**Teaching scenario ‘Mafia’ in mathematics**

**1. Teaching scenario identity**

**Thematic field:** Greek popular games in mathematics

**Thematic Unit:** Mafia card game in mathematics

**Class:** Secondary school, 3rd grade (15-16 years old)

**Competence level:** Students need a certain competence in basic mathematics

**Profile of target group:** Students with a scientific orientation

**Teaching scenario aim:** Learning about “Chance and Probability” using Mafia game.

**Teaching scenario objectives:** Students are able to:

- understand concepts as random experiences, random event, sure event, probability of an event, compound events, tree diagrams.

- calculate probabilities with regular instruments and using Laplace theory.

- compound experiences and using a tree diagram to calculate the probability of events.

**Duration:** 2 sessions of 50 minutes (one for simple probability and one for compound experiences)

**Teacher’s role:** presenter, facilitator and guide

**Method of students’ work:** discussion, teamwork, making exercises

**Required materials:** calculator

**2. Brief description of the teaching scenario**

In this lesson students put in practice their knowledge about Chance and Probability by playing Mafia games. We use this game in a scientific context, as a sample of calculate probabilities in real life and with an entertaining context.

**3. Planification, worksheets and their keys**

SESSION 1: Previously to this teaching scenario, teacher has explained the main concepts: random experiences, random event, sure event, probability of an event. Then teacher (or students involved in meeting in Greece) explain the students how to play Mafia game (the presentation of this game used during the meeting is available for this purpose).

To check the comprehension of the math concepts, as to the check if students know how to play Mafia, we can ask questions as the followings:

“Imagine, 12 friends playing Mafia…

* Is the “deal of cards” a random experience?
  + *Yes, it is. (If you shuffle the deck first, of course)*
* Put an example of sure event in this context
  + *To get one card, to get a card with a number, with a natural number, real number, positive number…*
* What’s the probability to be an “assassin”?
  + *2 of 12, 2/12, 1/6…*
* What’s the probability to be the “policeman”?
  + 1 of 12, 1/12…
* If you are on assassin, what is the probability that your best friend is the other assassin?
  + *1 of 11, 1/11*
* After, 2 nights, what’s the probability of not being murdered (being a simple person)?
  + *7 of 9 (as two are the assassins, one the policeman and other two are already dead, so only 7 simple people are alive)*

SESSION 2: Teacher uses Mafia game to explain compound events. This way students can understand how probabilities of “being killed” or “guess who is the assessin” changes every day. A tree diagram can be used for this purpose.

Other concepts like “independent or dependent events” can also been introduced.

Some questions to check if students have understood compound probability:

* Is there any dependence in the event “being an assessin playing Mafia two times in a row?
* What’s the probability of win the game being an assessin?
* After how many nights the probability of being killed is more than 50%?
* What is the difference, in terms of probability, between guess the assessin the first day and the second day?