ENGINEERING DESIGN
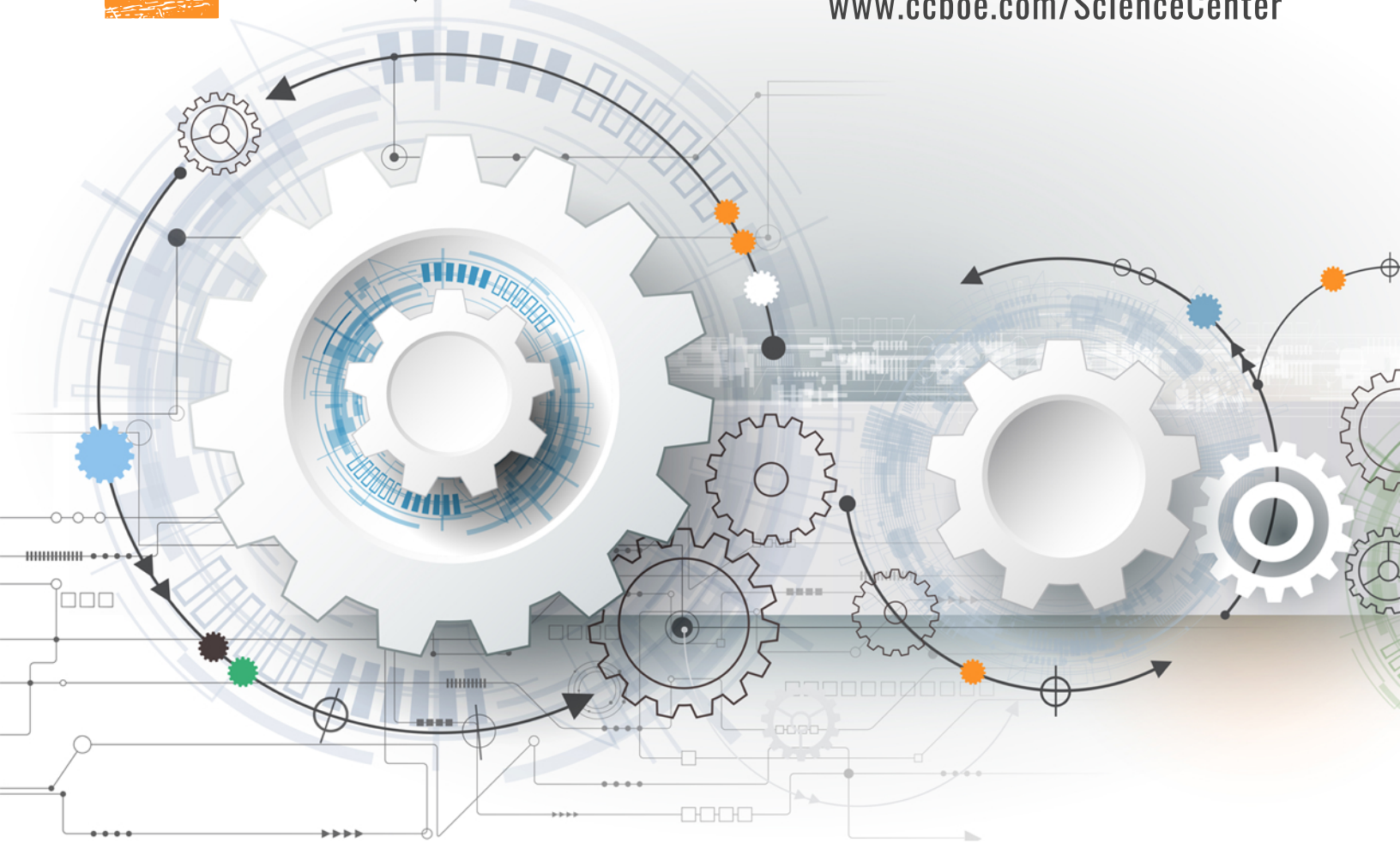

MY WASTE
A SCIENCE @ HOME ACTIVITY

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Engineering Challenge Directions
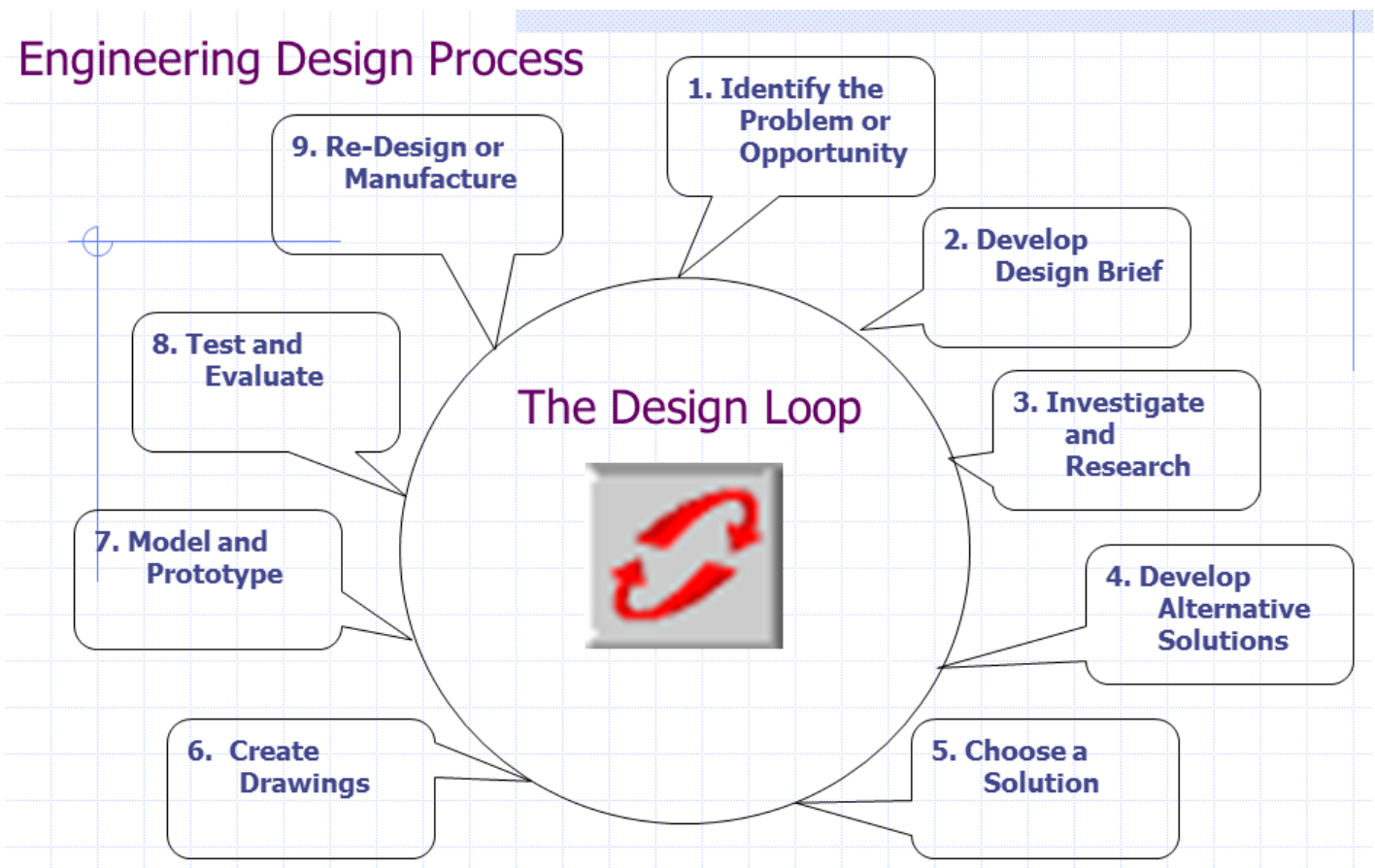
How much waste does my family make?

PURPOSE

Engineering challenges are a fun and educational activity to solve a stated task. There is not a single solution or one correct answer for each specific challenge. Rather you are encouraged to try alternative solutions and use the Engineering Design process to meet each mini-lab or challenge for the optimal result.

ENGINEERING DESIGN PROCESS

The **engineering design process** is a series of **steps** that engineers follow to come up with one possible solution to a problem. Often the solution involves **designing** a solution that accomplishes a certain task and/or meets certain criteria. However, one very important aspect of the design process, is the feedback loop. This is used to look at outcomes and then make adjustments to develop a solution that is more successful at meeting the task.

Engineering Design Process

The Design Loop

1. Identify the Problem or Opportunity
2. Develop Design Brief
3. Investigate and Research
4. Develop Alternative Solutions
5. Choose a Solution
6. Create Drawings
7. Model and Prototype
8. Test and Evaluate
9. Re-Design or Manufacture

LET'S LEARN ABOUT THE AMOUNT OF WASTE WE MAKE

How much trash does the average American produce a day?

- According to the EPA, the average American person will produce about 5.91 pounds of trash each day.
- That adds up to 2,157 pounds of waste per year per person, or over a ton (that is a lot!).
- Americans produce 254 million tons of trash in one year.
- The majority of that trash (2/3) ends up in landfills each year.

Why should we reduce the amount of waste that ends up in landfills?

- Space is limited for all the waste we make in the USA.
- Scientist and experts have said that landfills are bad for our health and environment.
- The EPA states all landfills will eventually leak.
- Runoff from landfills, carry toxic chemicals and it ends up in our water supplies.
- The EPA also found landfills to be the third-largest source of human-related methane emissions (a greenhouse gas 86 times more potent than carbon dioxide) in the United States.
- Harmful chemicals and greenhouse gasses are released from waste in landfills

Methane
(a very strong greenhouse gas) produced from food and garden waste kept in anaerobic conditions.

Compactor
Removes air in the landfill to save space which creates an anaerobic environment.

Landfill
Food scraps and garden waste create acids in anaerobic conditions and pollutes groundwater.

Leachate
Soaks into the surrounding ground and contamintates the groundwater.

Watch the following 3 minute video about landfills

https://app.discoveryeducation.com/learn/videos/ee846b94-63c3-4b64-b104-abd043f114ce/

What is "The Great Pacific Garbage Patch"?

Watch these videos to understand "The Great Pacific Garbage Patch"

https://theoceancleanup.com/great-pacific-garbage-patch/

https://www.schooltube.com/media/GMA+-+The+Great+Pacific+Garbage+Patch/1_826uee8m
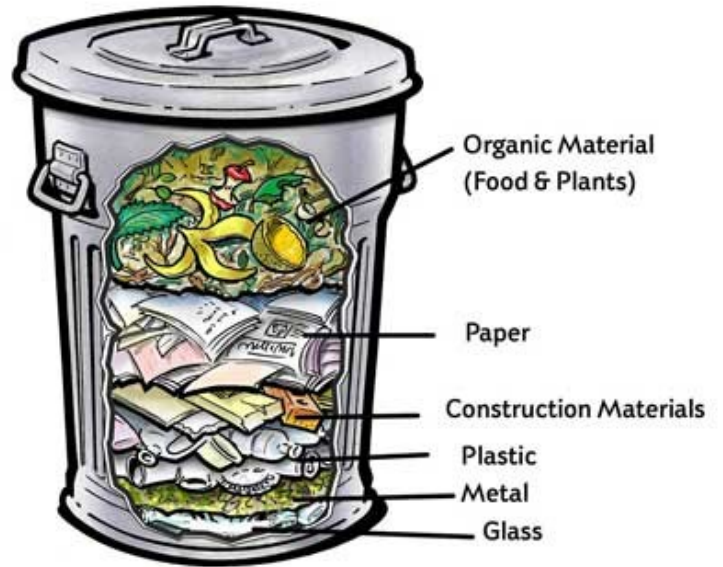
What's in my Family's Trash?

Observe the trash that your family creates in a day.

Use the following chart to classify how the trash could be sorted.

Develop a plan to reduce the amount of waste which would ultimately end up in your local landfill.

With your parents permission implement your plan.

Organic Material (Food & Plants)

Paper

Construction Materials

Plastic

Metal

Glass

Waste	Recycle	Repurpose	Reduce	Compost

Now that you have collected some data on your families waste habits, create a plan that will result in less of your families waste ending up in a landfill.

MY FAMILIES PLAN TO REDUCE WASTE: