



**WPI**

# **SEEDS of STEM**

**Professional Development Session I**

**STEM & the Engineering Design Process**

# Goals of today's workshop

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1. Get familiar with the engineering design process
2. Discuss vocabulary associated with STEM and problem solving
3. Collaborate with colleagues around teaching the EDP to young children

# But... What is Engineering?

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Video break

# STEM Education is...

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STEM education is an interdisciplinary approach to learning where rigorous *academic concepts* are coupled with *real-world lessons* as students apply **science, technology, engineering, and mathematics** in contexts that make connections between school, community, work, and the global enterprise, enabling the development of STEM literacy and with it the ability to compete in the new economy.

(Tsupros, Kohler, & Hallinen, 2009)

# Engineering is...

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...an *iterative* **design** and the **optimization** of materials and technologies to meet **needs** as defined by **criteria** under given **constraints**.

Engineers use systematic processes, mathematical tools and scientific knowledge to **develop, model, analyze, and improve solutions to problems**.

(Carr, Bennett & Strobel, 2012).

# STEM & Engineering at the Pre-K Level

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Take a few minutes to discuss your definitions for STEM & Engineering on the opening survey, then:

1. Review the handout with definitions
2. Come up with a **group** definition for engineering that matches the level of Head Start children's understanding

Time: 10 min

# Design Challenge

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Use the sheets of blue paper to build a structure that:

1. Has 3 stories, and
2. Is at least 8 inches (20 cm) high

Time: 5 minutes

# Design Challenge

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Use the sheets of blue paper to build a structure that:

1. Has 3 stories, and
2. Is at least 8 inches (20 cm) high - AND
3. Can support 5 markers

Time: 5 minutes

# The problem solving process

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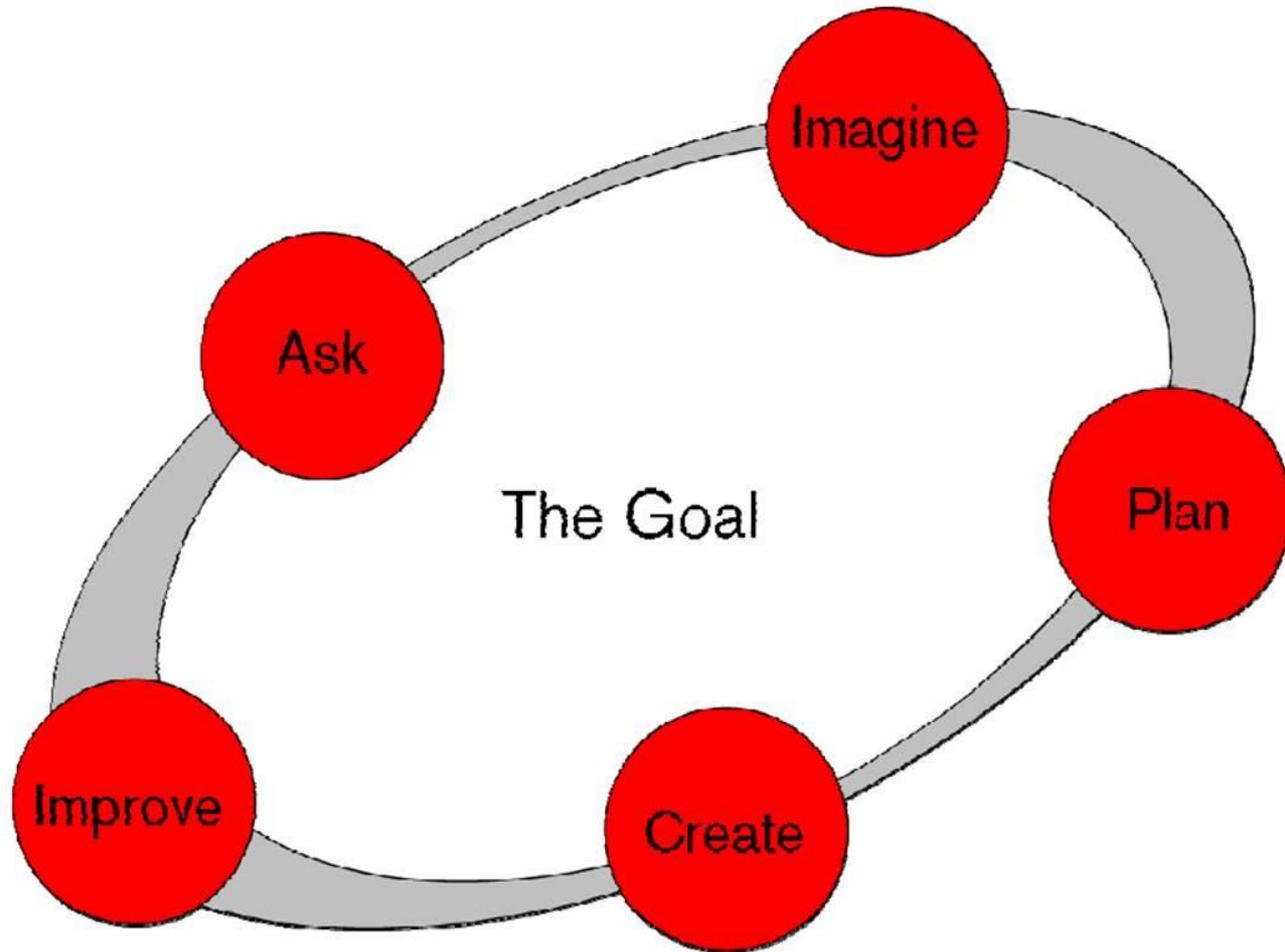
What steps did you follow when solving the challenge?

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# The Engineering Design Process

# Design Cycle by the Boston Museum of Science

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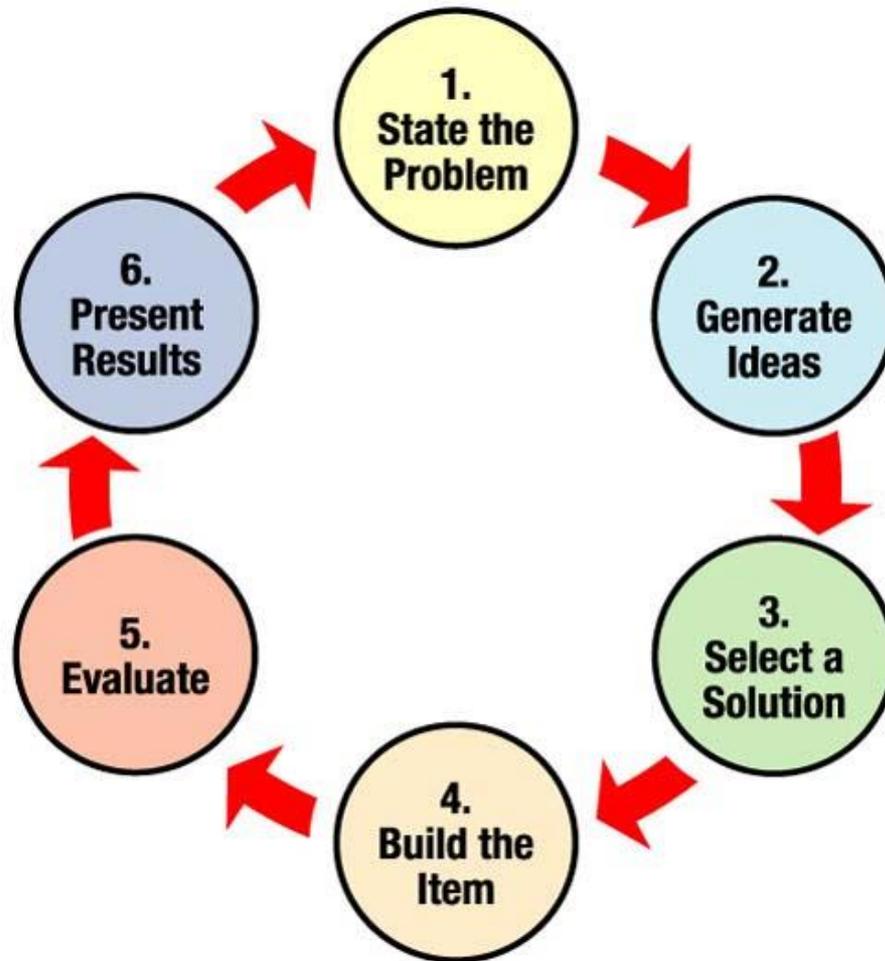
# Design Cycle by “Design Squad”

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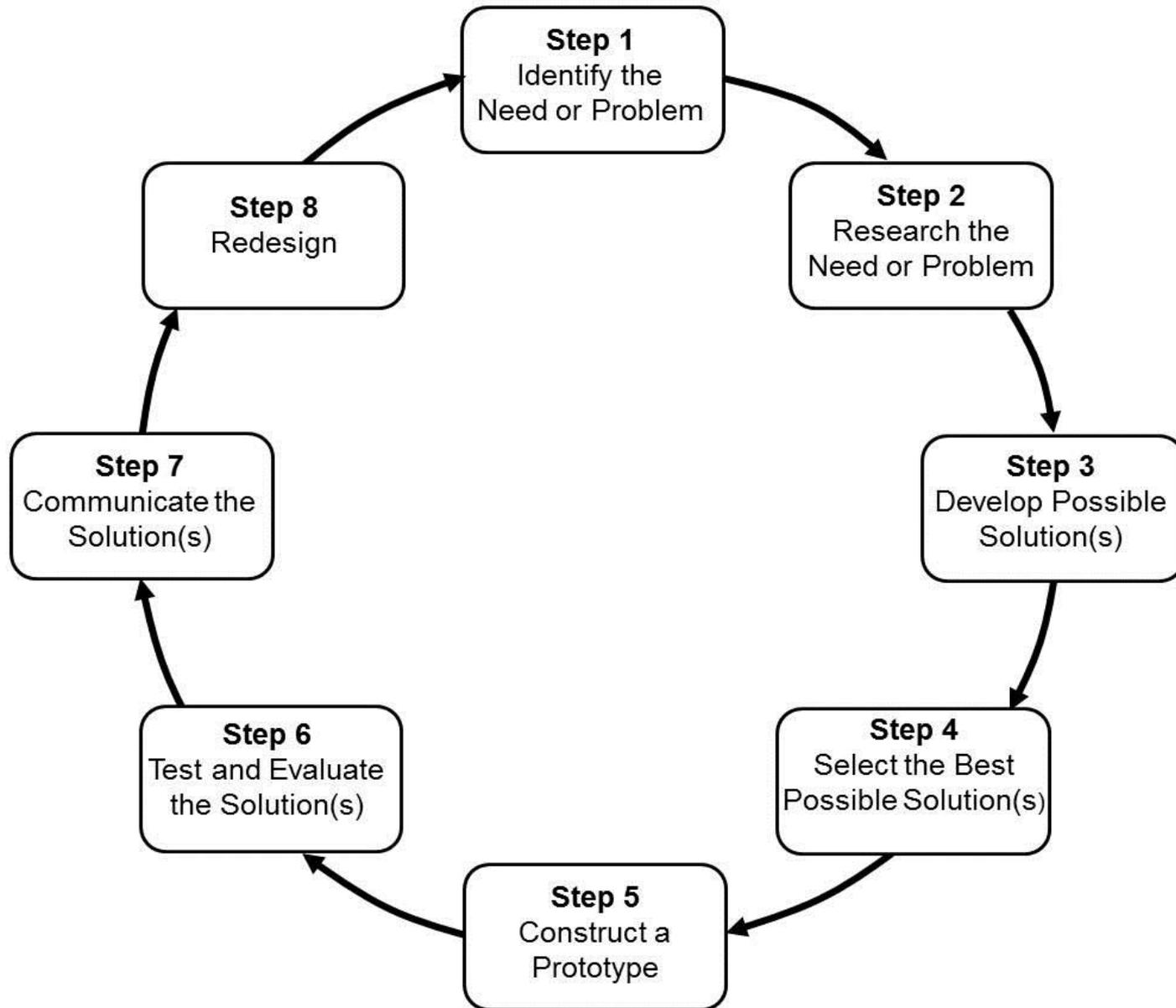


# Design Cycle by NASA

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# Steps of the Engineering Design Process



Pre-K

Ask  
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• What is the problem?



Improve



- Talk about what works, what doesn't and what can make it better.
- Modify design to make it better.
- Test it out!

Imagine

• Generate ideas



• What are some solutions?

Plan

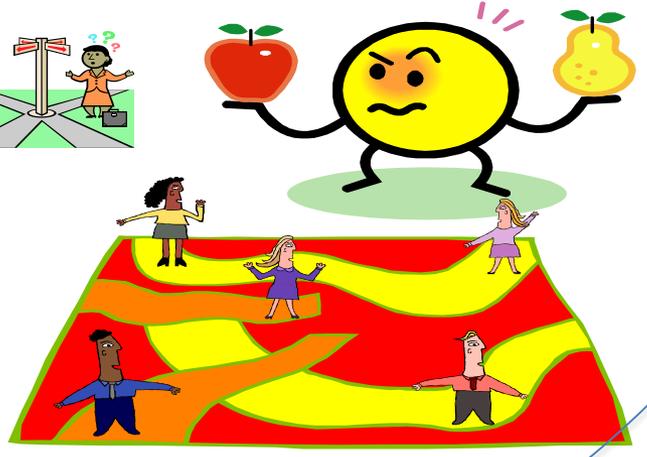
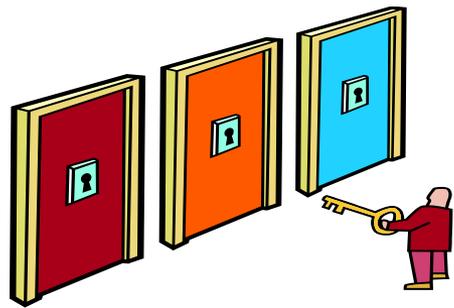
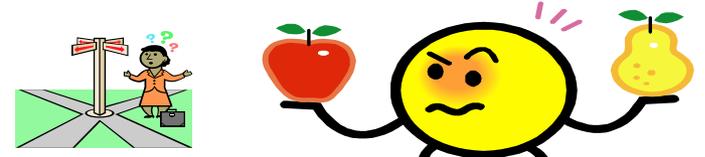
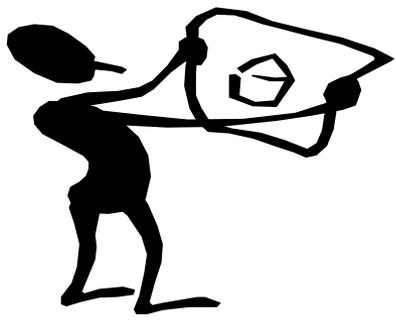
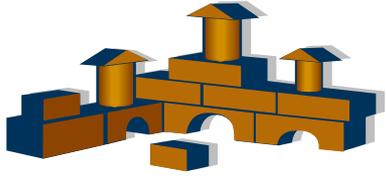
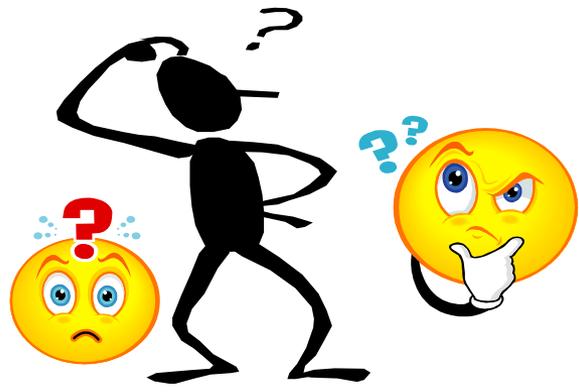


- Draw a diagram.
- Think of materials.

Create



- Follow your plan and create it!
- Test it out!



# Design Your Own Engineering Clock

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In small groups explore the different engineering process visuals and create a visual that fits your children's abilities and vocabulary

15 min