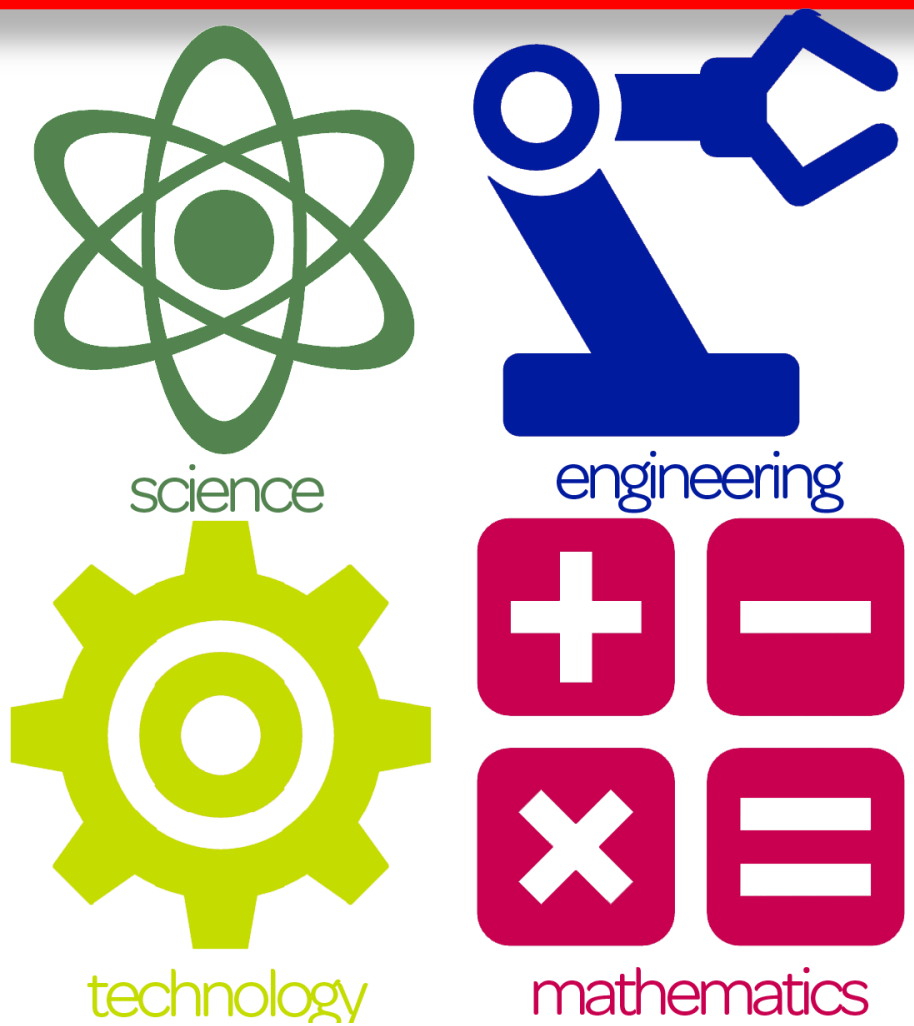
REGULAR COURSES 2019/2020 (BATCH 1)

Project-based learning through Engineering Design Process



Facilitator: Yuji OTSUKA
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What is project-based learning?

Definition

Project-based learning(PBL) is a learning method in which students identify a real-world problem and develop its solution.

Students gain knowledge and skills by working for a longer period of time to investigate

they collaborate with each other and assess themselves and each other.

Why should you use project-based learning?

1. PBL provides opportunities for students to use technology

They are familiar with and enjoy using a variety of tech tools. With those tools and apps, teachers and students can find the right resources, information, create products and collaborate more effectively.

2. PBL promotes lifelong learning

PBL also teaches students to take control of their learning, the first step as a lifelong learner.

3. PBL connect students and schools with the real world

Project-based learning enables students to solve problems in their communities, and the world.

Through PBL, students learn how to interact with adults and organizations.

4. PBL lends itself to formative and authentic assessment

Formative assessment ⇒ student's progress
Authentic assessment ⇒ deep learning

5. PBL encourages students to be more engaged and to learn actively

A real project engages their mind and their hearts.
It's a real world relevance for learning.

6. PBL builds skills for college, career and life

They learn to build their confidence, solve problems, work in teams, and communicate ideas.

7. PBL encourages imagination and creativity

When you need to solve a problem, you have to be inventive and creative.

INTRODUCTION

How do you solve problems in our society?

Many problems
In our life

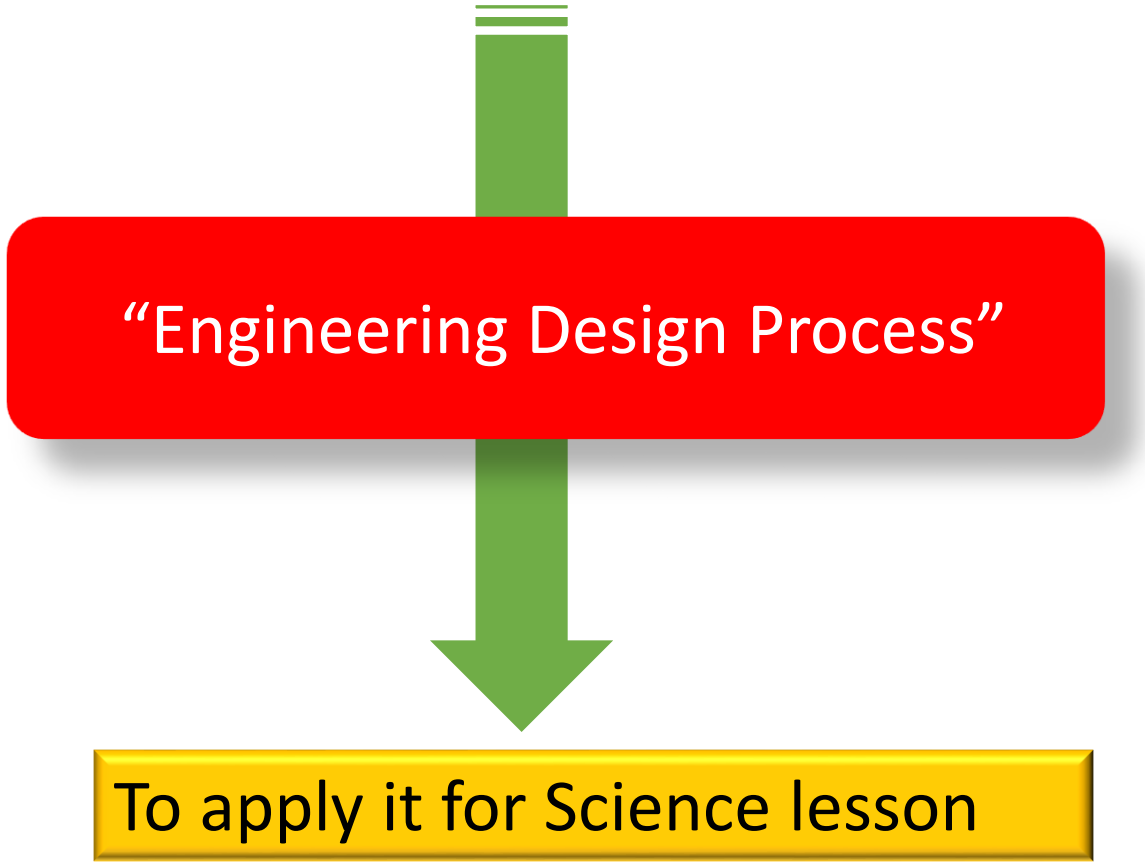
Recycle ?

Waste materials change to Teaching Aids! Possible?

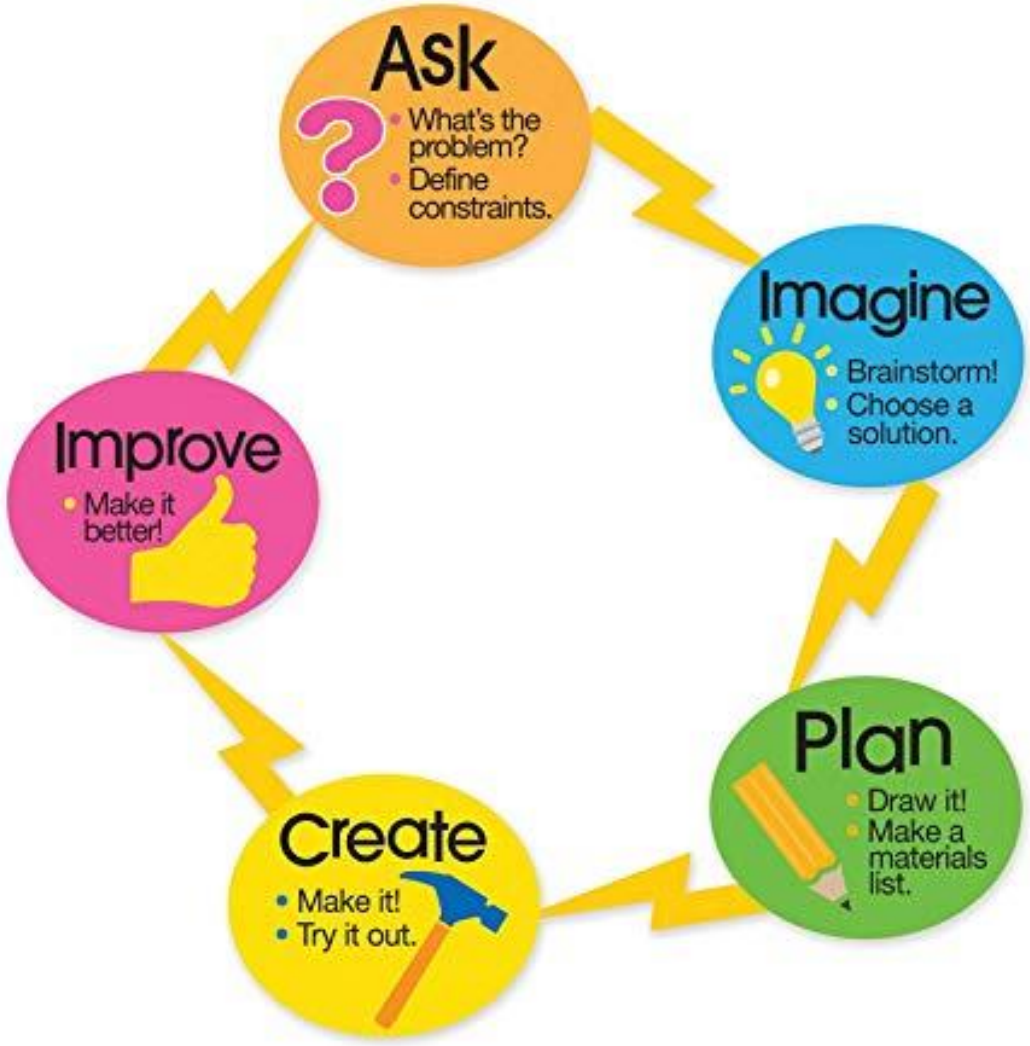
Water Rocket

Objective

To create a Teaching Aid using “Waste Materials”



Engineering Design Process



Engineering Design Process

Design process	Description
Ask	What is the problem? How have others approached it? What are your constraints?
Imagine	What are some solutions? Brainstorm ideas. Choose the best one
Plan	Draw a diagram. Make a list of materials you will need.
Create	Follow your plan and create something. Test it out!
Improve	What works? What doesn't? What could work better? Modify your design to make it better. Test it out!

Source: Museum of Science-Boston, 2009

Example

Drop an egg using a “Plastic Parachute”!

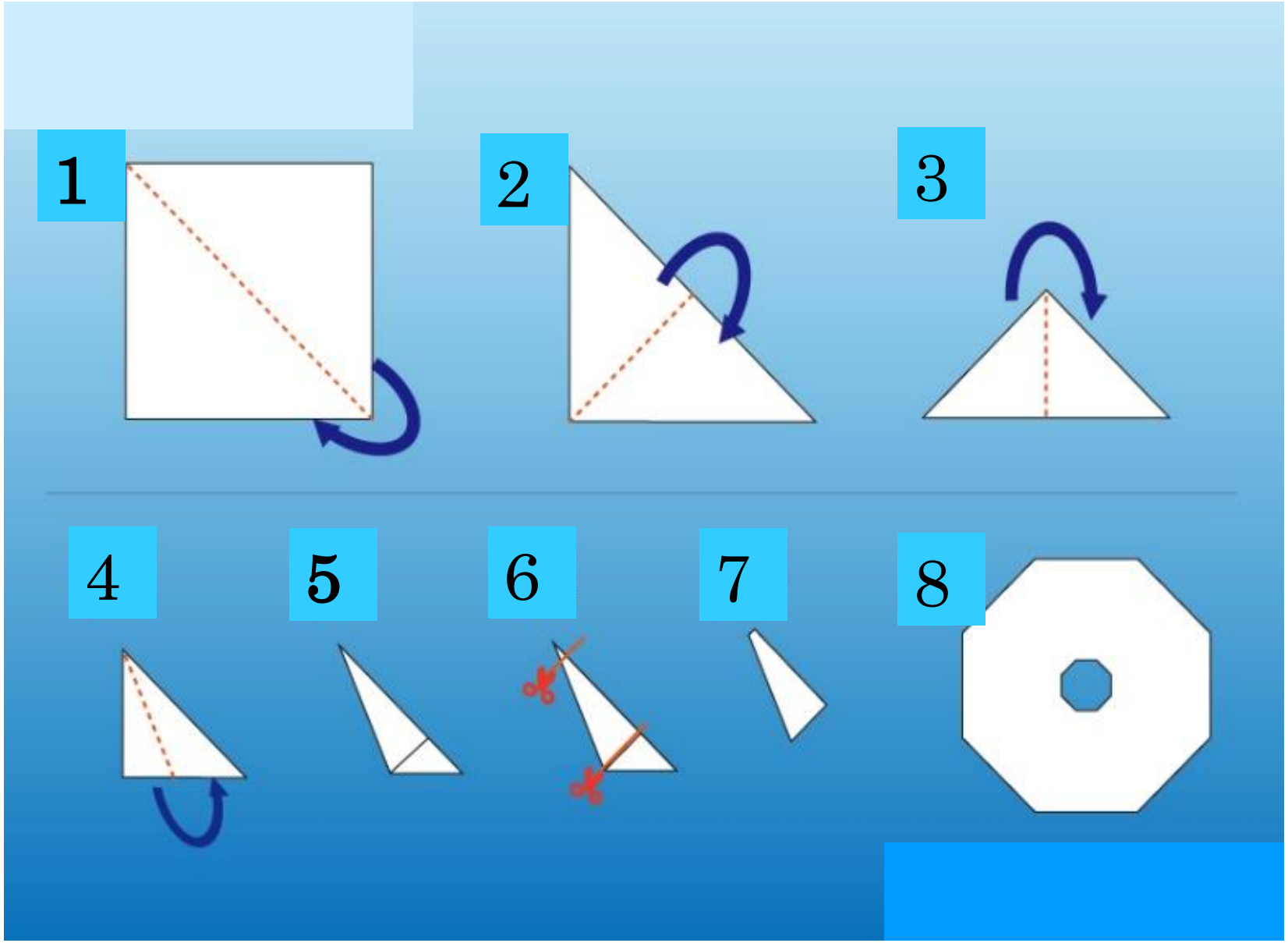
Task 1

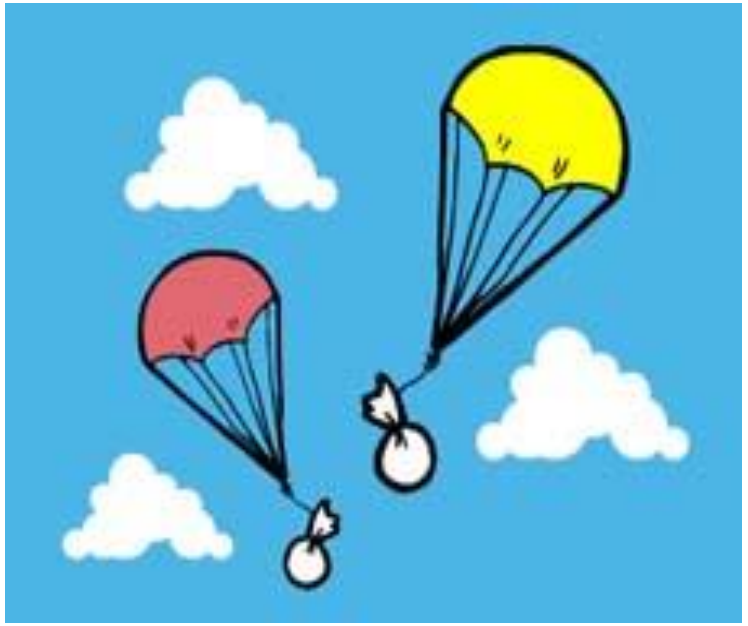
To create a “effective parachute” with the shape of right circle or regular polygon, Which is for a egg not to be broken.

Task 2

To measure the “flying time”

Let’s make a simple parachute!





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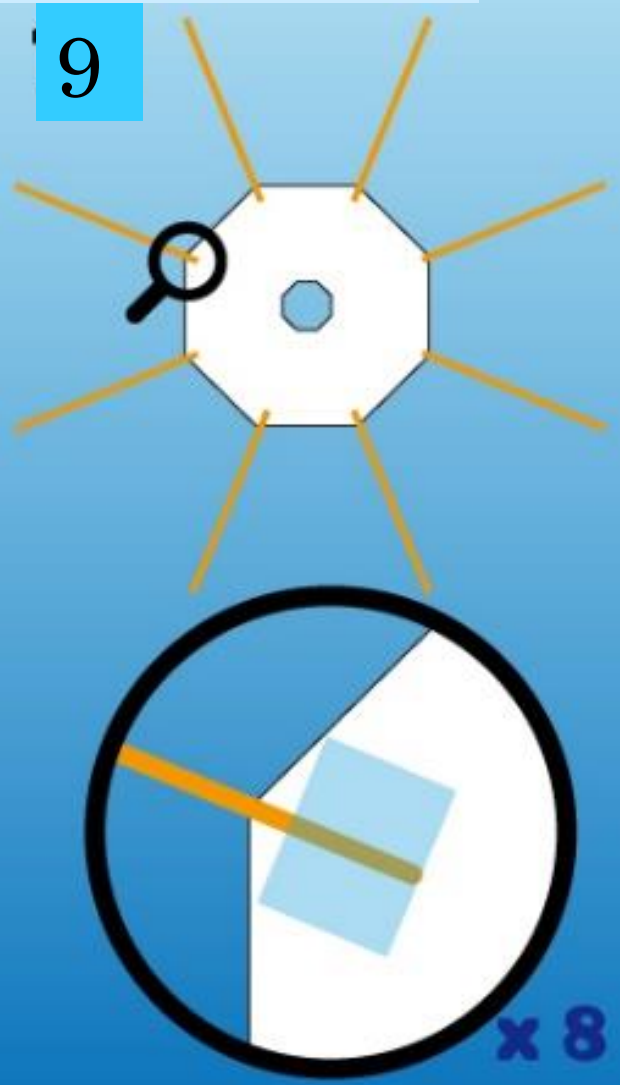

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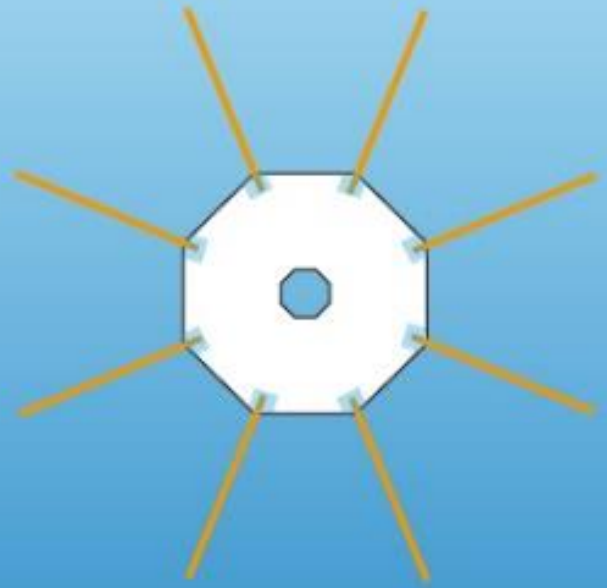

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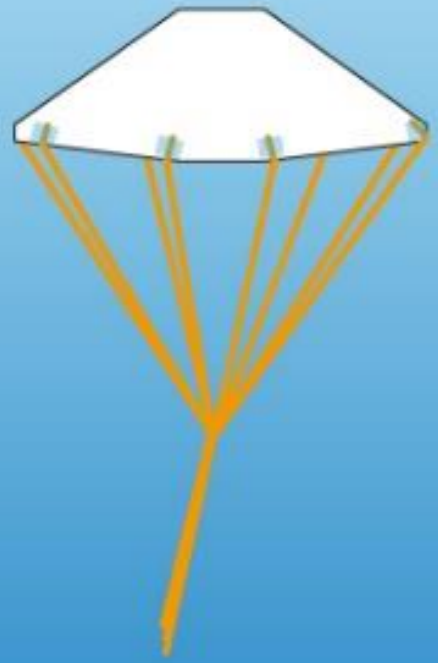


Application for a Science Lesson

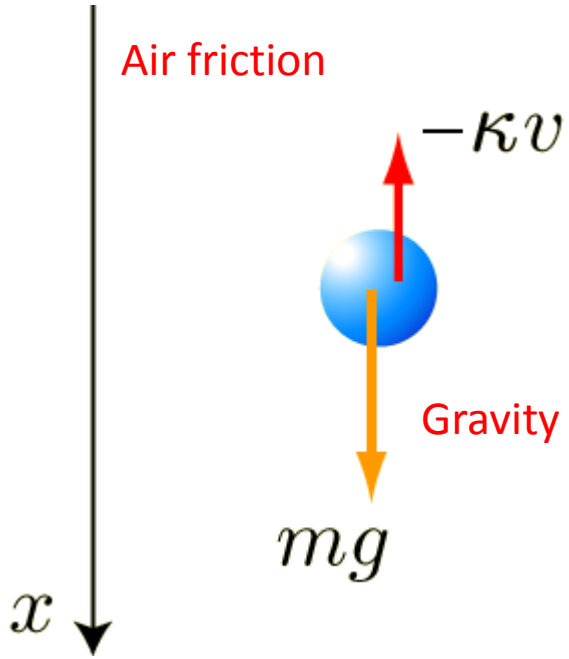
Topic: Air friction (Air resistance)

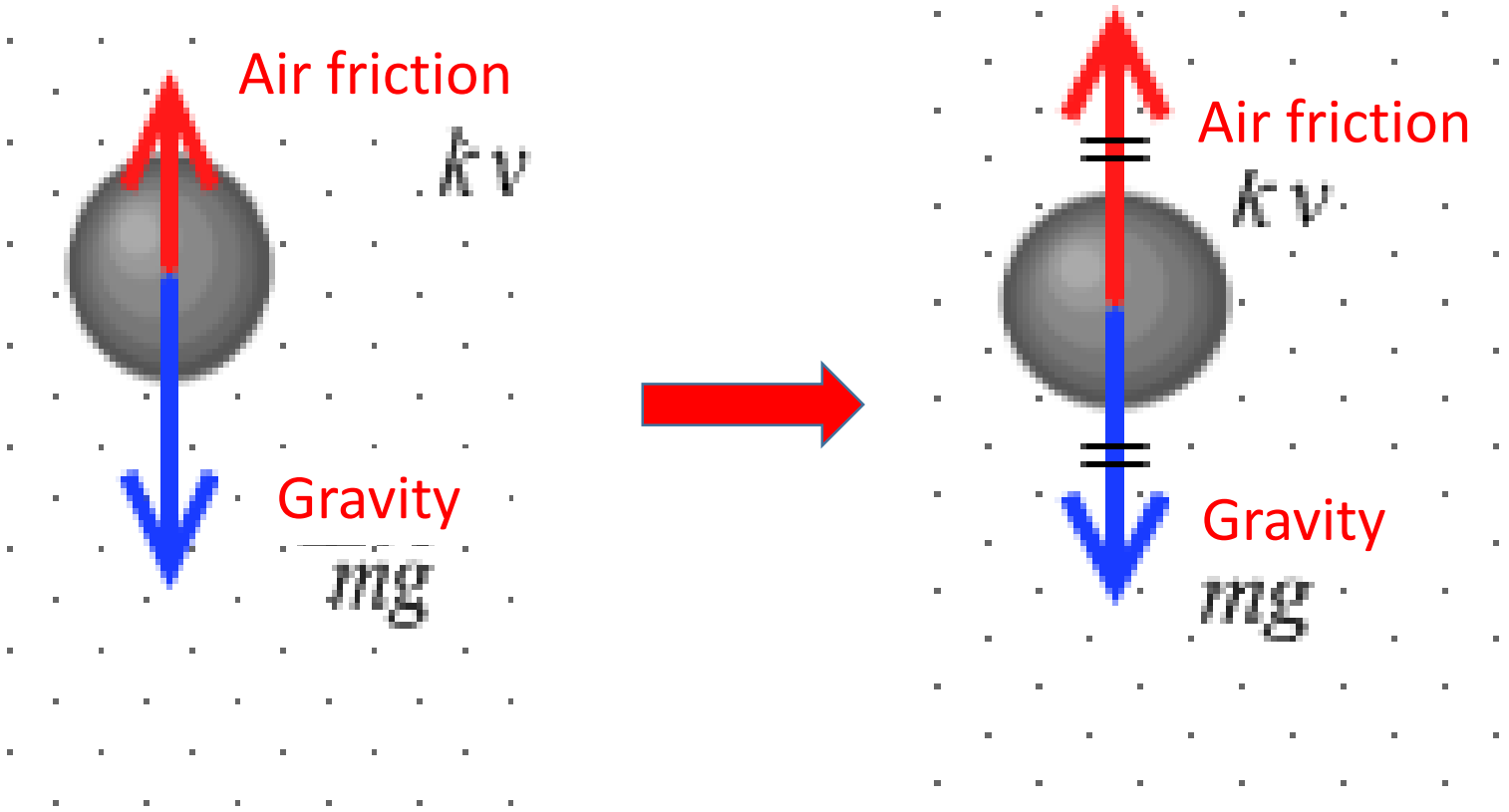
Newton's Low

Acceleration Force

Mass → $ma=F$

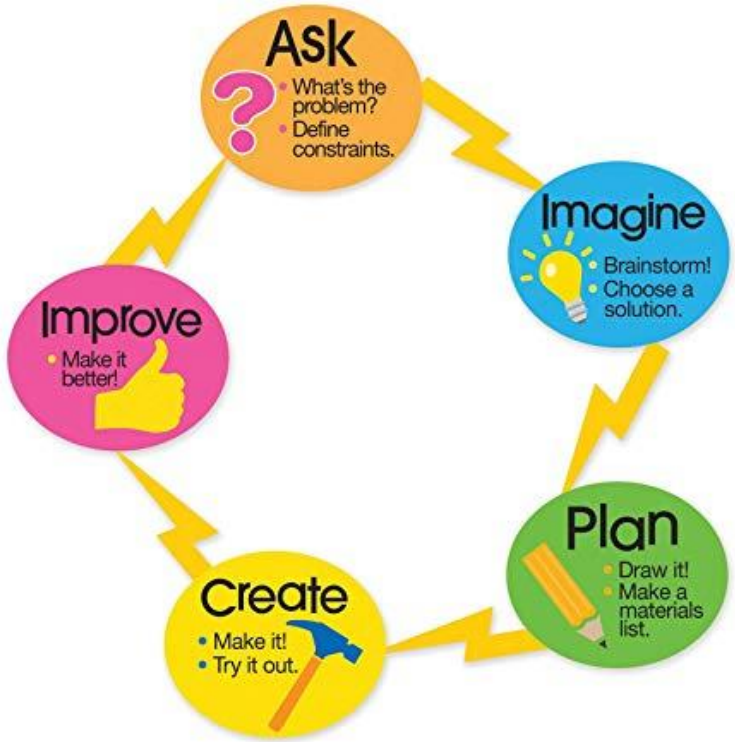
$$ma=F-kv$$




Air friction
kv
Gravity
mg
Air friction
kv
Gravity
mg

Group work (160 min)

Engineering Design Process

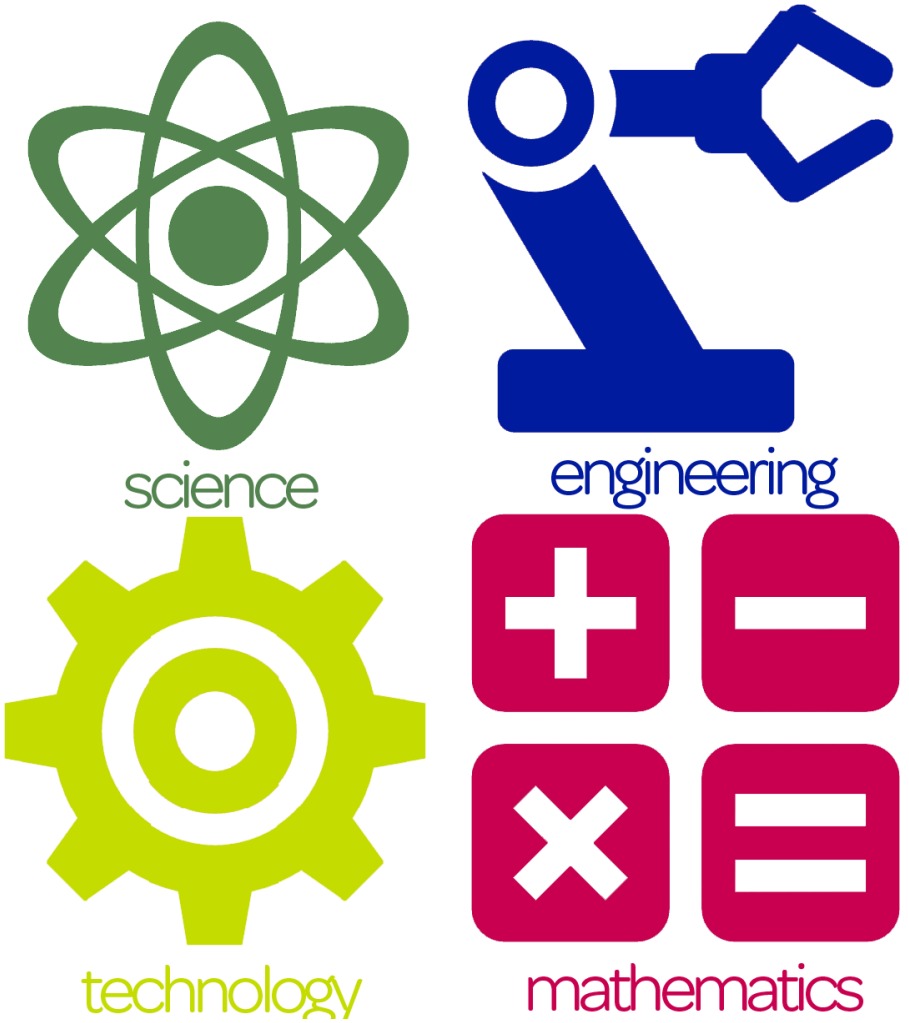


Review (10 min)

Presentation (40 min)

Evaluation (10 min)

Thank you for listening!



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