

INNOVATION WYRKSHOP

PNEUMATICS & HYDRAULICS

ESTIMATED TIME: **60 MIN**

LEARNING OBJECTIVES

- Learn about pneumatics and hydraulics systems
- Create a pneumatics elevator using syringes and air
- Convert your pneumatics system to hydraulics

LEVEL: 1

STANDARDS

- NGSS
 - MS-ETS1-1
- PBL
 - A challenging problem or question
 - Sustained inquiry
 - Reflection
 - Critique and revision
- ISTE
 - Empowered learner 1.1.d
 - Innovative designer 1.4.a, 1.4.c

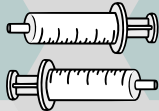
MATERIALS NEEDED:



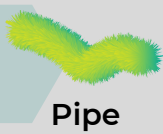
Straws



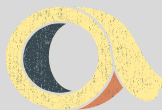
4" of
Tubing



2 Syringes



Pipe
Cleaners



Masking
Tape



Popsicle
Sticks



Small Glass
of Water



Scissors



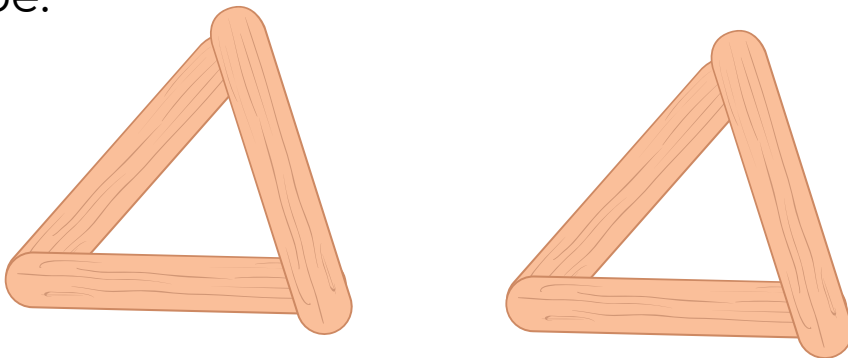
INTRODUCTION:

Pneumatics is like using the power of air to make things move. Instead of using electricity or muscles, we use air pressure to do the work. It's like having invisible hands that can push and pull things without touching them directly. Similarly, hydraulics uses the power of water to move things.

ACTIVITY OUTLINE:

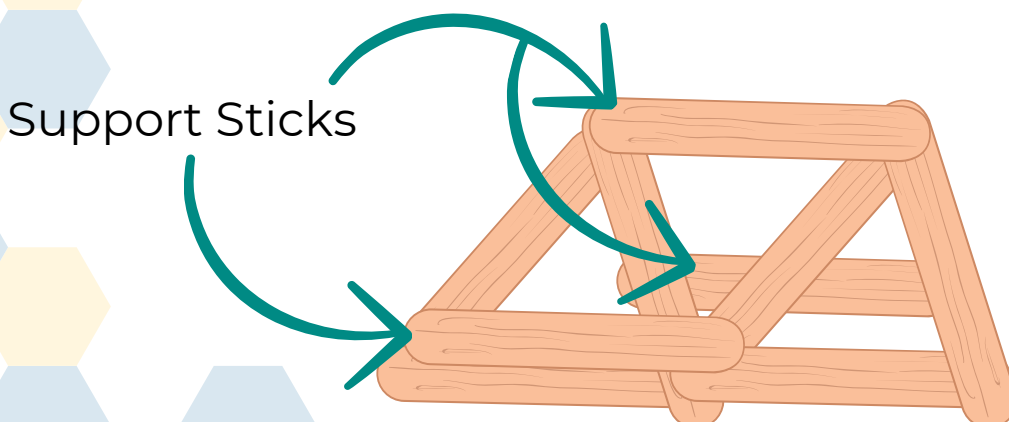
STEP 1:

Make two triangles bases using 3 popsicle sticks and tape.



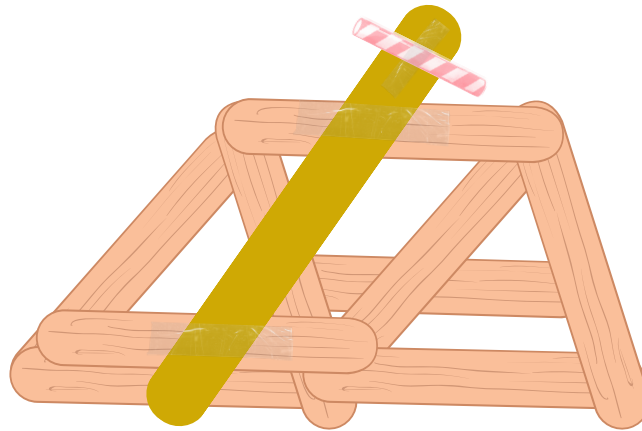
STEP 2:

Attach 3 support sticks between the two triangles.



STEP 3:

Now let's create a hinge point! Grab one jumbo popsicle stick (or tape together two small sticks side by side) and tape them between two support sticks. Then cut a small 1 inch section of a straw and tape horizontally it to the top of the popsicle stick.



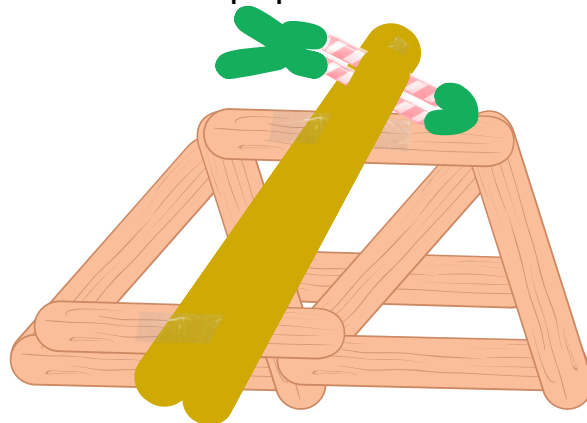
STEP 4:

Take another jumbo popsicle stick and create another hinge point.



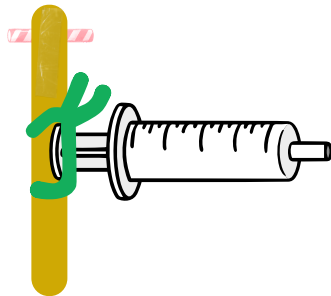
STEP 5:

Attach the two hinge points with a pipe cleaner.



STEP 6:

Now take a syringe that is empty and attach this syringe with a pipe cleaner about 1-1/2 inches below the hinge point on the stick only attached via pipe cleaner.



STEP 7:

Attach the tubing to the syringe and pull the plunger so it is 1/2 full with air and connect it to another syringe that is empty. Secure the tubing with tape.



STEP 8:

Push the air out of the full plunger and into the empty plunger. This should raise the attached popsicle stick! Now accessorize your pneumatics contraption.

BONUS CHALLENGE:

Fill one plunger with water and see what happens. Does the popsicle stick move faster, can it hold more weight?

