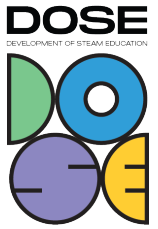


# TEMPLATE for BEST PRACTICE EXAMPLES - SOLVED TASK



1. **Name of the task: STEM JAM**
2. **Why did you choose this task?**

Jieznas gymnasium is a member of STEAM School network. During the lessons in 5-8 forms and gymnasium I-II forms integrated project activities are often used. The topic of the challenge engaged the students, corresponded to our educational facilities and allowed us to integrate different school subjects. This task is interesting, engaging and, most importantly, that by carrying out practical activities, it is possible to acquire new and deepen existing interdisciplinary (physics, chemistry, mathematics, etc.) knowledge, to acquire practical and entrepreneurial skills.



3. **Subjects covered from STEAM areas:**

1. Technological processes of jam making (technologies, physics).
2. Nutritional and energy value calculations (biology, mathematics).
3. Acidity research – pH level determination (chemistry).
4. Proportions and percentages (mathematics, IT).
5. Physical parameter changes in technological processes (physics, IT, mathematics).
6. Calculators, formulas and functions (IT).
7. Fruits and berries (geography, IT).
8. Jam labels (art and technologies).

4. **Target group (age range and size of the group):**

Form 10th, age – 16-17 years old, 15 students.

5. **Duration of the activity:**

12 lessons at school.

6. **Key words:**

Cooking technologies, nutritional and energy value, acidity, pH level, proportions, percentage, physical phenomena, density, volume, temperature, diagrams, cost, evaporation, thermal movement, diffusion, thermal conductivity, kilocalories, energy, pumpkin, lemon, cranberry, label, jam card.

7. **Key sentence describing context of the activity, followed by short description (200 words):**

**To make STEM jam and explain the role of different school subjects in jam making process.**

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Having chosen the STEM challenge students planned their activities and made pumpkin – lemon jam and pumpkin – cranberry jam. In the course of the process they performed research by observing physical and chemical conditions and recording parameters. Students gathered information about the ingredients used and defined their nutritional and energy values. Students used IT tools and their skills for data analysis, jam labels design and visual presentation of the results. Students learned about jam making technology processes, gained practical cooking skills and assessed the results during the jam tasting.

### 8. Description of the activity environment, including the list of materials and tools needed:

In the course of STEM activity online sources were used:

- <https://www.canva.com/>
- <https://bosskitchen.com/pumpkin-and-cranberry-jam/>
- <http://foodbase.azurewebsites.net/>
- <https://fdc.nal.usda.gov/fdc-app.html#/food-details/168448/nutrients>

Project activities were carried out in different educational spaces – specialized classrooms:

1. Technology and art classroom: analysis of jam making (cooking) technological process, planning of the technological processes, technological processes (jam making and pouring into the provided packages (glass jars)), collecting of physical parameters, labels design.

2. Biology and chemistry classroom: pH level measurements, evaluation of jam composition and nutritional value in calories.

3. Physics classroom: evaluation of physical parameters, quantitative and qualitative physical calculations, analysis of the jam making process, discussion and making conclusions.

4. IT and mathematics classroom: quantitative calculations and preparation of the presentation, tables and graphs using IT tools.

5. Geography classroom: organization of the available information about the fruits and berries.

Part of the tasks were fulfilled by the students in a virtual environment.

The project was presented in the annual Jieznas gymnasium STEAM conference in the school hall and in the regional conference at Prienai Revuona basic school.

**Main products and tools:** jam ingredients (pumpkin, lemon, cranberry cinnamon, sugar, water), dishes, scales, knives, cutting boards, electric cooker, digital thermometers, measurement vessels, timer, calculators, computers, Vernier digital pH sensor, universal indicator pH strips.

### 9. Step by step, detailed description of the activity, including teaching and learning strategies:

#### Activities step-by-step:

1. Analysis and selection of STEAM challenges.
2. Teachers and students team building and planning of joint activities.
3. Technological processes:
  - 3.1. Prepare the pumpkin – wash and peel it.

## TEMPLATE for BEST PRACTICE EXAMPLES - SOLVED TASK

- 3.2. Pour the required amount of water into the pot.
- 3.3. Weigh the required amount of sugar and pour it into the pot.
- 3.4. Melt the sugar.
- 3.5. Cut the pumpkin into the small cubes, weigh the required amount of it.
- 3.6. Put pumpkin cubes into the water and sugar mixture.
- 3.7. Simmer constantly stirring until pumpkin cubes soften (60 min).
- 3.8. Add clean and dry cranberries.
- 3.9. Simmer for a 15 min.
- 3.10. Add cinnamon and simmer for 5 min.
- 3.11. If you want a smooth jam, use the blender then. Usually, cranberries do not soften while simmering and are heated shorter and at a lower temperature in order to save vitamin C and useful nutrients.
- 3.12. Pour jam into clean jars.



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4. Jam tasting. In order to promote the project, jam tasting was organised at school. Evaluation criteria were prepared to find out how pupils evaluate taste, odor and visual look of different jams.



Students of primary classes taste the jam



School headmaster's opinion



Teachers enjoy the results

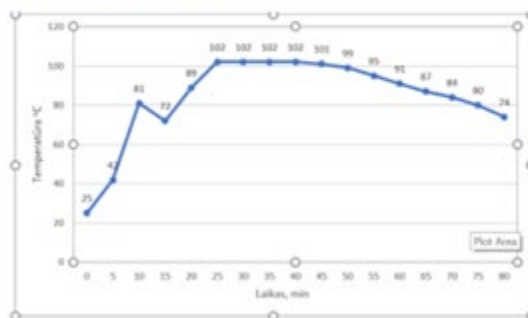
5. Data collection, processing and visual presentation. Students not only made the jam, they also did integrated tasks in different school subjects: physics, biology, mathematics, chemistry, geography. Visual and graphic presentation of the fulfilled tasks was done using art and IT tools.

### 5.1. Physics tasks.

## TEMPLATE for BEST PRACTICE EXAMPLES - SOLVED TASK

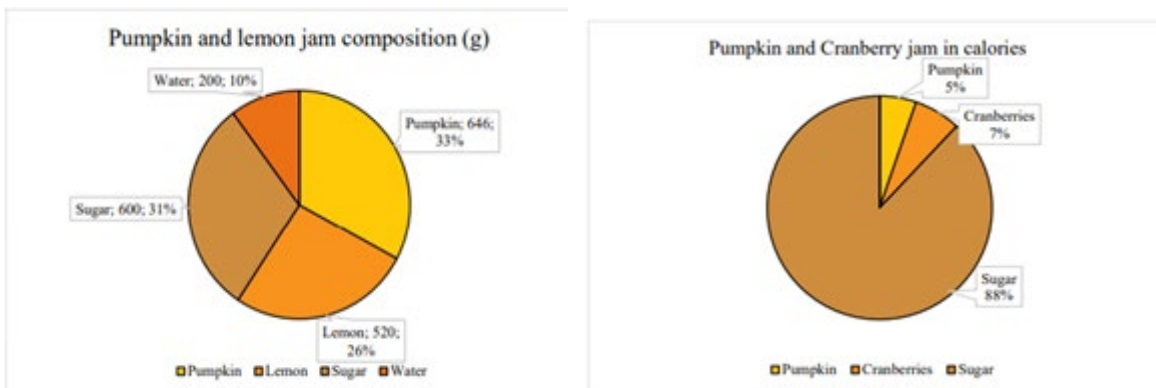
While making the jam, use proper devices to measure jam temperature, mass, boiling time and volume. After getting the necessary data, draw jam temperature alteration diagrams, calculate jam density, amount of consumed energy, its cost and amount of evaporated liquid.

**Jam temperature alteration diagram**



### 5.2. Biology tasks.

Nutritional and energy values of different jams were evaluated by using sources of information and jam recipes. The components of different jams and their nutritional composition (100 g of the product) were listed. Amount of nutritional and fibrous materials and vitamins according to the recommended daily norm were evaluated.

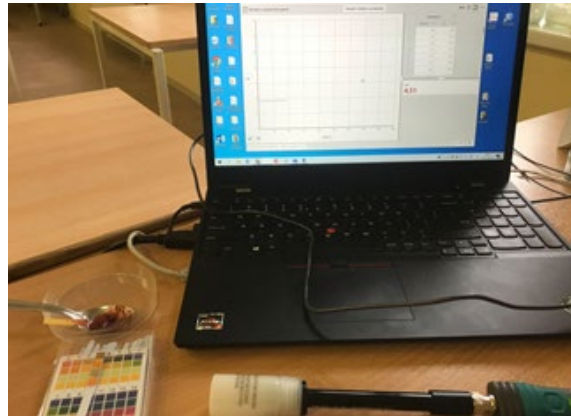
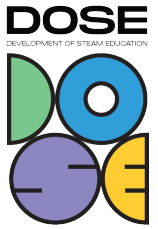


### 5.3. Chemistry tasks.

Conduct research on how precisely your taste receptors evaluate acidity – which of two jams is more sour? Identify jam pH level by using universal indicator strips and Vernier sensor. Present your data in the form of tables and diagrams.



# TEMPLATE for BEST PRACTICE EXAMPLES - SOLVED TASK



## 5.4. Geography tasks.

Search for information about lemons, pumpkins and cranberries specifying the place of origin, range and conditions of growth, special features. Present some interesting facts about the fruits or berries in the form of IT app.

## 6. Stating of conclusions.

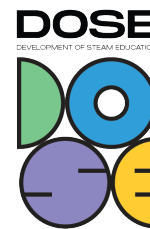
## 7. Work presentation.

„STEM Jam“ project was presented in the annual school STEAM conference and in the regional students' conference at Prienai Revuona basic school. Jieznas gymnasium students were awarded the certificates for this project in the regional conference.

## 10. Learning objectives/competencies:

1. Make two types of STEM jam from the chosen fruits and berries.
2. Observe biochemical and physical phenomena in the course of jam making.
3. Indicate parameters and do qualitative and quantitative calculations.
4. Discuss observations, research results and make conclusions.
5. Organise the jam tasting and project presentation.

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## 11. Evaluation/Assessment guidelines:

Group work assessment methods were applied, such as structured questions and „sharing the cake“. In different school subjects formal assessment marks were written to students according to their contributions in the project. Cumulative scores were applied to some students (students who worked in several groups).

## 12. Lessons learned:

Students made pumpkin – lemon, pumpkin – cranberry jams and defined their nutritional and energy values. In the course of technological processes students observed physical phenomena and carried out temperature, mass, volume, time, pH level measurements and calculations. Students used IT tools and design skills for data analysis and visual presentation of the results. In their research activities students experienced success level and joy of learning. Having made jam according to national recipes, students decided to try options with different fruits. Students gained practical cooking skills.

## 13. Additional information/Links:

<http://jieznogimnazija.lt/wp-content/uploads/2022/05/STEM-uogiene-STEM-JAM.pdf>

## 14. Contact person:

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