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Title of the STEPAM Unit: Non-Newtonian Fluids?

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RELATED SUBJECTS	AGE GROUP OF THE STUDENTS	TOTAL ACTIVITY TIME	LEARNING OBJECTIVES DURING THE LESSON SUBJECT-SPECIFIC COMPETENCIES	LEARNING OBJECTIVES AFTER THE LESSON
Science, Mathematics, Engineering, Physical Education, Arts, Technology	1st-4th grade (6 to 11 years old)	90 minutes	• Understand the states of matter, with a focus on liquids and their viscosity. • Differentiate between Newtonian and Non-Newtonian fluids. • Observe and experience how viscosity changes under applied force in Non-Newtonian fluids.	• Students will : • Explain viscosity and distinguish between Newtonian and Non-Newtonian fluids, • Analyze how viscosity changes under applied force. • Apply mathematical calculations to real-world fluid dynamics. • Design and execute a scientific experiment.

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			• Engage in mathematical problem-solving by calculating volumes and ingredient ratios. • Develop engineering skills by determining the optimal container size for the experiment. • Explore the physical properties of Oobleck through an engaging relay race. • Encourage creativity by allowing students to personalize their Oobleck. • Record and analyze observations using digital tools.	• Enhance coordination and endurance through a physical challenge. • Will reatively express their understanding by designing unique Oobleck samples.

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OVERVIEW: TOPIC & PURPOSE

This unit explores the **unique properties of Non-Newtonian fluids,** focusing on how **viscosity changes under force**. Students will:

- **Understand how liquids behave differently under stress**.
- **Investigate Oobleck,** a Non-Newtonian fluid, through a **hands-on relay race**.
- **Apply math skills** to calculate **ingredient proportions** and **container volumes**.
- **Explore viscosity concepts** through **real-world comparisons**.
- **Use technology** to record, edit, and explain their experiment.
- **Engage in teamwork** by completing a **physical activity on Oobleck**.
- **Encourage creativity** by personalizing their fluid with **colors and glitter**.

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ACTIVITY PREREQUISITES -

STEAM ELEMENTS

ELEMENT 1: context presentation	What is a fluid? How do its properties differ from solids and gases? What is viscosity, and how does it change under stress? How do Newtonian and Non-Newtonian fluids behave differently? What happens when force is applied to Oobleck?
ELEMENT 2: creative design	Calculating the necessary volume for the experiment. Mixing and preparing Oobleck using precise ingredient measurements. Creating a unique Oobleck sample with added colors and decorations. Building a relay team strategy to win the Oobleck race.
ELEMENT 3: emotional and social learning	Encouraging teamwork and collaboration in the relay race. Developing problem-solving skills in determining container size. Enhancing patience and focus during the experiment and documentation.

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STEAM SUBJECT ELEMENTS

STEAM SUBJECTS	SCIENCE	TECHNOLOGY	ENGINEERING	Physical Education	ARTS	MATHEMATICS
SHORT INTRODUCTION TO RELATED SUBJECT ELEMENTS	Understanding fluid properties, viscosity, and Non-Newtonian behavior.	Using digital tools to record and explain experiments.	Calculating container volume and material proportions.	Engaging in a relay race that demonstrates viscosity changes.	Customizing Oobleck with colors and decorations.	Solving volume and proportion problems for Oobleck preparation.

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SYLLABUS

LESSONS	SUBJECTS	TOPIC OF THE UNIT	LEARNING OBJECTIVES DURING THE LESSON: SUBJECT SPECIFIC COMPETENCIES	LEARNING OBJECTIVES AFTER THE LESSON: STEAM COMPETENCIES
1	**Science, Mathematics**	**Understanding Fluid Properties**	- Define viscosity and its role in fluids. - Classify Newtonian vs. Non-Newtonian fluids.	- Students explain fluid behavior under stress.
2	**Mathematics, Engineering**	**Volume Calculation & Container Design**	- Calculate Oobleck volume. - Choose an appropriate container.	- Students determine correct proportions for Oobleck.
3	**Science, Art**	**Creating Oobleck**	- Mix and customize Oobleck. - Experiment with viscosity	- Students describe viscosity behavior with applied force.

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			changes.submarines rise and sink.	
4	**Physical Education**	**Oobleck Relay Race**	- Run across Oobleck without sinking. - Develop teamwork skills.	- Students experience Non-Newtonian properties through movement.
5	**Technology**	**Video Documentation & Reflection**	- Record and present findings. - Analyze real-world applications.	- Students summarize and explain key concepts creatively.

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INSTRUCTIONAL PLAN BY LESSON

LESSON Grade 3-4 Science, Engineering, Physical Education, Art (Language) and Mathematics

TIME PLAN	TEACHING & LEARNING ACTIVITIES	MATERIALS	LEARNING OBJECTIVES
INTRODUCTION **(5-10 minutes)**	Discussing **fluid states and viscosity** using real-world examples.	Visual aids, liquid samples	Students learn about the types of fluids; newtonian fluids and non-newtonian fluids.
LEARNING ACTIVITIES **(60-70 minutes)**	**Activity 1: Fluid Experiment** – Mixing Oobleck and observing viscosity.	Cornstarch, water, food coloring, buckets	Students experience Non-Newtonian fluid behavior.
	Activity 2: Volume & Ratio Calculation – Determining material proportions.	Measuring cups, math worksheets	Students apply mathematical concepts..
	Activity 3: Oobleck Relay Race – Running across the mixture.	Large containers of Oobleck	Students observe viscosity changes under stress.
	Activity 4: Video Recording – Documenting findings and reflections.	Tablets, cameras, video editing apps	Students present their experiment digitally.
WRAP-UP & EVALUATION **(15-20 minutes)**	Reviewing key concepts and discussing real-world applications.	Videos and presentations.	Students articulate and present findings.

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EVALUATION PLAN BY LESSON

LESSON/ACTIVITY	EVALUATION CRITERIA	EVALUATION METHOD
1	Could the students identify and classify the two types of fluids (newtonian and non-newtonian) correctly ?	Worksheet assessment
2	Did students correctly calculate material ratios?	Math problem-solving review
3	Could the students successfully produce the Oobleck?	Hands-on experiment assessment
4	Did students engage in the relay race?	Physical participation
5	Did students effectively document and present findings?	Video analysis and reflection of their findings during presentation.

NOTES -

ACTIVITY SHEETS TO BE LINKED -

EVALUATION MATERIALS TO BE LINKED -

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REFERENCES / SUPPORTING MATERIALS TO BE LINKED

PDF / PPT slides:

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