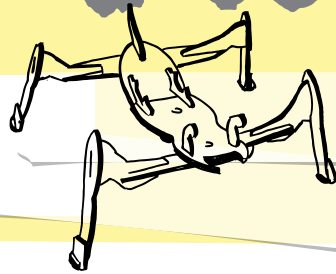


ACTIVITY 1

Pneumatics vs Hydraulics

Both pneumatics and hydraulics use cylinders to move things. The difference is that pneumatics use gases and hydraulics use liquids. So, what's the difference? Let's explore a little and find out.

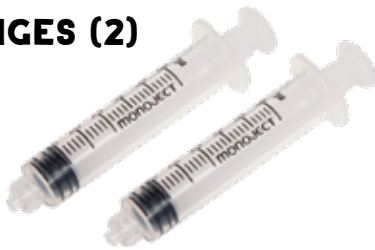
LET'S MAKE



GATHER YOUR SUPPLIES

INCLUDED

SYRINGES (2)



CLEAR TUBING



NOT INCLUDED

WEIGHTS (You can use a cup that you can add weight to test. Coins, rice, and beans all make good weights.)



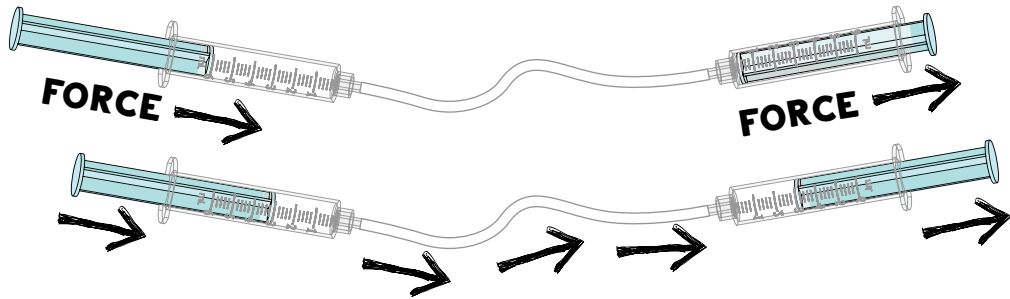
CUP OF WATER





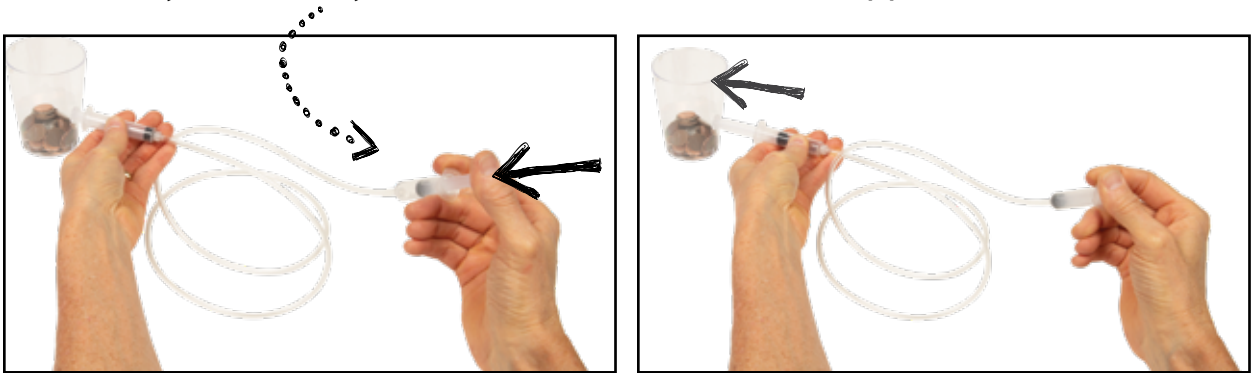
STEP 1

Pull one of the syringe plungers all the way out and then connect the two syringes with the clear tubing.



STEP 2

Put your weight on a surface and place the syringe with the plunger all the way down on the surface with the plunger against the weight. While holding the syringe in place so that it does not move, push the plunger on the other syringe all the way in. Record your observations about what happens.



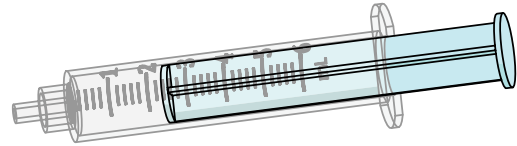
STEP 3

Add more weight and test the system several times with different weight amounts. Record your observations with each of the weights.



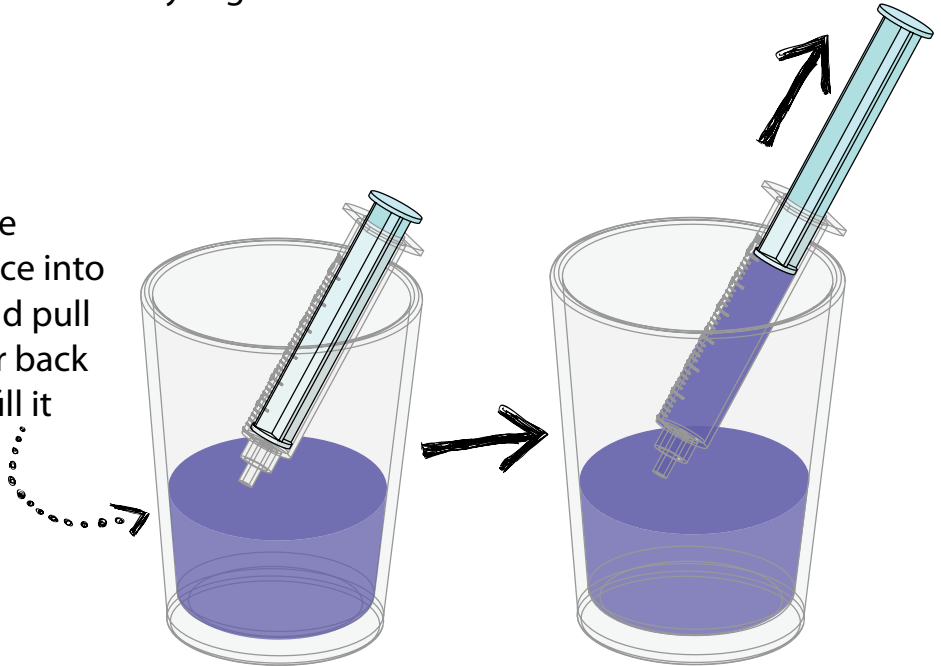
STEP 4

Remove the tubing from the syringes.



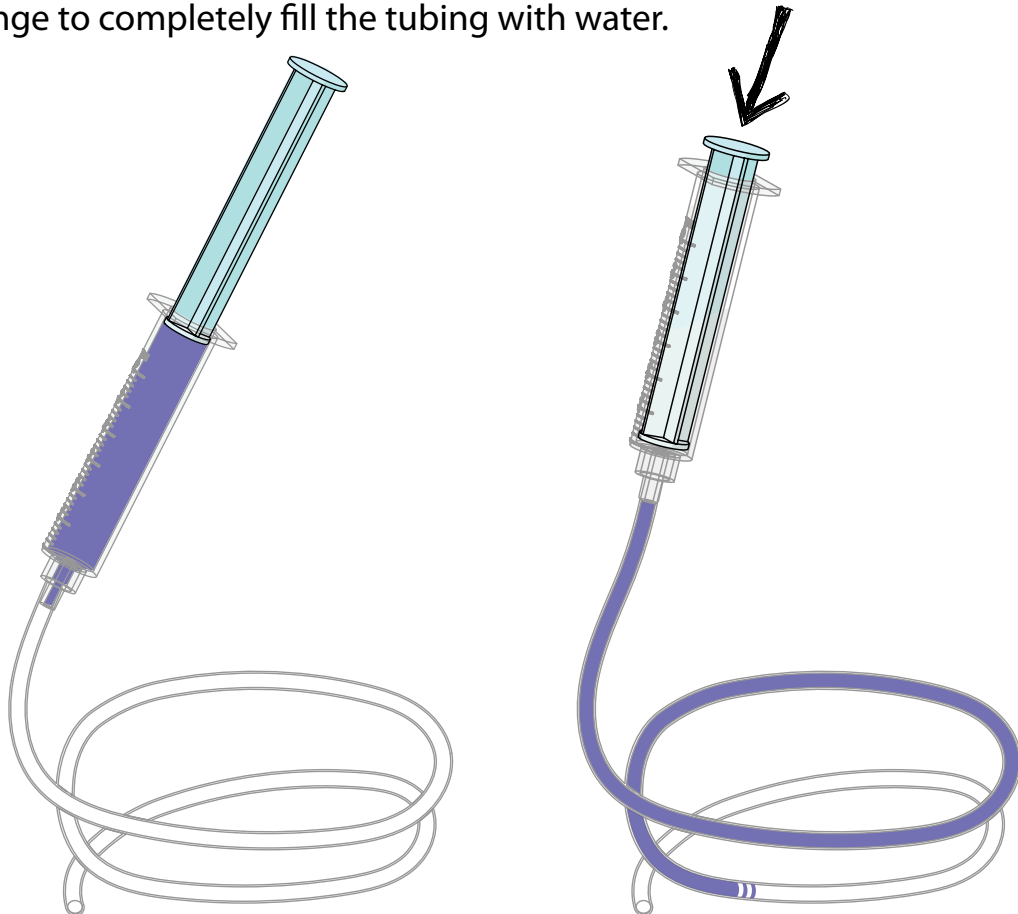
STEP 5

Depress one syringe completely and place into the cup of water and pull the syringe plunger back out to completely fill it with water.



STEP 6

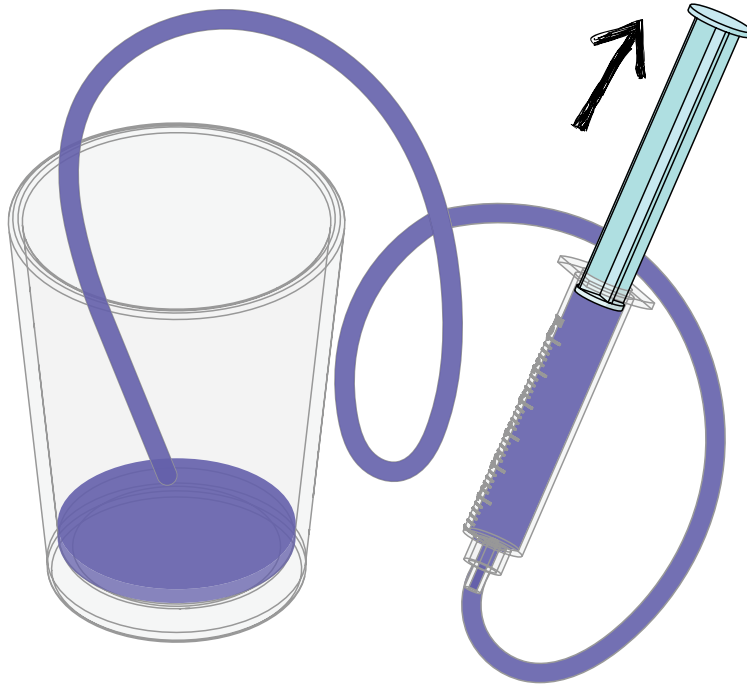
Attach the clear tubing to the end of the water-filled syringe and depress the syringe to completely fill the tubing with water.





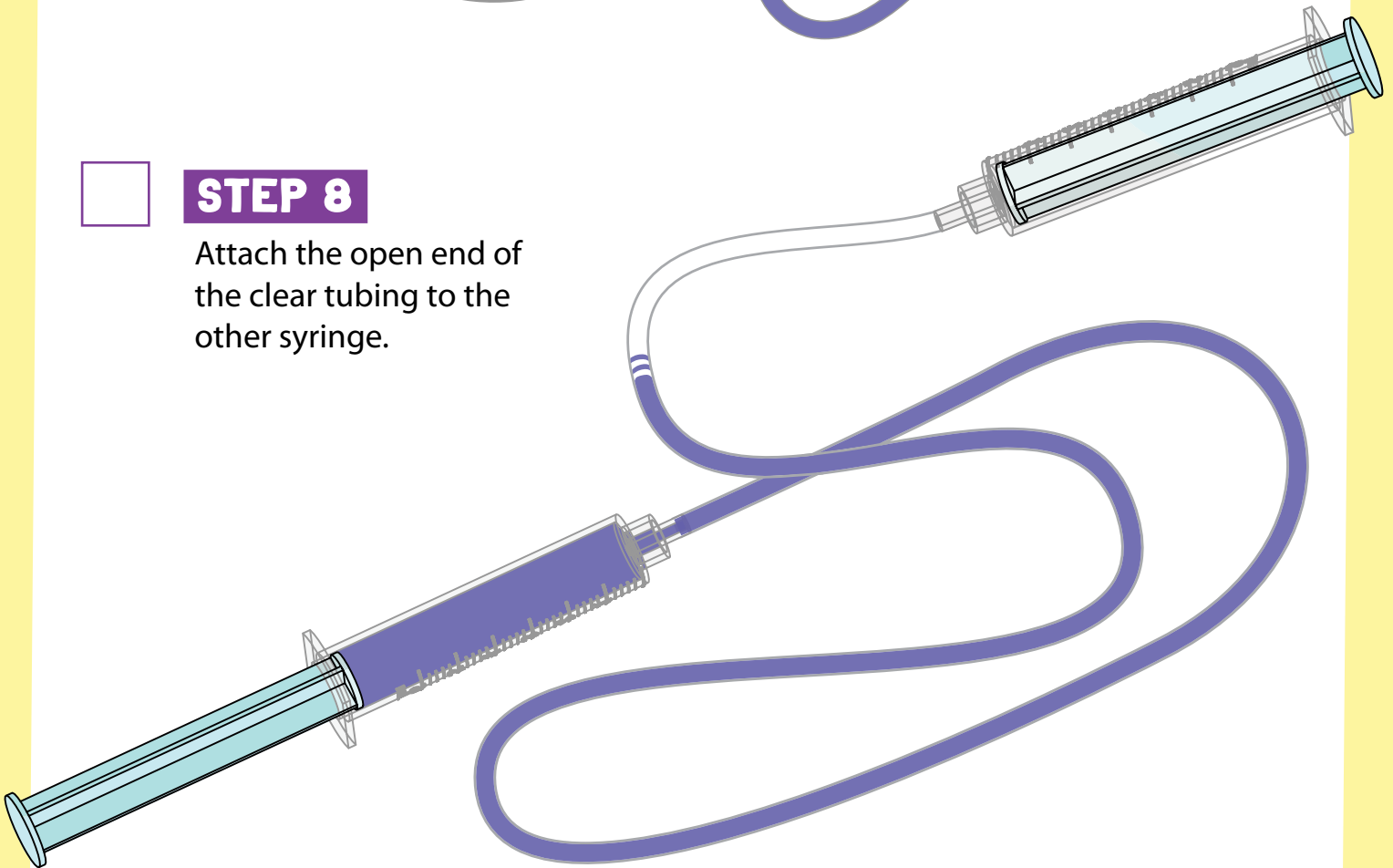
STEP 7

Place the open end of the tubing under the water in the cup and pull the syringe plunger back out to completely fill it with water again.



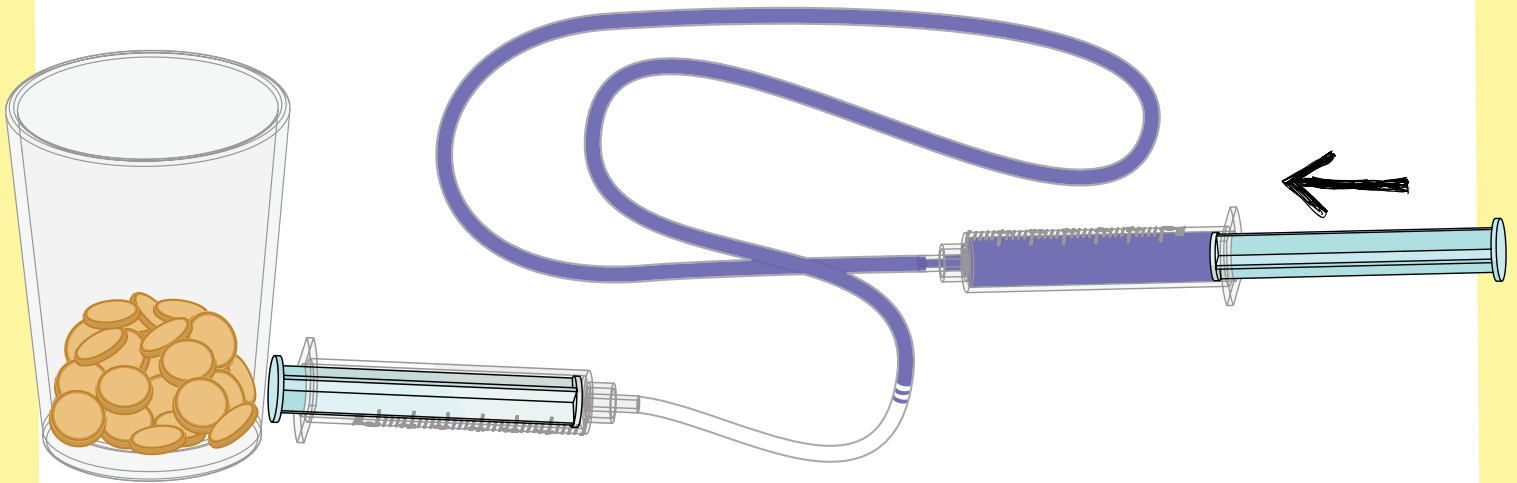
STEP 8

Attach the open end of the clear tubing to the other syringe.



STEP 9

Put your weight on a surface and place the syringe with the plunger all the way down on the surface with the plunger against the weight. While holding the syringe in place so that it does not move, push the plunger on the other syringe all the way in. Record your observations about what happens.



STEP 10

Add more weight and test the system several times with different weight amounts. Record your observations with each of the weights.



DATA AND OBSERVATIONS

Use this chart to organize your observations from Steps 3, 9, and 10.

AMOUNT OF WEIGHT (NUMBER OF COINS OR BEANS, 1/2 CUP OF WATER, AND SO ON)	PNEUMATIC SYSTEM (GAS FILLED)	HYDRAULIC SYSTEM (LIQUID FILLED)

THINK ABOUT IT

What moved the weight better, the air or the water?

Which system moved the most weight?

So, in order to have constant, smooth motion, would you want to use a pneumatic or hydraulic system? Why do you think that is?

When harnessed, hydraulic power has been used to great advantage by people. Think about where you might have seen hydraulic power used in your life. (You can read more about the discovery of hydraulic power and its uses in the "STEAM On Dream On" section of this booklet called *Blazing Power or Blaise-ing Power*.) Can you think of any other ways you have seen hydraulic power used? Explain how hydraulics are used in what you find to a family member or friend.