

# JUST HANGING AROUND

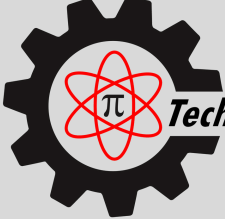
Materials Needed: Paper, Tape, and Scissors

Name: \_\_\_\_\_

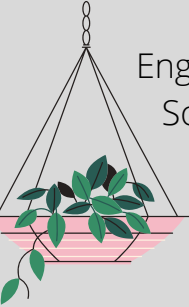
# UNLV

NEVADA NATIONAL  
**NINSS**  
SECURITY SITE

*Managed and operated by  
Mission Support and Test Services LLC*



**Tech Trekker**  
Powered by:  
UNLV Engineering



Engineers design hanging mechanisms to help lift heavy objects. Some hanging mechanism can support hundreds of pounds.

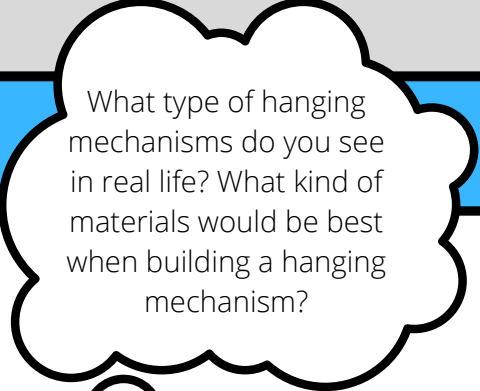
## SCENARIO:

You are trying to move your piano from the first floor of your brand new apartment to the fifth floor. Uh-Oh! We have a problem!!! There is no elevator in your building, and you do not have access to any machines. You need to design a hanging mechanism strong enough to lift your piano up to the tenth floor.

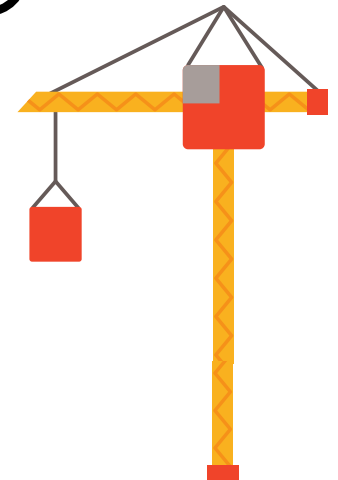
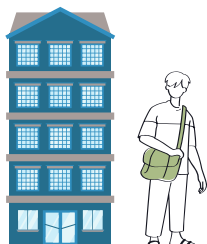


## BRAINSTORM

Write down your ideas in this box



What type of hanging mechanisms do you see in real life? What kind of materials would be best when building a hanging mechanism?



## LIMITATIONS AND CONSTRAINTS

**Uh Oh!** You look around and realize that the only materials you have brought to your new apartment so far are a half sheet of paper, 5 inches of tape, and a pair of scissors. Another limitation: your design needs to be at least 5 inches long! Now you have to design your hanging mechanism with these limitations and constraints in mind.





## DESIGN

Come up with **3 different designs** of a hanging mechanism you may build to lift your piano. Draw them and include markings of the types of shapes you will create, where you will be folding/cutting your paper, and where you will put the tape.

**Design A:**

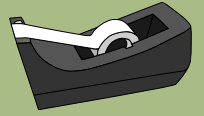
**Design B:**

**Design C:**



## BUILD

Now that you have designed a few different hanging mechanisms, choose the one you think is the best and have fun creating it! Remember: you can only use a specific amount of paper and tape!

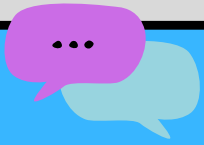


## TEST AND EVALUATE

### STEPS:

- 1) Connect your cup to the bottom of your hanging mechanism
- 2) Lift the top of your hanging mechanism so that both the cup and mechanism are no longer touching the surface of your table anymore.
- 3) Add weight into your cup until your design can no longer support it

How much weight could your design successfully lift?



## SHARE SOLUTION

Time to share your results with your classmates! Think about which of your classmates made the best design and why you think your classmates' designs were able to or not able to lift the weight of a shoe or multiple shoes.

## REDESIGN

Draw and mark your new design in this box:

What were the issues with your design? How do you improve your design to make it better?





## BUILD + RETEST AND REEVALUATE

Build your new design and then test it with the same steps as before. Have fun!



How much weight could your design successfully lift this time?

## SHARE SOLUTION

Once again, it's time to share your result with your classmates! This time, think about what your classmates did differently than before. Which classmates had the best designs, and why do you think these designs worked the best?



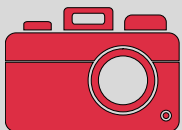
## EXPLAIN

### COMMUNICATE THE SOLUTION

Given the fact that the sling is the best design for a hanging mechanism designed to lift your piano, think of the following: Why were your designs successful or not? What design would you implement in the real world? Why?



## EXTENSION



See if you can find any hanging mechanisms in real life! When you're outside, around your house, or around the city, try to see if you can spot an example of a hanging mechanism in real life!

