Developing by Key Competences Mathematics Education

University of Cyprus
Department of Education

# LEARNING / ASSESSMENT SCENARIOS

## Deliverable 7.6 – Products from trainee teachers

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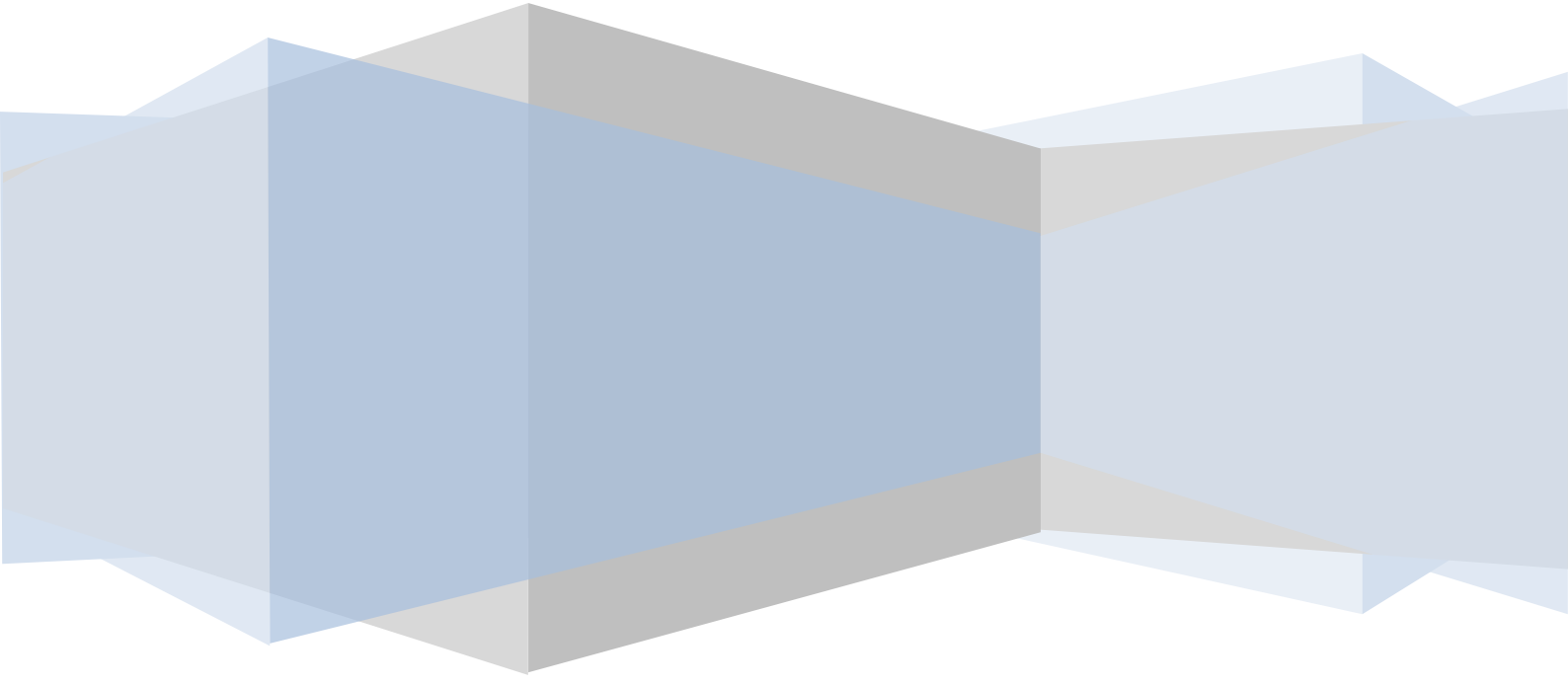

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Lifelong Learning Programme

*This project has been funded with support from the European Commission.This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.*

# LEARNING/ASSESSMENT SCENARIO 1: RENOVATION

*Theodosis Theodosiou, Andreas Ellinas & Philippos Philippou*

## GOALS (Mathematical Competence)

Students will be able to:

**Numbers**

- Perform addition, subtraction, multiplication and division of natural numbers and decimals.
- Round off decimals.
- Use the concept of ratio and solve proportional problems.
- Judge the reasonableness of calculated results.

**Measurement**

- Use standard units of measurement for length.
- Convert units within the metric system.
- Calculate the rectangle area.

## KEY COMPETENCES FOR LIFELONG LEARNING

- Social Competences
- Learning to Learn
- Sense of Initiative

### Problem

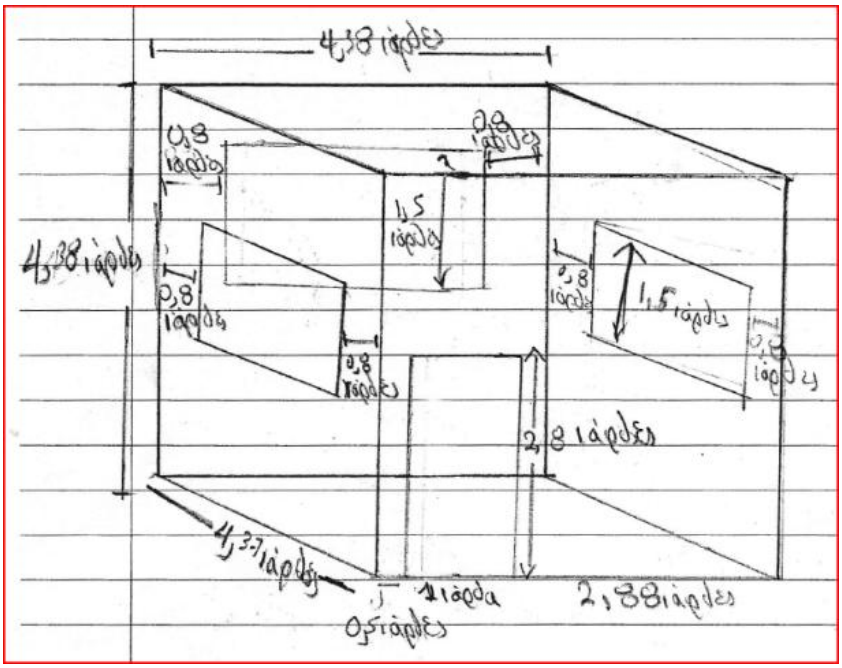
John wants to renovate his room by painting the walls and by changing the floor tiles. He can't spend more than €415. Can you help him to decide on the kind of tiles and the paint color?

| Paint color | Floor tiles | The colored strip for the walls (2,5 m) |
|---|---|---|
| John has chosen to buy Culux paints.<br>The price of each paint bucket is follows:<br>Bright green: €22<br>Olive green: €24<br>Yellow: €20<br>Blue electric: €23<br>Sky blue: €25 | The dimensions of the floor tiles are 45cm x 45cm.<br>The price of each floor tile is:<br>White: €4<br>Beige: €5<br>Black & White: €3<br>Grey: €4,5 | Each colored strip costs:<br>Disney theme: €7<br>Football theme: €6<br>Luna park theme: €5<br>Batman theme: €8<br>Barbie theme: €5 |

**Details:**

- ✓ Each paint bucket is adequate for 32m$^2$.
- ✓ He has access to all the tools needed for the renovation.
- ✓ His family will help him in this attempt, so he will not have any other expenses.

**Bedroom:**




***Extension problem***

John's family intends to renovate their kitchen in the future. Write a letter to illustrate the steps that they have to follow.

# LEARNING/ASSESSMENT SCENARIO 2: THE WORLD IS GETTING OLDER!

*Panayiota Irakleous*

## GOALS (Mathematical Competence)

Students will be able to:

**Numbers**

- Use natural numbers until 1000 000 000, fractions and decimal numbers to solve problems.
- Use fractions to represent quantitative relations.
- Convert fractions into percentages and conversely.
- Use the concept of ratio and solve proportional problems.
- Judge the reasonableness of calculated results.

**Statistics-Probabilities**

- Answer and pose questions about a dataset.
- Describe and compare datasets, using measures of central tendency (e.g. median, mean) and identify their affordances and limitations.
- Organize and present data in frequency charts (bar chart, pie chart and linear graph).

## KEY COMPETENCES FOR LIFELONG LEARNING

- Digital Competence
- Social Competences
- Communication in the mother tongue
- Learning to Learn

**A. Article**

Read the following article and answer the questions.

20 February 2014

# DAILY NEWS

**Greece Holds One of the Highest Ageing Rates in Europe**

According to a recent survey by the associate professor at the University of Thessaly, Marie-Noel Dyken, Greece is one of the most "aged" countries in the EU. Only Italy and Germany are presenting highest rates of population ageing.

Dyken studying data from Eurostat found that population ageing in Greece as well as in the rest of the EU countries continued incessantly during the last decade. The percentage of the elderly population in Greece increased significantly, from 16.7% to 19.4%, which is higher than the EU average (17.5% in 2011).

Examining the age structure of the Greek population, we see that the proportion of people aged over 65 years old exceeds 19% (nearly one in five), which places Greece among the three EU countries with the highest ageing rates, along with Italy (20.3%) and Germany (20.6%). On the contrary, the three countries with the smallest ageing rates are Ireland (11.5%), Slovakia (12.6%) and Cyprus (12.7%).

These indices bring out a serious problem of reproduction in Greece, which is also confirmed by the recent evolution of the country's natural balance (difference between births and deaths). According to data from the Hellenic Statistical Authority (ELSTAT), natural balance decreased rapidly during the period 2008-2012. In 2008, births exceeded deaths by 10,300 (positive natural balance), while from 2011 onwards, deaths exceed births.

The survey shows that regions such as the islands of Mykonos, Kos, Andros, Rhodes, Santorini and Crete present lower ageing rates with the population aged 65 years and over, not exceeding 17%.

Source: http://greece.greekreporter.com/2014/03/12/greece-holds-one-of-the-highest-ageing-rates-in-europe/#sthash.xvLOItIS.dpuf

**Comprehension questions:**

-What do you think that population ageing is? Have you ever heard this term?

-In your opinion, what factors affect this phenomenon?

**B. Warm up activity**

The following tables illustrate the number of deaths by age and the total population in Cyprus in 1946 and 2008.

Number of deaths by age in Cyprus

| Age of death | 1946 | 2008 |
|---|---|---|
| 0-4 | 32 | 35 |
| 5_9 | 10 | 6 |
| 10_14 | 8 | 5 |
| 15-19 | 20 | 30 |
| 20-24 | 42 | 22 |
| 25-29 | 70 | 41 |
| 30-34 | 135 | 46 |
| 35-39 | 177 | 40 |
| 40-44 | 198 | 70 |
| 45-49 | 250 | 94 |
| 50-54 | 340 | 134 |
| 55-59 | 425 | 206 |
| 60-64 | 480 | 307 |
| 65-69 | 230 | 368 |
| 70-74 | 68 | 531 |
| 75-79 | 78 | 731 |
| 80-84 | 92 | 937 |
| 85+ | 120 | 1583 |

Cyprus total population in 1946 and 2008

| 1946 | | 2008 | |
|---|---|---|---|
| Males | Females | Males | Females |
| 224.500 | 225.614 | 397.640 | 398.260 |

**Comprehension questions:**

-In what way the population of Cyprus has changed over time?

-Which age group had the highest concentration of deaths in 1946; Did this age group has the highest mortality level in 2008?

-Could you estimate the average age of death in 1946 and 2008?

-Using the Microsoft Excel program, calculate the average age of death in 1946 and 2008. What conclusions can you draw about mortality in Cyprus? How do you interpret these findings?

## C. Problem

UNESCO is interested in identifying the most "aged" countries of the world. To this end, it intends to collect data about their population. The tables below show the population of Cyprus and Japan by gender and age.

# Cyprus population by gender and age

| AGE | 2050 | | 2030 | | 2010 | | 2000 | |
|---|---|---|---|---|---|---|---|---|
| | MALES | FEMALES | MALES | FEMALES | MALES | FEMALES | MALES | FEMALES |
| TOTAL | **694,1** | **667,1** | **666,0** | **638,6** | **408,8** | **431,0** | **346,1** | **359,4** |
| 0-4 | 32,5 | 29,83 | 33,96 | 32,7 | 24,5 | 23,1 | 22,4 | 21,6 |
| 5-9 | 32,5 | 29,83 | 35,3 | 32,7 | 22,7 | 21,5 | 27,4 | 26,1 |
| 10 _14 | 32,5 | 29,83 | 35,3 | 32,7 | 25,4 | 24,3 | 28,0 | 26,2 |
| 15-19 | 33,9 | 31,18 | 36,6 | 34,0 | 32,7 | 31,0 | 28,7 | 27,1 |
| 20-24 | 36,6 | 33,9 | 40,5 | 37,9 | 35,5 | 34,9 | 27,1 | 26,5 |
| 25-29 | 39,3 | 36,6 | 40,5 | 37,9 | 35,1 | 36,6 | 23,9 | 26,1 |
| 30-34 | 40,7 | 38,0 | 45,7 | 43,1 | 30,7 | 34,6 | 23,1 | 26,1 |
| 35-39 | 40,7 | 38,0 | 52,2 | 48,3 | 27,1 | 32,3 | 25,3 | 27,4 |
| 40-44 | 42,0 | 39,3 | 52,2 | 45,7 | 26,1 | 30,2 | 26,1 | 27,3 |
| 45-49 | 42,0 | 39,3 | 56,2 | 49,6 | 27,6 | 29,7 | 23,2 | 23,4 |
| 50-54 | 46,1 | 43,4 | 49,6 | 44,4 | 27,0 | 27,9 | 21,5 | 22,0 |
| 55-59 | 51,5 | 48,8 | 41,8 | 39,2 | 23,8 | 24,1 | 17,3 | 18,0 |
| 60-64 | 51,5 | 48,8 | 36,6 | 36,6 | 22,1 | 22,9 | 15,3 | 16,1 |
| 65-69 | 52,9 | 47,5 | 34,0 | 34,0 | 16,2 | 17,4 | 12,2 | 13,8 |
| 70-74 | 43,4 | 40,7 | 30,0 | 31,3 | 13,4 | 14,8 | 9,6 | 11,8 |
| 75-79 | 32,5 | 33,9 | 22,2 | 24,8 | 9,0 | 11,4 | 7,2 | 9,1 |
| 80+ | 43,4 | 58,3 | 23,5 | 34,0 | 9,9 | 14,3 | 7,8 | 10,7 |

Note: All number are expressed in thousands.

***(Last update 29/05/2012)***



**JAPAN**

| | 2050 | 2030 | 2010 | 2000 |
|---|---|---|---|---|
| TOTAL | 100594 | 117579 | 127474 | 126926 |
| 0-14 | 10842 | 13233 | 17074 | 18505 |
| 15-65 | 53889 | 69576 | 81665 | 86380 |
| 65+ | 35863 | 34770 | 28735 | 22041 |

Note: All numbers are expressed in thousands.

Which of the two countries is the most aged? Write a letter to describe and explain the method you used to compare the level of population ageing in the two countries. UNESCO aims to use this method to compare other countries as well.

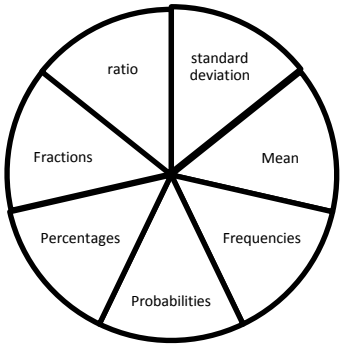
## D. Reflection

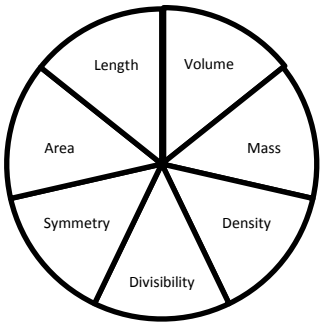
1. STEP DIAGRAM

Draw a step diagram to represent “changes in thinking” that your group went through during the solution of the problem as well as your level of engagement.

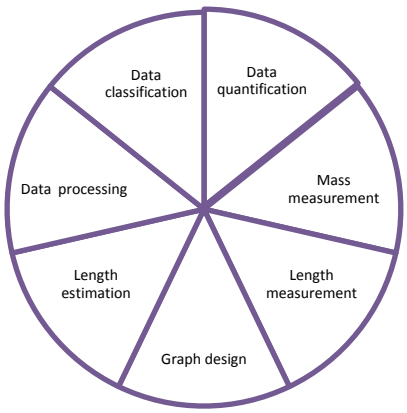
Start of session End of session

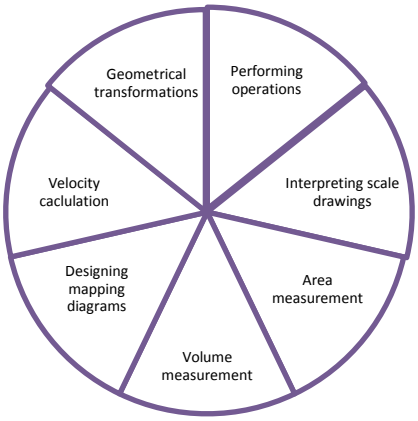
2. Which mathematical concepts did you use during the solution of the problem?




3. Which mathematical procedures did you use during the solution of the problem?



4. In your opinion, how well did you understand the concepts you have used? Explain why.

    - ✓ Not at all
    - ✓ To a small extent
    - ✓ To a moderate extent
    - ✓ To a large extent
    - ✓ Absolutely

5. How difficult was the problem for you? Explain why.
    - ✓ Very easy
    - ✓ Easy
    - ✓ Neutral
    - ✓ Difficult
    - ✓ Very difficult

6. In your opinion, which of the methods you have thought so far is the most appropriate?

# LEARNING/ASSESSMENT SCENARIO 3: EQUIPPING THE LIBRARY OF OUR UNIVERSITY!!!

*Panayiota Irakleous*

## GOALS (Mathematical Competence)

Students will be able to:

**Numbers**

- Use the concept of ratio to solve problems.
- Judge the reasonableness of calculated results.

**Geometry**

- Compose and decompose two-dimensional figures.
- Identify similar figures and calculate similarity ratio and use similarity to solve problems.

**Measurement**

- Use standard units of measurement for length.
- Convert units within the metric system.
- Calculate the perimeter and area of square, rectangle, circle and composite figures.
- Design and interpret scale drawings.

## KEY COMPETENCES FOR LIFELONG LEARNING

- Digital Competence
- Social Competences
- Communication in the mother tongue
- Learning to Learn
- Sense of Initiative

## A. Warm up activity

The text below is an excerpt from Sophia's Nikopoulou personal blog, who is an interior designer. Read it carefully and answer the comprehension questions.

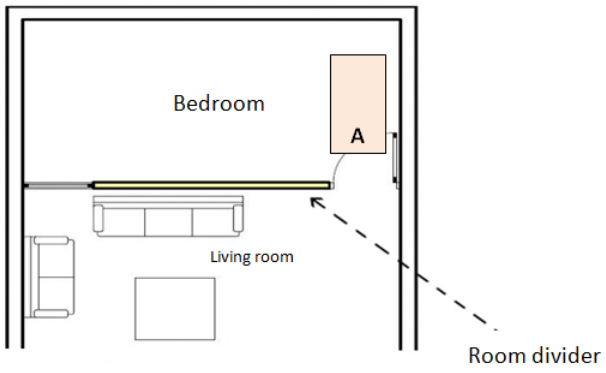
# Sophia Nikopoulou - Interior Designer

**Decoration through internet ... for all!**
In order to keep in touch with all of you who need to decorate your house, I developed a special form of cooperation. **"Decoration Online"** is a blog that aims to help you arrange and decorate your personal space easily, quickly and with low cost. It is too simple!

- ✓ Firstly, enter your name and details about the room you want to decorate.
- ✓ Send a diagram of the room.

*Comments:*

Nikos: Hi! I want to equip the bedroom of my new house with two single beds (2,20m X 1,10m), a bedside table (65 cm X 65 cm) and an office desk (1,20 X 0,75). I am sending you the floor plan of my bedroom.




Scale 1: 100

*Add your comment here:*

**Comprehension questions:**

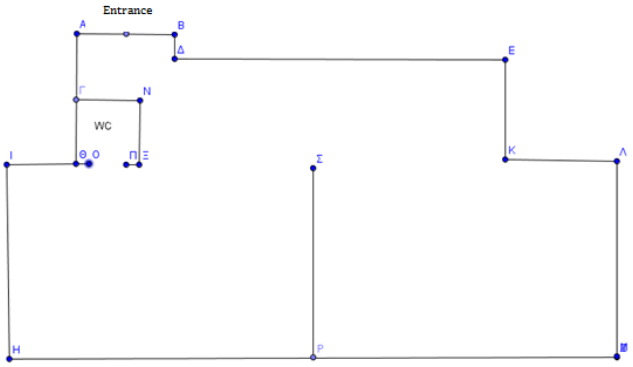
1. What should somebody send to the designer in order to decorate his personal space?
2. If Nikos wants to lay a carpet in his bedroom, how many square meters will be needed?
3. Nikos suggested placing the bed at point A, as shown in the above diagram. Do you agree? Explain your answer.
4. Draw a diagram that shows the arrangement of the furniture, so as to help the designer.

## B. Problem

The Council of University of Cyprus will equip the study room of the new library. To this end, they have to decide which type of chairs and desks they will purchase. However, they face several problems. Firstly, some students have been complaining that there was not enough space in the study room of the old library. Apart from this, the University has a limited budget for equipment, due to financial crisis. The Council has found some special furniture offers, as shown in the table below. You need to measure the dimensions of the desks and chairs and complete the table.

| | Width (m) | Length (m) | Diameter (m) | Price (euros) |
|---|---|---|---|---|
| Circular table | | | | 249 |
| Square table | | | | 149 |
| Rectangle table (brand A) | | | | 99 |
| Rectangle table (brand B) | | | | 118 |
| 4 chairs (brand A) | | | | 78 |
| 2 chairs (chairs B) | | | | 42 |

The figure below illustrates the floor plan of the library. The wall in the central entrance is 210 cm long.



Your duty is to propose an arrangement of the furniture, by designing a plan of the library. Additionally, write a letter to describe the method you have used. The Council intends to use this method in the case of a future library renovation.

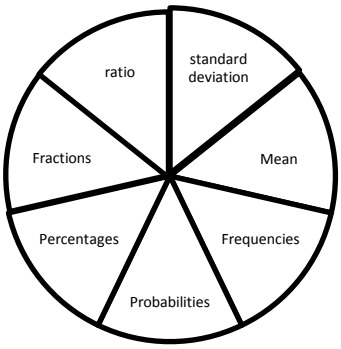
## C. Reflection

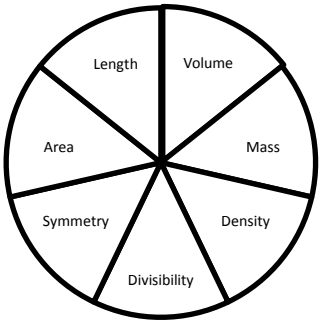
1. STEP DIAGRAM

Draw a step diagram to represent "changes in thinking" that your group went through during the solution of the problem as well as your level of engagement.

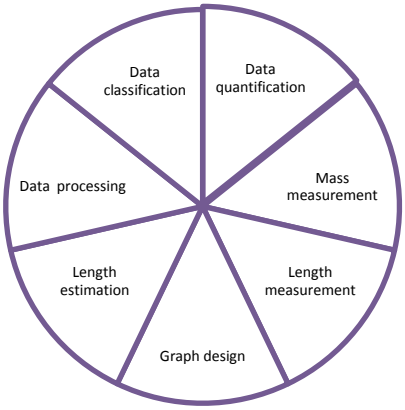
Start of session End of session

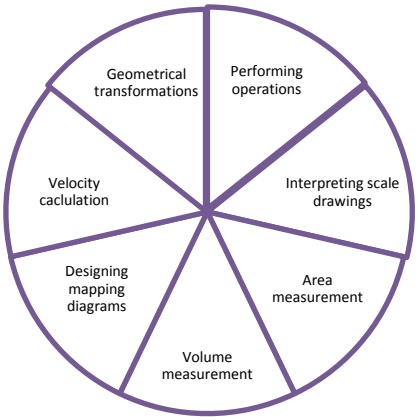
2. Which mathematical concepts did you use during the solution of the problem?




3. Which mathematical procedures did you use during the solution of the problem?



4. In your opinion, how well did you understand the concepts you have used? Explain why.

    - ✓ Not at all
    - ✓ To a small extent
    - ✓ To a moderate extent
    - ✓ To a large extent
    - ✓ Absolutely

5. How difficult was the problem for you? Explain why.
    - ✓ Very easy
    - ✓ Easy
    - ✓ Neutral
    - ✓ Difficult
    - ✓ Very difficult

6. In your opinion, which of the methods you have thought so far is the most appropriate?

# LEARNING/ASSESSMENT SCENARIO 4: MEDICAL SCHOOL

*Panayiota Irakleous*

## GOALS (Mathematical Competence)

Students will be able to:

**Numbers**

- Use natural numbers until 100 to solve problems.
- Compare and order natural numbers until 10000.
- Use fractions to represent quantitative relations.
- Judge the reasonableness of calculated results.

**Statistics-Probabilities**

- Interpret and design the most appropriate frequency chart (bar chart, pie chart and linear graph), based on the data type (categorical or continuous data).
- Describe and compare datasets, using measures of central tendency (e.g. median, mean) and identify their affordances and limitations.
- Perform the procedures of data classification, quantification, weighting and grouping.

**Algebra**

- Use algebraic symbols to represent and explain mathematical relations.
- Understand the concept of variable, interpret and explain relations between variables.
- Choose and use various forms of representation (e.g. algebraic equation, table, graph) to represent quantitative relations.
- Draw conclusions about a problem situation.

## KEY COMPETENCES FOR LIFELONG LEARNING

- Digital Competence
- Social Competences
- Communication in the mother tongue
- Learning to Learn
- Sense of Initiative

## A. Warm up activity

Read the following article from the "National News" newspaper and answer the questions.

**Article:**

Disagreements at Imperial College School of Medicine

*Jack Johnson*

Being admitted to the Imperial College School of Medicine is particularly challenging. The Medical School attracts more than 2000 students annually. More than 600 interviews are conducted every year, whereas only 300 students are accepted. The School of Medicine has a comprehensive admissions policy that ensures that all applications are dealt with in the same way. So far, they used the following criteria to assess candidates: Candidates had to meet the minimum academic requirements and have high marks for the three sections of BMAT. No offers are made without applicants attending for competitive interview.

In October 2014, the number of applications for entry has increased significantly, because of a reduction on the tuition fees. The candidate selection committee consists of six professors, who are going to change the entry requirements, based on their own opinions. They agree that English Language is a prerequisite qualification and that a minimum overall grade of 6 is required. Yet, they disagree about the other requirements. The table below indicates the requirements that each professor regards as essential.

We hope that the committee will reach consensus on this issue soon!

| Professors | Requirements |
|---|---|
| Dr. Harrison | 1. IGCSE in Mathematics<br>2. IGCSE in Biology<br>3. BMAT<br>4. Interview |
| Dr. Mason | 1. BMAT<br>2. Interview<br>3. English<br>4. IGCSE in Chemistry |
| Dr. Watson | 1. IGCSE in Mathematics<br>2. IGCSE in Biology<br>3. IGCSE in Chemistry<br>4. BMAT<br>5. Other qualifications |

| | |
|---|---|
| Dr. Simons | 1. BMAT<br>2. English<br>3. IGCSE in Biology<br>4. IGCSE in Chemistry |
| Dr. Elliott | 1. IGCSE in Chemistry<br>2. IGCSE in Biology<br>3. Interview<br>4. English |

**An indicative list of candidates who applied to the Medicine course**

| Candidates | Age | IELTS-English (out of 9) | IGCSE in Maths | IGCSE in Biology | IGCSE in Chemistry | BMAT (1st section) (out of 20) | BMAT (2nd section) (out of 15) | BMAT (3rd section) (out of 15) | Interview | Other qualifications |
|---|---|---|---|---|---|---|---|---|---|---|
| Jenny Dereck | | 6.5 | B | B | C | 16 | 15 | 12 | She loves Medicine but she doesn't wish to work as a doctor. | |
| Julia Nicholson | 18 | 7.5 | A | A | A | 18 | 15 | 11 | She can work well under pressure. | IGCSE in Information Technology |
| Alan Michael | 14 | 6 | C | B | B | 12 | 13 | 10 | He is too competitive. | |
| George Andrews | 20 | 7 | 68 | C | C | 12 | 14 | 10 | He lacks communication skills. | IGCSE in Information Technology |
| Christos Kyriakou | 23 | 6.5 | B | A* | A | 19 | 13 | 12 | He can cooperate with others efficiently. | |
| Ali Kyren | 30 | 6 | B | C | C | 13 | 10 | 9 | He wants pursue Medicine due to the high salary. | BA in Biology . He has worked in a Medical Lab for 4 years. |
| Helena Melias | 25 | 8 | A | B | A | 13 | 11 | 10 | During the interview, she was extremely anxious. | BA in Biology and Msc in Biotechnology |
| Marianna Chrysostomou | 24 | 7 | A* | A | A | 16 | 10 | 11 | She managed to control her stress and responsed in all questions incredibly well. | |
| Gregoris Kaliris | 16 | 6.5 | C | B | B | 15 | 15 | 10 | He can function both as a leaderand as a follower. | |
| Betty Bright | 25 | 6 | C | B | B | 15 | 11 | 12 | she is really communicative. | BA in Biochemistry, IGCSE in French |
| Anna Anderson | 56 | 7 | B | C | C | 8 | 10 | 9 | She stated that Medicine is one of her unfulfilled dreams. | |
| John Johnson | 18 | 6.5 | C | C | C | 9 | 10 | 10 | He seemed to be doubtful about attending the Medicine School. | |
| Harry Henry | 15 | 6.5 | A | B | B | 17 | 13 | 14 | He was notably confident. | |

***Comprehension questions:***

1. How many applications does the committee receive annually?
2. What happened to the number of applications this year? Why?
3. What problem do the committee members face?
4. Which candidate has achieved the highest score in IGCSE in Mathematics and in Biology respectively? Is this candidate the same person?

## B. Problem

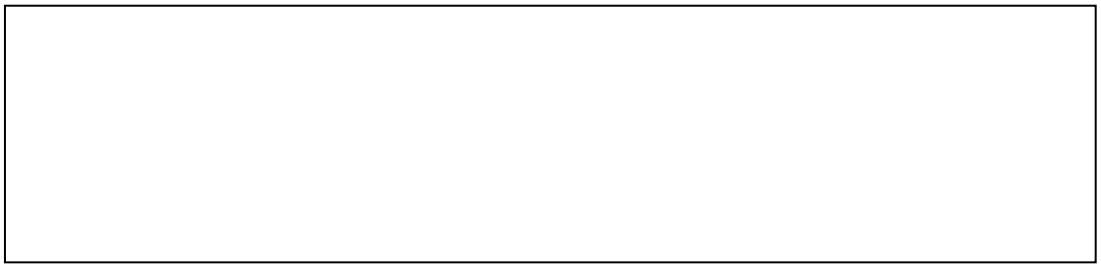
Firstly, you should decide upon the requirements that satisfy all the members of the committee. You can use any additional criteria you consider as important. Secondly, you have to select the top 5 candidates, based on the above table. Your duty is to write a letter in order to describe the method you have used. The

committee intends to apply this method so as to select the remaining 255 students who will attend the course.

## C. Reflection

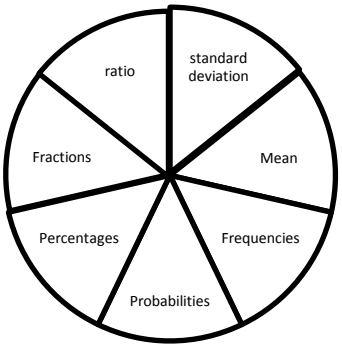
1. STEP DIAGRAM

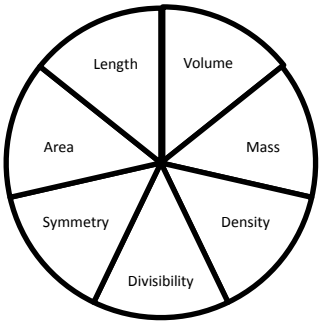
Draw a step diagram to represent "changes in thinking" that your group went through during the solution of the problem as well as your level of engagement.



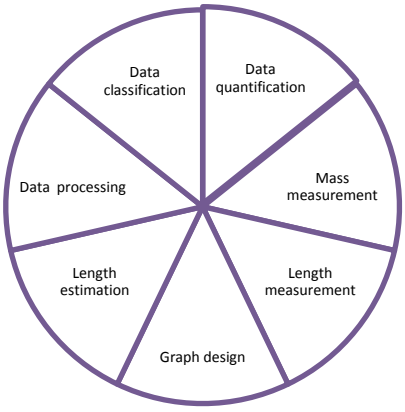
Start of session End of session

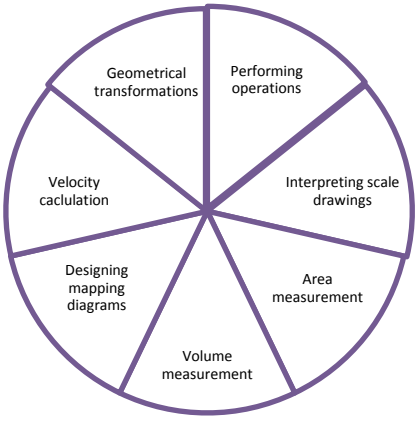
2. Which mathematical concepts did you use during the solution of the problem?




3. Which mathematical procedures did you use during the solution of the problem?



4. In your opinion, how well did you understand the concepts you have used? Explain why.

    - ✓ Not at all
    - ✓ To a small extent
    - ✓ To a moderate extent
    - ✓ To a large extent
    - ✓ Absolutely

5. How difficult was the problem for you? Explain why.
    - ✓ Very easy
    - ✓ Easy
    - ✓ Neutral
    - ✓ Difficult
    - ✓ Very difficult

6. In your opinion, which of the methods you have thought so far is the most appropriate?

# LEARNING/ASSESSMENT SCENARIO 5: MOVING TO A NEW HOUSE!

*Panayiota Irakleous*

## GOALS (Mathematical Competence)

Students will be able to:

**Numbers**

- Use natural numbers until 1000 and decimals to solve problems.
- Compare and order natural numbers until 10000.
- Use the concept of ratio and solve proportional problems.
- Judge the reasonableness of calculated results.

**Algebra**

- Use verbal and algebraic expressions to represent additive and multiplicative relations.
- Understand the concept of variable, interpret and explain relations between variables.

**Geometry**

- Describe the position of objects, using concepts such as up-down, behind-in front of, next to, between, right-left.

**Measurement**

- Convert units within the metric system.
- Use standard units of measurement for length.
- Make estimations of distances.
- Interpret scale drawings.

**Statistics – Probabilities**

- Interpret and design frequency charts (bar chart, pie chart, linear graph, plots and tables).
- Perform the procedures of data classification, quantification, weighting and grouping.

## KEY COMPETENCES FOR LIFELONG LEARNING

- Digital Competence
- Social Competences
- Communication in the mother tongue
- Learning to Learn
- Sense of Initiative

## A. Warm up activity

Family stories …

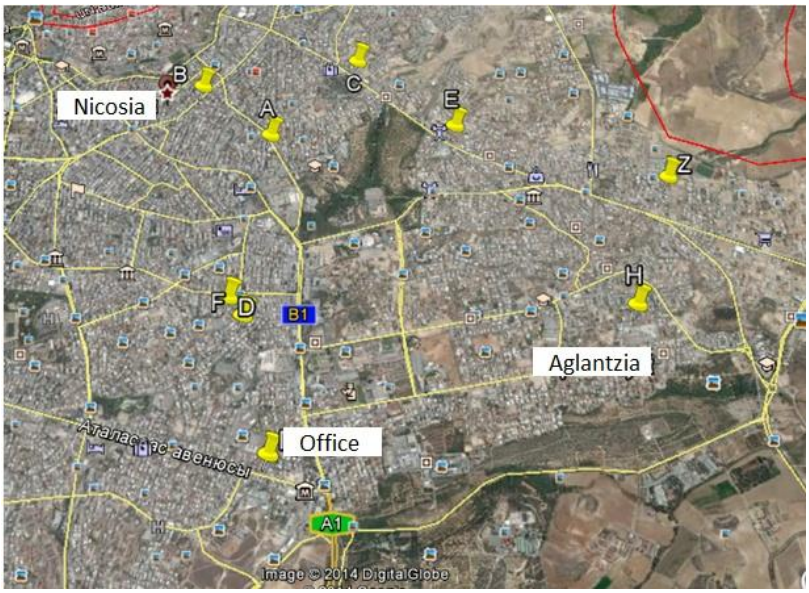
Leonidas and Ioanna have rented a furnished apartment at the center of Nicosia. They pay 620 euros per month in rent. They have two children, George and Marilia, who are twins. They are 7 years old and go to the A' Primary School in Latsia.

Both Leonidas and Ioanna have worked as accountants in the same office for 8 years, but last month Ioanna was fired. Thus, they want to move to a new house. The two parents believe that their children should still go to the same school, in order to protect their psychological balance. They seek to find an affordable apartment that meets their basic needs. To this end, they have conducted a market research and have collected information about two-bedroom apartments, as shown in the table below.

Apartments' features

| | Apartment | Area_in_square_meters | Year_of_construction | Parking_space | Storage | Furniture | Rent | Other_expenses | Floor |
|---|---|---|---|---|---|---|---|---|---|
| 1 | A | 65 | 1990-1995 | Covered | Yes | Full | 500 | 20 | 1st |
| 2 | B | 89 | 1990 | Not available | Yes | Two beds | 450 | 20 | Ground floor |
| 3 | C | 110 | 2000 | Covered | No | Full | 450 | 40 | 3rd |
| 4 | D | 75 | 2005 | Covered | No | Living room | 400 | 20 | 2nd |
| 5 | E | 85 | 1985-1990 | Non-covered | Yes | Unfurnished | 400 | 20 | 1st |
| 6 | Z | 70 | 1985 | Non-covered | Yes | Full | 420 | 20 | 4th (penthouse ) |
| 7 | H | 90 | 2003 | Non-covered | No | Living room | 510 | 0 | Ground floor |
| 8 | U | 75 | 1996 | Covered | Yes | Full | 470 | 0 | 2nd |
| 9 | I | 98 | 2007 | Covered | Yes | Unfurnished | 400 | 30 | 1st |
| 10 | K | 85 | 1994 | Covered | Yes | Three beds | 450 | 0 | 3rd |
| 11 | L | 120 | 2002 | Not available | No | Full | 520 | 30 | 4th (penthouse ) |
| 12 | M | 80 | 2009 | Not available | Yes | Full | 470 | 32 | Ground floor |
| 13 | N | 100 | 2010 | Non-covered | No | Unfurnished | 460 | 0 | 3rd |

Below you can find a map that shows the position of each apartment as well as the office where Leonidas works.




***Comprehension questions***

1. What problem does the family face?
2. How far is the apartment B from the office?

3. Which apartment is closest to Leonidas' office?
4. Which apartment has the highest rent? Which apartment has the highest rent in relation to its area? Are these apartments the same? Why?

## B. Problem

You should classify the apartments into three groups: very suitable for the family, moderately suitable and unsuitable. Write a letter to describe the method you applied in order to classify the apartments. The parents are going to use this method in the case of a future moving to a new house.

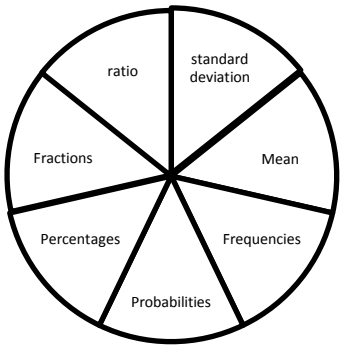
## C. Reflection

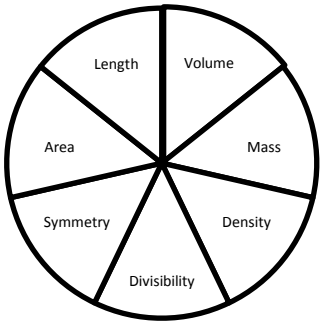
1. STEP DIAGRAM

Draw a step diagram to represent "changes in thinking" that your group went through during the solution of the problem as well as your level of engagement.

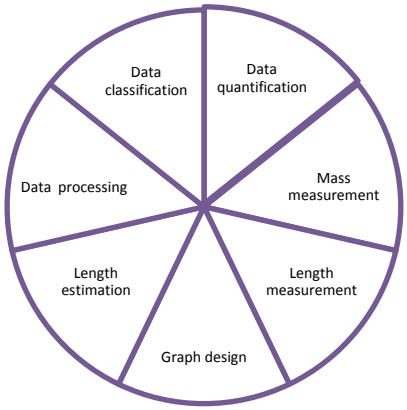
Start of session End of session

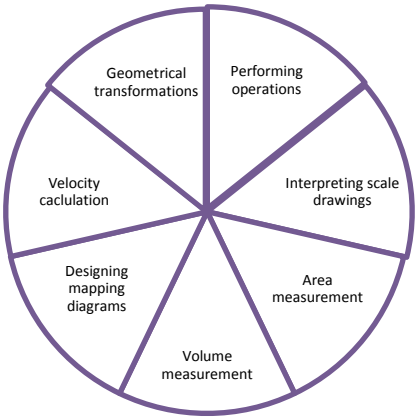
2. Which mathematical concepts did you use during the solution of the problem?



3. Which mathematical procedures did you use during the solution of the problem?




4. In your opinion, how well did you understand the concepts you have used? Explain why.

   - ✓ Not at all
   - ✓ To a small extent
   - ✓ To a moderate extent
   - ✓ To a large extent
   - ✓ Absolutely

5. How difficult was the problem for you? Explain why.
   - ✓ Very easy
   - ✓ Easy
   - ✓ Neutral
   - ✓ Difficult
   - ✓ Very difficult

6. In your opinion, which of the methods you have thought so far is the most appropriate?

# LEARNING/ASSESSMENT SCENARIO 6: THE ENERGY PROBLEM

*Panayiota Michael, Elena Sazeidou & Stella Shiakka*

## GOALS (Mathematical Competence)

Students will be able to:

**Numbers**

- Use natural numbers until 10000 and decimal numbers to solve problems.
- Perform addition, subtraction, multiplication and division of natural numbers and decimals.
- Compare and order natural numbers until 10000.
- Use the concept of ratio and solve proportional problems.
- Judge the reasonableness of calculated results.

**Statistics - Probabilities**

- Describe and compare datasets by using the concept of arithmetic mean.
- Perform the procedures of data classification, quantification, weighting and grouping.

## KEY COMPETENCES FOR LIFELONG LEARNING

- Social Competences
- Learning to Learn
- Sense of Initiative

### A. Warm up activity

EMS: Save money on your power bill …

*Maria Pileidou | January 2014, InBusiness Magazine*

Powerstar was established in 2001, and remains the only voltage optimisation system on the market with a patent on its design. What makes Powerstar unique is simply the way it is designed which ensures that regardless of the type of load that it is connected with, savings will be achieved through the **negative powe**r it creates.

The PowerStar transformer is a transformer-based system used to optimize the characteristics of the current supplied at the source (first current), according to current characteristics required at the load (second current). The Powerstar unit has been proven to be the most effective voltage optimization system in the market, according to independent tests.

- Savings up to 26.1% on energy consumption and associated $CO_2$ emissions
- Reduces maximum load demand (kVA) and in turn electricity bills
- Reduces carbon emissions
- Significantly reduces harmonics
- Improves power factor up to 20%
- Increases the life expectancy of equipment and helps protect against damaging transients (power spikes) of up to 25,000V
- Comes with up to 15 years warranty and 50 year life span
- Lowers the operating temperatures of motors and maintenance cost of equipment

EMS exports to 18 countries. In Cyprus, there are already 80 costumers. The average installation cost in Cypriot companies ranges from € 20.000 to € 30.000, while the savings are estimated close to € 40.000 per year. Auditing firms (PwC, Deloitte and KPMG), supermarkets (ALPHAMEGA, Carrefour, Papantoniou and Metro), hotels (Capo Bay, Leptos Calypso, Grecian Bay, Thanos Hotels), companies (Vassos Eliades, Photos Photiades, KEAN) and many others are among the customers of EMS. The creator of Powerstar, the world's market leading voltage optimization system, is the Cypriot Dr Alex Mardapittas. The EMS was established in 1999 and it has offices in England, Cyprus and Australia.

**Comprehension questions:**

1. What is the purpose of Powerstar?
2. Do you think that Powerstar is advantageous? If yes, explain the reasons.

| **Lamp** | **Electric power (watt)** | **Luminosity (Lm)** | **Lm/ watt** | **Number of days in use*** | **Number of replace-ments over 25 years** | **Cost per lamp (euros)** | **Electric power (kilowatt) for 25 years** | **Cost (Kwh) for 25 years** |
|---|---|---|---|---|---|---|---|---|
| *Led* | 7 | 256 | 36,5 | 9000 | 1 | 35 | 252 | 0,07 |
| *Halogen* | 17 | 256 | 15,07 | 500 | 19 | 2,50 | 612 | 0,07 |
| *High-pressure sodium* | 273 | 256 | 0,93 | 5000 | 2 | 14,96 | 9.828 | 0,07 |
| *Light bulbs* | 24,6 | 256 | 10,4 | 250 | 25 | 0,75 | 885,6 | 0,07 |
| *Fluorescent* | 95,7 | 256 | 2,67 | 2.500 | 4 | 1,30 | 3.445 | 0,07 |
| *Mercury* | 347,2 | 256 | 0,73 | 4000 | 3 | 8,30 | 12.499 | 0,07 |

*3 hours daily

## B. Problem

The University of Cyprus senate has decided to give the opportunity to a group of students to choose the most appropriate type of lamp for a specific lecture hall. The dimensions of the particular lecture hall are 24mX20m. The maximum amount of money that can be spent on the lighting of this hall for 12.5 years is €800.

## C. Problem

You are a member of the Central Committee of Electricity Authority of Cyprus. It is your duty to describe a procedure by which the customers will be able to choose the lamp that meets their needs, based on the above table.

# LEARNING/ASSESSMENT SCENARIO 7: WINE FACTORY

*Panayiota Michael, Elena Sazeidou & Stella Shiakka*

## GOALS (Mathematical Competence)

Students will be able to:

**Numbers**

- Use natural numbers until 10000 to solve problems.
- Perform addition, subtraction, multiplication and division of natural numbers and decimals.
- Compare and order natural numbers until 10000.
- Use the concept of ratio and solve proportional problems.
- Judge the reasonableness of calculated results.

**Statistics - Probabilities**

- Perform the procedures of data classification, quantification, weighting and grouping.

## KEY COMPETENCES FOR LIFELONG LEARNING

- Social Competences
- Communication in the mother tongue
- Sense of Initiative

### A. Warm up activity

**4P Model**

Every business envisions attracting new customers by providing them useful services. **Marketing mix** is one of the most powerful marketing concepts. It consists a conceptual framework that identifies the principal decision making managers make in configuring their offerings to suit consumers' needs. Marketing mix is a combination of all of the factors at a marketing manager's command to satisfy the target market. It is also known as the 4Ps (Product, Price, Place, Promotion). The 4P model has dominated in the domain of marketing.

Organisations need a **balanced marketing mix** to meet the needs of its customers. For instance, in the case of a useful product that has been unsuccessfully advertised, the marketing mix is not balanced at all.

A marketer's job is to make multidimensional decisions about products, price, place and promotion. For example, regarding the product dimension, he has to take into account the brand name, the design, the quality, the features, the warranty etc. The diagram below provides details about all the aspects he has to consider.


**Comprehension questions:**

1. What does 4P mean?
2. How are 4P connected?
3. Observe the table below. Which product is the least profitable?

## B. Problem

Suppose you are a marketer and you plan to enrich a wine cellar with 6 new brands. The results of your market research are presented in the following table. It is your duty to decide upon the ideal wine.

| Product | Supply price (per bottle) | Sale price (per bottle) | Promotion expense (monthly) | Conservation and delivery expense in Cyprus (annually) | Consumer Demand in Cyprus (per 100 consumers) |
|---|---|---|---|---|---|
| **CYPRIOT WINES** | | | | | |
| Commandaria | €4 | €9 | €500 | €2000-€3000 | 55 |
| "Ais Ampelis" | €7 | €13 | €300 | €2000-€3000 | 70 |
| "Ayios Onoufrios" | €8 | €15 | €350 | €2000-€3000 | 70 |
| "Avakas" | €7 | €14 | €600 | €2000-€3000 | 35 |
| **ITALIAN WINES** | | | | | |
| Casal di Serra (white) | 15 | 30 | 800 | €2000-€3000 | 22 |
| Moscato (white) | 14 | 30 | 850 | €2000-€3000 | 17 |
| Canneto (red) | 13 | 28 | 700 | €2000-€3000 | 25 |
| Ornellaia (red) | 12 | 20 | 850 | €2000-€3000 | 15 |
| **FRENCH WINES** | | | | | |
| Château Mylord (red) | 17 | 35 | 500 | €2000-€3000 | 30 |
| Château Fougas (red) | 16 | 35 | 600 | €2000-€3000 | 20 |
| Château Latour (red) | 14 | 30 | 550 | €2000-€3000 | 27 |
| Mas de Cadenet (rosé) | 13 | 24 | 600 | €2000-€3000 | 18 |

# LEARNING/ASSESSMENT SCENARIO 8: MOBILE PLAN "MakeYourOwn"

*Theodora Christodoulou*

## GOALS (Mathematical Competence)

Students will be able to:

**Numbers**

- Use natural numbers and decimals to solve problems.
- Perform addition and subtraction of decimals.
- Use the concept of ratio and solve proportional problems.
- Judge the reasonableness of calculated results.

**Algebra**

- Use algebraic symbols to represent and explain mathematical relations.

**Measurement**

- Convert Euros to cents.

**Statistics - Probabilities**

- Perform the procedures of data classification, quantification, weighting and grouping.

## KEY COMPETENCES FOR LIFELONG LEARNING

- Digital Competence
- Communication in the mother tongue
- Learning to Learn
- Sense of Initiative

### A. Problem

Mr. Costas' mobile phone device has been damaged. As a result, the internal speaker has broken. He decided to buy a new mobile phone device and he went to a mobile phone store. The store manager proposed him the Make Your Own Plan. According to this plan, a customer can buy any device he prefers and pay a fixed monthly charge. The statements of his account for the last 4 months are presented below.

| **Cytamobile-Vodafone [30]994***** [1]** | **€** |
|---|---|
| -Classic – Subscription | 1,82 |
| **Fixed charge** | **1,82** |
| -Local calls to service numbers | 13,66 |
| **-**Local calls to other providers | 1,17 |
| -Local SMS | 0,07 |
| **Calls charge** | **14,94** |
| **Total amount without VAT** | **16,76** |
| **VAT 18,27 @ 18%** | **3,02** |
| **Total** | **19,78 [8]** |

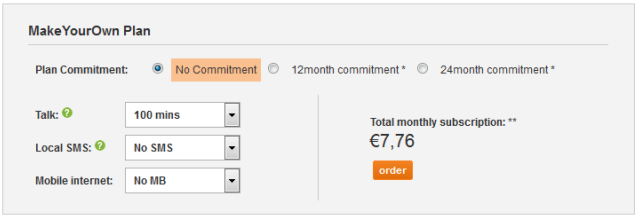
| **Cytamobile-Vodafone [30]994***** [1]** | **€** |
|---|---|
| -Classic - Subscription | 1,82 |
| **Fixed charge** | **1,82** |
| -Local calls to service numbers | 15,07 |
| -International calls | 0,73 |
| **-**Local calls to other providers | 0,65 |
| **Calls charge** | **16,45** |
| **Total amount without VAT** | **18,27** |
| **VAT 18,27 @ 18%** | **3,29** |
| **Total** | **21,56 [8]** |

| **Cytamobile-Vodafone [30]994***** [1]** | **€** |
|---|---|
| -Classic – Subscription | 1,82 |
| **Fixed charge** | **1,82** |
| -Local calls to service numbers | 14,50 |
| -International calls | 0,35 |
| **-**Local calls to other providers | 1,13 |
| -Local SMS | 0,21 |
| **Calls charge** | **16,19** |
| **Total amount without VAT** | **18,01** |
| **VAT 18,01 @ 18%** | **3,24** |
| **Total** | **21,25 [3]** |

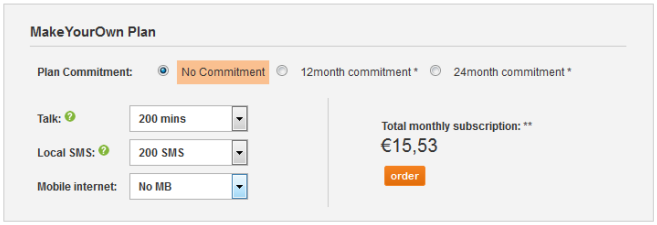
| **Cytamobile-Vodafone [30]994***** [1]** | **€** |
|---|---|
| -Classic - Subscription | 1,82 |
| **Fixed charge** | **1,82** |
| -Local calls to service numbers | 14,75 |
| -International calls | 0,17 |
| **-**Local calls to other providers | 1,85 |
| **Calls charge** | **16,77** |
| **Total amount without VAT** | **18,59** |
| **VAT 18,01 @ 18%** | **3,35** |
| **Total** | **21,94 [9]** |

In the site below, you can find the "Make Your Own" plans offered by Cytamobile-Vodafone. Based on these plans, it is your duty to create a poster in order to present the most ideal plan for Mr. Costas.

https://www.cyta.com.cy/makeyourown.




* With 12month or 24month commitment to MakeYourOwn, you get 10% and 20% discount respectively, on Talk and Local SMS packages. The Monthly Basic Subscription is excluded from the discount.
** The Monthly Basic Subscription is €2,07 and is included in the Total Monthly Subscription.

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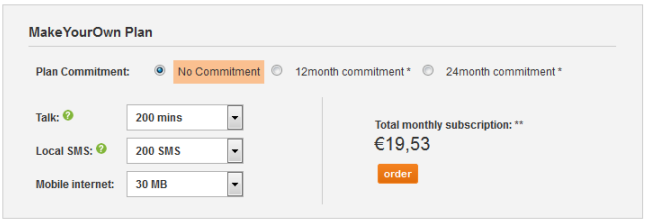



* With 12month or 24month commitment to MakeYourOwn, you get 10% and 20% discount respectively, on Talk and Local SMS packages. The Monthly Basic Subscription is excluded from the discount.
** The Monthly Basic Subscription is €2,07 and is included in the Total Monthly Subscription.

## B. Problem

You should create 3 different plans and describe the conditions under which each plan is suitable.

# LEARNING/ASSESSMENT SCENARIO 9: AT THE ZOO

*Eleni Constantinou*

## GOALS (Mathematical Competence)

Students will be able to:

**Numbers**

- Use natural numbers and decimals to solve problems.
- Perform addition and subtraction of natural numbers.
- Use the concept of ratio and solve proportional problems.
- Judge the reasonableness of calculated results.

**Geometry**

- Describe the position of objects, using concepts such as up-down, behind-in front of, next to, between, right-left.

**Measurement**

- Use standard units of measurement for length.
- Convert units within the metric system.
- Interpret scale drawings.
- Recognize relations between units of time.
- Estimate time duration.

**Statistics - Probabilities**

- Organize and present data in tables.
- Perform the procedures of data classification, quantification, weighting and grouping.

## KEY COMPETENCES FOR LIFELONG LEARNING

- Digital Competence
- Social Competences
- Communication in the mother tongue
- Learning to Learn
- Sense of Initiative

## Problem


Erodotos and his family are in Barcelona for holidays. One of Barcelona's top touristic attractions is the Zoo. They are planning to visit the zoo on Friday (26/03), but they will have only 2 ½ hours available.

You should help the family to plan the most appropriate route in order to see as many animals as possible and also to decide the best time to visit the zoo. Additionally, you have to present this route, explaining the reasons why the particular route is appropriate for the family and for any other visitor who has less than 3 hours to visit the zoo.


**Family preferences:**

*«I want to see….»*

***Mr. Nikos:*** the lions and the gorillas

***Mr. Danae:*** the seals and the flamingos

**Aphrodite** (6 years old): the elephants and the kangaroos

***Achilleas*** (10 years old): the dragons, the crocodiles and the camels

**Advice of friends who have visited the zoo:**

**Georgia:** *«The dolphins' show is incredible! You should definitely watch it!»*

**Alexander:** «*The lions sleep from 12 o'clock until 5 o' clock, so it is difficult to see them.*»

**Tools available:**

1. *Map of the zoo (digital and hard copy)*
2. *Family preferences*
3. *Advice of friends who have visited the zoo*
4. *PC*
5. *Stopwatch*
6. *Measuring tape*
7. *Skitch Touch application*

# LEARNING/ASSESSMENT SCENARIO 10: JOB SELECTION

*Eleni Constantinou*

## GOALS (Mathematical Competence)

Students will be able to:

**Numbers**

- Use and compare natural numbers until 10000.
- Use and compare fractions to solve problems.
- Use the concept of ratio and solve proportional problems.
- Judge the reasonableness of calculated results.

**Geometry**

- Describe the position of objects, using concepts such as up-down, behind-in front of, next to, between, right-left.

**Measurement**

- Use standard units of measurement for length (mm, cm, m).
- Convert units within the metric system.
- Interpret scale drawings.

**Algebra**

- Use algebraic symbols to represent and explain mathematical relations.
- Choose and use various forms of representation (e.g. algebraic equation, table, graph) to represent quantitative relations.

**Statistics - Probabilities**

- Perform the procedures of data classification, quantification, weighting and grouping.

## KEY COMPETENCES FOR LIFELONG LEARNING

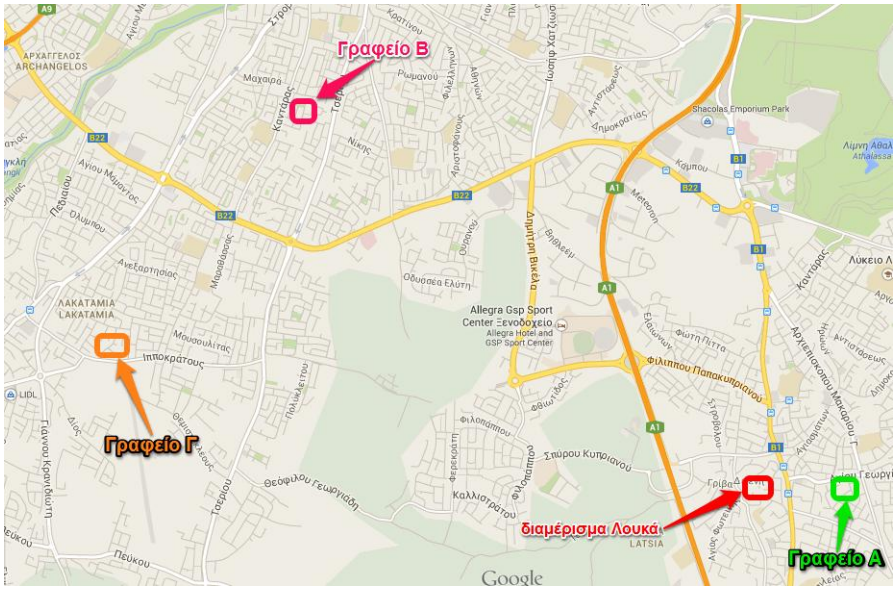
- Social Competences
- Communication in the mother tongue
- Sense of Initiative

### Problem

Loucas is 28 years old, single and lives in his flat in Latsia. He studied architecture at University of Cyprus and he also holds a MA degree from University of Genoa. He has been working in an architecture office for the last 2 years, but he quitted his job, in order to find a better one. To this end, he attended five personal interviews in different offices. Three employers offered him job and now he has to decide which job meets his needs.

| | OFFICE A | OFFICE B | OFFICE C |
|---|---|---|---|
| **Basic salary** | €1200 | €2100 | €1700 |
| **Overtime** | €8 per hour | - | €5 per hour |
| **Social Insurance Contributions** | Yes | No | Yes |
| **13rd salary** | Yes | Yes | Yes |
| **14th salary** | No | Yes | No |
| **Working hours** | 8 a.m.-4 p.m. M-Th | 9 a.m.-6 p.m. M-Th | 8 a.m-6 p.m. (one-hour break) M-Th |
| **Time off** | 20 days | 25 days | 23 days |
| **Health insurance** | Yes | No | Yes |
| **Bonus per task** | €200 | - | €100 |

Loucas should take into consideration some other factors. Firstly, he needs to have the freedom to be creative. However, he realized that only the employer C would provide him such an opportunity. Secondly, a pleasant and friendly environment is a prerequisite for his job selection. Loucas observed that the employees' relations differs between the three offices. At office B, the employer is friendly and he coordinates and consults the employees. On the contrary, at offices A and C, the employers make all the decisions and the employees execute the "orders". Finally, Loucas should have in mind the location of the office.




Which office do you think that Loucas should choose? Explain why. Write a letter to describe in details the reasons of your decision.

# LEARNING/ASSESSMENT SCENARIO 11: MENU LANGUAGE

*Eleni Constantinou*

## GOALS (Mathematical Competence)

Students will be able to:

**Numbers**

- Use and compare natural numbers until 1000000.
- Perform addition and subtraction of natural numbers until 1000000.
- Convert fractions to percentages to solve proportional problems.
- Use fractions and percentages to solve problems.
- Use the concept of ratio to solve problems.
- Judge the reasonableness of calculated results.

**Statistics - Probabilities**

- Perform the procedures of data classification, quantification, weighting and grouping.

## KEY COMPETENCES FOR LIFELONG LEARNING

- Social Competences
- Communication in the mother tongue
- Sense of Initiative

### Problem

Mr. Paul is the owner of an Italian restaurant at Limassol. He decided to renovate his restaurant and also change the menu. He is going to design the menu in five languages, in order to meet the needs of his customers.

Based on his experience, he knows that:

-Latino-Americans, Spanish and Portuguese people speak only their mother tongue.

-French people avoid restaurants without menu in French version.

-German and Swedish people don't speak English fluently.

The table below presents the number of tourist arrivals from 2000 to 2012.

http://www.acte.com.cy/statistics-gr

Can you propose a procedure in order to select the five most appropriate menu languages?

| Departure Country | 2012 [5] | 2011 | 2010 | 2009 | 2008 | 2007 | 2006 | 2005 | 2004 | 2003 | 2002 | 2001 | 2000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TOTAL** | **2.464.908** | **2.392.228** | **2.172.998** | **2.141.193** | **2.403.750** | **2.416.081** | **2.400.924** | **2.470.063** | **2.349.012** | **2.303.247** | **2.418.238** | **2.696.732** | **2.686.205** |
| **EUROPE (4)** | **2.315.866** | **2.245.001** | **2.017.588** | **2.008.622** | **2.267.501** | **2.270.185** | **2.273.688** | **2.334.392** | **2.226.228** | **2.180.228** | **2.283.625** | **2.554.887** | **2.509.449** |
| Belgium | 25.930 | 27.346 | 24.125 | 22.966 | 26.368 | 23.174 | 24.267 | 22.879 | 20.719 | 20.101 | 23.098 | 28.980 | 39.462 |
| Bulgaria | 10.443 | 10.247 | 8.905 | 8.922 | 10.675 | 10.088 | 3.765 | 3.408 | 2.486 | 3.446 | 2.619 | 2.588 | 3.995 |
| Czech Republic | 14.741 | 20.576 | 15.458 | 20.477 | 20.027 | 20.972 | 18.764 | 14.580 | 18.740 | 13.082 | 13.826 | 9.895 | 13.412 |
| Denmark | 31.763 | 34.064 | 30.335 | 29.667 | 38.216 | 34.759 | 30.802 | 29.547 | 30.281 | 28.517 | 31.805 | 33.015 | 34.591 |
| Germany | 144.407 | 157.890 | 139.190 | 131.161 | 132.058 | 138.451 | 152.808 | 182.689 | 161.574 | 129.034 | 173.718 | 214.153 | 233.687 |
| Estonia | 1.591 | 2.074 | 970 | 2.077 | 1.884 | 894 | 1.456 | 911 | 731 | 219 | 1.238 | 1.158 | 1.801 |
| Greece | 132.990 | 138.721 | 127.667 | 131.875 | 133.015 | 139.815 | 126.768 | 130.156 | 133.407 | 110.226 | 93.225 | 89.763 | 100.105 |
| Spain | 5.504 | 4.757 | 3.959 | 3.072 | 3.641 | 4.118 | 4.218 | 4.912 | 5.402 | 2.828 | 2.913 | 2.695 | 3.003 |
| France | 35.955 | 34.363 | 28.749 | 26.187 | 36.099 | 41.394 | 37.779 | 52.783 | 46.798 | 31.419 | 29.545 | 32.829 | 36.587 |
| Ireland | 7.832 | 9.662 | 10.527 | 18.537 | 23.632 | 35.875 | 47.463 | 52.711 | 44.292 | 61.571 | 56.654 | 51.881 | 36.192 |
| Italy | 34.415 | 16.828 | 12.992 | 15.604 | 16.859 | 19.225 | 17.865 | 20.202 | 20.681 | 13.381 | 12.185 | 21.910 | 27.238 |
| Latvia | 2.088 | 1.934 | 1.825 | 1.538 | 2.150 | 3.183 | 3.074 | 2.754 | 846 | 491 | 573 | 870 | 683 |
| Lithuania | 6.766 | 2.182 | 2.546 | 1.423 | 2.294 | 3.181 | 2.792 | 1.501 | 787 | 356 | 1.564 | 370 | 297 |
| Luxembourg (1) | 2.591 | 3.154 | 3.374 | 3.020 | 4.355 | 4.671 | 869 | 657 | 681 | 495 | 1.111 | 2.027 | 922 |
| Hungary | 12.376 | 11.334 | 10.721 | 9.700 | 9.641 | 10.086 | 11.458 | 11.174 | 11.150 | 8.760 | 8.080 | 8.523 | 11.295 |
| Malta | 4.866 | 4.511 | 4.358 | 6.154 | 3.421 | 3.266 | 2.581 | 1.998 | 2.077 | 1.606 | 1.219 | 744 | 693 |
| The Netherlands | 33.024 | 41.631 | 34.212 | 30.996 | 26.302 | 26.650 | 28.210 | 29.493 | 32.234 | 32.008 | 39.788 | 50.747 | 55.433 |
| Austria | 23.166 | 23.341 | 21.559 | 27.463 | 26.620 | 24.359 | 23.788 | 36.988 | 28.643 | 25.894 | 29.053 | 31.035 | 40.999 |
| Poland | 30.981 | 24.236 | 18.439 | 17.186 | 20.358 | 16.669 | 13.707 | 14.904 | 16.962 | 11.764 | 19.520 | 25.146 | 29.593 |
| Portugal | 925 | 1.034 | 1.161 | 1.106 | 855 | 1.148 | 1.202 | 1.378 | 1.302 | 429 | 715 | 779 | 853 |
| Ronania | 20.557 | 30.601 | 19.980 | 19.931 | 20.346 | 14.527 | 7.032 | 4.980 | 4.047 | 3.529 | 3.163 | 3.295 | 3.716 |
| Slovenia | 1.124 | 2.245 | 1.046 | 953 | 1.541 | 1.939 | 1.273 | 1.029 | 625 | 477 | 1.017 | 1.128 | 2.191 |
| Slovakia | 3.608 | 5.030 | 5.061 | 3.719 | 5.048 | 5.179 | 5.055 | 5.241 | 4.968 | 3.721 | 3.941 | 1.805 | 3.532 |
| Finland | 29.216 | 36.289 | 32.886 | 32.758 | 32.333 | 21.461 | 30.333 | 29.290 | 31.676 | 28.865 | 45.443 | 48.758 | 41.953 |
| Sweden | 117.286 | 112.212 | 109.746 | 108.253 | 124.948 | 120.989 | 94.028 | 88.125 | 83.964 | 86.824 | 99.753 | 127.419 | 127.498 |
| United Kingdom | 959.463 | 1.020.709 | 996.046 | 1.069.196 | 1.242.655 | 1.282.873 | 1.360.136 | 1.391.849 | 1.332.852 | 1.347.043 | 1.337.646 | 1.486.703 | 1.362.913 |
| **Other European Countries (4)** | **622.245** | **468.016** | **351.738** | **264.666** | **302.146** | **261.239** | **222.195** | **198.253** | **188.303** | **214.142** | **250.213** | **276.671** | **296.805** |
| Iceland | 280 | 88 | 144 | 223 | 281 | 257 | 123 | 227 | 484 | 1.041 | 356 | 2.779 | 346 |
| Norway | 69.410 | 64.024 | 63.347 | 60.245 | 63.470 | 53.442 | 50.664 | 48.281 | 50.706 | 56.098 | 57.706 | 61.620 | 60.127 |
| Switzerland (2) | 46.853 | 45.450 | 41.744 | 38.755 | 38.603 | 41.543 | 41.559 | 40.287 | 41.292 | 37.619 | 64.691 | 76.912 | 79.202 |
| Russia | 474.426 | 334.083 | 223.861 | 148.740 | 180.926 | 145.921 | 114.763 | 97.600 | 83.818 | 105.050 | 108.821 | 116.496 | 129.889 |
| Turkey | 53 | 264 | 321 | 116 | 135 | 246 | 254 | 228 | 213 | 65 | 99 | 250 | 173 |
| Georgia | .. | .. | 146 | 195 | 95 | 204 | 316 | 122 | 209 | 107 | 462 | 211 | 352 |
| Belarus | 5.221 | 3.371 | 3.507 | 2.186 | 2.125 | 2.405 | 1.933 | 1.612 | 1.071 | 1.923 | 1.777 | 2.286 | 3.661 |
| Ukraine | 19.482 | 14.274 | 11.766 | 7.496 | 8.847 | 8.729 | 6.374 | 5.083 | 5.778 | 6.673 | 8.558 | 7.141 | 9.361 |
| Serbia | 3.960 | 3.986 | 3.431 | 3.678 | 3.322 | 2.817 | ... | ... | ... | ... | ... | ... | ... |
| Yugoslavia | ... | ... | ... | ... | ... | ... | 3.170 | 2.855 | 3.093 | 3.095 | 5.168 | 5.774 | 9.135 |
| Czechoslovakia | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Soviet Union | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| East Europe | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **AFRICA** | **11.132** | **11.709** | **11.115** | **12.318** | **12.336** | **13.303** | **11.446** | **13.047** | **9.982** | **12.537** | **13.296** | **14.516** | **16.420** |
| South Africa | 4.708 | 5.793 | 4.816 | 5.623 | 6.249 | 5.506 | 4.882 | 5.816 | 4.053 | 5.460 | 5.548 | 5.662 | 7.406 |
| North West Africa | 290 | 401 | 489 | 661 | 643 | 718 | 736 | 688 | 536 | 701 | 643 | 631 | 908 |
| Egypt | 5.338 | 4.940 | 4.324 | 5.067 | 4.351 | 5.706 | 4.441 | 5.470 | 4.686 | 5.296 | 6.029 | 6.820 | 5.586 |
| Other countries | 795 | 572 | 1.485 | 965 | 1.092 | 1.372 | 1.386 | 1.071 | 707 | 1.080 | 1.076 | 1.403 | 2.520 |
| **AMERICA** | **25.087** | **32.089** | **31.366** | **23.743** | **27.784** | **30.361** | **26.353** | **28.991** | **22.924** | **23.246** | **26.734** | **30.186** | **38.738** |
| **North America** | 24.318 | **31.080** | **29.767** | **22.743** | **26.744** | **29.493** | **25.430** | **28.395** | **22.350** | **22.613** | **25.971** | **29.158** | **36.175** |
| USA | 20.462 | 25.832 | 22.719 | 17.921 | 21.117 | 23.744 | 20.048 | 22.051 | 18.196 | 18.097 | 20.566 | 23.298 | 28.430 |
| Canada | 3.830 | 5.180 | 6.822 | 4.698 | 5.512 | 5.625 | 5.194 | 6.222 | 4.007 | 4.386 | 5.260 | 5.766 | 7.376 |
| Other Countries | 25 | 66 | 225 | 123 | 114 | 124 | 188 | 121 | 147 | 130 | 145 | 94 | 369 |
| **South and Central Americal** | **769** | **1.009** | **1.599** | **999** | **1.039** | **868** | **922** | **595** | **574** | **633** | **763** | **1.028** | **2.563** |
| **ASIA (4)** | **100.464** | **89.995** | **97.699** | **85.237** | **83.650** | **90.395** | **76.011** | **81.536** | **78.394** | **77.556** | **85.235** | **86.996** | **106.772** |
| Kuwait | 1.698 | 1.268 | 1.480 | 2.544 | 4.049 | 5.546 | 1.612 | 1.531 | 1.826 | 2.844 | 2.792 | 2.551 | 3.689 |
| Bahrain | 1.862 | 1.766 | 2.184 | 2.970 | 2.790 | 2.297 | 1.799 | 1.249 | 1.993 | 2.332 | 1.875 | 1.773 | 1.686 |
| UAE | 10.664 | 11.433 | 11.832 | 14.197 | 12.853 | 10.705 | 8.154 | 6.627 | 6.294 | 5.979 | 5.634 | 5.940 | 5.317 |
| Saudi Arabia | 1.537 | 1.445 | 2.463 | 2.071 | 2.978 | 3.873 | 3.874 | 3.852 | 3.953 | 4.915 | 4.919 | 5.358 | 6.843 |
| Georgia | 194 | 141 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Jordan | 3.490 | 4.184 | 3.575 | 4.040 | 3.071 | 3.567 | 3.892 | 4.303 | 4.342 | 6.476 | 4.562 | 4.881 | 6.944 |
| Iran | 4.402 | 5.742 | 4.336 | 3.627 | 1.799 | 2.731 | 2.213 | 1.205 | 536 | 1.558 | 1.492 | 5.817 | 5.937 |
| Iraq | 2.757 | 1.409 | 358 | 89 | 58 | 164 | 261 | 172 | 157 | 282 | 143 | 128 | 91 |
| Israel | 39.420 | 31.910 | 37.876 | 31.364 | 32.034 | 34.205 | 34.197 | 40.940 | 36.917 | 27.206 | 39.943 | 36.678 | 44.404 |
| Lebanon | 25.658 | 21.202 | 20.664 | 15.431 | 14.192 | 14.635 | 11.442 | 13.762 | 14.575 | 16.993 | 15.203 | 14.270 | 15.270 |
| Syria | 1.272 | 983 | 1.626 | 1.455 | 1.392 | 2.143 | 1.896 | 1.559 | 1.915 | 2.754 | 2.230 | 2.301 | 4.186 |
| China (3) | 1.014 | 951 | 655 | 441 | 722 | 692 | 403 | 424 | 482 | 525 | 305 | 414 | 512 |
| Japan | 1.249 | 694 | 1.194 | 560 | 354 | 630 | 518 | 540 | 545 | 558 | 375 | 603 | 1.325 |
| South Korea | 81 | 292 | 144 | 60 | 0 | 136 | 49 | 51 | 12 | 25 | 146 | 327 | 171 |
| Arab countries | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |