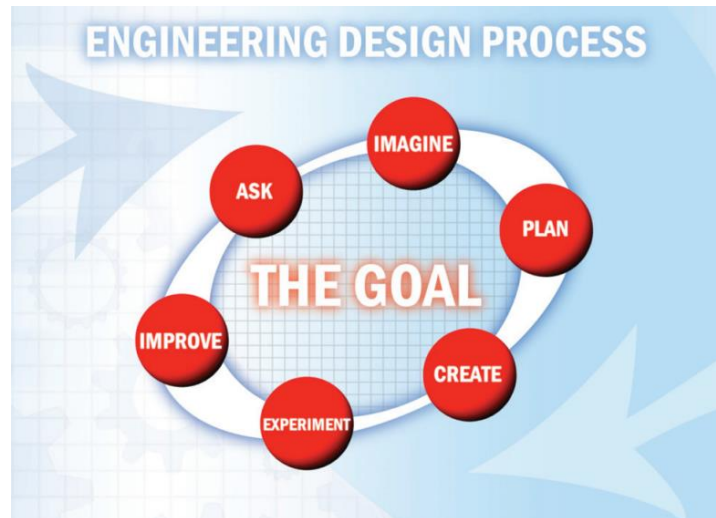


NASA's Cyclical Process

This NASA Engineering Design Process is a series of steps that engineers use to solve problems and create effective solutions. The process is cyclical, meaning it works like a circle. The flow shows that engineers go through steps in a certain order. To meet the goal, you may repeat steps as needed. There are six main steps in the process.



The first two steps require you, the engineer, to understand the problem better. First, ask questions. These questions help identify the problem. They also help understand the requirements of the project. The requirements can include what has to be in the solution and things that cannot be part of the solution. Then, engineers brainstorm possible solutions. This step requires creative thinking. Imagine many possibilities. At first, there are no bad ideas! After you imagine possible solutions, select the most promising ideas.

The next steps are to plan and build an example solution. Create a detailed plan for the chosen solution. This includes drawing diagrams or sketches and outlining the necessary steps and materials needed to make the solution. Then, engineers build a prototype based on the plan. A prototype is an example of the solution that is built quickly to try out the idea—it does not have to be perfect. The prototype step brings the idea to life.

After the solution is built, test and improve it. Test the prototype to see if it works as intended. Identify any issues or areas for improvement. Finally, improve the design using information from the test. Find ways to make it work better. This step may involve revisiting earlier steps to refine the solution.

This engineering process is cyclical. The steps repeat. After improving the design, engineers ask questions about the new idea and brainstorm even more possible solutions. The process continues until the design is perfected.

1. What are the first two steps in this process?

2. What is the definition of “prototype” in this reading?
 - a. the best possible idea
 - b. a plan to solve a problem
 - c. the most perfect final design
 - d. a quick example of a solution

3. Why is the phrase “the engineer” between commas in the second paragraph?
 - a. to show that you are the engineer
 - b. to describe why the engineer is important
 - c. to give an example of who may use this process
 - d. to explain that you and the engineer work together

4. What does the sentence, “At first, there are no bad ideas!” mean?
 - a. Any possible solution could be a good idea when brainstorming.
 - b. It is important to test all ideas, so you can learn which ideas are bad.
 - c. Engineers do not have any ideas when they start the design process.
 - d. No one will come up with any real solutions during the brainstorm step.

5. Here is an older version of NASA’s engineering design process:



NASA's engineering design process ("Habitation Gateway" STEM Guide).

Complete the Venn diagram to compare these two versions of the process.

