

Name:

Date:

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# Engineering Design Process Reference Sheet

## Engineering Design Process Steps

1. **Ask: Identify the Needs and Constraints:** What is the problem? What do I want to do? What are the project requirements? What are the limitations? Who is the customer? What is the goal?
2. **Research the Problem:** Gather information and research what others have done. Talk to people from many different backgrounds and specialties to assist with researching what products or solutions already exist, or what technologies might be adaptable to your needs.
3. **Imagine: Develop Possible Solutions:** You work with a team to brainstorm ideas and develop as many solutions as possible. This is the time to encourage wild ideas and defer judgment! Build on the ideas of others! Stay focused on topic, and have one conversation at a time! Remember: good design is all about teamwork!
4. **Plan: Select a Promising Idea:** Revisit the needs, constraints and research from the earlier steps, compare your best ideas, select one solution and make a plan to move forward with it.
5. **Create: Build a Prototype:** Building a prototype makes your ideas real! These early versions of the design solution help your team verify whether the design meets the original challenge objectives. Push yourself for creativity, imagination and excellence in design.
6. **Test and Evaluate Prototype:** Does it work? Does it solve the need? Communicate the results and get feedback. Analyze and talk about what works, what doesn't and what could be improved.
7. **Improve: Redesign as Needed:** Discuss how you could improve your solution. Make revisions. Draw new designs. Iterate your design to make your product the best it can be.  
And now, REPEAT!

## Types of Simple Machines and Their Mechanical Advantages

<b>Wedge</b>	Pushes material apart, cuts.
<b>Axle and Wheel</b>	Makes it easy to move objects by rolling them, and reducing friction.
<b>Lever</b>	Helps lift heavy objects using longer distances.
<b>Inclined Plane</b>	Makes it easier to move objects upward; a longer path but easier lifting.
<b>Screw</b>	Turns rotation into lengthwise movement.
<b>Pulley</b>	Helps lift heavy objects easier by redirecting

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