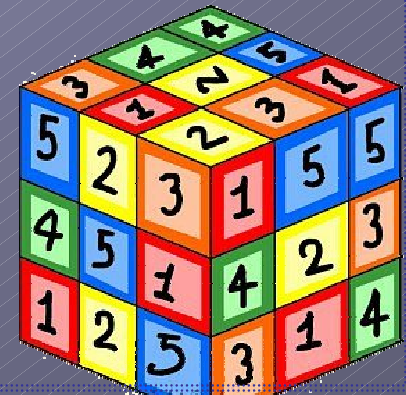
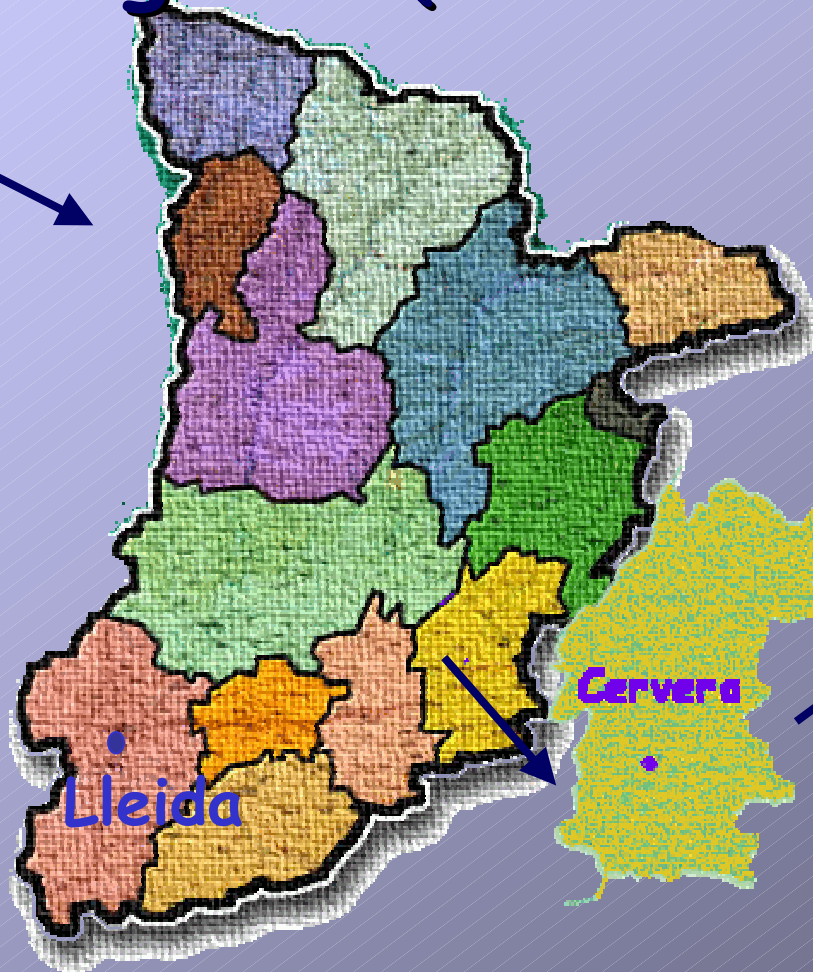
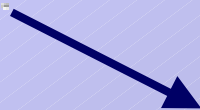
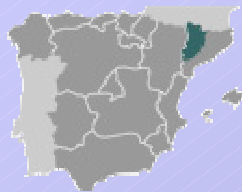


Mathematics CLIL Project IES La Segarra (Cervera)

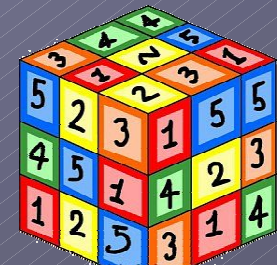
Imma Romero Garcia
December 2007



IES La Segarra (Cervera)



www.ieslasegarra.com



Cervera

- SITUATION

- 60km from Lleida

- POPULATION

- about 9000

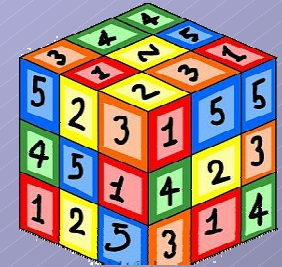
- immigration 9%

- ECONOMY

- agriculture

- farm industry

- services



IES La Segarra (Cervera)

- 400 STUDENTS

- OFFERS

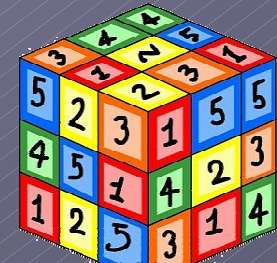
- ESO
- BATXILLERAT
- CFGM
- CFGS

- PROJECTS

- PLA PER A LA MILLORA DE LA QUALITAT DEL SERVEI EDUCATIU
- PROJECTE D' INNOVACIÓ EDUCATIVA

- TIC

- LLENGÜES ESTRANGERES 2007/2010



English is our choice



	Action	Courses	Groups	Time
1. Technology	1.1 Workshop	2 nd ESO	All	1 h/weekly
2. Other areas	2.1 Warming up & relaxing exercises PE	3 rd & 4 th ESO	All	20 min/weekly
	2.2 Software in ICT modules	1 st , 2 nd & 4 th ESO	All	-
	2.3 Latin texts translation and Latin culture aspects	1 st & 2 nd Batxillerat	Humanistic	25% of the subject
	2.4 Abstract in "Treball de Recerca"	1 st & 2 nd Batxillerat	All	-
	2.5 Technical vocabulary & the electromechanical instruction manual	5 & 6 modules	1 st & 2 nd of electromechanical & vehicles GFGM	30 h / course
	2.6 Telephone calls & costumer service	1 module	Administrative GFGM	15 h / course
	2.7 Mathematics: From sequences to Functions	3 rd ESO	All	35h / course



Mathematics CLIL Project

- Module
From Sequences to Functions (35h)
- Units
Unit 1: Sequences and Series
Unit 2: Functions
Unit 3: Linear functions
- Level
3rd ESO
- Time
2nd Term



Unit 1: Sequences and Series

- Lesson 1:
Introducing sequences
- Lesson 2:
Recurrence
- Lesson 3:
Basics of Arithmetic and Geometric sequences



Tools to build the CLIL Project

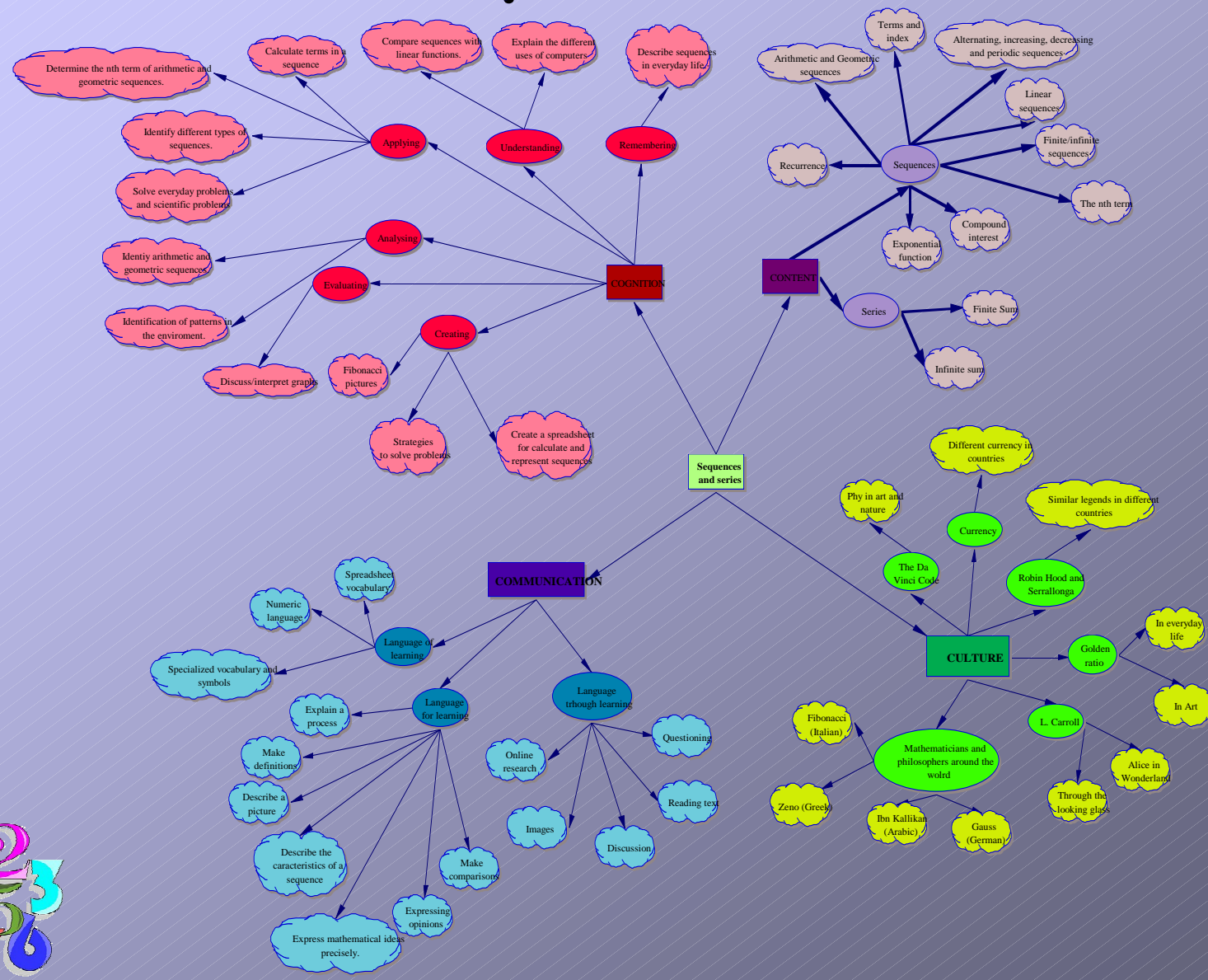
- 4Cs
- 3As
- CLIL Matrix
- Bloom's Taxonomy



Fundamentals

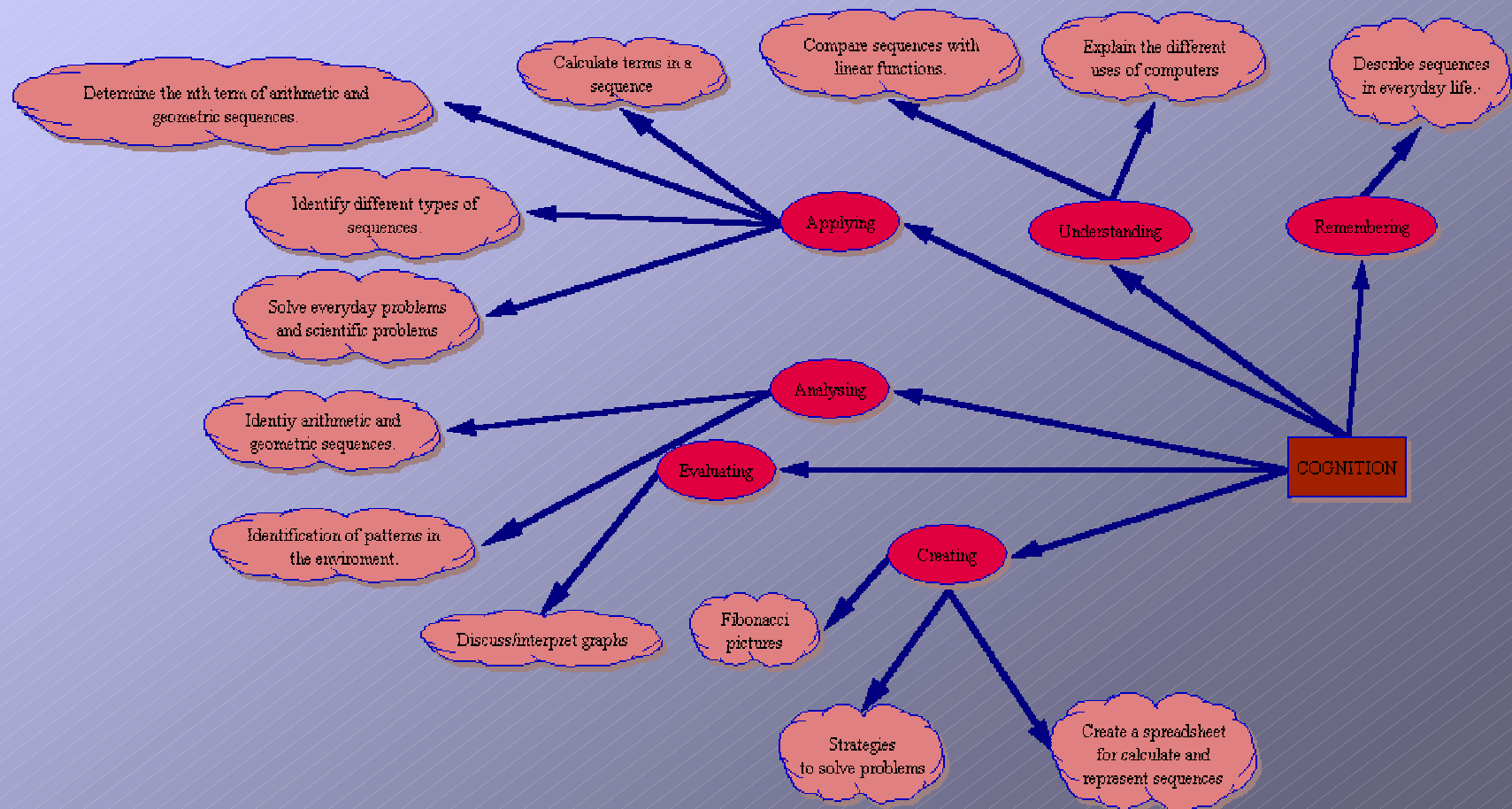
- Maths: a science that contributes to society
- Maths and real life
 - Reasoning
 - Criticism
- Importance of philosophers, researchers and mathematicians
- Encouraging students' self-esteem
- Looking at the students' needs
- Variety of activities and instruments of evaluation
- Use of ICT to build and to structure mathematic contents

Unit 1: Sequences and Series





Cognition



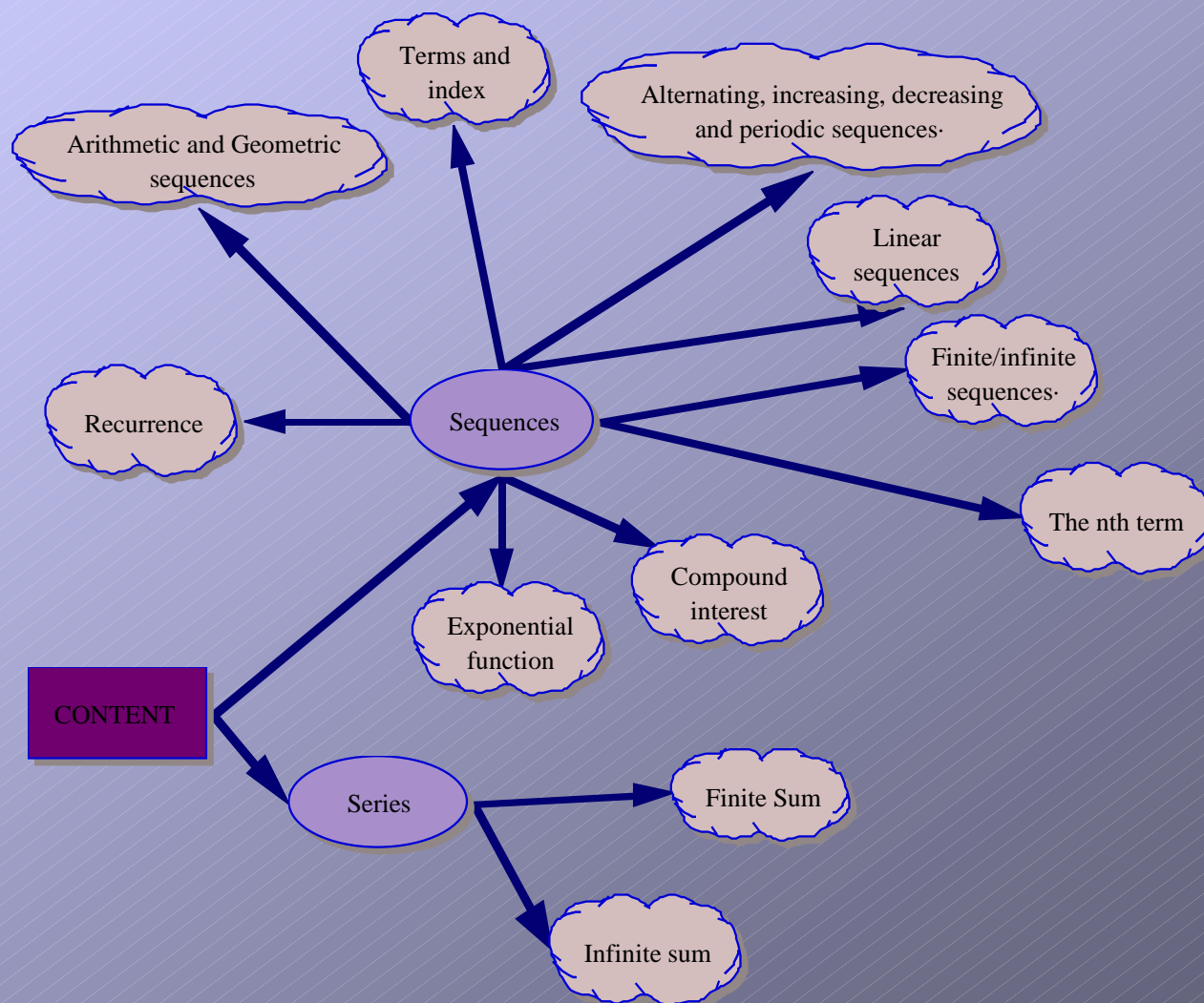


Culture



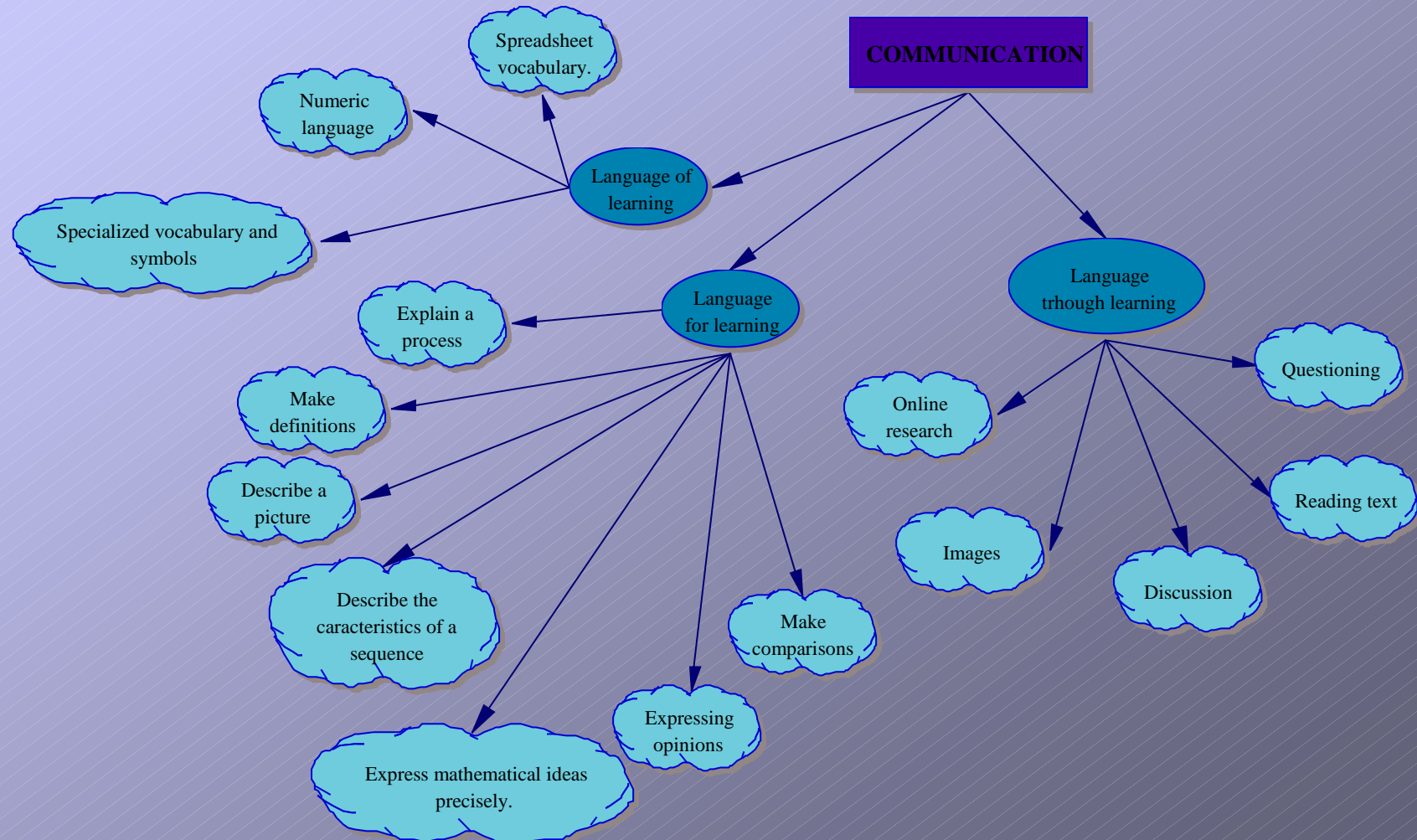


Content





Communication





Tasks and Activities

'I think I could, if I only knew how to begin (...)
Alice had begun to think that very few things indeed were really impossible.'

Lewis Carroll





Introducing theory



Definition 2 \Rightarrow An **arithmetic series** is an A.P. where we **ADD** each term of the A.P. In other words, if you look at the A.P. of hours and replace the commas with plus signs you get:

$$1+2+3+4+5+6+7+8+\dots$$



Imagine trying to add **ALL** of the terms in the sequence of odds numbers! You couldn't do it. (It would add up to infinity.) However, you **WILL** be asked to add up a **set** number of terms in a **series**. The formula to help you do this is:

$$S_n = \frac{n}{2}(a_1 + a_n)$$



Reading

Introduction

12) Let's read.

Below you have the slides Professor Langdon projected to his students. Langdon is one of the main characters in Dan Brown's book "The Da Vinci Code"

In pairs try to match the words with the appropriate image.

1. Nautilus		
2. Vitruvian Man		
3. Stradivarius		
4. Honeybee		
5. Sunflower		

Individual reading

Student 1

"Nautilus is a

Student 2

PHI

ad

sai

th

s

d

6

d

d

f

w

Student 3

Langdon pulled up another slide The Vitruvian Man. "Da Vinci was the first to show that the human body is full of proportional ratios related to PHI. Don't believe me? Measure the distance from the tip of your head to the floor. Then divide that by the distance from your belly button to the floor.

Student 4

Langdon explain that PHI appeared in the Greek Parthenon, the pyramids of Egypt... in Mozart's sonatas, Beethoven's Fifth Symphony, as well as the works of Bartók, Debussy, and Schubert and was even used by Stradivarius in the construction of his famous violins.

Work in Groups

- Why is the number Phi important?
- Can you demonstrate that Phi derives from the Fibonacci sequence? Calculate this number according to the text.
- Write down two or three examples of Phi in nature, in architecture and in music.
- With a tape measure, try to prove that the human body is a tribute to the Divine Proportion.



Speaking

- > Observe the values obtained for φ . Analyse these values and in pairs try to explain what happens.



We notice that...

the further the terms go the values for φ		are	more and more accurate.
		are not	bigger.
			smaller.
φ is	an irrational number	and	doesn't have
	a rational number		an exact value
		has	an approximate value
however many terms of the Fibonacci's sequence we chose, we		always	obtain approximations
		never	

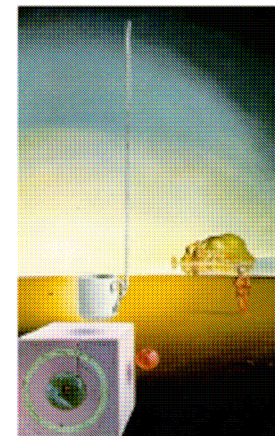
Analysing

Describing

- 13) Look at these two pictures. Describe them. Have they something in common?



"Fibonacci's World". Mary Anne Durvin



"Senitza gigante volante, con anexo inexplicable de cinco metros de longitud". Salvador Dali,

In the middle	of the picture	there is/ are
In the top/bottom left hand side/corner		colours are....
In the top/bottom right hand side/corner		I can see....
In the foreground		
In the background		



Writing

Explaining a process

8) Write down the rule for obtaining the next term in each of the following:

* $A_n = 100, 96, 92, 88, \dots$

The next term is obtained by subtracting four from the preceding term

* $B_n = 1, 4, 9, 16, \dots$

The next term is obtained _____

* $C_n = -3, -6, -12, -24, \dots$

The next term _____

* $D_n = 64, 32, 16, 8, \dots$

The next _____

* $E_n = 1, 10, 100, 1000, \dots$

* $F_n = 100, 90, 81, 73, \dots$

© The wheat and the chessboard

One of the earliest mentions of Chess in puzzles is by the Arabic mathematician Ibn Kallikan who, in 1256, poses the problem of the grains of wheat, 1 on the first square of the chessboard, 2 on the second, 4 on the third, 8 on the fourth etc.

How many grains of wheat are there?

Try to organize your work. In pairs decide your strategy and write it down.

In a chessboard there are...squares.

We need to find...

First we ... second...

Finally...

The sequence of grains of wheat is...

We have to use the formula...

The first term in the sequence is...

The common ratio is...

Deciding strategies



ICT



Sequences and Series

Lesson 1



Computers can be used for many things, even for solving mathematics!!

13) Complete the sentences below with the appropriate words:

Computers can be used for

- > playing ... games things on the Internet
- > writing... documents files
- > looking for... documents files
- > watching... music TV and movies
- > listening to... music TV and movies
- > transferring...



Here is some vocabulary you will need using the Calc. Try to match each word with its definition. Look at the sheet from the Calc for help.

Spreadsheet Vocabulary

Active cell	Graph	Value
Row	Row	Workbook
Cell	Selecting	Worksheet
Column	Sheet	
Formula	Spreadsheets	

- _____ is a grid that organizes data.
- _____ is one page of a spreadsheet
- _____ is the number that can be entered into a cell
- _____ is the horizontal reference on the spreadsheet
- _____ is a visual representation of data
- _____ is the cell you are currently working on



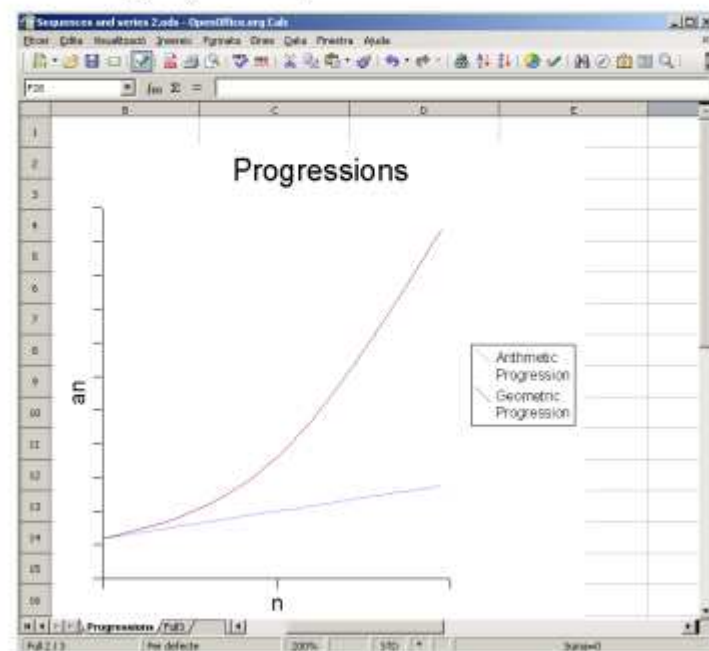
Imma Romero
IES La Segarra (Cervera)

11



Graph of Arithmetic and Geometric Progressions

You are now going to use the computer to generate and represent progressions. Chose an arithmetic and a geometric progression and represent them in a Calc Spreadsheet. I give you an example.



What are the differences between the two graphs? Discuss with a partner.

Comparing and describing graphs



Heads and Tails

odd numbers

even numbers

powers of 2

prime numbers

natural numbers

square numbers

1, 2, 3, 4, 5, 6, 7, 8, ...

2, 4, 6, 8, 10, 12, 14, ...

1, 3, 5, 7, 9, 11, 13, ...

2, 4, 8, 16, 32, 64, ...

1, 4, 9, 16, 25, 36, 49, ...

1, 3, 5, 7, 11, 13, 17, ...

Playing

Constructing Sequences

5) You know different number sequences. Work in pairs. Match each list of numbers with a mathematical rule.

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, ...

2, 4, 6, 8, 10, 12, 14, 16, ...

1, 3, 5, 7, 9, 11, 13, 15, ...

2, 4, 8, 16, 32, 64, 128, ...

1, 4, 9, 16, 25, 36, 49, ...

1, 3, 5, 7, 11, 13, 17, 19, ...

odd numbers

even numbers

powers of 2

prime numbers

natural numbers

square numbers

Matching



Experimenting and reasoning

Thinking challenge!!

It's impossible to fold a piece of paper more than eight times!



Sounds Odd, doesn't it? What is the reason for that? Try it yourself and try to answer. Think about the thickness of the paper, the number of layers and the mathematical rule.

I think that the reason for this is that...

I think it is impossible because...

This is due to...



Why did Robin Hood steal from the rich?

Find the answer with the help of sequences!!

Find the missing number in each of the following:

E 2, 4, 6, __, 10, 12, ...

C 0, 4, 8, 12, 16, __, ...

A __, 7, 9, 11, 13, ...

V 10, 15, 20, __, ...

I 3, 6, 9, __, ...

N 25, 20, 15, __, 5, ...

B 12, 10, 8, 6, __, ...

D 1, 1, 2, 1, 1, 2, 1, __, ...

S 5, 10, __, 20, ...

O 3, 4, 3, 3, 4, 4, __, 3, 3, 4, 4, ...

T 10, 12, 14, __, 18, ...

R 10, 20, 30, 40, __, 60, ...

U 1, 4, 7, 10, __, 16, ...

M 2, 6, 10, 14, __, 22, ...

H 15, 12, 9, __, 3, ...

P 3, 8, 13, 18, __, 28, ...

Y 14, 10, 6, __, ...

Now complete the secret message and you will find the answer by writing each letter in its right place:

_ _ _ E _ _ _ _ _ E _ _ _ E _ _ _ _ _
 4 8 20 5 13 15 8 16 6 8 23 3 3 50
 _ _ _ _ _ E _ _ _ _ _
 1 12 1 10 16 6 5 25 8 5 10 2
 _ _ _ E _ _ _
 18 3 10 8 2

Applying



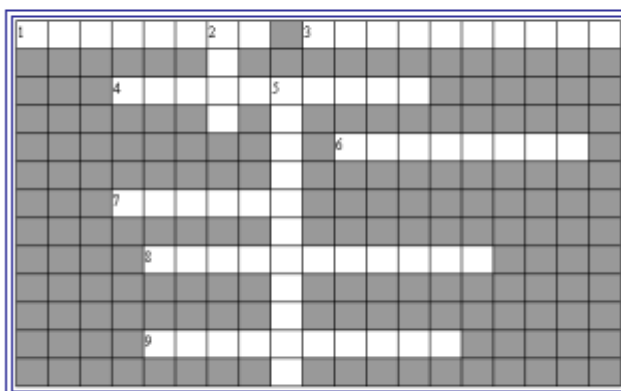
Revision and Assessment



Sequences and Series

Lesson 1

16) Solve this crossword.



ACROSS

1. If a sequence goes on forever, it is...

3. The terms of this sequence drop and drop...

4. The terms of this sequence grow and grow...

6. Ordered list of elements

7. Sequences where the rule is to add or subtract the same amount each time.

8. Catalan legendary who lived in 1627

9. English legendary who lived in Sherwood Forest

DOWN

2. Each element of a sequence is named...

5. The terms of this sequence don't grow or drop...

Key words



Sequences and Series

Assessment

Name: _____
Subject: _____
Lesson: _____
Date: _____

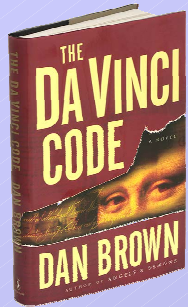
- 1) Have you learn something new?
- 2) Can you use the things you have learned in your daily life?
- 3) You are interested in learning more about...
- 4) What things need to be changed?
- 5) What do you suggest?



Imma
IES L

Assessment of
teaching process

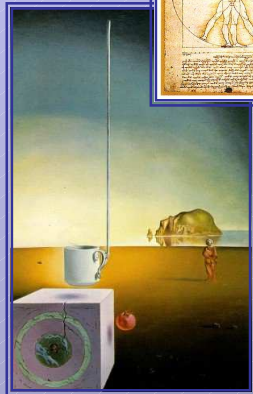
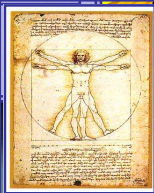
Literature



Legends



Art and Science



Maths and Culture

Currency



Mathematicians and philosophers

