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Title of the STEPAM Unit: Aggregate Condition – Exploring States of Matter

AUTHORS (NAMES /SCHOOL / COUNTRY): EXPERIENCE WORKSHOP, JAGODINA

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	Primary-Middle School (9 to 13 years old)	120-150 minutes	• Identify the three states of matter (solid, liquid, gas). • Describe key properties of each state and explain phase changes.	• Students can explain and demonstrate key concepts about matter. • Students apply math skills to real-world phenomena.

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			• Observe and compare liquids of different densities. • Apply mathematical reasoning through measurement, fractions, and ratios. • Create models and artistic representations of matter states. • Work collaboratively and reflect on learning.	• Students reflect creativity in model design and data representation. • Students show collaborative skills in experiments and games.

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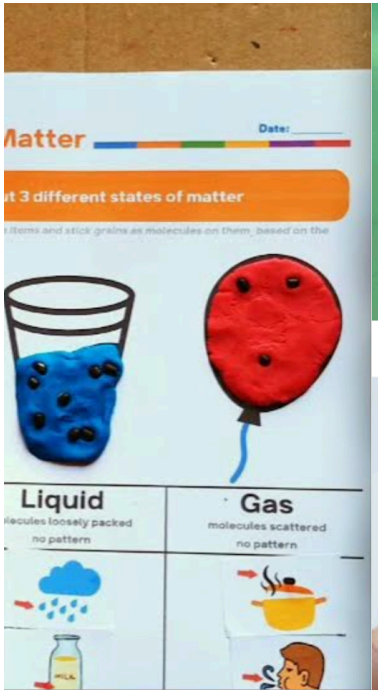





OVERVIEW: TOPIC & PURPOSE

This unit introduces students to the properties and behavior of matter in its different states. Through hands-on experiments, mathematical analysis, model-making, and physical activities, students explore the concepts of solids, liquids, gases, density, and phase change. Integration with art and physical education enriches creativity, teamwork, and kinesthetic learning.

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ACTIVITY PREREQUISITES -

STEAM ELEMENTS

ELEMENT 1: context presentation	• Display examples of solids, liquids, and gases (rock, water, balloon). • Prompt questions about classification and properties.
ELEMENT 2: creative design	• Create Rainbow Jars using layered liquids. • Design models of matter states with clay, balloons, and recyclable materials. • Play cooperative and competitive balloon-based PE games.
ELEMENT 3: emotional and social learning	• Encourage teamwork in group experiments. • Develop resilience and creativity when predictions or results vary. • Reflect on learning through exit tickets and peer discussion.

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STEAM SUBJECT ELEMENTS

STEAM SUBJECTS	SCIENCE	TECHNOLOGY	ENGINEERING	Physical Education	ARTS	MATHEMATICS
SHORT INTRODUCTION TO RELATED SUBJECT ELEMENTS	States of matter, density, phase change	Thermometer apps, digital sensor logging, recording experiments	Rainbow Jar construction, stable model design	Balloon-based games, coordination, teamwork	Creative model-making, labeling, and presentations	Fractions, ratios, measurement, scale drawing, data charts

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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, Art**	**States of Matter & Density**	Identify solids, liquids, gases; explore density with Rainbow Jar	Understand states of matter and density differences
2	**Science, Technology**	**Phase Change**	Demonstrate melting, boiling, evaporation with thermometer logging	Recognize phase changes and temperature thresholds

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3	**Mathematics**	**Measuring Layers**	Apply measurement, fractions, ratios, and charts	Represent data visually and mathematically
4	**Arts, Science**	**Model-Making**	Build creative models of matter states	Consolidate knowledge through creativity
5	**Physical Education**	**Balloon Games**	Practice coordination and teamwork through balloon challenges	Link PE to matter concepts (gases, air) .

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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)**	Display solid, liquid, and gas examples. Discuss differences and prior knowledge.	• Solids, liquids, and gases examples (rocks, water, balloons) • Rainbow Jar liquids (honey, oil, syrup, etc.) • Thermometer or digital logging app with sensor	Activate prior knowledge and establish lesson focus.
LEARNING ACTIVITIES **(120-150 minutes)**	**Activity 1: Discovery Stations (15 min):** Rotate through solids, liquids, gases.		Observe characteristic properties of each state in small-group settings.

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	Activity 2: Rainbow Jar Density Challenge (20 min): Layer liquids, discuss density.	• Art supplies: clay, paper, markers, recyclable items • Balloons, Frisbees, sponge noodles for PE games	Visualise that not all liquids behave identically; link particle spacing to density.
	Activity 3: Mathematics Integration (25–30 min): Fractions, ratios, bar charts, scale drawings.		• Reinforcement of *part–whole* reasoning and comparing fractions without needing decimals. • Builds skills in measuring length, recording data, and discussing variation/error. • Introduces data representation: reading scales, drawing labelled axes, and interpreting which layer is tallest/shortest. • Practicing of ratio and scale concepts in a concrete context.
	Activity 4: Watch It Change (15 min): Ice to steam, record temperature with thermometer app.		Demonstrate phase changes and relate them to temperature.

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	Activity 5: Model-Making (20–25 min): Create 3D models of matter states.		Consolidate understanding through creative representation and verbal explanation.
	Activity 6: PE Games with Balloons (20–25 min): Cooperative and competitive balloon challenges.		Cooperative and competitive games which connect movement through kinesthetic learning and teamwork.
WRAP-UP & EVALUATION (10-15 minutes)	Reflections	—----------	Encourage metacognition and identify any remaining misconceptions.

EVALUATION PLAN BY LESSON

LESSON/ACTIVITY	EVALUATION CRITERIA	EVALUATION METHOD
1	Accurate identification of states of matter	Teacher observation

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2	Correct use of thermometer app & explanation of phase changes	Observation, data logs
3	Accurate measurement, fraction use, chart creation	Student work samples
4	Creativity and accuracy in model-making	Presentation, peer review
5	Teamwork and coordination in balloon games	Teacher observation, peer feedback

NOTES -

ACTIVITY SHEETS TO BE LINKED -

EVALUATION MATERIALS TO BE LINKED -

REFERENCES / SUPPORTING MATERIALS TO BE LINKED

PDF / PPT slides:

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