

The image features a teal background with a white geometric pattern of triangles pointing inwards from the edges, creating a border around the central text.

Science/STEM Update

Science Technology
Engineering Math



Science Professional Development

Professional Development: Science Practices

by Lisa Marco-Bujosa, PhD, Villanova Assistant Professor of STEM Education

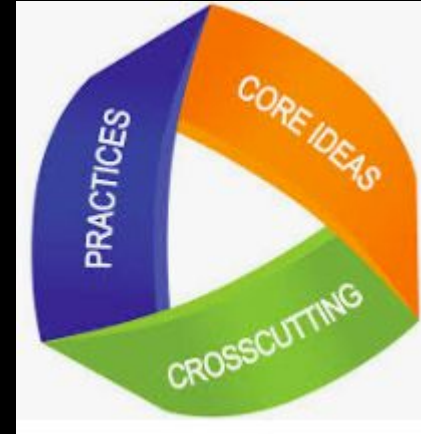
- Provided for Elementary Audit Team and Middle School science teachers-Fall of 2018
- Focused on making sense of NGSS and incorporating it into science units
- Developing all science units to include the practices



Elementary Science

The science audit team is now

- Developing all science units with the practices in mind
- Creating brief summaries of units to share with parents/guardians
- Aligning all schools to the same science units
- Adding new Engineering is Elementary units which align with science units



Elementary Science

Engineering Practices

Integrating the “E” from STEM

Adding engineering units into grades 1-5

Engineering is Elementary

Created by Museum of Science in Boston

Aligns with our present Science Units



Elementary Science

1st Grade - Windmills - Weather

2nd Grade - Hand Pollinators - Butterflies

3rd Grade - Plant Packaging - Plants

4th Grade - Parachutes - Sun, Moon, Stars

5th Grade - Oil Spill Cleaning - Ecosystems

Astronomy



A Long Way Down:
Designing Parachutes

Engineering is Elementary Components - 4th Grade Parachutes

- Introductory Story
- What is Engineering
- Background Information

Engineering is Elementary

Components - 4th Grade Parachutes

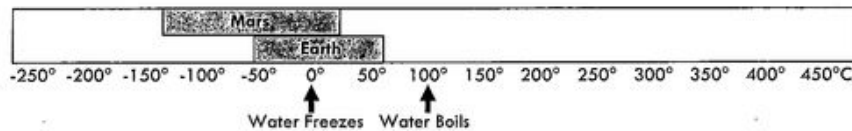
- Ask, Imagine, Plan, Create, Improve
- Build Parachutes - Testing
Materials/Variables
- Design Challenge

Mars

Size: 4,000 miles (6,437 kilometers) in diameter (half as big as Earth)

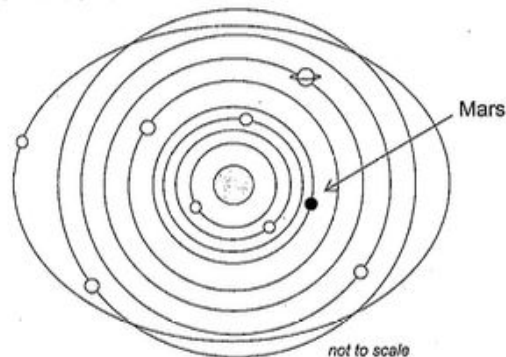


Temperature: -140° to 20° Celsius (-220° to 68° F)



Atmosphere: much thinner than Earth's atmosphere

Moons: 2 small moons



Location in the Solar System: Mars is 142 million miles (229 million km) from the Sun on average. It is the fourth planet from the Sun.

Surface: rocky planet

Atmosphere: Parachutes fall most slowly in a

Thick Atmosphere

Thin Atmosphere

Canopy size: The canopy size that falls most slowly is

Small



Medium



Large



Canopy material: The canopy material that falls most slowly is

Paper



Plastic



Sheer Fabric



Suspension line length: The line length that falls most slowly is

Short



Medium



Long

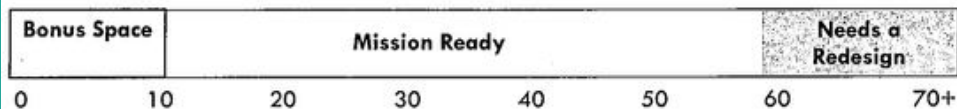


Engineering Design Process: Create!



Parachute Packing Score

1. Mark your Parachute Packing Score with an X on the bar below:

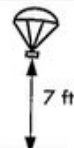


2. Is your Parachute Packing Score "Mission Ready"? _____

****Reminder: If your Parachute Packing Score is not "Mission Ready," you need to redesign your plan.****

Total Drop Time

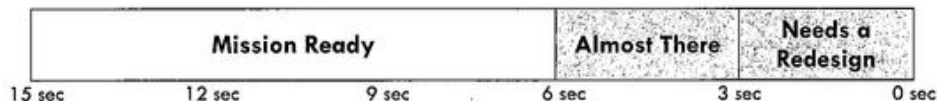
3. How many seconds did it take your parachute to fall 7 feet?



Trial 1	Trial 2	Trial 3	Total Drop Time (add the 3 trials together)

+ + =

4. Mark your Total Drop Time with an X on the bar below:



5. Is your Total Drop Time "Mission Ready"? _____

High School Science - Adding Engineering

- Engineering to Learn
 - All ninth grade students will take the course as the beginning of all high school science courses.
 - Focused on building critical thinking, collaboration, adaptability, analysis, curiosity and imagination.
 - Learning physical science concepts through building.

Engineering to Learn

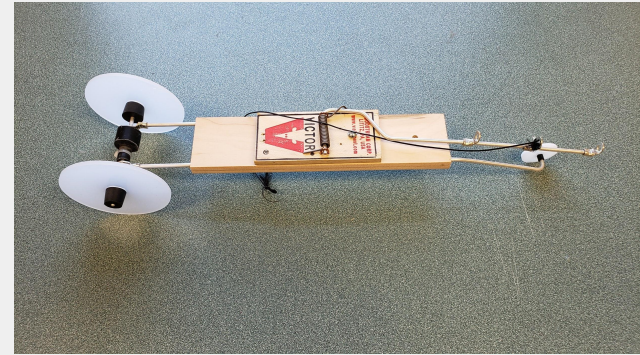
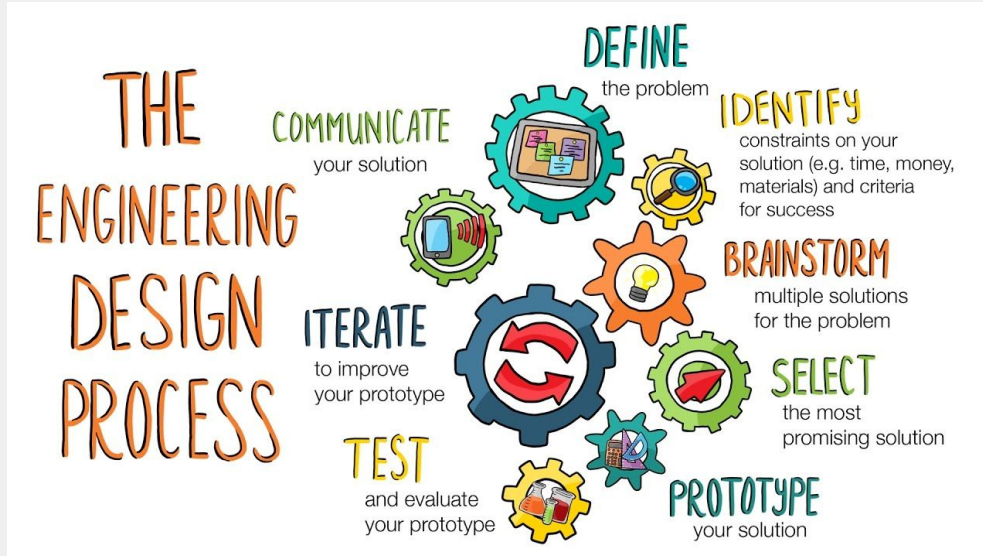
6 different challenges and 6 different assessments

Mousetrap Car	Summary Paper
Egg-cellent Race Car	Screencast
Balsa Bridge	Blueprints and Summary Paper
Self-Propelled Boat	Trifold
Instrument	Presentation and Paper Test
Rube Goldberg	Successful Outcome of Machine

- Increase student creativity
- Rethinking “failure”
- Student led projects and questions
- Collaboration

Engineering to Learn

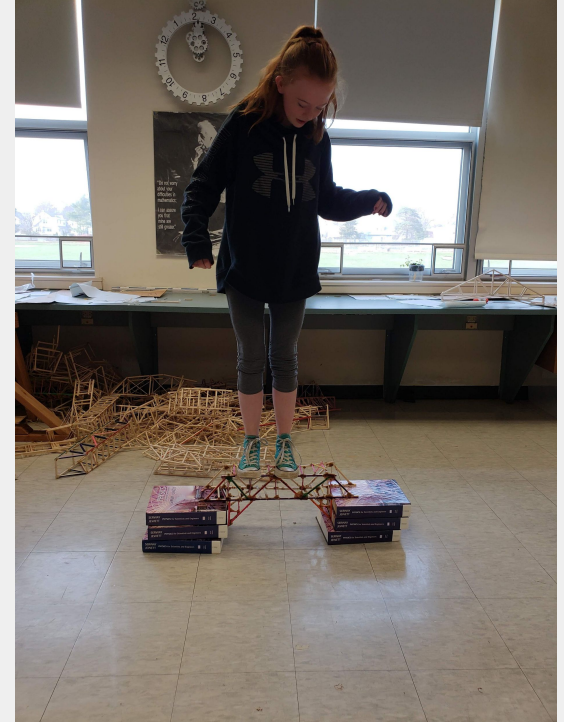
Mousetrap Cars are designed to be limited in options with the goal of learning the engineering design process.



Engineering to Learn



Students were challenged to build bridges with maximum efficiency.



Engineering to Learn

Our final project teams competing in a Rube Goldberg competition

Each class chose their own challenge from watering a plant to hammering a nail.

Each team consisted of 5 groups of 3 students who were responsible for different sections of the overall project.



Experts' best guess about
the combination of traits
that will guarantee
rewarding employment in
tomorrow's economy.

Elite-level technical
abilities

The probing mind
of a scientist

And a deft human
touch