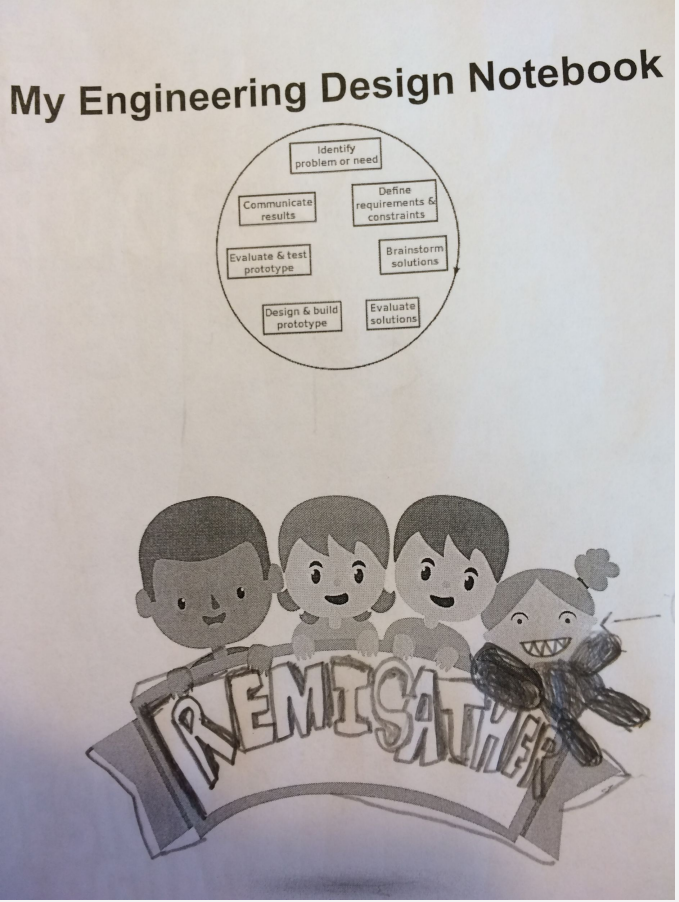
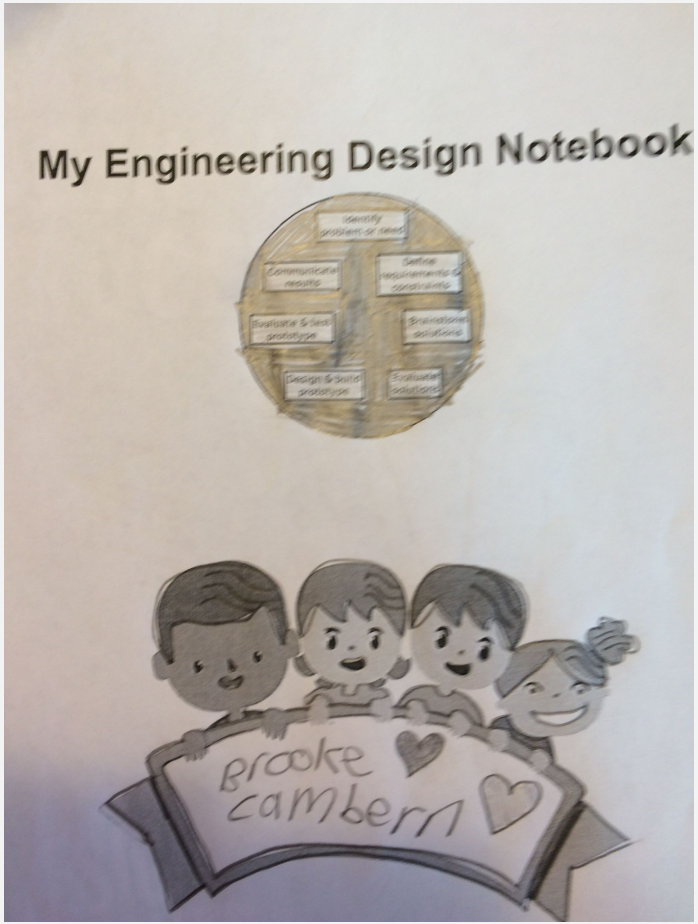
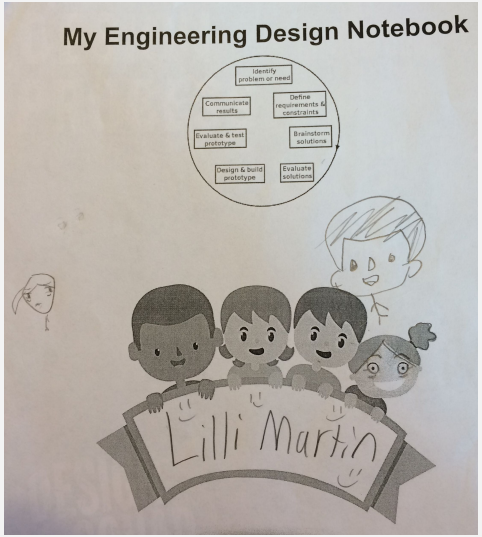
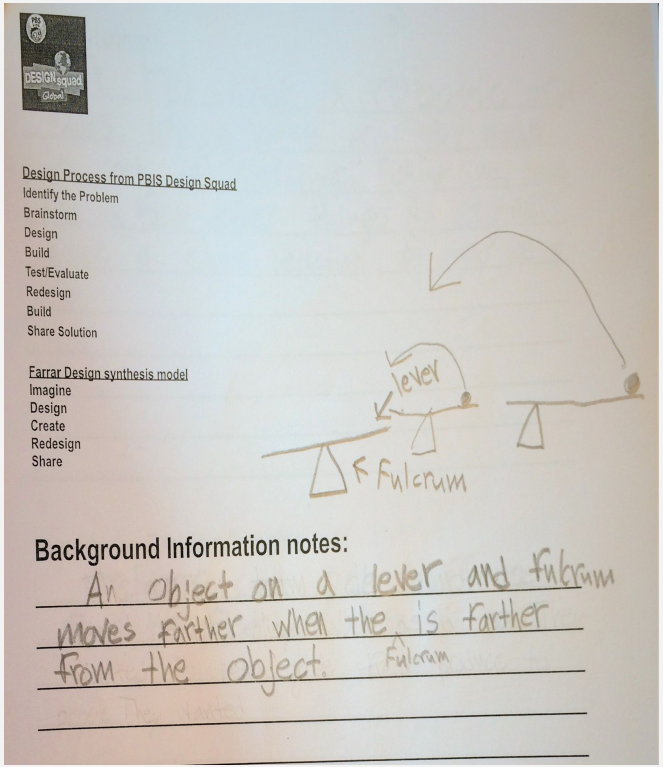






Mrs. Farrar's 5th grade class
Engineering Design Notebooks (2019)

Page 1: Design Process and Background information

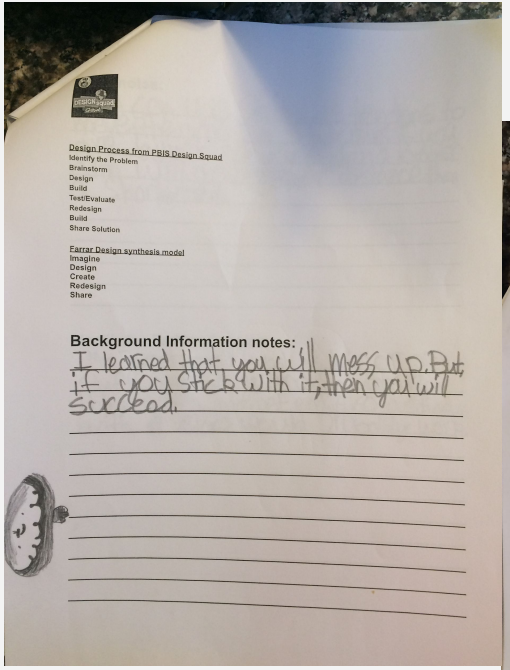


Design Process from PBIS Design Squad
Identify the Problem
Brainstorm
Design
Build
Test/Evaluate
Redesign
Build
Share Solution

Farrar Design synthesis model
Imagine
Design
Create
Redesign
Share

Background Information notes:

An object on a lever and fulcrum moves farther when the is farther from the object. Fulcrum

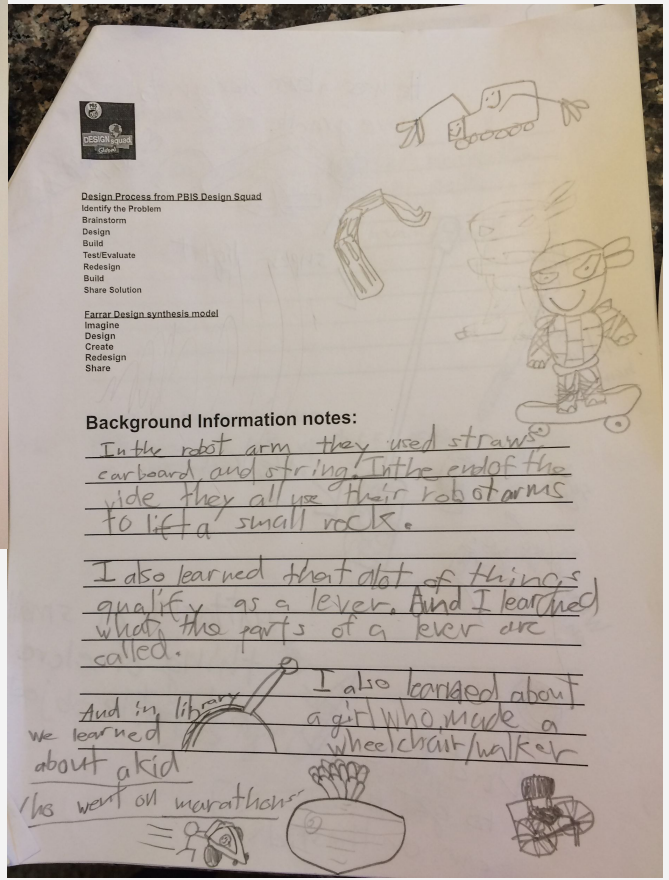


Design Process from PBIS Design Squad
Identify the Problem
Brainstorm
Design
Build
Test/Evaluate
Redesign
Build
Share Solution

Farrar Design synthesis model
Imagine
Design
Create
Redesign
Share

Background Information notes:

I learned that you will mess up. But if you stick with it, then you will succeed.



Design Process from PBIS Design Squad
Identify the Problem
Brainstorm
Design
Build
Test/Evaluate
Redesign
Build
Share Solution

Farrar Design synthesis model
Imagine
Design
Create
Redesign
Share

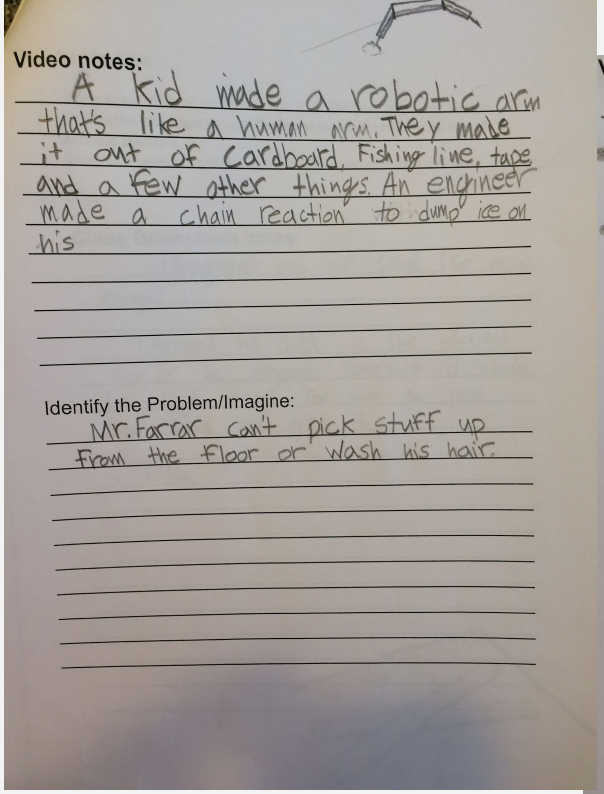
Background Information notes:

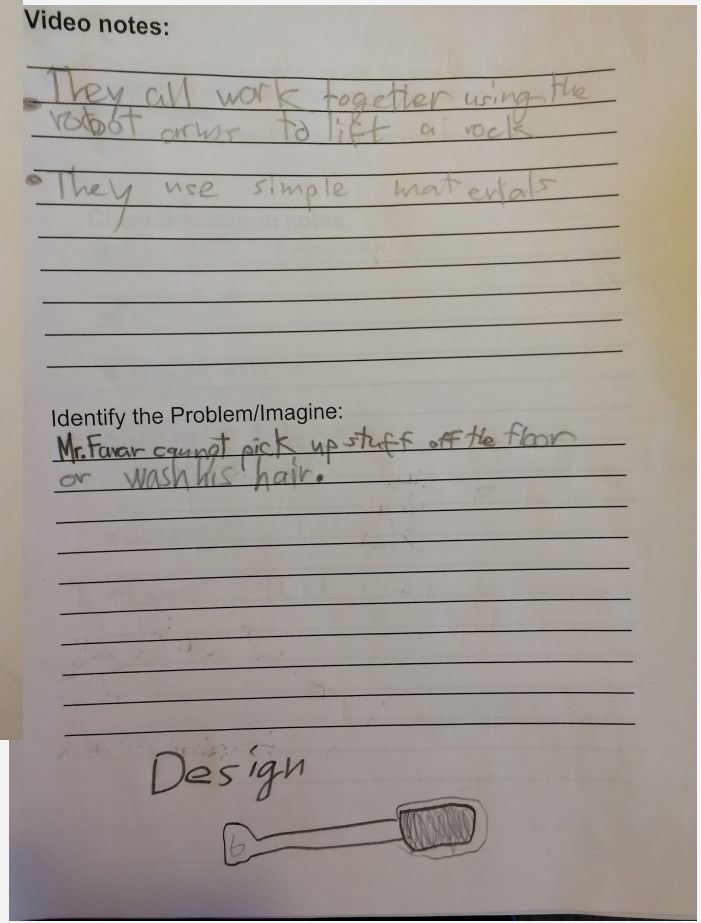
In the robot arm they used straws cardboard and string. In the end of the vide they all use their robot arms to lift a small rock.

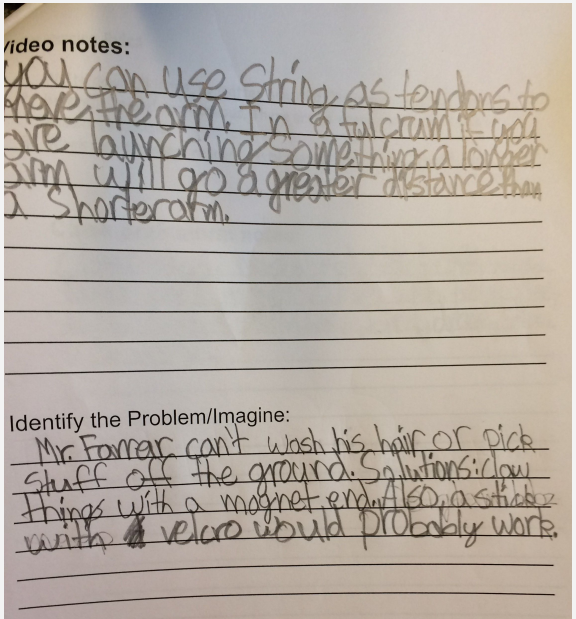
I also learned that alot of things qualify as a lever. And I learned what the parts of a lever are called.

And in library we learned about a kid who went on marathons.

I also learned about a girl who made a wheelchair/walker







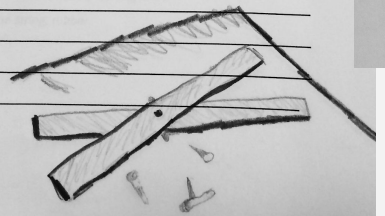
Page 2: Video notes
Identify the problem/Imagine
Student pages

Brainstorming Rules

1. Write down all ideas, no matter how wild. The more ideas, the better!
2. Be creative and spontaneous. There are no wrong answers and lots of possible solutions.
3. Work as a team and respect every idea. Everyone should participate.

Class Brainstorm notes:

- Magnent end of claw (for metal things)
- Around his desk is like elevated floor. If he dropped something it would be high enough for him to just reach down and grab it.
- He



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3. Work as a team and respect every idea. Everyone should participate.

Class Brainstorm notes:

- Magnet Gloves
- Pet bird
- Magnet stick
- Velcro stick
- Tape stick
- Grabber
- Giant Pencil

instorming Rules

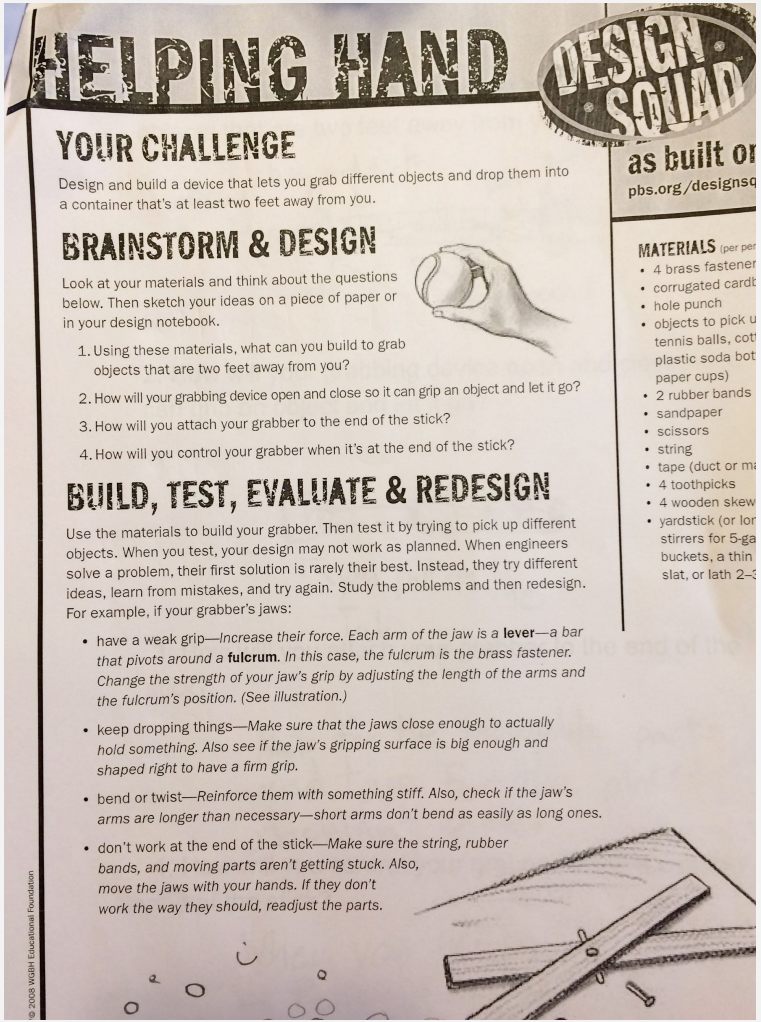
1. Write down all ideas, no matter how wild. The more ideas, the better!
2. Be creative and spontaneous. There are no wrong answers and lots of possible solutions.
3. Work as a team and respect every idea. Everyone should participate.

Class Brainstorm notes:

Claw things, magnet end, Stick with tape, Large pencil, magnet glove, web, trampoline, tube with Suction, train, bird, drone, Stick with velcro.

Page 4:
Brainstorm rules and class Brainstorm notes

Page 5:
Design Squad Helping Hands Challenge
“The Grabber”



HELPING HAND

DESIGN SQUAD

YOUR CHALLENGE

Design and build a device that lets you grab different objects and drop them into a container that's at least two feet away from you.

BRAINSTORM & DESIGN

Look at your materials and think about the questions below. Then sketch your ideas on a piece of paper or in your design notebook.

1. Using these materials, what can you build to grab objects that are two feet away from you?
2. How will your grabbing device open and close so it can grip an object and let it go?
3. How will you attach your grabber to the end of the stick?
4. How will you control your grabber when it's at the end of the stick?

BUILD, TEST, EVALUATE & REDESIGN

Use the materials to build your grabber. Then test it by trying to pick up different objects. When you test, your design may not work as planned. When engineers solve a problem, their first solution is rarely their best. Instead, they try different ideas, learn from mistakes, and try again. Study the problems and then redesign. For example, if your grabber's jaws:

- have a weak grip—*Increase their force. Each arm of the jaw is a* **lever**—*a bar that pivots around a* **fulcrum**. *In this case, the fulcrum is the brass fastener. Change the strength of your jaw's grip by adjusting the length of the arms and the fulcrum's position. (See illustration.)*
- keep dropping things—*Make sure that the jaws close enough to actually hold something. Also see if the jaw's gripping surface is big enough and shaped right to have a firm grip.*
- bend or twist—*Reinforce them with something stiff. Also, check if the jaw's arms are longer than necessary—short arms don't bend as easily as long ones.*
- don't work at the end of the stick—*Make sure the string, rubber bands, and moving parts aren't getting stuck. Also, move the jaws with your hands. If they don't work the way they should, readjust the parts.*

as built or

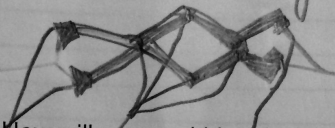
pbs.org/designsq

MATERIALS (per per

- 4 brass fastener
- corrugated cardb
- hole punch
- objects to pick u tennis balls, cot plastic soda bot paper cups)
- 2 rubber bands
- sandpaper
- scissors
- string
- tape (duct or ma
- 4 toothpicks
- 4 wooden skew
- yardstick (or lon stirrers for 5-ga buckets, a thin slat, or lath 2–3

1. Using these materials, what can you build to grab objects that are two feet away from you?

A claw grabber



2. How will your grabbing device open and close so it can grip an object and let it go?

with the rubber bands here, and hole punchers and brass fasteners here

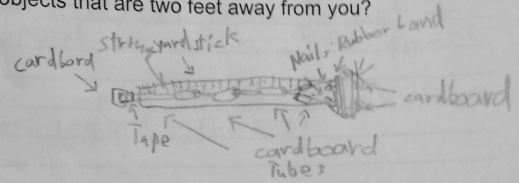
3. How will you attach your grabber to the end of the stick?

with rubber bands and tape

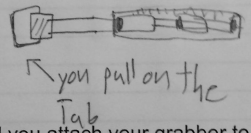
4. How will you control your grabber when it's at the end of the stick?

grab each end of the handle.

1. Using these materials, what can you build to grab objects that are two feet away from you?



2. How will your grabbing device open and close so it can grip an object and let it go?

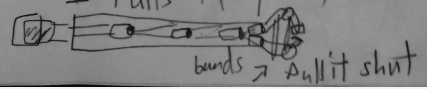


3. How will you attach your grabber to the end of the stick?

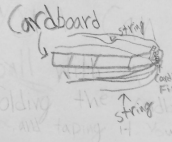
Nails for the moveable parts and tape for the places that shouldn't move.

4. How will you control your grabber when it's at the end of the stick?

When you pull on the tab, it pulls it open

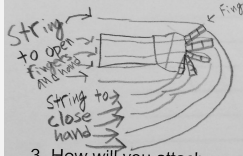


1. Using these materials, what can you build to grab objects that are two feet away from you?



Cardboard could act as the actual arm and there could be cardboard fingers with string connected to the fingers.

2. How will your grabbing device open and close so it can grip an object and let it go?



Some string opens the hand to grab. When it grabs it. Other string closes the hand.

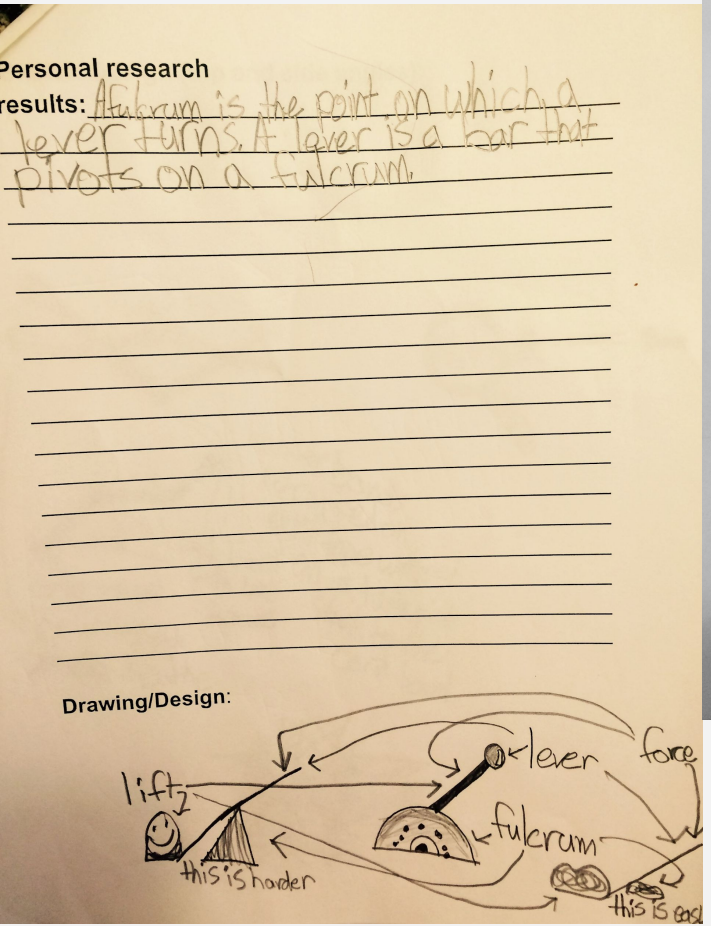
3. How will you attach your grabber to the end of the stick?

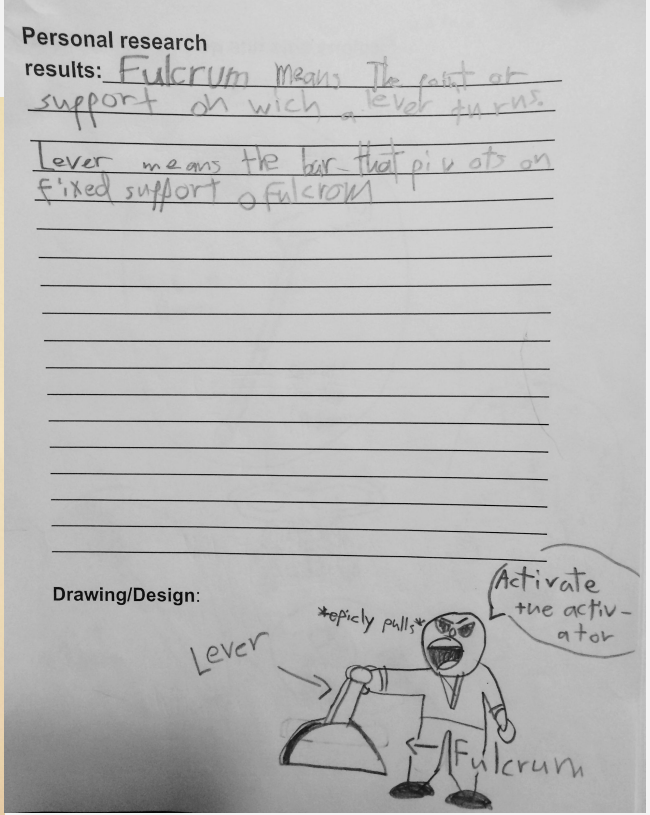
With string, tape, and Rubber bands

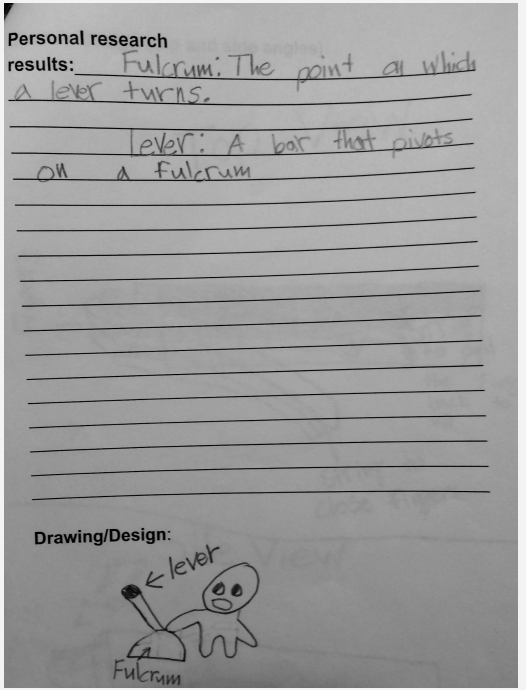
4. How will you control your grabber when it's at the end of the stick?

With string on the fingers, and the cardboard or stick.

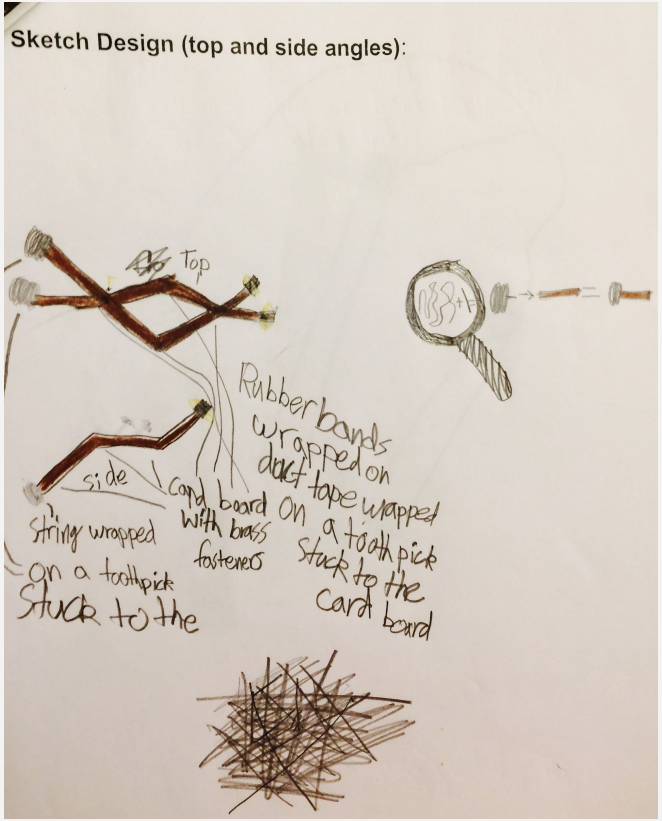
Page 6:
Narrowed individual planning questions

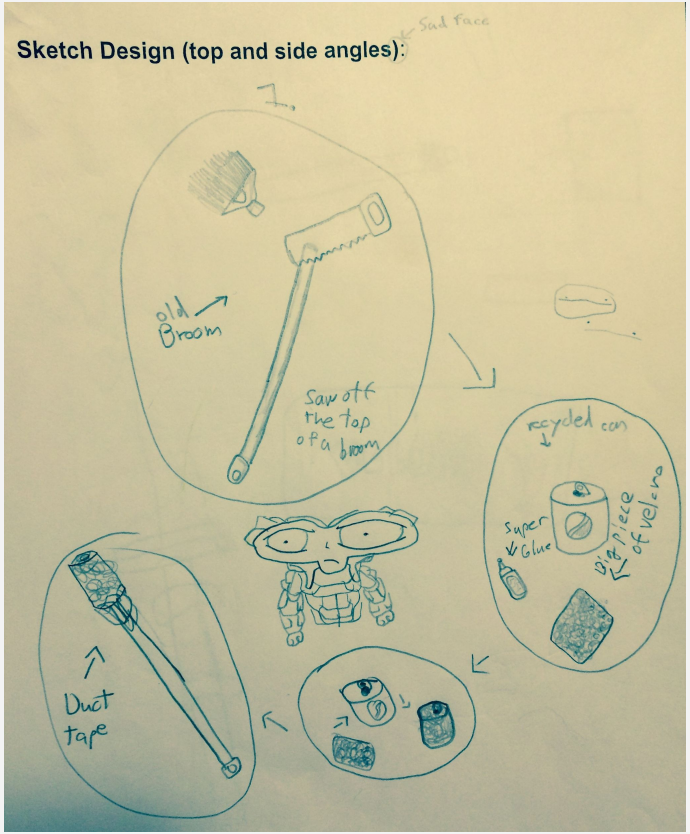


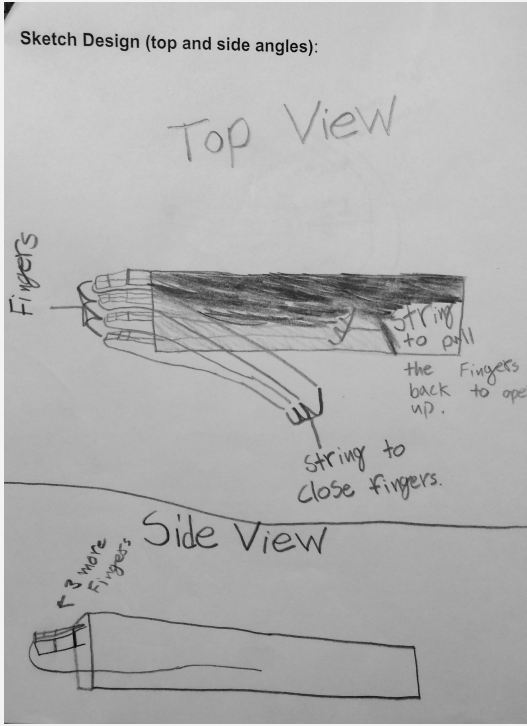




Page 7:
Personal Research Results
And Drawing/Design

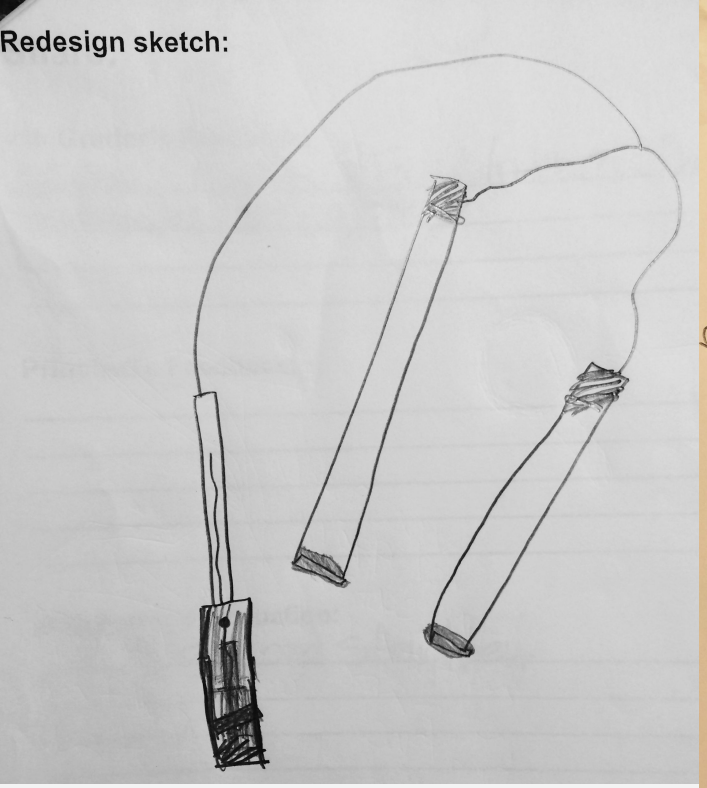




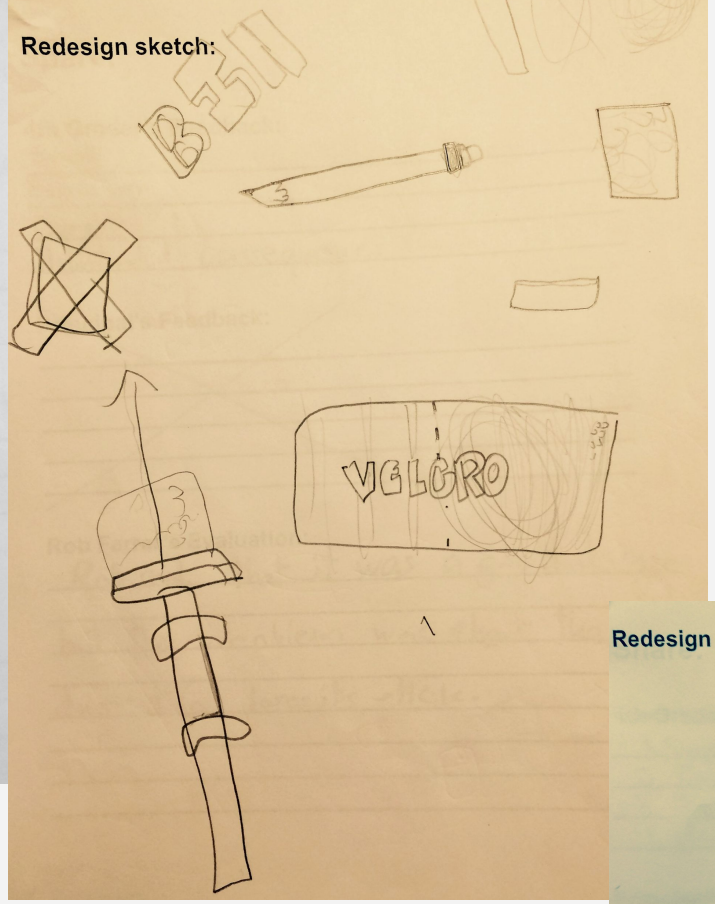


Page 8:
Sketch Design (top and side views)

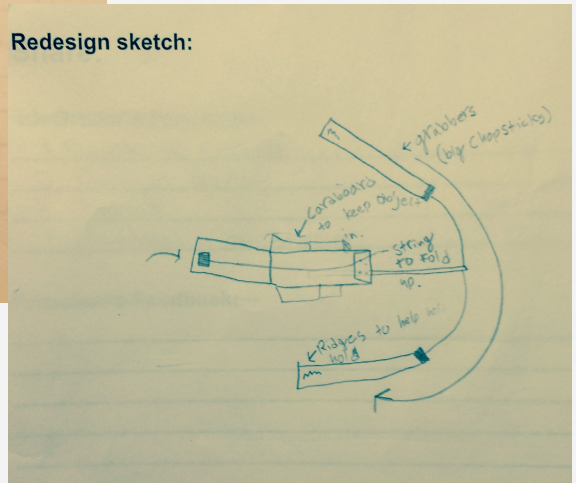
Redesign sketch:



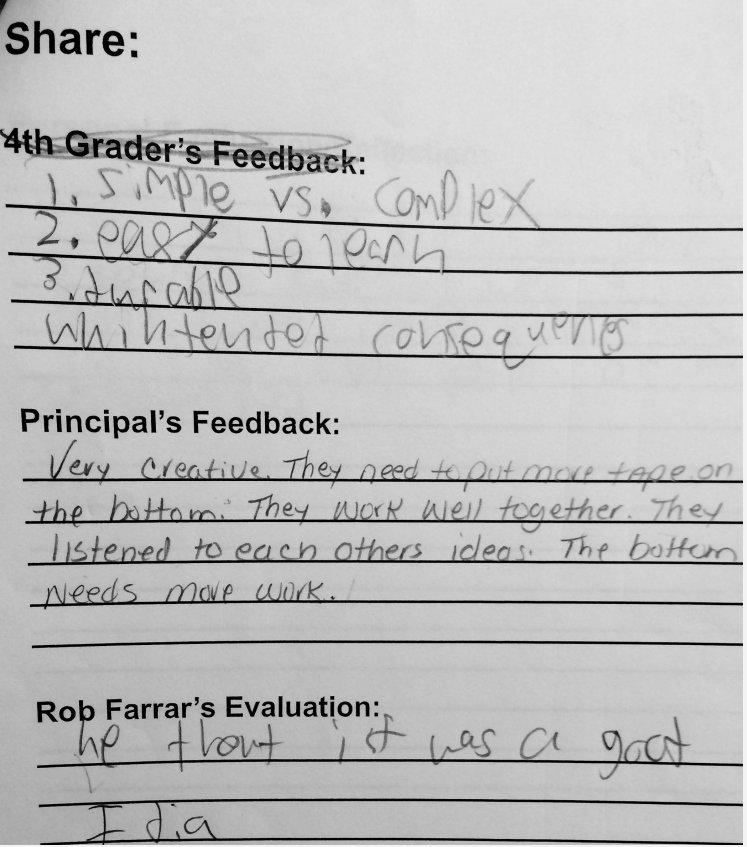
Redesign sketch:

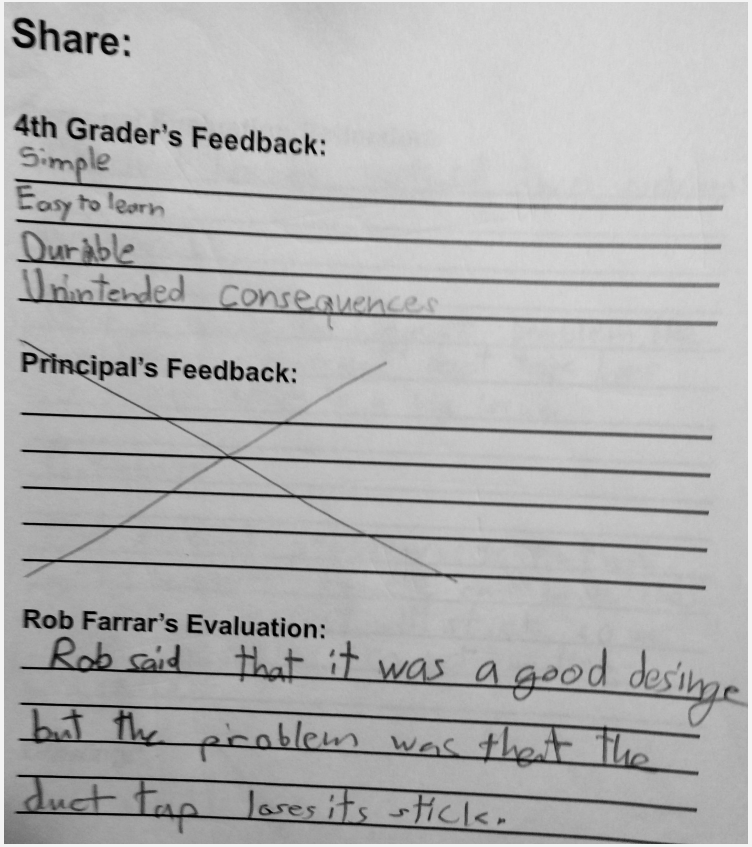


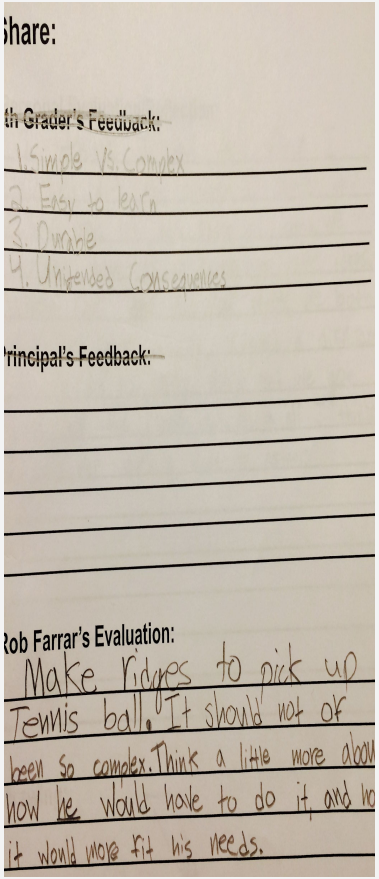
Redesign sketch:



Page 9:
Redesign Sketch





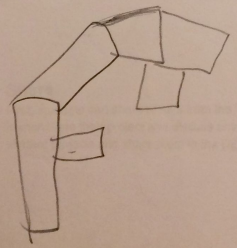


Page 10
Share
Rob Farrar's Evaluation and Feedback

Personal Evaluation/Reflection:

I think that our team worked well together and we could have made a claw but both of ours failed.

Drawing:



Personal Evaluation/Reflection:

Me and Landis noticed two problems.

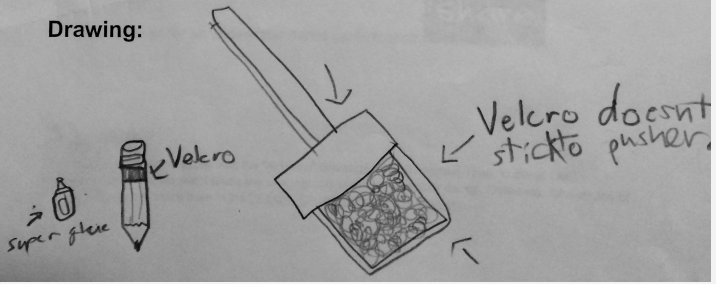
Problem 1:

This is easily the biggest problem. The problem is that the duct tape loses its stick which is a big issue

Problem 2:

Our second problem is that we ~~get to close to the~~ cant have the pusher to low or it will stick so we won't be able to get smaller objects.

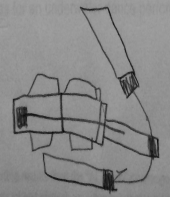
Drawing:



Personal Evaluation/Reflection:

I think I did well when I worked with my partner. I shared my ideas and let him share his ideas. We worked together in combining our ideas. When our idea did not work, we both did not get mad. We designed a different idea. It did not really work but we got some of the flaws out. All in all I think I did well working with my partner.

Drawing:



Page 11:
Personal Evaluation/Reflection and Drawing

AT HOME

During this "At Home" challenge, students will interview friends or family to identify a problem, and then create a prototype to help solve it.

Challenge

Make a Prototype

Students will make a prototype device that will help someone move, accomplish a task, or make work easier. First, they will conduct interviews with family or friends to identify the problem that their device will help solve. Then they will make a sketch or prototype of their device. Optionally, they can take photos or record video of their prototype being used by a family member or friend. Finally, they will bring their sketch or prototype to class to discuss the next day.

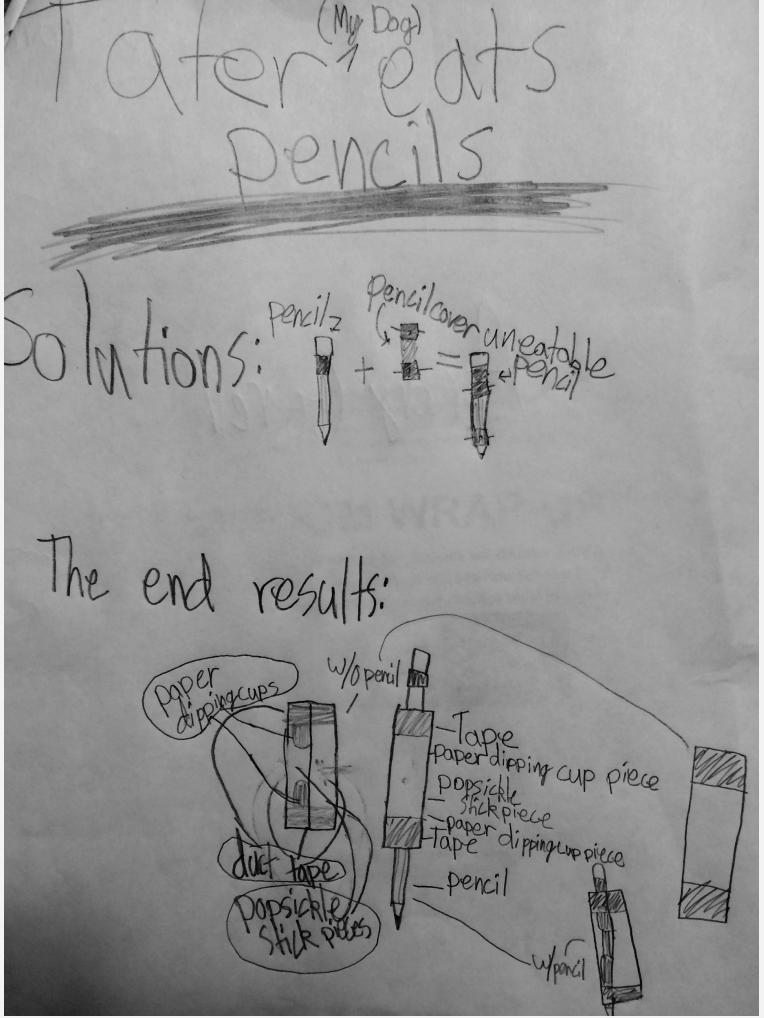
CLASSROOM WRAP-UP

Once all of the prototypes have been shared, students will discuss elements that could improve upon their design. Then, students will see how the teams on DESIGN SQUAD used engineering and the design process build specialized prostheses for an underwater dance performance.

Share

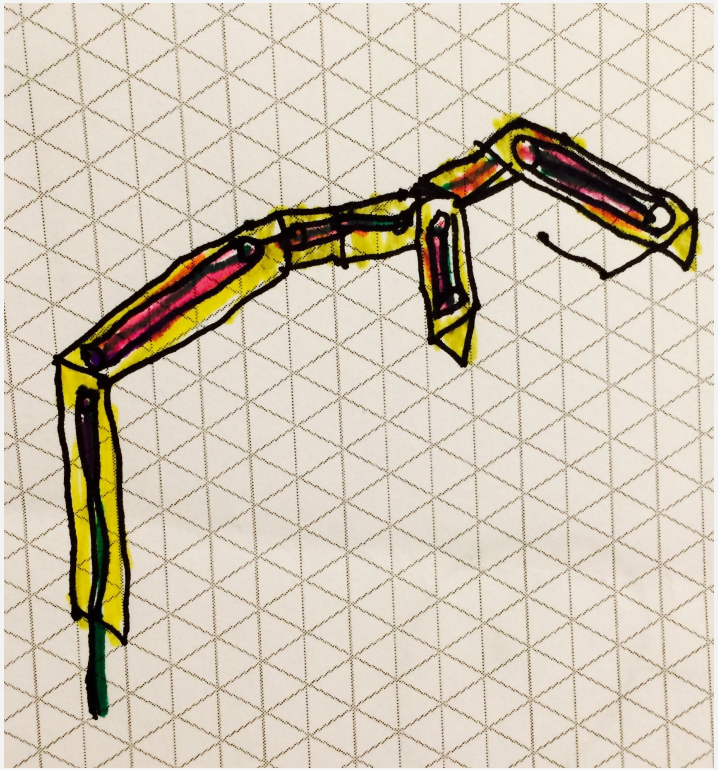
Share

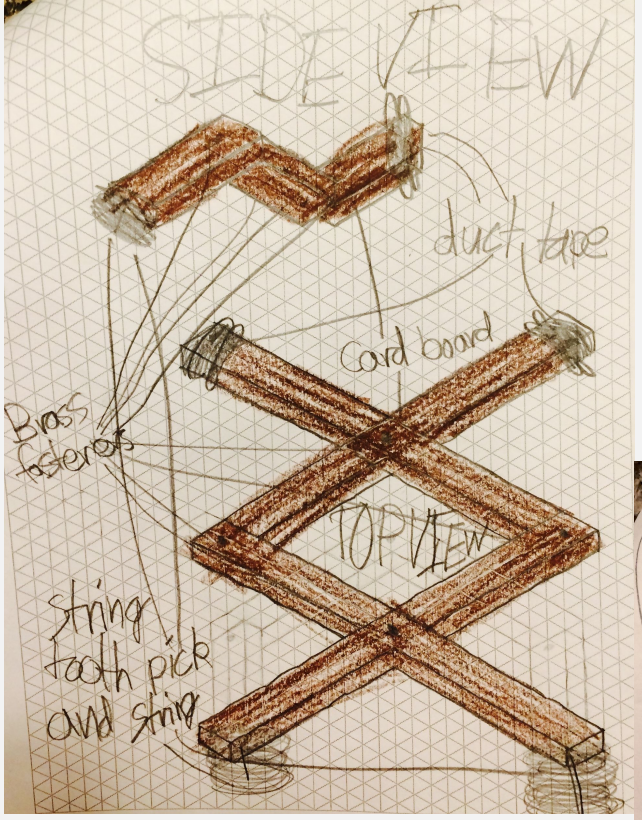
First, students can share results from the "At Home" challenge. (10-15 minutes) Then, students can demonstrate their project and discuss any changes that would improve their design. Optionally: take photos of student projects and share them in the DESIGN SQUAD website project gallery.

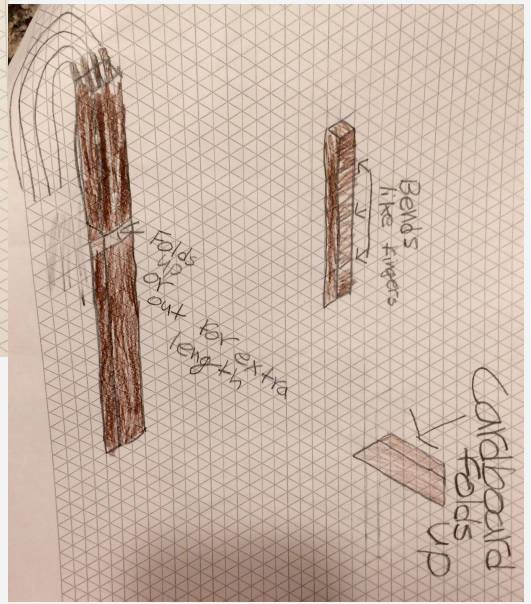


Andy's Dog Pencil Protector

Page 12:
At Home Challenge and Online sharing to the Design Squad Gallery







Page 13:
Isometric Design Drawings