Understanding the Engineering Design Process

Consequences

1st warning

2nd | lunch detention with reflections

3rd | Contact Parent/Guardian

4th | Report to Team Leader/Administration

Warm-Up

In your notebook, start a new blank page, add the date and complete the warm up.

Look around the classroom and identify 3 engineered items. How do they make your life easier?



What is Engineering Design Process



Warm-Up

In your notebook, start a new blank page, add the date, and answer the following question …

What is collaboration?

Why is collaboration helpful?

Materials

Notebook
Pencil

Agenda

- ❏ Warmup
- ❏ Engineering Design Process
- ❏ Identify the Problem

Learn to Work Together



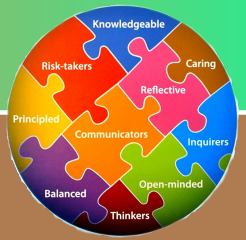
Criteria	Constraints
People - 4 people **Time** - 17 mins or less **Energy -** lantern	**You** - 1 min. **Lab Asst.** - 2 min. **Janitor** - 5 min. **Professor** - 10 min. **Two people can cross at a time** **Must carry a lantern** **No swinging across** **No rafting across** **No befriending zombies**

Friday,Feb 20



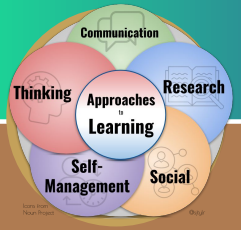
Objective

Students will understand review the engineering process.



IB Trait

Thinker



ATL Skill

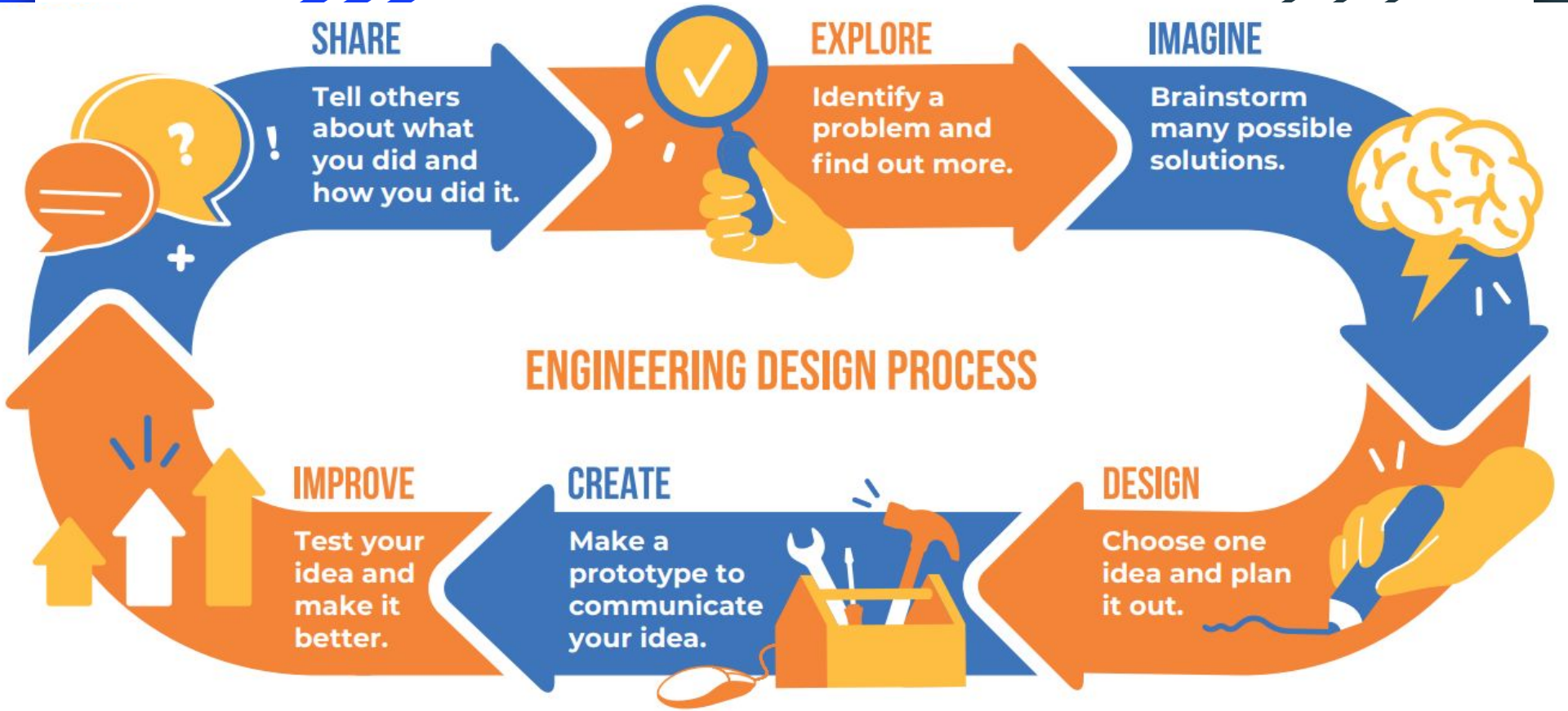
Thinking Skills

CLASSROOM AGREEMENTS

1. **Respect yourself and others** – Use kind words, listen when others speak, and keep hands/feet to yourself.
2. **Follow directions the first time** – Be ready to learn and respond quickly.
3. **Be prepared** – Bring materials, complete homework, and stay on task.
4. **Raise your hand to speak** – One voice at a time; don't interrupt.
5. **Take care of our classroom** – Clean up after yourself and respect school property.
6. **Stay on task and try your best** – Focus during class and participate fully.
7. **Move safely** – Always walk, stay in line, and do not run indoors.
8. **No food or snacks** – Eat only during designated times.
9. **No hats or hoodies** – Keep your head uncovered during class.



ENGINEERING DESIGN PROCESS



Step 1:Define the Problem

Identify exactly what needs to be solved and what the "rules" are.

You research the issue and set Criteria (what it must do) and Constraints (limits like budget or size).

Step 2: Generate Concept

Come up with as many ideas as possible.

You brainstorm some ideas, and research how others have solved similar problems.

Step 3: Design Solutions

Pick the best idea and make a detailed plan.

You narrow down your ideas to one. You create technical drawings, select specific materials, and map out the exact measurement.

Step 4: Build a Prototype

Build a prototype and see if it works.

You build a functional version/Prototype of your design.

Step 5: Test and Evaluate

Analyze the data and make it better.

Does the prototype meet the criteria? You look at your test results, find failures, and go back to redesign parts that didn't work.

Step 6: Present the Solution

Share your success and findings.

You communicate your final results through a formal report, a presentation, or a demonstration to show that the problem is solved.

Activity-Engineering Design Process

Engineering Design Process

Define the Problem	**Generate Concepts**	**Develop a Solution**
Construct & Test Prototype	**Evaluate the Solution**	**Present the Solution**

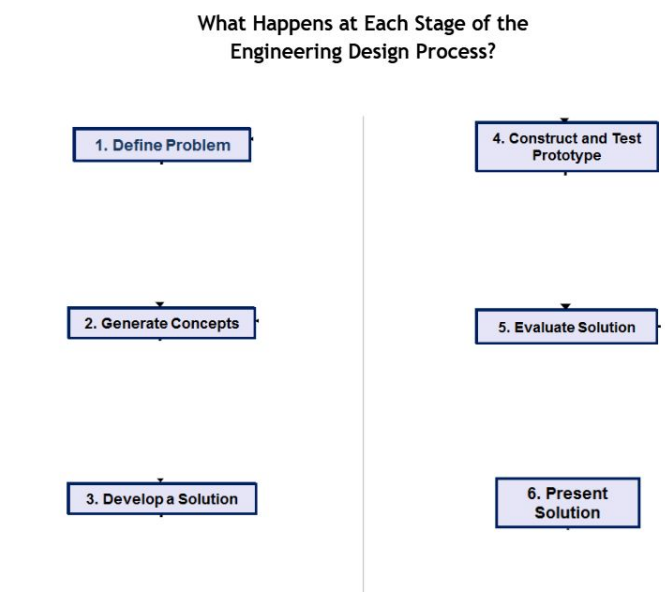
1. A group of engineers visits a town that floods every spring. They meet with residents and city leaders to **identify, validate & justify** the flooding as a serious issue that needs solving.

Which step of the process is this? _____

2. Students are designing a new lunch container. They list the **criteria & constraints**: it must keep food cold, be lightweight, cost less than $15, and fit inside a backpack.

Which step of the process is this? _____

Engineering Design Process Sort



Work in groups to sort the tasks into the appropriate part of stage of the engineering design process.

Practice:



Choose a idea of problem to solve.Apply engineering design steps.Document your process.Prepare to share with class.

1. ***How to carry multiple books without a bag***
2. ***A better way to organize classroom supplies***

Wrap-Up Question

Exit Ticket: Name three things you learned

- One question you still have
- Preview: Tomorrow we'll start applying these steps to our class project
- Homework: Research example of engineering design in everyday life

Optional: ENGINEERING DESIGN PROCESS MATCHING CHALLENGE



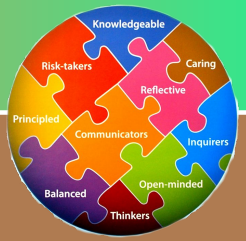
Collect your Notebook.

Tuesday,Feb 24



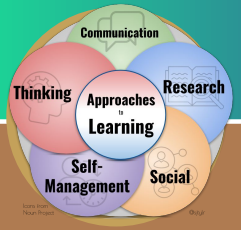
Objective

Students will be able to use the engineering design steps to build, test, and improve a solution to a problem.



IB Trait

Thinker and Risk taker



ATL Skill

Thinking Skills and Communicating Skill

CLASSROOM AGREEMENTS

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Tuesday , February 24th

In your notebook, start a new blank page, add the date, and answer the following question …

What do engineers do when their first idea does not work, and why is it important to improve a design?

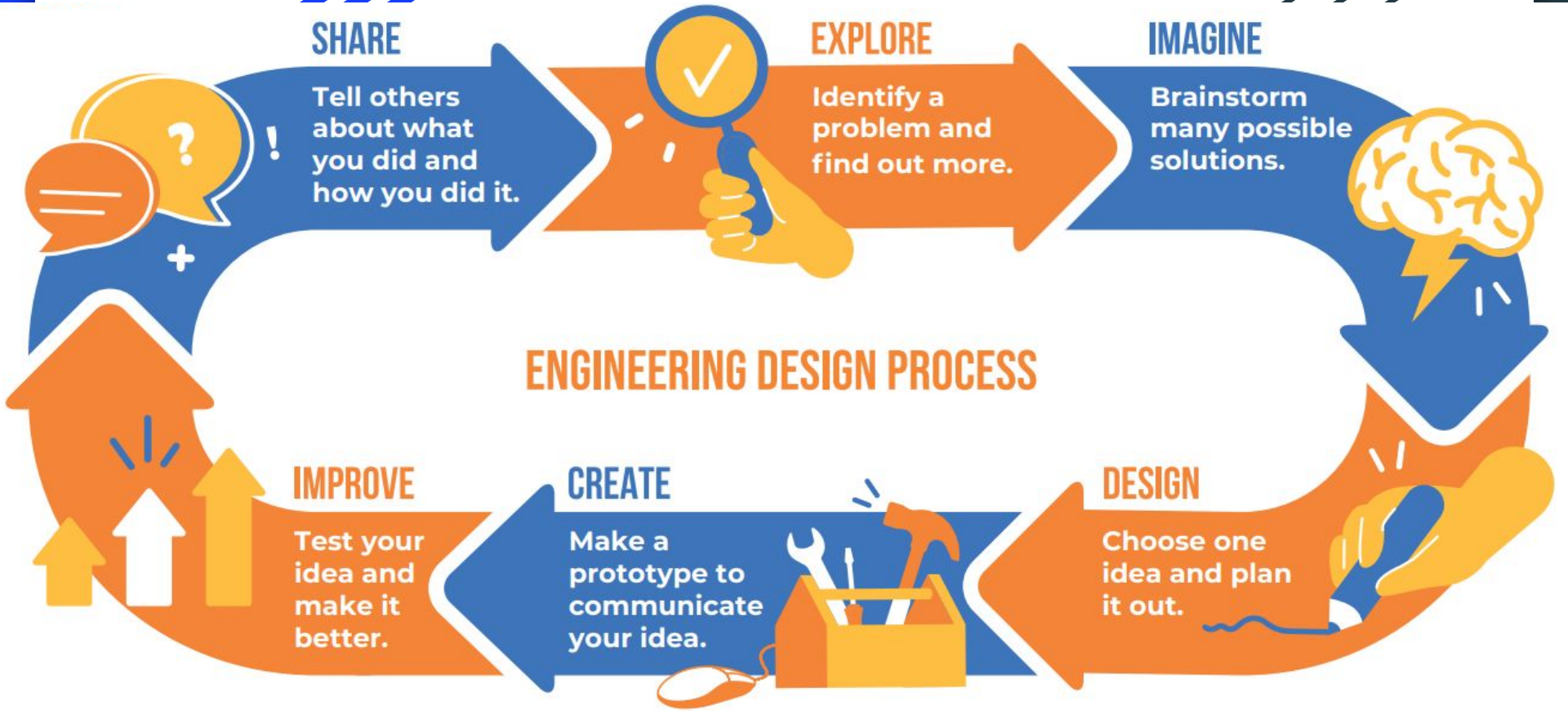
Materials

Notebook
Pencil

Agenda

- ❏ Warmup
- ❏ Engineering Design Process
- ❏ Identify the Problem

ENGINEERING DESIGN PROCESS



ENGINEERING IN ACTION

In 2006, Raphaëla le Gouvello windsurfing 3,541 miles across the Indian Ocean—a record-setting first! Raphaëla first discovered windsurfing while on a family vacation. Soon, the idea of windsurfing across an entire ocean caught her imagination. To turn her dream into reality, she teamed up with engineer Guy Saillard. His challenge was to make her a sailboard she could live on. For years, Guy had experimented with new ways to use durable hi-tech materials such as epoxy resin, carbon fiber, and foams. For Raphaëla, he designed a strong, lightweight, 25-foot-long sailboard. It has a sleeping compartment, a shower, and its own satellite communication system—all the comforts of home. Or not! The cabin was only 8 feet long, 20 inches wide, and 31 inches high (slightly bigger than a coffin). If an engineer could build you the boat of your dreams, would you want to take a trip like Raphaëla's?

Boat Challenge

Team Supplies:

- ❑ 1 - 12” x 12” piece of aluminum foil
- ❑ 1 balloon
- ❑ 2 straws
- ❑ 1 - 12” piece of tape
- ❑ 2 index card
- ❑ 2 wood steak
- ❑ 2 rubber bands

The Challenge:

Build a boat that can hold 25 pennies and travel down the water table fastest.

Constraints & Expectations:

- 20 minutes to build
- Must not sink
- Travel the fastest

In Your Notebook …

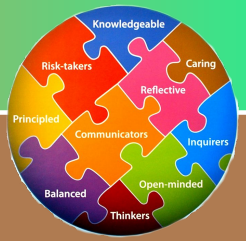
- Brainstorm
- Plan and sketch
- Build
- Share the final design

Wednesday,Feb 25



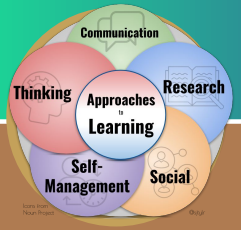
Objective

Students will be able to use the engineering design steps to build, test, and improve a solution to a problem.



IB Trait

Thinker and Risk taker



ATL Skill

Thinking Skills and Communicating Skill

Wednesday, Feb 25th

Get your notebook, boat, and head to your groups space.

Materials

Notebook
Pencil

Agenda

- ❑ Float Test
- ❑ Redesign
- ❑ Reflection Questions

Thursday, Feb 26th

Get your chromebook and keep it close.

Materials

Notebook
Pencil

Agenda

- ❏ Assessment Test
- ❏ Gutter Boat

Take Time & Reflect

1. Describe the results for your boat.
2. What worked well during your team building?
3. What challenges did you encounter?
4. How did your team overcome the challenges?
5. How did testing during the process / build affect your final design? Explain.
6. Did your team successfully complete the challenge? Explain.
7. Did collaboration occur within your team (among the group members)? Provide examples to support your response.