**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, Lituania

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**SCIENTIFIC EXPERIMENT 5.12**

**Experiment Title**

**How Microbes Spread: A Model of Sneezing and Droplet Transmission**

**Type of Activity**

Scientific experiment using a **physical model** to simulate the spread of microorganisms through respiratory droplets

**Grade Level**

Primary / Lower Secondary (teacher-guided)

**Learning Objectives**

**Scientific Objectives**

Students will be able to:

1. Understand that microbes spread through droplets released by sneezing or coughing.
2. Observe how far droplets can travel.
3. Compare how barriers (hand, tissue, mask) reduce spread.
4. Use a model to represent an invisible biological process.

**Interdisciplinary Objectives**

Students will be able to:

- **Biology:** Recognize microbes as microscopic organisms.
- **Health Education:** Understand hygiene and disease prevention.
- **Civic Education:** Develop responsibility for protecting others.
- **Mathematics:** Measure and compare distances of spread.
- **Art:** Create visual representations of droplet patterns.

**Research Question**

*How do respiratory droplets spread during a sneeze, and how can barriers reduce their spread?*

**Hypothesis**

If a sneeze is not covered, droplets will spread widely.
If a barrier is used, the spread of droplets will be reduced.

**Materials**

- ★ Flour (represents droplets carrying microbes)
- ★ Spoon or squeeze bottle (to simulate a sneeze)
- ★ Large dark sheet of paper or table surface
- ★ Measuring tape or ruler
- ★ Tissue, hand, or paper towel (as barriers)
- ★ Observation sheet

**Variables**

1. **Independent Variable:** Type of barrier used (none, hand, tissue)
2. **Dependent Variable:** Distance and area of flour spread
3. **Controlled Variables:** Same amount of flour, same force, same surface

**Experimental Procedure**

**Part A: Uncovered "Sneeze"**

1. Place the dark paper on the table.
2. Fill a spoon or bottle with flour.
3. Simulate a sneeze by quickly blowing or squeezing over the surface.
4. Observe how far and wide the flour spreads.

**Part B: Covered "Sneeze"**

1. Clean the surface.
2. Repeat the sneeze simulation while covering it with:
    - a hand
    - a tissue or paper towel
3. Observe and compare the spread.

**Observations**

Students observe that:

- Flour spreads in many directions.
- Small particles travel farther than expected.

- Barriers significantly reduce spread.
- Some particles still escape if the barrier is not used correctly.

**Results**

The largest spread occurs when no barrier is used.
Using a tissue or covering reduces both distance and area of spread.

**Scientific Explanation**

Sneezing releases tiny droplets that can carry microbes. These droplets travel through air and land on surfaces. Barriers block or absorb droplets, reducing transmission.

**Model Interpretation**

This experiment is a **model**, not real germs:

- **Flour** represents droplets carrying microbes.
- **Sneezing motion** represents air pressure from a real sneeze.
- **Barriers** represent hygiene behaviors.

**Conclusion**

Microbes spread easily through droplets, even when we cannot see them. Simple actions like covering a sneeze can greatly reduce the spread and protect others.

**Key Health Message**

> *Good hygiene is not just about protecting ourselves—it is about protecting everyone.*

**Interdisciplinary Connections**

**Biology (**Microorganisms, Transmission of disease), **Health Education, (**Hygiene habits, Public health responsibility), **Civic Education (**Caring for others, Community safety), **Mathematics (**Measuring distances, Comparing quantities), **Art (**Creating droplet-spread patterns, Visual storytelling)

**Safety Notes**

1. Do not inhale flour.
2. Clean surfaces after the experiment.
3. Emphasize that no real germs are used.

**Reflection Questions**

1. Why can germs spread even when we cannot see them?
2. Which barrier worked best?
3. How does this experiment relate to real life?
4. What hygiene rule will you remember?

**Student Observation Worksheet**

**How Microbes Spread: A Sneeze Simulation Experiment**

**Name: _____**
**Date: _____**
**Class: _____**

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**1. Experiment Title**

**How Microbes Spread: A Sneeze Simulation**

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**2. Research Question**

How do droplets spread during a sneeze, and how can covering a sneeze reduce the spread?

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

What do you think will happen when a sneeze is not covered?

☐ The flour will spread far
☐ The flour will stay in one place
☐ I am not sure

**Explain your prediction:**

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**4. Materials Used**

Circle the materials used in the experiment:

1. Flour
2. Spoon / squeeze bottle
3. Dark paper or surface
4. Tissue / paper towel
5. Ruler or measuring tape

**5. Observation – Part A (Uncovered Sneeze)**

What did you observe when the sneeze was **not covered**?

☐ Flour spread far
☐ Flour spread in many directions
☐ Only a small area was covered

**Describe what you saw:**

**Approximate distance of spread: _____**

**6. Observation – Part B (Covered Sneeze)**

What did you observe when the sneeze was **covered with a tissue or hand**?

☐ Less flour spread
☐ More flour stayed close
☐ Almost no flour spread

**Describe what you saw:**

**Approximate distance of spread: _____**

**7. Results**

Which situation caused the **most spread**?

☐ Uncovered sneeze
☐ Covered sneeze

**8. Scientific Explanation**

Why did covering the sneeze change the result?

**9. Model Explanation**

Fill in the meanings:

- Flour represents: _____
- Sneezing motion represents: _____
- Tissue or hand represents: _____

**10. Health and Responsibility Reflection**

Answer in complete sentences.

1. Why is it important to cover our mouth and nose when we sneeze?

_____

2. How does this experiment help protect other people?

_____

_____

**11. Real-Life Connection**

Complete the sentence:

One hygiene rule I will remember after this experiment is _____.

_____

**12. Conclusion**

What did you learn from this experiment?

☐ How germs spread
☐ How to protect others
☐ Both

**Explain:**

_____

_____

_____

**Teacher Observation (Optional)**

- Student participated: ☐ Yes ☐ Somewhat ☐ No
- 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?

*Observation sheet source: WeAreTeachers,2024*