A *Community* of Engineers

A Six Week Education Curriculum for 3rd grade students

Meet the Author!

Ally Lochhead, author of *A Community of Engineers,* is a fourth-year, graduating senior from Cal Polytechnic State University.
She is a 4-H Volunteer for the Youth Development Program, and has worked with children from preschool age up to sixth grade. She has a passion for all children and is currently an intern for Family Care Network, which supports children, youth, and families who have often been impacted by trauma.

"I truly have a passion and love for working with children. The field of teaching is so rewarding, and I love connecting with each and every student. As a Liberal Studies major with minors in Child Development and Religious Studies, I am excited to enter into a Multiple Subject Teaching Credential Program in 2018 and continue to learn alongside my students. I have loved creating these hands-on engineering lessons, and I am excited to use the curriculum in my future classroom! Being a teacher has been my dream since I was in Mrs. Wirkus' 3rd grade classroom, and I'm excited to see it come true!

GOAL: Next Generation Science Standards Science and Engineering **Practice 6**: **Constructing Explanations and Designing Solutions**.

- By the conclusion of the sixth lesson, students will be able to understand the cycle of design used by engineers to find the solution to problems. They will have experienced a brief introduction into four different careers within the field of engineering. They will be able to work in groups to ask questions, imagine solutions, plan a blueprint, create and then revise their design.

- The lessons will be cross-curricular and will involve different aspects of science, technology, engineering, math, reading, and art. The lessons will be aligned with the NGSS curriculum.

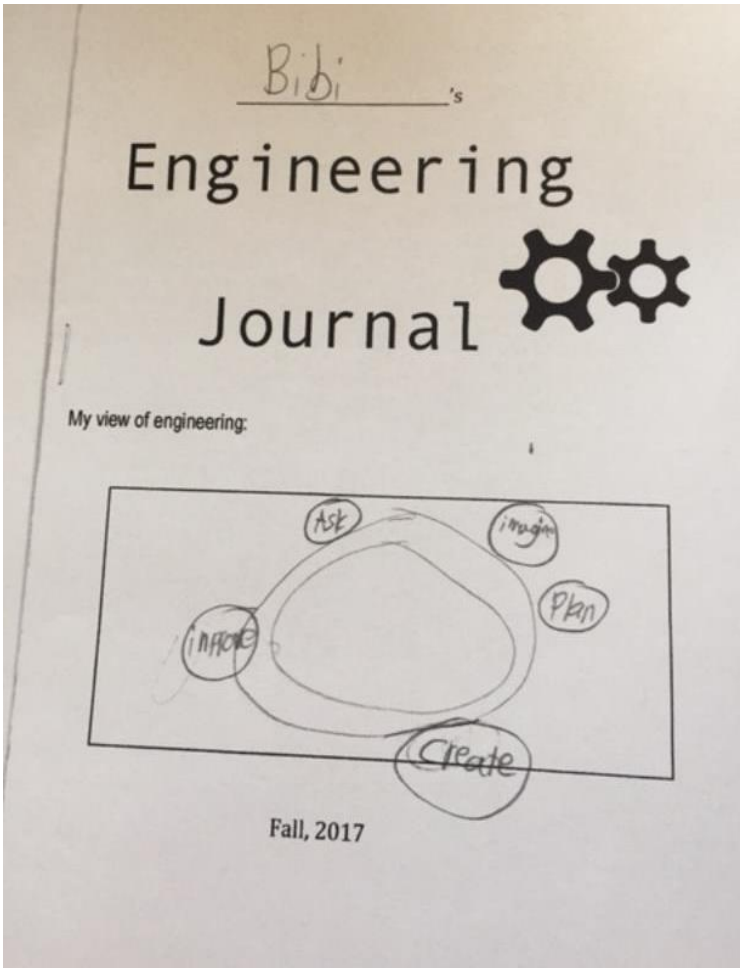
- Main goal: ignite a desire to learn more about engineering and its place in our world. Get students interested in these fields of work, and learn how to deal with challenges and draw from new information to solve the issues.

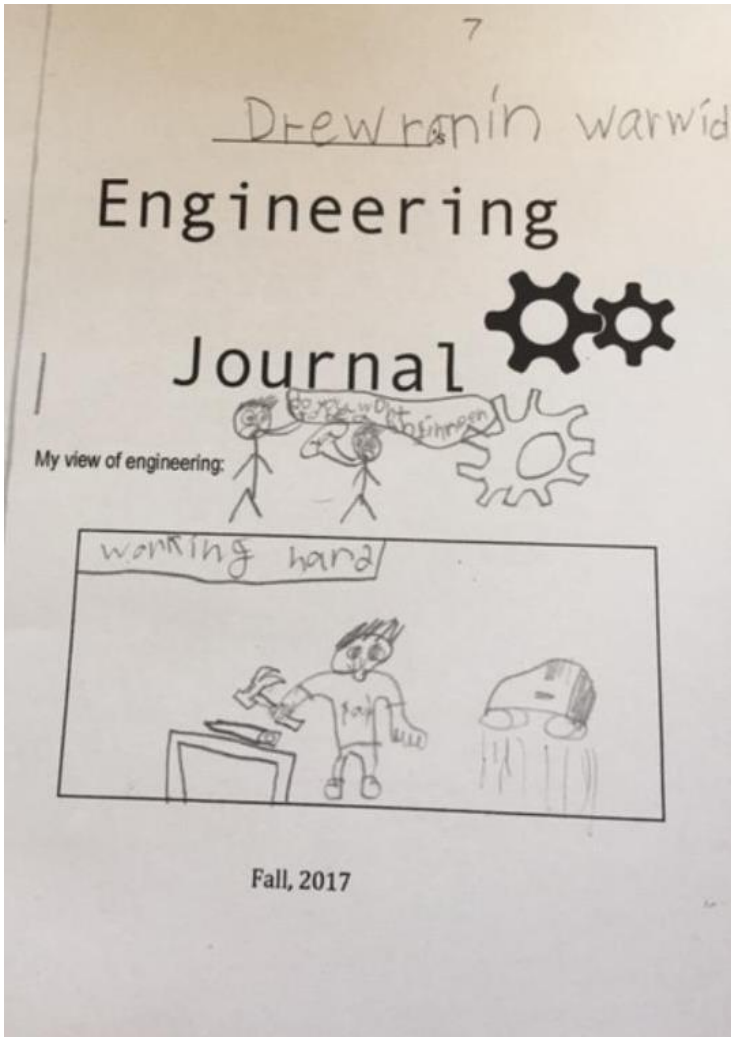
Photo Credit: modified by S. Bush, Cal Poly, originally from Engineering is Elementary poster.

Table of Contents

Every child receives an engineering journal to use for each of the six lessons.
TIPS:

1. Assemble these prior to the first lesson for easy distribution to class.
2. Collect the journals after each class to keep all together before next lesson.
3. Have a few extras on hand for the few that misplace them in between work and collection.





Journal templates on pg. 55 & 56.
Include 3 of the blueprint journal paper to provide ample room in journals for designs.

JOBS

Retriever

Recorder

Reporter

Engineering Song in American Sign Language

Ask

Imagine

Plan

Create

Improve

Inspired by https://www.youtube.com/watch?v=-mr47VAbRmk, modified by Ally Lochhead

Lesson 1: Up, Up, and Away!

Aeronautical Engineering

Overview & Objectives

This lesson will equip students with a strong foundation to dive into the STEM lessons on engineering. The goal is to get an idea of what students know about engineering, let them know where we will be going, and introduce them to a new field: aeronautical engineering.
Students will understand the basis of what one is to do as an engineer, and how to revise and restructure their original designs. They will gain a better understanding of gravity and air resistance as they ponder the issue of keeping their "Whirlygig" twirling longer.

Materials

- Rosie Revere, Engineer
- Engineering poster for classroom wall
- Engineering journals (1 per child)
- Whirligig Components: Templates, different sized paper clips, copy paper, cardstock paper, scissors
- Gallon ziplock bag with construction paper, binder paper, and copy paper (1 per group)

Ask/Engage

1. Introduce Engineer song & hand movements ~10 minutes
   "Ask, Imagine, Plan, Create and Improve"
2. Read 3 pages of Rosie Revere, Engineer
   -*ask* what they noticed about Rosie & being an engineer
3. Introduction and basics
   Ask children "what can you tell me about engineering? Who are engineers?".

Imagine/Plan

4. Give challenge: "Secret Agent Captain Aero's next job consists jumping out of a plane with a human size whirligig he is constructing. He is so busy with his captain duties that he has appointed _____'s 3rd grade class to construct it for him! He needs the maximum flight time from the plane to the ground, so that his body can adjust to the altitude change and he can safely land. Use the given materials to explore the best design for Captain Aero to safely make it to the ground."

Experiment/Create

1. Construct 1 Whirlygig per group ~15 minutes
   TASK: groups want their whirligig to stay in the air as long as possible to support our agent's safe landing.
   Instructions:
2. **PART ONE:** Teacher makes a demo of copy paper, cut in the provided format, and clip on one paper clip to the end and show the class.

NEXT: Have students decide on jobs: retriever, recorder, reporter.

THEN: Pass out templates for whirly gigs and have each group construct on (copy paper and regular paperclip)

TEST and see how it flies.

- **PART TWO:** 5 minutes: build cardstock whirligig and paperclip.

TEST and see how it flies.

Experiment/Create cont.

- **Give** students time for experimentation with whirligigs- *which flies longer: copy or cardstock?*
- **Show** students other materials that they can use (have various types of paper and paperclip sizes)
- **Give** the group time to plan what materials they think will be the most successful. **~10 minutes**
  → ***pass out** journals & model for class to **sketch** in Engineer Journals (*include list of materials)* in design.
- Then send the 'retriever to get the extra supplies when needed (1 gallon ziplock pre-packed with various papers per group).
  TAPE TIP: keep tape with you and rip off strips for students.
- Group of 3 will construct whirligig and test it as a group.
  ~12 minutes
- Once the time is up, have each group tell the class what made their whirligig fly in the air longest, and send "reporter" to demonstrate in front of the class.
  ~8-10 minutes
- Closing & final thoughts

Informal assessment: have reporters of each group share out what they found out with their testing and revising.
Which dropped slower: copy or cardstock paper?

Tips:

As the teacher/facilitator, GET EXCITED! Your students will feed off your enthusiasm for the challenge. They will DIVE headfirst into it.

I had a student include a helmet in their design to keep Secret Agent Captain Aero's head safe during his jump! They come up with the most creative ideas, and need to be reciprocated with the same excitement!

Standards:

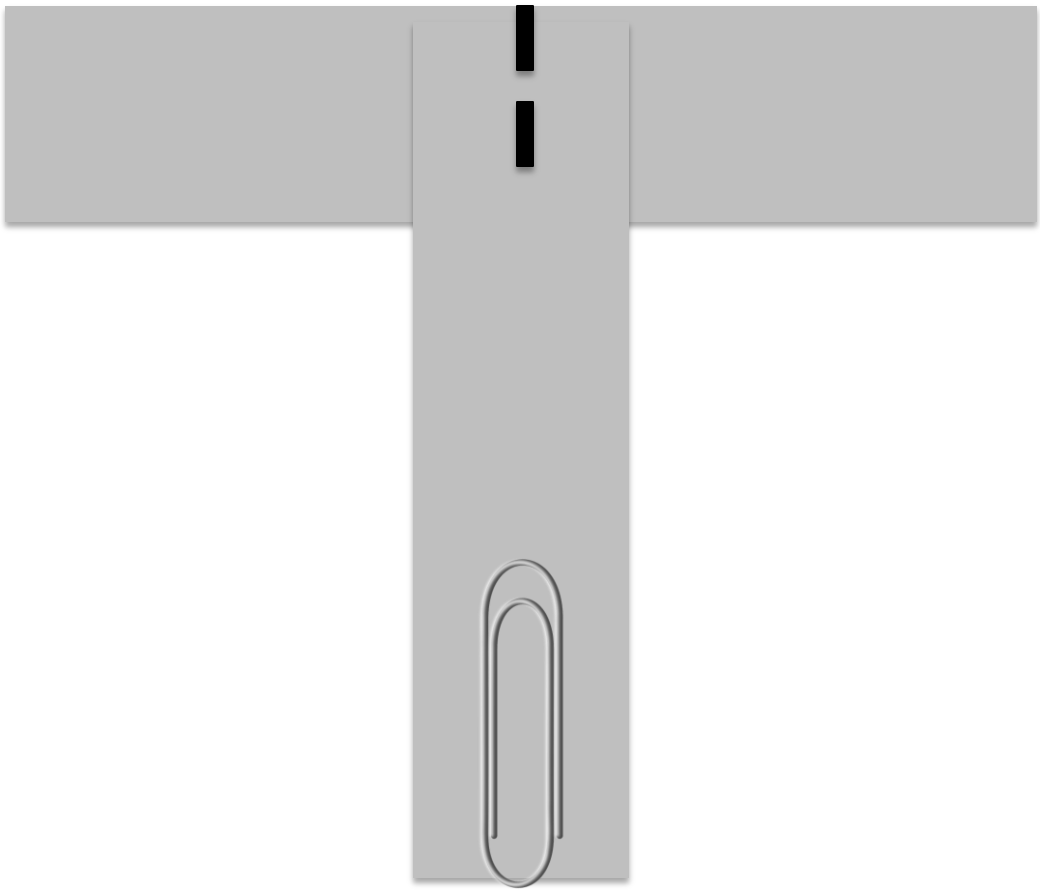
R.I.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers

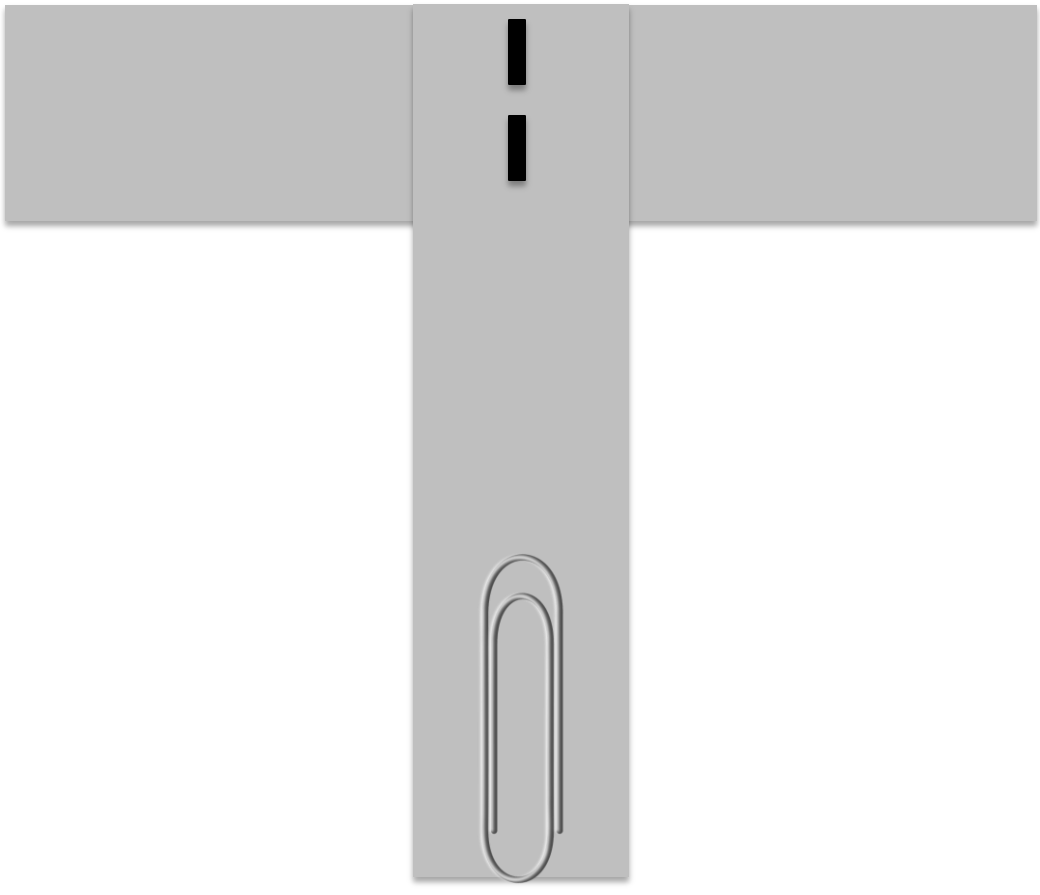
Practices:

3-5-ETS1-1.	**Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.**
3-5-ETS1-2.	**Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.**
3-5-ETS1-3.	**Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.**

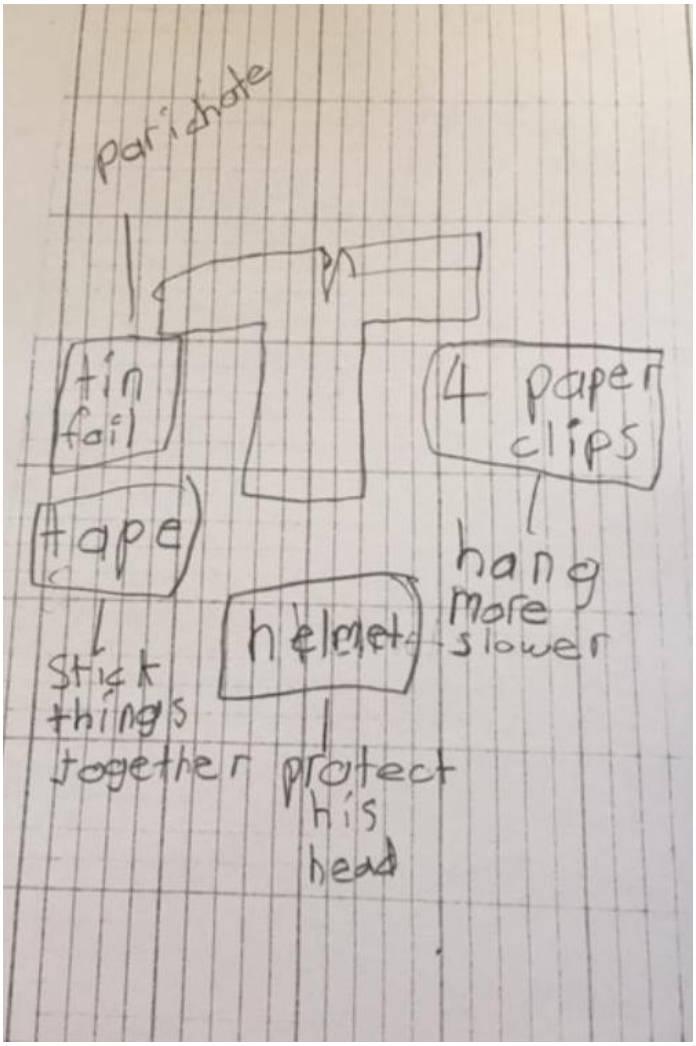
Aeronautical

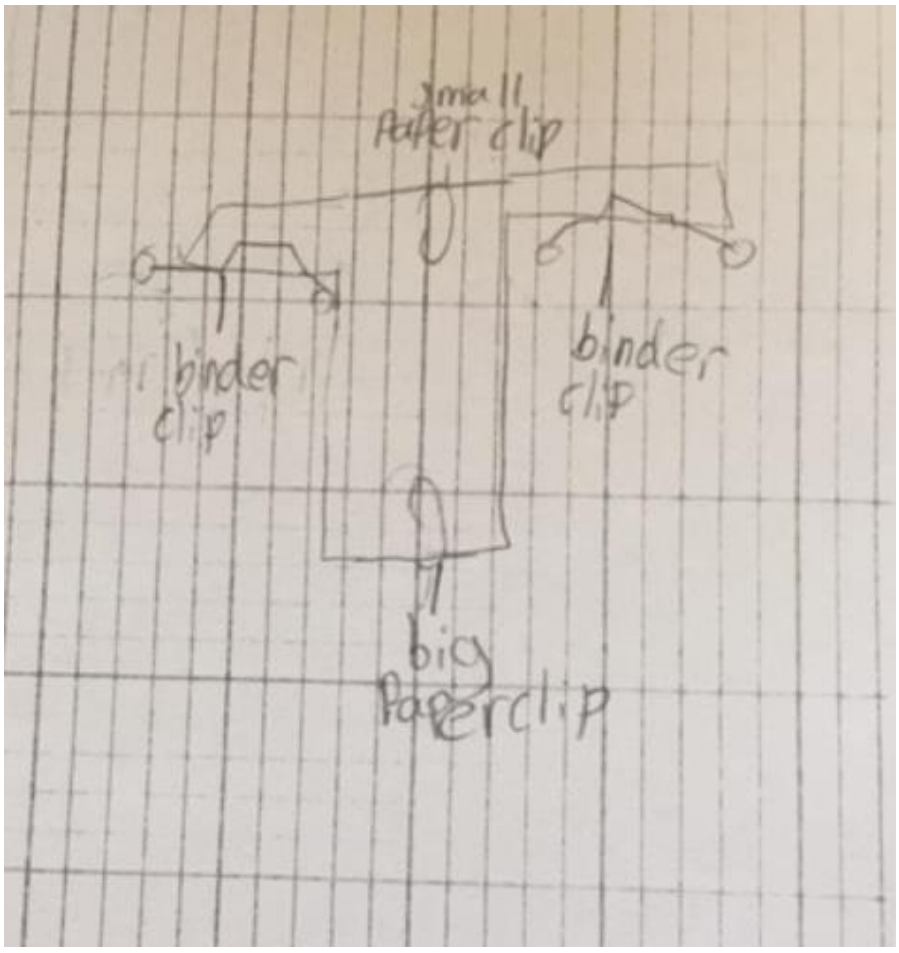
These engineers work with the performance and design of aircraft.

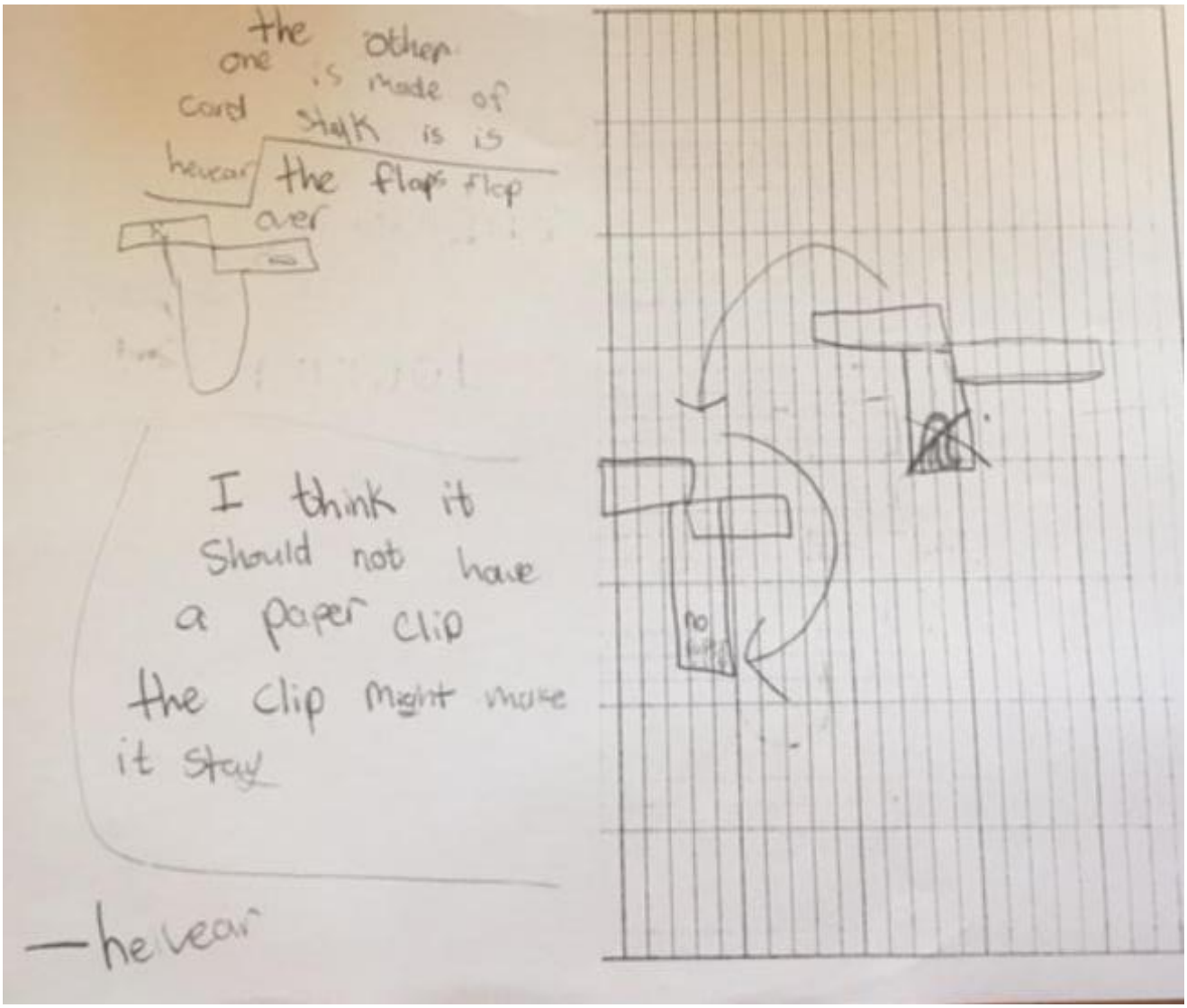


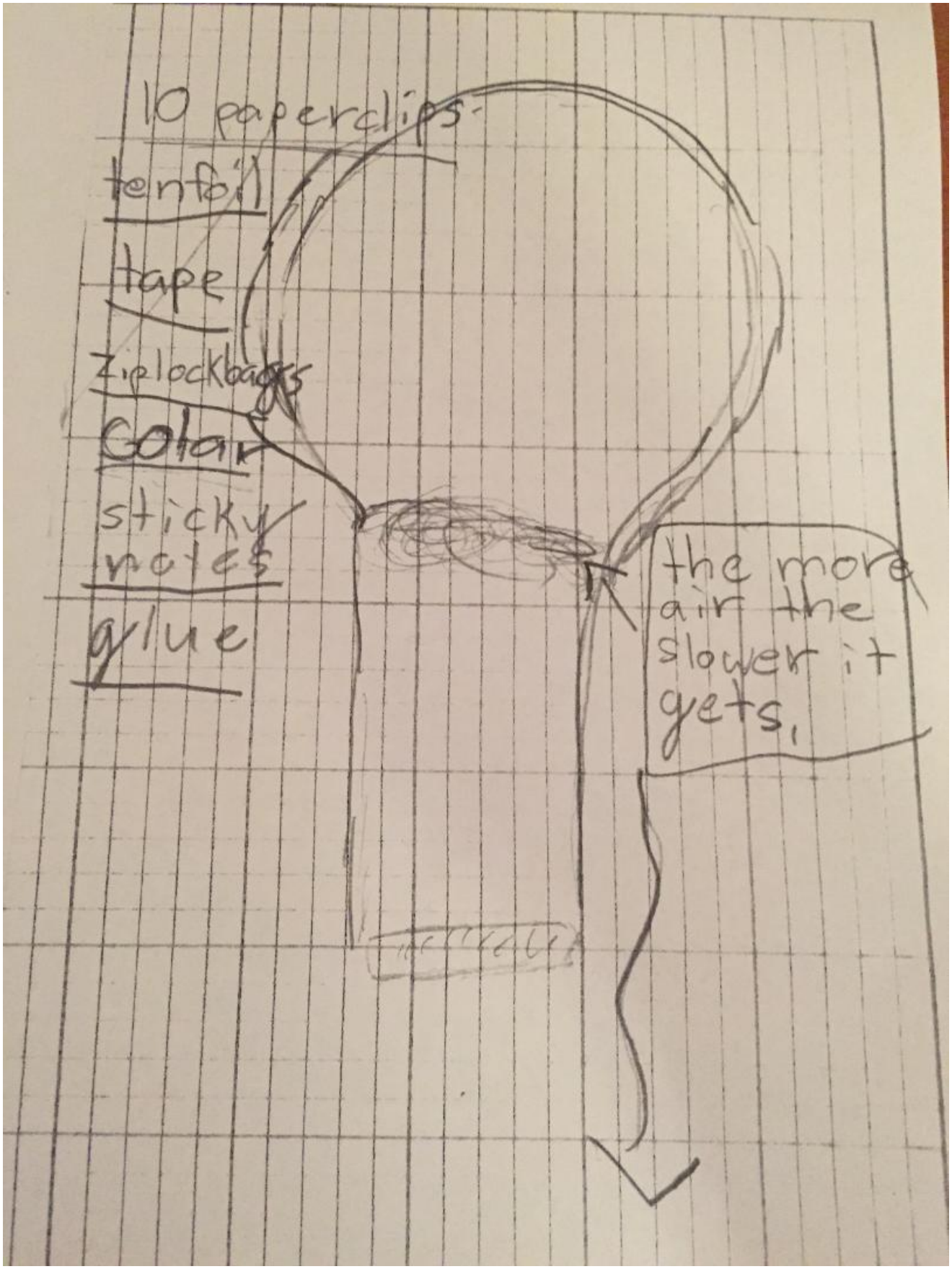


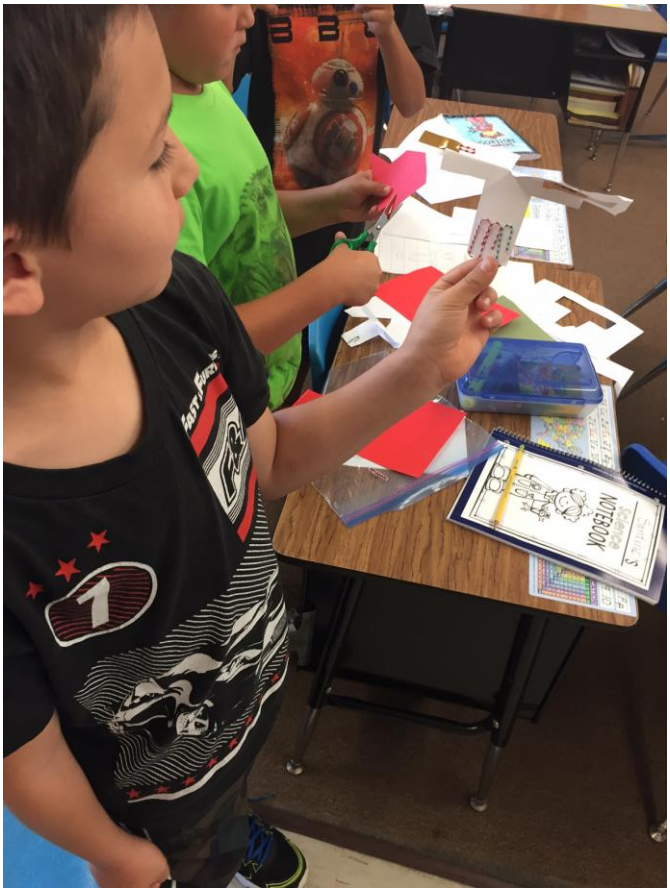
STUDENT WORK

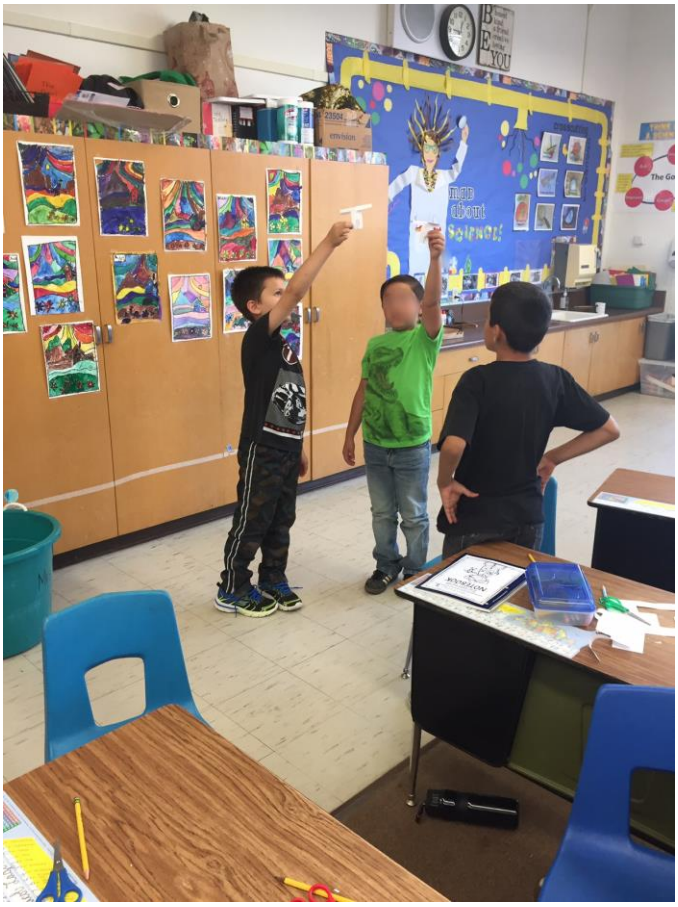





the other one is made of card stock is is helvear the flap flop over
I think it should not have a paper clip the clip might make it stay
—helvear


10 paperclips
tenfoil
tape
ziplockbags
Colour
sticky notes
glue
the more air the slower it gets.


NOTEBOOK



Lesson 2: Machines, Mechanics, and Pumpkins? Oh my!

3rd Grade Engineering

Mechanical Engineering

Overview

Students will step into the shoes of a mechanical engineer, and engage in the idea of designing a machine and making it function. Their machine task will be to make a catapult! Students will be given materials and allowed time to design a blueprint before constructing their design.

Ask/Engage

- Start with engineer song **~10 minutes**
- Read Rosie Revere, 2 pages
  Discuss what Rosie why Rosie's contraption was a machine
- Ask students what they can tell you about catapults- engage in class discussion with teacher's role as *facilitator.*
- Show class a video of catapulting to give them ideas of the function and mechanisms of the catapult
  (video link under 'resources')

Imagine

- Give challenge: "____'s 3rd grade class has been entered into Grover Beach's First Annual Pumpkin Catapulting Contest! Your task is to build the catapult that can launch objects the furthest. Remember to utilize the design process so you can create your design with the most potential to successfully launch."
- Show materials that each group will have access to so they can get an idea of a design that may work. ~**3 minutes**

Plan

- What does a mechanical engineer do?
- Ask the class what a M.E. may have to do with a catapult
- Have volunteer read the definition.
- **Vocab:** 'machine', 'design', 'develop'
  -Ask students what they already know about the words to establish prior knowledge, and then have volunteers read the provided definitions.
- Show class Google search for "simple catapults" briefly to get their minds thinking (building these catapults is trickier than originally thought)
- Display the picture of the materials for all students to see.
- Students will complete a detailed blueprint of their design in their engineer journals, while labeling materials used for each part.~**15 minutes**

Create

- Allow students to work in teams of 3 and assign them jobs: retriever, reporter, recorder.
- Once they show their design to the teacher and get approval for their complete thoughts, the "retriever" will grab their tray of materials from the front table and the team will work together to construct their catapult. **~15 minutes**
- Make sure there is **ample time** for students to plan, build, and test. The building will take the longest and students will truly engage if they are met with appropriate time measurements.

Test/Improve

- The reporter, along with the group, will test their catapults in the classroom.
- Students will grab the marshmallow or cotton ball, and mini pumpkin and test their catapult outside, preferably in the launching area (labeled with sign as these catapults shoot pretty far).
- Designate the area preferably as a place where there won't be a lot of foot traffic or launching interceptions (a long, rectangular area works best)
- Students will use measuring tapes to record their distances traveled
- Student who is the "recorder" will write down the distances that each object was catapulted on the provided data chart.
- If time, students can brainstorm and revise their design to see how they can improve it.

Materials

- Rosie Revere, Engineer
- Trays
- Rubber bands!!
- Plastic condiment cups
- Cotton balls, mellows, mini candy pumpkins
- Plastic spoons
- String
- Popsicle sticks
- Tape measures (these catapults will go pretty far!)

Other Resources

https://kidsactivitiesblog.com/28871/catapult-for-kids-to-make

Standards

3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

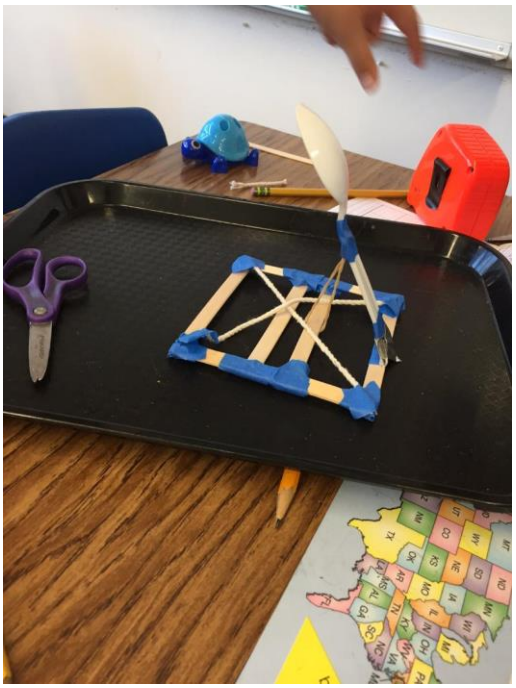
MP.2 reason abstractly and quantitatively.

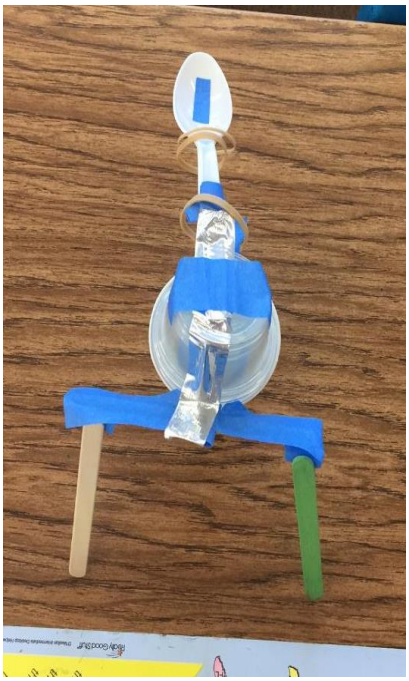
MP.4 model with mathematics.

Materials

Mechanical

These engineers design power-producing machines, such as fridges. They also design machines inside buildings like elevators.





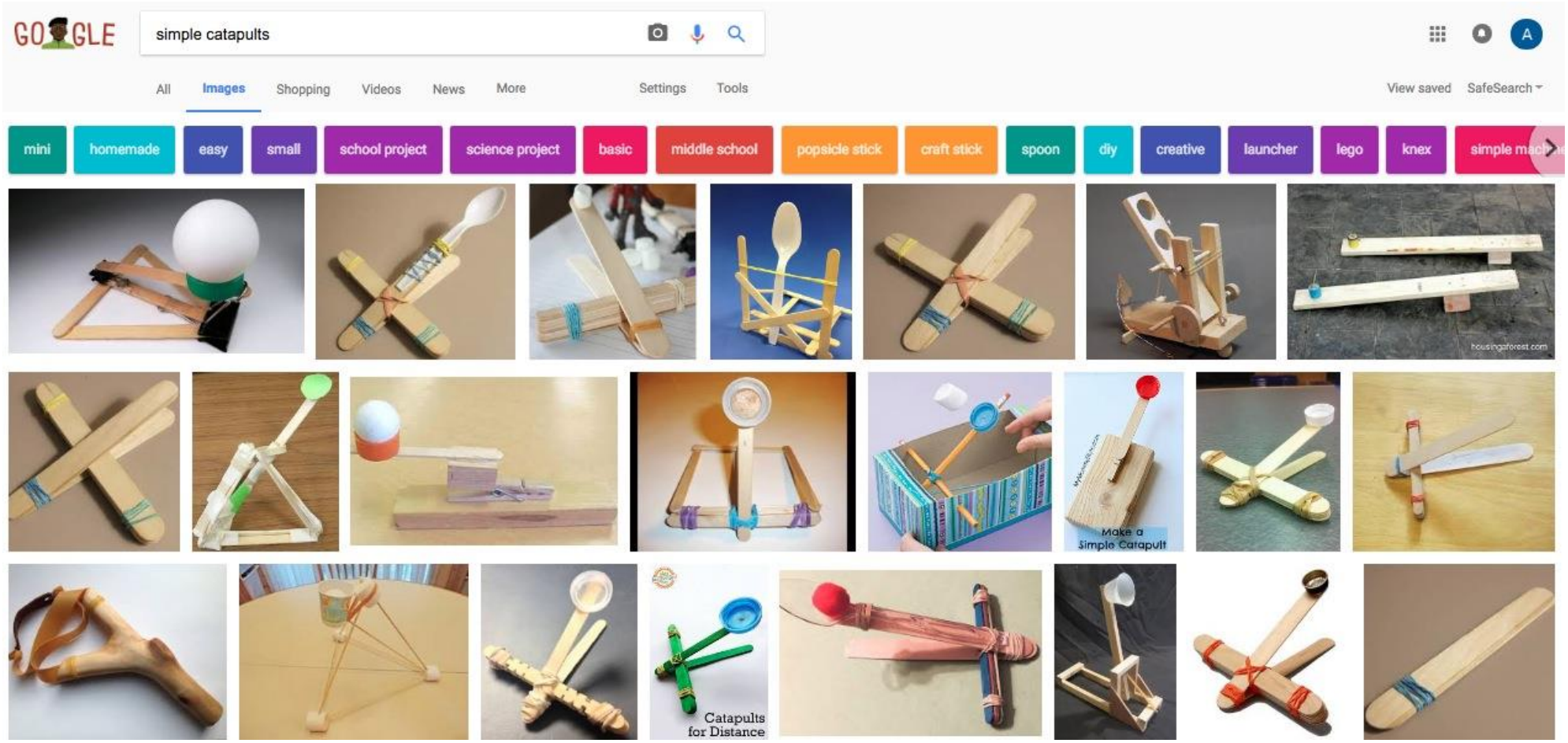
Catapult Distance (inches)

	Circle one: Marshmallow Cotton ball	Mini Pumpkin
Distance (measure in inches)	_____in	_____in

Catapult Distance (inches)

	Circle one: Marshmallow Cotton ball	Mini Pumpkin
Distance (measure in inches)	_____in	_____in

Launching Zone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simple catapults
All
Images
Shopping
Videos
News
More
Settings
Tools
View saved
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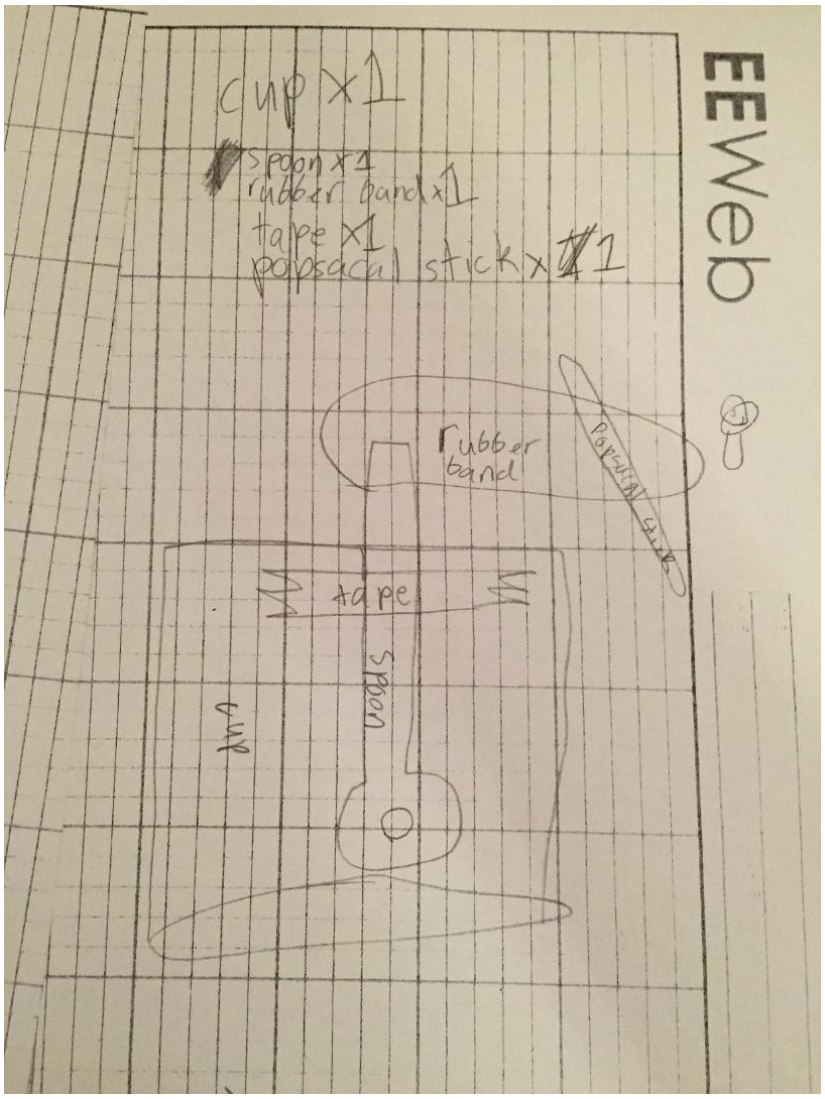
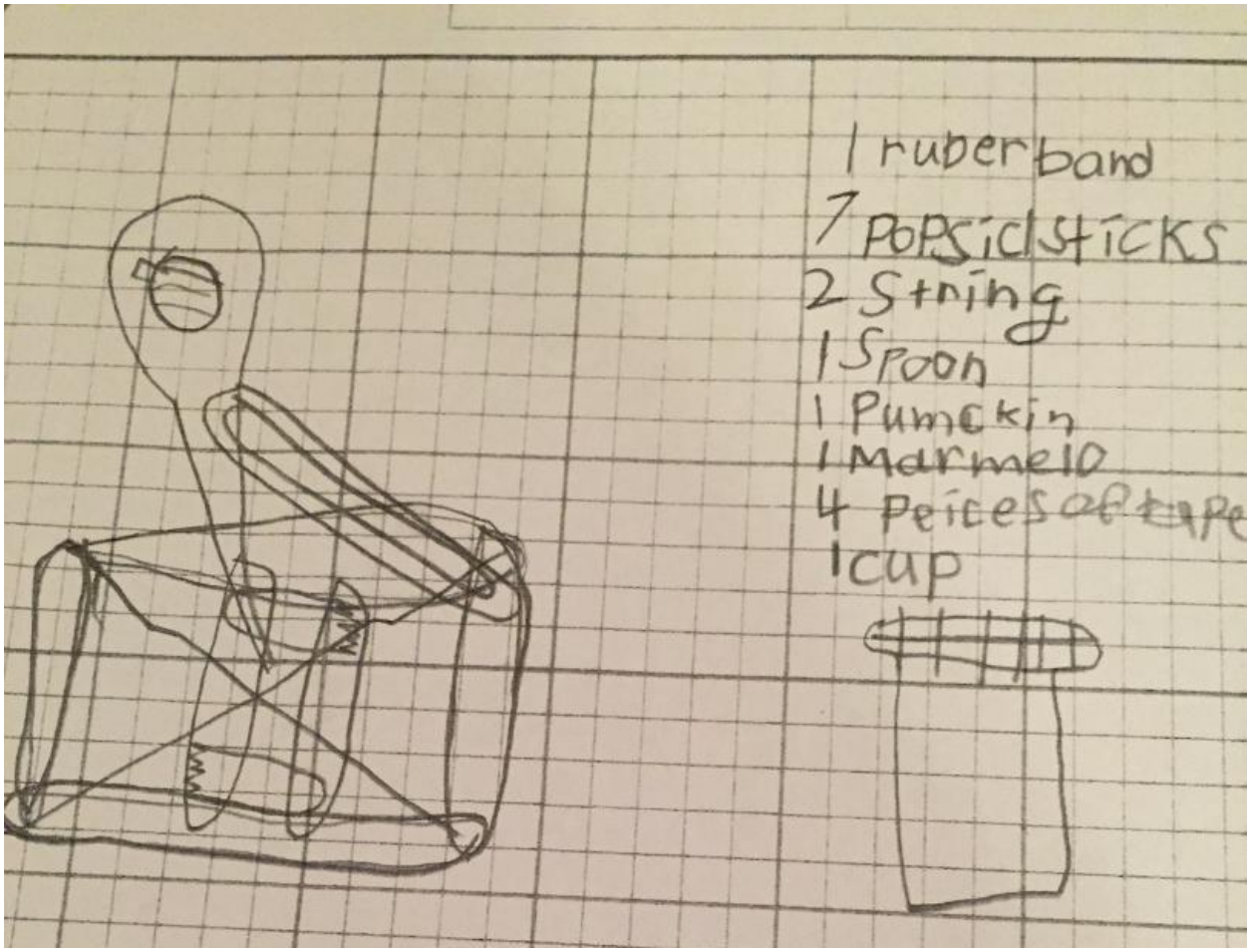
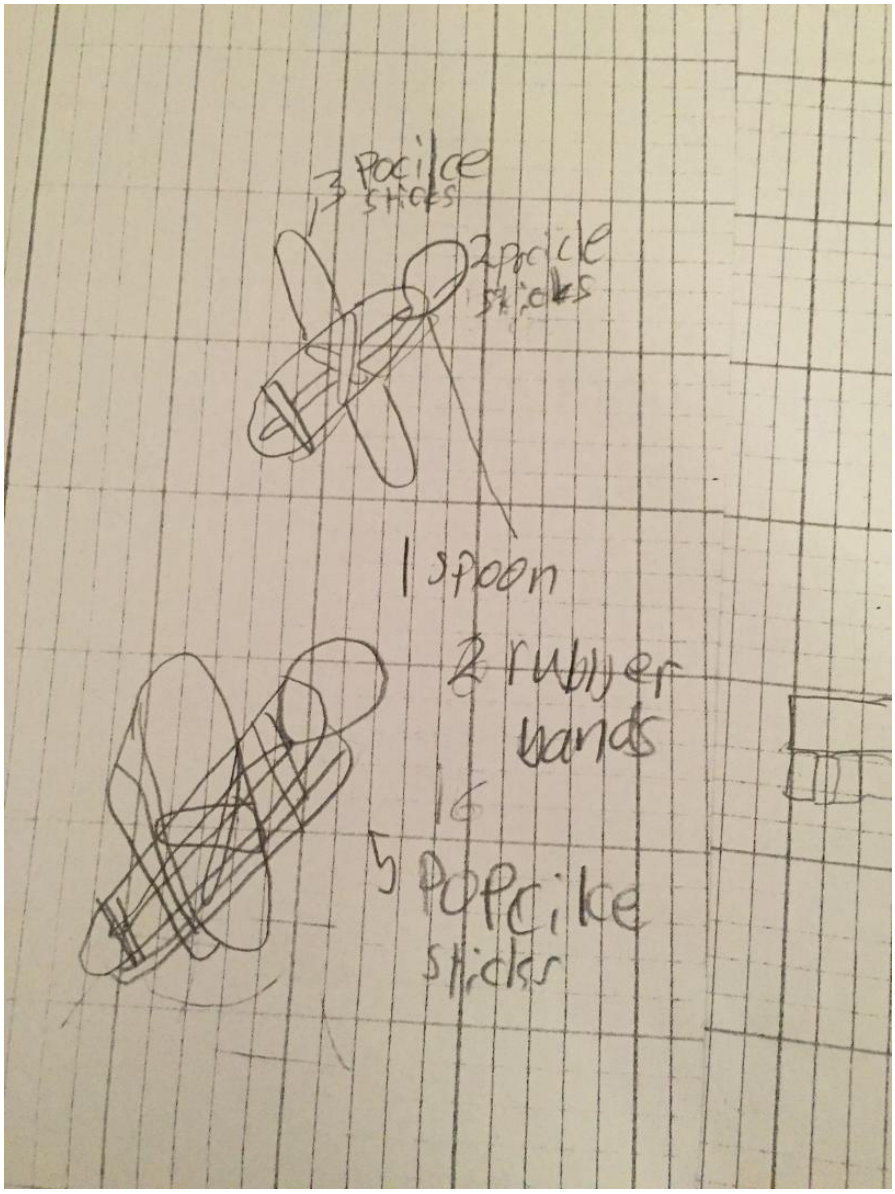
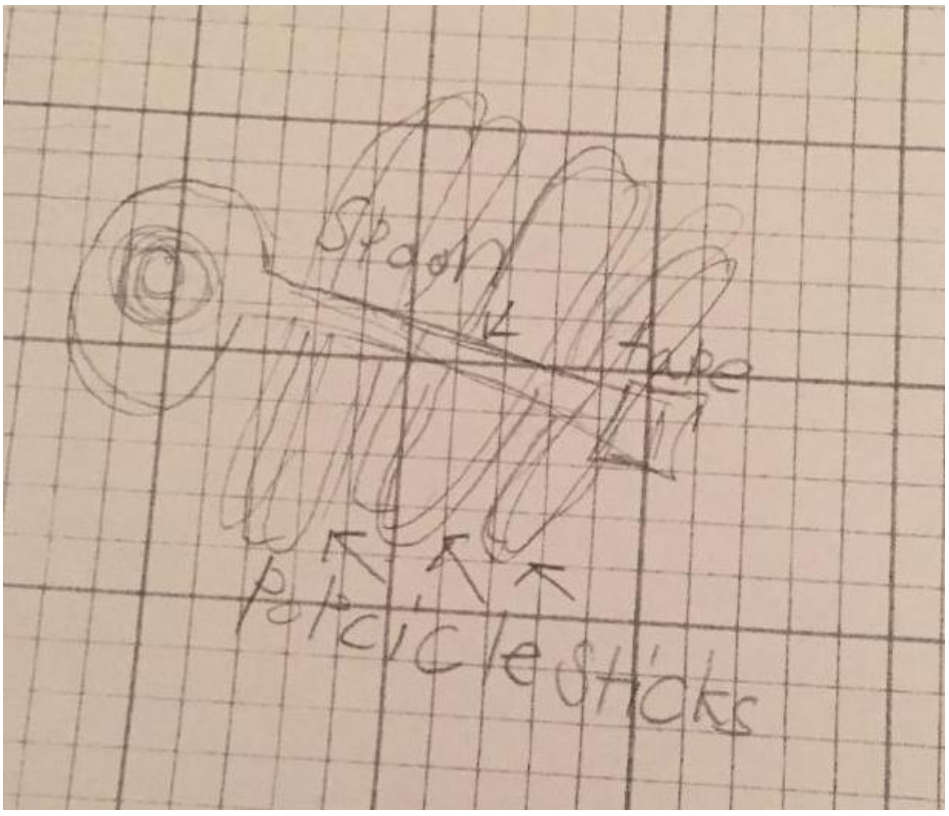
mini
homemade
easy
small
school project
science project
basic
middle school
popsicle stick
craft stick
spoon
diy
creative
launcher
lego
knex
housingaforest.com
Make a Simple Catapult
Catapults for Distance

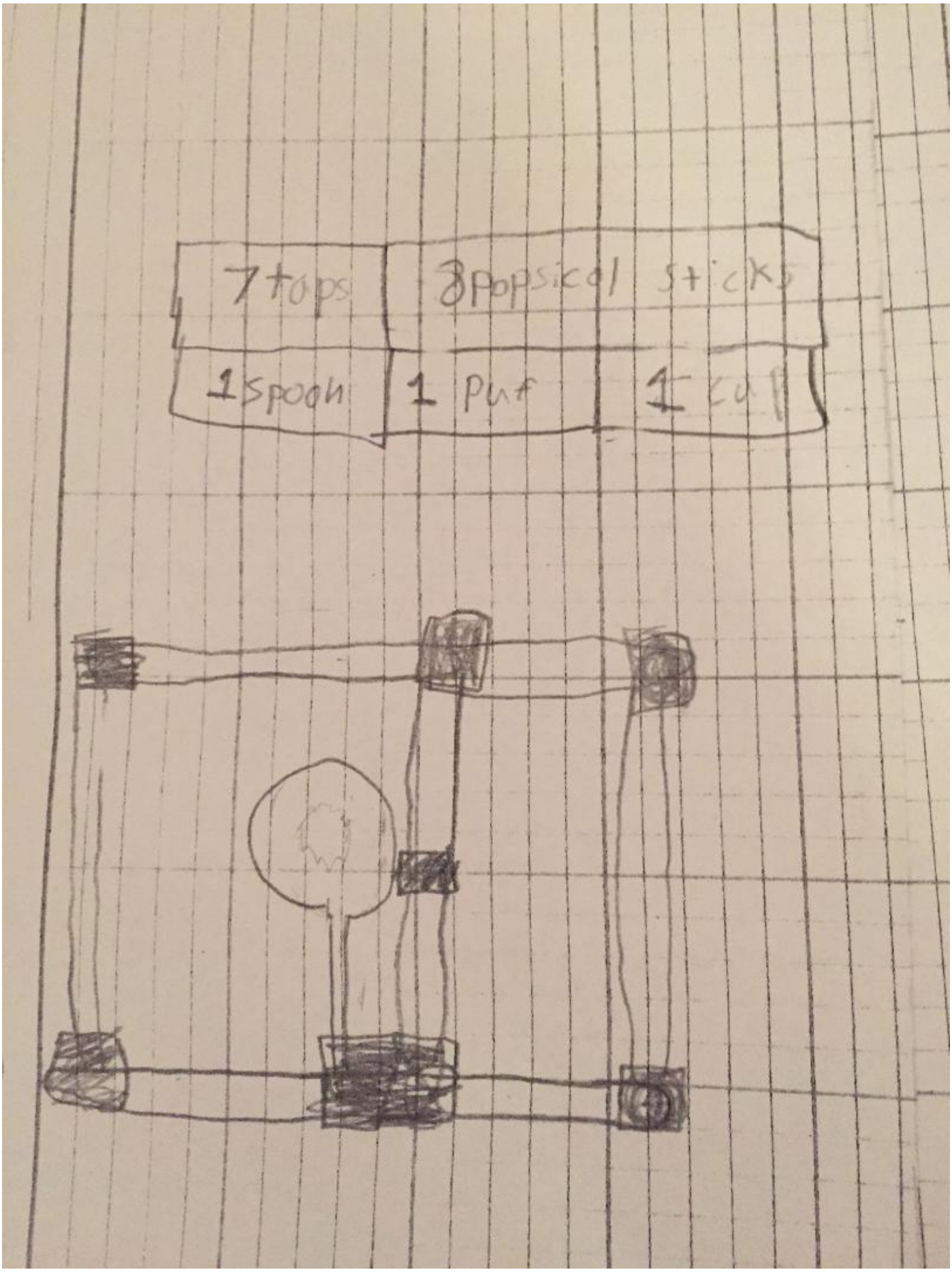
STUDENT WORK






3 Popsicle sticks
2 popsicle sticks
1 spoon
2 rubber bands
6
5 Popsicle sticks


Spoon
tape
popsicle sticks


7 tops
3 popsicel sticks
1 spoon
1 put
1 cu

Lesson 3: Bridge the Gap

Civil Engineering Part 1

Overview & Objectives

Students will be civil engineers today, as they learn how to meet the needs of the people of the community by designing and supervising a large construction project. They will work with their team to inspect materials, imagine their design, and create their blueprint.

Ask/Engage

- Open with Engineer Song **~15 minutes**
- Read Rosie Revere, Engineer 3 pages
- Have a large sticky on white board with different types of bridges (see picture below)
- Show some different pictures of bridges (PPT)
  -Trusses to add strength
  -Beam Bridges
  -Suspension Bridges
  -Arch Bridges

Ask class, "which category of bridges do you think this falls under?" for each picture to make the pictures interactive.

Ask open-ended questions such as, "What bridges has anybody been on before? What do you think the engineers did to make them withstand so much weight?, What do you notice about these bridges?"

- Challenge: our third grade class has entered into a bridge-building challenge with the students at _____Elementary! Our task is to build a bridge that will need to be built strong, as we will be testing it's strength with varying sizes of pumpkins (or other objects of various weight). You must carefully plan your bridge and think of the most successful design.

Imagine

- Have students decide on jobs: retriever, recorder, reporter.
- In your groups, **discuss** what makes a bridge strong? Weak?
- What will be your plan to make the most successful bridge?
- **Investigate** materials on trays (one of each item that will be available for construction the following lesson)

  PREFACE the activity: tell students to take close observation of the materials, as you will need a detailed drawing in your journal so you can reference it next week. **~15 minutes**

Plan

- ~ 12 minutes. In Engineer Journals, **sketch** the plan for the bridge. It should take up one full piece of engineering paper. Students are to do careful, detailed work. An onlooker should be able to tell which materials are used in the plan (LABEL!)
- **Record** the materials as they will be needed to reference plan upon building next class.
- If they finish early, have students draw a picture on their front of the journal to answer "My view of engineering:".

Materials

- Toilet paper rolls
- String (different sizes)
- Pieces of cardboard (cereal boxes, other thin cardboard)
- Dixie cups
- Objects of various sizes to test weight (pumpkins)
- Trays for supplies
- Mini duct tape strips (precut)
- Pennies (for passengers & weight)
- Box cutter & cutting board

Other Resources

www.stemactivitiesforkids.com

https://thestemlaboratory.com/straw-bridges/

If Extra Time:

Engineer Charades! (Instructions at back on **page** 58)

- Next lesson we will be creating and improving our designs!

Adaptations

For older students: along with the challenge of testing by weight, have them test by *height,* too. Use a **barge** (a Tupperware container works fine) that needs to fit beneath the bridge, before it can be tested. This can be quite challenging!

Standards

3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Civil

These engineers design, build, supervise, operate, and maintain construction projects. They build roads, buildings, dams, bridges, and airports.

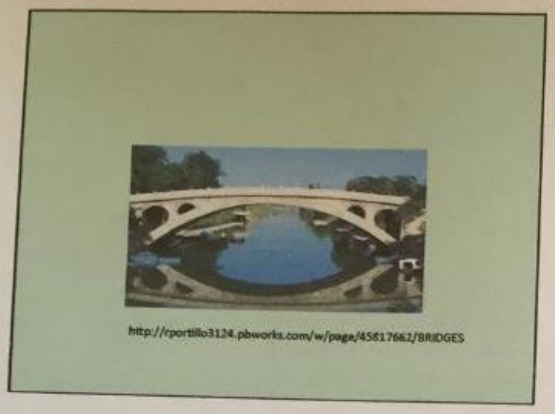
Beams, Bridges, and Barges, Oh My!

http://wallpaperweb.org/wallpaper/known_places/golden-gate-bridge_53654.htm

https://theluxurytravelexpert.com/2016/05/02/top-10-most-beautiful-bridges-in-the-world/

http://www.huffingtonpost.com/departures-magazine/worlds-most-beautiful-bridges_b_1730245.html

http://www.physicsforum.com


http://rportillo3124.pbworks.com/w/page/45617662/BRIDGES


https://nz.pinterest.com/pin/381117187192022735/

The arch bridge...
has great natural strength. Thousands of years ago, Romans built arches out of stone. Today, most arch bridges are made of **steel** or **concrete**, and they can **span** up to 800 feet.

The beam bridge...
consists of a horizontal **beam** supported at each end by **piers**. The weight of the beam pushes straight down on the piers. The farther apart its piers, the weaker the beam becomes. This is why beam bridges rarely **span** more than 250 feet.

The suspension bridge...
can span 2,000 to 7,000 feet -- way farther than any other type of bridge! Most suspension bridges have a **truss** system beneath the roadway to resist **bending** and twisting.

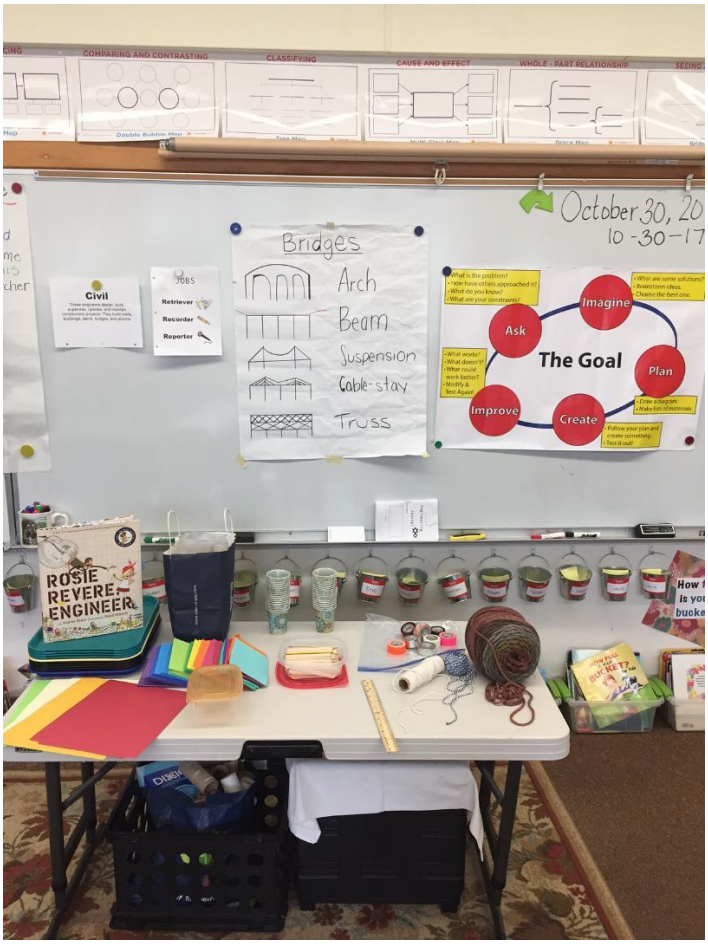
The cable-stay bridge...
consists of the cables run from the roadway up to a single tower that alone bears the weight.

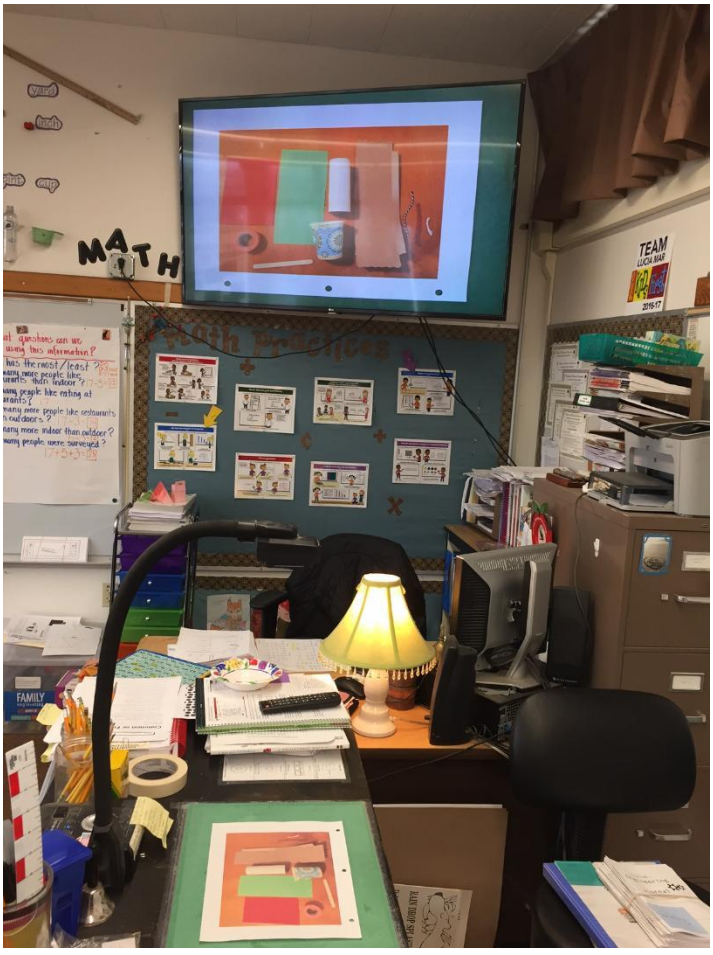
The truss bridge...
consists of an assembly of triangles. Truss bridges are commonly made from a series of straight, **steel** bars.

Facts from: How Bridges Work. (2017) Retrieved from:
https://science.howstuffworks.com/engineering/civil/bridge7.htm

Materials

NOTE: these are just *samples* of materials. The building day will need large quantities of each material. Have a box of different sizes of cardboard that they can dig through (cereal boxes, Keurig cup boxes, think/thin cardboard).





Lesson 4: Bridge the Gap

Civil Engineering Part 2

3rd Grade Engineering

Overview & Objectives

Students will dive into the second part of the lesson by building, testing, and revising their bridges for their challenge.

Ask/Engage

- Open with Engineer Song ~3 minutes
- Read Rosie Revere, Engineer 2-3 pages
- Dive right into creating and building so there is enough time.

Imagine & Plan

- Students imagined and planned during part 1.
- Encourage students to continue to imagine new designs, and that it is okay to modify their current designs.
- Engineers are always revising and improving designs!

Create & Improve

~ 30 minutes

- Keep same groups as last time.
- Have retriever bring Engineer Journal up front with detailed design to show teacher, once approved can get tray and go through assembly line to get supplies. TIP: utilize "one-way traffic" to help with easy distribution of materials!
- Retriever will bring supplies back to table and group of 3 will build together their design.
- Group will keep in mind the bridge is being designed to hold *weight,* and they'll need to make sure it is stable.
- Encourage groups to do some testing with various objects from their desk before the final test.

Test

~ 15 minutes

- Facilitator will bring pumpkins (weights) *to* the group so the bridge does not need to be moved. Reporter will be the one placing the weights on the bridge, and they will gradually increase weights placed on bridge.

Materials

- Toilet paper rolls
- String (various sizes)
- Pieces of cardboard (cereal boxes)
- Dixie cups
- Objects of various sizes to test weights (pumpkins)
- Trays for supplies
- Mini duct tape for each group
- Box cutter @ Cutting Station

Extras:

- Safety note: have an adult at the "cutting station" with a box cutter to cut cardboard for students if needed.
- If **extra time:** debrief "What worked?", "What didn't?"

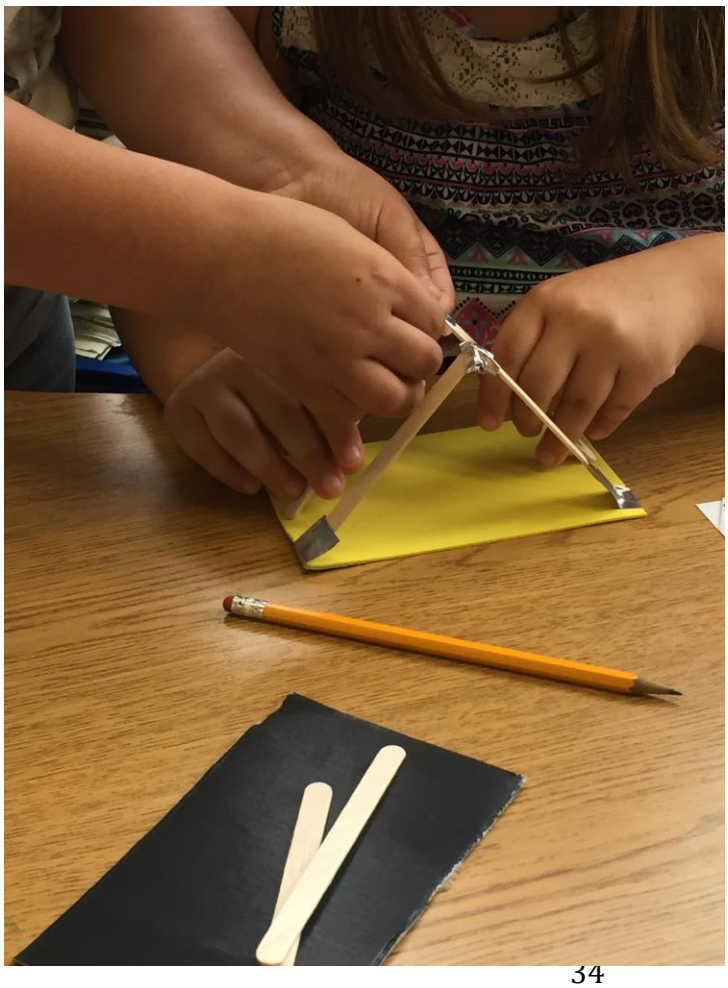
Standards

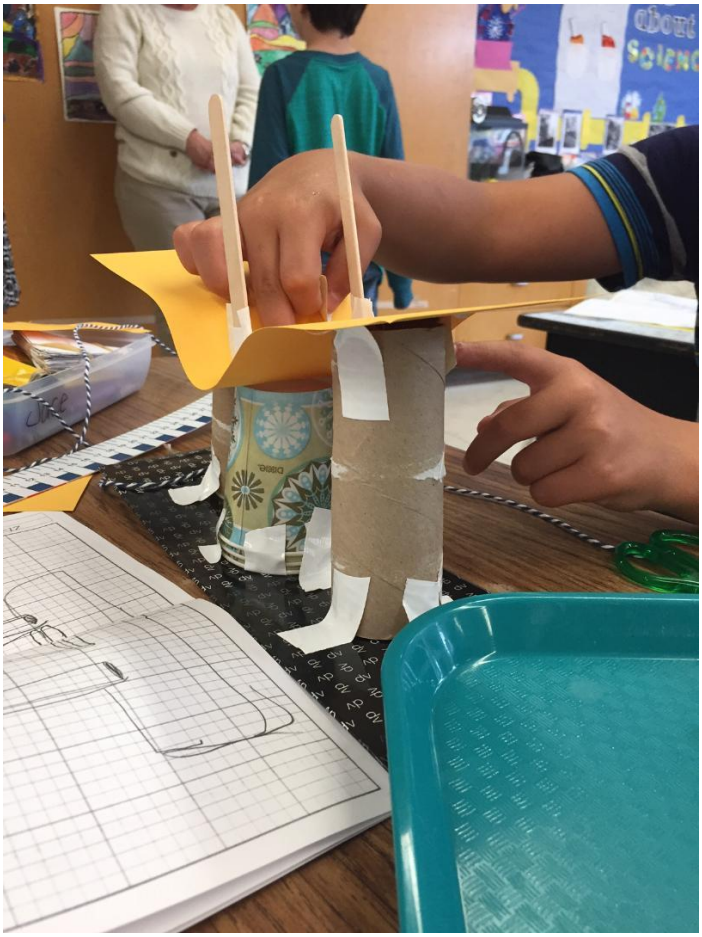
3-5-ETS1-3. **Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.**

MP.2 **reason abstractly and quantitatively.**

MP.4 **model with**

I chose pumpkins as our testing supplies since we tested the day before Halloween! Other ideas for weights include various sizes of water bottles!

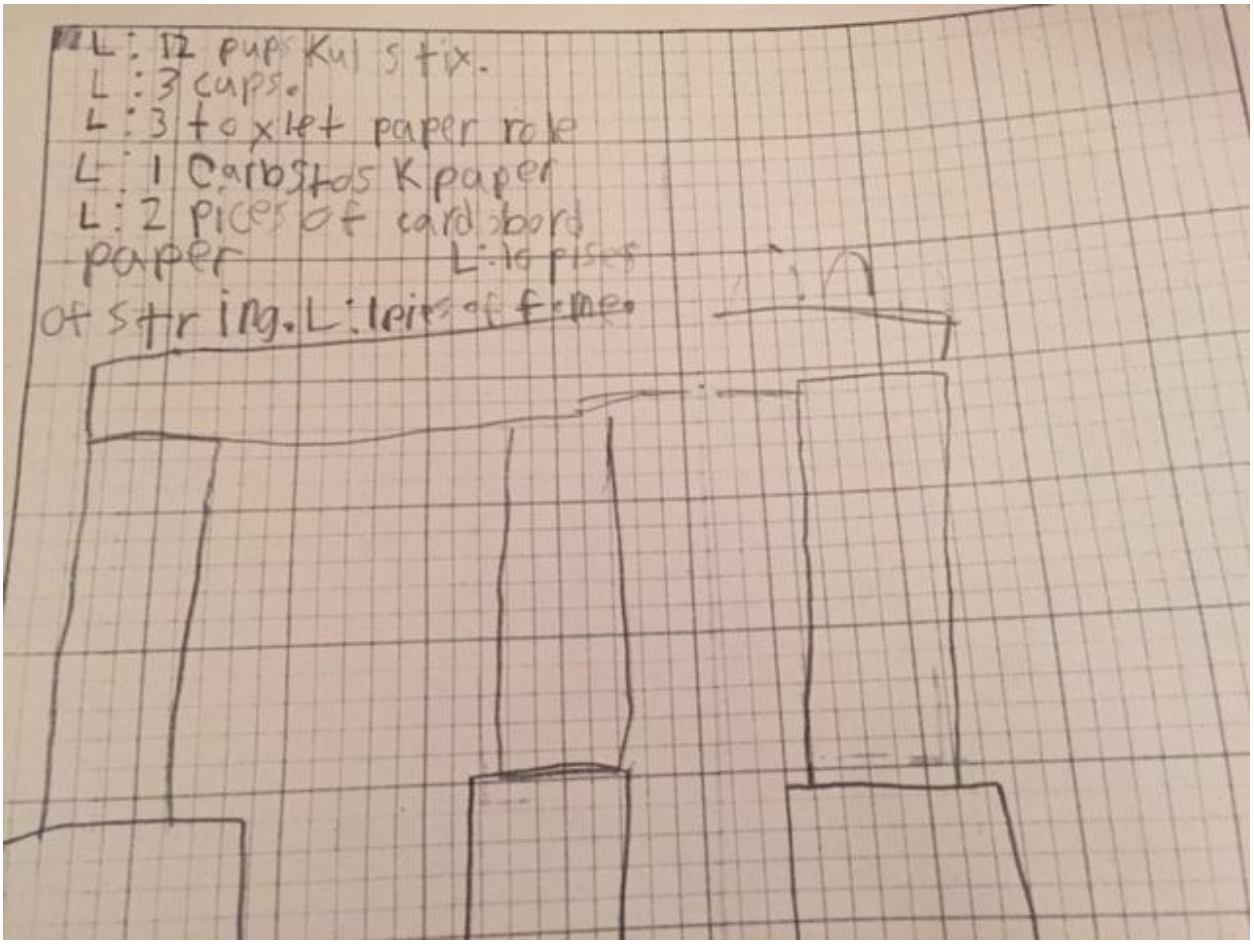





Foggy
Sunny


MATH
data
categories
MATH

STUDENT WO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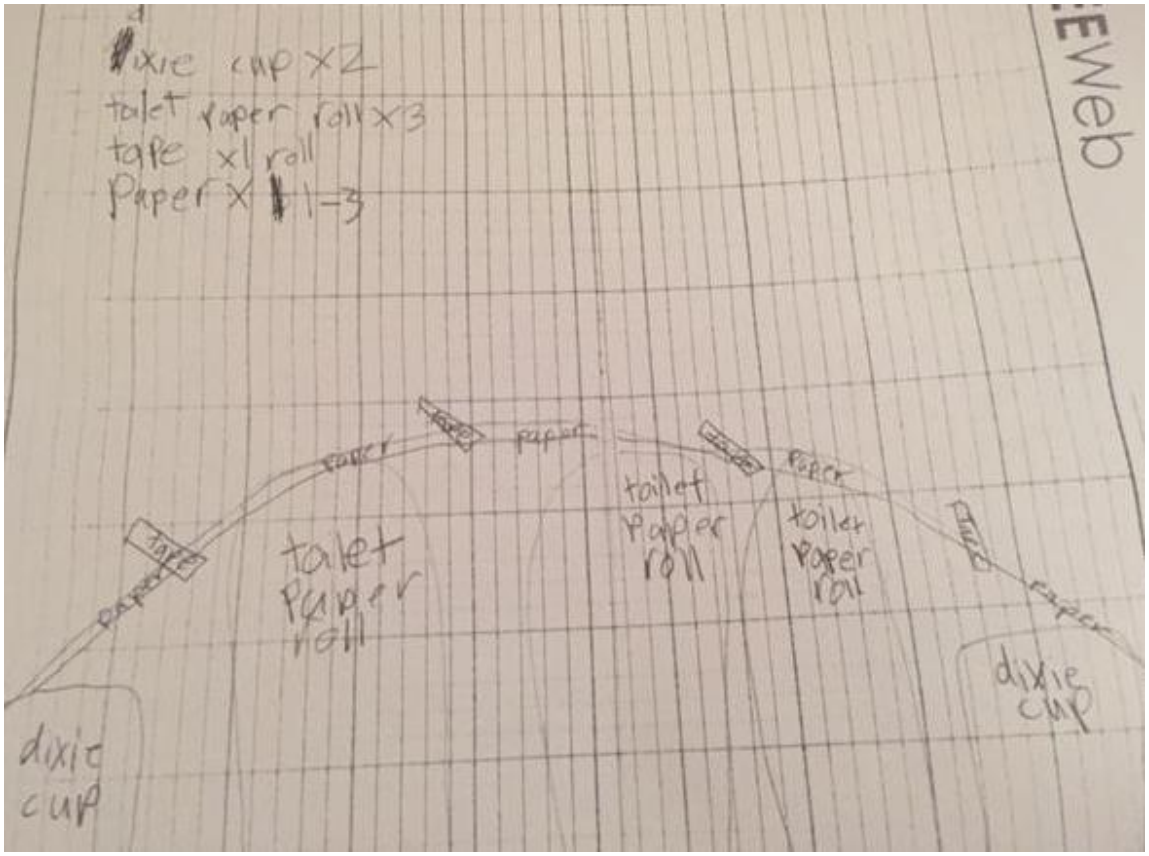
dixie cup x2
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Paper x 1-3
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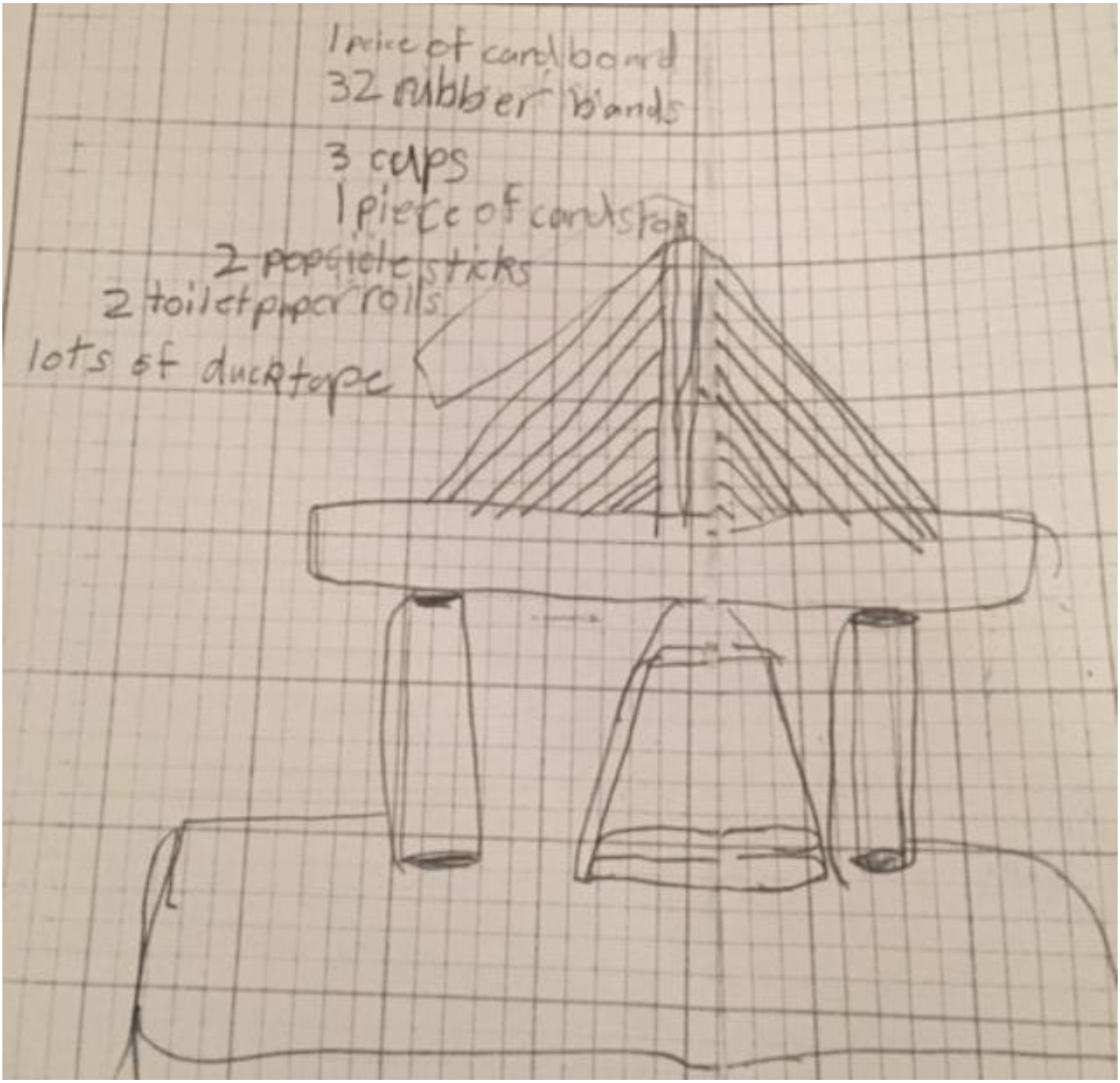

1 piece of cardboard
32 rubber bands
3 cups
1 piece of cardstock
2 popsicle sticks
2 toilet paper rolls
lots of duct tape

Lesson 5: Boats that Float!

BioResource and Agricultural Engineering Part 1

3rd Grade Engineering

Overview & Objectives

The students will be BioResource and Agricultural Engineers (BRAE) for the next two lessons! They will be working in teams to construct a boat the floats using the provided materials.
On day 1, the students will first brainstorm and sketch their design for their boat. Day 2 will consist of how they will construct it to successfully float. They will take into consideration others' ideas to come up with one main blueprint.

Ask/Engage

~10 minutes: start with engineer song.

- Finish Rosie Revere, Engineer
    - *Ask,* "before Rosie built, what did she do?"
    - *Ask,* "once she built it, what was her plan?"

- Talk about BRAE in the local community-for SLO: Cal Poly and the Tractor Pull Club.
  -Show students work that the engineers do, such as the Cal Poly tractor built by students studying BRAE.
  -If time: show a video of this tractor, link in under "Resources" to get the students engaged.
- **INTRO:** "Today we won't be building tractors, but we'll be designing our boats to build next week!"
- Ask students "what makes some objects float/sink in water?"
  -What makes them float/sink?
- **Discuss** *buoyancy***:** the ability or tendency to float in water or air or some other fluid. (have volunteer read definition)
- **Class observations** of "*Will it Sink or Will it Float?":* Each student makes a table for compare/contrast in Engineer Journal, records prediction as teacher demonstrates with objects at front table. Teacher will ask students to put a "thumb up" if they think it will float, "thumbs down" if they think it will sink. Then test. **~8 mins**

Begin lesson by telling students their **challenge**: they are on Survivor Man and need to get off this island they are stranded on! They will need to build a boat that floats, and figure out how they can get as many people off of this island with them.

Imagine

- Discuss what materials would make their boat float.
- Have retriever get tray of materials from front of room.
    - **Investigate** different materials & their properties; record materials needed for their design
      ~10 minutes

- **Imagine** their design, *remember* they will also be keeping penny passengers" afloat so should take their placement into their design.

Plan

- Individually plan in Engineer Journals their design ~10 minutes
- Come back together to share designs (use talking pencils here so everyone listens to each person share in group)
- Together, combine ideas and make one master plan for boat to be built next lesson.

Materials

- Bucket to test boats in (at least one large one to account for big designs), water
- Scissors, pennies, plastic wrap, egg cartons, craft sticks, paper, mini duct tape (pre-cut), masking tape, pre-cut aluminum foil, cardboard, Dixie cups.
- Observation tank (or clear bucket) & table
- Objects to test for "*Will it Sink or Will it Float?*"

Create & Improve

- We will create & improve next week for our next lesson!

Other Resources

http://www.firstgradenest.com/2014/01/stem-making-boat.html

Tractor Pull:
https://www.youtube.com/watch?v=0-1KRLVyoXQ

EXTRA IDEAS

For younger students:
Sketch out a boat that they have been on before or would like to see as an intro, or play a boat song!

For older students:
Provide other stipulations like using math to calculate out their budget to buy various supplies that are worth X amount. They could also construct a bar graph as a class as to how many pennies each boat held.

Standards

3-5-ETS1-1. **Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.**

MP.2 **reason abstractly and quantitatively.**

MP.4 **model with mathematics.**

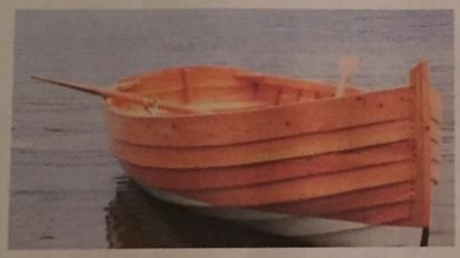
BRAE

(Bioresource & Agricultural Engineering)

These engineers manage systems and advanced technology. Their field includes agriculture, environment, and engineering.

Boats that Float!

http://shellislandpontoonrentals.com/wp-content/uploads/2013/06/Kayak-floride-keys.jpg



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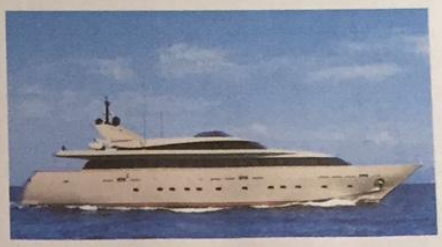

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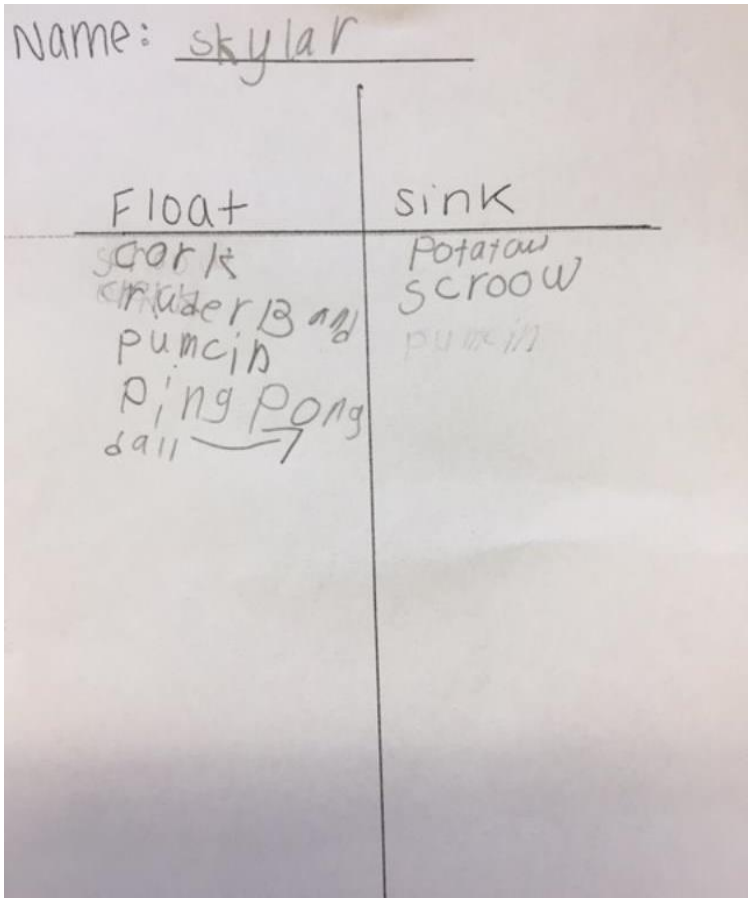
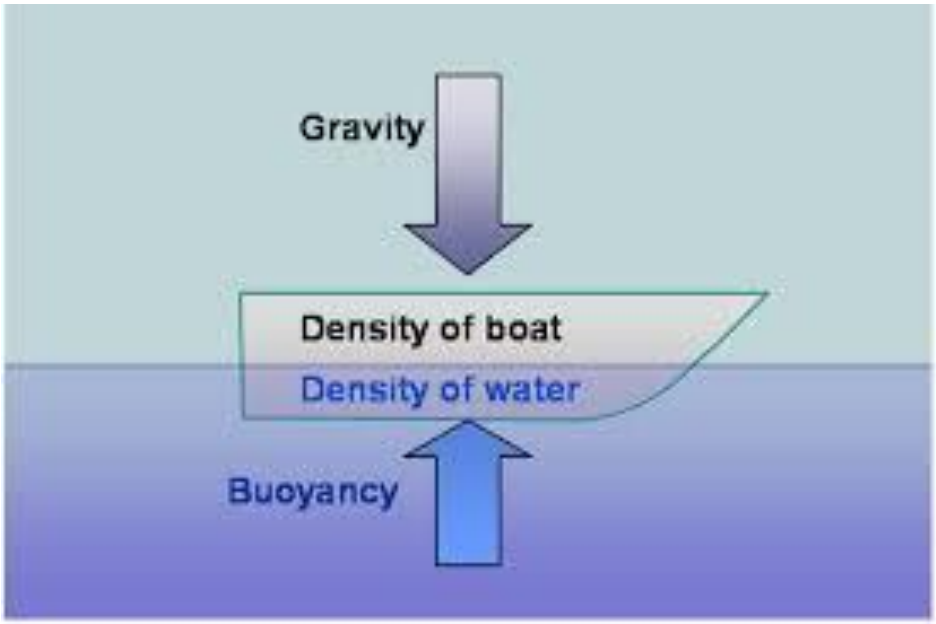
Will it Sink or Will it Float?

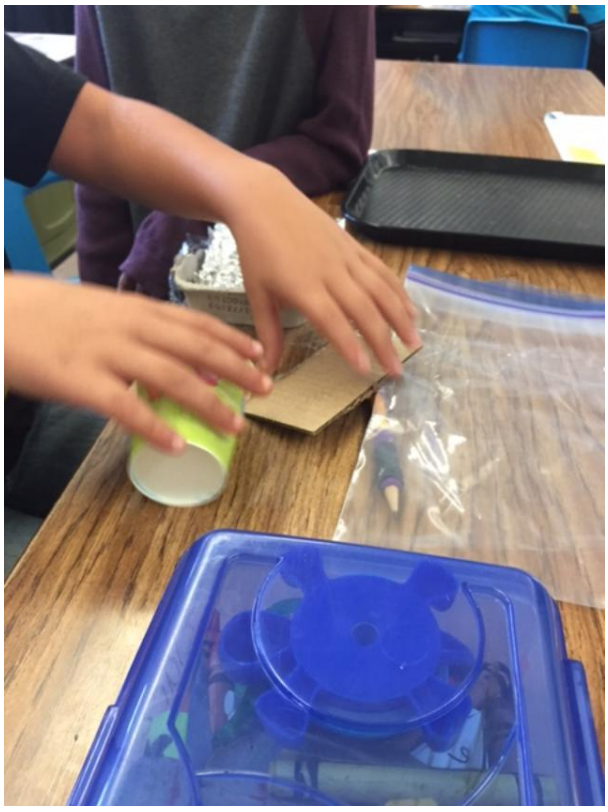


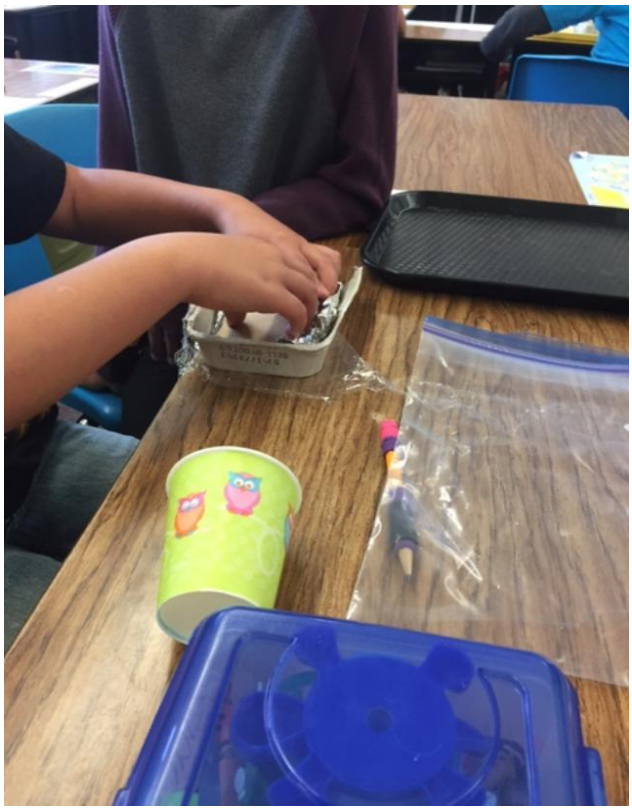
Materials

Buoyancy:

the ability or tendency to float in water or air or some other fluid.







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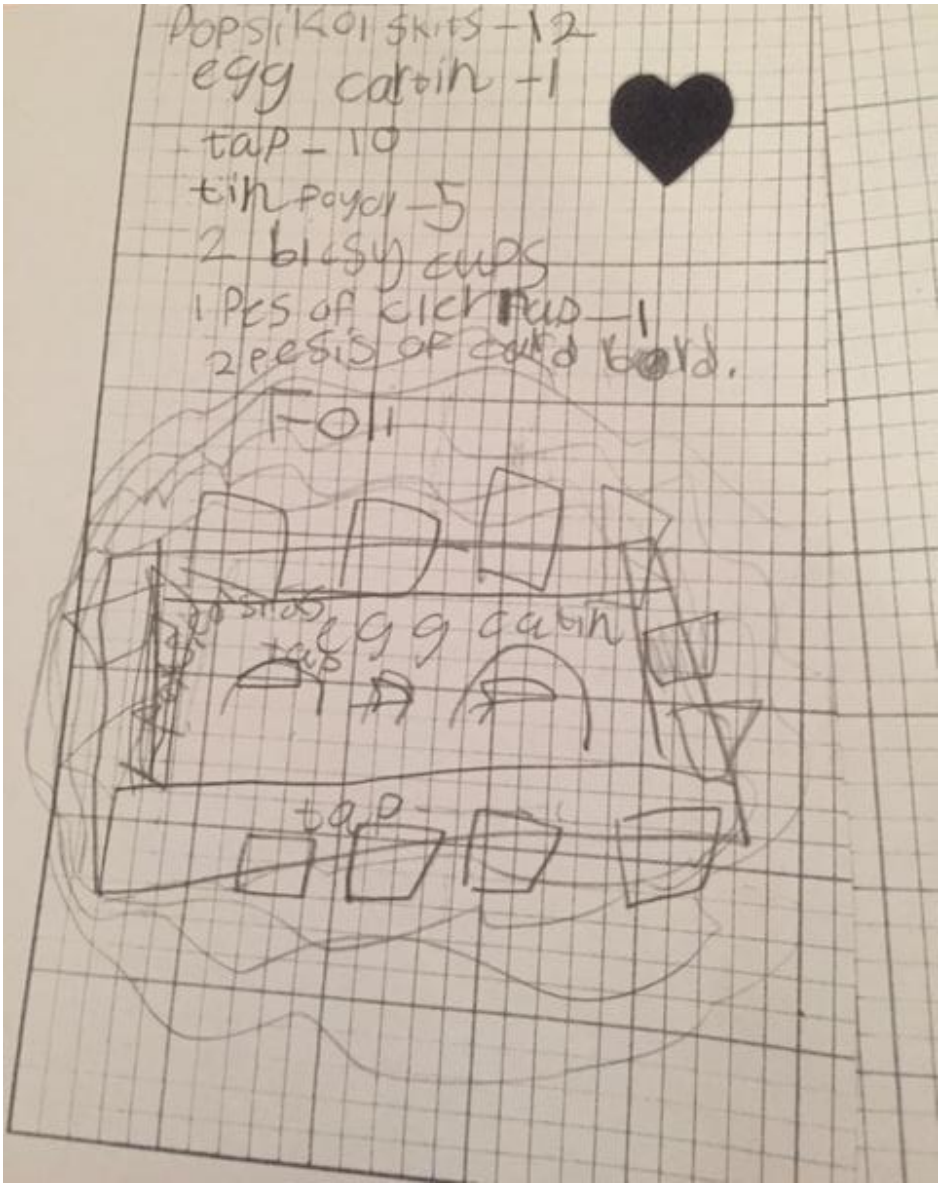
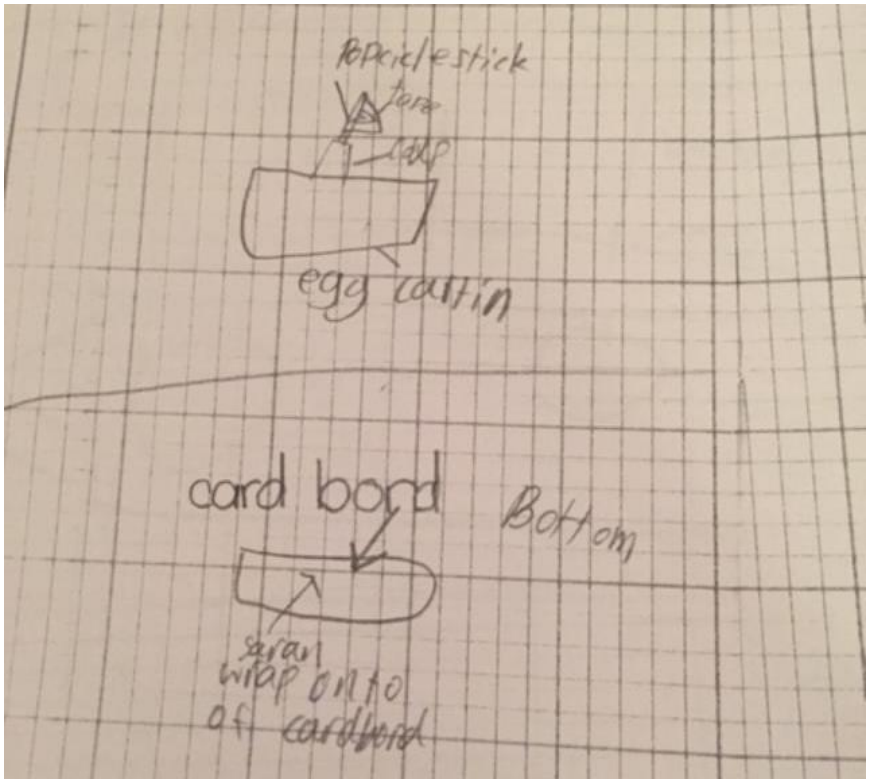
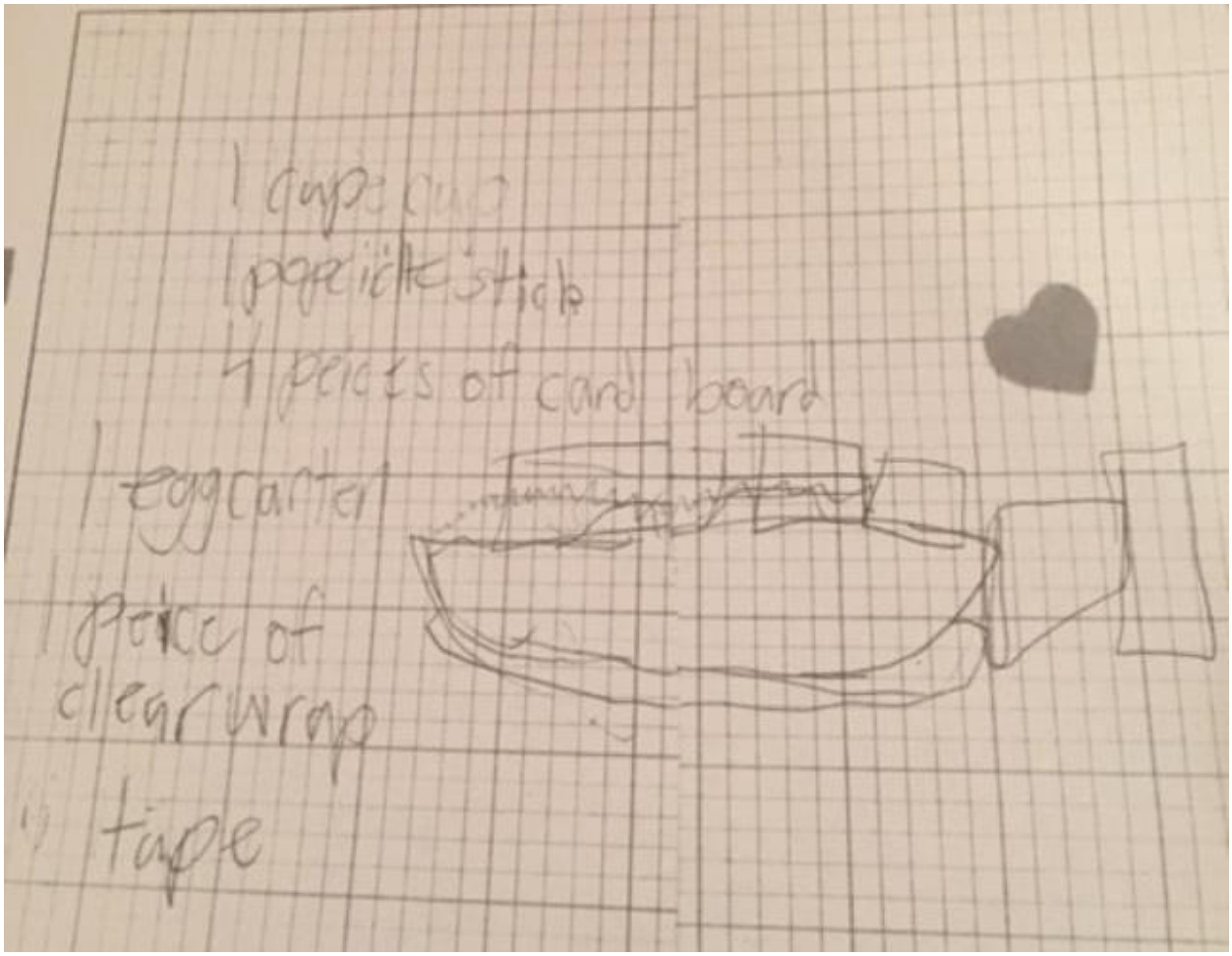
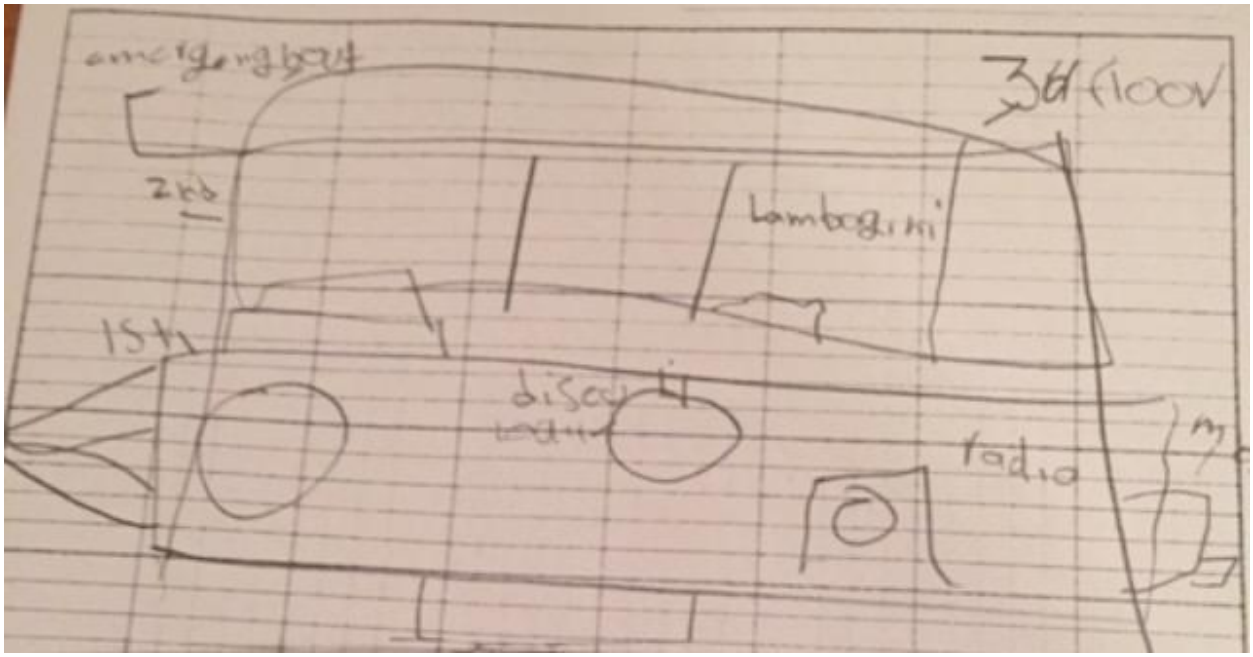

egg carton -1
tap - 10
egg carton
tap


egg carton
card bord
Bottom


1 cup
popsicle stick
4 pieces of cardboard
1 eggcarton
piece of
clearwrap
tape


emergency boat
36 floor
2nd
lamborghini
15th
radio

Lesson 6: Boats that Float!

BioResource and Agricultural Engineering Part 2

3rd Grade Engineering

Overview & Objectives

Students will understand the process of constructing and revising a design. This lesson will help the students design, build, and maintain construction projects and systems.

Ask/Engage

1. Intro and game plan

Imagine & Plan

- The imagining and planning was done during part 1 of lesson, but allow students time to regroup and focus their attention on their plan.
- Pass out journals.
- Group will send retriever to the front of the room to "go shopping" and pick out supplies on a tray.

Create

- Students' initial designs will be with the materials written down from their initial design.
- Working together, they will make a boat that floats and can carry as many "penny passengers" as possible.
- If there are different ideas, the group will need to compromise and settle on one to build on boat per group.
- The group can come get additional materials after they have use the supplies from their original design. (Encourage revision of blueprint within journal with updated supply list).

Test

- Have plastic tubs with a few inches of water already filled up 1 tub per 2 group of students. Have at least 1 LARGE tub as some groups will create big boats. Be prepared to meet their enthusiasm!
- If weather permits & there are enough adults present, have testing tubs outside to account for any spillage. Outside is **ideal.**
- Have reporter, with group, bring boat to their "test station"/ bucket.
- Have students take note of what worked and what didn't

Improve

- If time, send groups back to the designing board. Have them revise design so it can carry more penny passengers and have more success.

Materials

- Bucket to test boats in, water, pitchers
- Towel to account for cleanup/spillage.
- Scissors, pennies, plastic wrap, egg cartons, craft sticks, paper, duct tape (pre-cut), pre-cut aluminum foil, cardboard, Dixie cups.
- Observation tank (or clear bucket) & table

Standards

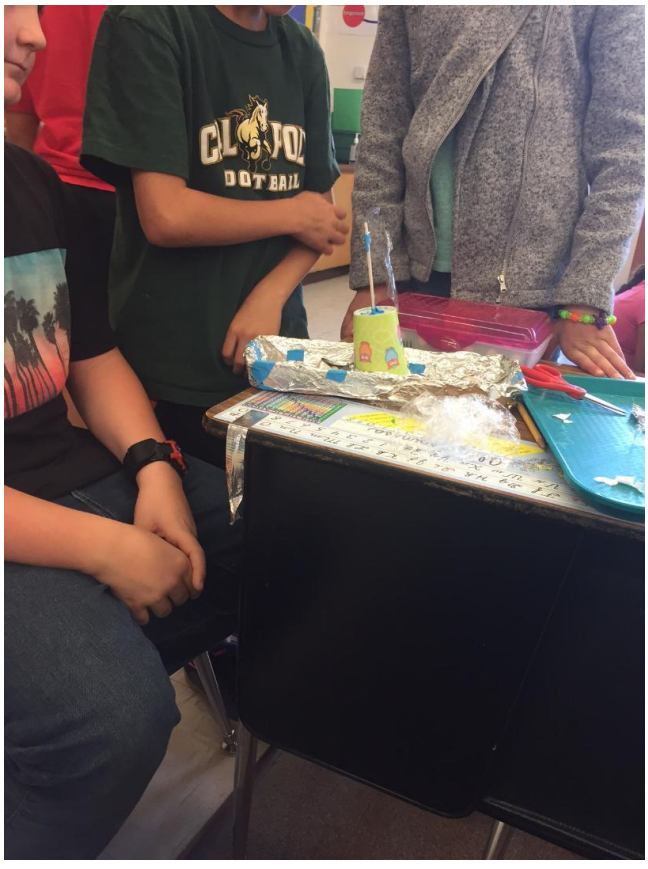
3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

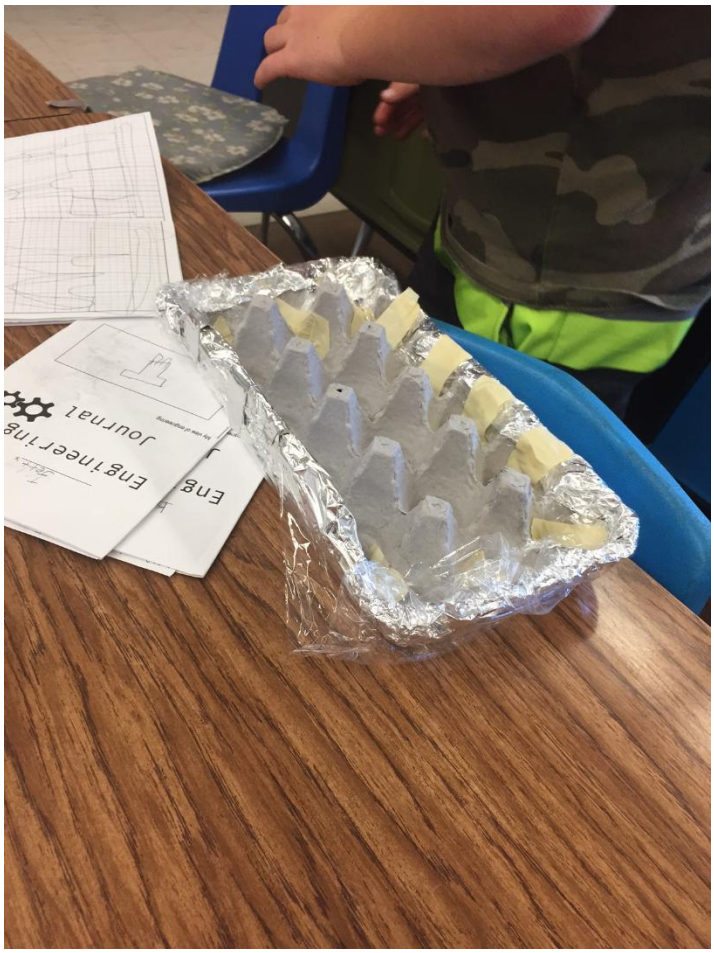
3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

MP.2 reason abstractly and quantitatively.

MP.4 model with mathematics.

- **SAFETY:** have an adult at "Cutting Station" to assist with box cutter for cardboard and egg cartons. Need: cutting board and box cutter.

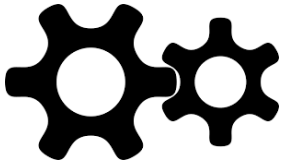



Engineering
Journal


OOTBALL
Ice melting
Plates

_____’s

Engineering



Journal

My view of engineering:

Fall, 2017

EEWeb

TITLE	
NAME	DATE

Engineer Charades

Supplies:

- Set of Engineering Charades Cards (one per group of 4-5)
- Letter-sized envelope to hold each set of cards
- Engineering Charades Game Instructions

Procedure

1. Engage by asking, "has anyone ever played charades before?"
    - *Explain* that charades is a guessing game where players act out their card, which is an object within an engineering field, and the other groups will try and guess their card.
    - *Tell* students that most objects we use every day are made by engineers.
    - *Explain* that these cards only list the main field of engineering that would help make the product.

2. Demonstrate
   (Pick a couple students to help you demonstrate the game)
   - Announce to the class the field of engineering your object that you are acting out is (for instance a bridge designed by a civil engineer). Act out the bridge and encourage groups to work together to guess the engineered object.

3. Make sure students are in groups of 4-5

4. Pass out instructions to each group

5. Pass out envelope of cards to each group.

6. Play for as much time as is necessary. Collect materials at end.

7. *Point out* that engineers design just about everything we need, love, and use. Engineers have all sorts of jobs and they all are constantly involved in our everyday life.

Inspired by Family Engineering, modified by Ally Lochhead

Engineering Charades

Game Instructions

1. Each group will draw one card out of their envelope when it is their turn. Without letting the other groups see the card, spend 2 minutes planning out your charade.

2. Announce field of engineering before team starts acting out charade. Work as a team to act out so other teams can guess.

3. Each group has 2 minutes to act out their product,

4. Once all teams have gone, we will repeat the round again (if time).

RULES

- Sounds are okay words describing the object are not.
- No pointing to objects in room.
- Only act out objects on the cards in the envelope.

Photo Credit: Charades! Kids. (2017) Retrieved at https://play.google.com/store/apps/details?id=com.fatchicken007.headsupcharadeskids.

CHEMICAL ENGINEER

Post-It (Sticky) Note

AEROSPACE ENGINEER

Rocket

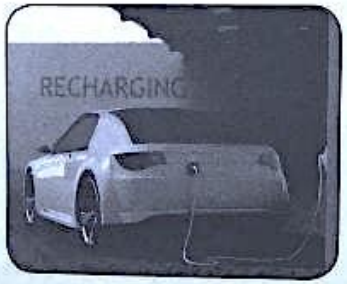
CIVIL ENGINEER

Skyscraper

CHEMICAL ENGINEER

Cleaning Fluid

MECHANICAL & ELECTRICAL ENGINEER



Electric Car

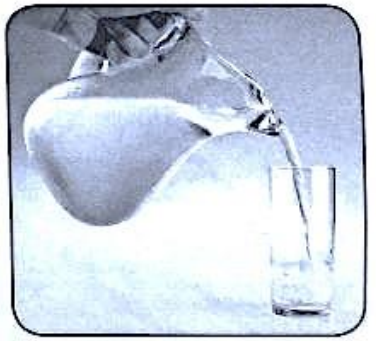
CIVIL ENGINEER

Bridge

AEROSPACE ENGINEER

Airplane

ENVIRONMENTAL ENGINEER



Clean Water

Engineering Charades Cards

MECHANICAL ENGINEER

Bicycle

BIOMEDICAL ENGINEER

Wheelchair

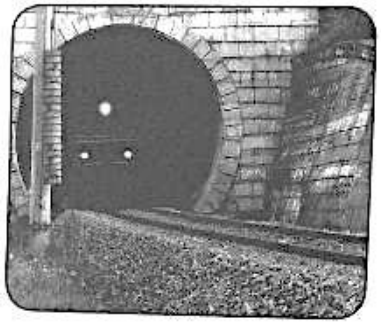
MATERIALS ENGINEER

Waterproof Fabric

MECHANICAL ENGINEER

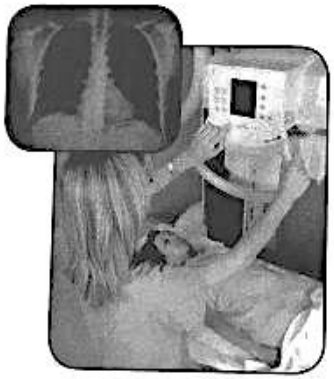
Conveyor Belt

GEOLOGICAL ENGINEER



Tunnel

BIOMEDICAL ENGINEER

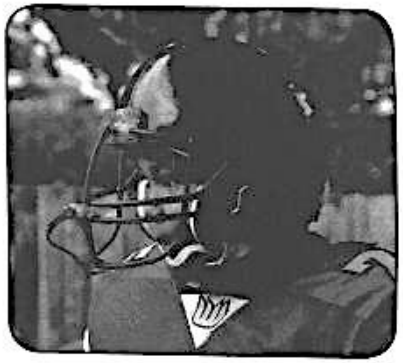


X-Ray Machine

COMPUTER ENGINEER

Computer Mouse

MATERIALS ENGINEER



Football Helmet