

## Lesson Plan: “Taking the Heat: a water pump STEAM lesson

Overview: Shadra Strickland created the art for “Taking the Heat” in *Shaking It Up*. The poem tells the story of how Molly Williams assisted the NYFD to put out a fire in 1818. In this lesson, we will learn about the “hand tub” water pumpers of the time that were used instead of fire engines and perform an experiment that reveals the very basics of how these pumps work.

- Resources & Preparation
  - Materials and Technology
    - Copy of “Shaking It Up”
    - Pictures, [videos](#), and diagram of 19<sup>th</sup> century [Hand Tubs](#)
    - Materials for hand tub science project
      - 2 transparent cups, one cup half full of water
      - 1 uninflated balloon
      - 1 drinking straw
      - Scissors
    - Optional additional resources
      - *Molly, By Golly* by Dianne Ochiltree
      - [“New York’s First Black Firefighters”](#) by Ginger Adams Otis
  - Instructional Plan
    - Student Objectives:
      - List what we know about Molly Williams
      - Examine the firefighting equipment Molly Williams would have used, including the hand tub
      - Build a water pump
    - 1. Read “Taking the Heat” in *Shaking It Up*.
    - 2. Discuss what we know about Molly Williams, possibly looking at a [picture of her](#) and talking about the [hand tub](#) water pumpers of the early 1900s.
    - 3. Using this [diagram](#), encourage students to figure how the hand tub pumped water. Use the [website](#) to answer questions.
    - 4. Build your own simplified water pump using the attached directions, discussing how by filling the pump with air and then compressing the air, water is forced to stream out.



[http://www.auroraregionalfiremuseum.org/handtubexpo/handtubs\\_%26\\_musters.html](http://www.auroraregionalfiremuseum.org/handtubexpo/handtubs_%26_musters.html)

- Additional Resources

### Water Pump Science Project

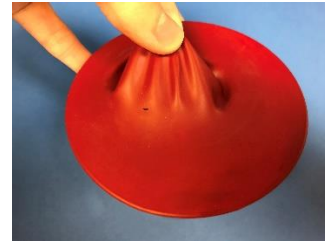
- a. Gather your supplies: 2 transparent cups, water, 1 balloon, 1 drinking straw, a pair scissors.



- b. Slice the end of the balloon off with scissors so that you can fit the top portion over the mouth of one cup.



- c. Slice a small hole in between the middle and the outer edge of the balloon, just wide enough to stick in a straw. Stretch the balloon over the mouth of the cup containing water. Can you see the hole?



- d. Stick the straw into the hole. Position the empty class under the mouth of the straw. Lift up on the middle of the balloon, filling the cup with air. Press down on the cup and watch the water stream out of the straw!



- Online Resources
  - Video Demonstration of a Hand Pumper.  
[https://www.youtube.com/watch?v=z4CFaw\\_J38U](https://www.youtube.com/watch?v=z4CFaw_J38U)
  - Handtub Fire Engine: Historical and Technical Information  
[http://www.auroraregionalfiremuseum.org/handtubexpo/handtubs\\_%26\\_must\\_ers.html](http://www.auroraregionalfiremuseum.org/handtubexpo/handtubs_%26_must_ers.html)
  - “New York’s First Black Firefighters” by Ginger Adams Otis  
<http://www.thehistoryreader.com/modern-history/black-firefighters/>