to share solutions your students developed for the engineering design challenge, post them on TheSTEMAZingPro's Facebook and/or Twitter pages using the hashtag #SciencingAndEngineering in the posts.

Facebook: <https://www.facebook.com/TheSTEMAZingPro/>

Twitter: <https://twitter.com/TheSTEMAZingPro>

Thank you to Mrs. Ferris and Miss Rivera's 3rd grade students at Innovation Academy in Tucson, AZ for inspiring me to make this video!