

Erasmus+ Cultural connections : Enhancing EU heritage, Social  
Inclusion and Digital Literacy through our Pupils' hearts  
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## LESSON PLAN 1.2

# Mathematics Lesson Plan: Proportions

## Empowerment through Decision-Making and Inquiry

**Subject:** Mathematics

**Topic:** Proportions and proportional reasoning

**Grade:** Lower secondary (Grades 6–7)

**Duration:** 50 minutes

**Lesson type:** Inquiry-based, student-centred

## Learning Objectives

By the end of the lesson, students will be able to:

- apply proportions to **real-life situations**
- make **mathematical decisions** and justify them
- work independently and collaboratively
- explain and reflect on their own reasoning

## Empowerment Pillars

1. Student choice: students **choose methods**, do not follow algorithms.
2. Shared responsibility and Collaboration
3. Independent inquiry: the teacher guides learning without controlling it.
4. Reflection and self-regulation: reflection closes the learning loop.
5. Students **create mathematical content**.
6. Students **justify decisions** publicly.

## 1. INTRODUCTION

**Sparking Student Motivation 5 min**

**Activity:** Real-Life Trigger

The teacher presents a real context: "In a supermarket, you see two offers: 3 bottles of juice for 12 lei and 5 bottles of juice for 18 lei. Which offer is better?" No method is given.

### Student actions

- Students think individually for 1 minute.
- They write **one idea** about how they might decide.

**Teacher role:** Facilitator, problem-poser.

### Possible student reactions

"The second one is better because you get more bottles."

"The first one is cheaper because 12 is less than 18."

Some students immediately start dividing.

Others hesitate, unsure how to compare.

### Teacher intervention (minimal, enabling)

"I am not asking which one *feels* cheaper. I am asking: *how could we decide mathematically?* Write one idea. Any idea."

### Empowerment element

Students are not told **how** to solve the problem; they decide **how to start thinking**.

## 2. CHOOSING DIRECTION

Decision Points 7 min

### Activity: Choice of Strategy

Students form **small groups (3–4)** and choose:

- how to compare (price per item, ratio, table, drawing),
- who will take which role (calculator, explainer, checker).

Each group writes on a mini-card: "We will compare the offers by..."

### Examples of acceptable student responses:

"We will use price per item because it is easy to compare."

"We will use a table to see the pattern."

"We will use proportions because the quantities are different"

### Teacher role

- Confirms mathematical validity of chosen strategies.

- Asks guiding questions only:
  - “When you compare the two, you need a constant, compare same value or same quantity. What stays constant?”
  - “What are you comparing: value or quantity?”
  - Clarifies method choice:

“There is more than one correct way to compare these two offers. I am **not choosing the method for you**. Your group will decide *how* to compare them, but you must be able to explain your choice.” The teacher then **writes or displays** the following options:

1. Price per item (unit rate)
2. Ratio or proportion
3. Table of values
4. Drawing or visual model

“You may choose one of these, or a different method you trust—but you must agree on it as a group.”

- Clarifies method choice: “Each group needs three roles. You will decide who takes which role.” Roles are displayed:
- **Calculator** – carries out calculations and checks numbers
- **Explainer** – prepares to explain the method and reasoning
- **Checker** – asks: *Does this make sense in real life?* “If something is unclear, the checker’s job is to stop the group and ask questions.”

### Empowerment element

Students choose the **method**, not the teacher.

## 3. INQUIRY AND ACTION

### Independent Inquiry 15 min

#### Activity: Student-Designed Proportion Problem

Each group must:

1. **Solve the supermarket problem** using their chosen method.
2. **Create their own real-life proportion problem**, related to:
  - shopping,
  - mobile data plans,
  - recipes,
  - sports statistics.

Examples students may create:

- “Is a 10 GB plan for 25 lei better than a 15 GB plan for 40 lei?”
- “Which recipe is more concentrated in sugar? Compare quantity of sugar per quantity of flour.”
- Players’ number of goals per number of matches played

Groups decide:

1. numbers,
2. context,
3. difficulty level.

Possible group feedback: “What if Player B played fewer minutes, can we still compare goals per match?”

### Teacher role

- Observes.
- Supports struggling groups with prompts, not solutions.
- Ensures correctness through checkpoints.

### Empowerment element

Students become **problem designers**, not just problem solvers.

## 4. COLLABORATION AND SHARING

**Duration: 10 min**

### Activity: Peer Check & Mathematical Responsibility

Each group:

- exchanges their created problem with another group,
- solves it,
- identifies **one possible mistake or misconception**.

Original group must:

1. listen,
2. decide whether the feedback is valid,
3. explain or correct their reasoning.

**Expected peer feedback**

“You forgot to explain why you divided.”

“Your numbers are realistic.”

“You compared different units.”

**Teacher intervention on structure, not on content**

“When you give feedback, name the mistake and suggest a fix.”

**Teacher role**

Moderator of discussion, ensures respectful dialogue.

**Empowerment element**

Responsibility for correctness shifts from teacher to students.

**5. REFLECTION AND SELF-REGULATION****Individual Reflection (written) 8 min**

**Activity:** Students complete three prompts:

1. “One decision my group made today was...”
2. “What helped me understand proportions better was...”
3. “Next time, I would...”

**Expected student reflections**

“I usually wait for the formula. Today we had to decide.”

“I understood proportions better when we created our own problem.”

“I was confused at first, but our method made sense.”

**Exit Ticket (Self-Assessment)**

Students rate themselves (1–5):

- I contributed ideas.
- I understood proportions better.
- I can apply this to real life.

**Teacher role**

Collects evidence for formative assessment.

**Empowerment element**

Students evaluate **their own learning**, not just receive grades.

## **Formative Assessment**

- observation of decision-making,
- quality of student-created problems,
- peer explanations,
- reflection responses.