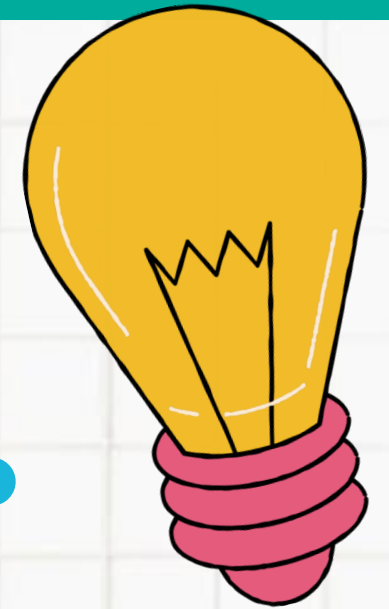
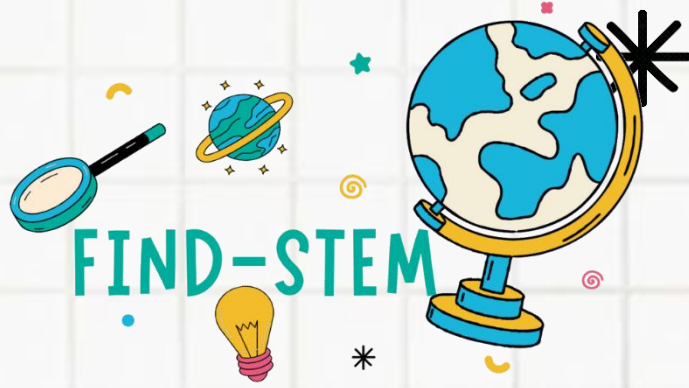


MODULE 2:

Creative and Inclusive Teaching

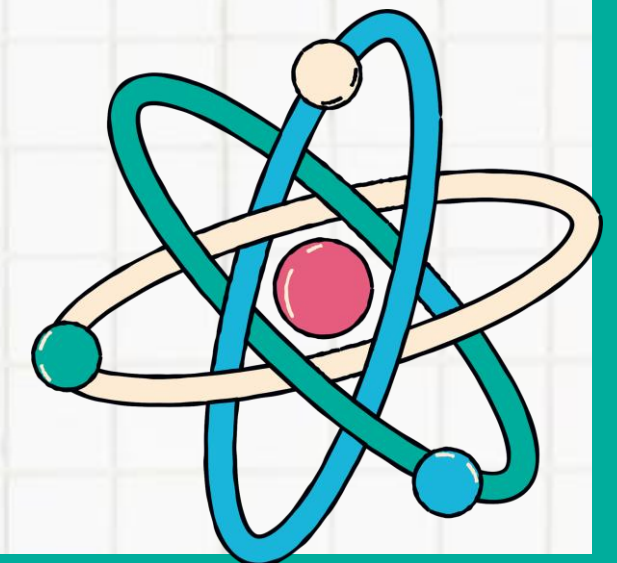
Approaches in STEM

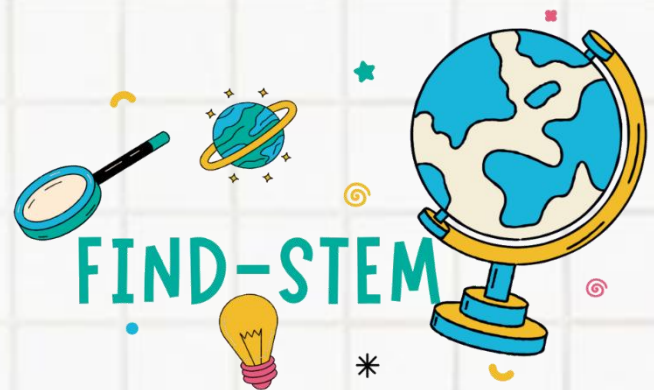




INTRODUCTION

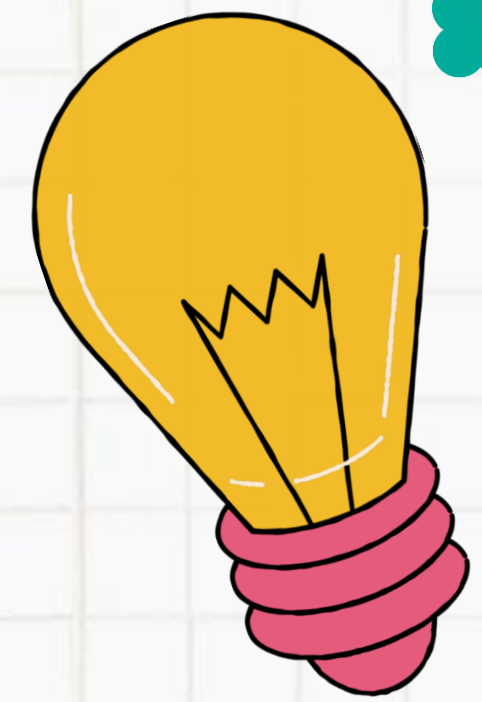
Project-Based Learning (PBL) in STEM is an instructional approach in which students actively explore real-world problems and challenges through hands-on, collaborative projects that integrate concepts from Science, Technology, Engineering, and Mathematics. Rather than learning content in isolation, students apply interdisciplinary knowledge to design, build, test, and refine solutions over time.





FIND-STEM

KEY TOPICS



01

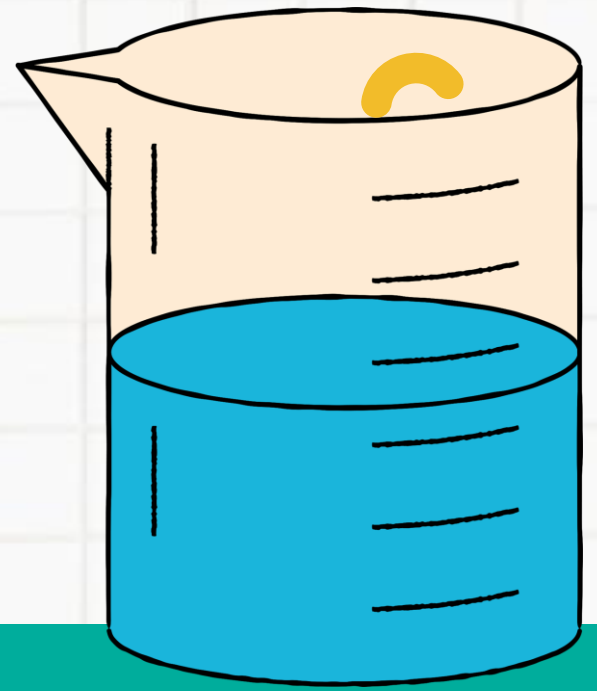
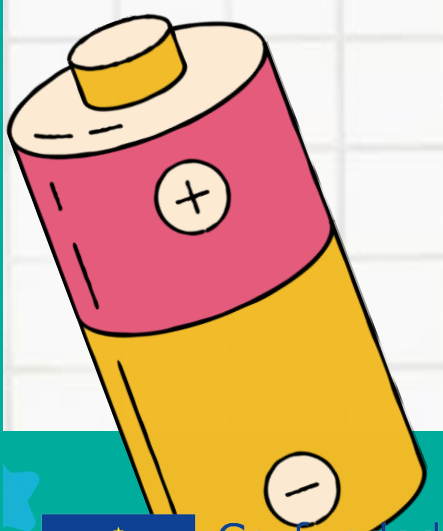
Collaborative projects

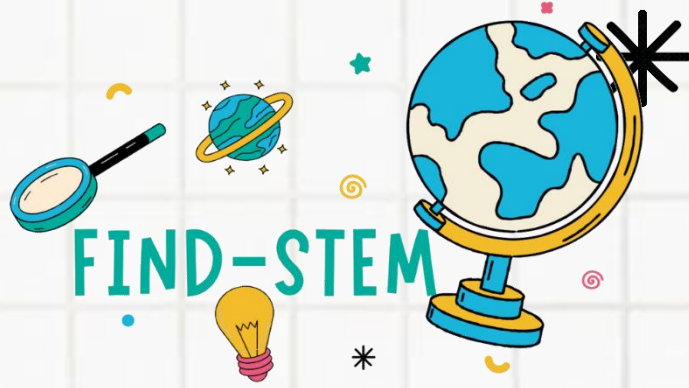
02

Inquiry-Based Learning Techniques

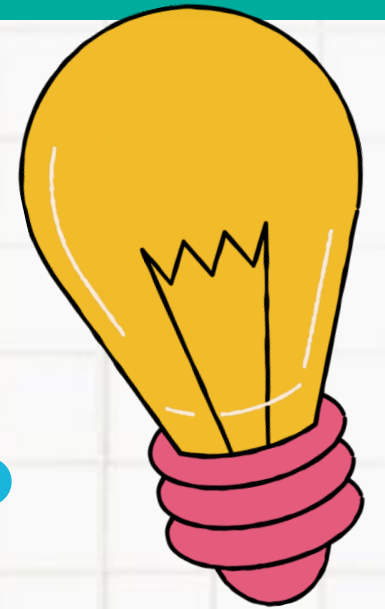
03

Real-world problem-solving

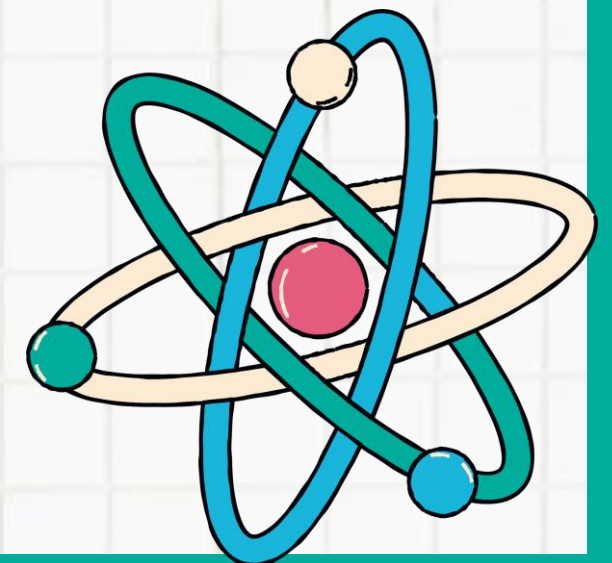


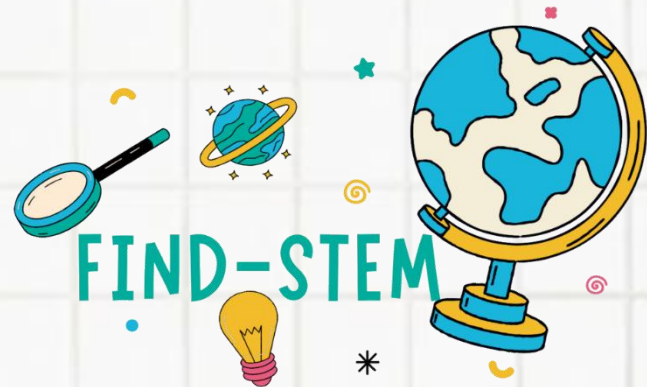


GENERAL LEARNING OUTCOMES



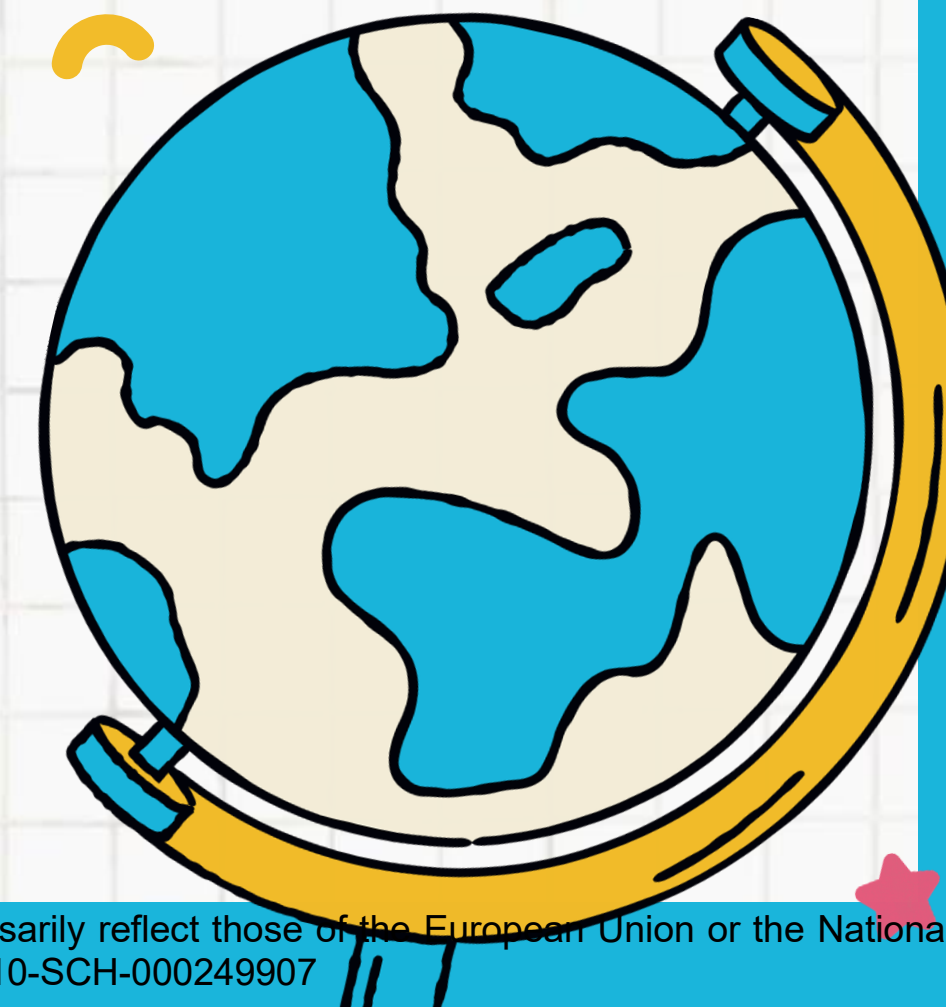
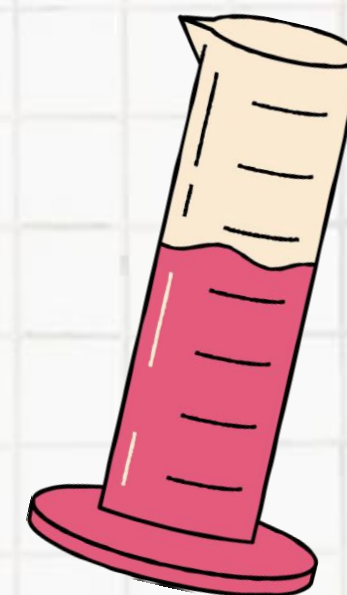
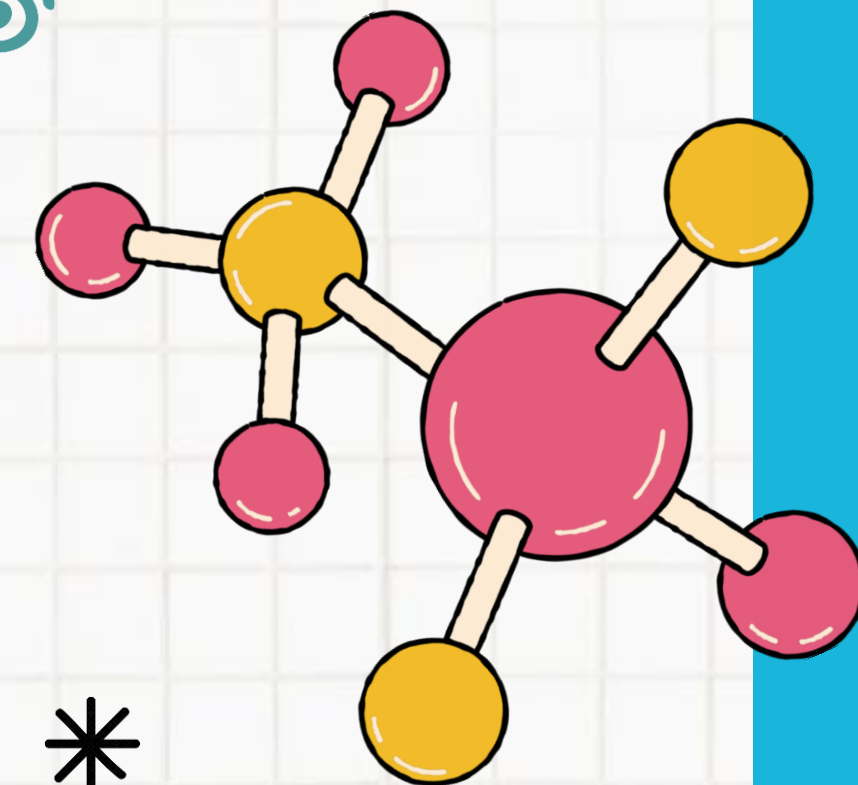
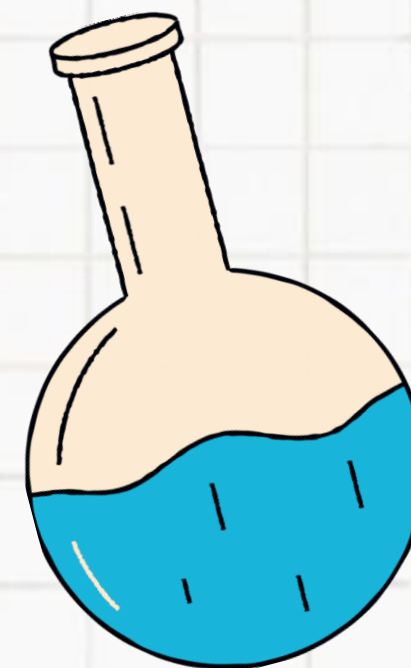
- Design and implement project-based learning experiences that enhance pupil collaboration and problem-solving.
- Apply inquiry-based learning techniques to foster curiosity, independent thinking, and deeper understanding.
- Utilize experiential learning strategies to create hands-on, immersive STEM experiences for diverse learning styles.
- Develop strategies to adapt STEM lessons to be more inclusive and engaging for all pupils, especially those from underrepresented groups.

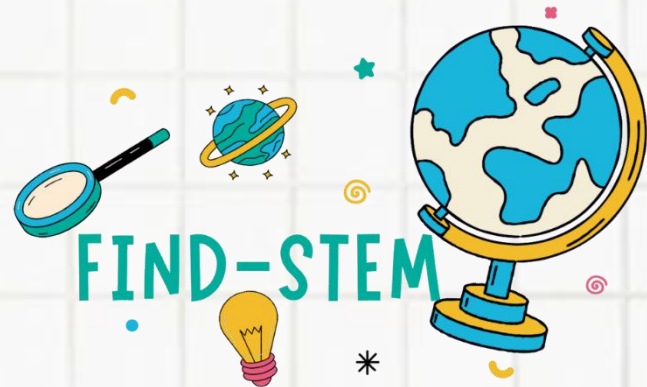




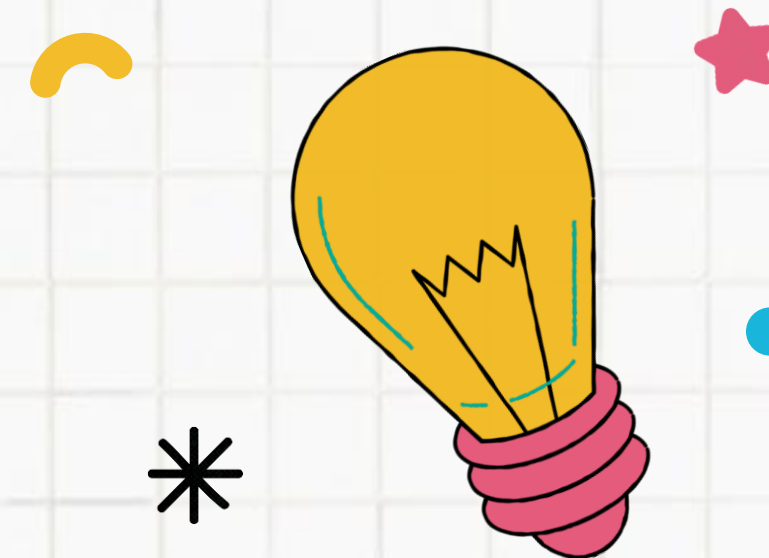
ACTIVITY 1

Project-Based Learning in STEM by Designing a Water Purification System





OBJECTIVES



1

Introduce the water cycle and filtration principles

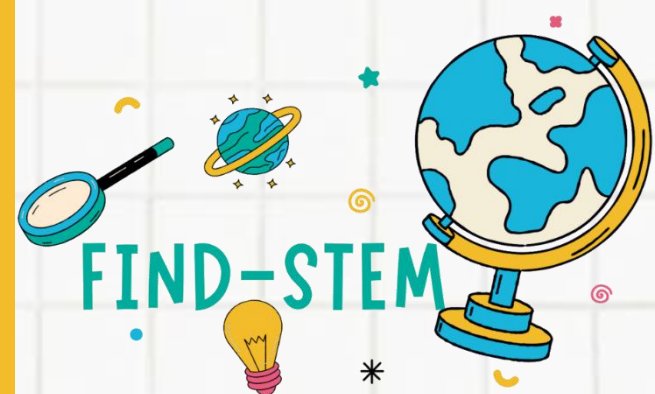
2

Encourage problem-solving through hands-on construction

3

Use a scientific process to test and refine designs



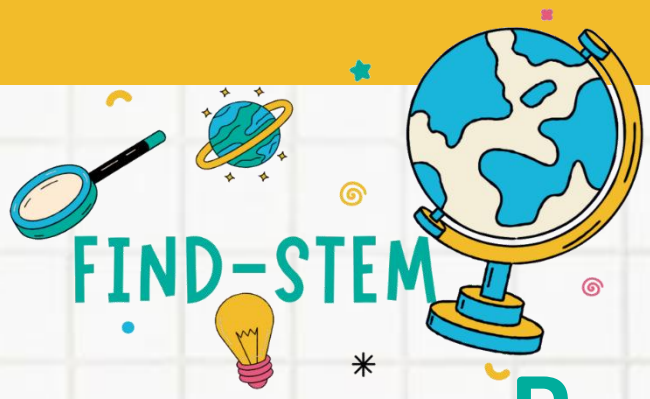


Project-Based Learning in STEM by Designing a Water Purification System

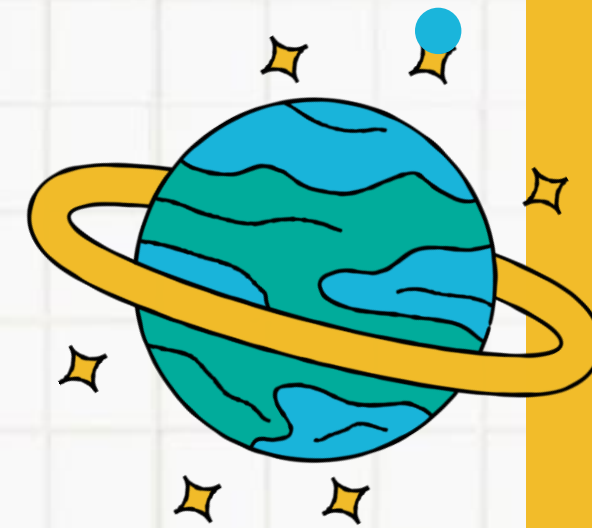


Project-Based Learning (PBL) in STEM is an instructional approach in which students actively explore real-world problems and challenges through hands-on, collaborative projects that integrate concepts from Science, Technology, Engineering, and Mathematics. Rather than learning content in isolation, students apply interdisciplinary knowledge to design, build, test, and refine solutions over time.





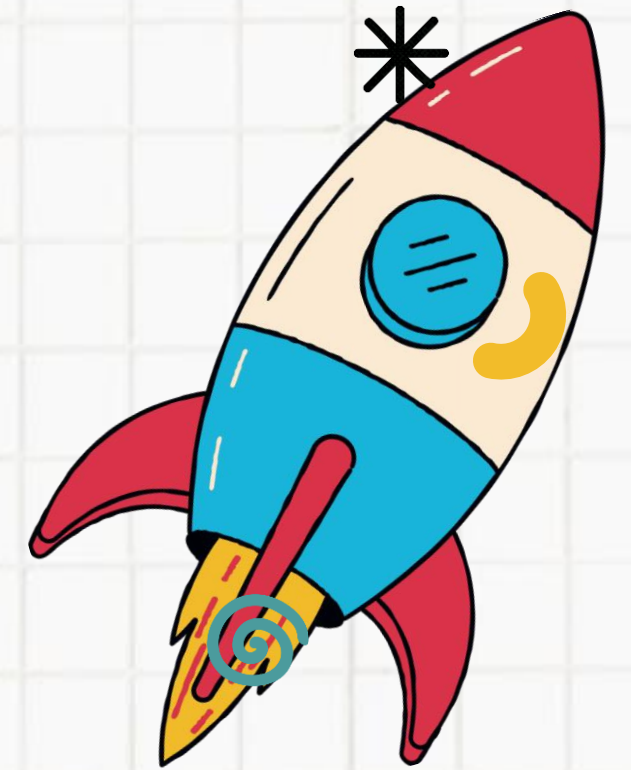
Project-Based Learning in STEM by Designing a Water Purification System

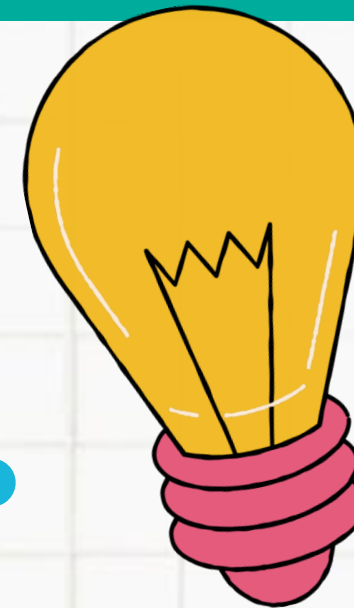
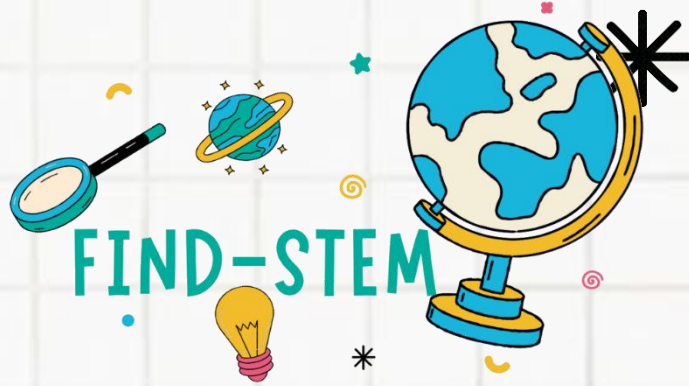


Challenge: In small groups build a water purification system!

Document:

- a. Type of water filtration system built
 - b. Problem being solved
 - c. Construction process and challenges faced
-
- a. How it works?
 - b. Which scientific principles did you involve?
 - c. Which Improvements would you make?





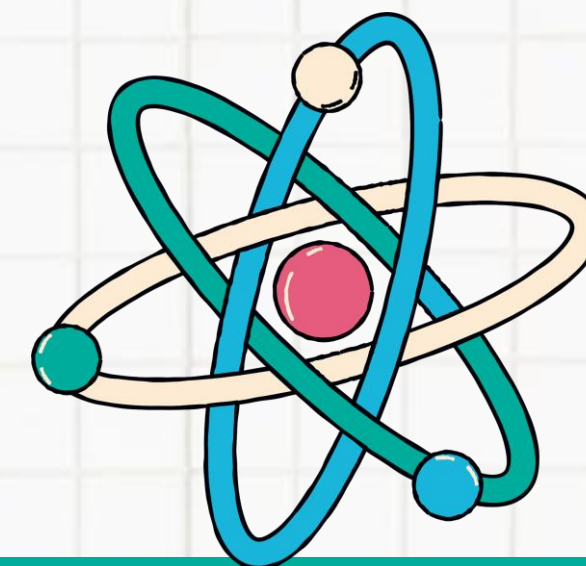
Additional Resources

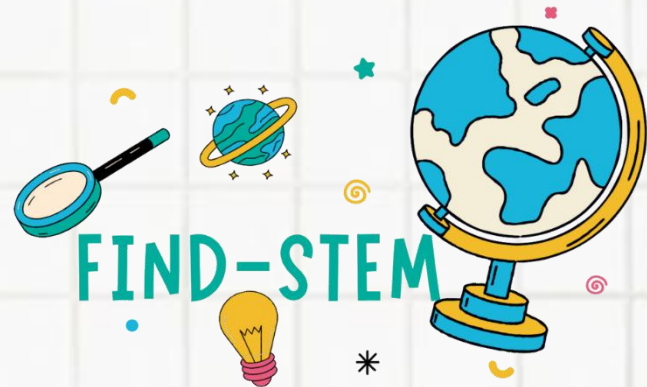
Teach Engineering:

https://www.teachengineering.org/activities/view/cub_eng_lesson01_activity1

Make a water filter:

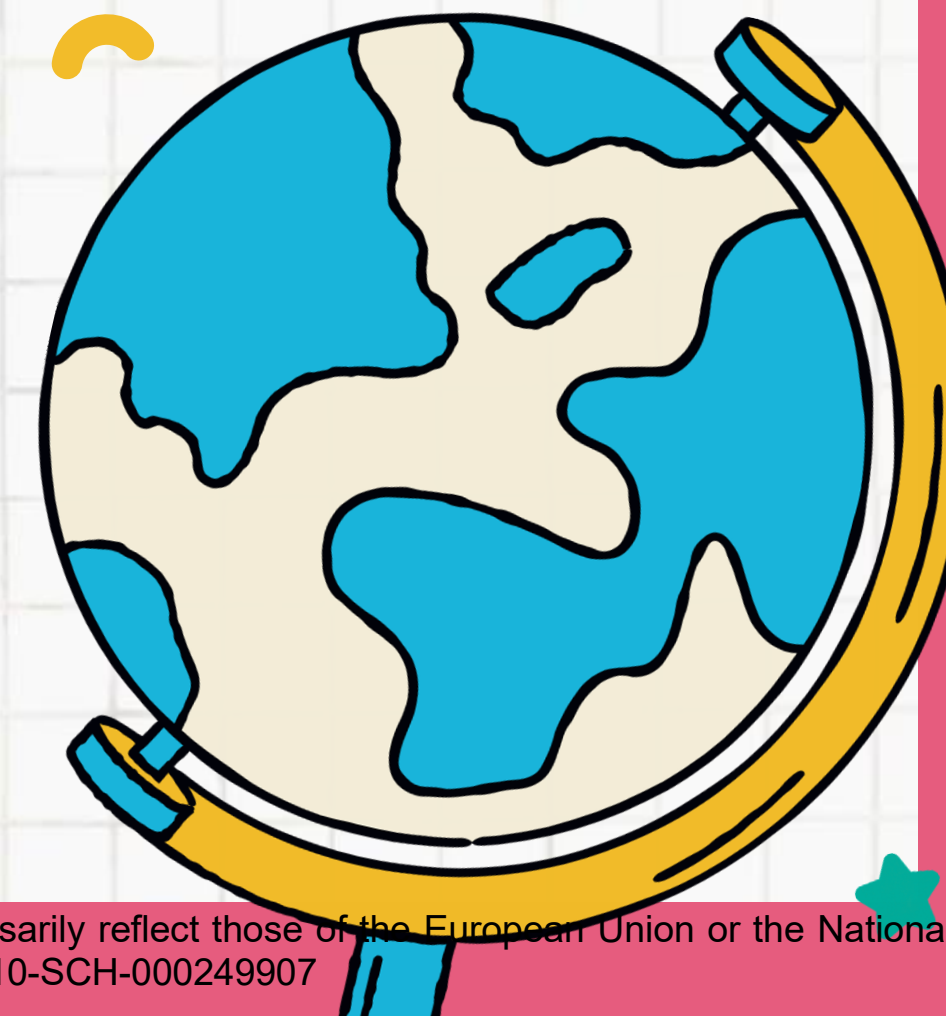
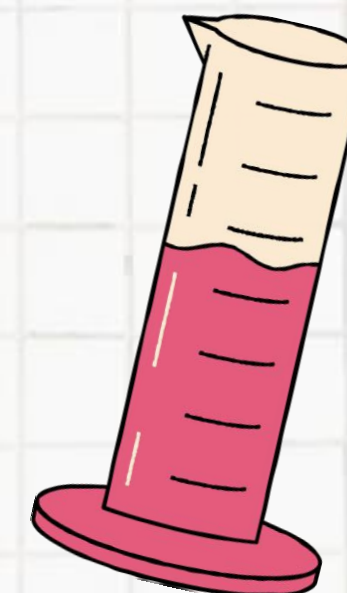
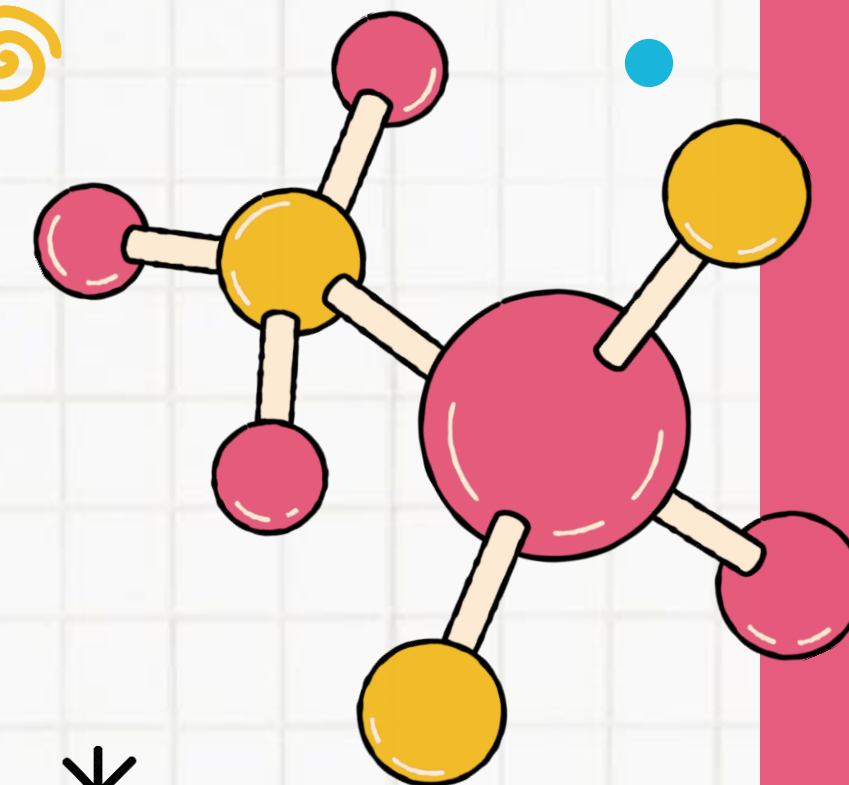
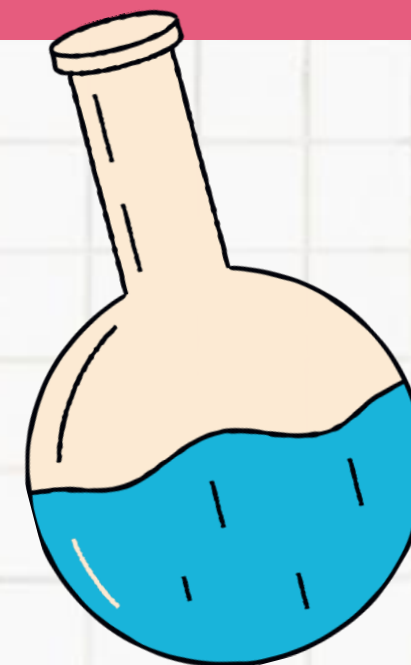
<https://www.jpl.nasa.gov/edu/resources/project/make-a-water-filter/>

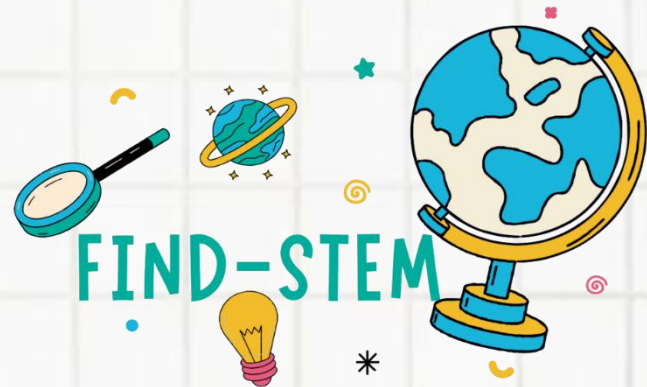




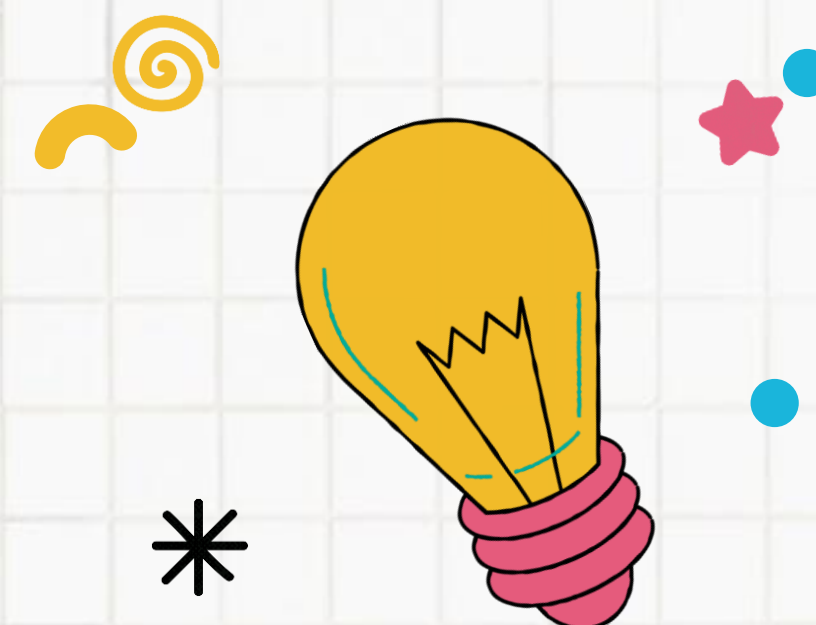
ACTIVITY 2

Inquiry-Based Learning Techniques by Explaining Newton's First Law





OBJECTIVES

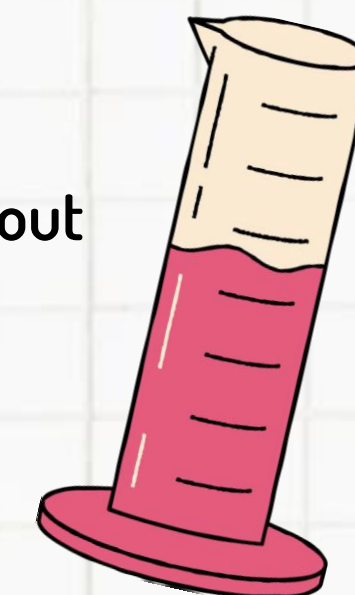


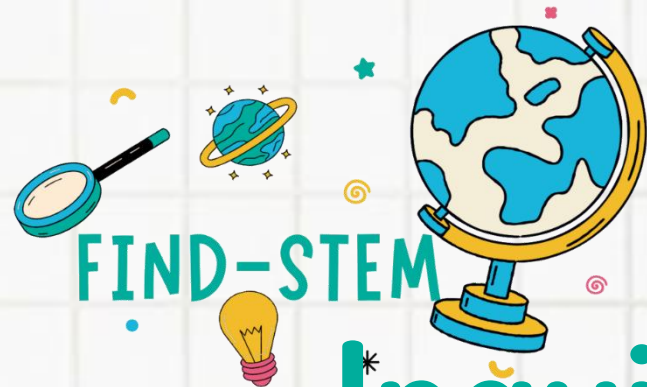
1
Define Newton's First Law of Motion and explain the concept of inertia in their own words.

2
Interpret real-life examples that illustrate Newton's First Law.

3
Formulate a testable question related to motion and forces

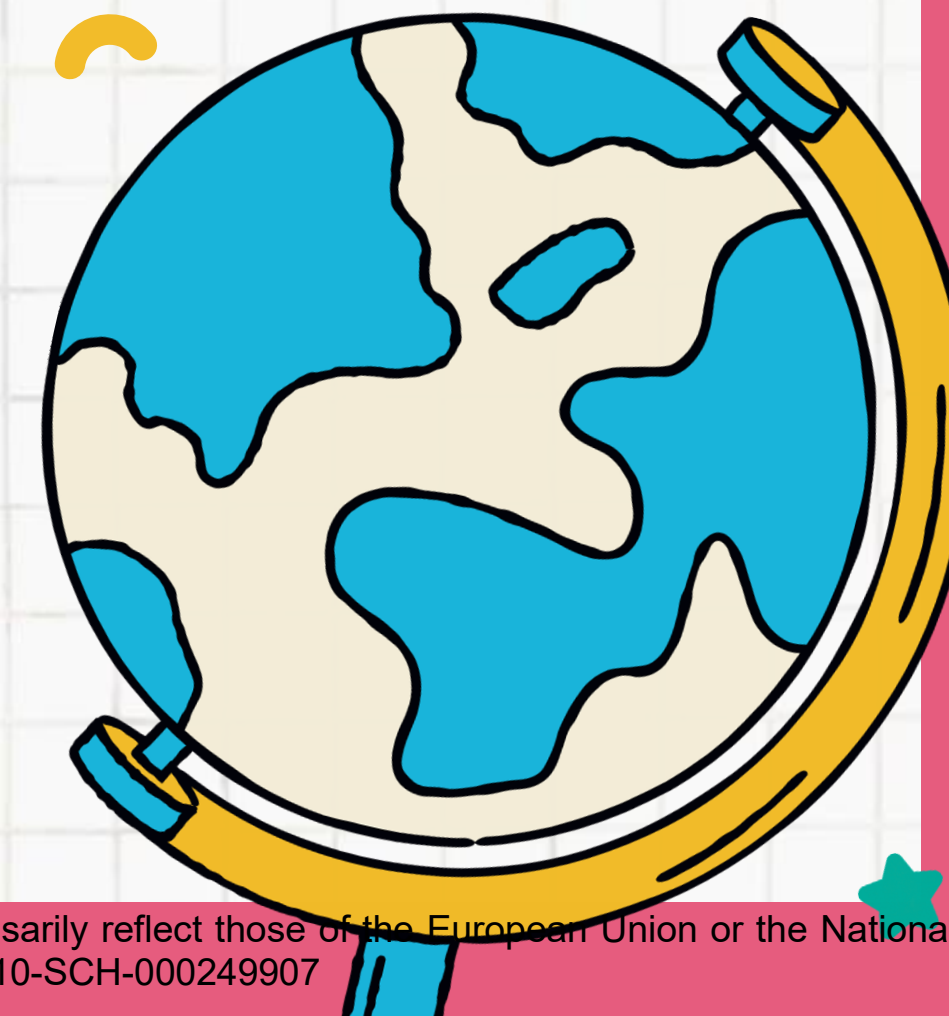
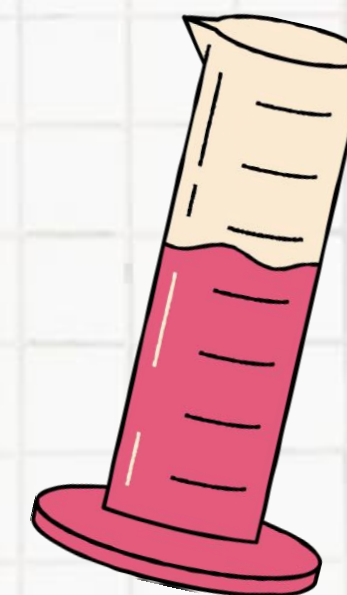
4
Demonstrate curiosity by asking questions about how things move in everyday life.

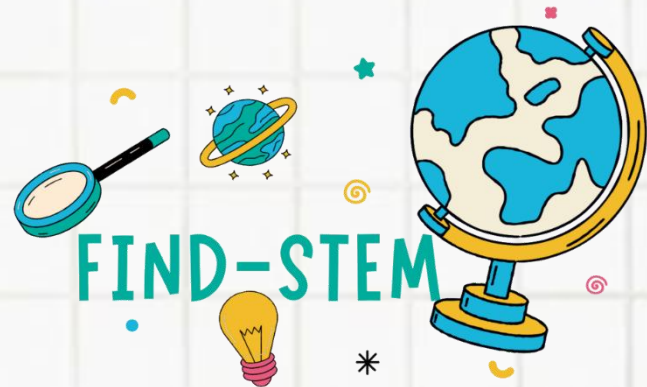




Inquiry-Based Learning Techniques by Explaining Newton's First Law

Inquiry-Based Learning is a student-centred educational approach where learning is driven by questioning, exploration, and evidence-based reasoning. Teachers act as facilitators, guiding students as they construct their own understanding of concepts..





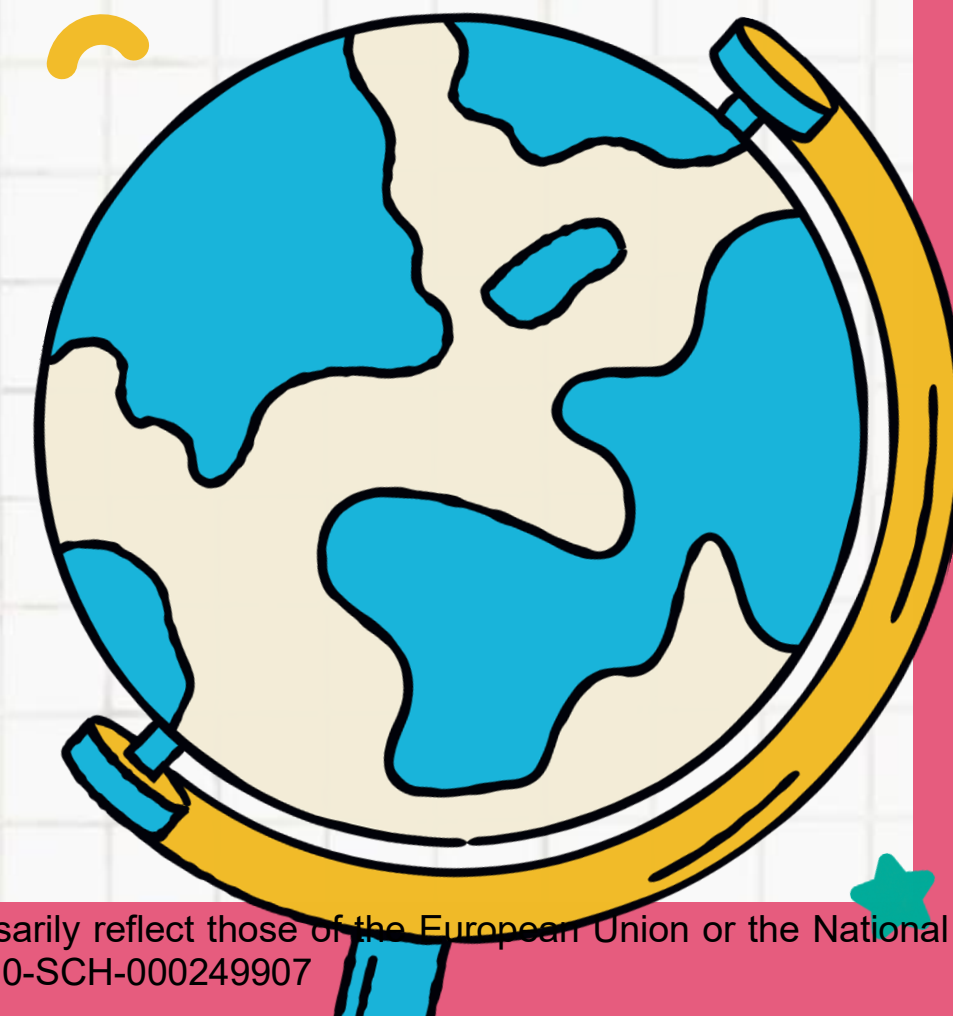
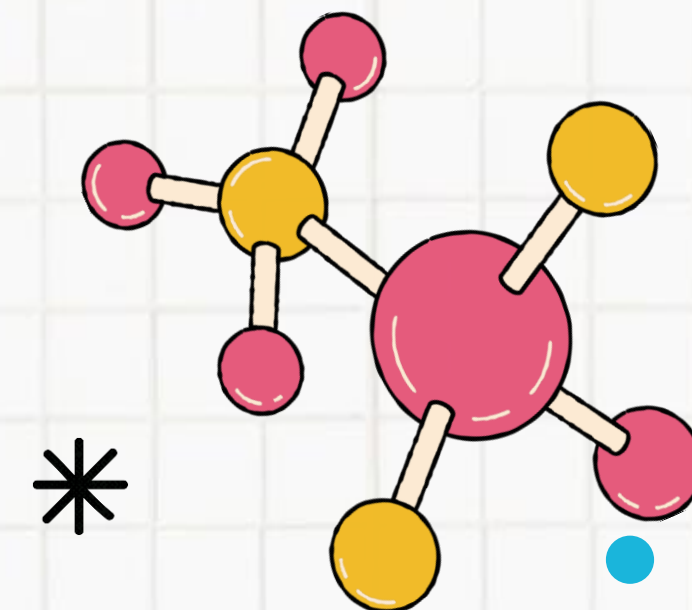
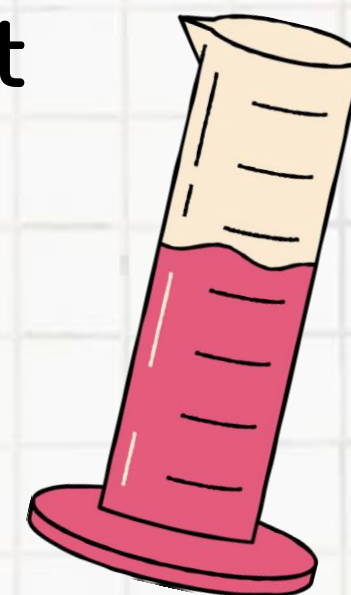
Inquiry-Based Learning Techniques by Explaining Newton's First Law

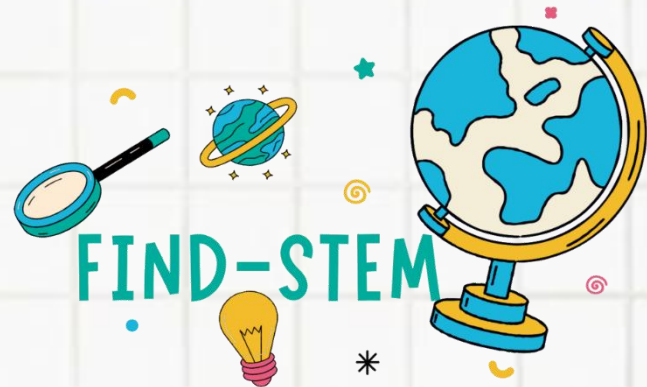
Challenge: Generate inquiry-based questions that could launch student investigations:

“Why do you fly forward when a car stops suddenly?”

“What would happen if we played hockey in space?”

“Can things move forever?”



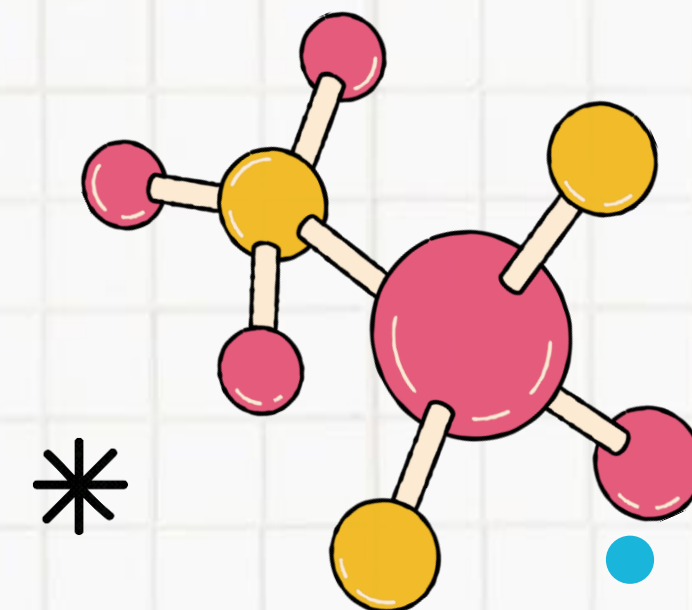
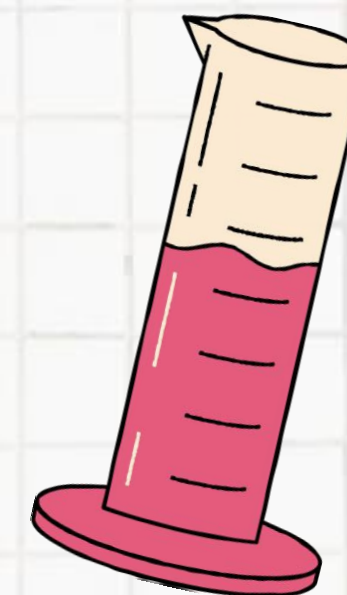


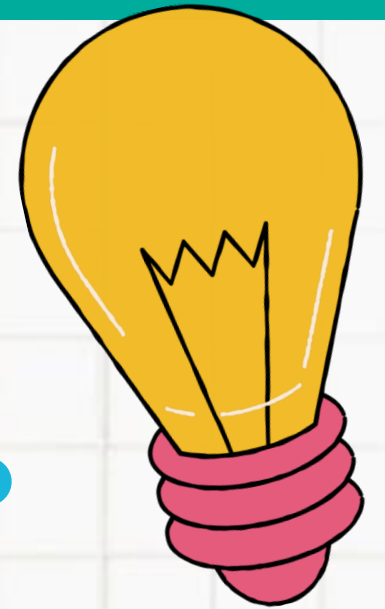
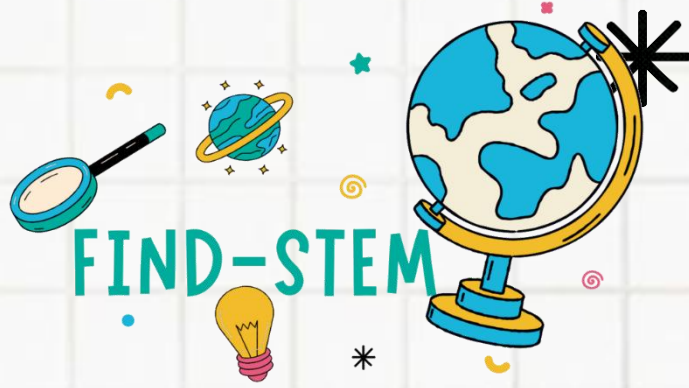
Inquiry-Based Learning Techniques by Explaining Newton's First Law

Roleplay:

Ask one teacher to play a sceptical or curious student:
“But if nothing is touching the ball, why does it stop rolling?”

Ask the other teachers to use inquiry scaffolding to help guide understanding:
“What do you think slows it down on Earth?”
“Can you think of a place where there's less friction? What might happen





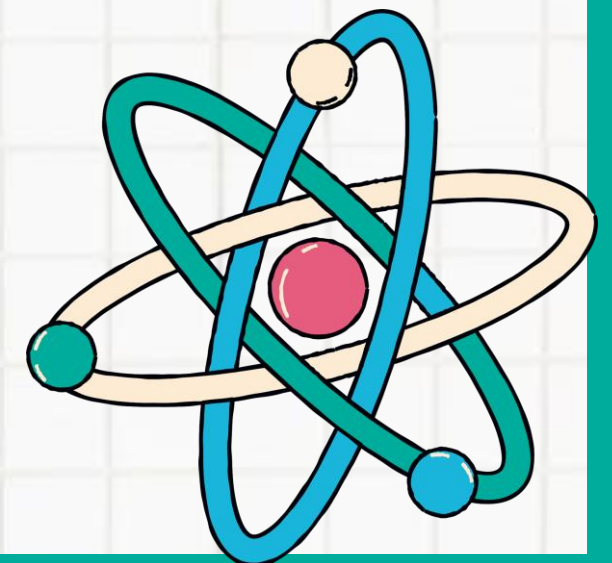
Additional Resources

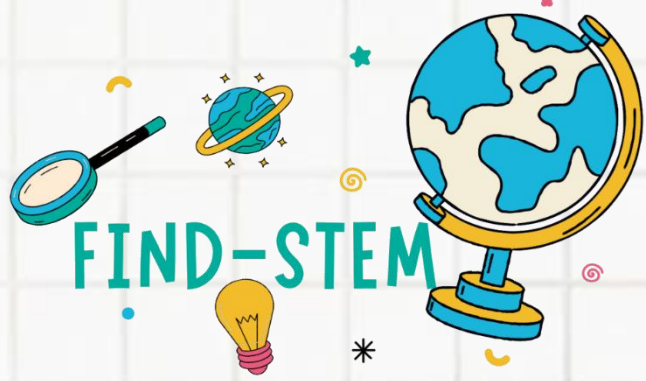
Heavy helicopters:

https://www.teachengineering.org/activities/view/cub_mechanics_lesson01_activity1

Why don't people fall out of roller coasters when they go upside down?:

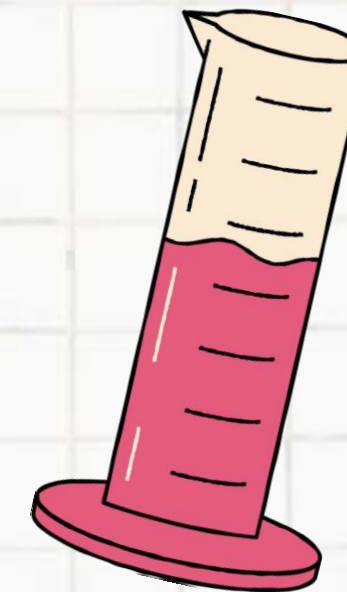
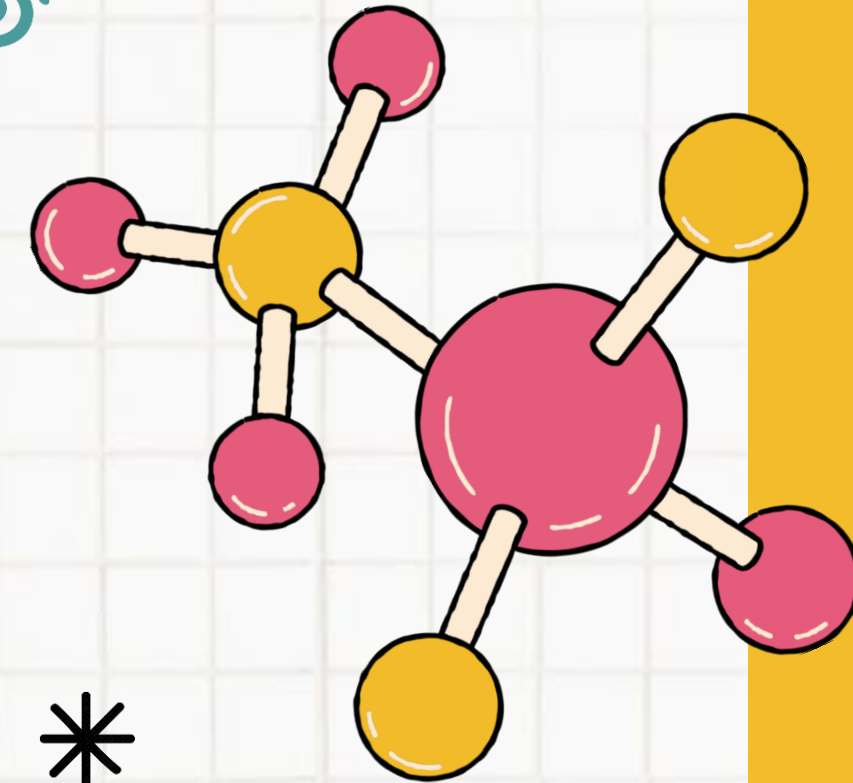
<https://www.youtube.com/watch?v=zZo-5DZNnEo>

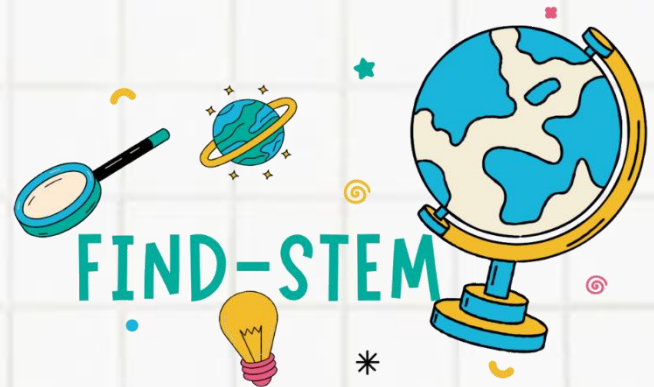




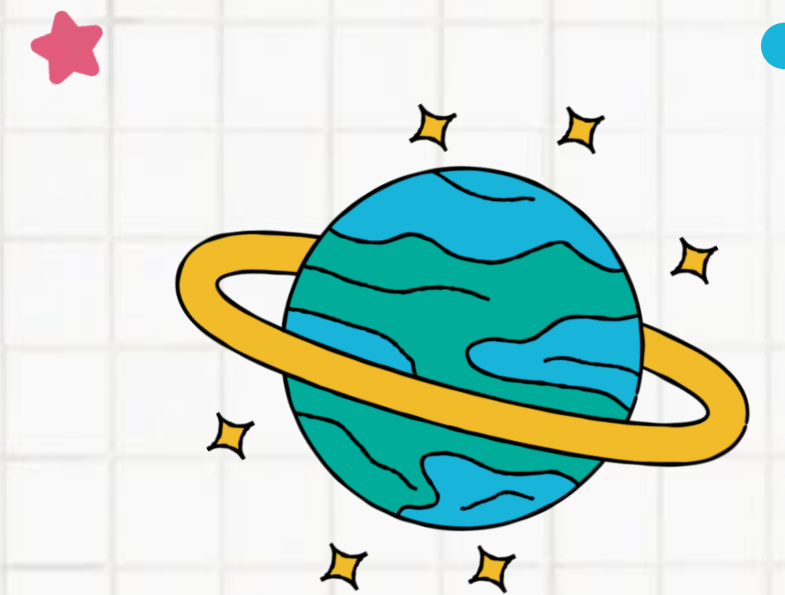
ACTIVITY 3

**Experiential Learning in STEM by Using a
Station Rotation**





OBJECTIVES



1

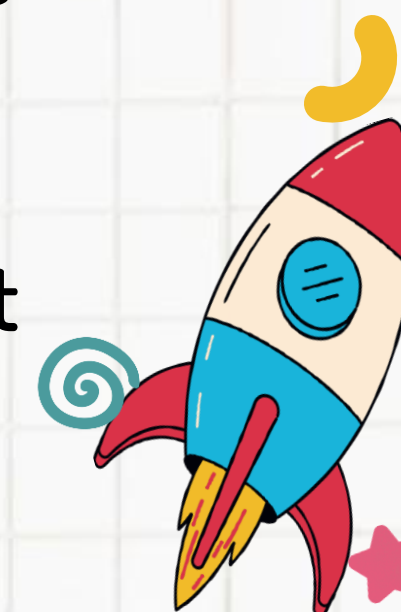
Follow structured inquiry procedures at each station to test magnetic interactions

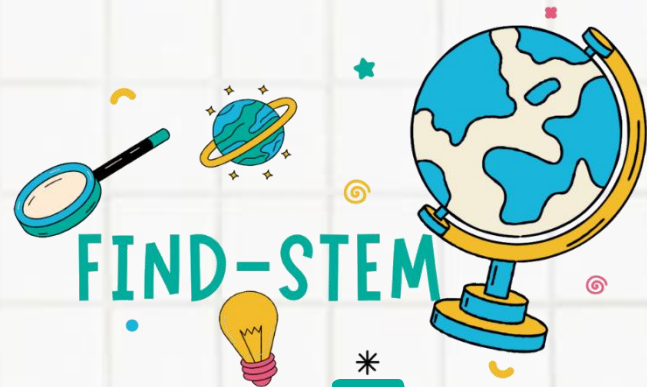
2

Describe the basic properties of magnets .

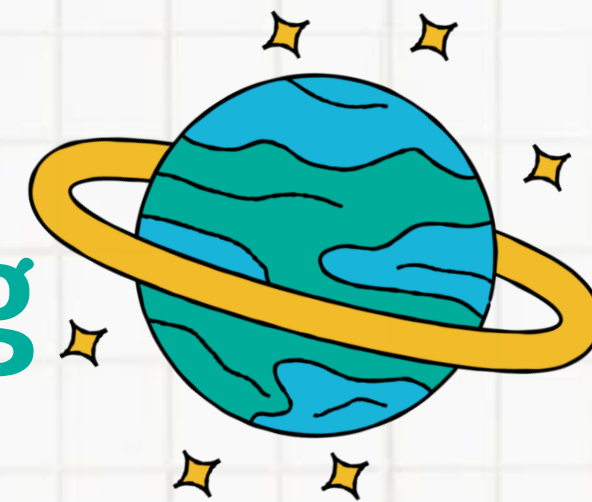
3

Demonstrate persistence and creativity when problem-solving or overcoming challenges at each station



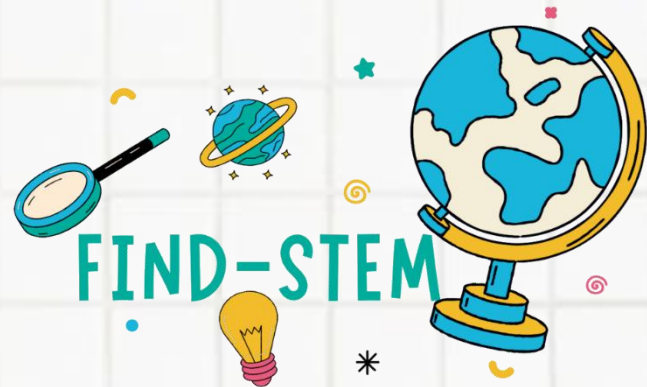


Experiential Learning in STEM by Using a Station Rotation

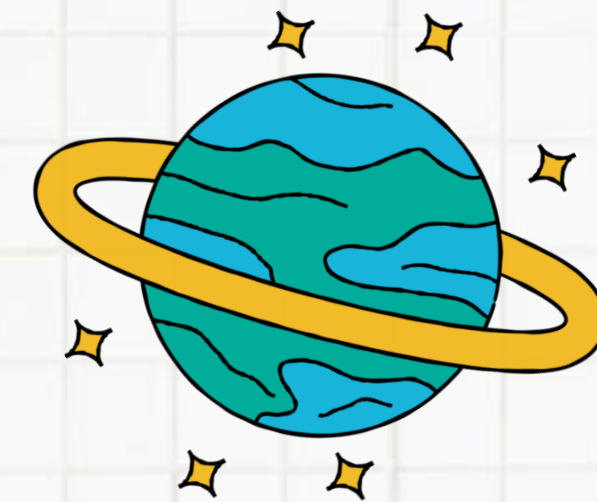


Experiential Learning in STEM is a hands-on, active learning approach where students gain knowledge and skills in Science, Technology, Engineering, and Mathematics through direct experience, reflection, and application. It emphasizes learning by doing—students engage in real-world tasks, experiments, and projects that require critical thinking, collaboration, and problem-solving.





Experiential Learning in STEM by Using a Station Rotation (1)



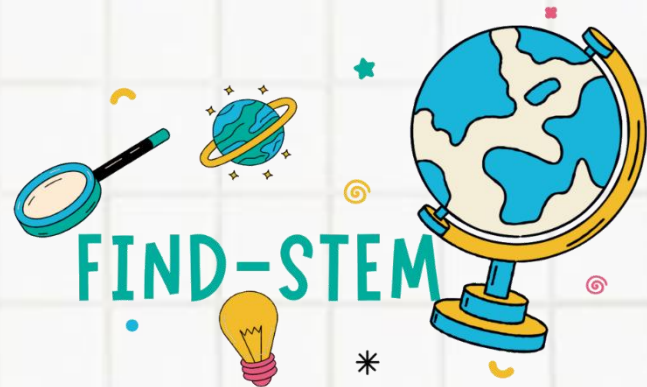
Set up 2–3 mini stations with materials (e.g., magnets, simple circuits, soil samples). Teachers rotate through and adapt activities for different learners (e.g., visual aids, tactile tools, simplified instructions).

Station 1: Magnetic or Not?

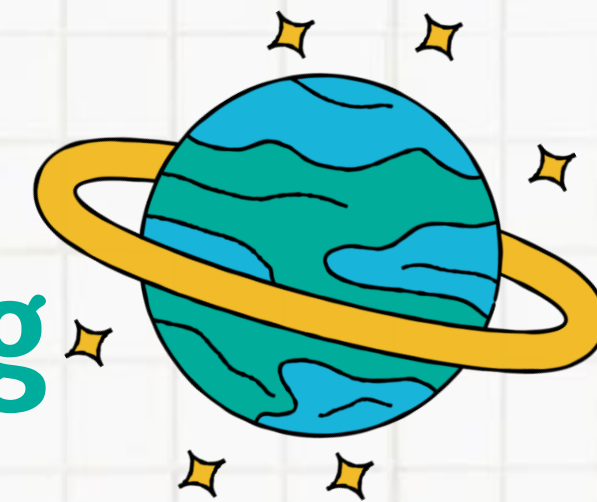
Materials: A tray of mixed objects (paperclips, plastic spoon, coin, rubber band, nail, key, etc.), magnets, recording sheet

Task: Predict and test which objects are magnetic. Sort them into magnetic/non-magnetic piles.





Experiential Learning in STEM by Using a Station Rotation (2)



Station 2: Magnetic Maze Challenge

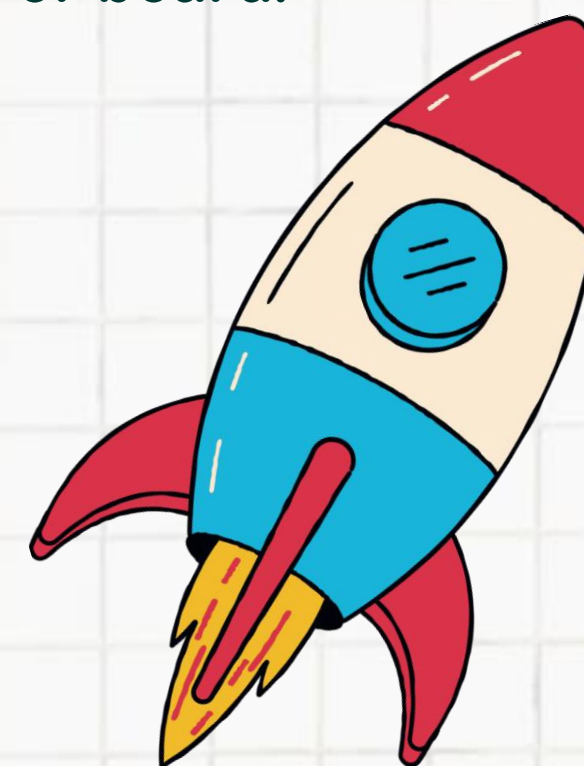
Materials: Paper maze templates, magnetic wands, small metal washers or paperclips

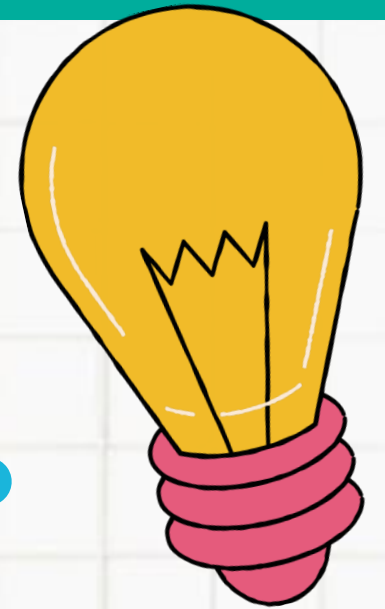
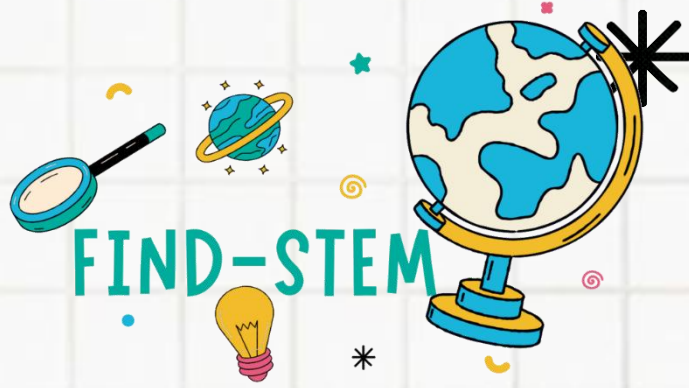
Task: Move the metal piece through the maze using a magnet under the table or board.

Station 3 (Optional): Build a Magnetic Toy

Materials: Magnets, cardboard, pipe cleaners, paper, tape

Task: Design and build a simple toy or character that uses magnetic motion.

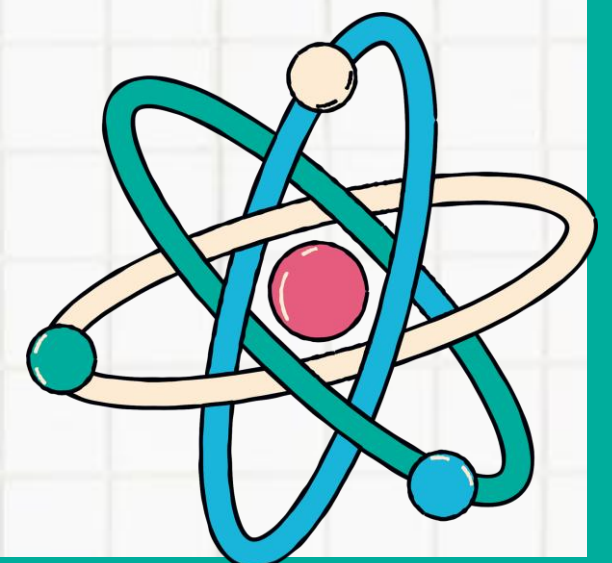


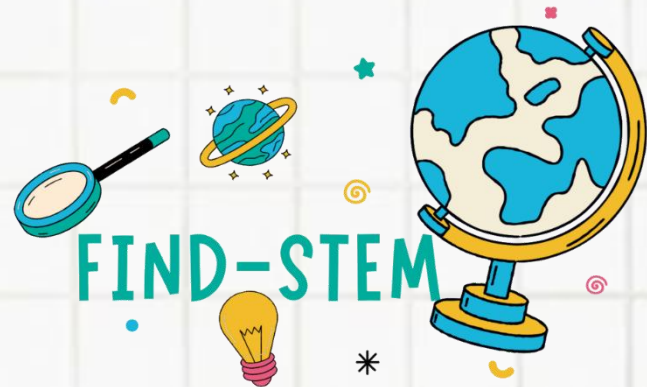


Additional Resources

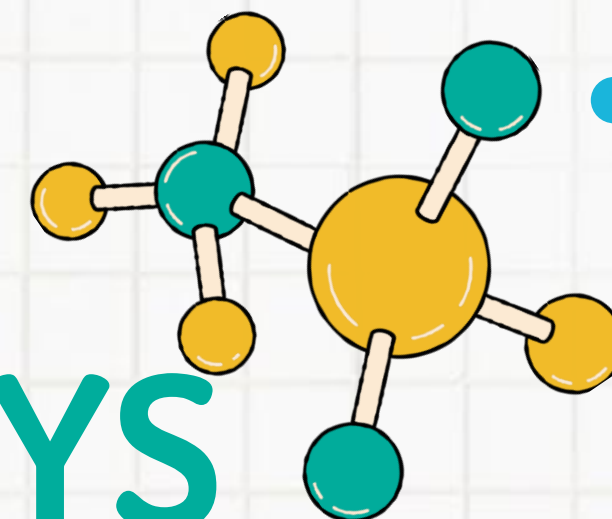
<https://www.edutopia.org/article/prioritizing-active-learning-experiences/>

<https://www.air.org/sites/default/files/Station-Rotation-Research-Brief-Final-July-2020.pdf>





SUMMARY OF KEY TAKEAWAYS



1. Creativity Enhances Engagement and Understanding;

2. Inclusive teaching removes barriers so that all students—regardless of background, gender, ability, or learning style—can participate and succeed.

3. Creative and inclusive STEM teaching is not about adding more—it's about teaching differently to reach more students, foster innovation, and build a future-ready, diverse STEM workforce





THANK YOU!

Any questions? Don't hesitate to
ask for our help



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