

# *“Cool Math”*

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Loving Math with your  
Older Child

# Attitudes are Contagious

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- What is your attitude toward math?
  - How will it affect your children?
  - Will understanding more about what math **really** is help you get excited about it?
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## Typical Math Education in America

Kindergarten=counting

1st grade =addition

2nd grade=subtraction

3rd grade= multiplication

4th grade=division

5th grade=fractions

6th grade=decimals

7th grade=pre-algebra

8th grade=algebra

9th grade=geometry

10th grade=algebra II

11th grade=trigonometry/pre-calculus

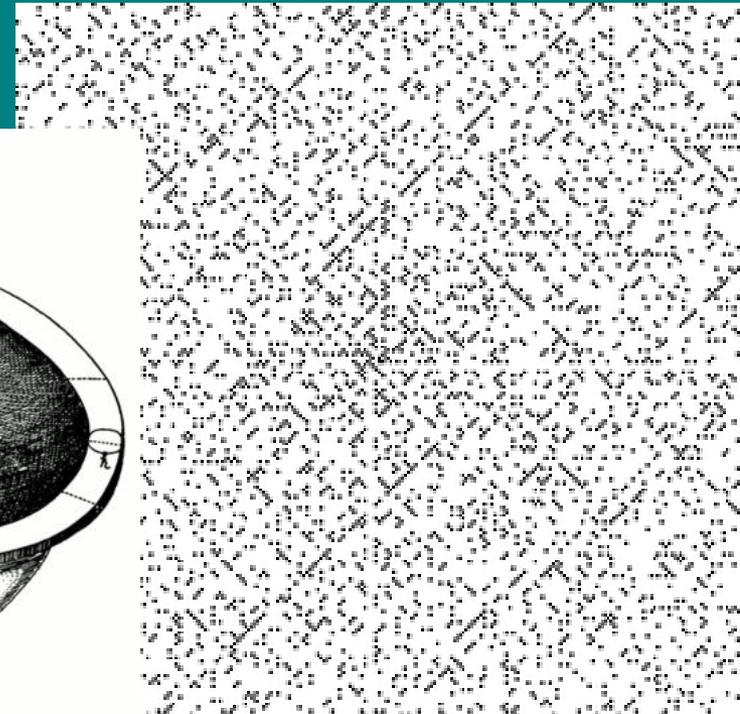
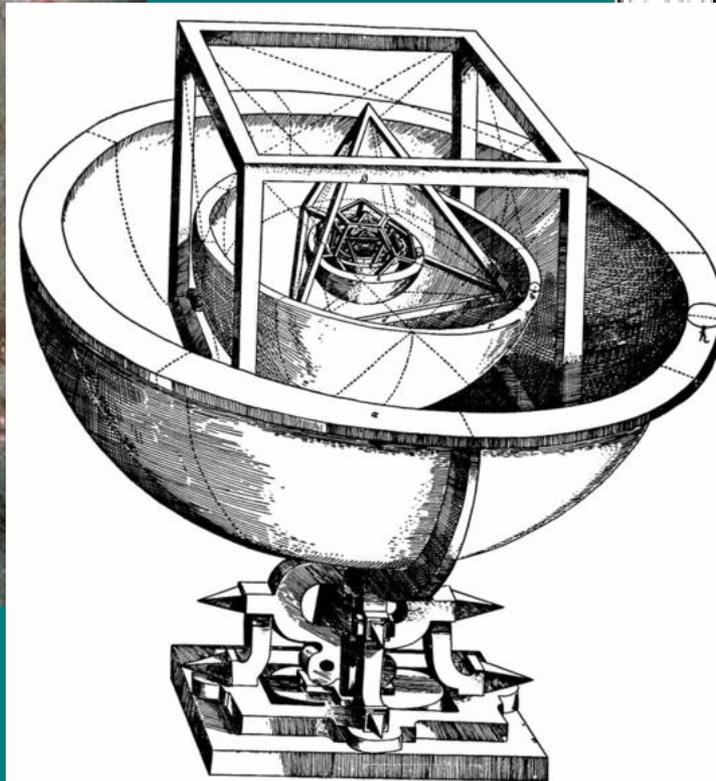
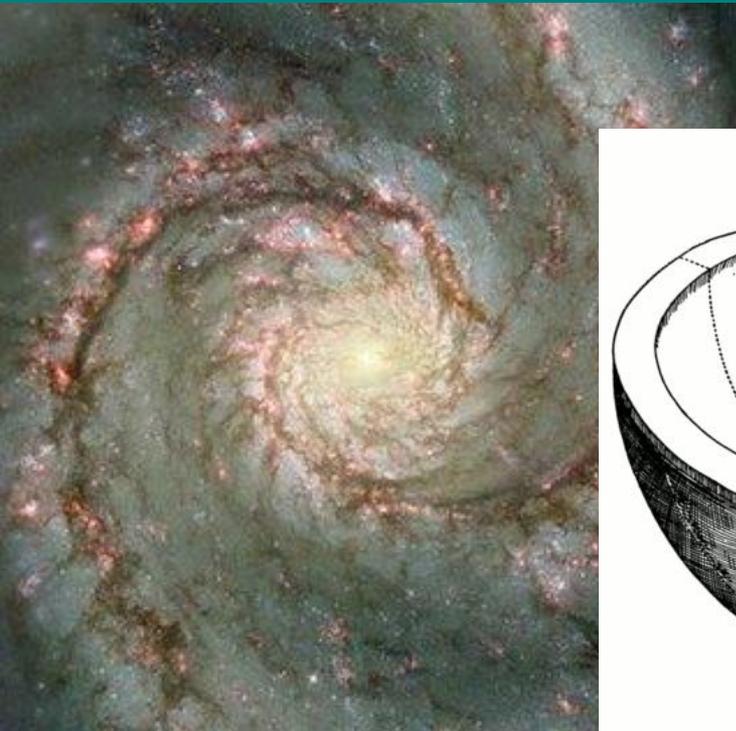
12th grade=calculus



Mathematics:

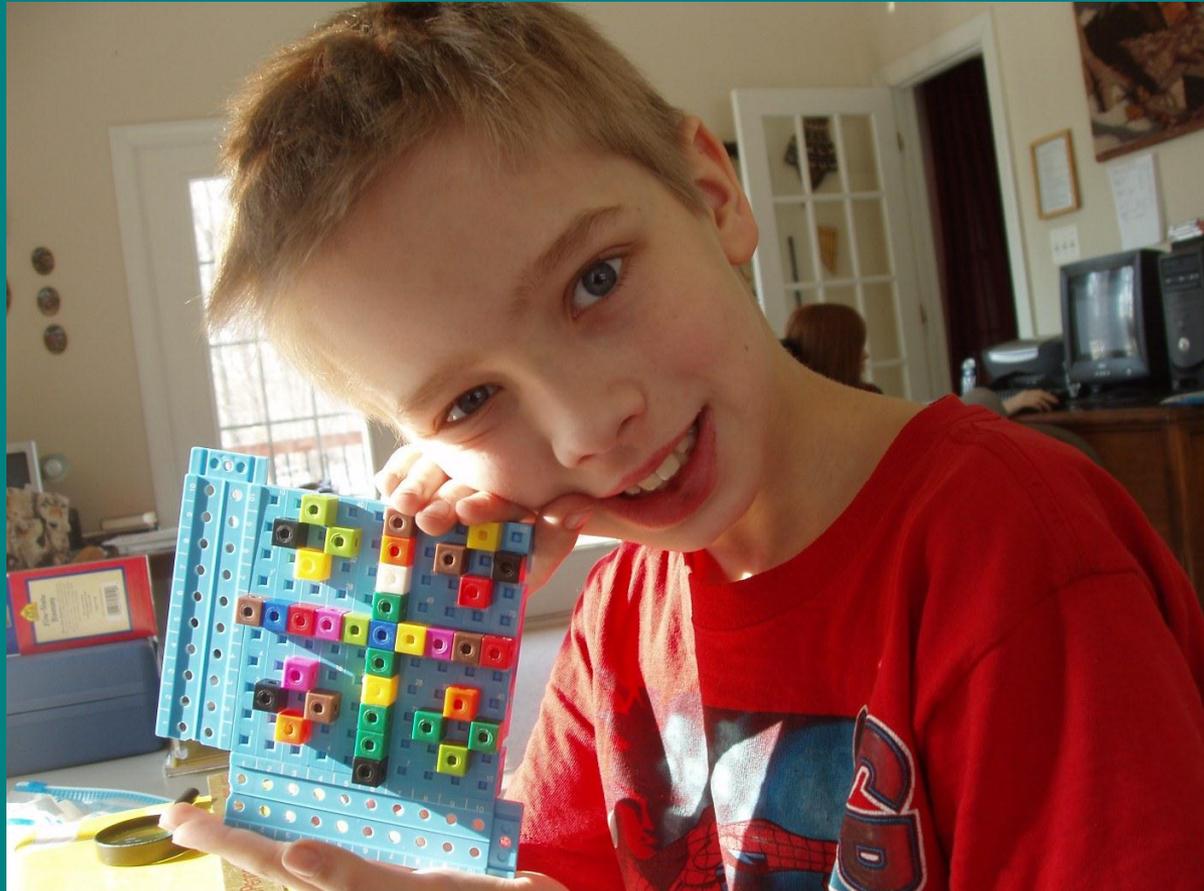


One of God's Beautiful Creations



Ulam spiral of  
prime numbers

# Luke making patterns with his “Weigh To Learn Math” kit



This is the pattern made by the multiples of 6  
on a multiplication table.

# Suggestion

Rotate daily between the two:

- Standard Math

Focus on calculations

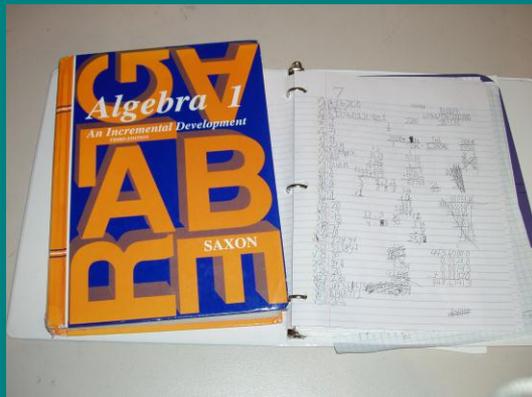
Two lessons, one  
problem set

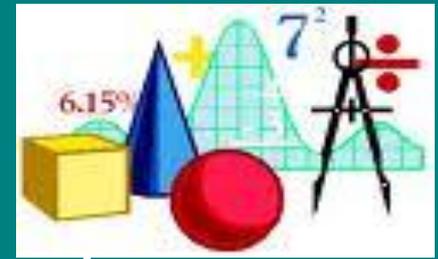
Increase the density,  
decrease the length  
of the program

- Cool Math

Focus on concepts

Have several main  
sources that you turn  
to according to what  
interests you and your  
child at the moment





“Mathematics, like music, needs to be expressed in *physical actions* and *human interactions* before its symbols can evoke the silent patterns of mathematical ideas (like musical notes), simultaneous relationships (like harmonies) and expositions or proofs (like melodies).”

Richard Skemp, *The Psychology of Learning Mathematics*



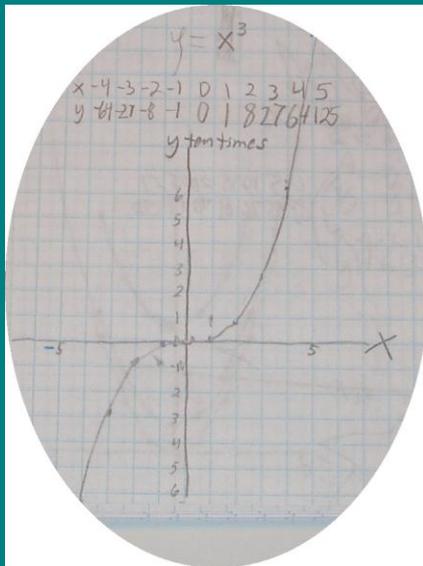
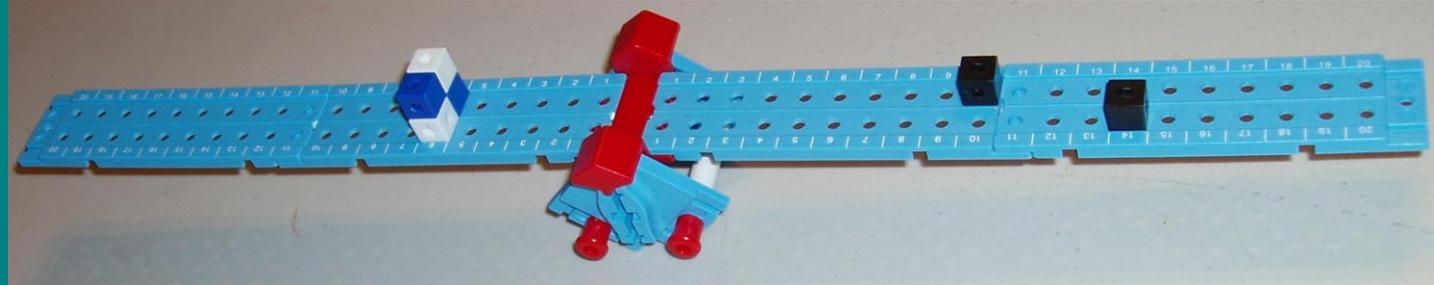
# Something to Think About

“If I had to design a mechanism for the express purpose of *destroying* a child’s natural curiosity and love of pattern-making, I couldn’t possibly do as good a job as is currently being done — I simply wouldn’t have the imagination to come up with the kind of senseless, soul-crushing ideas that constitute contemporary mathematics education.”

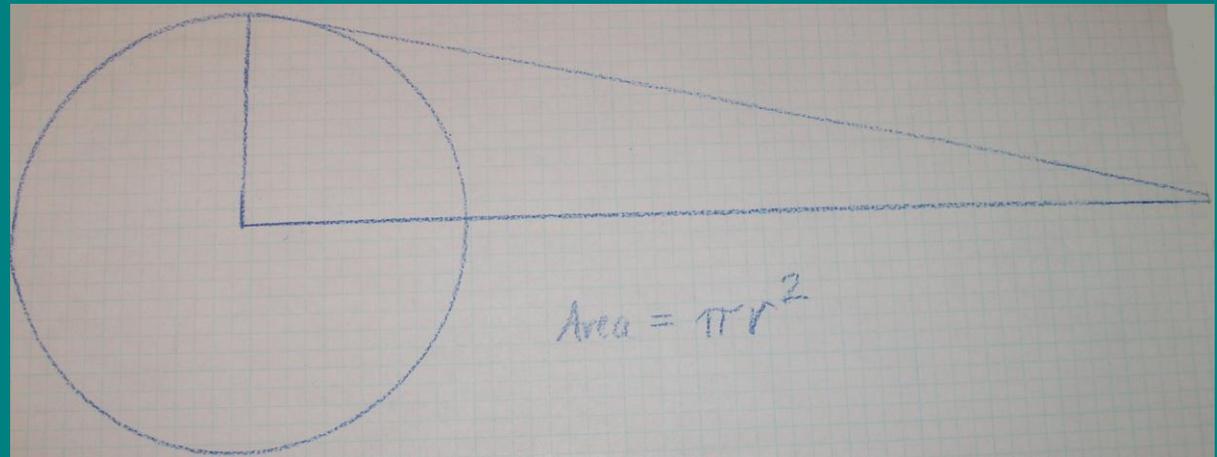
Paul Lockhart, *A Mathematician’s Lament*

# Make it Visual/Tangible

Play with  
manipulatives

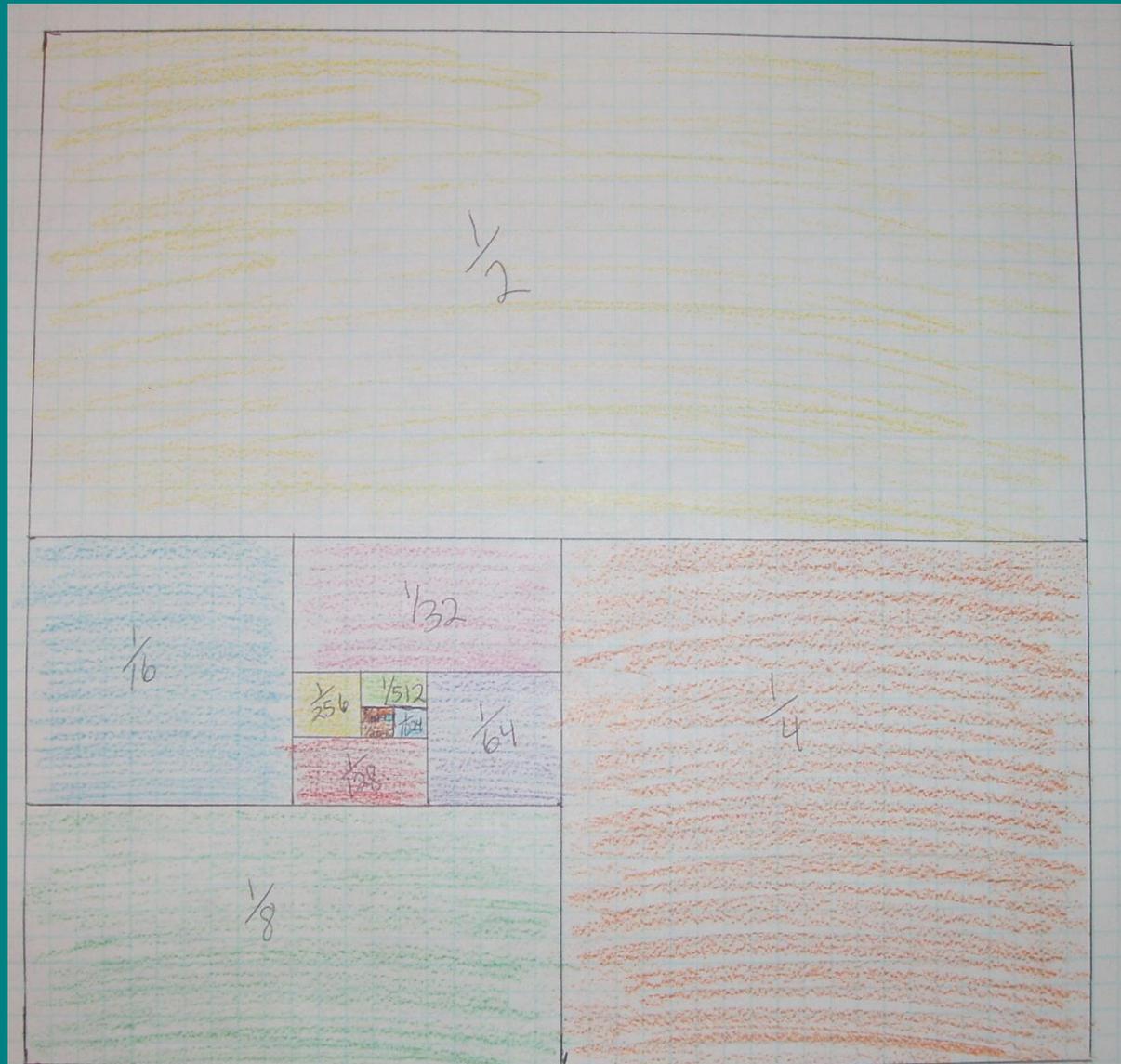


Draw pictures of a concept

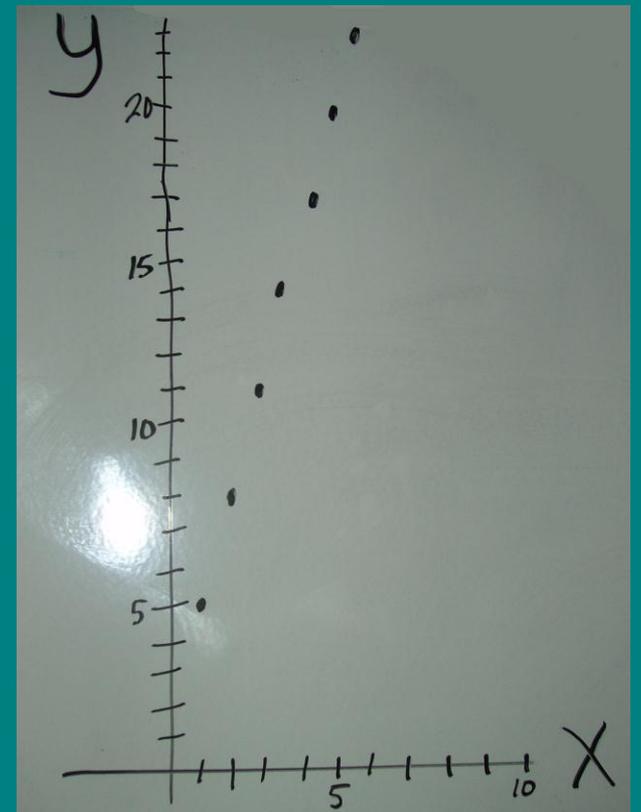


Graph a number series

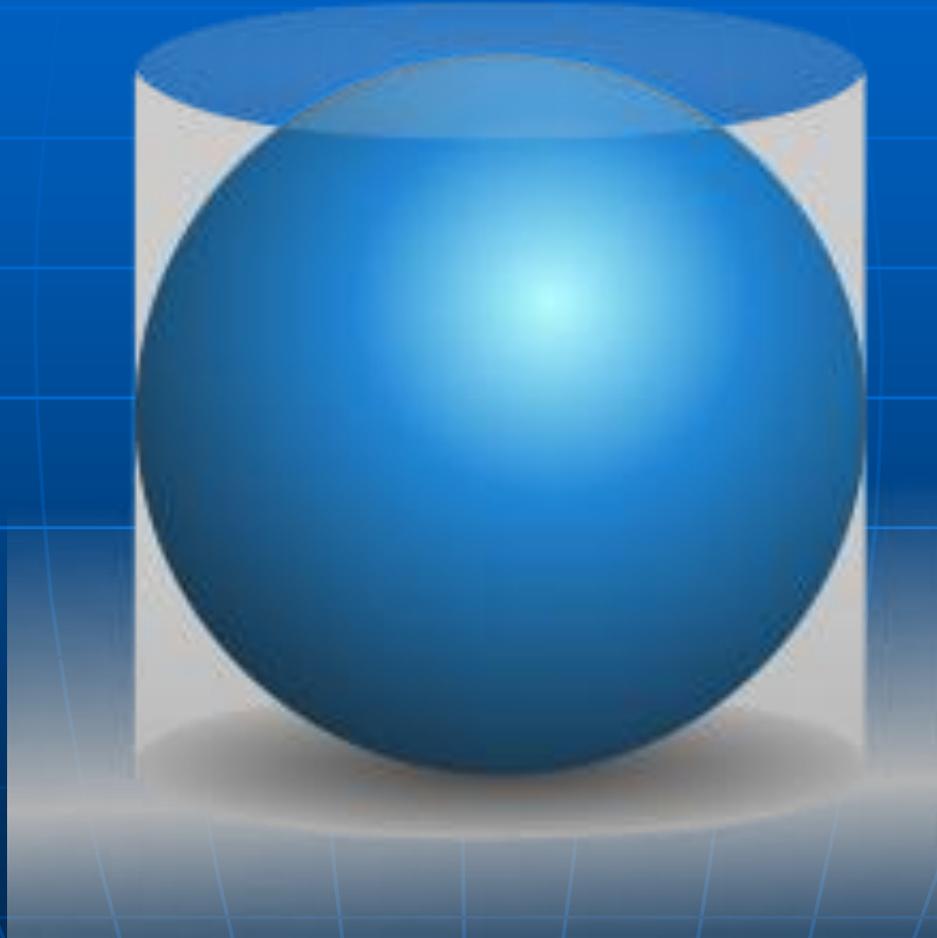
# Calculus for Young People?!



# “Function Machine” Game



# Geometry



# Square and Non-Square Numbers

9



3 threes



4 twos



2 fours



8 units

8

16



4 fours



5 threes



3 fives



15 units

15



5 fives



6 fours



4 sixes

25



24 units

24

# *"Look for Patterns"*

$3^2=9$

$2 \times 4=8$

$1 \times 5=5$

$0 \times 6=0$

$-1 \times 7=-7$

$4^2=16$

$3 \times 5=15$

$2 \times 6=12$

$1 \times 7=7$

$0 \times 8=0$

$5^2=25$

$4 \times 6=24$

$3 \times 7=21$

$2 \times 8=16$

$1 \times 9=9$

$6^2=36$

$5 \times 7=35$

$4 \times 8=32$

$3 \times 9=27$

$2 \times 10=20$

0

1

4

9

16

Will it work for every square number?

# *"Write a Rule"*

Any number squared equals the number one less than itself, times the number one bigger than itself, plus one.

$$n^2 = (n - 1)(n + 1) + 1$$

*"Test it"* (F-O-I-L)

$$n^2 = (n^2 + n + -n + -1) + 1$$

# The “Golden Ratio”



phi (pronounced “fee”)

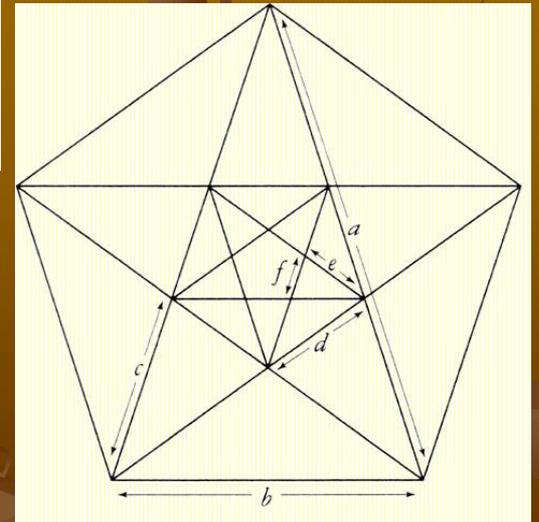
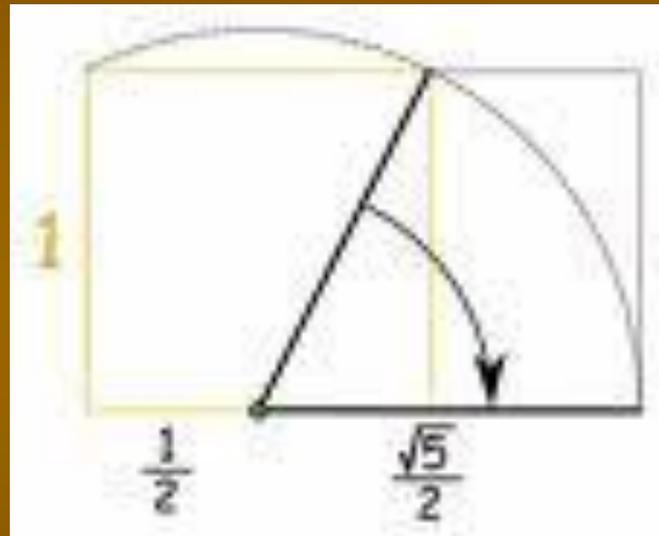
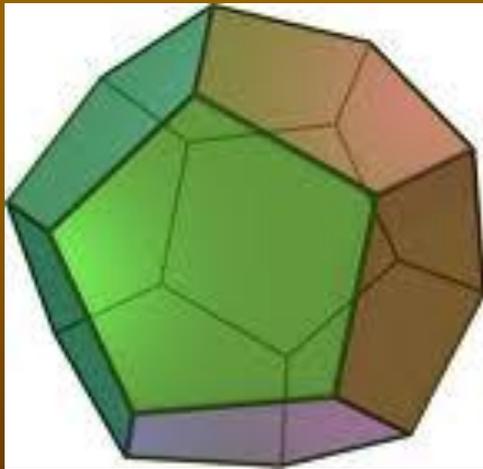


“A straight line is said to have been cut in extreme and mean ratio when, as the whole line is to the greater segment, so is the greater to the lesser.”

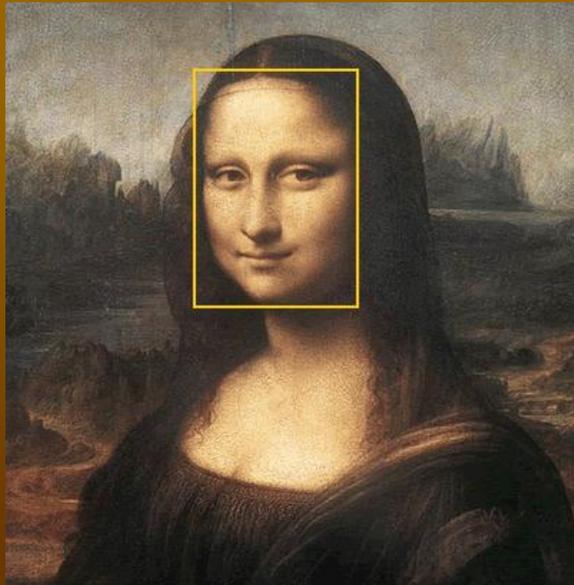
Elements, Euclid of Alexandria, 300 B.C.

# Golden Ratio in Geometry

1.6180339887498948482...

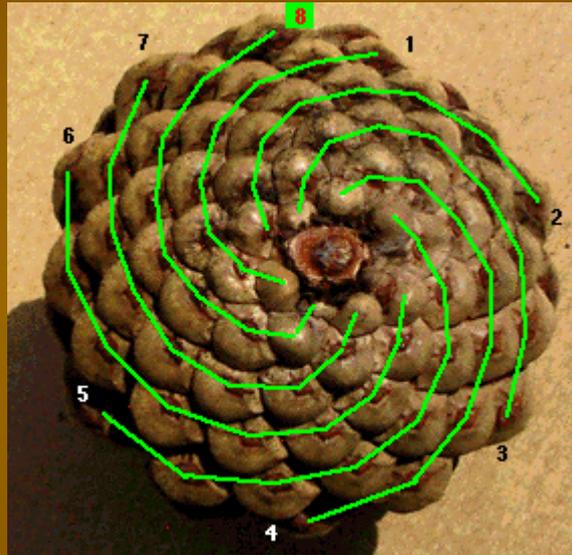


# The Golden Ratio is Everywhere

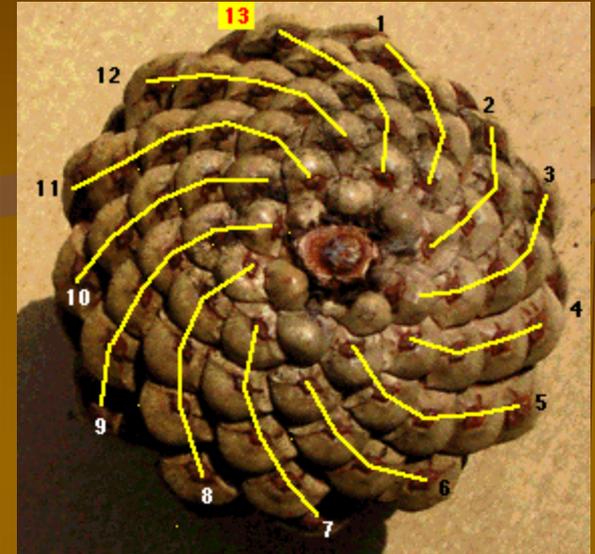




Just an ordinary pinecone

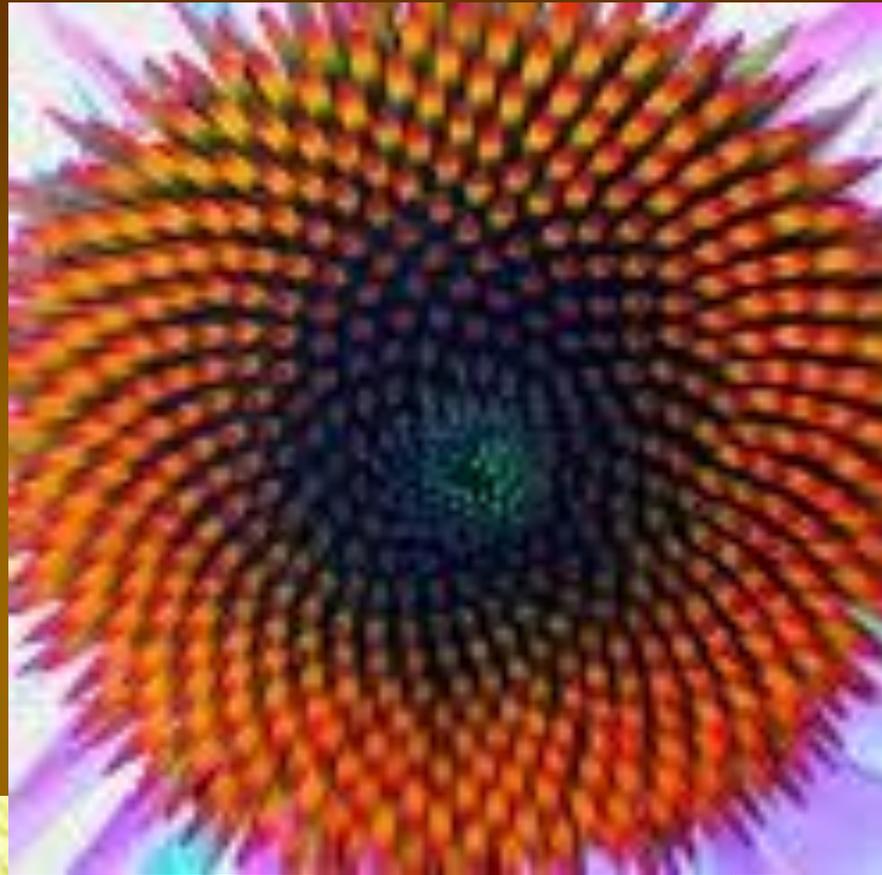


with eight spirals going clock-wise,



and thirteen going counter-clockwise.

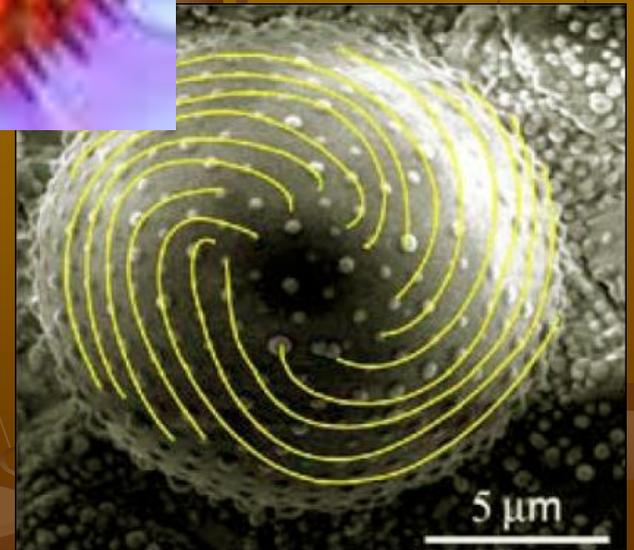
21:34



8:13



13:21



# Fibonacci Series

0 1 1 2 3 5 8 13 21 34 55 89 144 233

$$1/1 = 1$$

$$1/2 = 0.5$$

$$2/3 = 0.666\dots$$

$$3/5 = 0.6$$

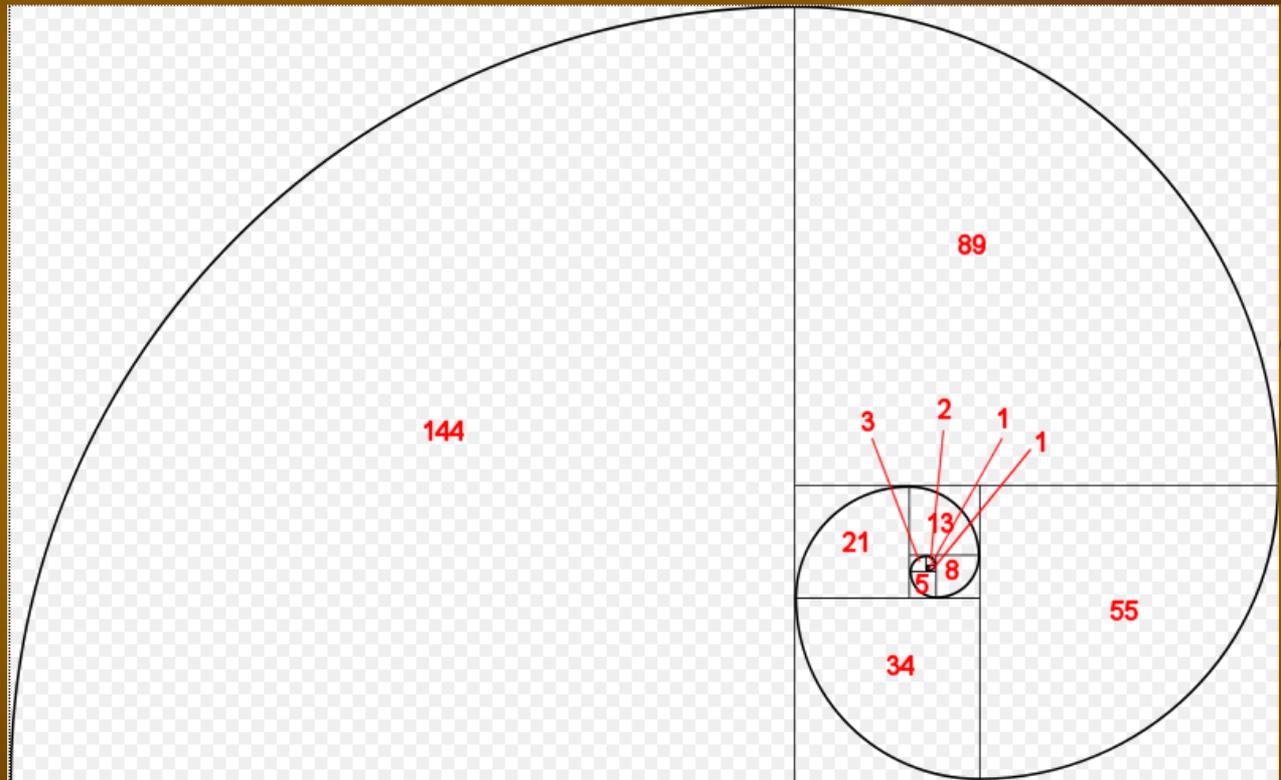
$$5/8 = 0.625$$

$$8/13 = 0.615\dots$$

$$13/21 = 0.619\dots$$

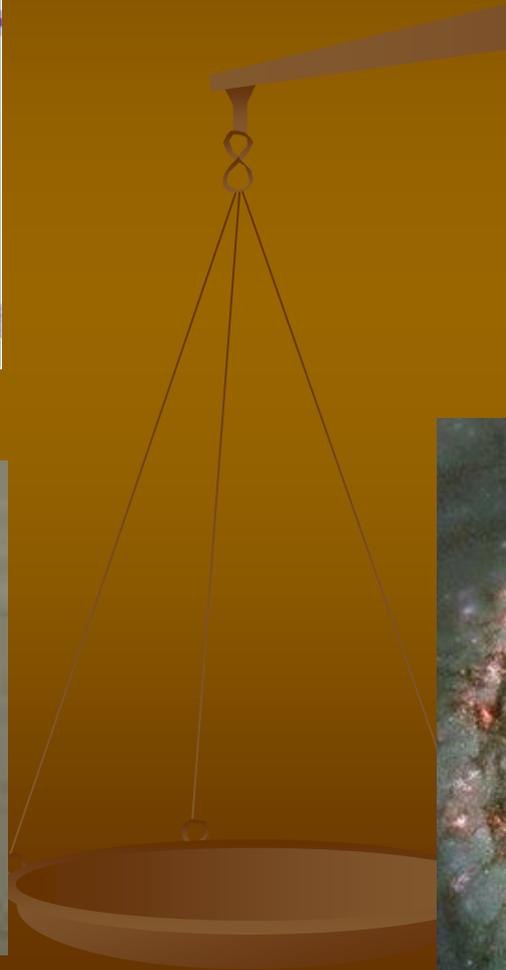
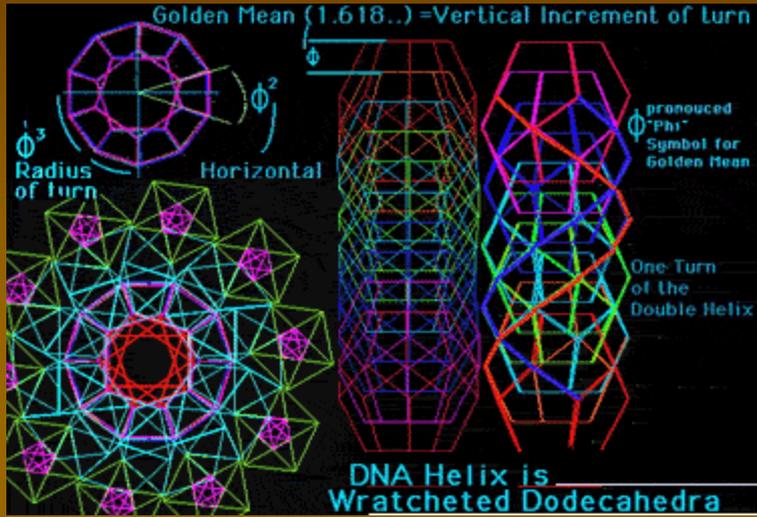
$$21/34 = 0.617\dots$$

$$34/55 = 0.618\dots$$



**THE GOLDEN RATIO** 1.6180339887498948482...

# Logarithmic Spiral based on the Golden Ratio



# Frequencies of Musical Notes



**1, 2, 3, 5, 8.....**

