

**Erasmus+ Cultural connections : Enhancing EU heritage, Social  
Inclusion and Digital Literacy through our Pupils' hearts**  
Scientific and Creative Thinking Workshop  
7-12 December 2025, Ukmerges, Lithuania



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## SCIENTIFIC EXPERIMENT 4.12

### Experiment Title

**The Jar Experiment: Time, Capacity, and Priorities**

### Type of Activity

Scientific demonstration and inquiry-based experiment using a physical model to explain abstract concepts (time management and prioritization)

### Grade Level

Upper primary / lower secondary (adaptable for older students)

### Learning Objectives

#### Scientific Objectives

Students will be able to:

1. Observe how volume and capacity affect what can fit into a container.
2. Understand sequencing and order as critical variables in experimental outcomes.
3. Use a physical model to represent abstract concepts.
4. Draw conclusions based on evidence from a demonstration.

#### Interdisciplinary Objectives

Students will be able to:

1. **Civic / Personal Education:** Identify priorities in life and decision-making.
2. **Mathematics:** Reason about volume, space, and capacity.
3. **Ethics / Values Education:** Reflect on what is essential versus optional.
4. **Language:** Explain observations and conclusions using cause-and-effect language.

### Research Question

*How does the order in which we add materials affect what can fit into a fixed container, and how can this model represent life priorities?*

## Hypothesis

If large objects are placed into the jar first, followed by smaller ones, then all materials will fit.  
If small materials are added first, there will not be enough space for the larger objects.

## Materials

- ❖ 1 transparent jar or container
- ❖ Large stones or rocks
- ❖ Small pebbles
- ❖ Sand
- ❖ Tray or surface mat
- ❖ Observation sheet

## Variables

- A. **Independent Variable:** Order in which materials are added
- B. **Dependent Variable:** Whether all materials fit inside the jar
- C. **Controlled Variables:** Same jar, same materials, same quantities

## Experimental Procedure

### Part A: Incorrect Order (Sand First)

1. Place the empty jar on the table.
2. Fill the jar completely with sand.
3. Attempt to add the pebbles and rocks.
4. Observe what happens.

### Part B: Correct Order (Rocks First)

1. Empty the jar completely.
2. Place the large rocks into the jar first.
3. Add the pebbles, allowing them to settle between the rocks.
4. Pour the sand last, filling the remaining spaces.
5. Observe the final result.

## Observations

Students observe that:

- When sand is added first, there is no room for rocks or pebbles.
- When rocks are added first, all materials fit.
- Smaller materials fill the empty spaces between larger ones.
- The container's total capacity never changes—only the order does.

## Results

All materials fit into the jar **only** when the largest objects are placed first.

## Scientific Explanation

The jar has a fixed volume. Large objects take up more space and cannot adjust their position easily. Smaller materials can move into gaps between larger objects. Therefore, placing large objects first allows maximum use of available space.

## Model Interpretation (Life Analogy)

This experiment functions as a **model**:

- ★ **The Jar** represents a person's life or the total time available in a day.
- ★ **The Big Rocks** represent the most important priorities (health, family, core values).
- ★ **The Pebbles** represent important but secondary responsibilities (school, work, hobbies).
- ★ **The Sand** represents minor tasks, distractions, and material concerns.

## Conclusion

The experiment demonstrates that **order matters**. If minor tasks take up time first, there may be no space left for what truly matters. By prioritizing essential values early, everything else can still find its place.

## Key Lesson

*If you do not make time for your most important priorities first, you may never have time for them at all.*

## Interdisciplinary Connections

**Science** (Modeling and experimentation, Cause and effect, Capacity and volume), **Mathematics** (Spatial reasoning, Comparing quantities, Understanding fixed capacity), **Civic / Personal Education** (Decision-making, Time management, Responsibility and values), **Ethics / Character Education** (Clarifying priorities, Understanding long-term consequences), **Language / Communication** (Explaining models, Using metaphors, Structured reflection)

## Reflection Questions

1. What happened when the sand was added first?
2. Why did the order change the result?
3. What might "sand" look like in everyday life?
4. What are examples of "big rocks" for a student?
5. How can this experiment help us make better choices?

**Student Observation Worksheet (older students)****The Jar Experiment: Time, Capacity, and Priorities**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Class: \_\_\_\_\_

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**1. Experiment Title****The Jar Experiment: Time, Capacity, and Priorities**

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**2. Research Question**

How does the order in which materials are added to a jar affect what can fit inside?

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**3. Prediction (Before the Experiment)**

What do you think will happen?

- All materials will fit no matter the order
- The order will change the result
- I am not sure

**Explain your prediction:**

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**4. Materials Used**

Circle the materials used in the experiment:

1. Jar
2. Large rocks
3. Pebbles
4. Sand

**5. Observation – Part A (Sand First)**

What happened when the jar was filled with sand first?

- Rocks fit easily
- Pebbles fit easily
- Rocks did not fit
- Pebbles did not fit

**Describe what you observed:**

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### 6. Observation – Part B (Rocks First)

What happened when the rocks were placed in the jar first?

- All materials fit
- Some materials did not fit
- Pebbles filled the spaces
- Sand filled the small gaps

**Describe what you observed:**

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### 7. Results

Which order allowed all materials to fit into the jar?

- Sand → Pebbles → Rocks
- Rocks → Pebbles → Sand

### 8. Scientific Explanation

Why did the order of materials change the result?

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### 9. Life Model Connection

Match each object to what it represents:

- The jar represents: \_\_\_\_\_
- The big rocks represent: \_\_\_\_\_
- The pebbles represent: \_\_\_\_\_
- The sand represents: \_\_\_\_\_

### 10. Reflection: Understanding Priorities

Answer in complete sentences.

1. What happens if we fill our time with “sand” first?

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2. Why are the “big rocks” important?

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3. What could be one “big rock” in a student’s life?

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### 11. Personal Reflection (Optional)

Write or draw one thing that is a **big rock** in your life.

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### 12. Conclusion

Complete the sentence:

This experiment teaches us that \_\_\_\_\_

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### Teacher Observation (Optional)

1. Student participated actively:  Yes  Somewhat  No
2. Student understood the model:  Yes  Partially  Needs support

Name: \_\_\_\_\_ Date: \_\_\_\_\_

# Experiment

Write the name of your experiment in the blank space above. Then, complete the rest of this page with information about your experiment.



Question: What are you testing?

Hypothesis: What do you think will happen?



Observations: What happened during the experiment? Draw a picture or record data below.



Conclusion: What conclusions can you draw based on the results of your experiment?

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*Observation sheet source: WeAreTeachers, 2024*