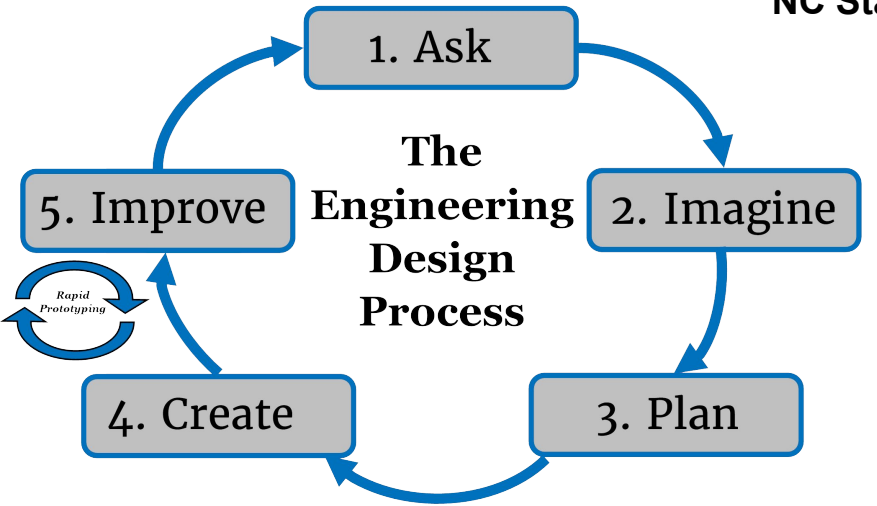
Introduction to the Engineering Design Process: Don't Break Humpty!

A K-5 engineering activity

Grade Levels: K-5

Subject: Engineering Design - This lesson is meant to be an easy and accessible introduction to the engineering design process for K-5 students.

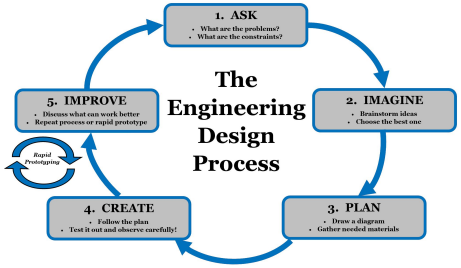
NC Standard: ISTE Student Standard 4 - Innovative Designer



Building Engineers

Teacher Information

Lesson Summary:	In this lesson, students will build a wall for Humpty Dumpty (a plastic egg) to sit upon- with the goal of building the TALLEST, SAFEST wall possible in a limited amount of time. Students will not only need to collaborate well in their design but also utilize good teamwork as they build quickly due to the time constraint. Humpty must stay safe at the top of the wall when time is called.
Materials/Resources: *Note: The materials for this activity are open-ended- meaning use whatever is easiest/handiest for your classroom*	Potential Materials to utilize: • Wooden blocks • Unifix cubes • Legos • Keva Planks • Any other stackable/buildable material • 1 plastic egg per group *Note: tape or other "joining" materials are not recommended for this task*
Estimated Time:	1 class period (45 min)

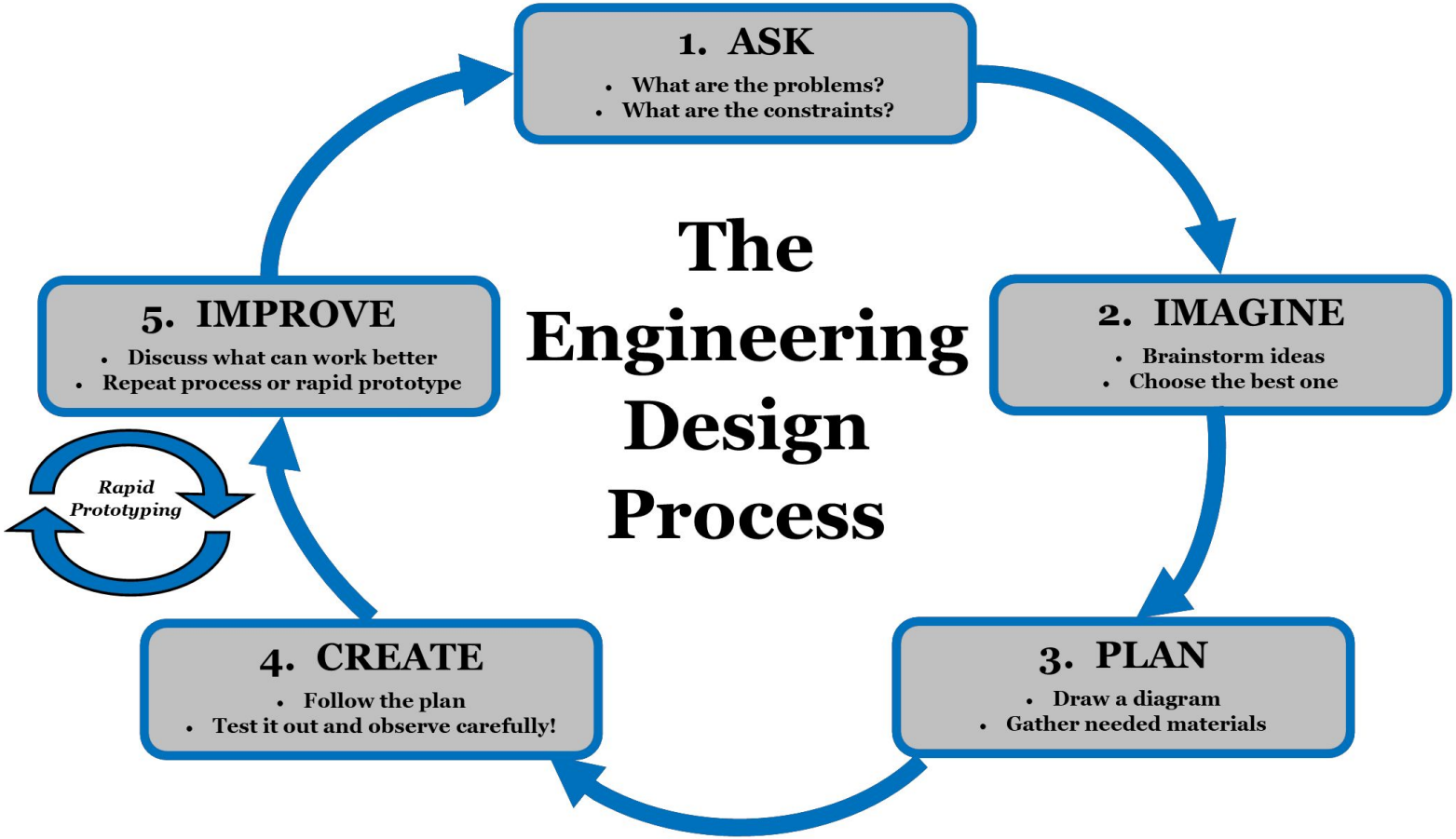


What is engineering?

Engineering is a process by which things or ideas are made better / improved. Everything around you that is man-made has been engineered / improved many times over the years.
*Look around you- what can you see that has been **engineered**?*

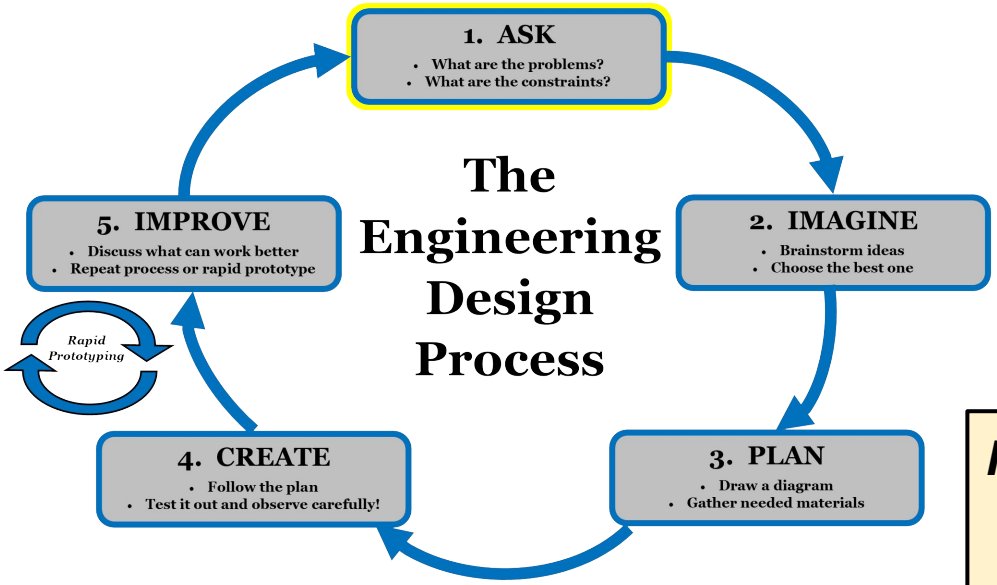
What is an engineer?

*An engineer is somebody who works with teams to solve problems and make things better. **YOU are an engineer** and today you'll learn to work like one!*



This is the process or STEPS that engineers use to create things and solve problems with teams. Today you will get a chance to create/engineer something with your classmates!

Step One: ASK



Today's engineering task:

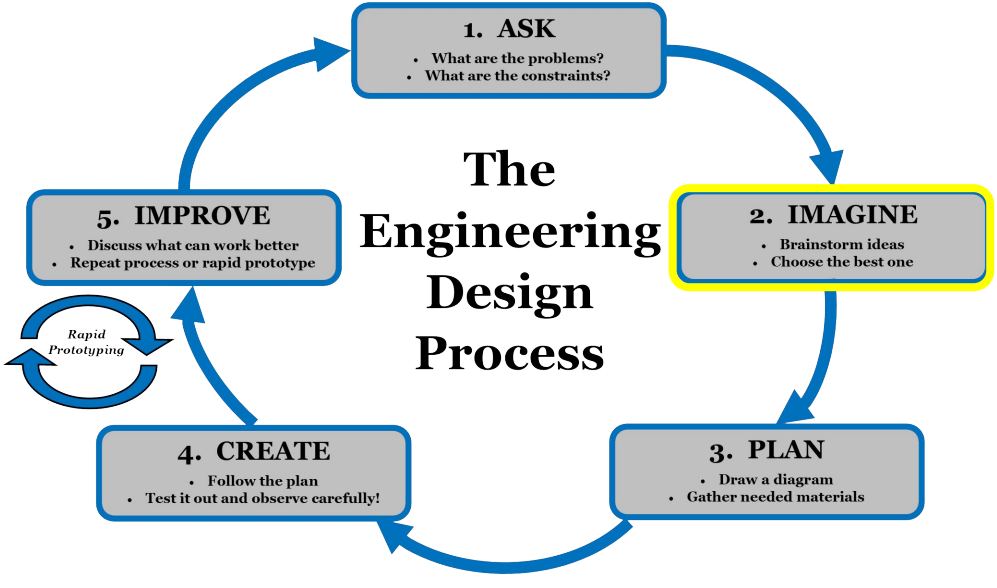
Can you build the TALLEST, SAFEST wall structure for Humpty to sit on?

What questions do you have about this task?

Remember to think like an engineer:

- *Failing is a part of the process- it is normal and expected!*
- *When things go wrong, keep at it- don't give up!*
- *Work kindly with your team- encourage them and problem solve together!*

Step Two: IMAGINE



Task Constraints

(constraints = the rules we have to follow)

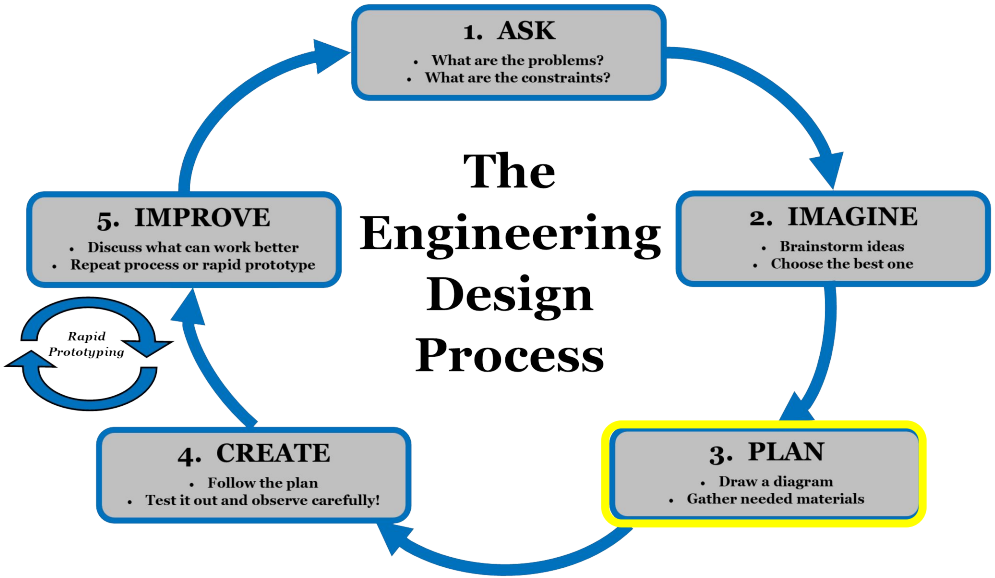
- **You may only use the materials assigned to your group**
- **You will only have 5 minutes to build the tallest structure possible**
- **Humpty (your egg) must sit safely at the top when time is called**

Imagine:

Now is the time to imagine or brainstorm possible solutions.

What ideas do you have about how this problem can be solved?

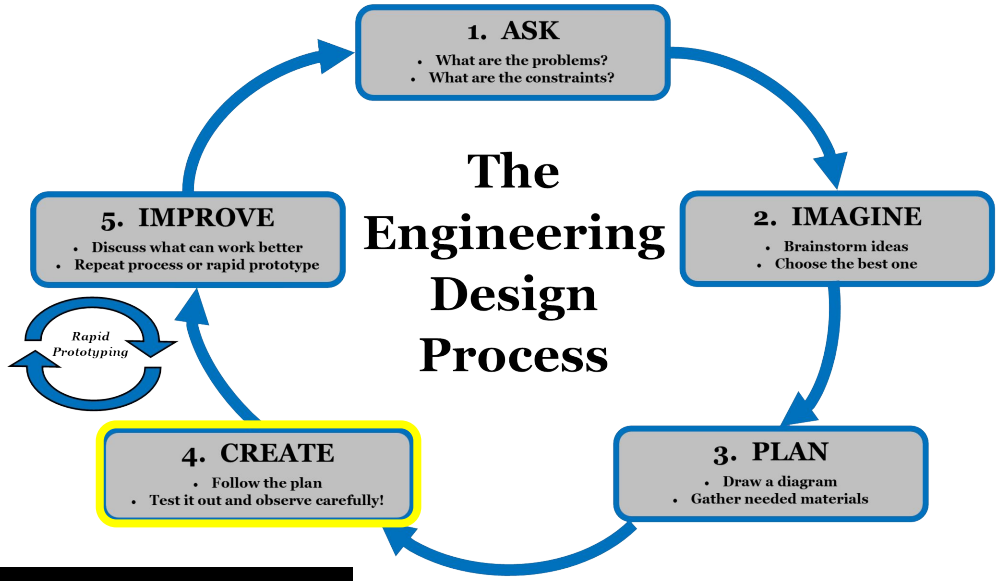
Step Three: PLAN



In small groups, discuss your ideas and draw a diagram/picture together that shows how you will build your wall structure.

When you present your group's plan, you will receive your materials. Please wait for the timer to begin!

Step Four: CREATE



You now have 5 minutes to build your wall- Remember Humpty MUST be sitting safely on top when the timer rings!

Task Constraints

(constraints = the rules we have to follow)

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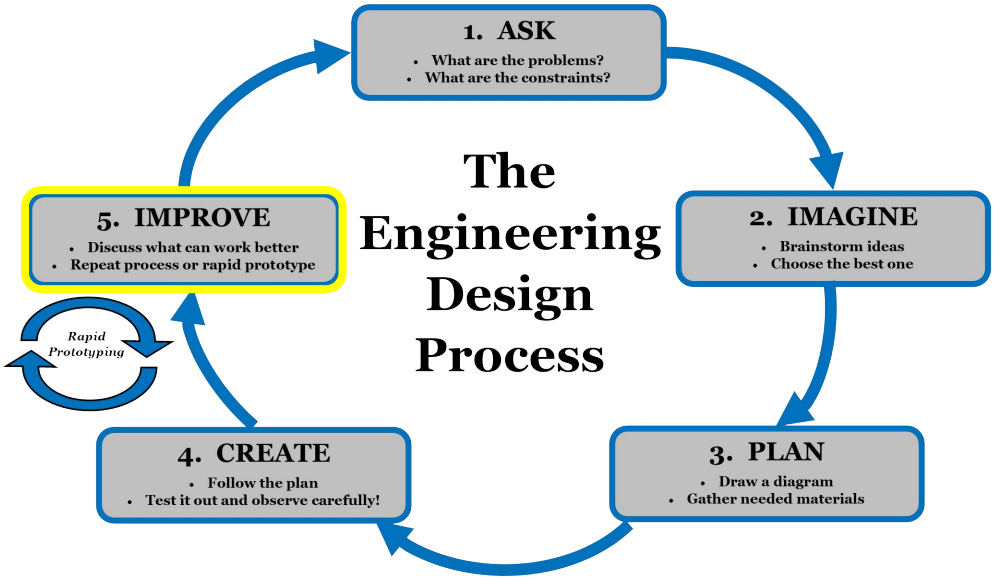
Step Five: IMPROVE



When asked, share your group's design with the class

- *Whose wall was the tallest? Why?*
- *What problems came up when you were building your wall? How did you solve those problems?*
- *Did you have any problems collaborating with your group? How could you handle this better next time?*
- *Did your plan work or did you have to change it when you began building? How would you change your plan if you were able to try again?*
- *If you could add more materials to make your wall better, what would you add and why?*

Teacher Information

Possible Extensions or Modifications:

- Have students write about their problem solving process- what worked, what didn't work, what they'd do differently
- Have students write a story about their egg and his time on their wall- or his perspective from sitting on top
- This task pairs perfectly with the book "After the Fall"
- Do the task again but try and link all the walls together creatively

Ways to change this task to make it easier/harder depending on grade level or experience level of students:

- Increase/decrease time
- Add a testing component- shaking the table, for example.
- Add a budget to the materials list being used and in the Plan stage make sure students stay within budget
- Put a materials constraint on- ie, only use _____ number of blocks- who can make the tallest?