TEMPLATE for the TEACHERS

★ **Name of the project:**
Mathematical Memes

★ **Subjects covered from STEAM areas:**
This example is connecting mathematics and contemporary art, but it also can be applied to any other STEAM subject.

★ **Target group (age range and size of the group)**
High school students 14-18, whole class.

★ **Duration of the activity:**
Activity last 90 minutes.

★ **Keywords:**
Mathematics, memes, contemporary art, digital content.

★ **Key sentence describing context of the activity, followed by short description (200 words):**
In this activity students make a meme based on mathematical content learned in previous lessons. Besides the creation of memes, students make a follow-up presentation that explains the mathematics behind the memes. In our activity, students based their activities on functions and properties of functions. Students used digital tools to produce memes. The activity connects mathematical content and the contemporary way of communication among young people.

★ **Description of the activity environment, including the list of materials and tools needed:**
Students use mathematical content and produce memes in the classroom. They use digital tools, computers, or cellphones to produce visual representation of memes. At the end, students use Power Point to make a short representation of their work.

★ **Step by step, detailed description of the activity, including teaching and learning strategies.**

During this activity students go from a mathematical idea to a visual representation in the form of meme. The first step is to choose a mathematical concept that a student wants to present with a meme. For example, parabola as a graphical representation of a quadratic function. The second step is to connect the mathematical content with a meme. In this stage, there should be a discussion about the connection between mathematical content and real-world representations that could be presented with a meme. Students produce the mathematical memes using digital tools. They can take pictures, draw, or work on different kinds of visual representations. The final step of this workshop is presenting mathematical memes and explaining the connection of mathematical meme with the mathematical content. The presentation should be made to fellow students. Also, students can make an exhibition of memes.

★ Learning objectives/competencies:

In this workshop students will have the opportunity to revise previously learned concepts. To connect mathematical concepts to the visual representation of a meme, such as a function, students need to know the definition and features. This workshop is a good way to investigate mathematical concepts through art and creative activities and contemporary concepts of urban culture such as the meme culture. It can raise students' attention and present mathematics in way that modern students can relate to. It can connect mathematics and digital art.

★ Evaluation/Assessment guidelines

In Figure 1 we can see how students represented the zero of the function, connecting calculation zeros of the function to a treasure hunt.

Figure 1. Mathematical meme about zero of the function

In Figure 2 we can see how students represented the trigonometric function to the winter season.

Figure 2: Mathematical meme about trigonometric function

★ **Lessons learned:** Students liked the activity, and it was easy to explain the task to them. They were familiar with the memes culture. It was interesting that when they did not understand the meme, they asked each other to explain the mathematical content behind the meme.

★ **Additional information/Links:**
http://math4all4math.blogspot.com/2019/01/innovative-approach-mathematical-memes.html

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