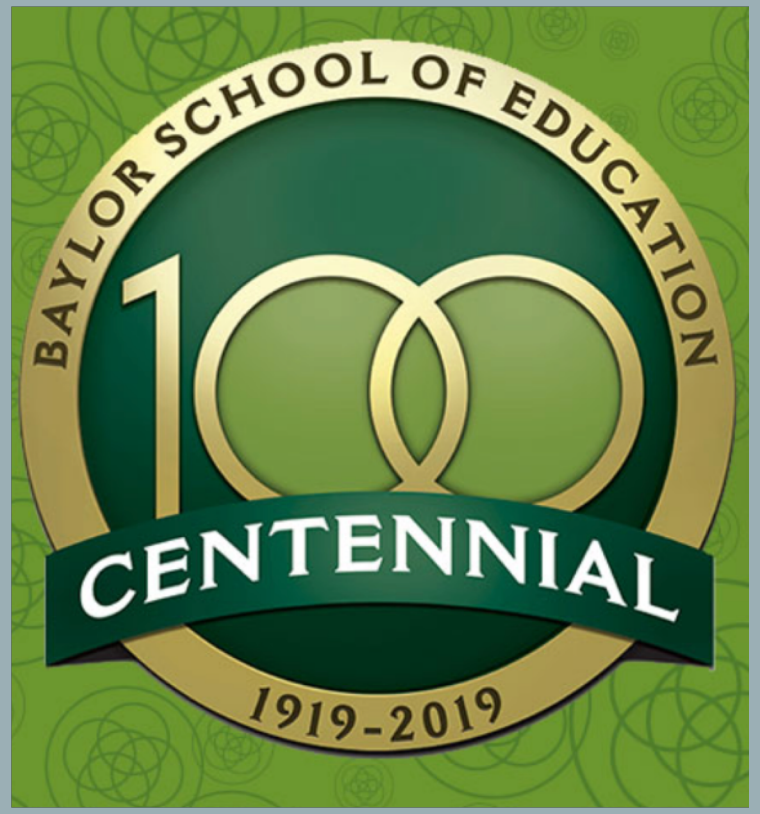
MAKERSPACE MATHEMATICS

Empowering students to move from math consumers to math creators.

April 6, 2019



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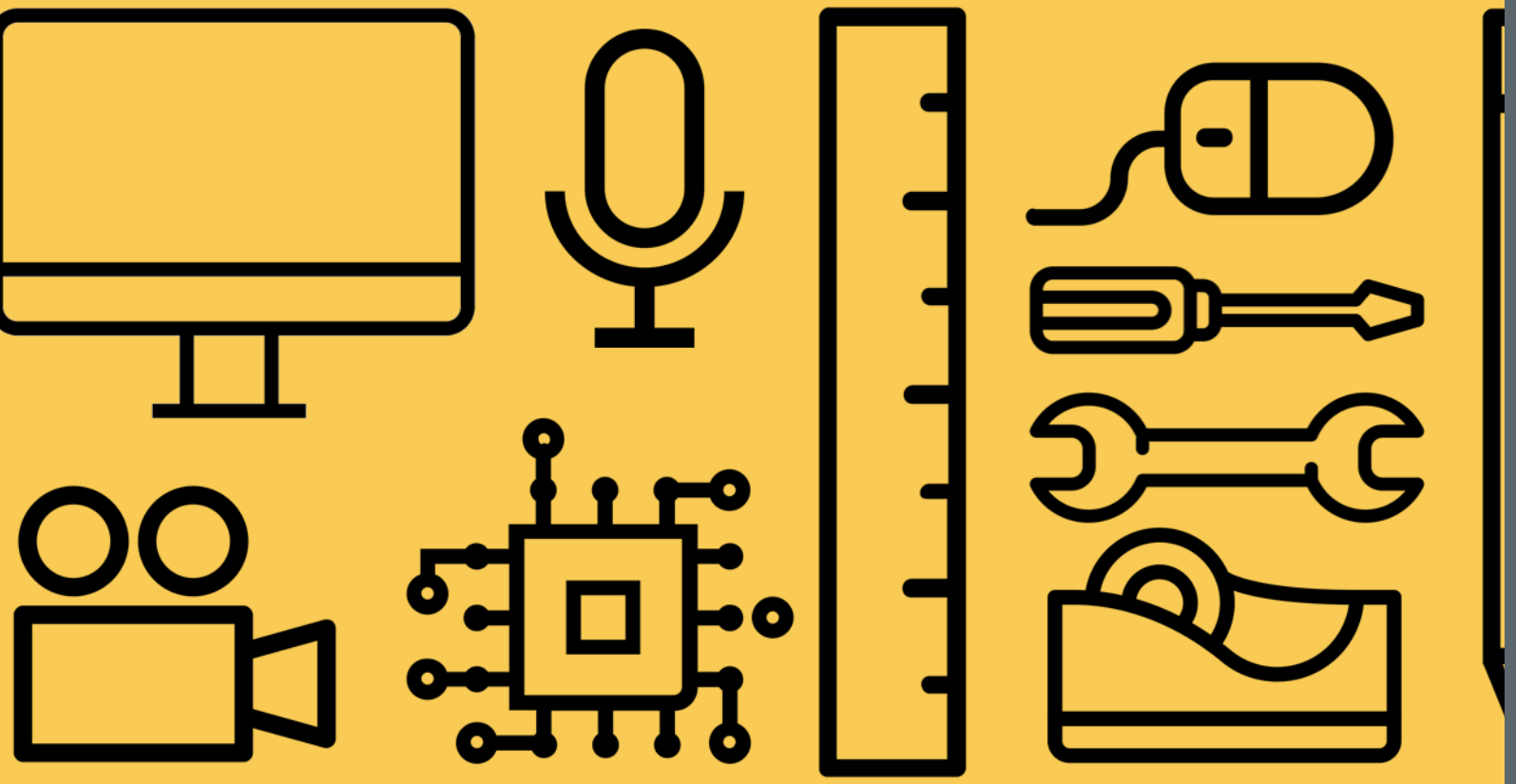
MAKERSPACE MATHEMATICS

- Makerspace
- Promoting Access and Equity Through Making
- How Teachers Have Implemented Makerspaces Into Mathematics Curriculum
- Student Work
- Teacher Perspectives of Makerspace Mathematics



A MAKERSPACE IS ABOUT "TURNING KNOWLEDGE INTO ACTION"

LAURA FLEMING, 2015

WORLDS OF MAKING: BEST PRACTICES FOR ESTABLISHING A MAKERSPACE FOR YOUR SCHOOL

“WHEN EXCITING NEW TECHNOLOGIES COMBINE WITH HANDS-ON TRADITIONS, YOUR CLASSROOM BECOMES A MAKERSPACE WHERE LEARNING SOARS” – MARTINEZ & STAGER, 2013

INVENT TO LEARN: MAKING, TINKERING, AND ENGINEERING IN THE CLASSROOM

MAKERSPACE POTENTIAL FOR ACCESS AND EQUITY

"Now, almost anyone can innovate. Now, almost anyone can make. Now, with the tools available at a makerspace, anyone can change the world" (Hatch, 2014, p.10).

The Maker Manifesto

The makers movement has sparked interest for its potential role in breaking down barriers in STEM.

STEM making empowers youth to foster their agency.

Barton, A. & Tan, E. (2018). A longitudinal study of equity-oriented STEM-rich making among youth historically marginalized communities. American Educational Research Journal, 20 (10). 1-40.

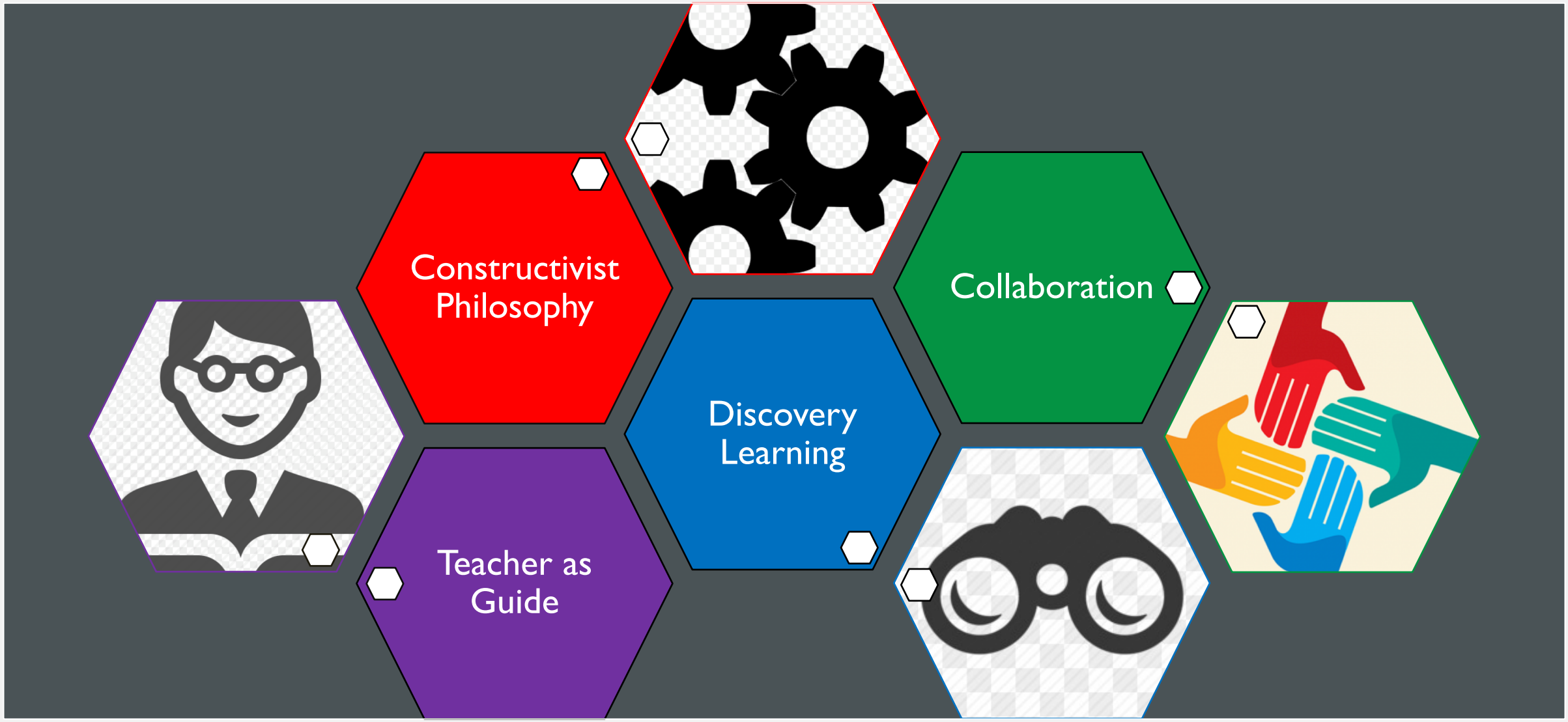
Most leaders believe that makerspaces have the potential to breakdown stereotypes associated with gender.

"First-generation English learners expressed greater agency and self confidence from their experience in makerspaces. These students felt empowered to work on new language skills in the open and collaborative environments through conversations with their peers" (Kim, Edouard, Alderfer & Smith, 2018).

MAKER CULTURE

Kim, Y. E., Edouard, K. Alderfer, K. & Smith, B. (2018). Making culture: A national study on educational makerspaces.

MAKERSPACE IN THE CLASSROOM



MAKERSPACE CLASSROOM PROCESS

Explore
(Research)

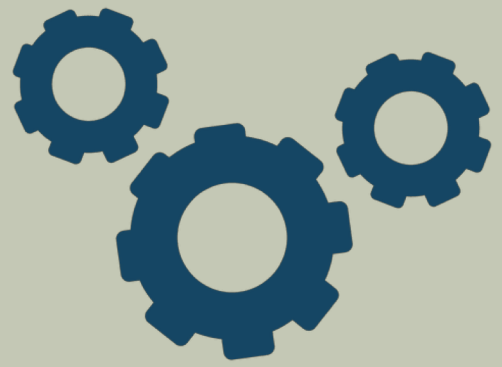
Explore a new topic aligned with state standards.

Collaborate
(Design)

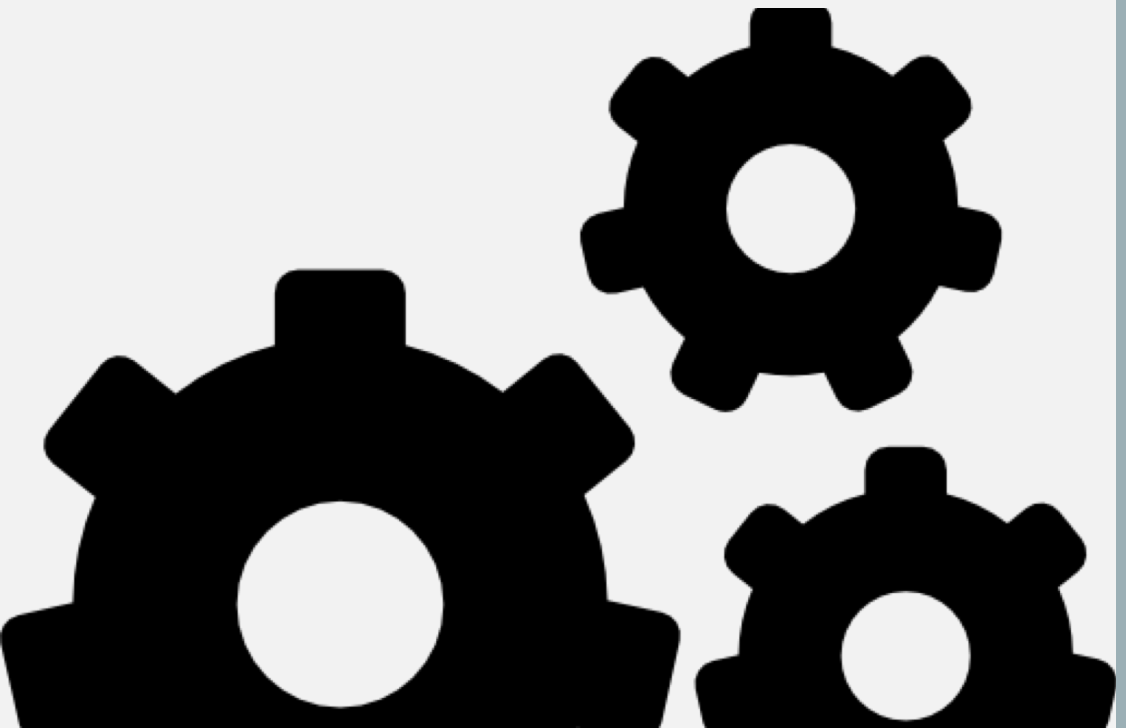
Challenge students to collaboratively design a solution to a problem or task.

Innovate
(Build)

Students create their solution and test to see if it works.



Failure It's Ok!



MAKERSPACE MATHEMATICAL TASK

The Cake Contest by Collen Haberen

Haberen (2016). *The Cake Contest.* Mathematics Teaching in the Middle, NCTM. 22 *(5)*.

EXPLORE VOLUME AND SURFACE AREA

A serving size is 6 cubic inches.

The whole cake must serve between 180 and 200 people.

The cake must have at least two tiers.

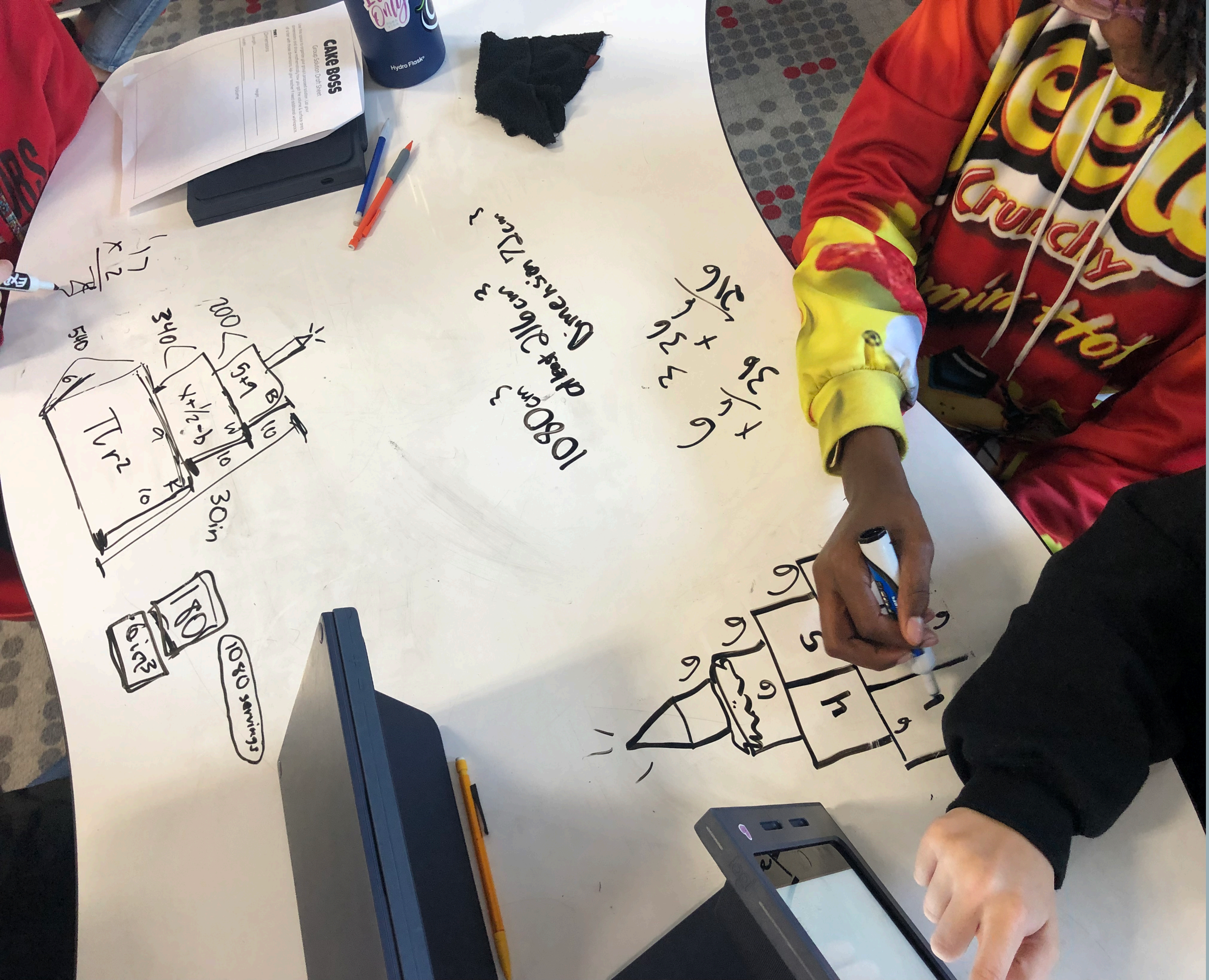
Each tier must be the same height.

You will need to know the amount of frosting.

The cake must be visually appealing!

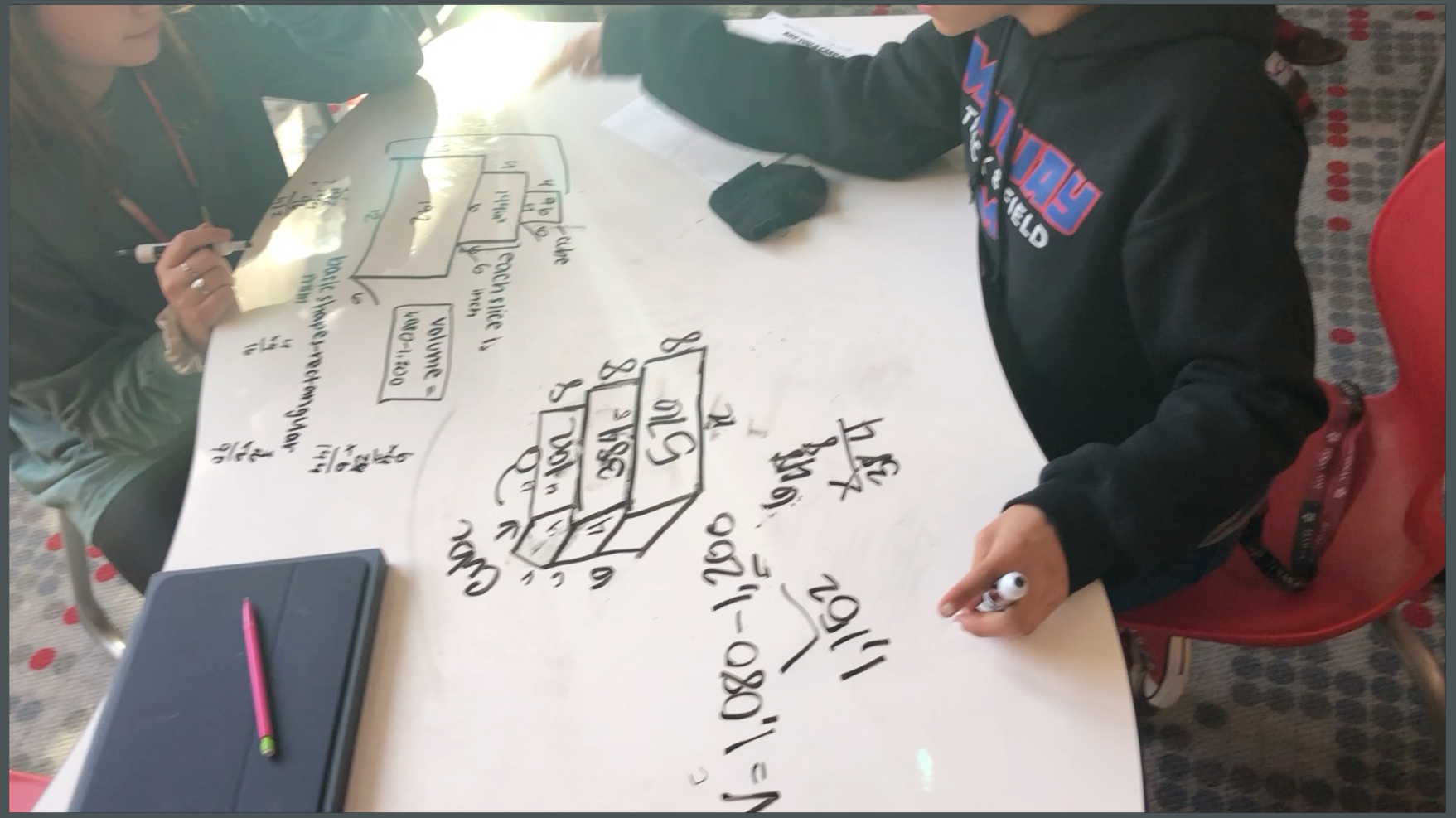
EXPLORE

Students have the freedom to explore the math related to the task.



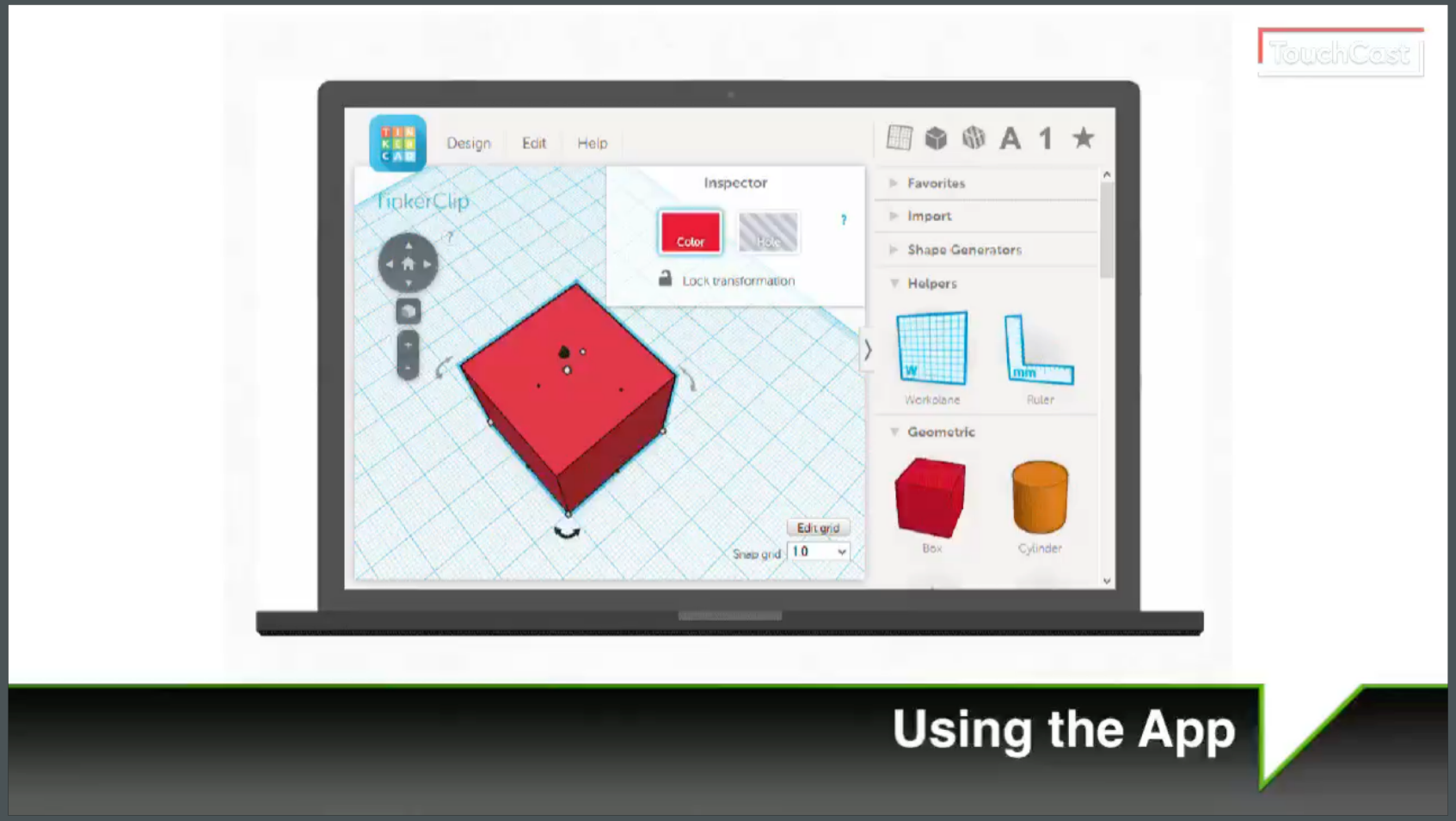
EXPLORE

The freedom to explore in the maker environment allows for a variety of solutions and approaches.



COLLABORATE

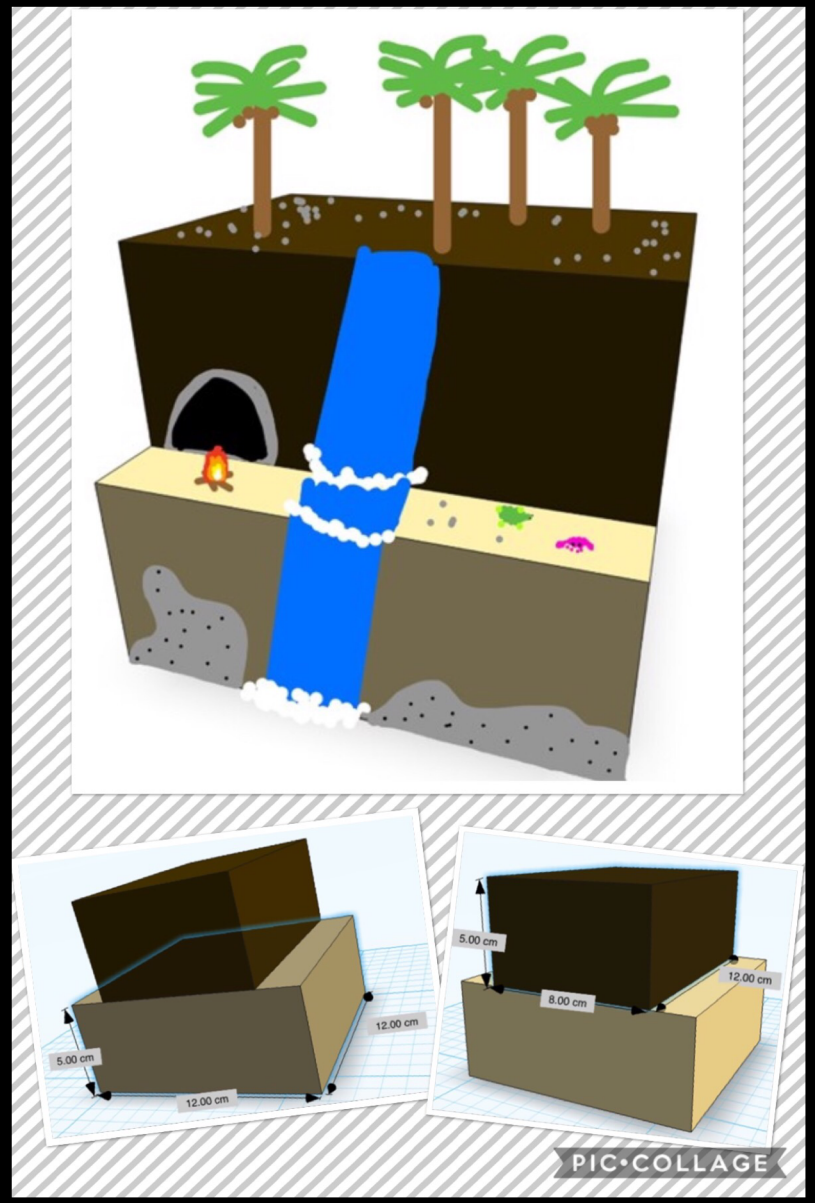
Students collaborate on final designs before transferring them to technology.



COLLABORATE

Students "tinker" with designs as technology allows them to visualize their solutions.

INNOVATE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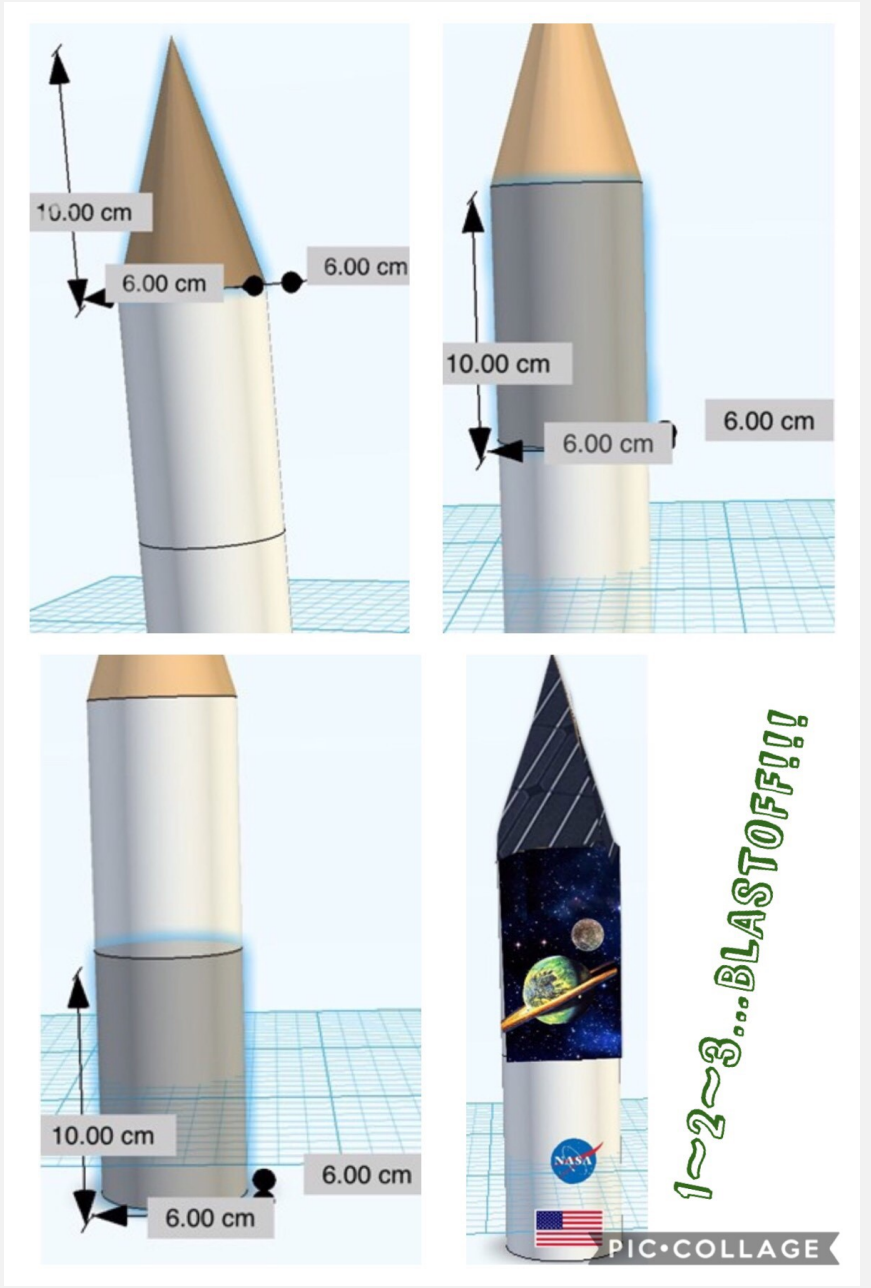
PIC•COLLAGE


10.00 cm
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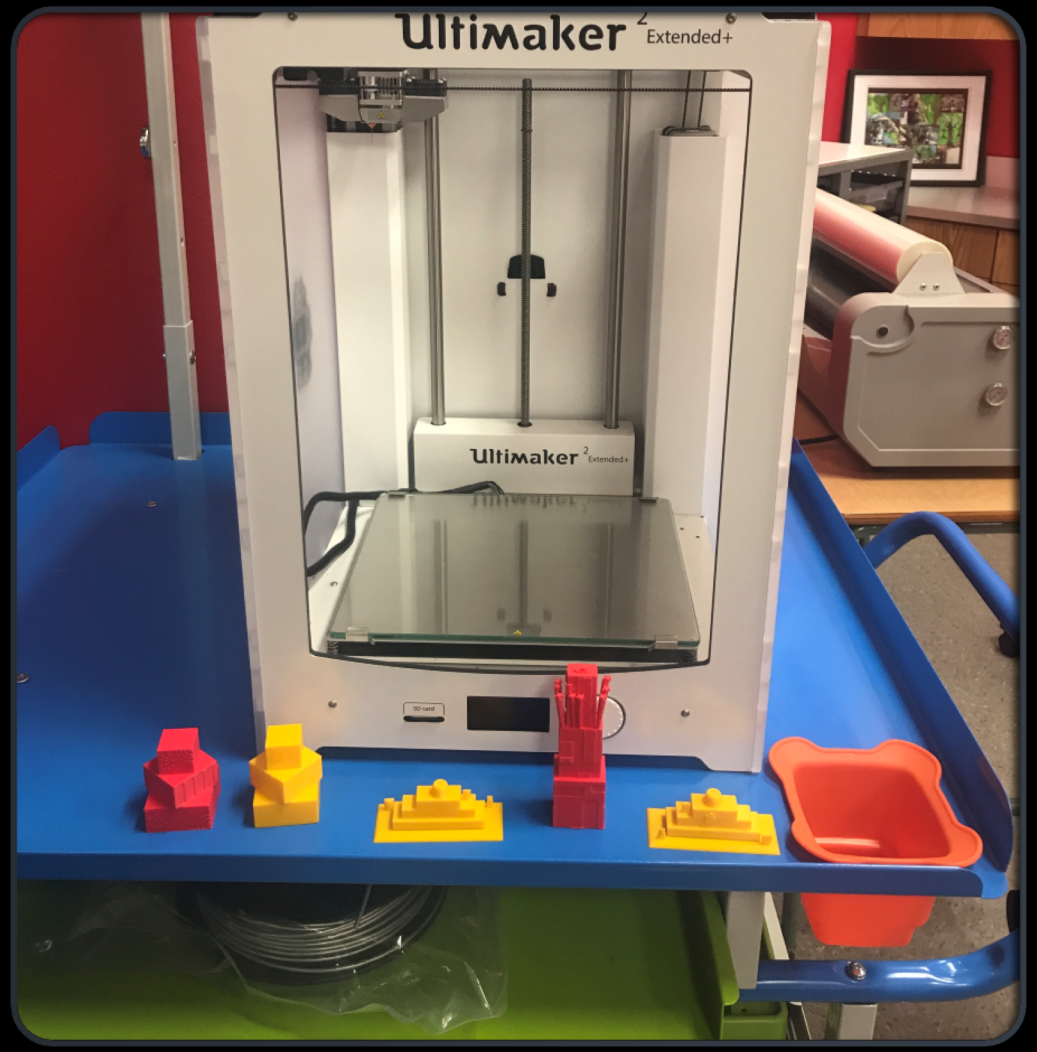
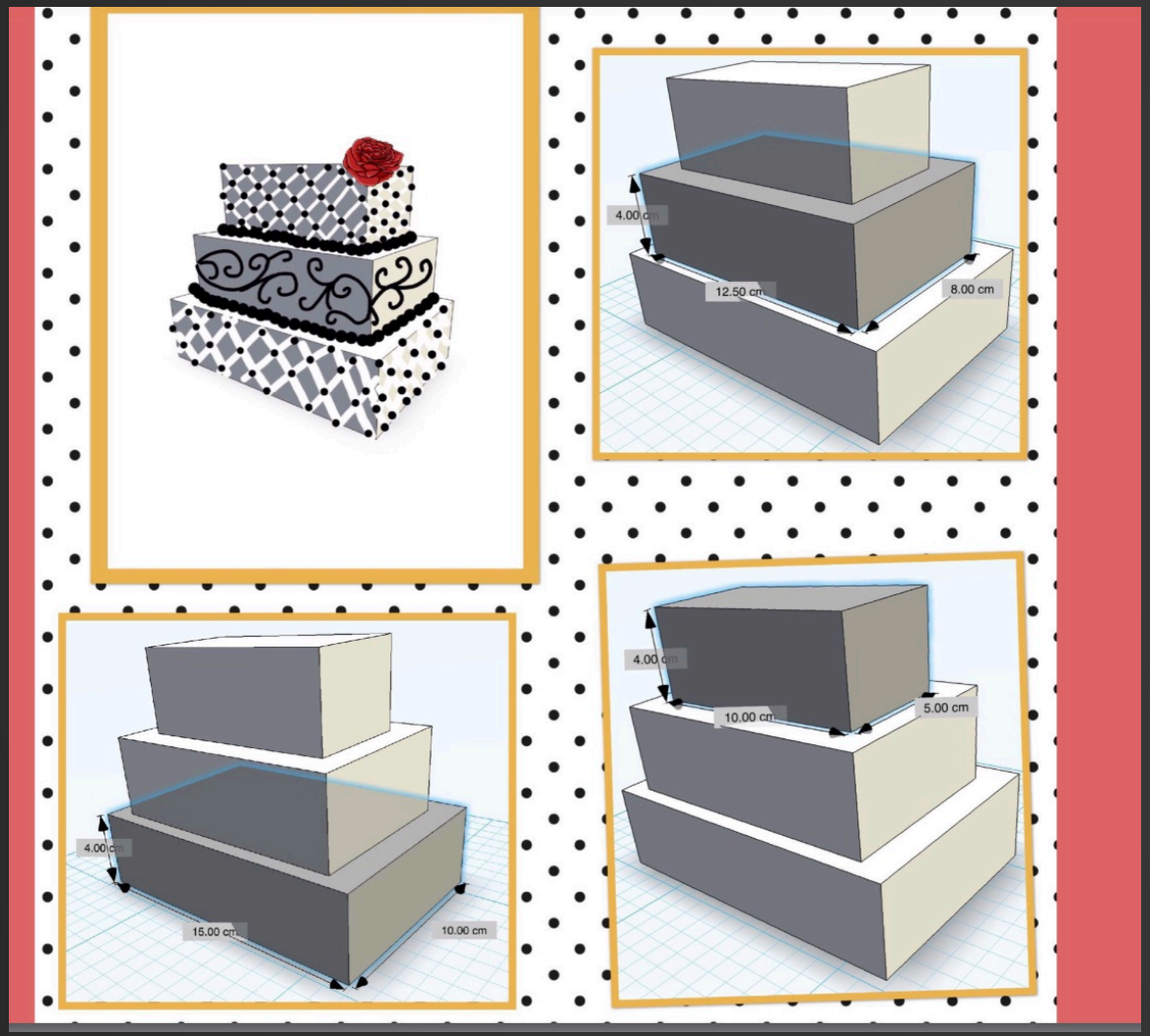
1~2~3...BLASTOFF!!!
PIC•COLLAGE

INNOVATE



FINAL DESIGNS



STUDENT REFLECTIONS

Mathematical Reflection

1. Explain how your group's solution met the requirements for the Cake Boss challenge. Use words, symbols, and diagrams. 4

Are cake met the requirements because we used the # of Peaple 200 and multiplyed by 6 for the cubic inches then we divided by 4 the number of tires which was 300 thats we used that to know how the volum had to be for each tier.

2. What strategy helped you the most in solving the Cake Boss challenge? 4

We did a lot of experimenting and drafings to try and figuer it out we did strugle some but we eventaly got what we needed.

3. What was your total volume? How do you know? 4

Are totle volume is 1,200 we know this cause 10+6=60 60x10=600 divided by 2 is 300 times 4 tiers is 1,200.

Mathematical Reflection

1. Explain how your group's solution met the requirements for the Cake Boss challenge. Use words, symbols, and diagrams. 4

We decided on 200 people and multiplied that by 6 to get the volume.
We had 4 tiers, all being triangular prisms and the same height
We tried to make the cake look different from the others, making it more appealing.

2. What strategy helped you the most in solving the Cake Boss challenge? 4

Most likely experimenting. We kept trying new numbers, solutions, multiplying, dividing, to get the outcome we wanted. We then looked for different resources by asking other students and teachers questions.

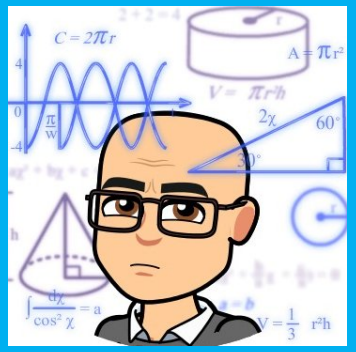
3. What was your total volume? How do you know? 4

Our total volume is 1,200 in^3. We got this by multiplying the amount of people, 200, by the cubic inches of each serving, which was 6. 200 x 6 = 1,200 in^3.

TEACHER PERSPECTIVES

QUESTIONS

CONTACT INFORMATION



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