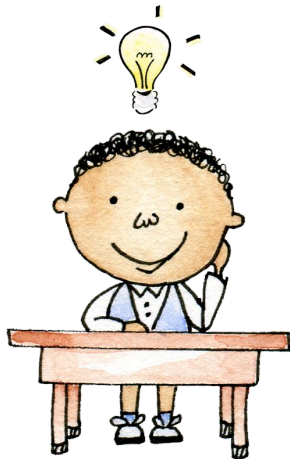


Marshmallow Catapults and Rube Goldberg Machines





Social distancing has forced us to think about creative ways to make physical contact with something.

Today **STEM FAMILIES by STEM@Home** offer your family a chance to explore the role of machines when interacting with other people, places, and things

STEM FAMILIES by STEM@Home is a series to share practical tips, virtual experiments and other concrete tools that families - even those with little time, few resources and no STEM exposure or teaching experience - can use to engage their children's learning.





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Development
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Driving Question:

How can machines be used to make physical contact with other people or things in a safe way?





NGSS Practice : Asking Questions

Questioning leads to **explanations** about how the natural world works and these questions can be **tested** using **evidence** (things your kiddo can see touch hear and feel) during your family's experiment.

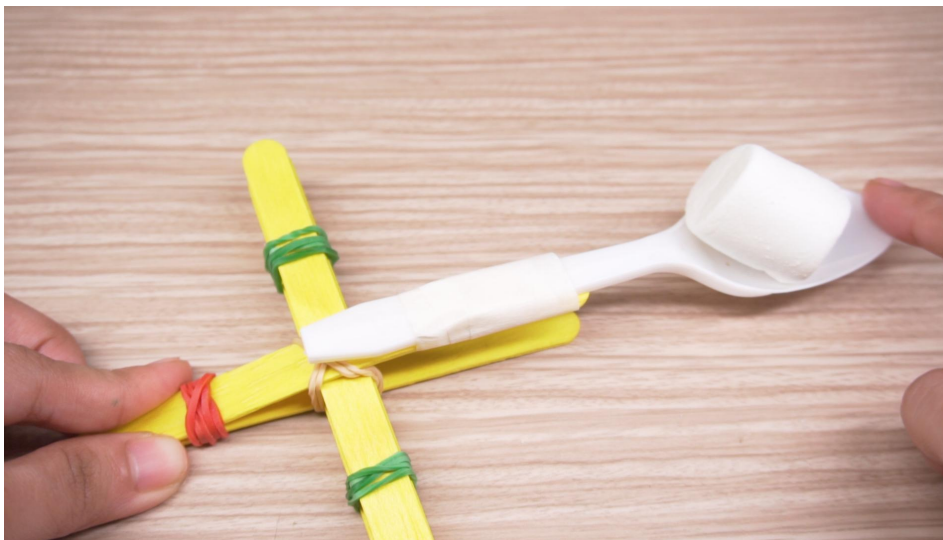
Cross Cutting Concept: Cause and Effect Relationships

Asking questions and testing possible answers can help us to understand **cause and effect relationships** between people, places, things and the world around us.

Target Grade Levels: 4-8

NOW, IT'S TIME FOR SOME FUN!!!!





Marshmallow Catapults

Liz Peterson

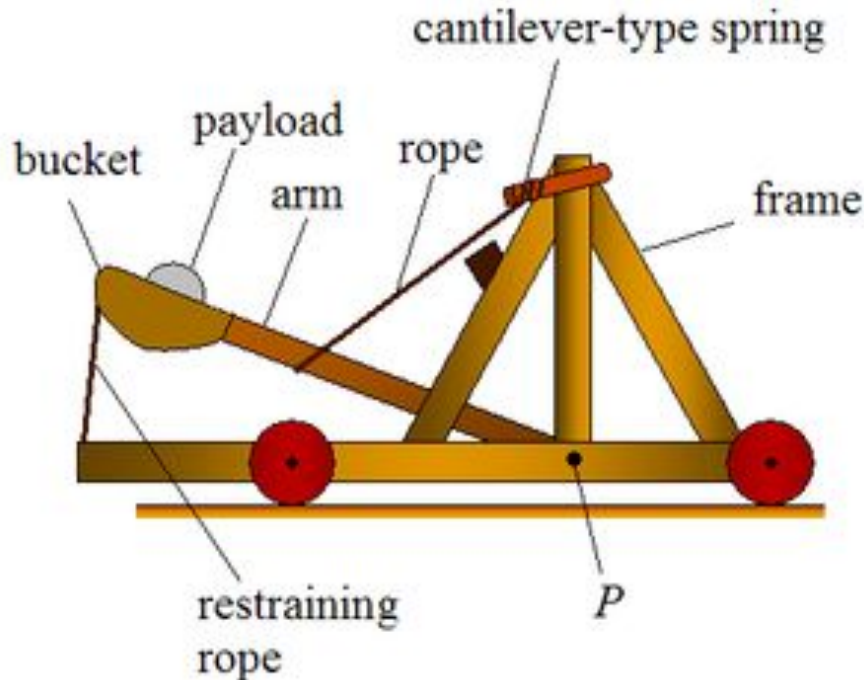
Extension Agent, 4-H Youth Development
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What is a Catapult?

- A simple machine used as a weapon to throw rocks or other things that would cause damage to something else



History of Catapults

- Catapults were common in the Middle Ages, and used to be called “trebuchets”
- Trebuchets catapulted rocks, hot tar, garbage, and more, either into or over castle walls to try to defeat enemies
- Catapults were also used in World War I to throw hand grenades into enemy trenches



Marshmallow Catapults



Design question: Can you design a simple machine that can launch a marshmallow into another person's mouth?



Supplies Needed

- Popsicle sticks
- Rubber bands
- Spoon (preferably plastic)
- Marshmallows (or other soft objects, such as ping pong balls, fuzz balls, etc)



Optional Supplies

- Skewers
- Pencils
- Binder Clips
- Hot Glue Gun
- Bottle caps
- Tape







AND BUILD!

- Draw your design
- Build your catapult
- I'll build one, too! You can follow along if you'd like, but if you have another idea, I'd love to see it!





Share & Process

- Test your catapult!
 - Was it successful? Why or why not?
 - How far did it go?
 - What needs to happen for your marshmallow to go farther or hit the target?
- Redesign and rebuild your catapult
- Retest your catapult
 - Was it successful this time? Why or why not?
 - How far did it go? Was that shorter or farther than last time?





4-H[☘] EXPERIENTIAL LEARNING MODEL



Based on the Kolb Learning Model (1975) and Kolbert's Learning Cycle (1975)

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4H 3302

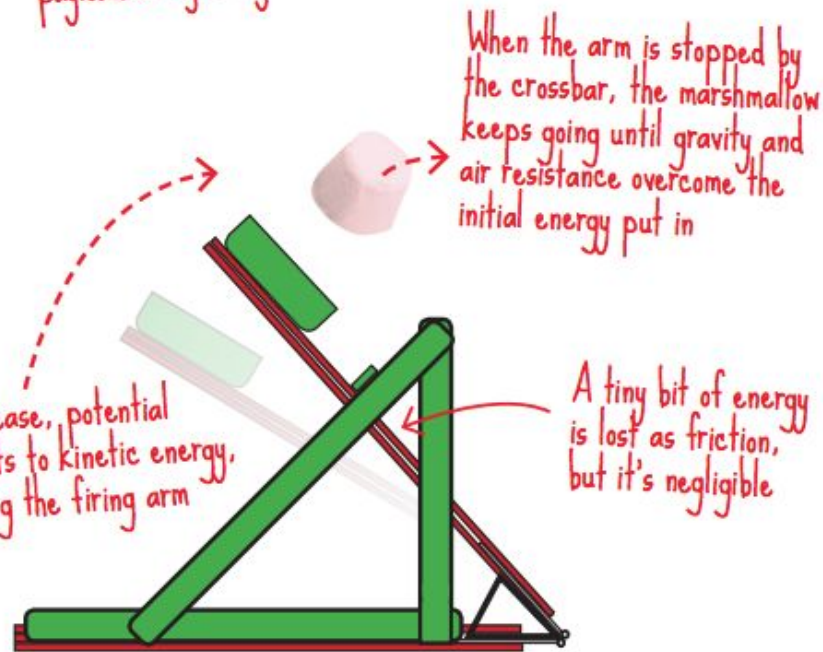
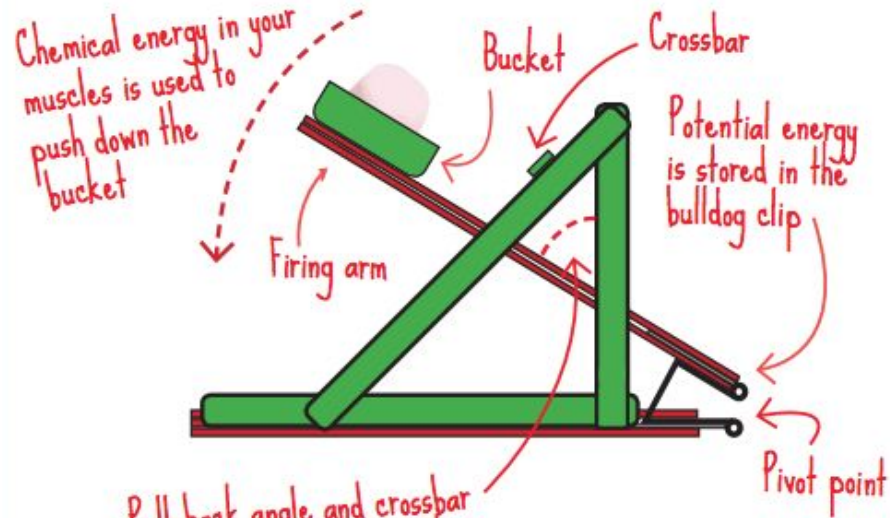


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More Reflection & Processing Questions

- What caused the marshmallow (or ball) to propel forward?
- What effect did the marshmallow (or ball) have?
- What part of the activity was the hardest to do?
- How did you feel being able to successfully build your own catapult?
- What were some of the things that were hard to understand when you started building your catapult?
- What did you learn about yourself by doing this activity?
- What problems came up over and over?
- What materials would you want to use to make this catapult even better?
- What did you learn in this activity that you didn't know before?
- In what other ways could you use what you learned during this activity?
- What advice would you give to someone starting this activity?
- How would you teach someone about this activity?
- How could the things you learned today help you in other situations?

HOW DOES IT WORK?





So now what?

- You have just created a simple machine!
- What happens when you put more than one simple machine together?
- Can you create your own Rube Goldberg Machine?

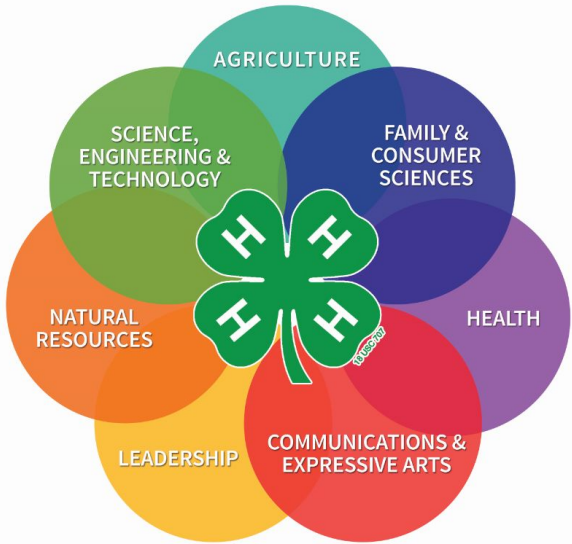


Photo from Children's Museum of Pittsburgh

What is 4-H?

- 4-H is America's largest youth development organization
- 4-H is delivered by Cooperative Extension – a community of more than 100 public universities across the nation.
- For more than 100 years, 4-H has welcomed young people of all beliefs and backgrounds, giving kids a voice to express who they are and how they make their lives and communities better.
- In 4-H programs, youth complete hands-on projects in areas like health, science, agriculture, and civic engagement in a positive environment where they receive guidance from adult mentors and are encouraged to take on proactive leadership roles.





Thank you!

Show me what you have created! Send me pictures, videos, ideas, thoughts!

Liz Peterson

liz_peterson@ncsu.edu
go.ncsu.edu/pendercounty4h

Looking for more?

Contact the 4-H Agent or Educator at your local County Extension Office or visit **4-h.org**



Catapult Questions?





NEWTON'S
ROAD

Sneaky
Deep
Fun
with

Rube Goldberg Machines!

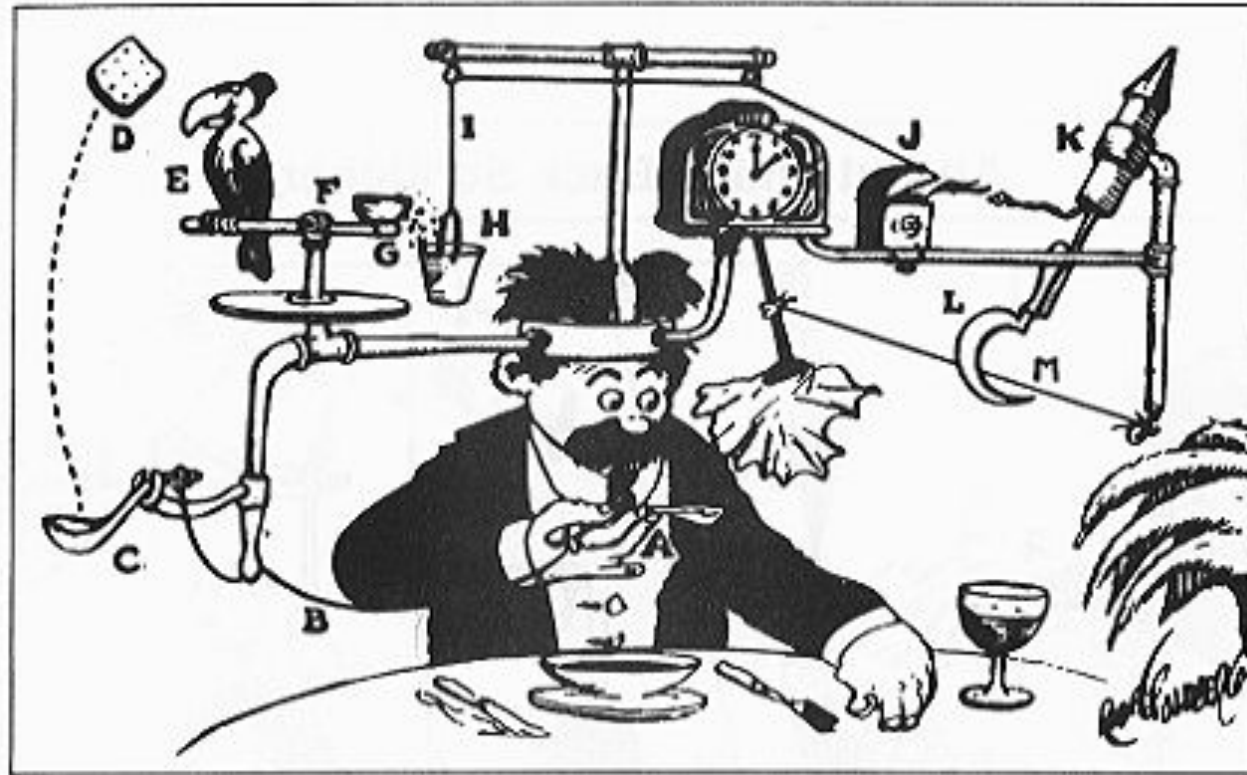
Barb Termaat
Annalisa Wiesner

www.NewtonsRoad.org
Traverse City, Michigan

We are a nonprofit working to ensure access to quality STEM Learning and Career Exploration experiences for all youth in Northwest Michigan.

What is a Rube Goldberg Machine?

Self-Operating Napkin



NEWTON'S
ROAD

What is a Rube Goldberg Machine?



NEWTON'S
ROAD

What is a Rube Goldberg Machine?



NEWTON'S
ROAD

Why Create a RGM?

Asking Questions and Defining Problems

- we start our design process by asking questions and keep asking more and more questions as problems come up because...
- your machine will fail many times--it's all a part of the fun!

Cause and Effect

- a RGM is a chain reaction happening over and over again
- when your RGM fails, ask why and come up with ways to fix the problem

Bonus!

There's nothing to buy --
use what you have at home



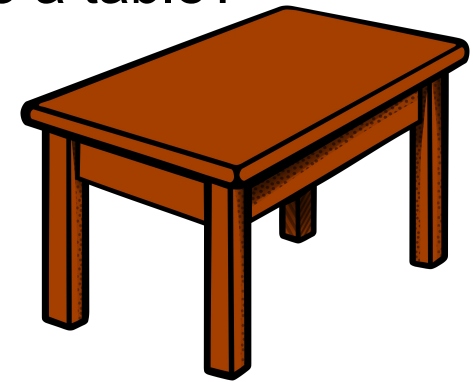
Our Design Question

How can you design a machine that starts at one place in the room and makes contact with something across the room?

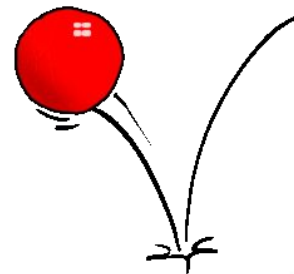
Can we use a catapult?



How can we get something from the floor to a table?



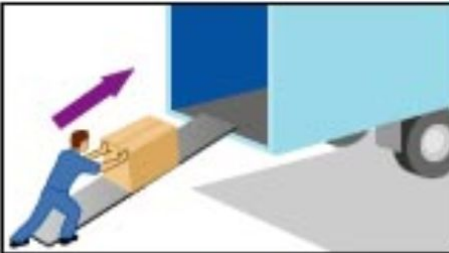
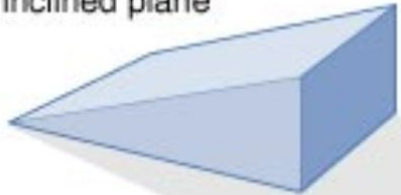
What could you do with a ball or a magnet?



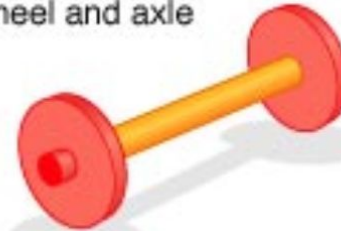
NEWTON'S
ROAD

Six Simple Machines

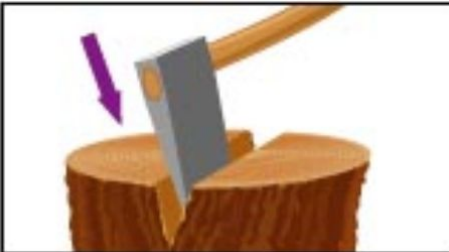
inclined plane



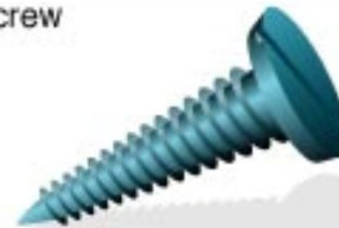
wheel and axle



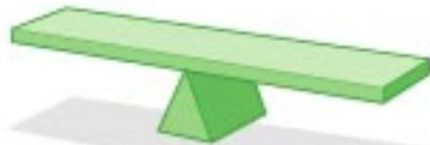
wedge



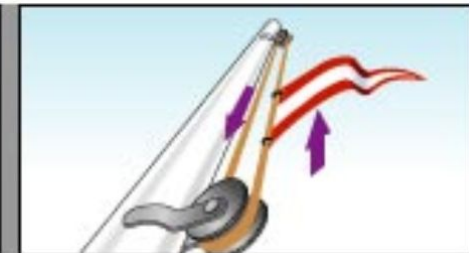
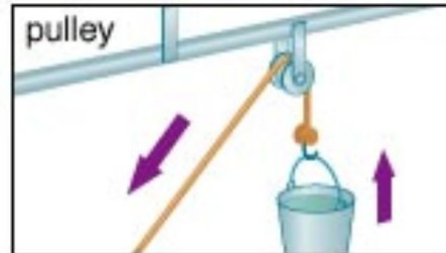
screw



lever



pulley



Ideas on how to start!

1 There are no rules with RGMs, but your parents may have some!

2 Watch some videos of RGMs for inspiration

For example, the band OK Go!, Newton's Road & others all on YouTube

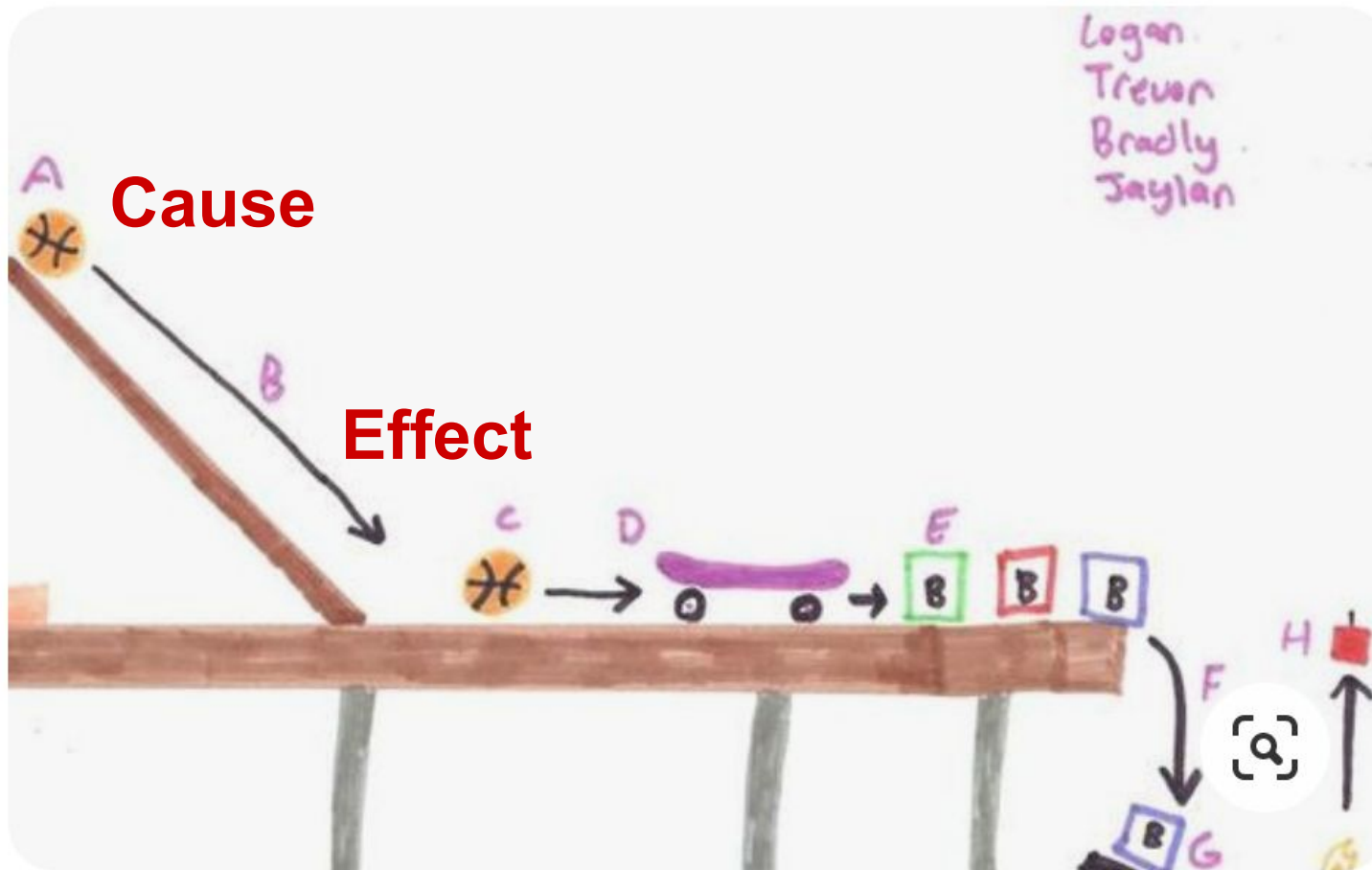
3 Gather some odds & ends from your house

Funny shapes, things that move, old toys, heavy things, light things, etc.

4 Make small pieces of your machine first...

... THEN figure out a good order to put all the pieces together!

Draw your Design



Share your machines!



**LEARN AT HOME:
RUBE GOLDBERG
CONTEST!!**

Build your own
Rube Goldberg Machine...

Post a video of your machine to
our Facebook page and tag it
#NRRubeGoldbergContest...

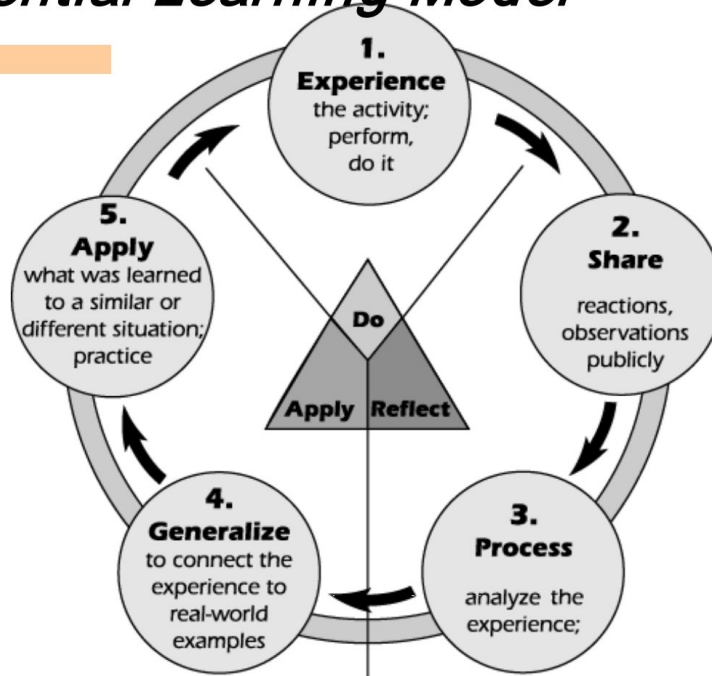
The post with the most likes by
the time schools open again in
April wins a prize!

facebook.com/NewtonsRoad

Have a contest in
your community!

Reflective Questions

Experiential Learning Model



DO: Let's the kids lead the DOing whenever possible, and increasingly more with age. With RGM's, it's all in on the DOing!

REFLECT and **APPLY:** Parents ask reflective questions that help your kids Share, Process, Generalize and Apply the skills and behaviors learned while creating RGMs.

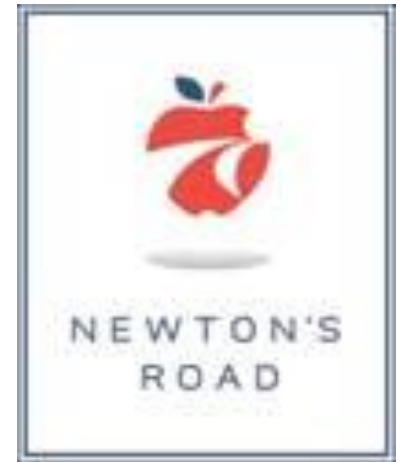
Have fun making your RUBE GOLDBERG MACHINES !!



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Executive Director



Annalisa Wiesner (MTU Intern)
Business Liaison Programs



NewtonsRoad.org [Facebook.com/NewtonsRoad](https://www.facebook.com/NewtonsRoad)

ContactUs@NewtonsRoad.org

Questions?





JOIN US NEXT WEEK

FREE DISCUSSION - Federal Policy
Developments in Response to
COVID19

Tuesday, March 31 at 1 p.m. ET





JOIN US NEXT WEEK

STEM Families Virtual Lab:
Family STEM Cards

Thursday, April 2 at 1 p.m. ET

