Date: November 12,2013
Teacher: Tuğba Özcan
Number of Students:17
Grade Level: 11th grad
Time Frame:40 minutes

Mathematics Learning Plan

Write this lesson plan as if you were planning for a substitute teacher in your classroom. You can use bullets to organize each section or alternatively write in paragraph style. Provide all of the pertinent information someone would need to teach this lesson to your students. Do not assume that the substitute teacher knows about your class.

1. Goal(s)
- To develop an understanding of number sequences and relation between the Golden Ratio and Fibonacci sequence

2A. Specific Objectives (measurable)
- The students will comprehend the Fibonacci sequence and Golden ratio
- The students will collect the data in nature
- The students will make connection with the Golden ratio
- The students will find a formula of the pattern of number sequences

2B. Ministry of National Education (MoNE) Objectives
- Gerçek sayı dizileri: bir terimin kendinden önceki bir veya birkaç terimin cinsinden tanımlanması. Fibonacci ve benzeri dizilerden örnekler verilir

2C. IGCSE Standards:
- Algebra: continuation of a sequence of numbers or patterns. Determination of the nth term.

3. Rationale
- The purpose of the lesson is to get the students recognize that the Fibonacci sequence is everywhere in nature
- The subject is related other sciences such as biology, astronomy and so the students will integrated Fibonacci sequence and Golden ratio with other subjects
- Students will need this information because they will reach a conclusion about the other number sequences

4. Materials

Each student will need a paper, a pencil, a ruler and a calculator

Computers with internet access

Copies of classroom activity sheet: finding Fibonacci numbers and its relation with golden ratio

Copies of homework sheet

5. Resources

- Book: mathematics for the international students mathematics high level, chapter 7: sequences and series, p.214-229
- Website for video: http://m.youtube.com/watch?v=03uC9bhX0Rc

6. Getting Ready for the Lesson (Preparation Information)

- Teacher will need the activity sheets and arrange them properly
- Teacher will reach these sheets or other materials on the desk of Ms. Tugba Ozcan in the mathematics teachers room
- Teacher will need a computer with internet connection to show the video on the website above
- Before demonstrating the video, teacher will distribute the activity sheet and wait for a second that the students will predict the topic of the day
- Teacher will form four groups with 4 people in each group. Groups should be arranged as separating Ada, Ezgi, Ruzgar and Deniz in different groups and the other students should be arranged randomly
- Teacher will spend 4 minutes for the visual aids and 3 minute for the prediction and for the activity

7. Prior Background Knowledge (Prerequisite Skills)

- As a prior knowledge, teacher should make certain that the students are able to do the ratio of numbers
- Students will be supposed to estimate the components of the sequences

Lesson Procedures

Transition: let's make a prediction this sequence related with which ratio

8A. Engage (at most ten minutes)

- Teacher will begin the lesson by distributing the colorful sheets and wait 20 seconds for students' prediction
- Teacher will show the video about the Fibonacci numbers relation on golden ratio for engaging the students to the lesson
- Teacher will ask " How many pairs of rabbits would be produced in one year?"

Engagement phase is used:

- In order to catch the students' attention on the lesson, a video related with the Fibonacci numbers and golden ratio will be shown
- To get students make prediction and get them be excited and curious about the subject, and wait for that they will make a connection between the nature and number sequences

Transition: let's predict the pattern of these numbers.

B. Explore (about 15 minutes)

- Students will discuss what kind of rule in the sequence and what will be the next number in this pattern
- Teacher will help students understand to get the next number in the sequence
- Teacher will listen to students observations and their opinions and findings

Transition: let's see the relationship between the golden ratio and Fibonacci sequence

C. Explain (5minutes)

- Teacher will ask " How can you explain or define the relationship between golden ratio and Fibonacci sequence?"
- "How can we express this relation mathematically?"
- "Do you notice before where there is such pattern observed in nature"
- "Can you give me examples?"
- "What else did you notice? Or Can you predict?"

Transition: let's observe where the sequence is on these pictures of objects from nature

D. Extend (10 minutes)

- Students will work together and try to demonstrate the Fibonacci numbers and golden ratio in nature
- Teacher will ask "Which shape do you observe commonly in these objects?"
- "Are they going to spiral, why does it so?"

Transition: let's share your findings with your friends and discuss what else do we find any other sequences

E. Evaluate (throughout the lesson)

- Teacher will assess students' performance according to their participation in classroom discussion
- Teacher will evaluate the students for number of creating new things or with respect to their ability to solve the problem on sheets or number of finding the pattern in pictures

9. Closure & Relevance for Future Learning
- Teacher will say students to think about their learning for 5 minutes about the topic of the day and to write them as a journal
- Teacher will give students their homework and lastly mentioned about the next week's topic

10. Specific Key Questions:
- What is the next number in this pattern and why?
- How can we predict the next number?
- What is the relation of golden ratio with Fibonacci sequence? And why?
- Can you give any other example of this kind of sequences which you observe in nature?