2025

Liceo Enrico Fermi
Montesarchio
Italia

Lycée Rémi Belleau
Nogent-le -Rotrou
France

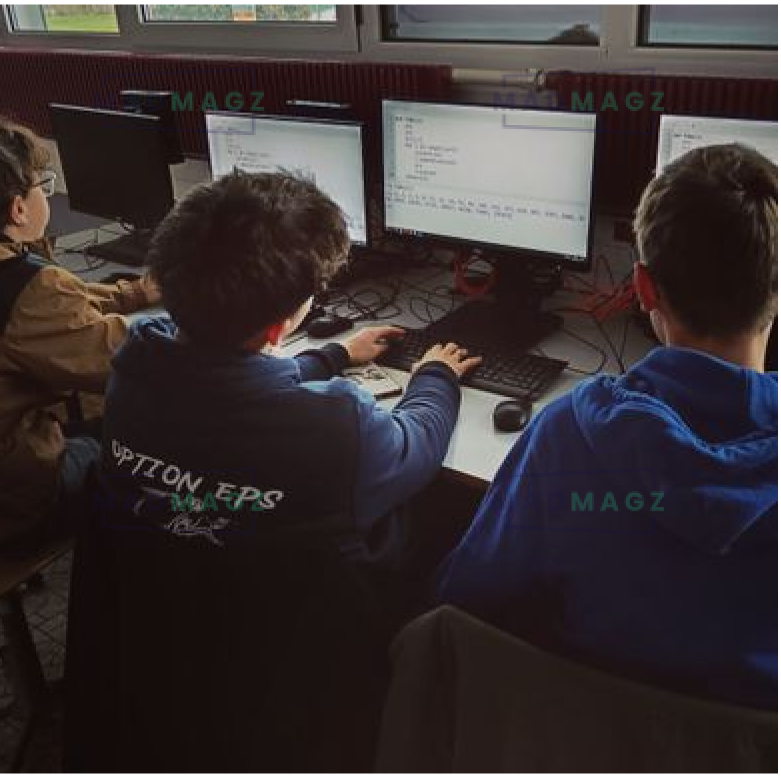
MATH is everywhere

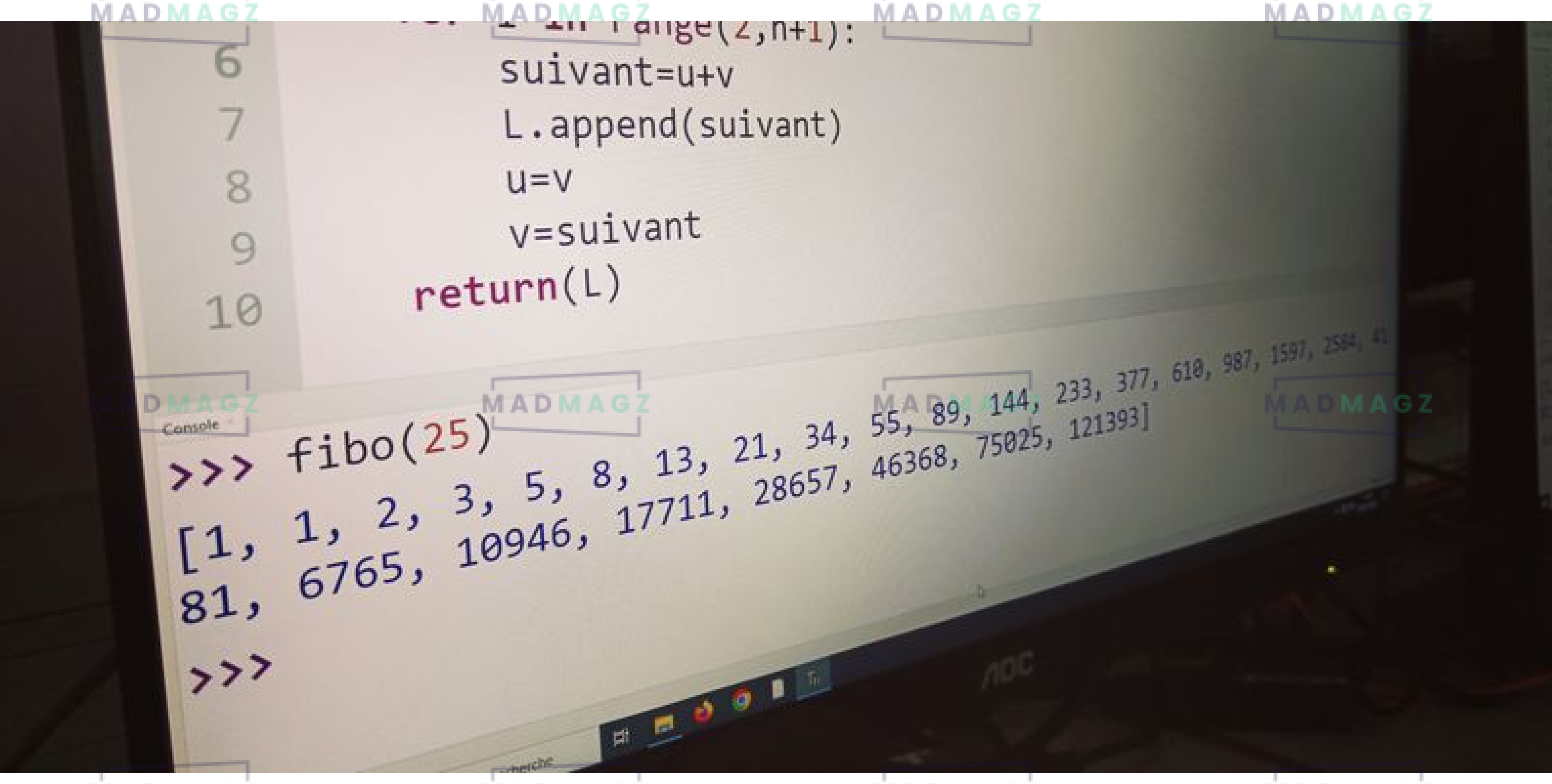
Istituto di Istruzione Superiore Enrico Fermi
Lycée polyvalent Rémi Belleau

Istituto di Istruzione Superiore Enrico Fermi, Montesarchio, Italia

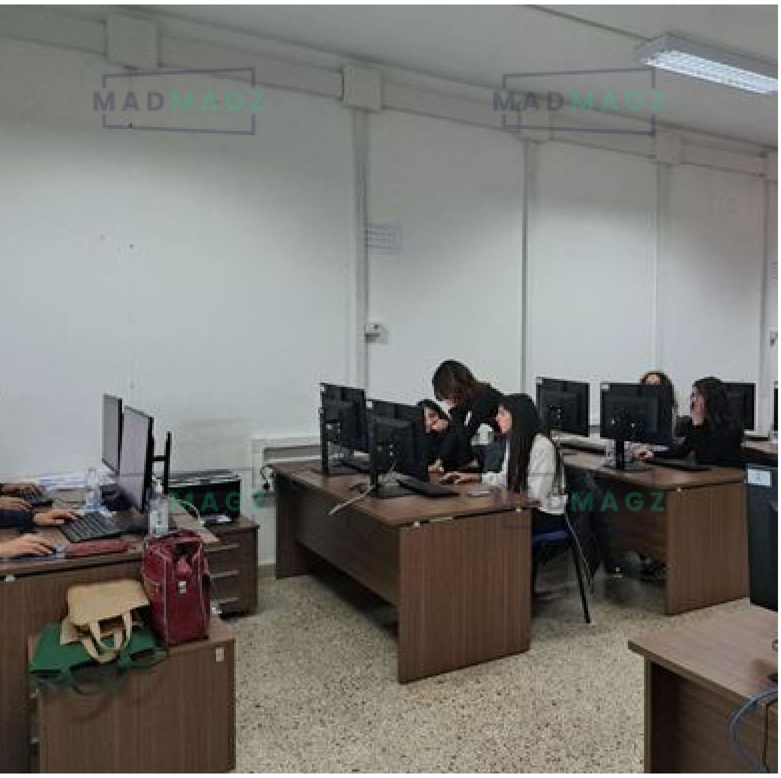
Lycée polyvalent Rémi Belleau, Nogent-le-Rotrou, France

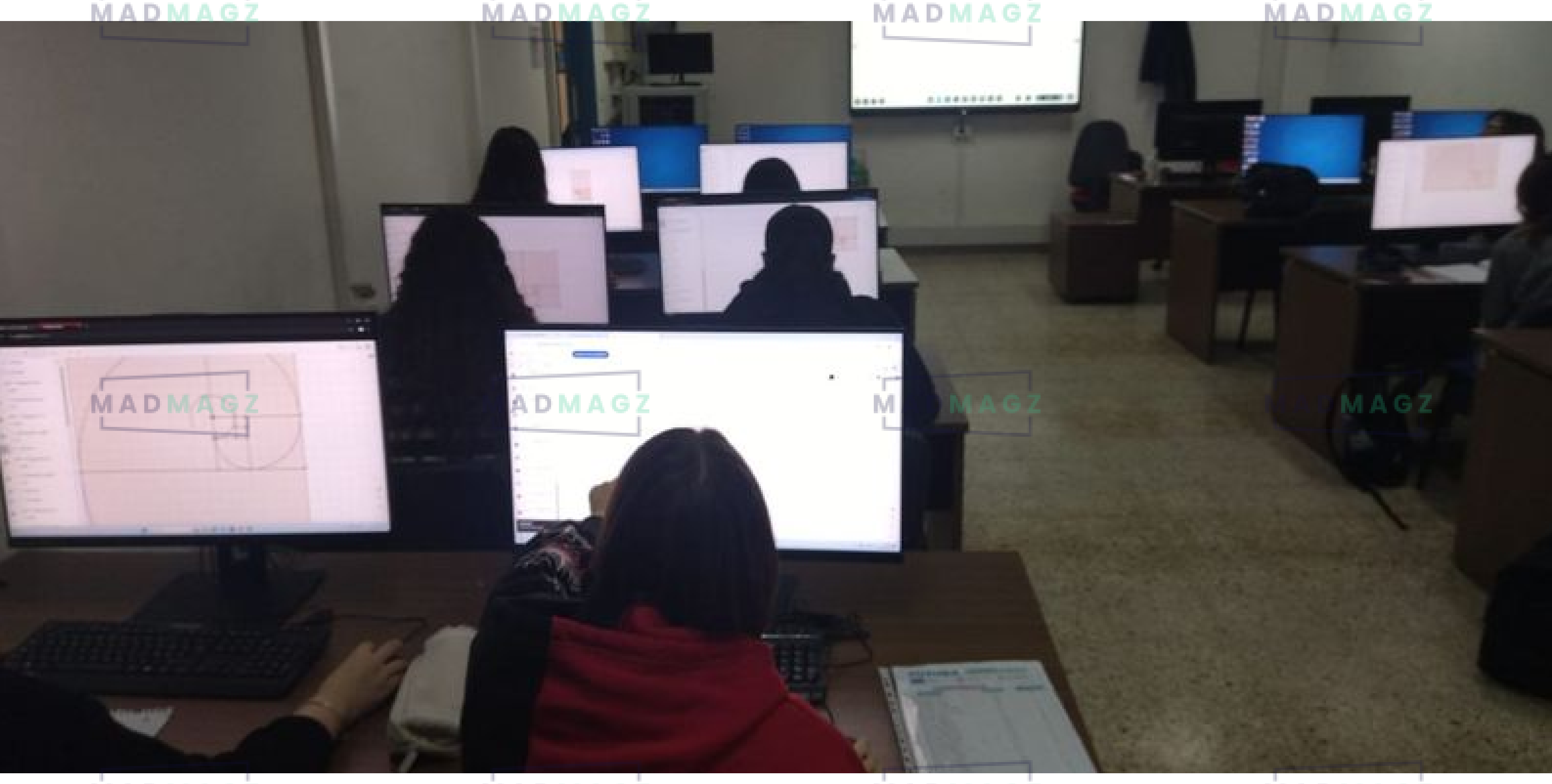
Python workshop in France





Geogebra workshop in Italia





Fibonacci sequence with Excel

by Federica & Marco

Excel sheet by Federica

	A	B	C	D	E
1	n	Numeri di Fibonacci	F(n+1)-F(n)	F(n+1)/F(n)	
2	1	1			
3	2	1	0	1	
4	3	2	1	2	
5	4	3	1	1,5	
6	5	5	2	1,66666667	
7	6	8	3	1,6	
8	7	13	5	1,625	
9	8	21	8	1,61538462	
10	9	34	13	1,61904762	
11	10	55	21	1,61764706	
12	11	89	34	1,61818182	
13	12	144	55	1,61797753	
14	13	233	89	1,61805556	
15	14	377	144	1,61802575	
16	15	610	233	1,61803714	
17	16	987	377	1,61803279	
18	17	1597	610	1,61803445	
19	18	2584	987	1,61803381	
20	19	4181	1597	1,61803406	

	A	C	E	G	I	K	M	P
1–2	SUCC. DI FIBONACCI	f_{n+1}/f_n	SUCCESSIONE GENERALIZZATA	f_{n+1}/f_n	SUCCESSIONE GENERALIZZATA	f_{n+1}/f_n	CONTATORE	SOMMA DEI PRIMI n NUMERI DI FIB
3	1	1	16	1,125	106	1,69811321	1	
4	1	2	18	1,88888889	180	1,58888889	2	2
5	2	1,5	34	1,52941176	286	1,62937063	3	4
6	3	1,66666667	52	1,65384615	466	1,61373391	4	7
7	5	1,6	86	1,60465116	752	1,61968085	5	12
8	8	1,625	138	1,62318841	1218	1,61740558	6	20
9	13	1,61538462	224	1,61607143	1970	1,61827411	7	33
10	21	1,61904762	362	1,61878453	3188	1,61794228	8	54
11	34	1,61764706	586	1,61774744	5158	1,61806902	9	88
12	55	1,61818182	948	1,61814346	8346	1,61802061	10	143
13	89	1,61797753	1534	1,61799218	13504	1,6180391	11	232
14	144	1,61805556	2482	1,61804996	21850	1,61803204	12	376
15	233	1,61802575	4016	1,61802789	35354	1,61803473	13	609
16	377	1,61803714	6498	1,61803632	57204	1,6180337	14	986
17	610	1,61803279	10514	1,6180331	92558	1,6180341	15	1596
18	987	1,61803445	17012	1,61803433	149762	1,61803395	16	2583
19	1597	1,61803381	27526	1,61803386	242320	1,618034	17	4180
20	2584	1,61803406	44538	1,61803404	392082	1,61803398	18	6764
21	4181	1,61803396	72064	1,61803397	634402	1,61803399	19	10945
22	6765	1,618034	116602	1,618034	1026484	1,61803399	20	17710
23	10946	1,61803399	188666	1,61803399	1660886	1,61803399	21	28656
24	17711	1,61803399	305268	1,61803399	2687370	1,61803399	22	46367
25	28657	1,61803399	493934	1,61803399	4348256	1,61803399	23	75024
26	46368	1,61803399	799202	1,61803399	7035626	1,61803399	24	121392
27	75025	1,61803399	1293136	1,61803399	11383882	1,61803399	25	196417
28	121393	1,61803399	2092338	1,61803399	18419508	1,61803399	26	317810
29	196418	1,61803399	3385474	1,61803399	29803390	1,61803399	27	514228
30	317811	1,61803399	5477812	1,61803399	48222898	1,61803399	28	832039
31	514229	1,61803399	8863286	1,61803399	78026288	1,61803399	29	1346268
32	832040	1,61803399	14341098	1,61803399	126249186	1,61803399	30	2178308
33	1346269		23204384		204275474		31	3524577

Excel sheet by Marco

Leonardo

by Augustin

Fibonacci, whose real name was Leonardo of Pisa, was a 13th-century Italian mathematician (c. 1170–c. 1250). He is best known for introducing the Hindu-Arabic number system (the numbers we use today) to Europe with his work Liber Abaci (1202). This book had a major influence on the development of mathematics in Europe.

Suite de Fibonacci et Python

by Augustin

BSF ex 13.py

```python
def fibo(n):
    u=1
    v=1
    for i in range(3,n+1):
        suivant=u+v
        u=v
        v=suivant
    return(v)
```

Console

```
>>> fibo(10)
55
>>> fibo(15)
610
>>>
```

The program calculates a specific term of the Fibonacci sequence.

It starts with 1 and 1, then adds the last two numbers to obtain the next one, and repeats as many times as necessary until the requested rank is reached.

At the end, it displays the result.

In this program, the process is the same except for one detail : during each calculation, the result is entered into a list named L.

When this function is called, this list is returned.

BSF ex 14.py

```python
def fibo(n):
    u=1
    v=1
    L=[1,1]
    for i in range(3,n+1):
        suivant=u+v
        L.append(suivant)
        u=v
        v=suivant
    return(L)
```

Console

```
>>> fibo(10)
[1, 1, 2, 3, 5, 8, 13, 21, 34, 55]
>>> fibo(15)
[1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233,
377, 610]
>>>
```

Suite de Fibonacci et Python

by Augustin

```
BSF ex 15.py
def fibo(n):
    u=1
    v=1
    for i in range(3,n+1):
        suivant=u+v
        u=v
        v=suivant
    return(v)

def nbor(n):
    L=[]
    for i in range(1,n+1):
        w=fibo(i)/fibo(i-1)
        L.append(w)
    return(L)
```

```
Console
>>> nbor(15)
[1.0, 1.0, 2.0, 1.5, 1.6666666666666667, 1.6, 1.
625, 1.6153846153846154, 1.619047619047619, 1.61
76470588235294, 1.6181818181818182, 1.6179775280
898876, 1.6180555555555556, 1.6180257510729614,
1.6180371352785146]
>>> |
```

The fibo(n) function generates the nth number in the Fibonacci sequence, where each number is the sum of the two preceding numbers (1, 1, 2, 3, 5, ...). For example, for n=3, it returns 2.

The nbor(n) function creates a list of the ratios between two consecutive Fibonacci numbers, i.e., fibo(i)/fibo(i-1), for i ranging from 1 to n. These ratios tend toward the golden ratio (approximately 1.618).

In the console, nbor(15) displays a list of 15 ratios: [1.0, 1.0, 2.0, 1.5, ..., 1.61803371352785146]. We see that the values begin to fluctuate and then stabilize around 1.618, which is an approximation of the golden ratio.

This program does the same thing, but this time the nbor program executes (2 x ratio - 1) to the power of 2.

In the console, nbor(15) displays 15 results of this formula, which hover around 5.

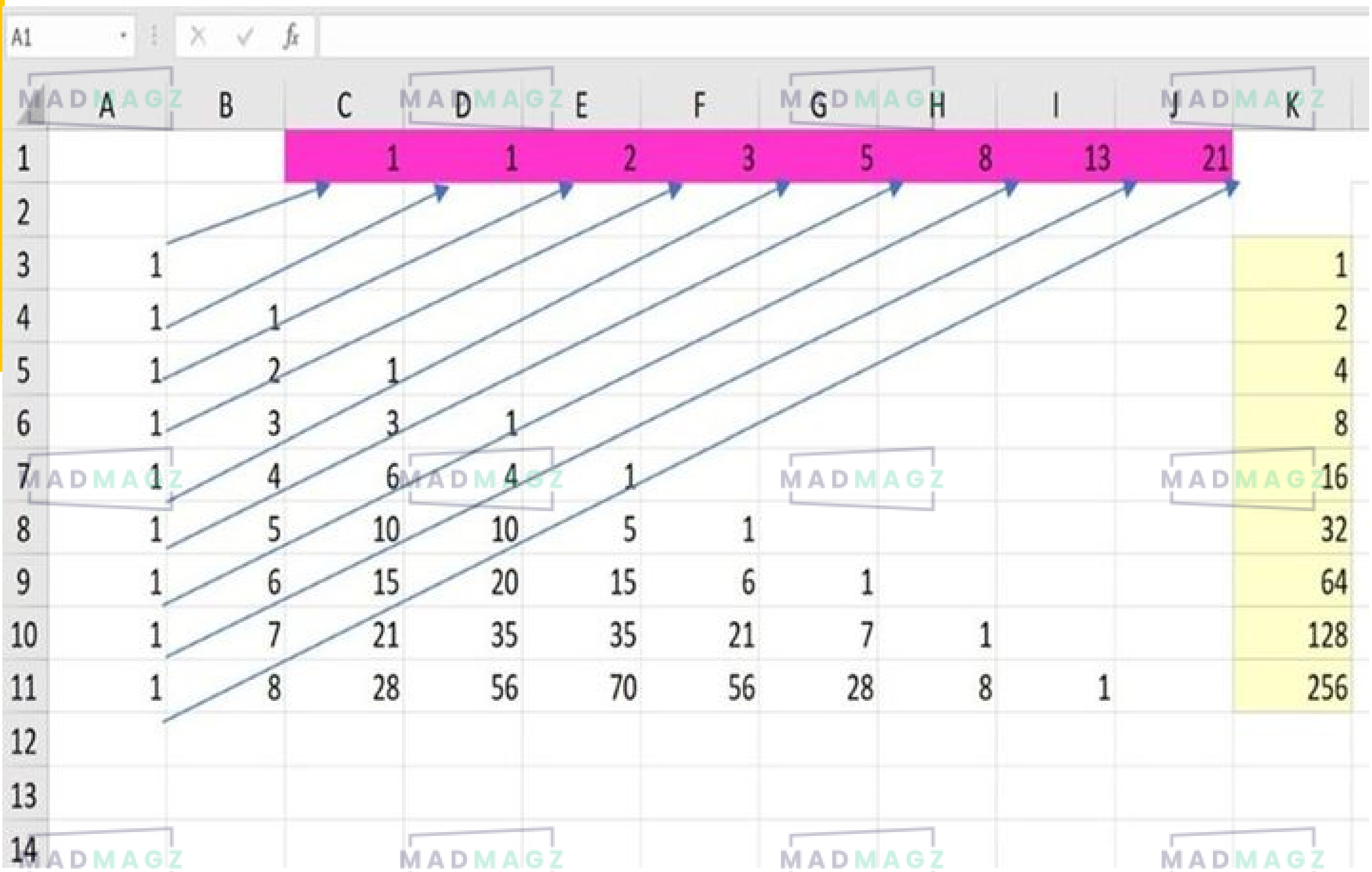
```
BSF ex 16.py
def fibo(n):
    u=1
    v=1
    for i in range(2,n+1):
        suivant=u+v
        u=v
        v=suivant
    return(v)

def nbor(n):
    L=[]
    for i in range(1,n+1):
        w=fibo(i)/fibo(i-1)
        L.append((2*w-1)**2)
    return(L)
```

```
Console
>>> nbor(15)
[1.0, 9.0, 4.0, 5.4444444444444455, 4.8400000000
00001, 5.0625, 4.976331360946745, 5.009070294784
581, 4.996539792387543, 5.001322314049586, 4.999
495013255902, 5.000192901234568, 4.9999263202490
38, 5.00002814344715, 4.999989250201559]
>>> |
```

Pascal's triangle

by Cassandra & Célestine, Excel sheet by Michela



	A	B	C	D	E	F	G	H	I	J	K
1			1	1	2	3	5	8	13	21	
2											
3	1										1
4	1	1									2
5	1	2	1								4
6	1	3	3	1							8
7	1	4	6	4	1						16
8	1	5	10	10	5	1					32
9	1	6	15	20	15	6	1				64
10	1	7	21	35	35	21	7	1			128
11	1	8	28	56	70	56	28	8	1		256
12											
13											
14											

Principle of construction of Pascal's triangle

Pascal's triangle is based on a simple construction principle: the first and last coefficients of each row are always equal to 1. Each other coefficient is obtained by adding the number above it and the one above it to the left. The image below illustrates this principle.

Here, the numbers in the first cell of each column are equal to 1. Those in column A are also equal to 1. Then, if we take the number 15 contained in cell C9: to calculate it, we add the number above it (10) and the one above it on the left (5). So 10 + 5 = 15. This principle also works for the other cells. You can use this principle endlessly.

Formula for constructing Pascal's triangle

To obtain the number 2, we place ourselves in cell B5 and enter the formula =SUM(A4:B4).

Get the terms of Fibonacci sequence (pink)

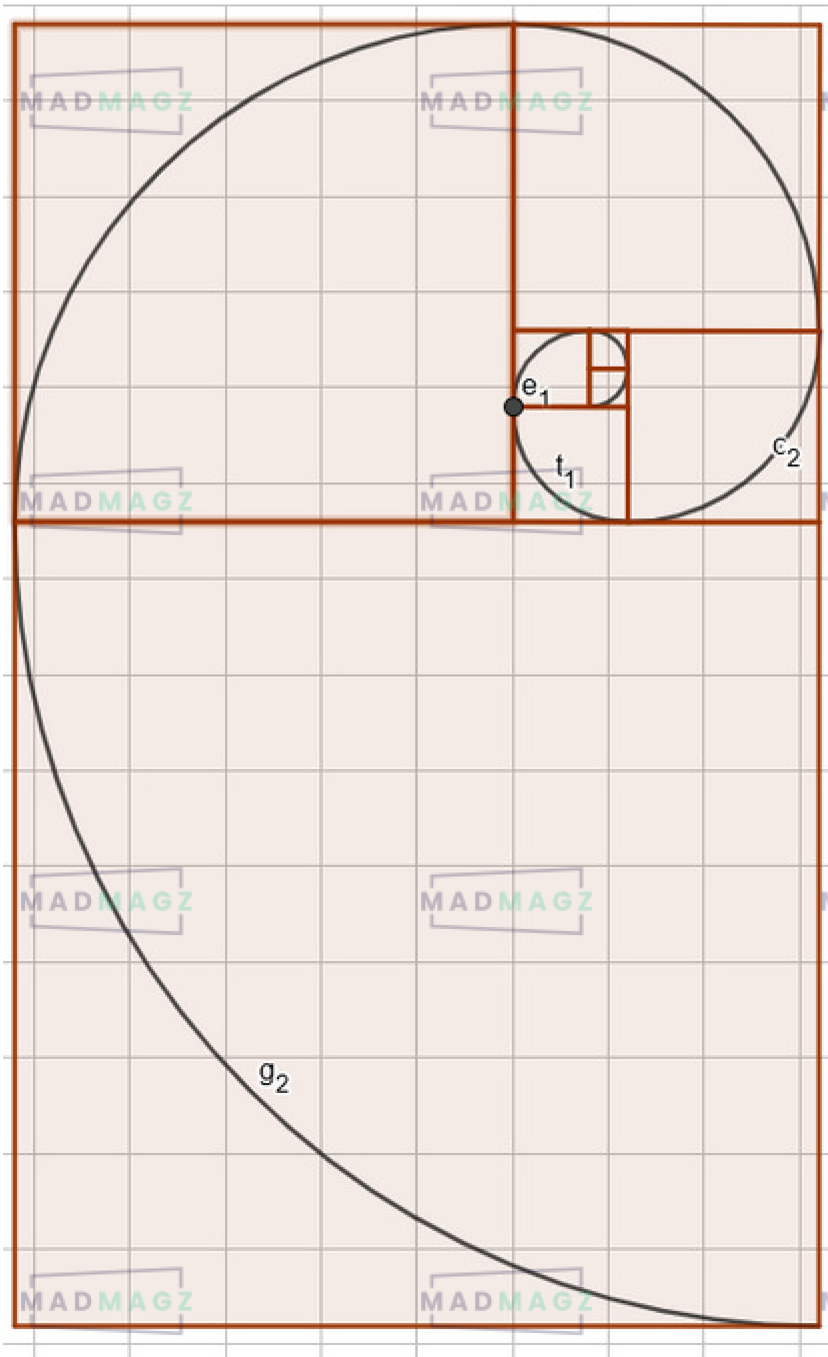
The numbers in pink are obtained by adding the "1"s in column A with the numbers diagonally across them in each row. For example, to get 3, add the 1 in column A6 and the 2 in column B5.

Get the successive powers of 2 (yellow)

The numbers in yellow are the sums of the numbers in the rows. For example, to get 4, we add cells A5, B5, and C5, that is, 1+2+1=4.

La spirale de Fibonacci

by Maiwenn and Nolan



Drawing by Michelle

The first terms of the sequence :

u0=1 ; u1=1 ; u2=2 ; u3=3 ;
u4=5 ; u5=8 ; u6=13 ; u7=21.

Where do we find the terms of the Fibonacci sequence : in mathematics, the Fibonacci sequence is a sequence of integers in which each number is the sum of the two numbers preceding it. It begins with the numbers 0 and 1.

How was this spiral built :

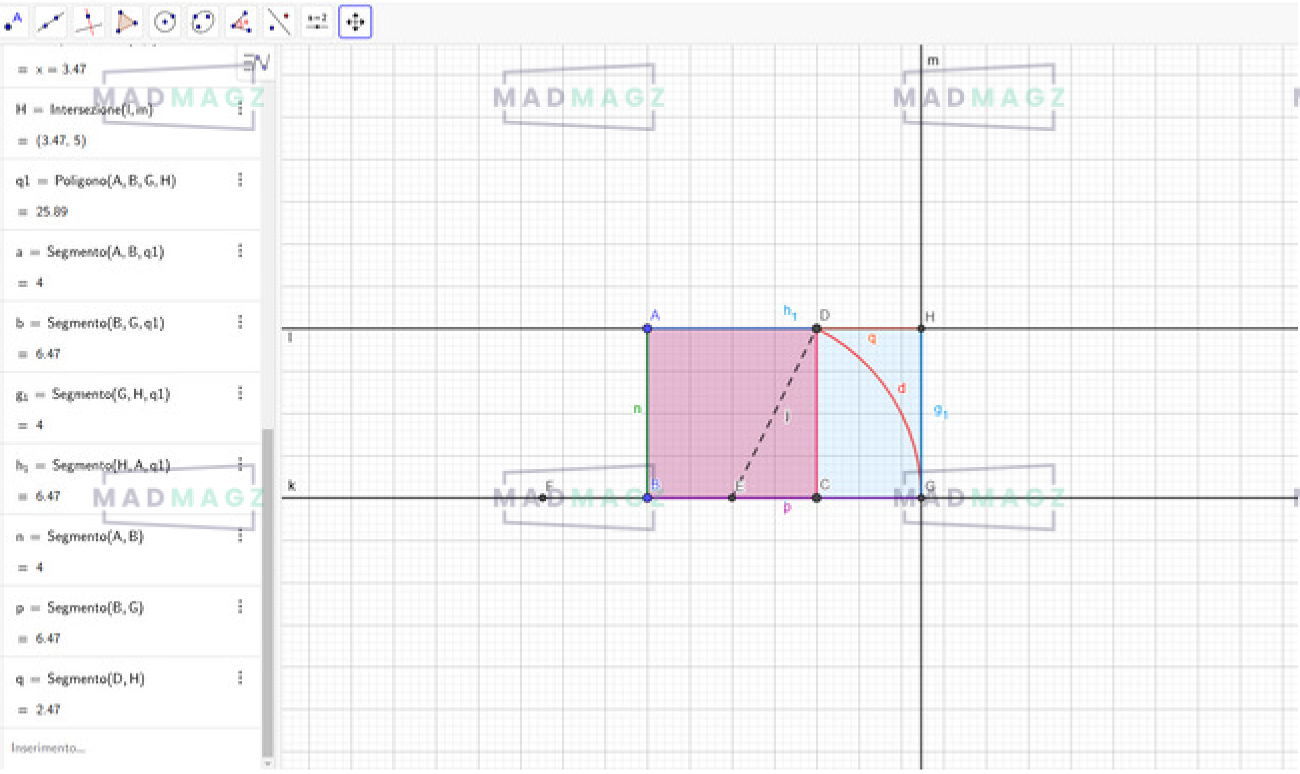
The Fibonacci spiral is constructed by using squares whose sides correspond to the terms of the Fibonacci sequence (1, 1, 2, 3, 5, 8, ...), drawing quarter circles in each square, connecting opposite vertices to form a spiral curve.

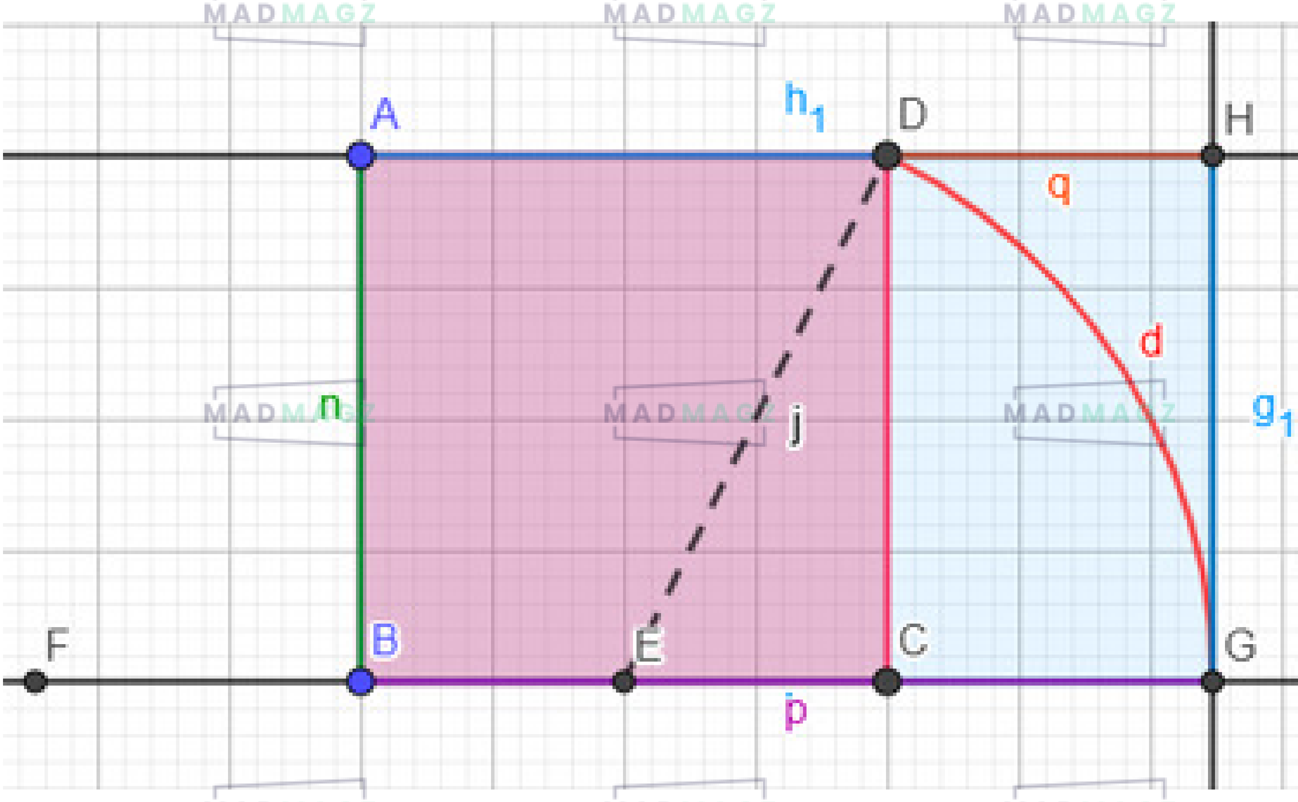
Where is this spiral found in nature ?

The Fibonacci spiral is a fascinating geometric shape that is frequently found in nature, for example, the galaxy on a cosmic scale. Some galaxies, such as the Milky Way, exhibit a spiral shape that follows the Fibonacci sequence. This structure allows for a uniform distribution of matter and stable dynamics of the galaxy. This sequence can also be found on the human body in flowers, etc.

Golden rectangle

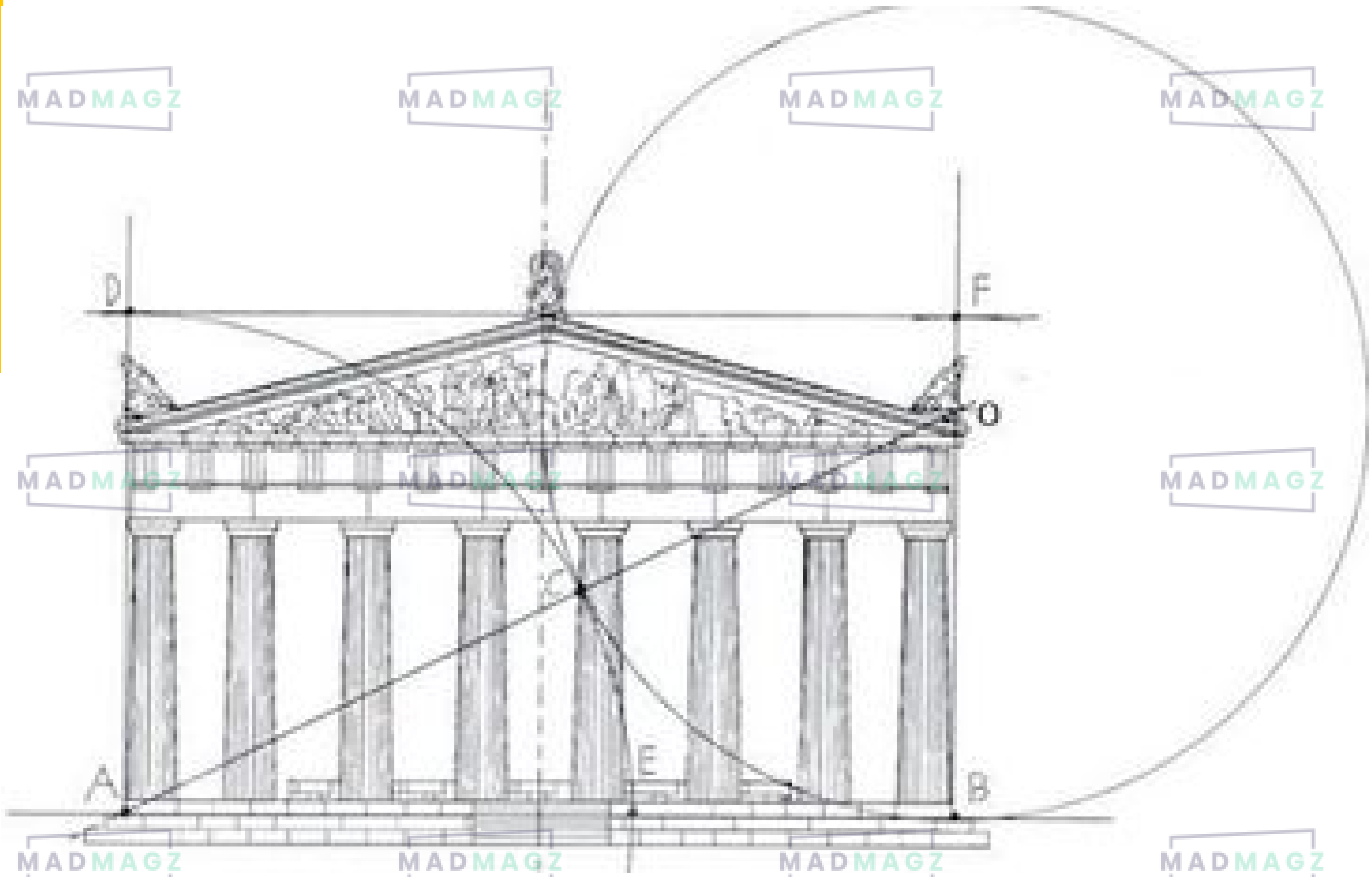
by Alessia





La sezione aurea nel Partenone

The golden section in the Parthenon



Il Partenone di Atene, il più celebre dei monumenti ellenistici, contiene molti rettangoli aurei. Ne deriva un aspetto armonico, che ispira una profonda sensazione di equilibrio. La pianta del Partenone è un rettangolo con lati di dimensioni tali che la lunghezza sia pari alla radice di cinque volte la larghezza, mentre nell'architrave in facciata il rettangolo aureo è ripetuto più volte.

Le dimensioni della base del Partenone sono di 69,5 per 30,9 metri. Il pronao era lungo 29,8 metri e largo 19,2, con colonnati dorico-ionici interni in due anelli, strutturalmente necessari per sorreggere il tetto. All'esterno, le colonne doriche misurano 1,9 metri di diametro e sono alte 10,4 metri.

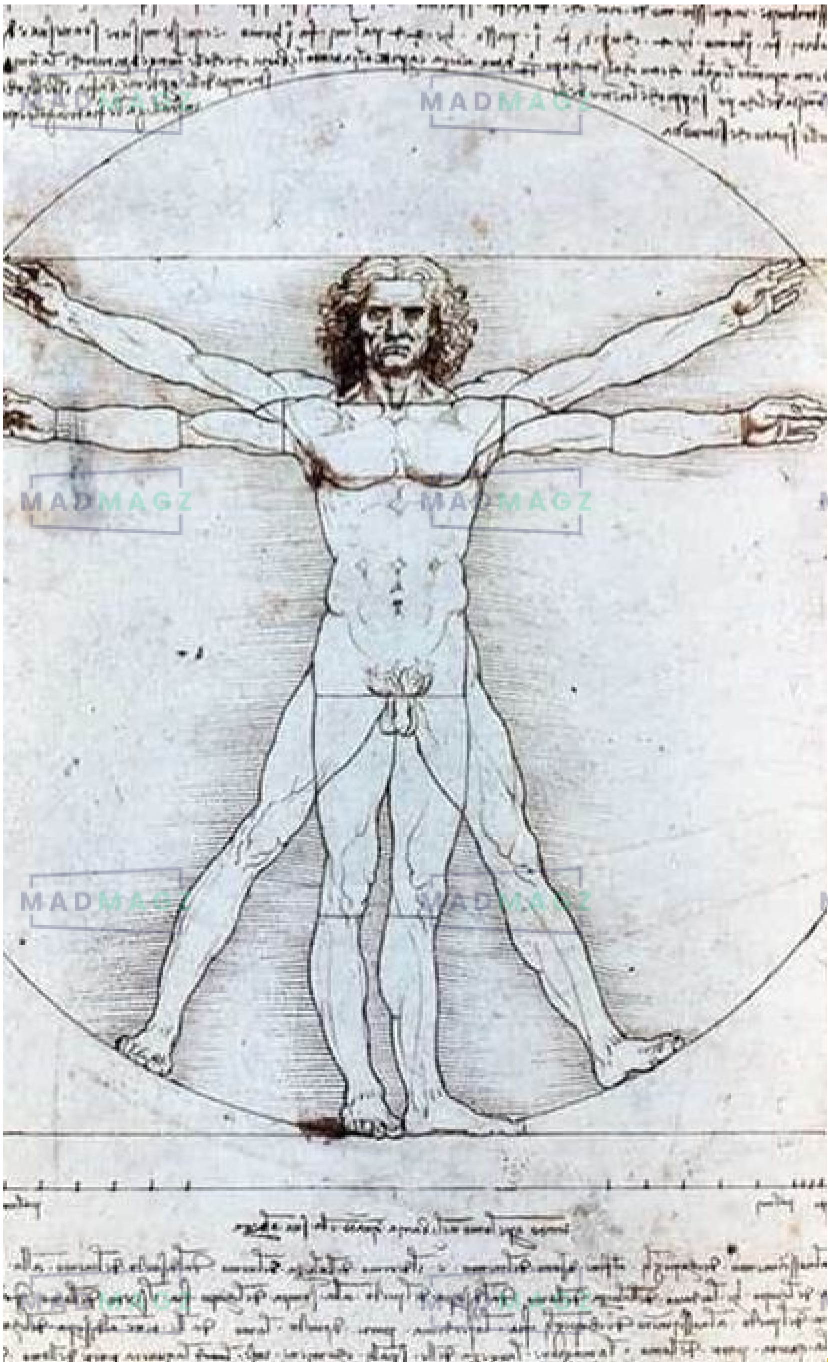
Maria Nives

The Parthenon in Athens, the most famous of the Hellenistic monuments, contains many golden rectangles. The result is a harmonious aspect, which inspires a deep sense of balance. The Parthenon is a rectangle with sides of such dimensions that the length is equal to the root five times the width, while in the facade architrave the golden rectangle is repeated more times.

The base of the Parthenon is 69.5 by 30.9 metres in size. The pronaos was 29.8 metres long and 19.2 metres wide, with internal Doric-Ionic colonnades in two rings, structurally necessary to support the roof. Outside, the Doric columns are 1.9 metres in diameter and 10.4 metres high.

Maria Nives

Uomo Vitruviano
Vitruvian man



Misuere

34,4 x 24,5 rapporto 34,4 / 24,5 =1,404082

Legame numero fidia

L'uomo vitruviano rappresenta le proporzoni ideale del corpo umano basato sui principi di vitruvio .

La correlazione con il numero di fidia risiede nell'uso di queste proporzioni per rappresentare l'armonia e la belleza del corpo umano.

Leonardo ha utilizzato il concetto di proporzione per creare una figura che simboleggia l'equilibro tra l'uomo è l'universo, integrando la matematica e l'arte in modo che le misure del corpo umano riflettendo il numero aureo.

Measurements

34.4 x 24.5 ratio 34.4 / 24.5 = 1.404082

Relationship with the golden number

The Vitruvian Man represents the ideal proportions of the human body based on the principles of Vitruvius. The correlation with the golden number lies in the use of these proportions to represent the harmony and beauty of the human body.

Leonardo used the concept of proportion to create a figure that symbolizes the balance between man and the universe, integrating mathematics and art so that the measurements of the human body reflect the golden number.

Federica

The arch vault of the Romans

Antonin & Simon

Herculaneum

Role of the Romans in the development of arch vaults

Although earlier civilizations, such as the Etruscans, had used vaults, the Romans perfected the barrel vault, thanks in part to their mastery of concrete. This innovation allowed them to span vast spaces without the need for numerous columns. They thus widespread its use in various types of buildings: aqueducts, baths, basilicas, amphitheaters, sewers, and bridges. Through their innovations, the Romans played a significant role in the spread of this architecture.

Saepinum

Arch of Trajan, Benevento

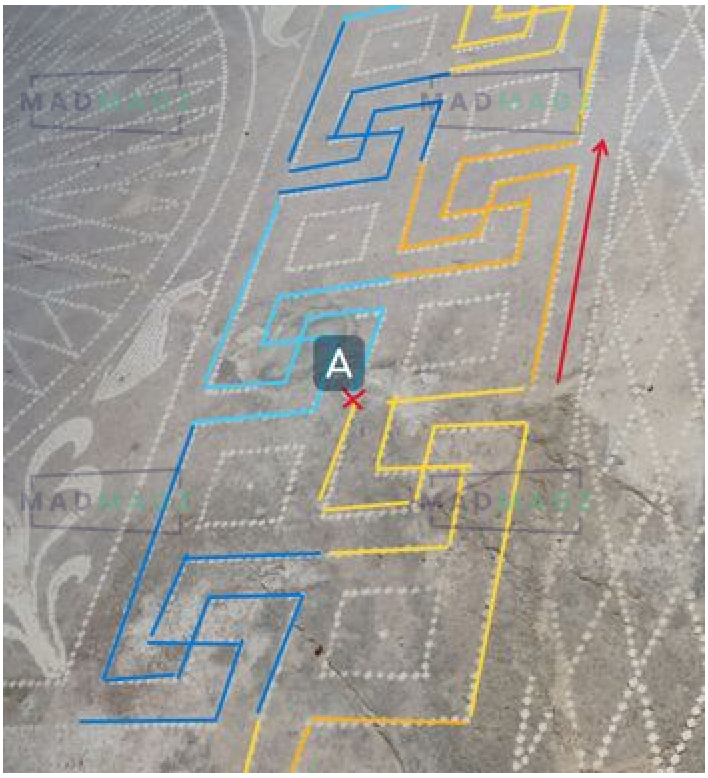
Contribution to modern architecture

The barrel vault allows for a gradual distribution of loads towards the side walls. It distributes the loads continuously there.

By combining two barrel vaults, the Romans invented the groinvault, which distributes the loads even better at four points (on piers or columns). This paved the way for structures like the Pantheon in Rome, whose dome is based on this principle of circular load distribution.

The mosaics of Herculaneum

by Alexandre



Mes magnissit exerrumque ditaquam, sit endiciendes repudandam, num sam, inullan delique evenisc.

Starting with the yellow pattern at the bottom right

To obtain the other yellow patterns: as in the previous mosaic, a simple translation is sufficient: all the patterns are moved to the left by a fixed step.

To obtain the red patterns

To obtain the red pattern, we apply a translation to the yellow along the vector drawn in blue, then a symmetry along the line drawn in gray.

Starting with the yellow pattern at the bottom right

To obtain the other yellow patterns, simply apply a translation along the vector drawn in red. All the yellow patterns are identical and oriented in the same direction, simply moved upwards at a regular rate.

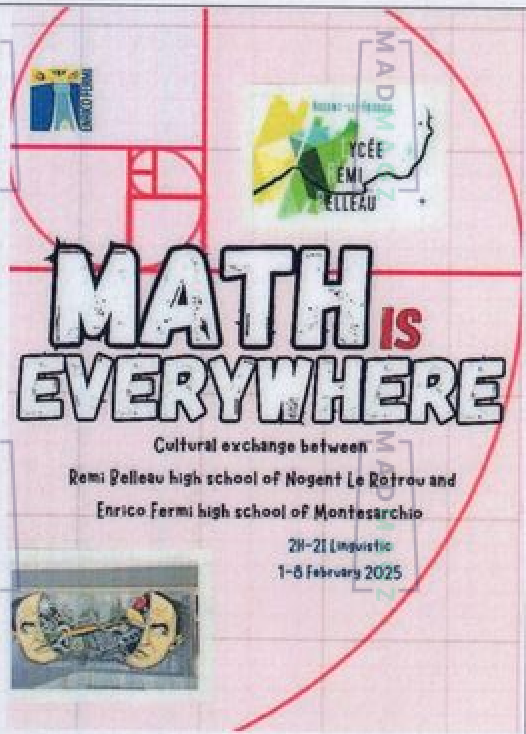
To obtain the blue patterns

We start with a central symmetry with center A, then apply a translation identical to that of the yellow patterns.
In other words, the blue is a central symmetry of the yellow, then shifted.

Mes magnissit exerrumque ditaquam, sit endiciendes repudandam, num sam, inullan delique evenisc.

Istituto di Istruzione Superiore "Enrico Fermi"
Liceo Scientifico e Liceo Scientifico con opz. Scienze applicate
Liceo delle Scienze Umane e Liceo delle Scienze Umane con opz. Economico sociale
Liceo Linguistico
Via Vitulanese, 82016 MONTESARCHIO (BN) - Tel. 0824 847291 - C.F. 80000020620 - C.M. bnis00300n
e-mail: bnis00300n@istruzione.it - PEC: bnis00300n@pec.istruzione.it - web: www.fermimontesarchio.gov.it

CERTIFICATE OF ATTENDANCE



The undersigned, Mrs. **Pasqualina Luciano**, email address bnis00300n@istruzione.it, headmaster representing the host school I.I.S. "Enrico Fermi" located at Via Vitulanese – Montesarchio - Italy, certifies that the following person:

teachers **Mr. VALIBOUSE ERIC, Mrs. KRIEF AGNES**

students **THURIN CELESTINE, BERNARD ALICIA, ANDRÈ SIMON, PIPEREAU__BRIERE LOUISE, TILLOT__BEAUVAIS MAIWENN, DEMAIS CASSANDRA, LHOTE AUGUSTIN, VAUCELLE ANTONIN, DALOMIS DEROIDE ALEXANDRE, RIGOT NOLAN**

at IIS "E. FERMI" MONTESARCHIO- Benevento – ITALY,
attended in Project "MATH IS EVERYWHERE"
2024-1-FR01-KA121-SCH-000224987

Montesarchio (BN) – Italy, 1-8 February 2025

"MATH IS EVERYWHERE"
LPO Rémi Belleau Nogent Le Rotrou - FRANCE
I.I.S. "E. FERMI" Montesarchio-ITALY

DS dott. Pasqualina LUCIANO