

Choose and Ask Questions

- ☐ What device is being taken apart?
- ☐ Draw your device and label all visible parts.
- ☐ What does the device do when in operation?
Research or use operator's manual.
- ☐ What parts do you think you will find inside?
Draw a diagram to go with your description.

Share and Present

- ☐ How will present your findings and your ideas in a clear, and concise way?
- ☐ Be sure to share your notes and observations.



The Reverse Engineering Process

Disassemble and Organize

- ☐ Record the parts you see.
- ☐ What do you think the parts do?
- ☐ What parts make the whole?
- ☐ How can you organize or group the parts you see?

Analyze and Compare

- ☐ Do you see any parts that are similar/different?
- ☐ Are there any simple machines?
- ☐ What part is the largest? Smallest?
- ☐ Why are the parts necessary?
- ☐ Did any parts surprise you?
- ☐ Do the parts have the same function in different devices?

Redesign and Improve

- ☐ How would you improve the way this device is made?
- ☐ How could you change this device to make it work better?
- ☐ Can you redesign this device to make it function differently? How would you do this?



- ☐ Make connections and build background knowledge.
- ☐ Brainstorm questions to guide your research.
- ☐ Identify keywords to make a research plan.

Research Process



- ☐ Present your new knowledge to an audience.
- ☐ Reflect on your research process and product.



- ☐ Search the information landscape to locate resources.
- ☐ Evaluate sources to choose the best ones for you and your topic.



- ☐ Use the writing process to organize information and ideas.
- ☐ Use media ethically by respecting creators and copyright.
- ☐ Use media, technology, and creativity to create a research product.



- ☐ Use reading strategies to develop your understanding of the topic:
 - Make predictions
 - Analyze text structure
 - Identify main ideas and important details
 - Distinguish between facts and opinions
 - Make inferences and draw conclusions
 - Summarize
- ☐ Use note-taking strategies and avoid plagiarism.
- ☐ Organize information as you gather.
- ☐ Collaborate with others.

Ask a Question and Research

- ☐ What are you curious about?
- ☐ What have you seen that makes you wonder?
- ☐ Research to see what has already been discovered about your topic using books, encyclopedias, the internet, etc.

Develop a Hypothesis

- ☐ What do you think is the answer to your question?
- ☐ Make an educated guess based on your research.
- ☐ Take your original question and turn it into an answer.

Conduct an Experiment

- ☐ What will you do to test your hypothesis?
- ☐ Write a step-by-step procedure to test your hypothesis
- ☐ Make a list of materials you will need.
- ☐ Record your observations and data as you carry out your plan.

Draw Conclusions

- ☐ What were your results?
- ☐ What did you learn from your experiment?
- ☐ Is your hypothesis correct?

Share and Present

- ☐ How will you share your findings?
- ☐ Construct a display using charts, graphs, illustrations, signs, models, and/or demonstrations of your experiment.
- ☐ Prepare an oral presentation to explain your project to others.

Scientific Method



Ask

- ☐ What is the problem or need?
- ☐ Who has the problem or need?
- ☐ Why is it important to solve?
- ☐ How have others approached it?
- ☐ What are your design requirements?

Imagine

- ☐ What are some solutions? Try to generate as many possible solutions as you can.
- ☐ Choose the best one. Look at whether each possible solution meets your design requirements.
- ☐ Reject solutions that do not meet the requirements.

Plan

- ☐ Communicate your best solution by drawing and labeling a diagram.
- ☐ Make a list of materials you will need to build your prototype.

Create

- ☐ Follow your plan and build your prototype.
- ☐ Test it out!
- ☐ Did your design solve your problem? Redesign if needed.
- ☐ If you had measurable targets for your solution, did you meet them?

Improve

- ☐ What worked?
- ☐ What didn't?
- ☐ What could've been better?
- ☐ How could you modify your design to make it better?

Engineering Design Process

