Rubber Band Car Engineering Design Challenge

Student Notebook

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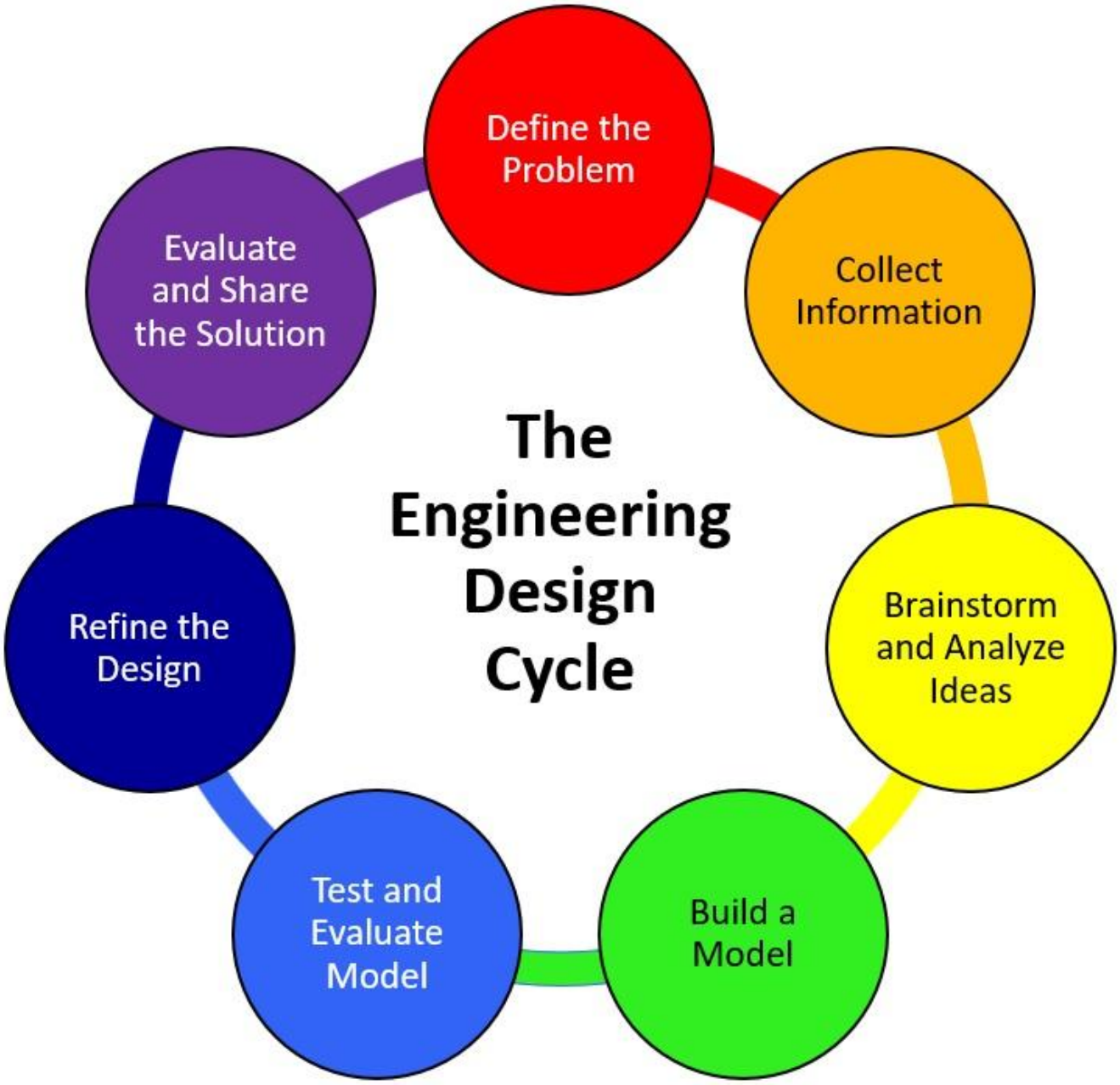
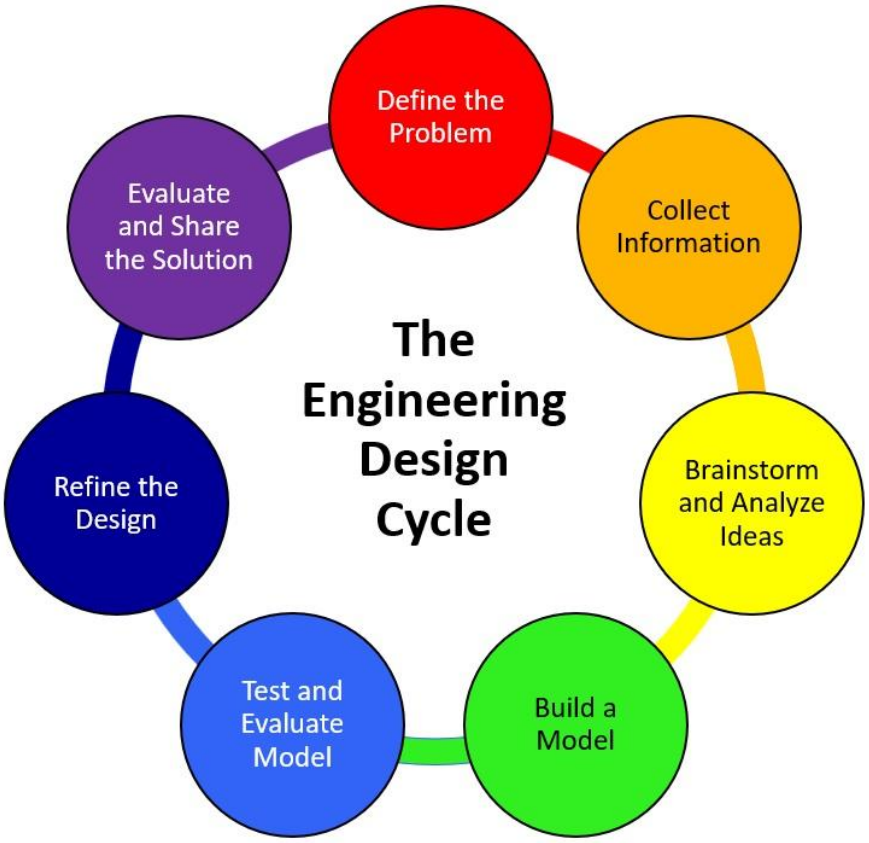
The engineering design cycle is a systematic approach to solve a problem.



The Challenge

Use the engineering design cycle to create a 3D printed car that:

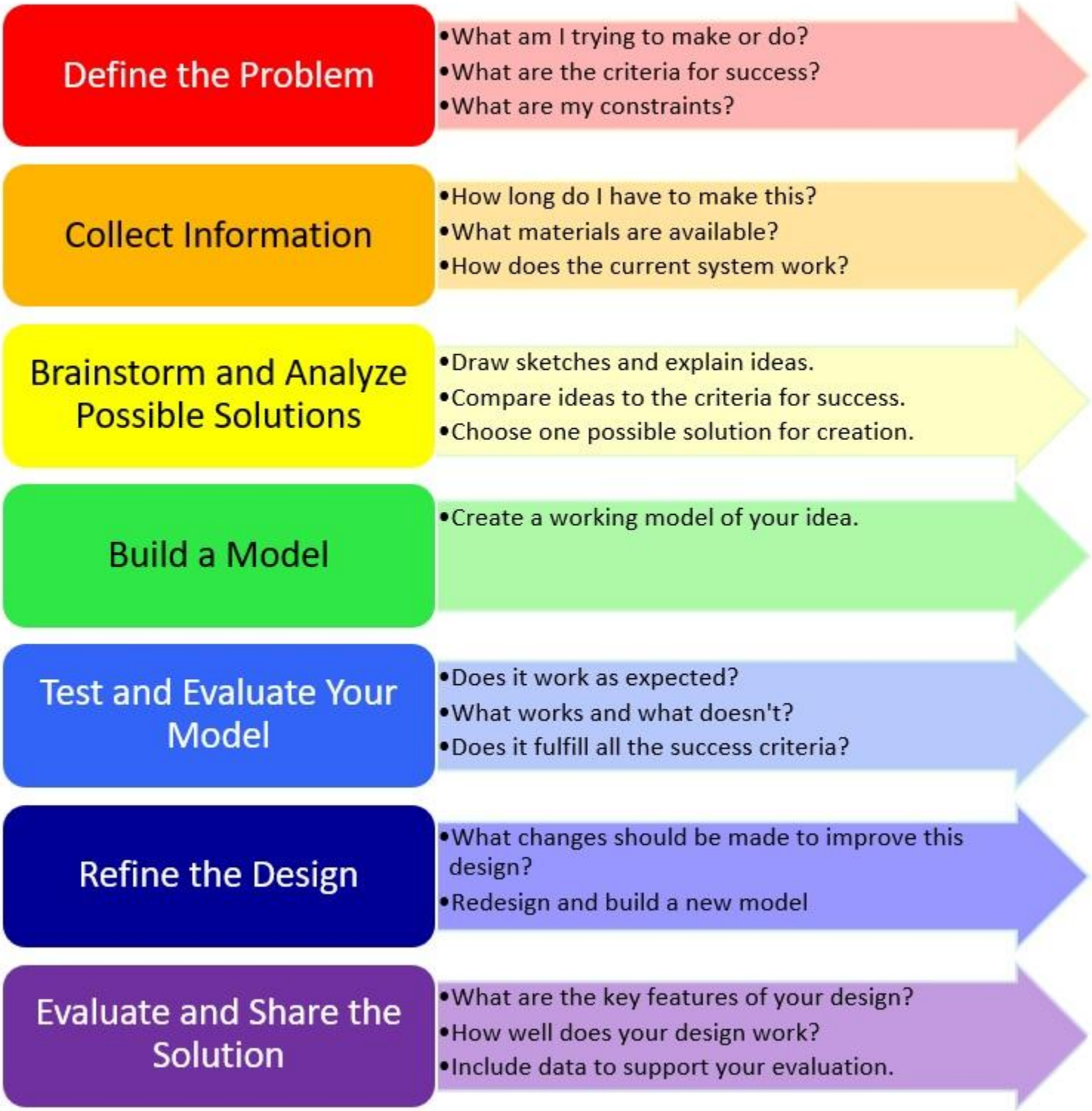
- fits inside a 180mm x 120mm x 120mm sizing box.
- Is powered by the stored energy from a rubber band.
- Must contain at least one **original** 3d printed part.
- Must travel at least 3 meters before stopping.
- Must be visually appealing.

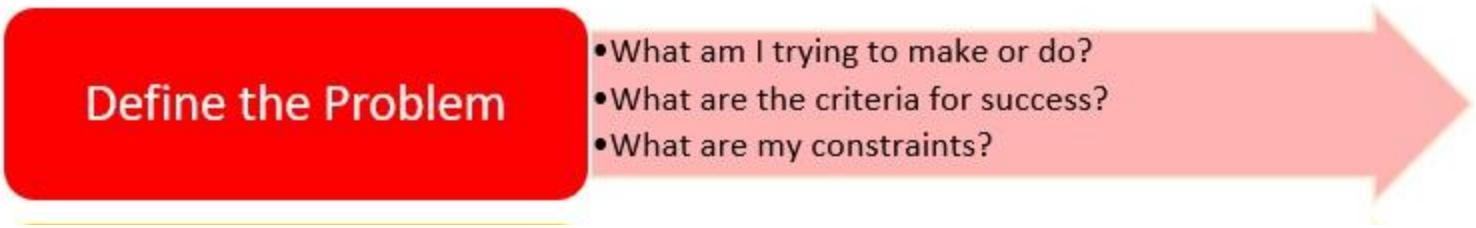


The Original Car

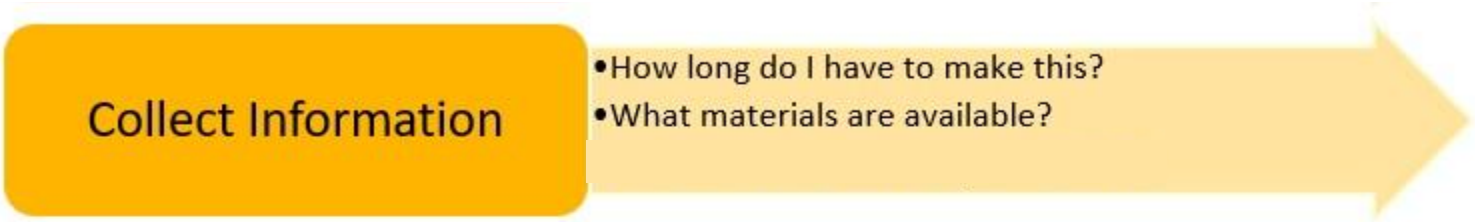
Mrs. Killian designed the original rubber band car for us. Our job is to understand this system and improve it over the next few weeks. All of the original car's TinkerCAD files will be shared with the class.

The engineering design cycle explained:





Use this page to answer the questions listed above.



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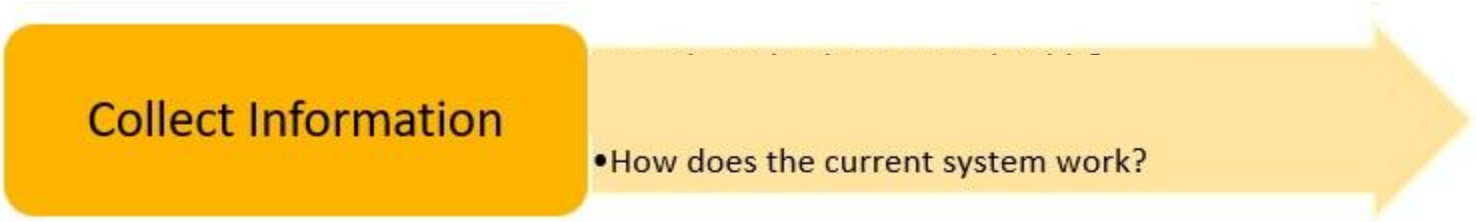


How far does this car travel? Complete the data table below:

Distance traveled in centimeters			
Trial 1	Trial 2	Trial 3	Average

Does the current car fit in the sizing box?

Is the current car visually appealing?

Is anything else wrong with the original car? Make a list here:

Collect Information

What other questions can you ask about this system?

The purpose of this experiment is to determine if the size of the wheels makes a difference in how far the car goes.

Wheel Size	Distance traveled in cm			
	Trial 1	Trial 2	Trial 3	Average

Conclusions:

Collect Information

What other questions can you ask about this system?

The purpose of this experiment is to determine if the size of the car body makes a difference in how far the car goes.

Body size	Distance traveled in cm			
	Trial 1	Trial 2	Trial 3	Average

Conclusions:

Collect Information

What other questions can you ask about this system?

The purpose of this experiment is to determine if the number of winds of the rubber band makes a difference in how far the car goes.

Rubber band winds	Distance traveled in cm			
	Trial 1	Trial 2	Trial 3	Average

Conclusions:

Collect Information

What other questions can you ask about this system?

The purpose of this experiment is to determine

	Distance traveled in cm			
	Trial 1	Trial 2	Trial 3	Average

Conclusions:

Brainstorm and Analyze Possible Solutions

- Draw sketches and explain ideas.

Using the information you have gathered and the stated design criteria, brainstorm 3 designs with your partner. Include a description and drawing for each design. If size matters, include measurements and units.

Idea 1.

Brainstorm and Analyze Possible Solutions

- Draw sketches and explain ideas.

Using the information you have gathered and the stated design criteria, brainstorm 3 designs with your partner. Include a description and drawing for each design. If size matters, include measurements and units.

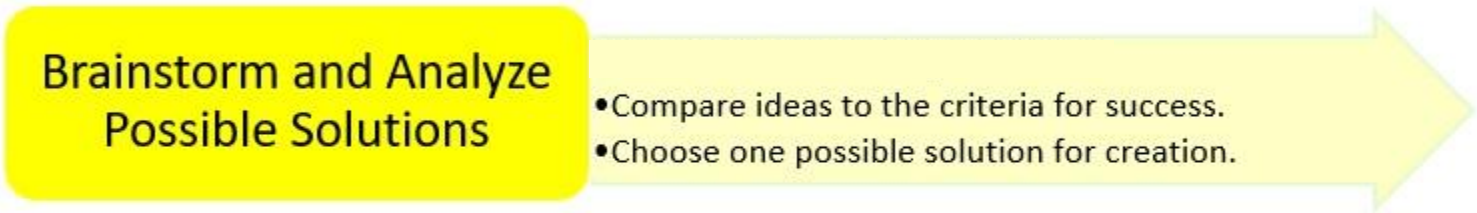
Idea 2.

Brainstorm and Analyze Possible Solutions

- Draw sketches and explain ideas.

Using the information you have gathered and the stated design criteria, brainstorm 3 designs with your partner. Include a description and drawing for each design. If size matters, include measurements and units.

Idea 3.



Look at your 3 design ideas. How do they do on each design criteria?

	Idea 1	Idea 2	Idea 3
fits inside sizing box			
Has an **original** 3d printed part			
Is visually appealing			
Other notes			

Choose the best design based upon your chart above.

Build a Model

- Create a working model of your idea.

Using TinkerCad, create a 3D model of your design and send it to the printer. **Take a screenshot of the CAD and insert here.**

Test and Evaluate Your Model

- Does it work as expected?
- What works and what doesn't?
- Does it fulfill all the success criteria?

fits inside sizing box	
Has an **original** 3d printed part	
Is visually appealing	
Does it go 3 meters?	
What doesn't work or could be improved?	

Refine the Design

- What changes should be made to improve this design?
- Redesign and build a new model

Using TinkerCad, create a 3D model of your redesign and send it to the printer. **Take a screenshot of the CAD and insert here.**

Evaluate and Share the Solution

- What are the key features of your design?
- How well does your design work?
- Include data to support your evaluation.

Include a photo of your final car and a brief description of the key features.

Evaluate and Share the Solution

- What are the key features of your design?
- How well does your design work?
- Include data to support your evaluation.

Distance traveled in centimeters			
Trial 1	Trial 2	Trial 3	Average

fits inside sizing box	
Has an **original** 3d printed part	
Is visually appealing	
Does it go 3 meters?	
What doesn't work or could be improved?	
What is the best part of your car?	