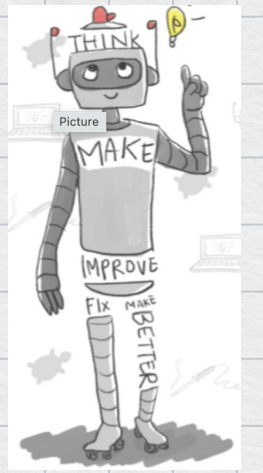
Breaking It Down: Creating a Universally Accessible Makerspace



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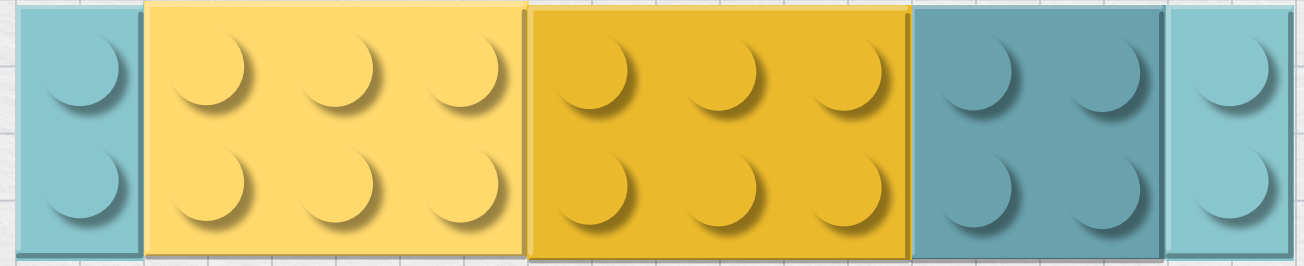
Session Agenda



Intros & 916 Overview

Makerspace Introduction

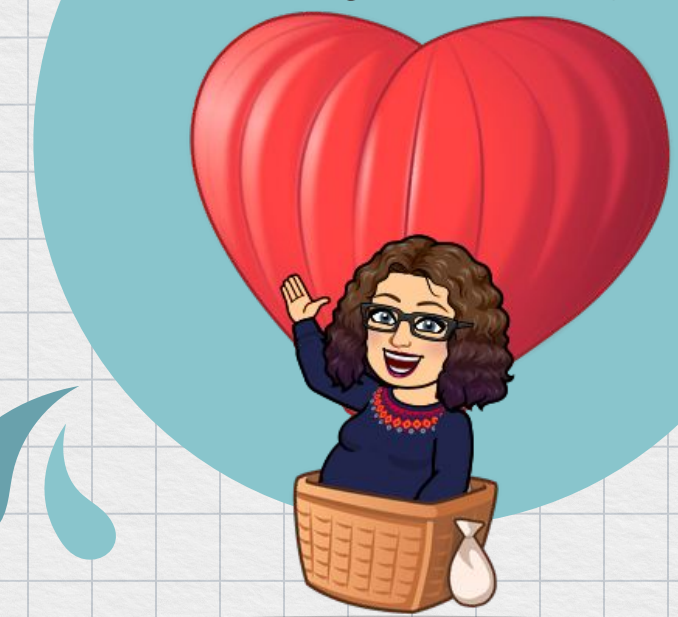
Making it Accessible to ALL

Shared Resources

Questions & Conversations

About Emily

- English teacher in Austria
- Middle School German Teacher in Minnesota
- Tech Integrationist
- ISTE 20 to Watch 2023, Certified Educator and Community Leader
- Google Certified Trainer and Coach
- Passionate about Universal Design for Learning and supporting all learners to grow from where they are
- Avid knitter and crocheter



About 916

- One of four intermediate school districts in Minnesota, similar to an educational services cooperative
- We offer specialized programming, including career and technical education, Level IV/C-D/Self-contained special education services and area learning centers.
- Sharing resources, talent and ideas with 14 member districts
- Provides cost-effective, expert and reliable services to the students and families we collectively support.
- Relevant Demographics- 40% BIPOC, 10% HHH, 48% FRL

ISTE Standards

Student 4d: Innovative Designer

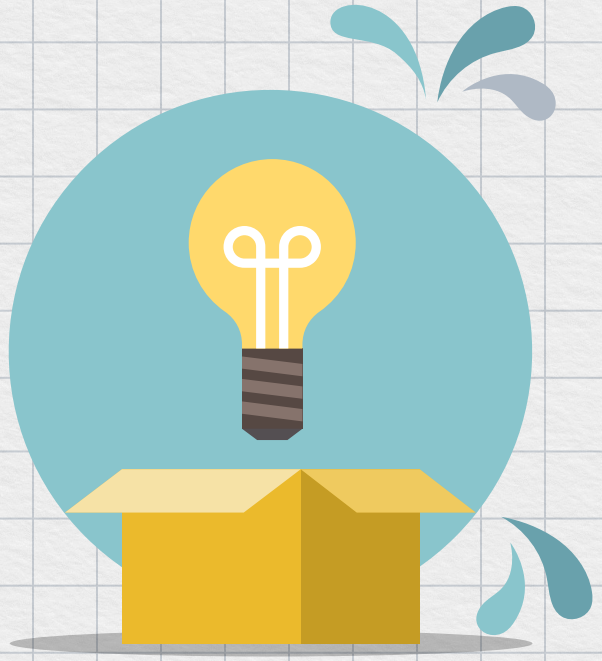
Students exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.

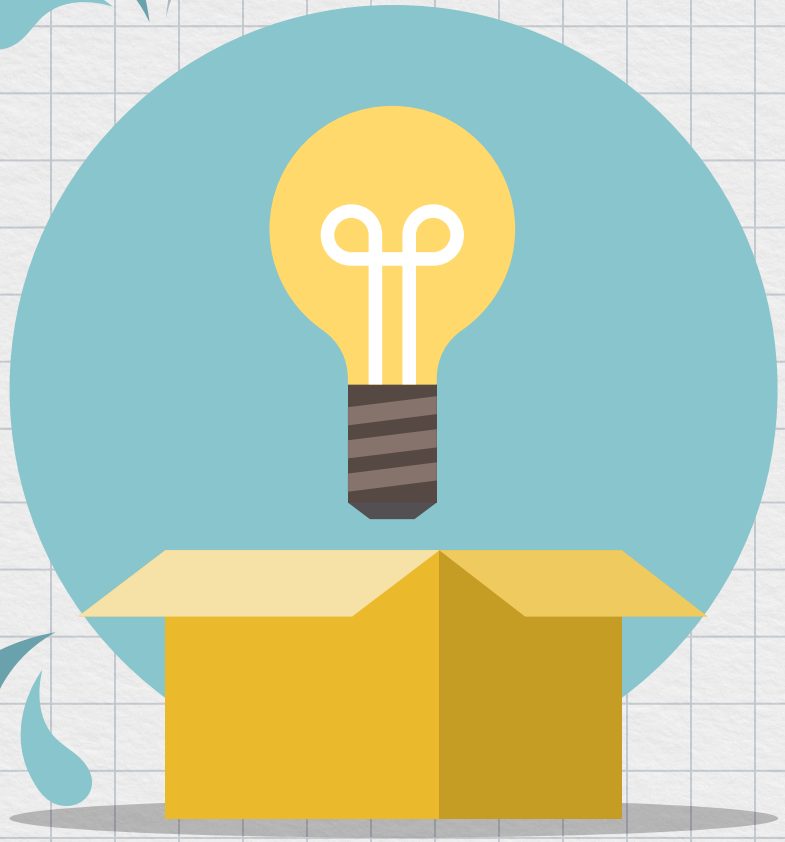
Coaches 4c: Learning Designer

Collaborate with educators to develop authentic, active learning experiences that foster student agency, deepen content mastery and allow students to demonstrate their competency.

Educator 6c: Facilitator

Create learning opportunities that challenge students to use a design process and computational thinking to innovate and solve problems.



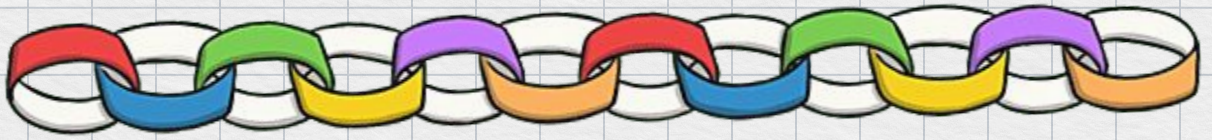


What is a Makerspace?

Makerspace Challenge

Using just your one post it note, make the longest connected paper chain.

You have 5 minutes.



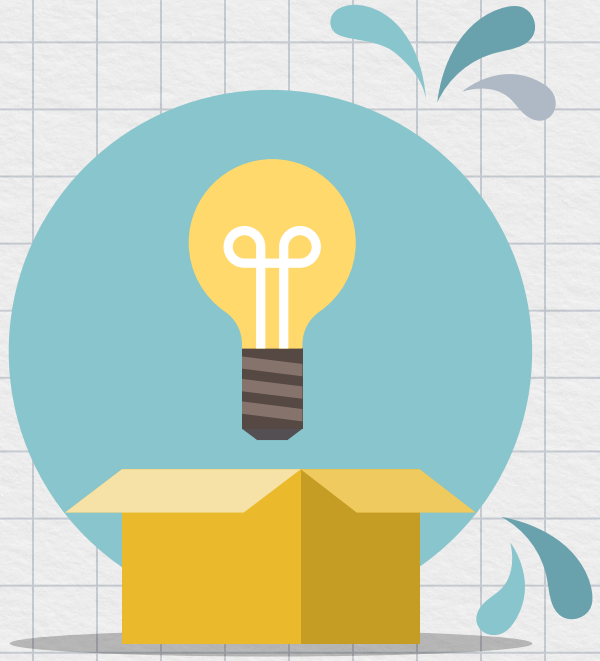
Makerspace Expectations

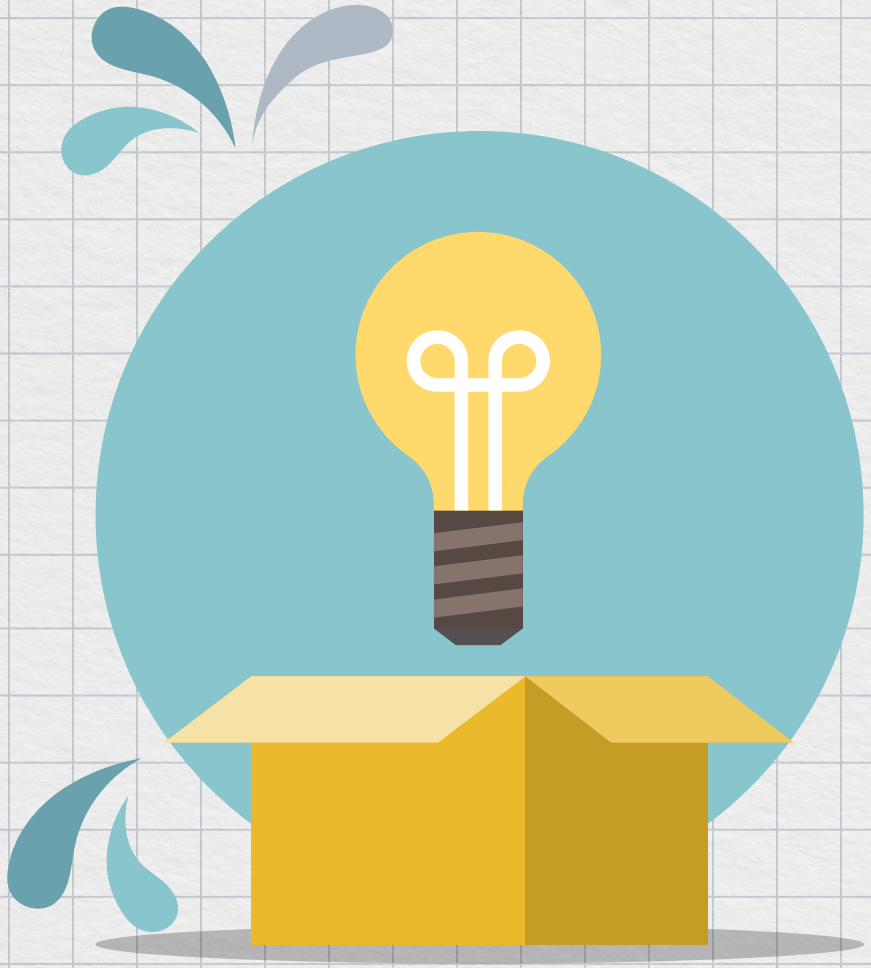
- Safety
- Respect
- Share
- Ask for help
- Fail Forward

Start!

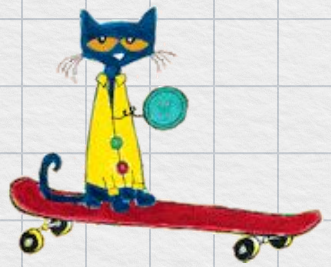
Show and Tell - Turn and Talk

- How was the Makerspace Activity?
- What successes did you have? What were some challenges?
- How would you see this activity in your district?
- What would your next steps be with this activity?
- Link to the activity instructions





UDL in the Makerspace



Students can:	Create a cotton ball launcher and test out different methods and designs to see which design will travel the furthest.
Standards:	K-12 - Students will be able to design and conduct investigations in the classroom, laboratory, and/or field to test students' ideas and questions, and will organize and collect data to provide evidence to support claims the students make about phenomena.
Background Knowledge:	• Iteration and trying again when something doesn't work as expected
Activity/Task:	Teachers will pick one of three connection options for this activity • Pete the Cat and his Four Groovy Buttons • Angry Birds Launchers • T-shirt Launcher (sporting events) 1. Introduce the activity to students using the selected video 2. Students follow instructions (at the appropriate differentiated level, linked in folders) for the type of launcher they are going to make either a catapult-style or a piston-style launcher. 3. When just about half of the allotted time is remaining, pause students and have them test their launchers. Then as a class discuss some ideas of how they could make changes to their launcher. 4. Students can work until it is nearly the end of the time and then again launch their cotton balls from the start line and measure the distance. 5. Discuss results and do a checkout reflection.

Kit Design Process – UDL in Action

Provide multiple means of **Engagement**

Affective Networks
The "WHY" of learning

Provide options for
Sustaining Effort & Persistence (8)

- Heighten salience of goals and objectives (8.1)
- Vary demands and resources to optimize challenge (8.2)
- Foster collaboration and community (8.3)
- Increase mastery-oriented feedback (8.4)

Provide options for
Recruiting Interest (7)

- Optimize individual choice and autonomy (7.1)
- Optimize relevance, value, and authenticity (7.2)
- Minimize threats and distractions (7.3)

Provide options for
Self Regulation (9)

- Promote expectations and beliefs that optimize motivation (9.1)
- Facilitate personal coping skills and strategies (9.2)
- Develop self-assessment and reflection (9.3)

Provide multiple means of

Representation

Recognition Networks
The "WHAT" of learning

Provide options for

Language & Symbols (2)

- Clarify vocabulary and symbols (2.1) >
- Clarify syntax and structure (2.2) >
- Support decoding of text, mathematical notation, and symbols (2.3) >
- Promote understanding across languages (2.4) >
- Illustrate through multiple media (2.5) >

Provide options for

Perception (1)

- Offer ways of customizing the display of information (1.1) >
- Offer alternatives for auditory information (1.2) >
- Offer alternatives for visual information (1.3) >

Provide options for

Comprehension (3)

- Activate or supply background knowledge (3.1) >
- Highlight patterns, critical features, big ideas, and relationships (3.2) >
- Guide information processing and visualization (3.3) >
- Maximize transfer and generalization (3.4) >

Provide multiple means of

Action & Expression

Strategic Networks

The "HOW" of learning

Provide options for

Expression & Communication (5)

- Use multiple media for communication (5.1) >
- Use multiple tools for construction and composition (5.2) >
- Build fluencies with graduated levels of support for practice and performance (5.3) >

Provide options for

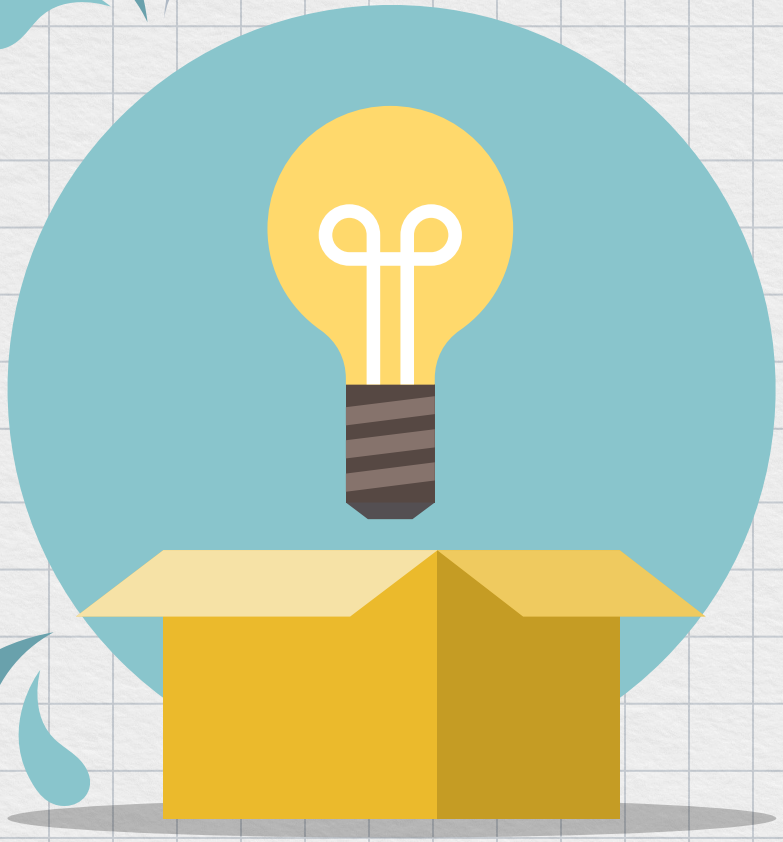
Physical Action (4)

- Vary the methods for response and navigation (4.1) >
- Optimize access to tools and assistive technologies (4.2) >

Provide options for

Executive Functions (6)

- Guide appropriate goal-setting (6.1) >
- Support planning and strategy development (6.2) >
- Facilitate managing information and resources (6.3) >
- Enhance capacity for monitoring progress (6.4) >



Computational Thinking in the Makerspace

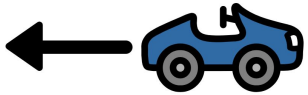
Build the track around the grey train track on the map.


STOP
MALL
shop
112
Train Station

Stop

Gas

Pause



Reverse

Horn

Light on/Light off


STOP
MALL
shop
112
Train Station

Computational Thinking

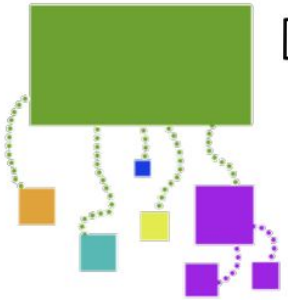
Decomposition

Pattern Recognition

Abstraction

Algorithms

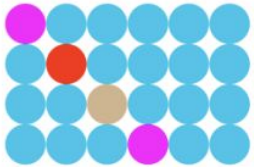
Definition from Gail Lovely:
Computational thinking (CT) is a creative way of thinking that encourages young children to be systematic problem-solvers who can identify problems and generate step-by-step solutions that can be communicated and followed by computers or humans.



Decomposition:

Breaking a problem into smaller "chunks" (and then using those "chunks" to replicate, solve a problem or understand a process.)

Examples: steps in a process, parts of a story, sounds in a word



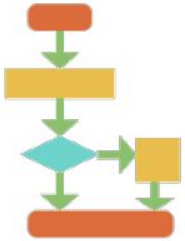
Pattern Recognition:

Making connections between similar problems and experience and/or finding patterns and extending and testing them. Requires noticing and describing attributes and characteristics.

Examples: sequences of events (lunch before recess), robots need power to "work", word order

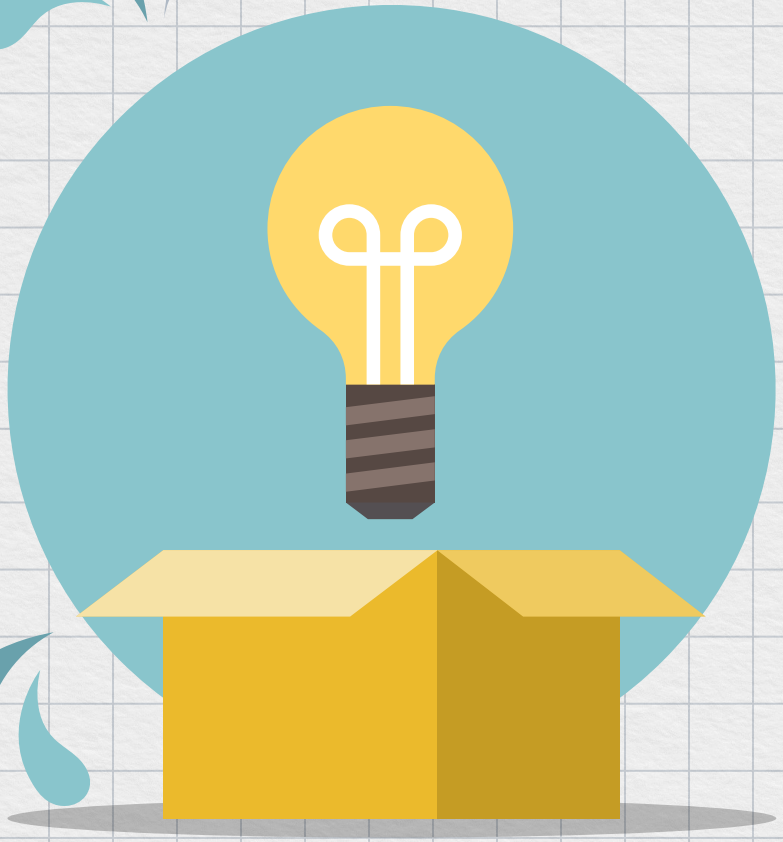
Abstraction:

Filtering out (ignoring) the characteristics we don't need (or focusing on only the characteristics which "matter") AND Identifying important information while ignoring unrelated or irrelevant details.
Example: when sorting something by color, the shape doesn't matter



Algorithms:

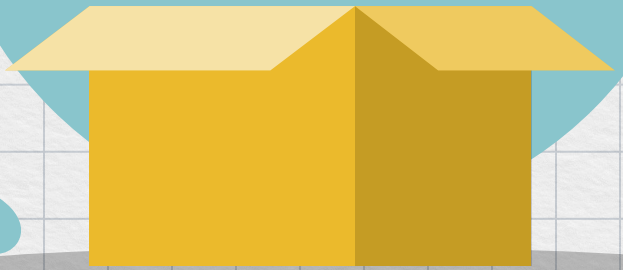
Creating and testing step-by-step plans to solve problems or achieve results.
Examples: Solving disputes between friends, building things, stacking blocks



Building the Accessible Makerspace

916's Makerspace Goals

"Accessible and Differentiated appropriately for *EVERY* 916 student"



- Provide opportunities for students to create and explore new topics and ideas
- Provide novel STEAM activities *accessible and differentiated appropriately for EVERY 916 student*
- Enrichment through and exploration of emerging technologies

Build a Makerspace

No Tech

- Cardboard
- Lumber scraps
- Styrofoam
- Playdough
- Paper tubes
- Fabric scraps
- Yarn
- Glue
- Scissors
- Tape
- Paper
- Unplugged Coding

Low Tech

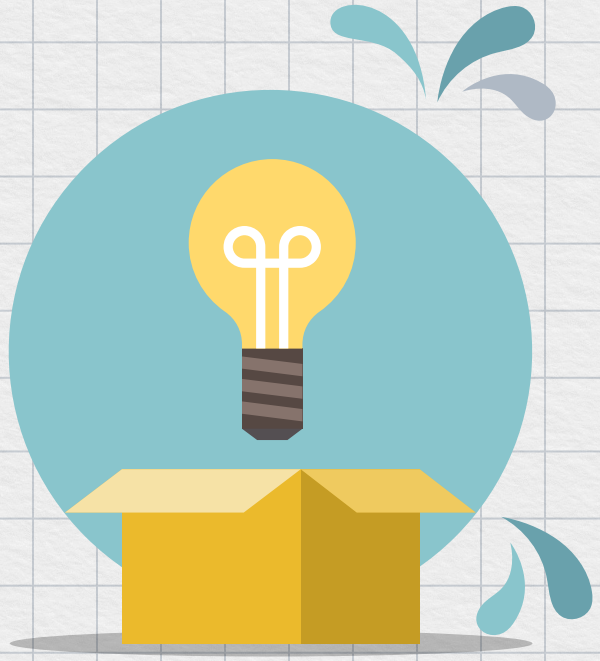
- Lego
- Duplo
- Upcycling
- K'Nex
- Keva Structures
- Coding board games

High Tech

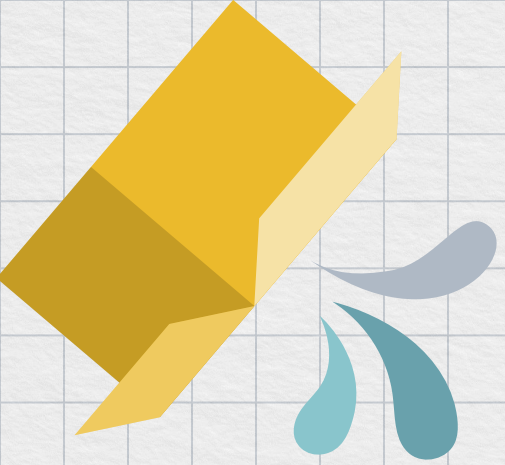
- Makey Makey
- Arduino
- Cubelets
- Chromebooks/ Devices
- Video production
- Coding
- Robotics
- 3D printing
  - ChefDoodler
- Hour of Code

Makerspace Activities

1. Wind-powered Car
2. Da Vinci Bridge
3. 3D Printing Pens
4. Balloon Tower
5. Cotton Ball Launchers
6. Coded Art
7. Lego Car or Duplo Train coding puzzles
8. Bottle Rocket
9. Bubble Art
10. Sailboat/Paddle boat
11. Circuits
12. Lego and Duplo Walls/Table
13. Lego/Duplo Marble Run
14. Lego Landmarks
15. Lego Minifig Challenges
16. Duplo Letters
17. Duplo Stories
18. Unplugged Coding Activities
19. Robotics Challenges

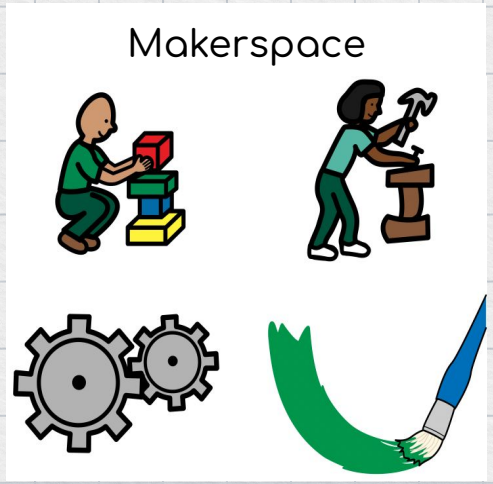


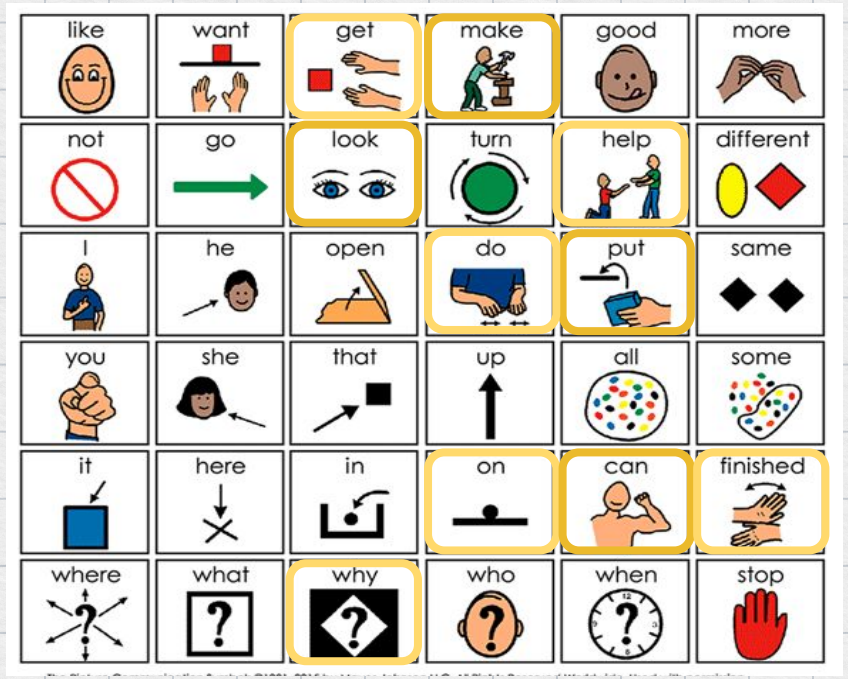
bit.ly/makerspacekits



Making the Makerspace Accessible

Using Core Vocabulary Symbols students are familiar with.





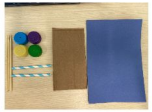
Math & Engineering Core Vocabulary

Having common choices available for students to select.

Standard Levels of Differentiation

Cut the straw to the size of the cardboard.

Single-instruction slides

Gather materials according to the supply list	
Cut the straw in half	
Use scissors to poke a single hole in the center of the cardboard	

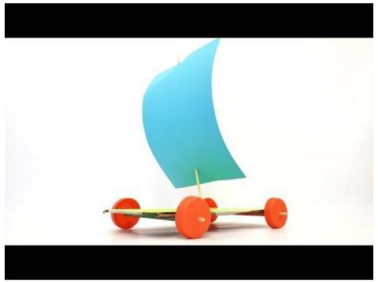
Instruction list with pictures

1. Gather materials according to the supply list
2. Cut the straw in half
3. Use scissors to poke a single hole in the center of the cardboard
4. Set the straws on the bottom of cardboard; one at the top and one at the bottom (on either side of the hole in the center. At least a centimeter from the top and bottom edge.

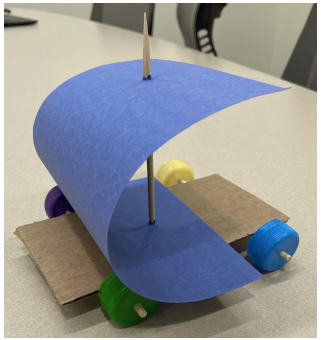
Instruction list

Video Demonstration

Build a Wind-Powered Vehicle Video Model - Pause and rewind as needed.



Finished product image



Challenge Card

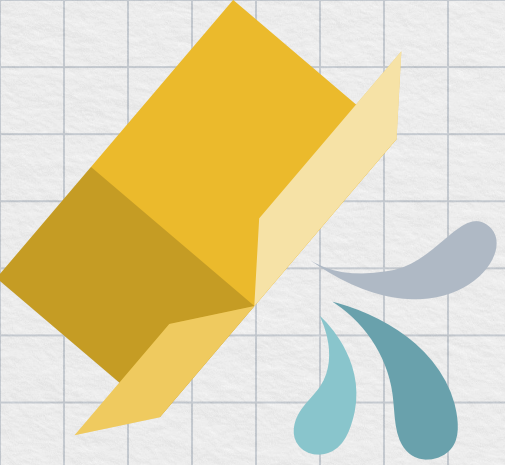
Your Challenge

Create a vehicle that moves as far as possible when a battery operated fan is directed at it.

The vehicle must move on its own with the fan (not human or any other object assisted).

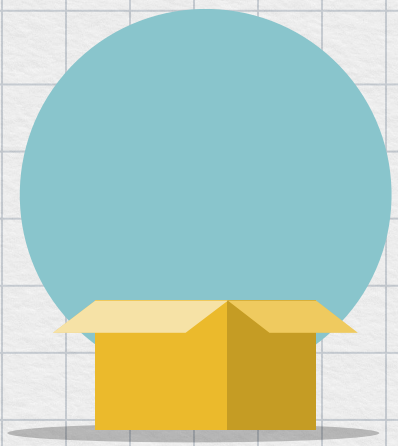
Alternate Activities with the same learning outcome/goal

- What are 3D shapes and History of 3D printing
- 3D Doodling
  - Desk Monster
  - Accessibility/Learning Tool
  - Alebrije/Mythical Animals
- Balloon Tower and Lego Tower
- Coded Art Activities
  - Sphero Painting
  - Artie/Dash Drawing
  - Sheets Pixel Art
- Lego/Duplo Wall Marble Run on the wall or on a base plate



Accessibility

- Printed Instructions
- Printed instructions laminated with braille text
- Switches and switch-activated dice
- Sensory tools (lights)
- Using 20 gallon bins for Kits
- Mobile Makerspace trailer goes around to schools



Mobile Education Center

Shared Resources

Lessons:
bit.ly/makerspacekits

Video:
bit.ly/makerspacevideo2023

Questions and Conversations

Thank you!