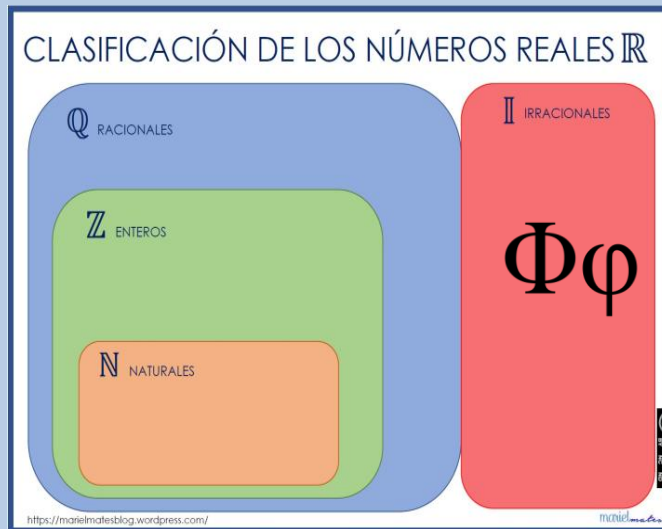


GOLDEN NUMBER

- It is a irrational number.
- By 1914, mathematician Mark Barr suggested Greek letter Phi as a symbol for the golden ratio.

Φ ϕ

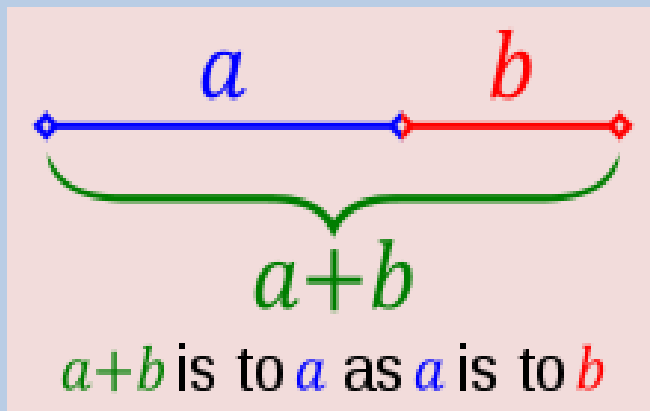


- The golden number is also called the golden mean, golden section (Latin: sectio aurea), divine proportion and golden ratio.

GOLDEN NUMBER NUMERICAL VALUE

If you divide a line into two parts so that: the longer part divided by the smaller part is also equal to the whole length divided by the longer part then you will have the golden ratio.

Expressed algebraically, for quantities a and b with $a > b$,




$$\frac{a+b}{a} = \frac{a}{b} = \varphi$$

$$\begin{aligned} a &= 1 \\ a+b &= x \\ b &= x-1 \end{aligned}$$

$$\varphi = \frac{x}{1} = \frac{1}{x-1}$$

GOLDEN NUMBER NUMERICAL VALUE

$$\varphi = \frac{x}{1} = \frac{1}{x-1}$$

Doing cross multiplication and simplifying:
Second degree equation 

$$\varphi^2 - \varphi - 1 = 0$$

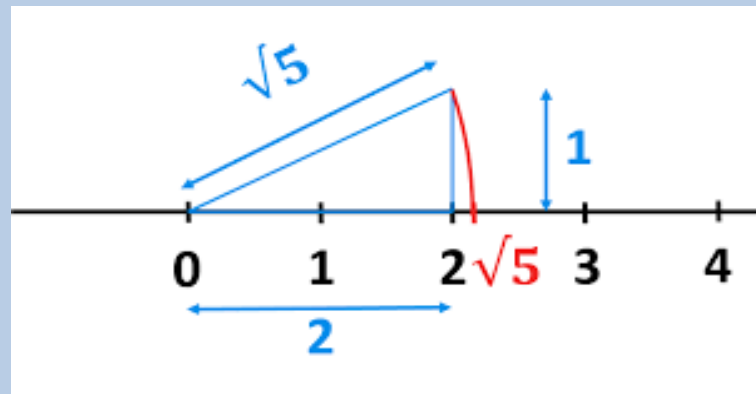
POSITIVE SOLUTION:

$$\Phi = \frac{1 + \sqrt{5}}{2} = 1,618033988749\dots$$

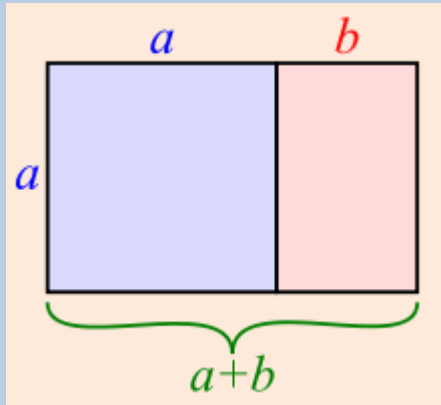
GOLDEN NUMBER REPRESENTATION ON THE REAL LINE

$$\Phi = \frac{1 + \sqrt{5}}{2}$$

- We represent the irrational number $\sqrt{5}$
- We add 1 unit and divide by 2 (perpendicular bisector=mediatriz)

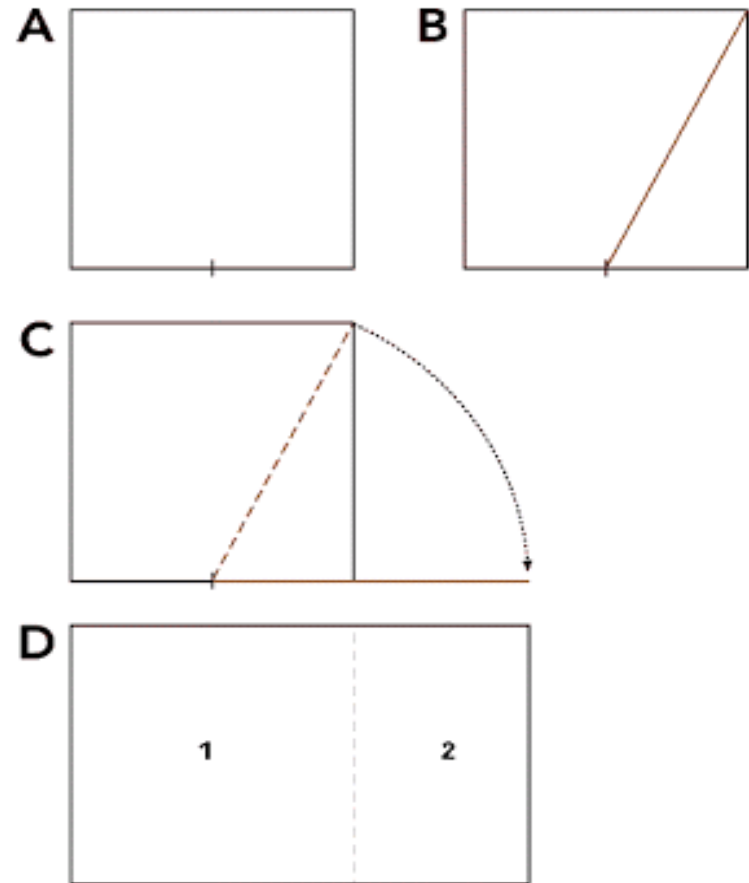


GOLDEN RECTANGLES



$$\frac{a+b}{a} = \frac{a}{b} = \varphi$$

$\frac{\text{lado mayor}}{\text{lado menor}} \cong \varphi = 1.618 \dots$



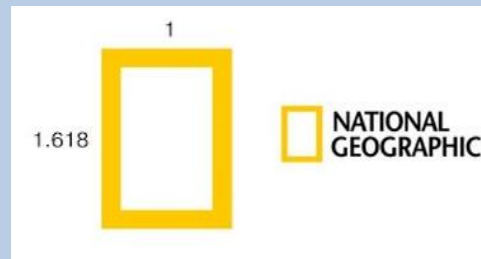
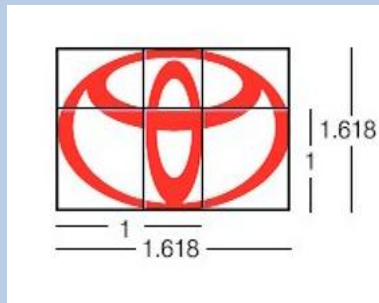
GOLDEN RECTANGLES

1.- Can you find some golden rectangle in our classroom?

2.- DNI

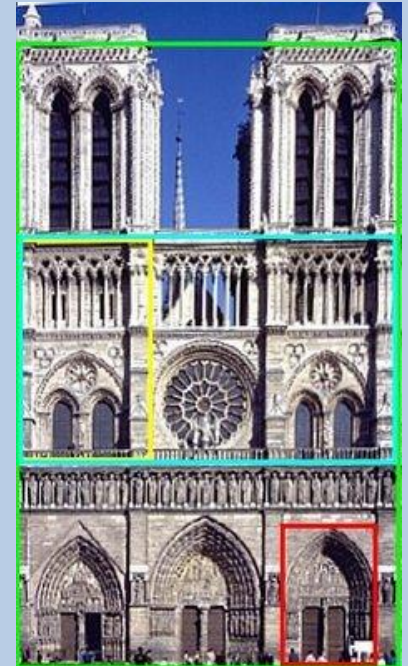
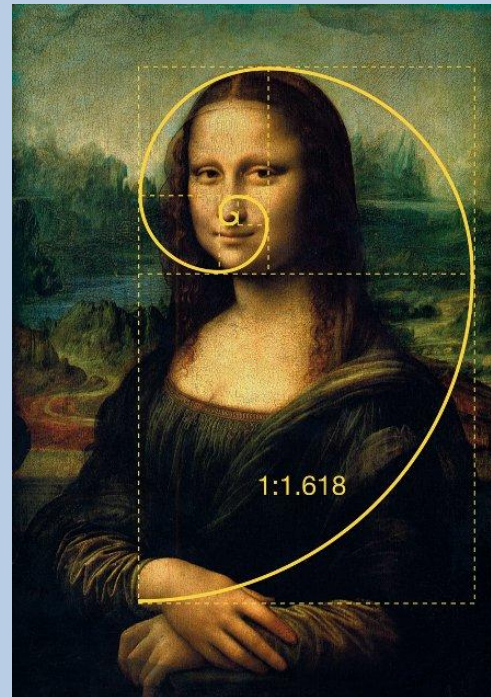
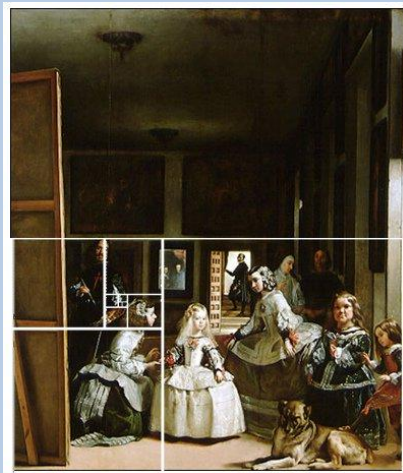


3.- Advertising



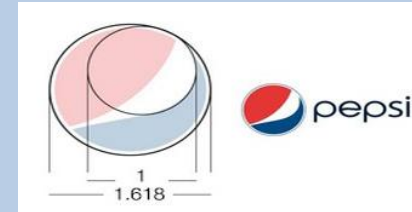
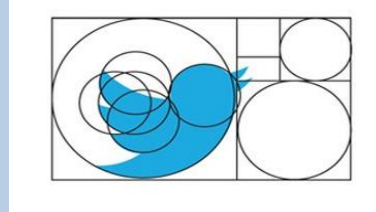
GOLDEN RECTANGLES

4.- Architecture and painting

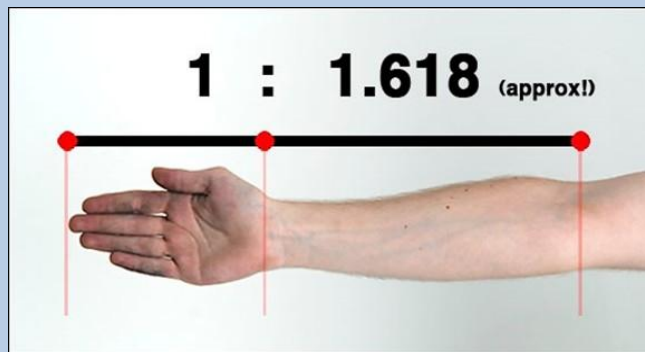


GOLDEN NUMBER

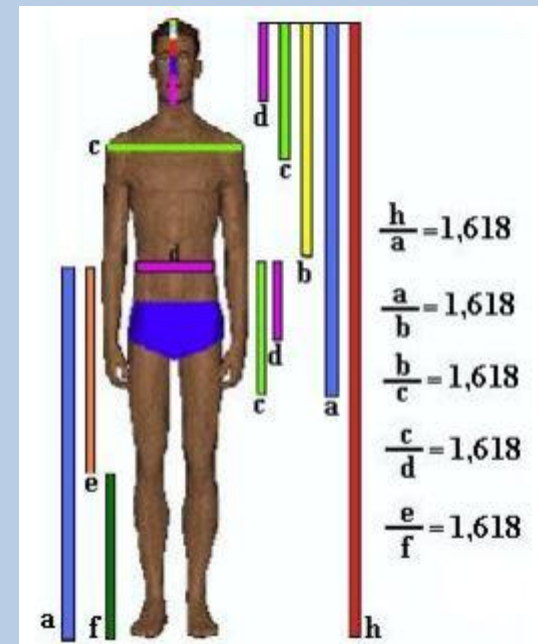
1.- Advertising



2.- Human body

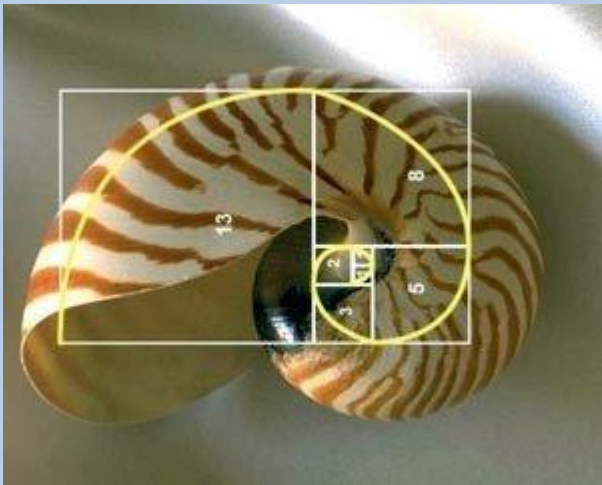


The distance between the finger tip and the elbow /distance between the wrist and the elbow equals the golden number.



GOLDEN NUMBER

3.- Nature



FIBONACCI SEQUENCE

There is a special relationship between the Golden Ratio and the Fibonacci Sequence.

The Fibonacci Sequence

1,1,2,3,5,8,13,21,34,55,89,144,233,377...

$$1+1=2$$

$$1+2=3$$

$$2+3=5$$

$$3+5=8$$

$$5+8=13$$

$$8+13=21$$

$$13+21=34$$

$$21+34=55$$

$$34+55=89$$

$$55+89=144$$

$$89+144=233$$

$$144+233=377$$

FIBONACCI SEQUENCE

If you take any two successive Fibonacci Numbers, their ratio is very close to the Golden Ratio.

$$\begin{array}{l} 1/1 = 1 \\ 2/1 = 2 \\ 3/2 = 1.5 \\ 5/3 = 1.666666666666 \\ 8/5 = 1.6 \\ 13/8 = 1.625 \\ 21/13 = 1.61538461538 \\ 34/21 = 1.61904761905 \\ 55/34 = 1.61764705882 \\ 89/55 = 1.61818181818 \\ \text{---} \\ \text{Phi} = 1.6180339887... \end{array}$$