JUST HANGING AROUND!

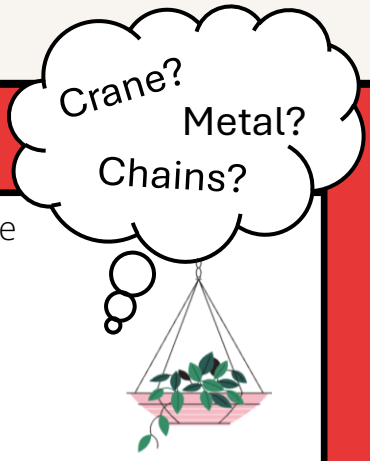
Name: _____

Materials Needed: Paper, Tape, Scissors, Large Bag, and Weights (water bottles, sandbags, etc.)

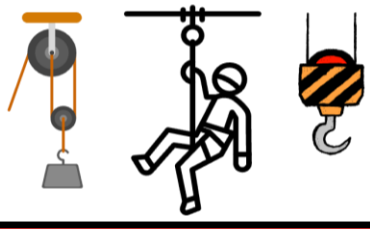
Engineers design hanging mechanisms to help lift heavy objects. Some hanging mechanisms can support thousands of pounds. How do you think engineers design these mechanisms in a way that they can lift the heaviest objects?

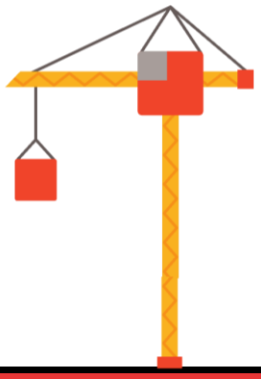
Scenario: You are moving into a new apartment and need to get your piano up to your room on the fifth floor. Uh-Oh! The elevator in your building is broken, and you do not have access to any machines. You need to design a hanging mechanism strong enough to lift your piano up to your floor.

BRAINSTORM



Think about the following questions: What type of hanging mechanisms have you see in real life? What kind of materials would be best when building a hanging mechanism? **Write down your ideas in this box.**



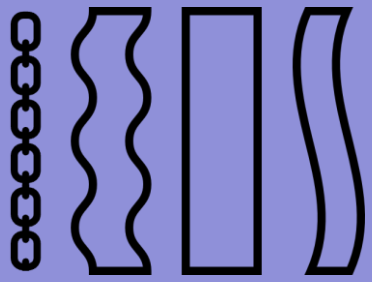


LIMITATIONS AND CONSTRAINTS

You look around and realize that the only materials you have with you are a half sheet of paper, 5 inches of tape, and a pair of scissors. Your design needs to be at least 5 inches long to be effective! Keep in mind these limits and constraints for the following steps.

DESIGN

Draw and plan out the hanging mechanism that you are going to build. Come up with 3 different designs you believe will make your mechanism hold the most weight it can. Don't forget to include markings of where you would fold/cut your paper and where you would put the tape.



Design A:

Design B:

Design C:

BUILD

Now that you have designed a few different mechanisms, choose the design you think is the best. It is time to bring your design to life. Have fun building it!

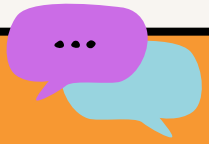
TEST AND EVALUATE

STEPS:

1. Attach the bag to the bottom of your hanging mechanism.
2. Lift the top of your mechanism so that both the bag and the mechanism are not touching any surface or the floor.
3. Add weight to your plastic bag until your design can no longer support it.

My hanging mechanism was able to hold _____ weights before breaking.

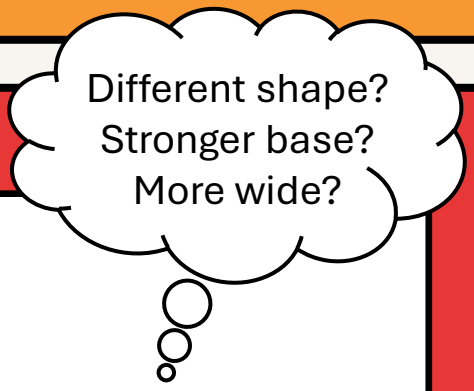
Explain what happened to your mechanism when it broke:



SHARE SOLUTION

Time to share your results with your classmates! Think about why you think their designs were able to or were not able to withstand the earthquake simulation. Additionally, think about which of your classmates made the best mechanisms and about why their mechanisms were the best.

REDESIGN



Think about the following questions: What were the issues with your design? How can you improve your mechanism to make it able to hold more weight? **Draw and mark your new design in this box:**

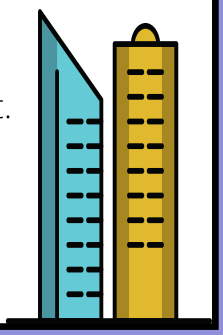
REBUILD, RETEST AND REEVALUATE

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

Explain what you did differently for your redesign and retest:

My hanging mechanism was able to hold _____ weights before breaking for my retest.

Explain what happened to your mechanism when it finally broke:

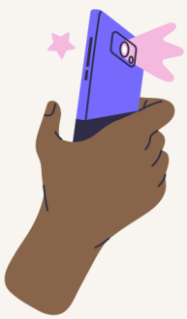


SHARE SOLUTION

Once again, it's time to share your results with your classmates! This time, think about what your classmates did differently than before. Which classmates made the best designs, and why do you think these designs were able to hold a lot of weight?

COMMUNICATE SOLUTION

Write any final thoughts or notes in this box:



EXTENSION

Next time you see a hanging mechanism in real life, think about how it was designed so that it could hold a lot of weight. Try to spot the differences in different ones you see. Take a picture if you can!