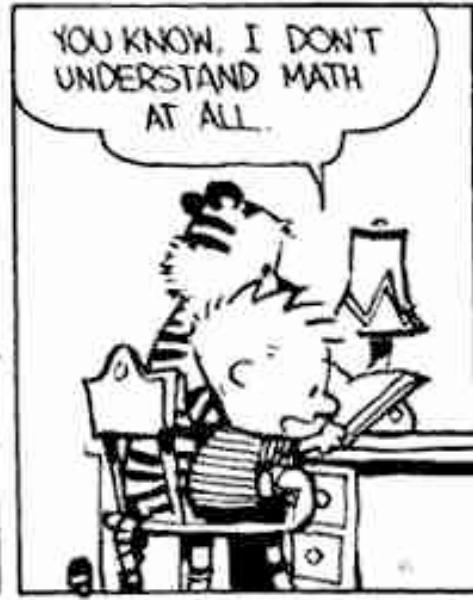
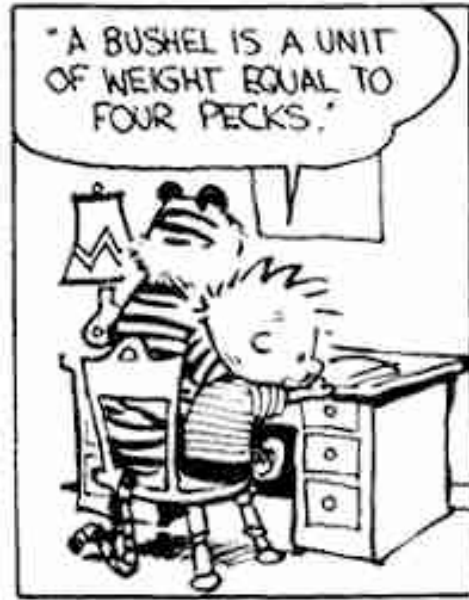


Math Fun For Everyone!

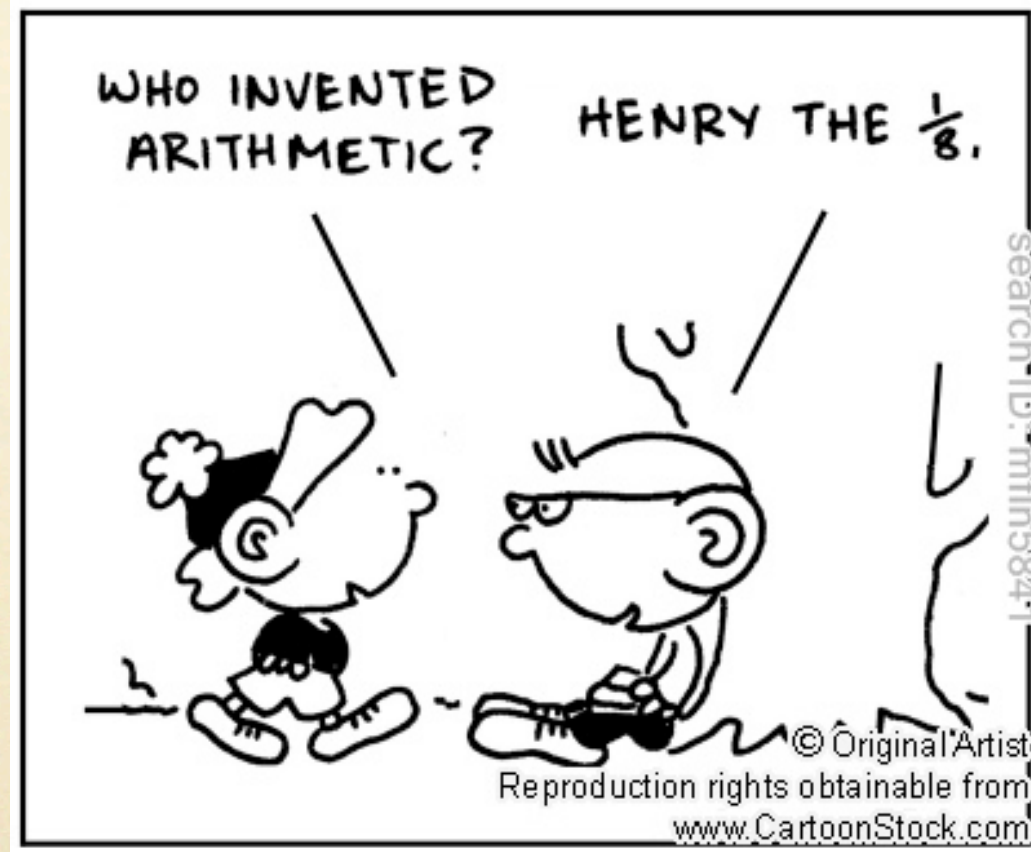


Mini Math Attitude Inventory

1. I liked Math... A. A Lot B. A Little C. Not at All
2. My Math Ability was... A. Pretty Good B. Average C. Poor
3. Which Describes Math? A. Fun B. Hard C. Interesting
D. Logical E. Satisfying F. Frustrating G. Useless

ARITHMETIC

The branch of
Mathematics
Dealing with the
Properties of and
Calculations with
Numbers



SOMETHING FROM ARITHMETIC

Is Your Name Worth a Dollar?



How do you think we could find out?

A B C D E F G H I J K L M

1¢ 2 3 4 5 6 7 8 9 10 11 12 13¢

N O P Q R S T U V W X Y Z

14¢ 15 16 17 18 19 20 21 22 23 24 25 26¢

Add up the values of the letters to find out what your name is worth.

P H A R E S

$$16+8+1+18+5+19 = 67¢$$

JUST FOR FUN WE COULD...

1. See if anybody at Luther Oaks has a name that is a \$1 word.

Daughenbaugh 99¢ Rollins 99¢

Phillips, Schmucker, Murphy; 101¢

Trefzger 105¢

2. Find a \$1 word, or a 5 or 4-letter \$1 word

quarter, mitten, cookout, contented, chimpanzee,
doubleheader, Afghanistan

3. Create a \$1 word sentence

Inefficient, immature, botanist permits
inapplicable insecticide boycott.

Let's Try to Find a Five-Letter \$1 Word!

What do we know about the average value of each letter in a five-letter \$1 word?

20¢

So we are going to need some pretty high value letters. Let's just choose a few.

Z₂₆ Z₂₆

Y₂₅

Hmmm. That adds to 77 already. We only need 23 more.

How about a vowel? We could try high-valued U₂₁

So we have Z₂₆, Z₂₆, Y₂₅, U₂₁, and we're up to 98¢

Do you see a 5-LETTER \$1 word?

BUZZY

A 4 Letter \$1 Word?

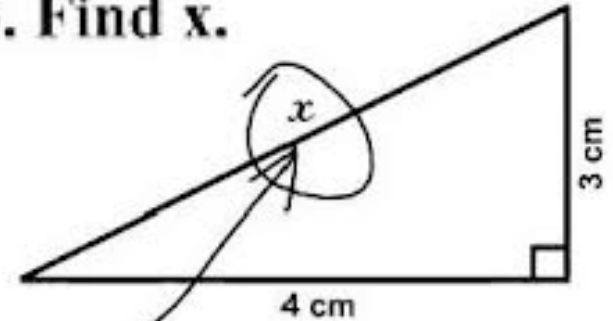
Two More: **NUTTY** **PUSSY**

W₂₃ X₂₄ Y₂₅ Z₂₆

ALGEBRA

The part of Mathematics in which letters are used to represent numbers and quantities in formulas, equations, and functions.

3. Find x .



Here it is

(x, why?)

Say, Cube, do you consider yourself to be religious?

I believe there are higher powers than us, if that's what you mean.



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SOMETHING FROM ALGEBRA

You use your shoe size,
not known to me, do a
little calculation, which I
won't see, and give me
the final answer.
I'll tell you your shoe size
and your age. OK?



Start with your shoe size. 9

Multiply by 5 45

Add 50 95

Multiply by 20 1900

Add 1015 2915

Subtract the year you were born

$$2915 - 1934 = 981$$

Had a birthday earlier in 2017, add 2: 983

Birthday coming up in 2017, add 1: 982

Start with your shoe size. s

Multiply by 5 $5s$

Add 50 $5s + 50$

Multiply by 20 $20(5s + 50)$

$100s + 1000$

Add 1015 $100s + 2015$

Subtract the year you were born

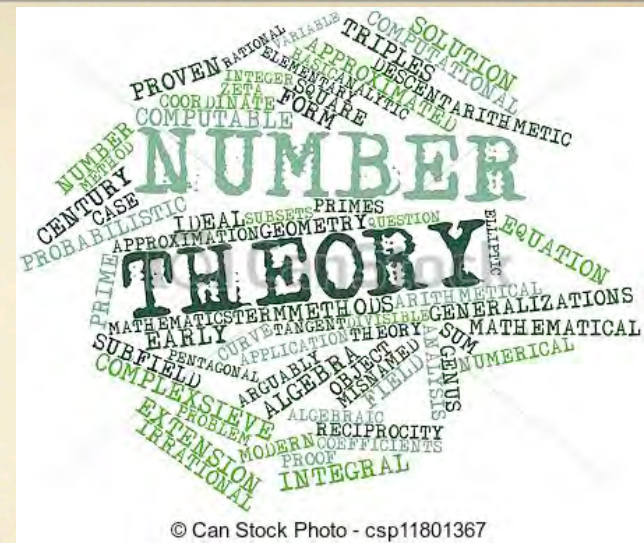
$100s + 2015 - 1934$

$100s + 81$

Add 2(BD Earlier) or 1(Later) 983 or 982

NUMBER THEORY

Number theory is a field of mathematics sometimes called "higher arithmetic," consisting of the study of the properties, patterns, and relationships among whole numbers.



© Can Stock Photo - csp11801367

Only **1**, **2**, and **3** (and **6**)
divide evenly into **6**

$$1 + 2 + 3 = 6 \quad \text{PERFECT}$$

Only **1** and **7** divide
evenly into **7** **PRIME**

SOMETHING FROM NUMBER THEORY

- Who was Fibonacci?

Leonardo Pisano (Leonardo of Pisa) (right), better known as Fibonacci, was an Italian mathematician who is most famous for his **Fibonacci Sequence** and for popularizing the Hindu-Arabic numeral system in Europe.

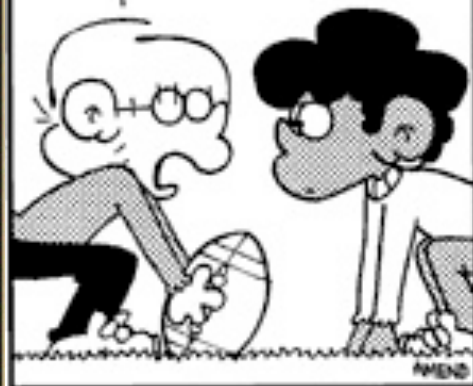


Fibonacci

- What are the next 3 terms of the Fibonacci Sequence?

1, 1, 2, 3, 5, 8, 13, 21, 34, ...

HUT 0!
HUT 1!
HUT 1!
HUT 2!



HUT 3!
HUT 5!
HUT 8!
HUT 13!

IS IT THE
FIBONACCI
SERIES?



CORRECT!
TOUCHDOWN,
MARCUS!



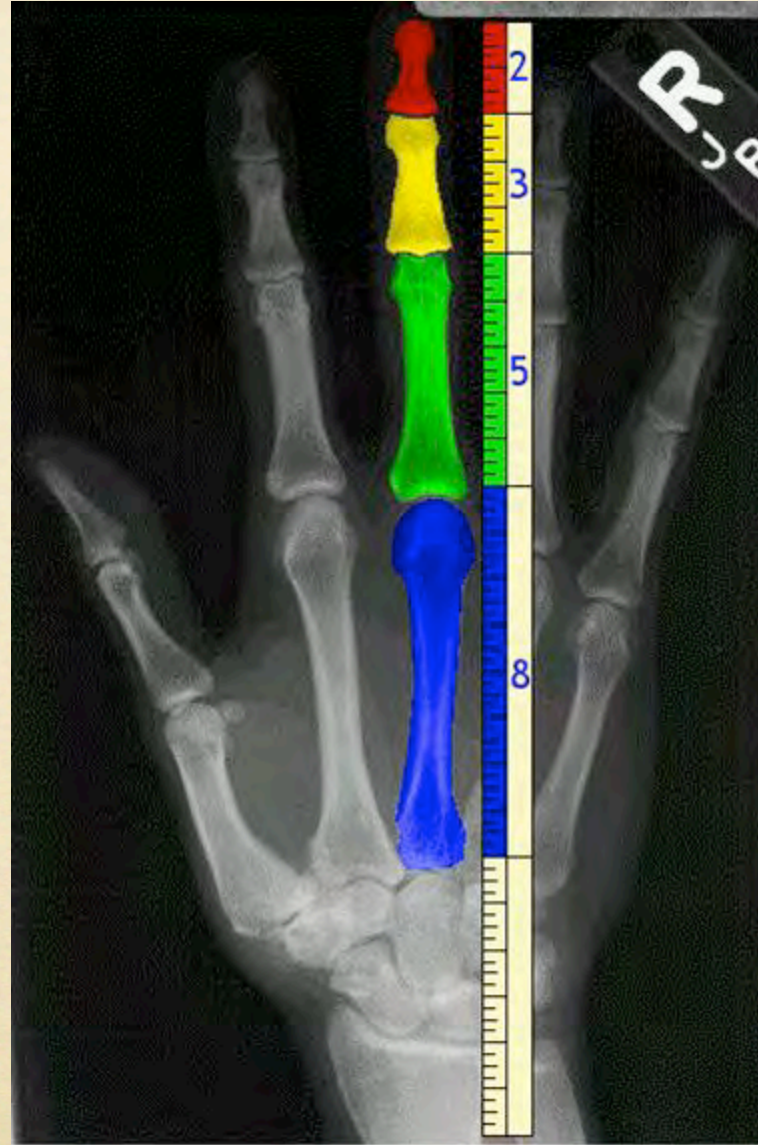
WOO-
HOO!



WE'RE HUT 3!
SICK OF HUT 0!
FOOTBALL HUT 2!
FAVOR- HUT 3!
ING THE HUT 2!
BRAVNY. HUT 5!

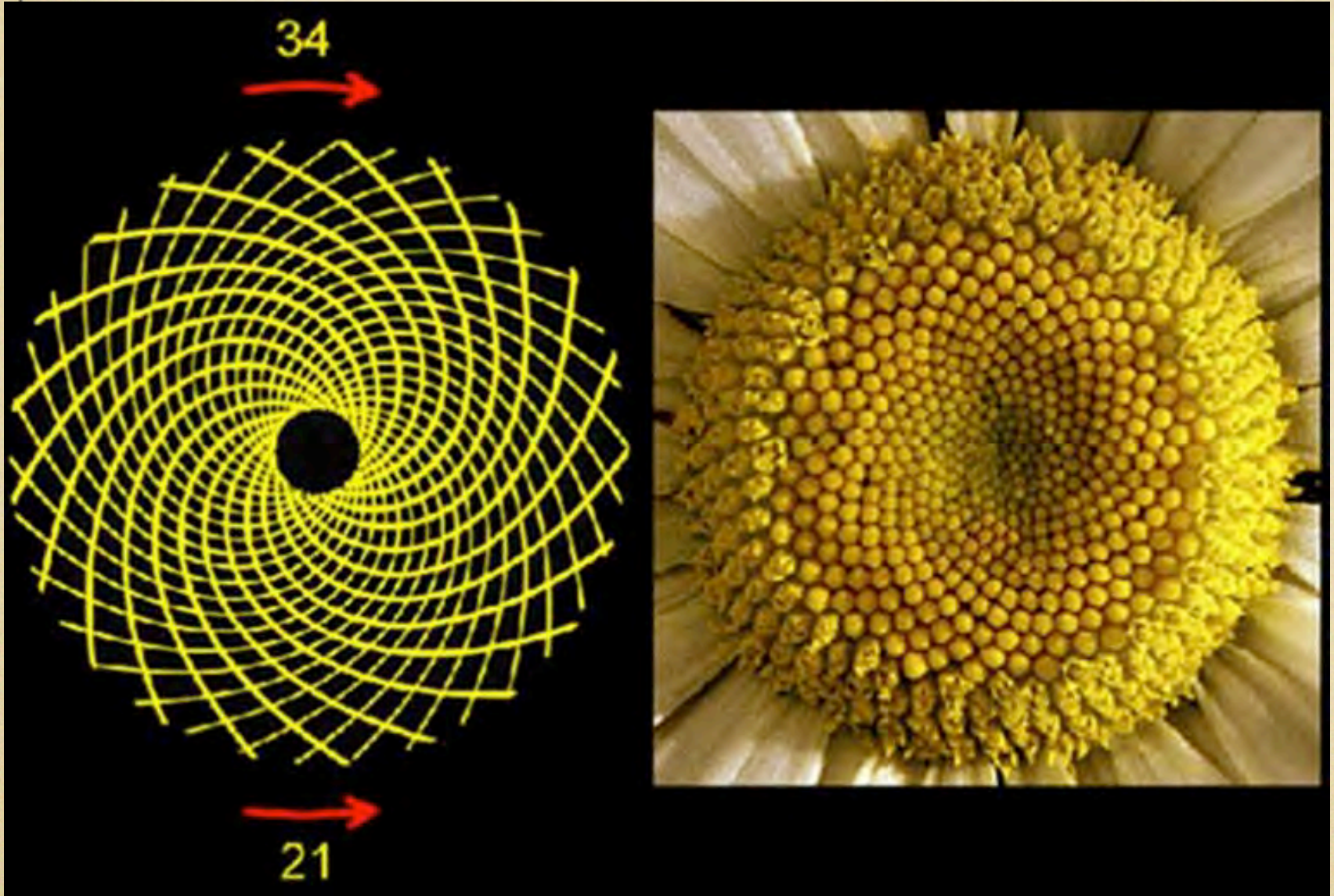


The Fibonacci Sequence in Nature- Humans(cm)

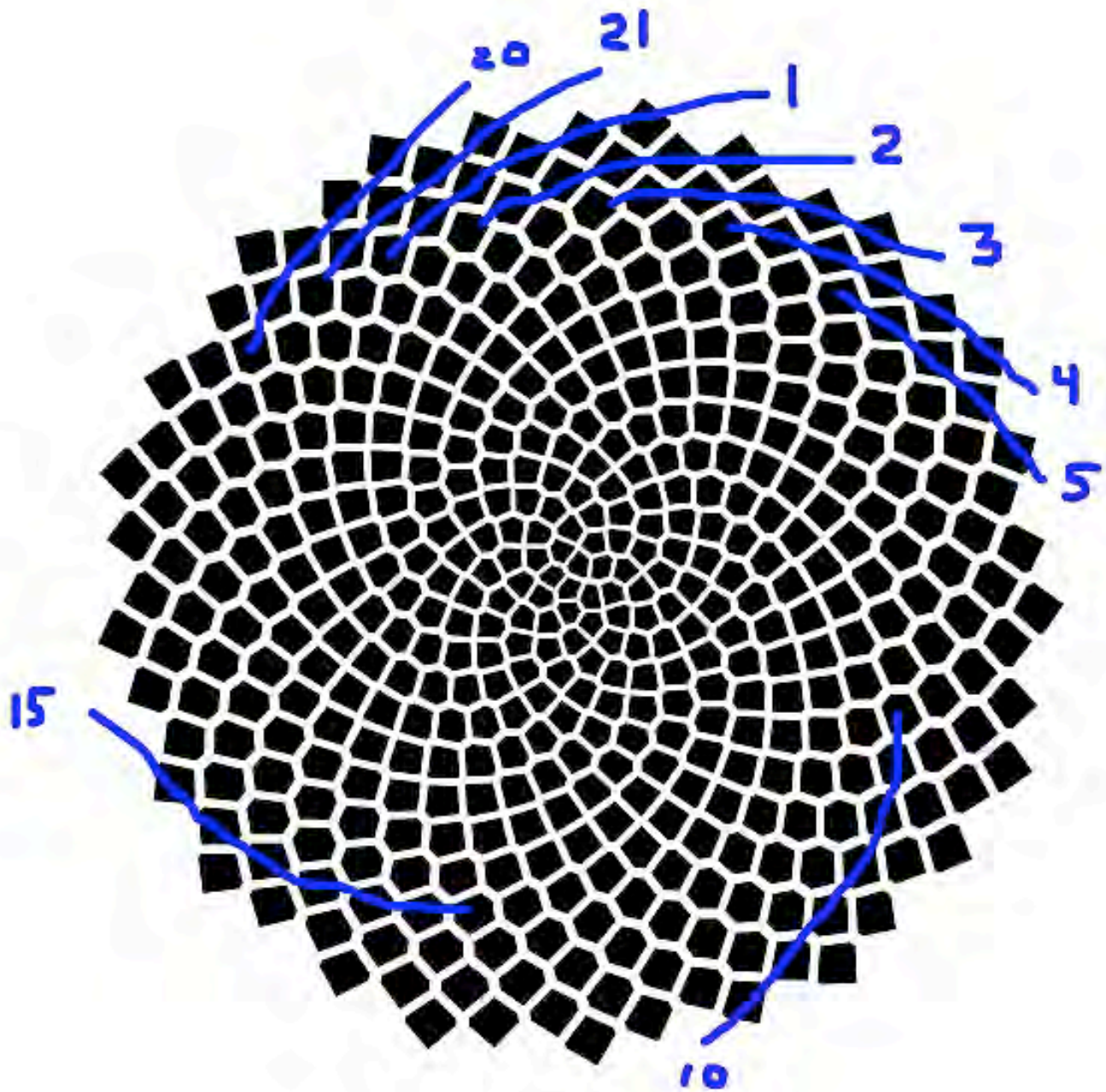


1, 1, 2, 3, 5, 8, 13, 21, 34, 55

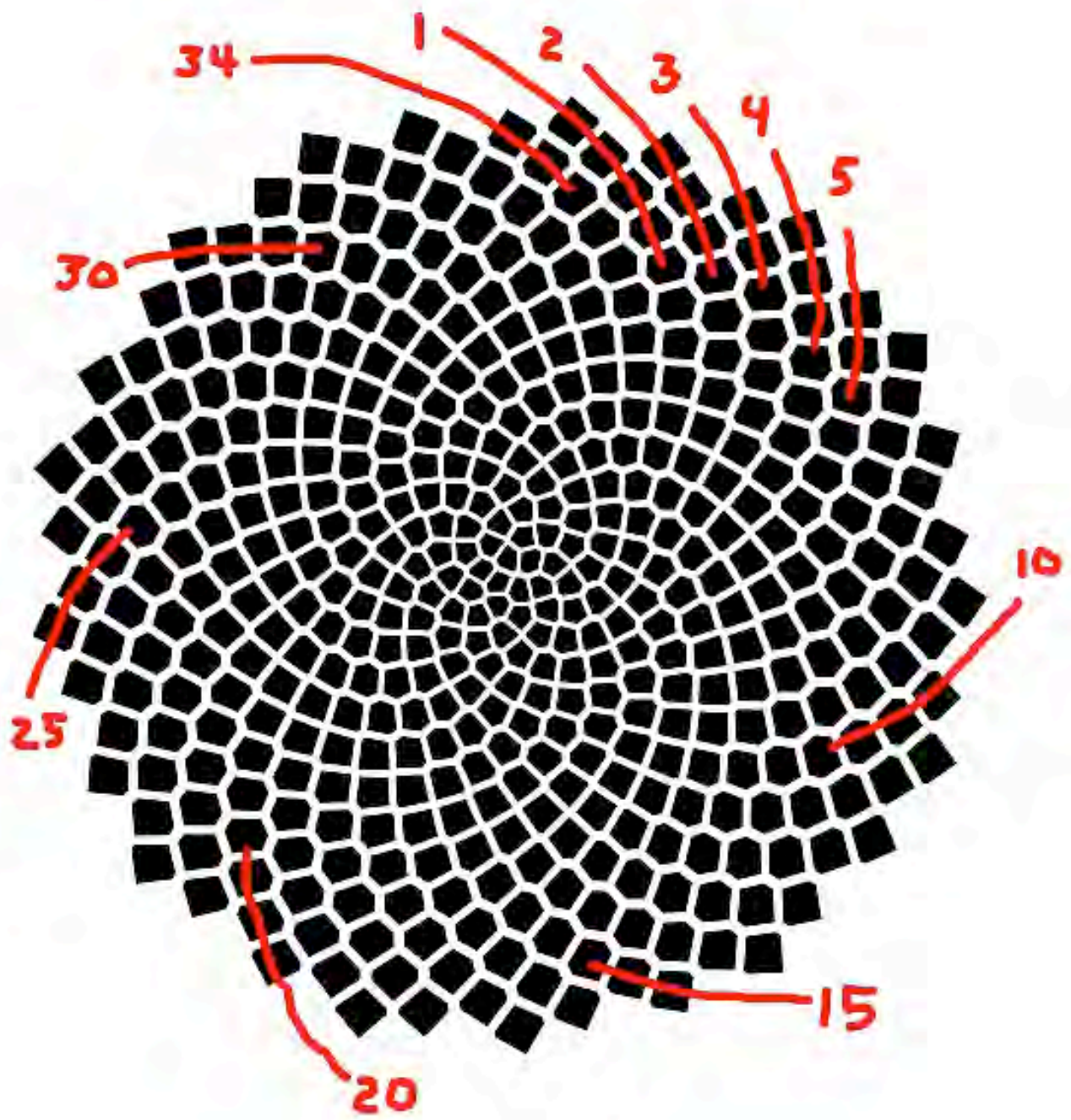
The Fibonacci Sequence in Nature- Sunflowers



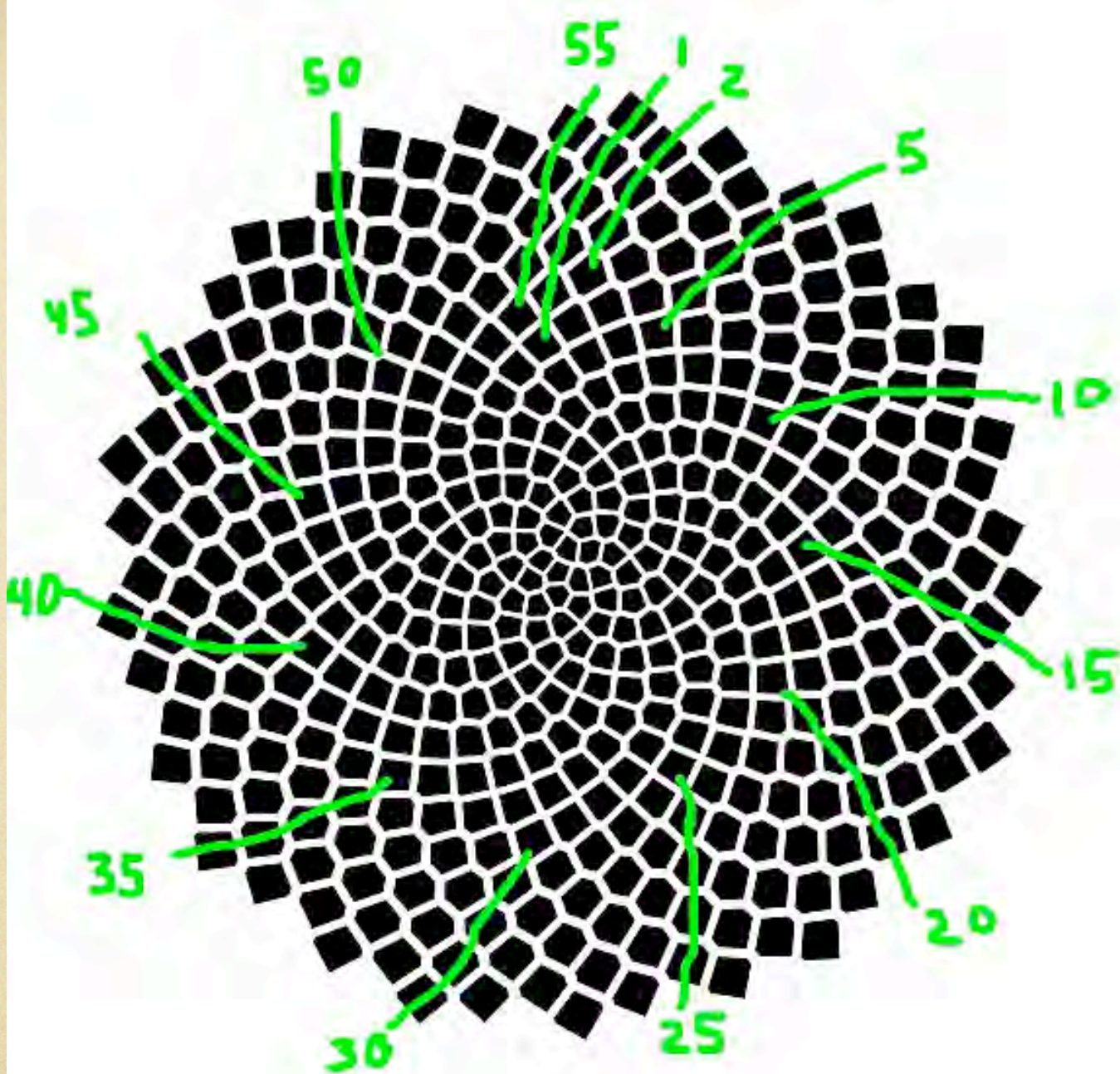
1, 1, 2, 3, 5, 8, 13, 21, 34, 55



1, 1, 2, 3, 5, 8, 13, 21, 34, 55

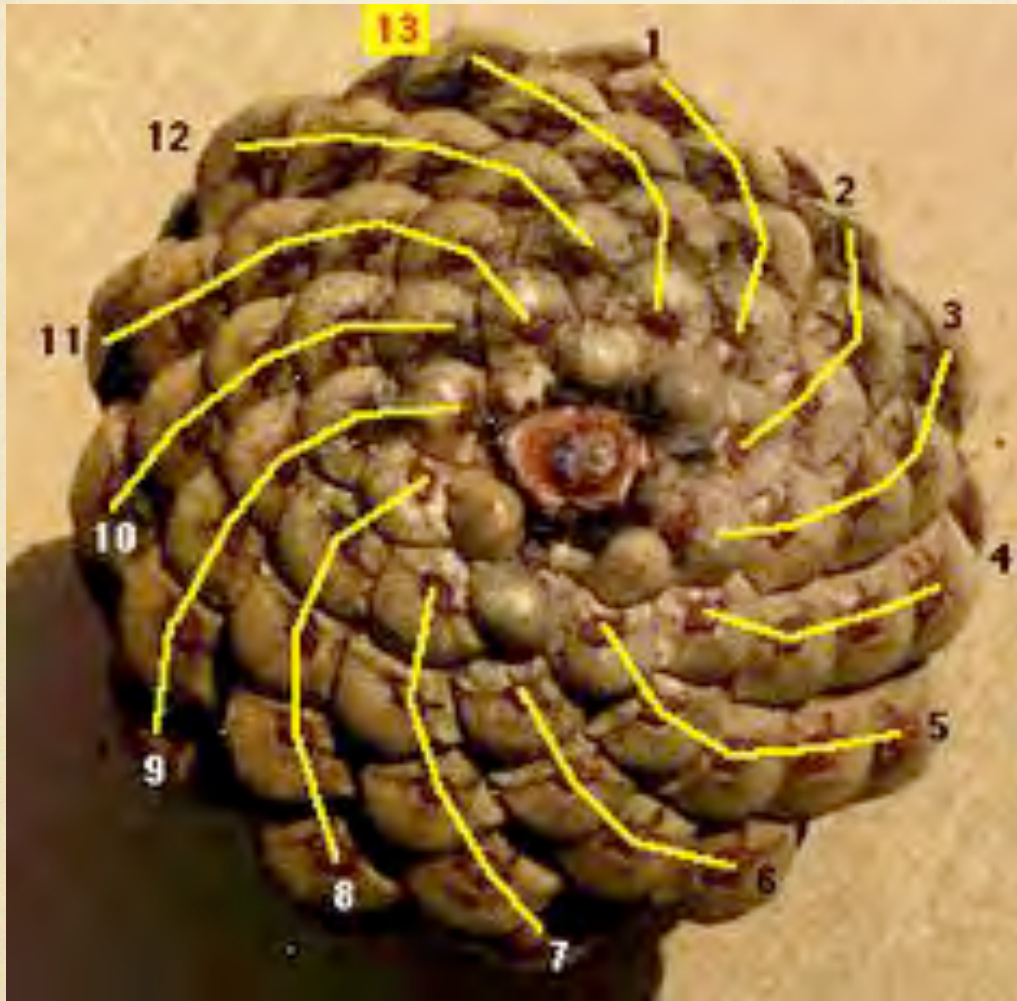


1, 1, 2, 3, 5, 8, 13, 21, 34, 55



1, 1, 2, 3, 5, 8, 13, 21, 34, 55

The Fibonacci Sequence in Nature- Pine Cones



1, 1, 2, 3, 5, 8, **13**, 21, 34, 55

The Fibonacci Sequence in Nature- Flower Petals

1



2



3



5



8



13



21



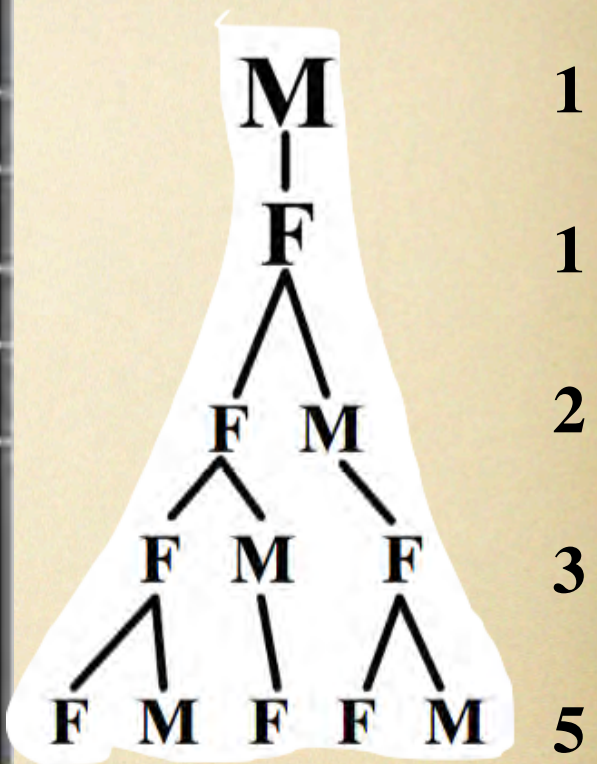
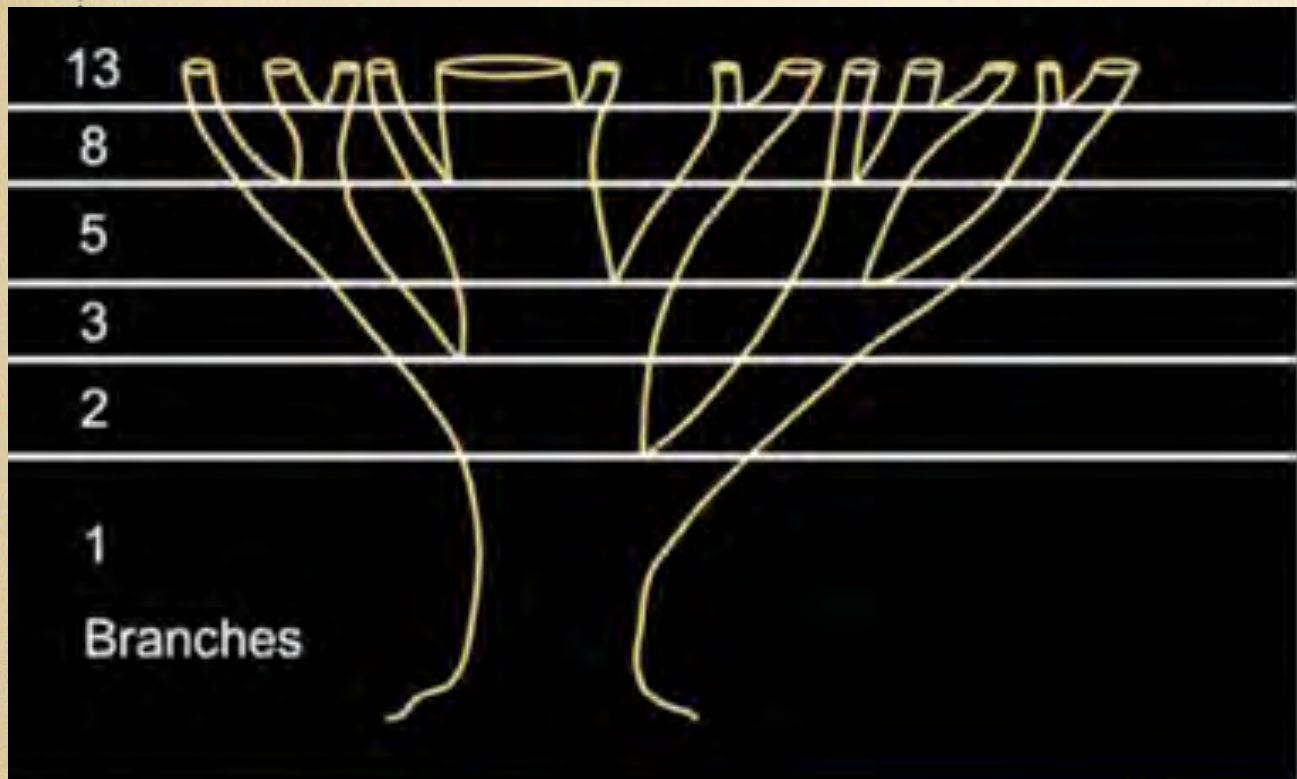
34



(Figure 3: Fibonacci Numbers and Petals of Flowers)

1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89

The Fibonacci Sequence in Nature- Trees & Bees



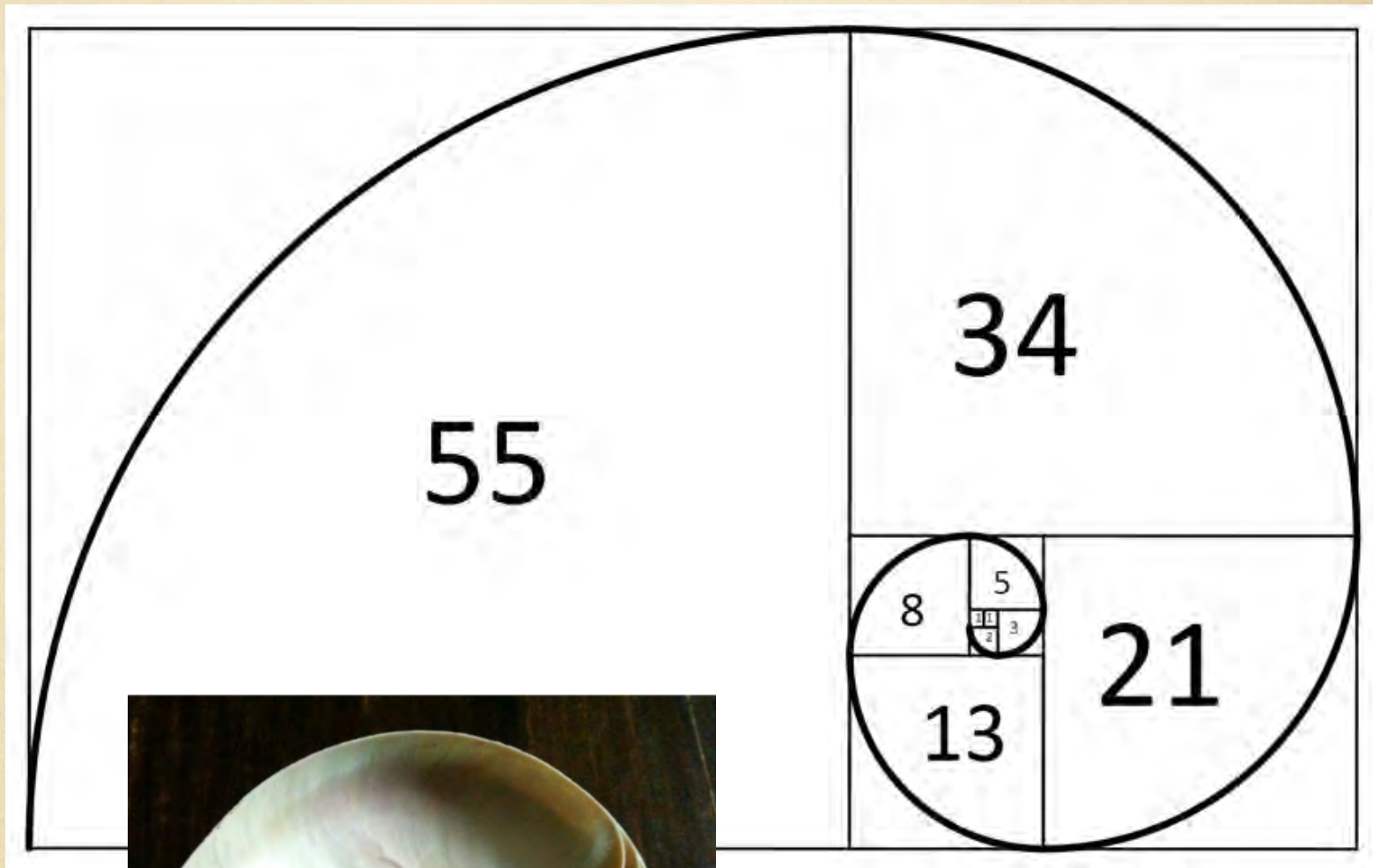
Female Bees can produce with or without a male!



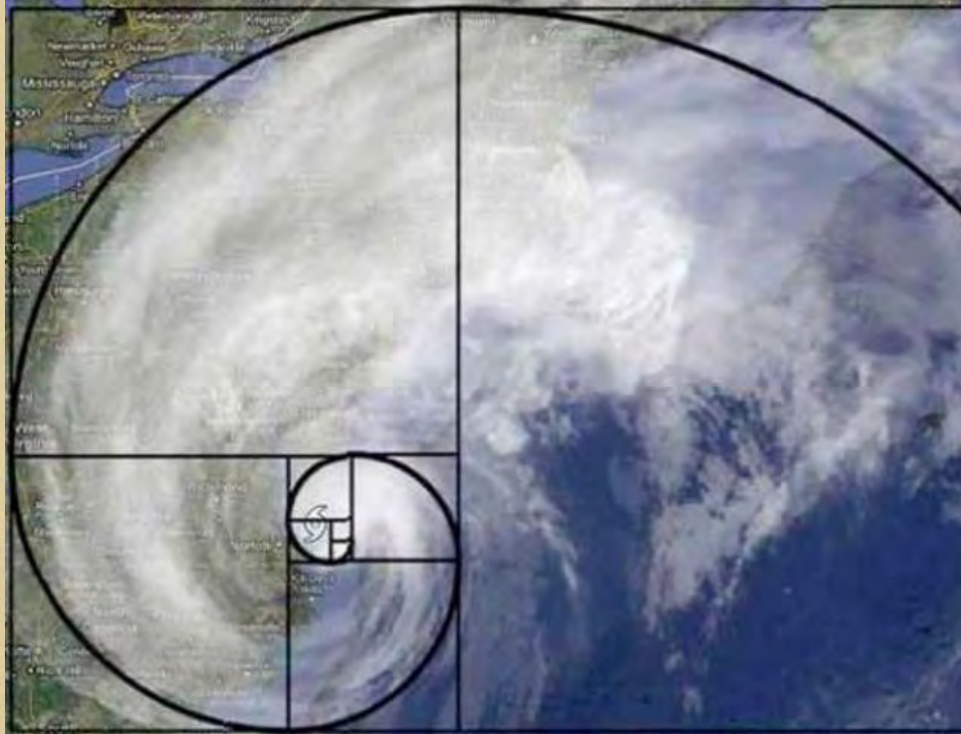
Funfertilized → **M**ale

Ffertilized by male → **F**emale

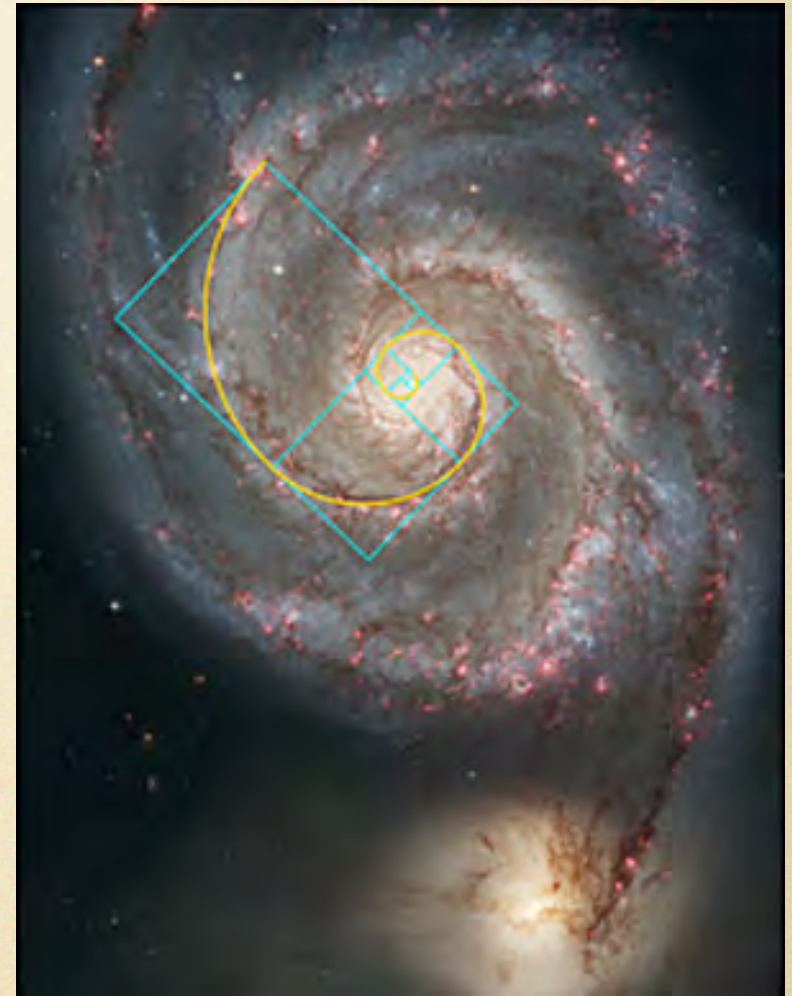
The Fibonacci Sequence/Spiral in Nature- Shells



The Fibonacci Spiral in Nature

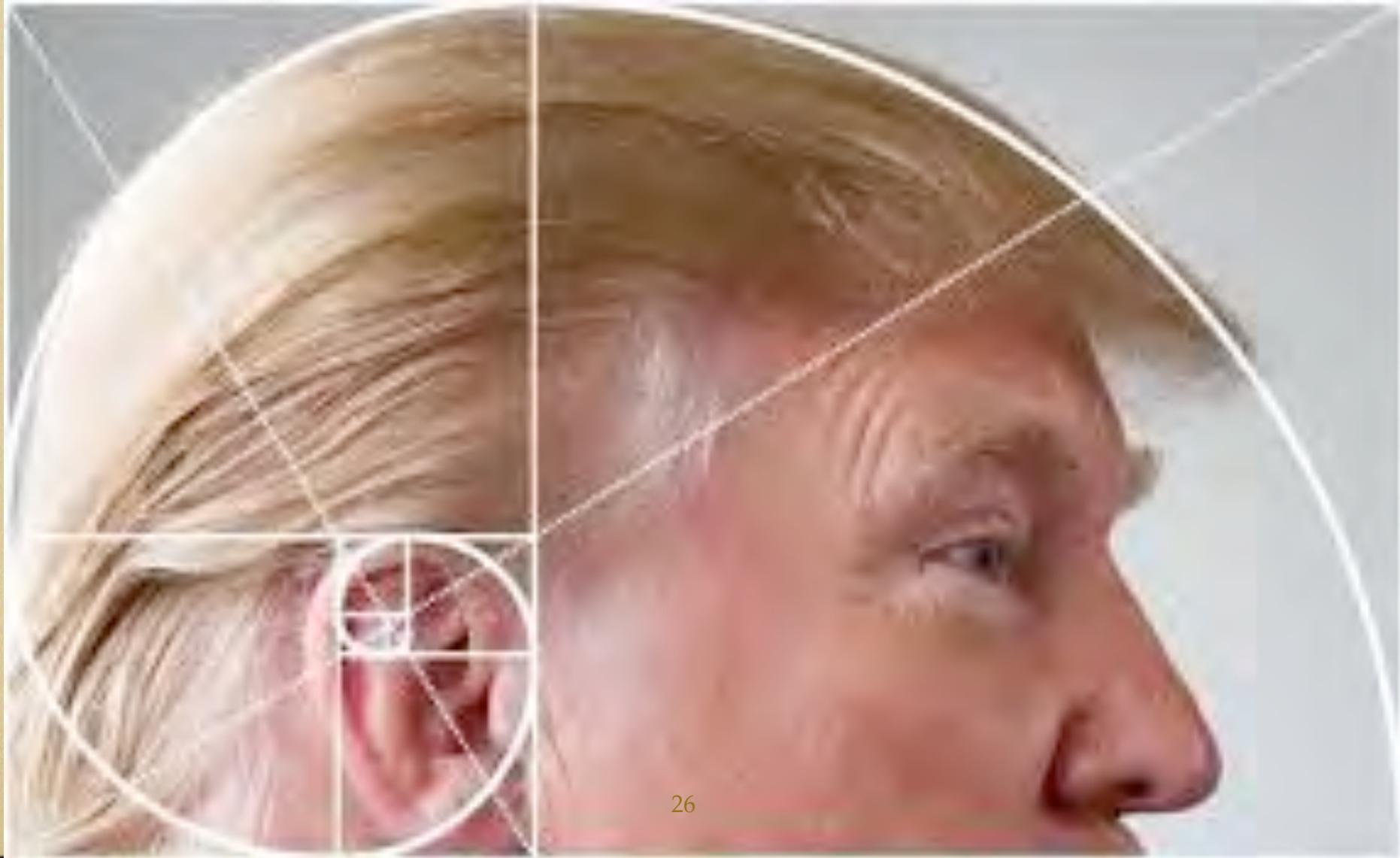


Aerial View of a
Hurricane



Telescopic View of a
Galaxy

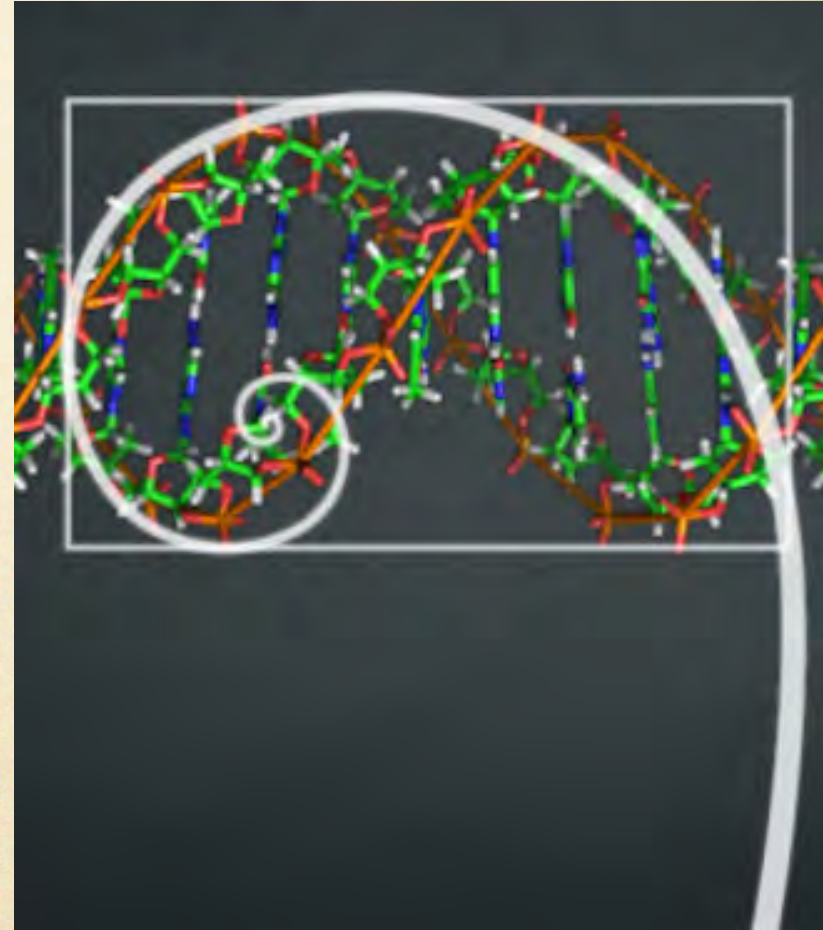
The Fibonacci Sequence in Nature- Where You Least Expect It!



The Fibonacci Spiral in Life /Living Things

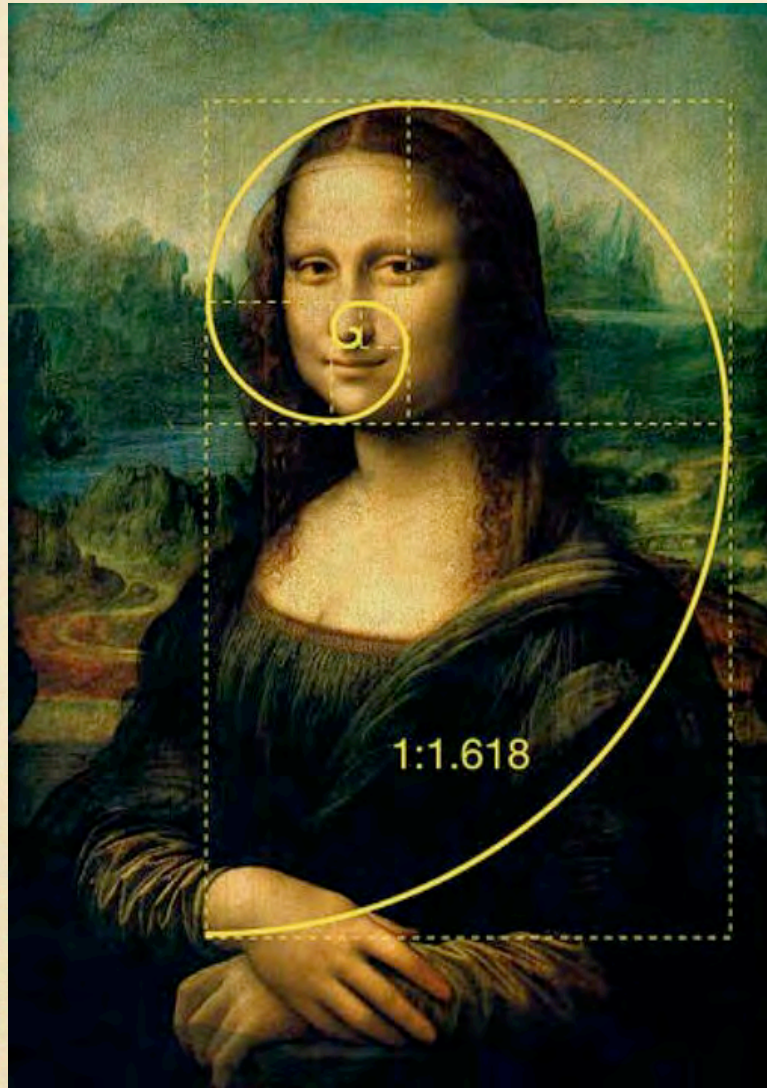


Proboscis of a
Sap-Feeding
Butterfly



Double Helix
DNA Spiral

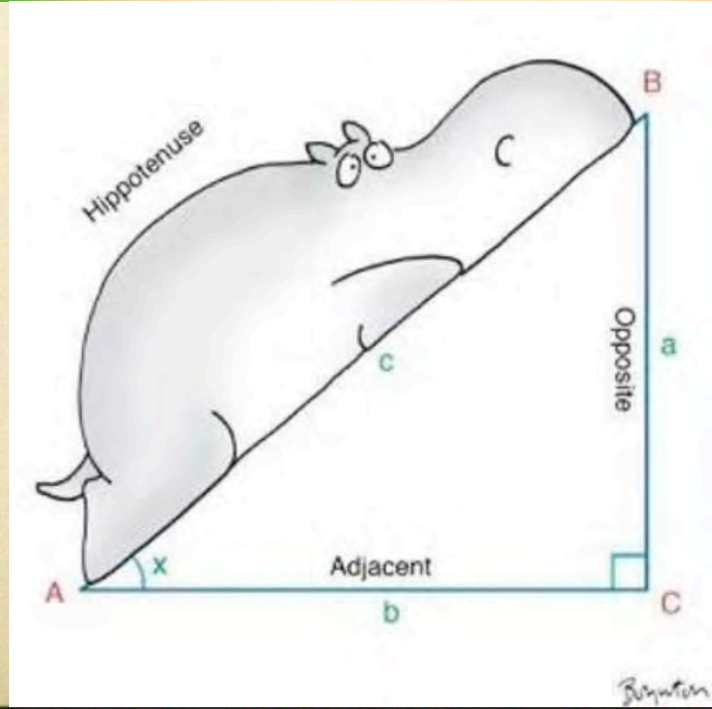
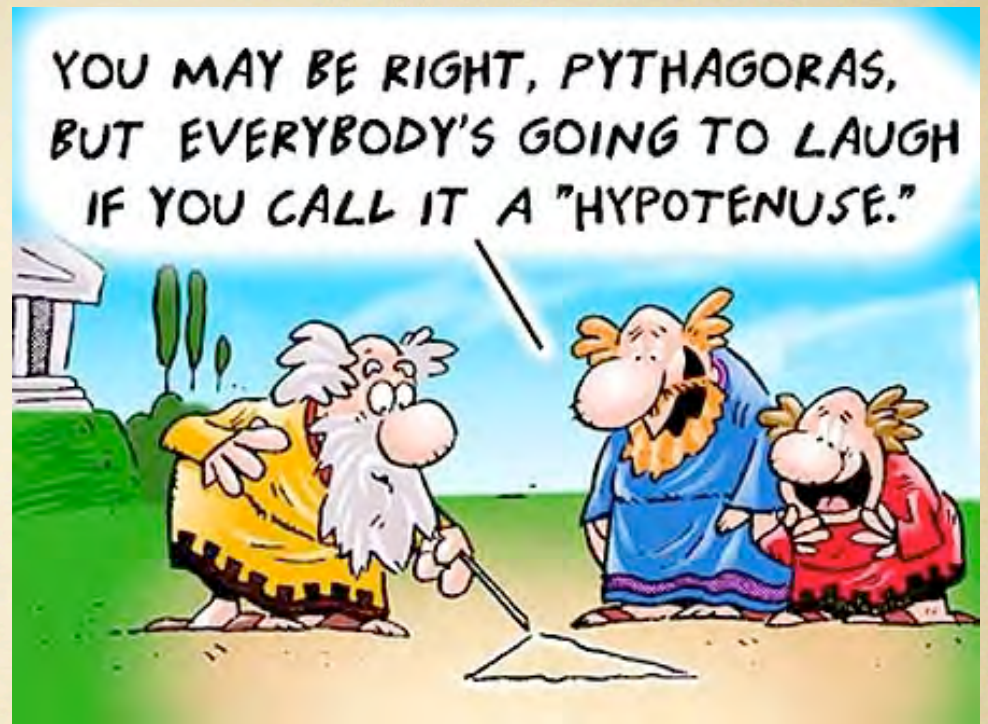
The Fibonacci Spiral in Art



1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, ...

Geometry

the branch of mathematics concerned with the properties and relations of points, lines, surfaces, polygons, 3-D, and higher dimensional figures.



SOMETHING FROM GEOMETRY

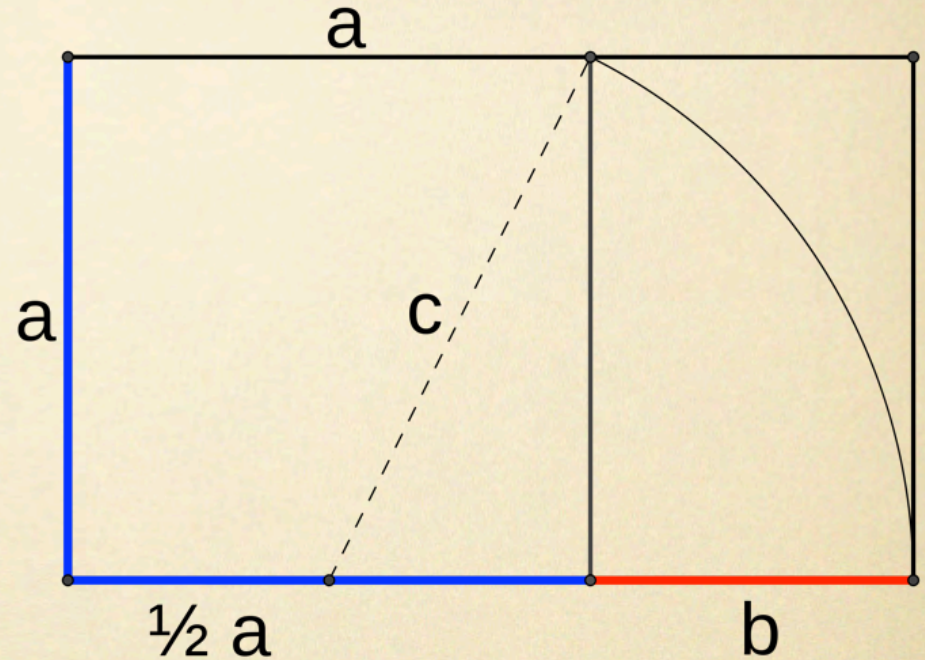
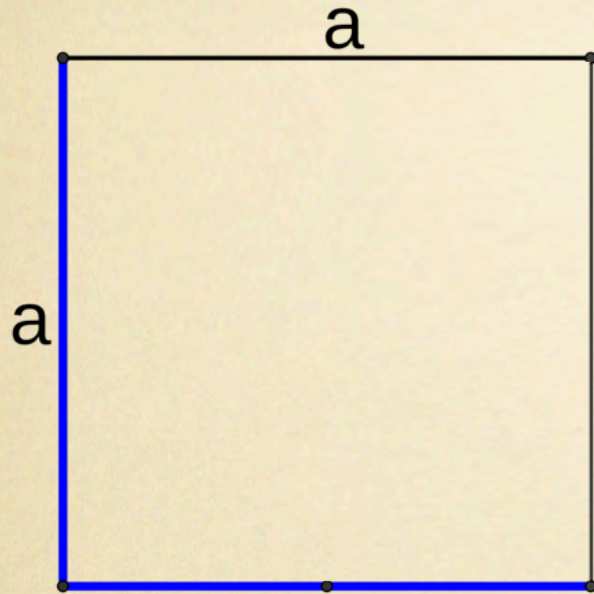
A **GOLDEN RECTANGLE** IS A SPECIAL RECTANGLE IN WHICH THE LENGTH L DIVIDED BY THE WIDTH W IS APPROXIMATELY 1.618.



$$L / W = \Phi \approx 1.618 \quad (\text{Golden ratio})$$

Phi

CONSTRUCTING A GOLDEN RECTANGLE



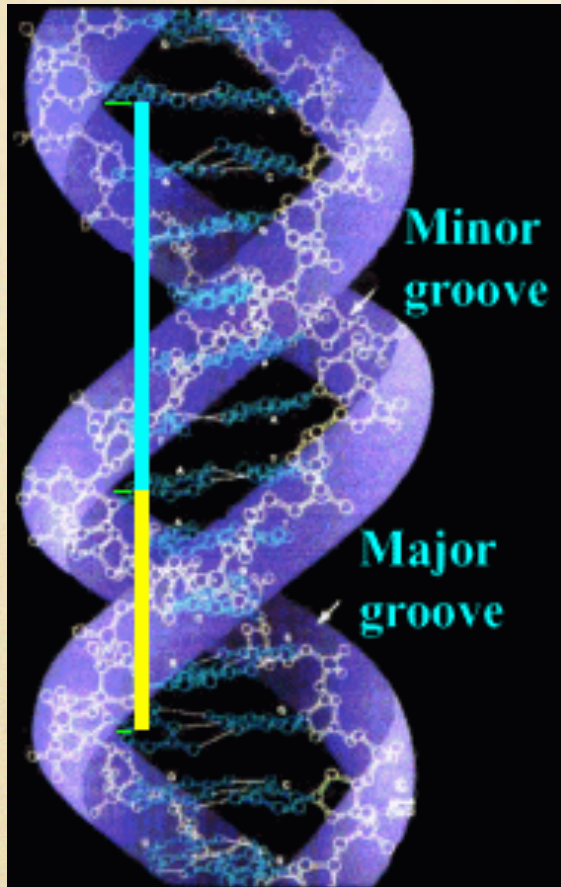
$$c^2 = (a/2)^2 + a^2 = 5a^2/4 \quad c = (\sqrt{5} a)/2$$

$$\text{Length} = a/2 + (\sqrt{5} a)/2 = a(\sqrt{5} + 1)/2 \approx 1.618a$$

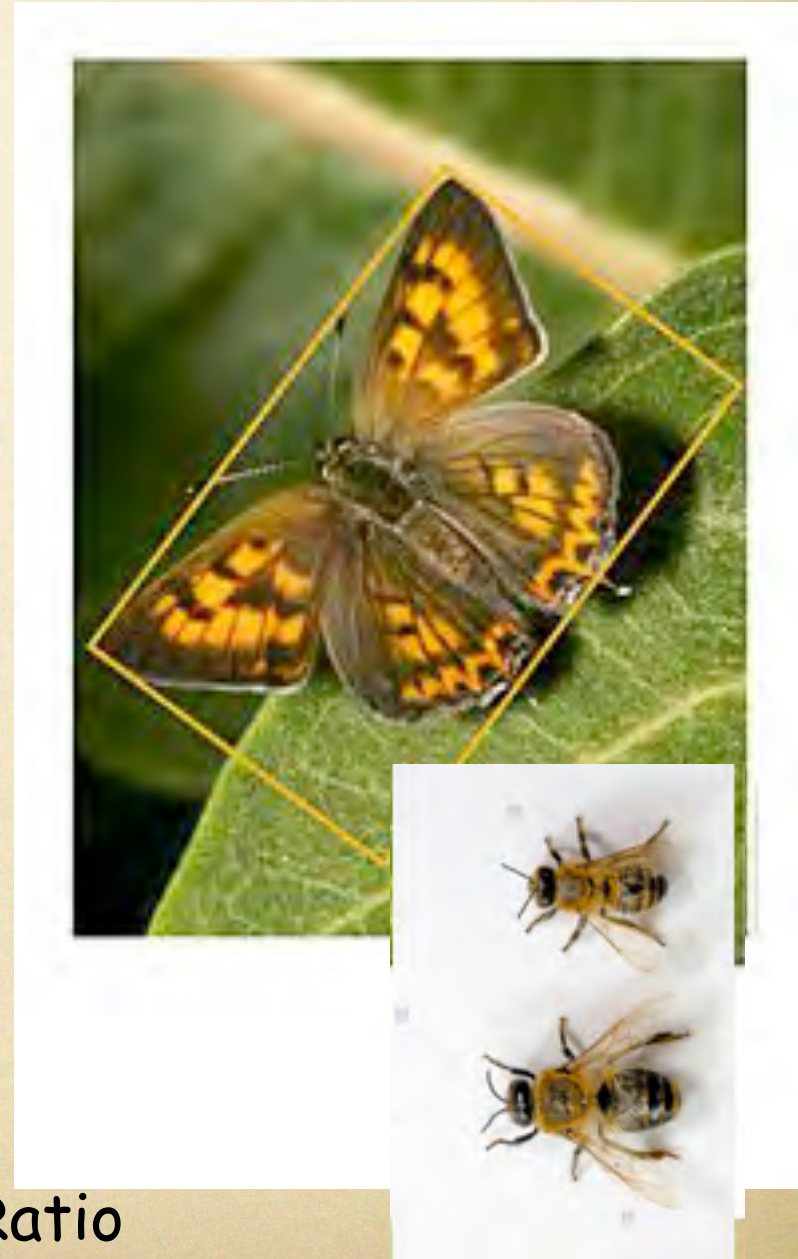
$$\text{Length} / \text{Width} = 1.618a/a \approx 1.618$$

= Golden Ratio

The GOLDEN RATIO IN LIFE

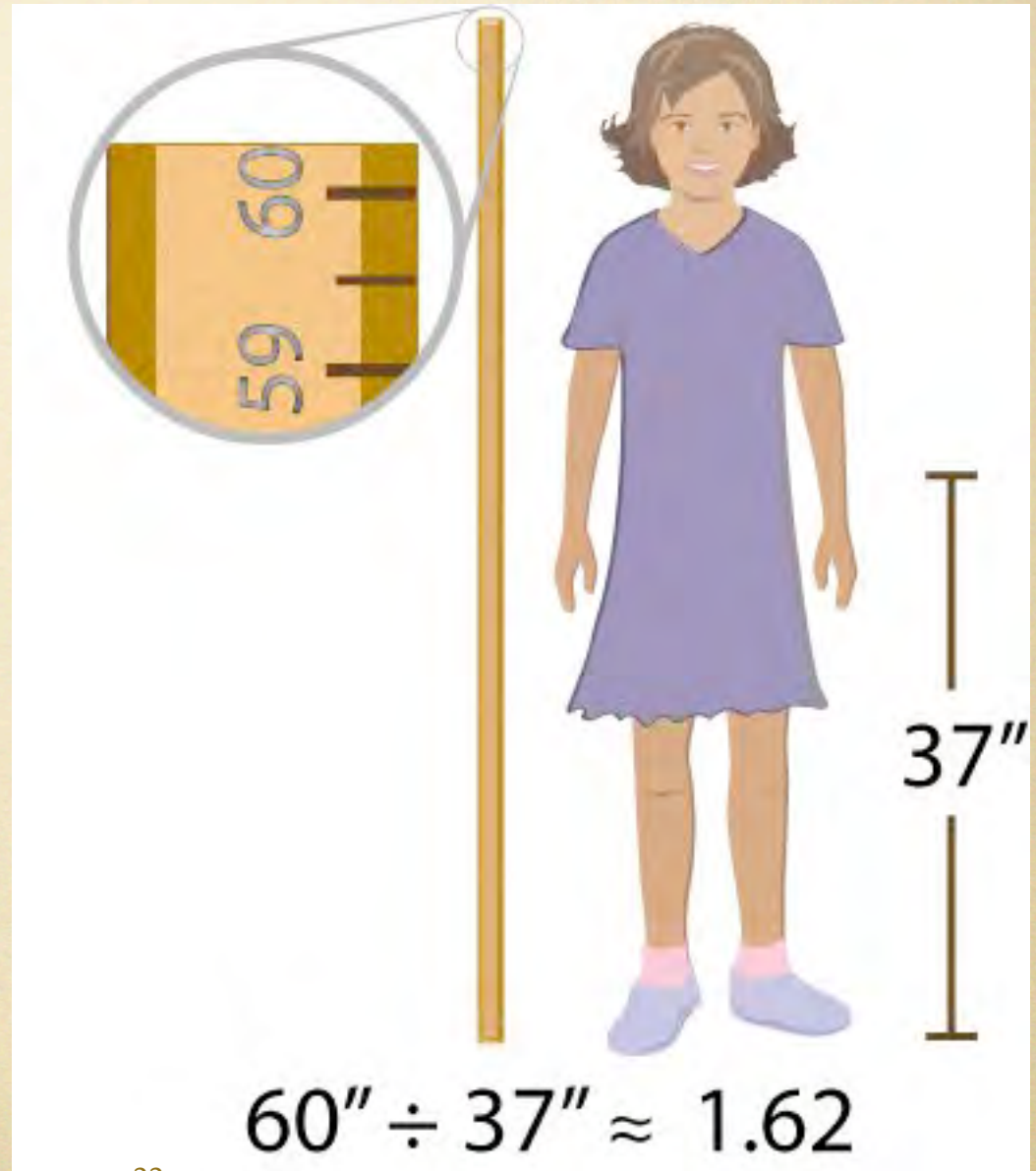


The ratio of the Major groove to the Minor groove in the DNA Double Helix Spiral is the Golden Ratio



THE GOLDEN RATIO IN THE HUMAN BODY

HEIGHT/
HEIGHT OF
NAVEL



“Beauty is in the Phi of the beholder.”



Florence Colgate, England³⁴

Height of head/Width of Head

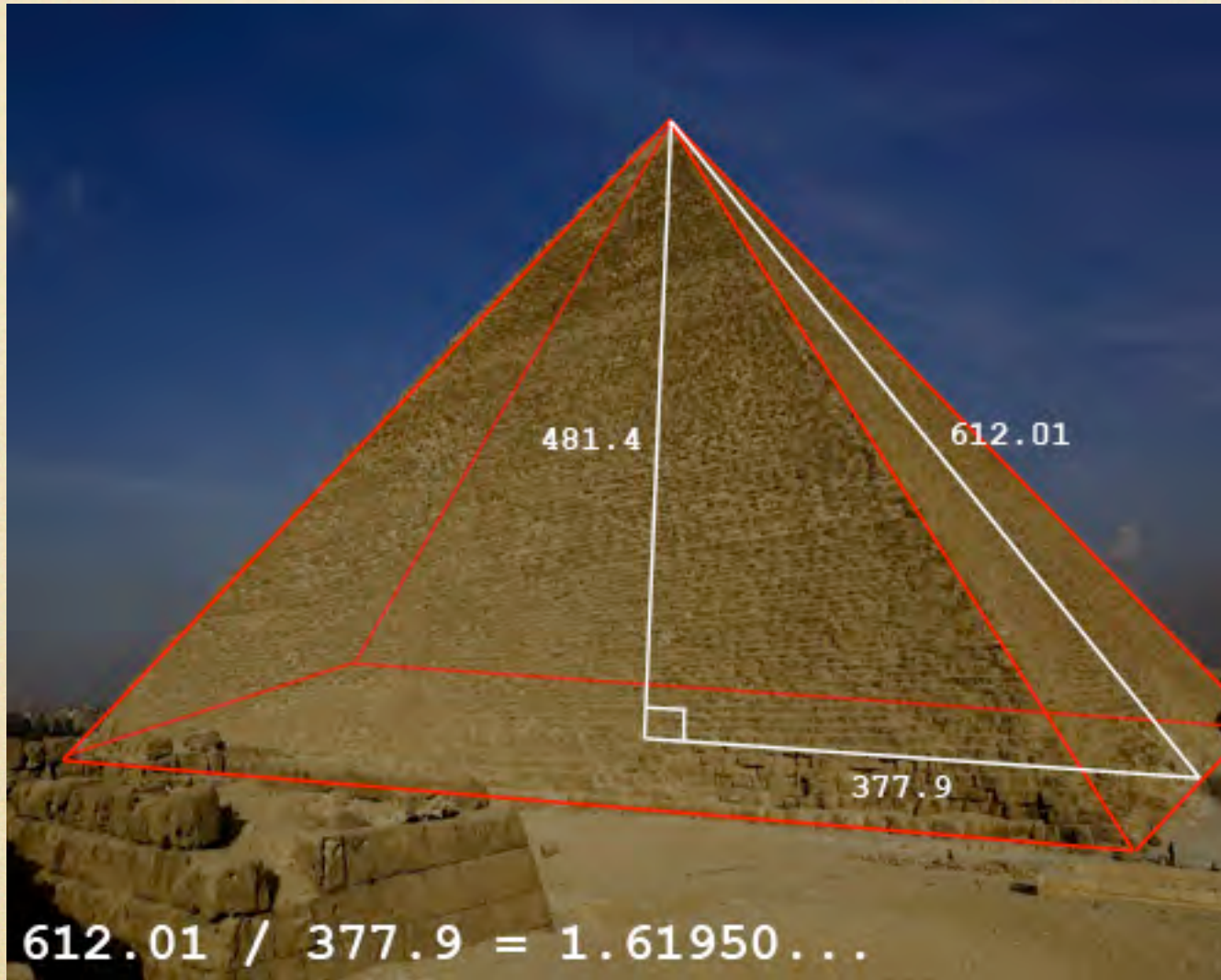
Eyes to lip center/Lips to Chin

Nose to Chin/Lips to Chin

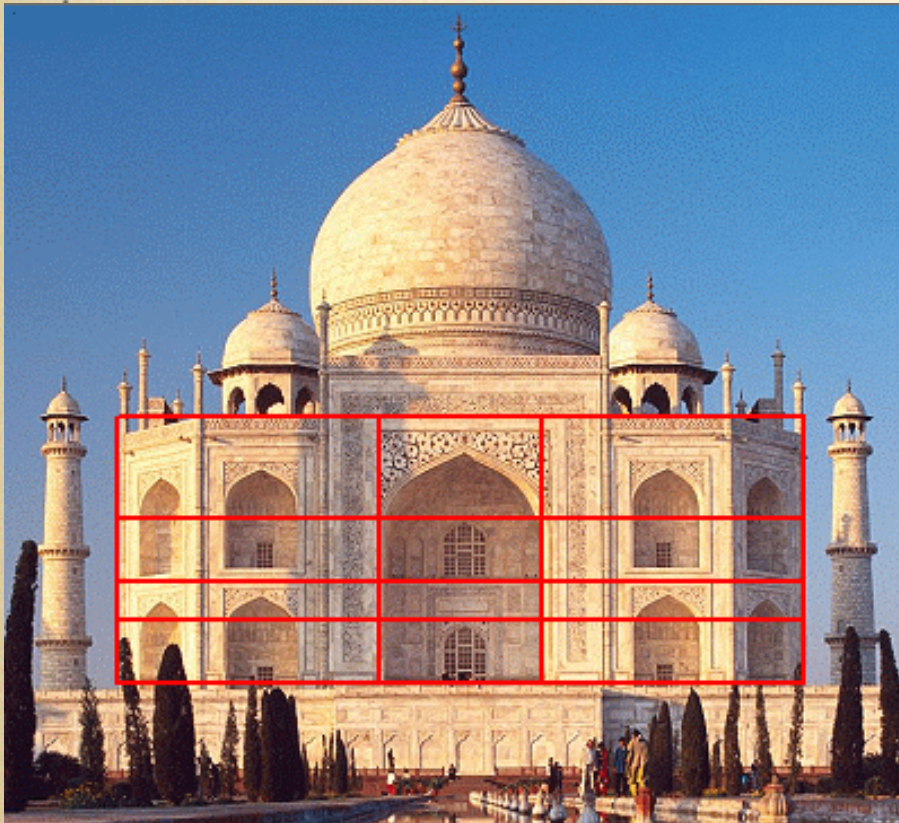
Bottom of Nose to Top of
Lips/Top of lips to bottom
of lips

The above, and at least
16 others. All are the
Golden Ratio ≈ 1.618

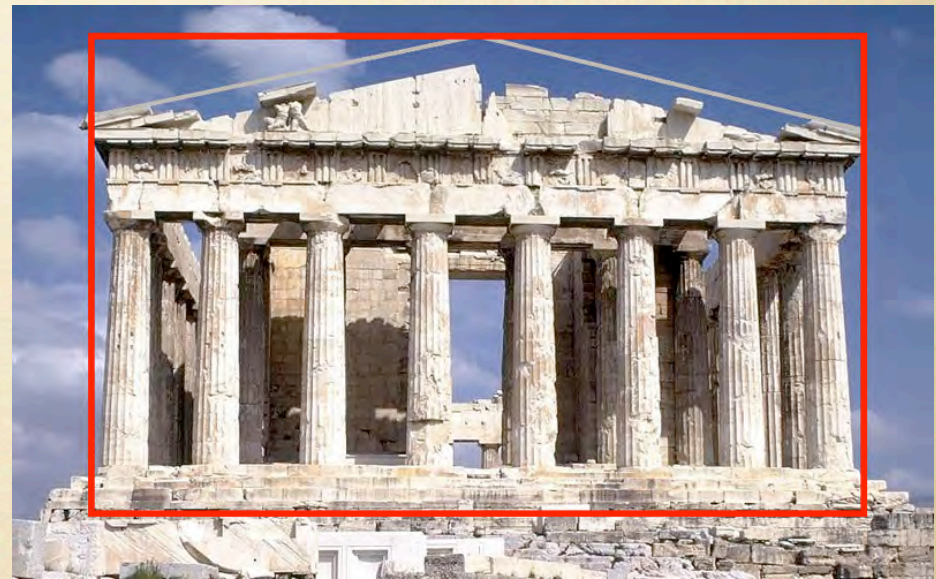
THE GOLDEN RATIO IN THE GREAT PYRAMID



THE GOLDEN RATIO IN ANCIENT BUILDINGS



The Taj Mahal, India



The Parthenon, Greece

THE GOLDEN RATIO IN MODERN BUILDINGS



The CN Building in Toronto. The ratio of its height (553 m) to the height of its observation tower is 1.618



The UN Building in NYC. It's width compared to the height of every 10 floors is 1.618

THE GOLDEN RATIO IN VIOLIN CONSTRUCTION

$$\frac{a1 + a2}{a2} = \frac{a2}{a1} = \frac{b2}{b1} = \frac{b2}{c2} = \frac{c2}{c1} = \phi$$

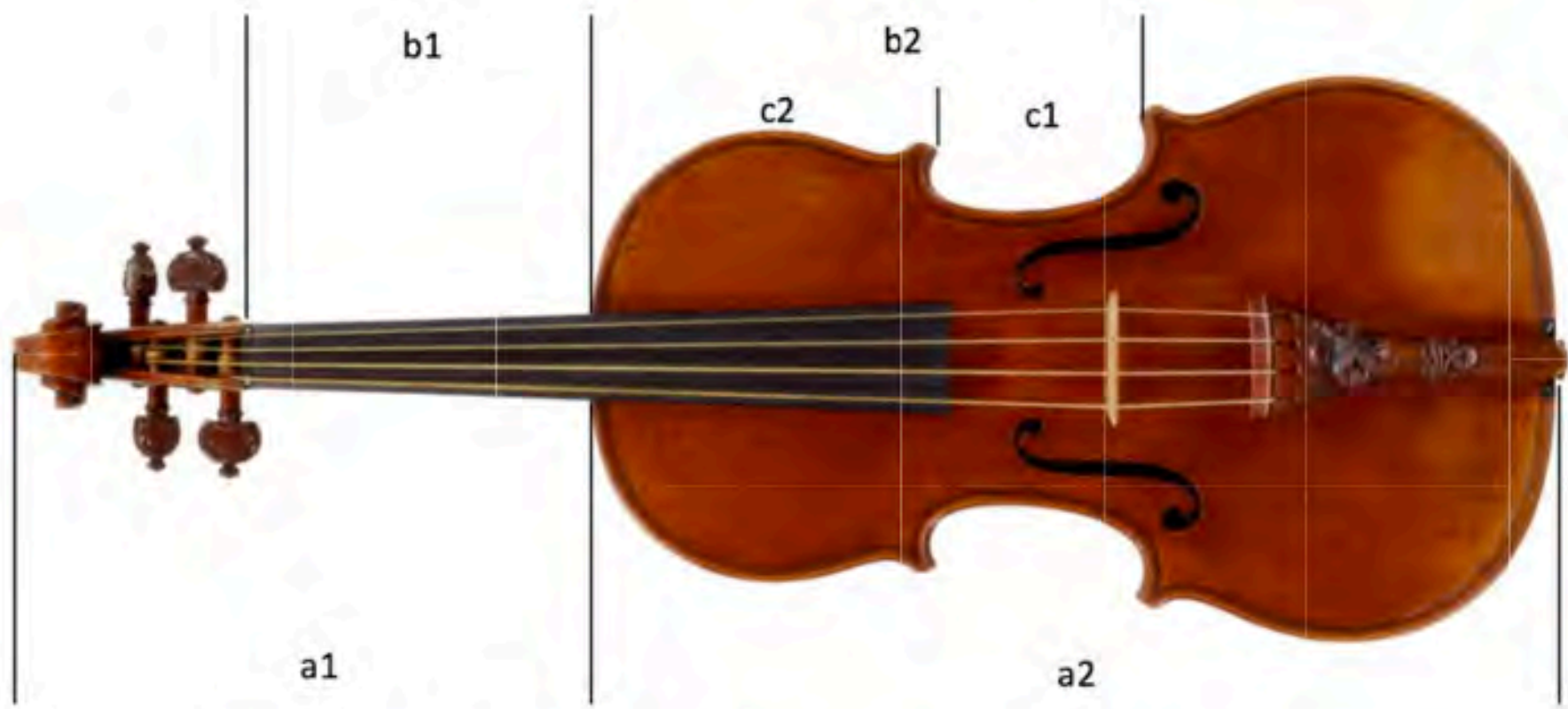


Figure 2. Photo of “Lady Blunt” Stradivarius violin (sold for nearly \$16M).

AN AMAZING RELATIONSHIP!

The Golden Ratio is
"Married to" the
Fibonacci Sequence!

1 , 1 , 2 , 3 , 5 , 8 , **13** , **21** , 34 →

A term of the Fibonacci Sequence,
say **21**, divided by the term before
it, **13**, is the Golden Ratio,
approx **1.618**, as it's limiting value.

$$1/1 = 1.000000$$

$$2/1 = 2.000000$$

$$3/2 = 1.500000$$

$$5/3 = 1.666666$$

$$8/5 = 1.600000$$

$$13/8 = 1.625000$$

$$21/13 = 1.615385$$

$$34/21 = 1.619048$$

$$55/34 = 1.617647$$

$$89/55 = 1.618182$$

$$144/89 = 1.617978$$

$$233/144 = 1.618056$$

PROBABILITY

Probability is the area of mathematics that deals with the likelihood of a given event's occurrence- which is expressed as a number between 0 and 1.



Probability (Heads) = 0.5



Odds are 5-2



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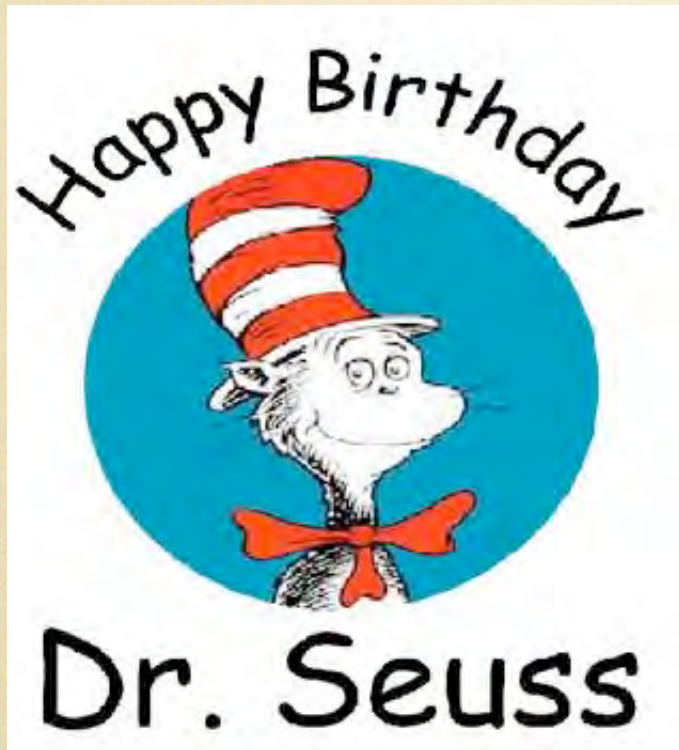
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ANDERTOONS.COM



"I wish we hadn't learned probability 'cause I don't think our odds are good."

SOMETHING FROM PROBABILITY



WHAT'S THE PROBABILITY THAT TWO PEOPLE
IN THIS ROOM HAVE THE SAME BIRTHDAY?

What's the probability that two people in this room have the same birthday?

- If 23 are here, over 50% (.50+)
- If 30 are here, over 70% (.70+)
- If 40 are here, 89% (.89)
- If 50 are here, 97% (.97)
- If 60 are here, 99.4% (.994)
- If 70 are here, 99.9% (.999)
- If 80 are here, 99.99% (.9999)

Now, Let's Check This Out !

Proof that if there are 23 people in a room, the probability that at least 2 of them have the same birthday is over 50%

The goal is to compute $P(A)$, the probability that at least two people in the room have the same birthday. However, it is simpler to compute $P(A')$, the probability that no two people have the same birthday and use the fact that $P(A) = 1 - P(A')$ to find $P(A)$

$$P(A') = \frac{365}{365} \times \frac{364}{365} \times \frac{363}{365} \times \frac{362}{365} \times \cdots \times \frac{343}{365}$$

The terms of equation (1) can be collected to arrive at:

$$P(A') = \left(\frac{1}{365} \right)^{23} \times (365 \times 364 \times 363 \times \cdots \times 343)$$

Evaluating equation (2) gives $P(A') \approx 0.492703$

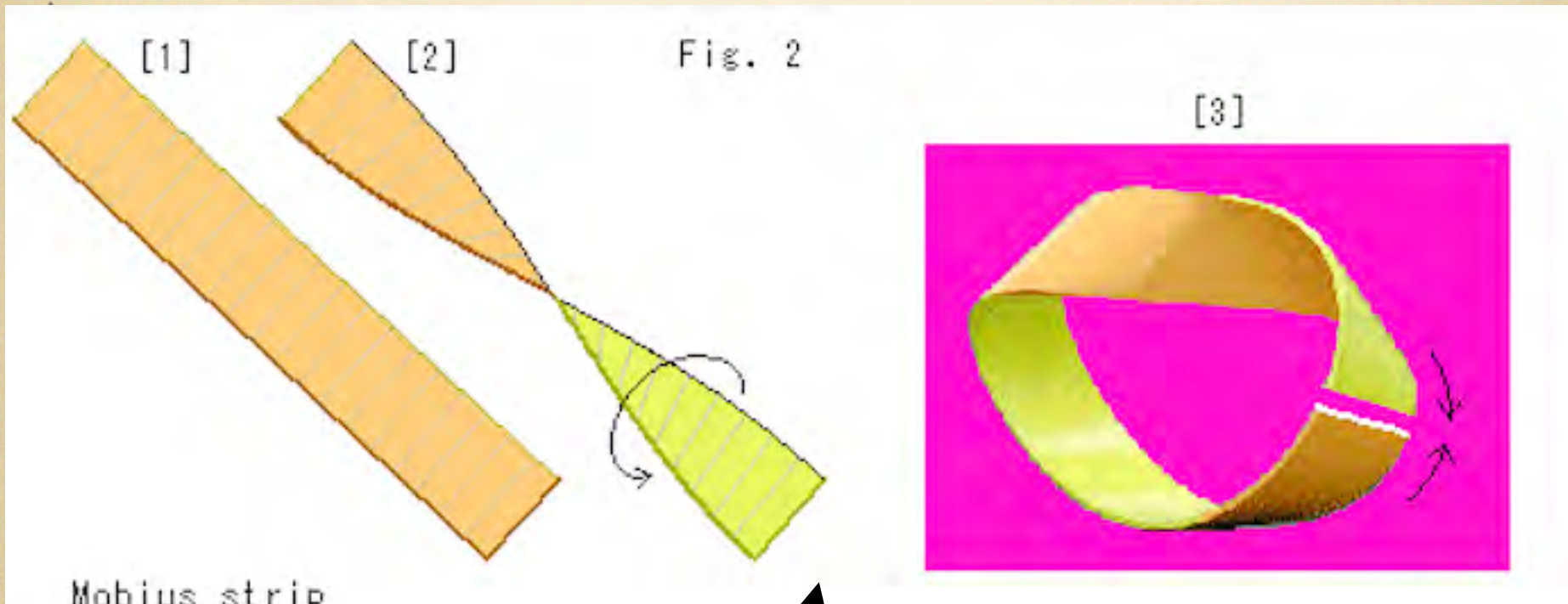
Therefore, $P(A) \approx 1 - 0.492703 = 0.507297$ (50.7297%)

TOPOLOGY

Topology is the area of mathematics dealing with properties of space that are preserved under continuous deformations, such as stretching, crumpling, and bending, but not tearing or gluing.



Topologists Play Around with Mobius Strips



Making a Mobius Strip

- A mathematician confided
- That a Möbius Strip is one-sided,
 - And you'll get quite a laugh,
 - If you cut one in half,
- For it stays in one piece when divided.

.....

B.F. Goodrich Company manufactures a Turnover Conveyor Belt System which has half twists in it to allow for equal wearing on both sides of the belt

WHY DID THE
CHICKEN CROSS THE
MOBIUS STRIP?
TO GET TO THE SAME
SIDE.



SOMETHING FROM TOPOLOGY

IS IT POSSIBLE TO TAKE OFF YOUR VEST
WITHOUT TAKING OFF YOUR COAT?



TOPOLOGISTS KNOW!



Nature is written
in mathematical language.

Galileo Galilei

MATHEMATICS, RIGHTLY
VIEWED, POSSESSES NOT
ONLY TRUTH, BUT
SUPREME BEAUTY.

- BERTRAND RUSSELL



MATHEMATICS IS THE
MOST BEAUTIFUL
AND MOST
POWERFUL
CREATION OF THE
HUMAN SPIRIT.

QUOTEHD.COM

Stefan Banach
Polish Mathematician

**THE MATHEMATICIAN'S
PATTERNS...
MUST BE BEAUTIFUL ...
BEAUTY IS THE FIRST TEST;
THERE IS NO PERMANENT
PLACE IN THE WORLD FOR
UGLY MATHEMATICS.**

G. H. HARDY

$$1 \times 8 + 1 = 9$$

$$12 \times 8 + 2 = 98$$

$$123 \times 8 + 3 = 987$$

$$1234 \times 8 + 4 = 9876$$

$$12345 \times 8 + 5 = 98765$$

$$123456 \times 8 + 6 = 987654$$

$$1234567 \times 8 + 7 = 9876543$$

$$12345678 \times 8 + 8 = 98765432$$

$$123456789 \times 8 + 9 = 987654321$$

Mathematics of Life

$$\text{Life} + \cancel{\text{Love}} = \text{Happy}$$

$$\text{Life} - \cancel{\text{Love}} = \text{Sad}$$

$$2 \text{ Life} = \text{Happy} + \text{Sad}$$

$$\therefore \text{Life} = \frac{\text{Happy} + \text{Sad}}{2}$$

$$\therefore \text{Life} = \frac{1}{2} \text{ Happy} + \frac{1}{2} \text{ Sad}$$

That's Real Life. Enjoy It.

Mini Math Attitude Inventory

1. I liked Math... A. A Lot B. A Little C. Not at All
2. My Math Ability was... A. Pretty Good B. Average C. Poor
3. My Math Teachers were... A. Good B. Average C. Poor
4. My Favorite was... A. Algebra B. Geometry C. Neither
- 5 Which Describes Math? A. Fun B. Hard C. Interesting
D. Logical E. Satisfying F. Frustrating

Applications in Music

It is clear that the Fibonacci sequence of numbers and the golden ratio are manifested in music. The numbers are present in the octave, the foundational unit of melody and harmony. Stradivarius used the golden ratio to make the greatest string instruments ever created. Roy Howat's research on Debussy's works shows that the composer used the golden ratio and Fibonacci numbers to structure his music.

More About "God's Fingerprint" in the Human Body

From measurement of 5000 Uteruses per year by ultrasound, Dr Jasper Verguts, a Gynecological Specialist at the University Hospital Lueven in Belgium looked at the ratio of uterus length to width (uterus ratio) and found:

For newborn girls, the uterus ratio is about 2

In old age, the uterus ratio shrinks to 1.46

In the most fertile time of a woman's life (Between ages 16 and 20) the uterus ratio is 1.6, strikingly close to the Golden Ratio!