Application of Phi and Pi:

Great Pyramids of Giza

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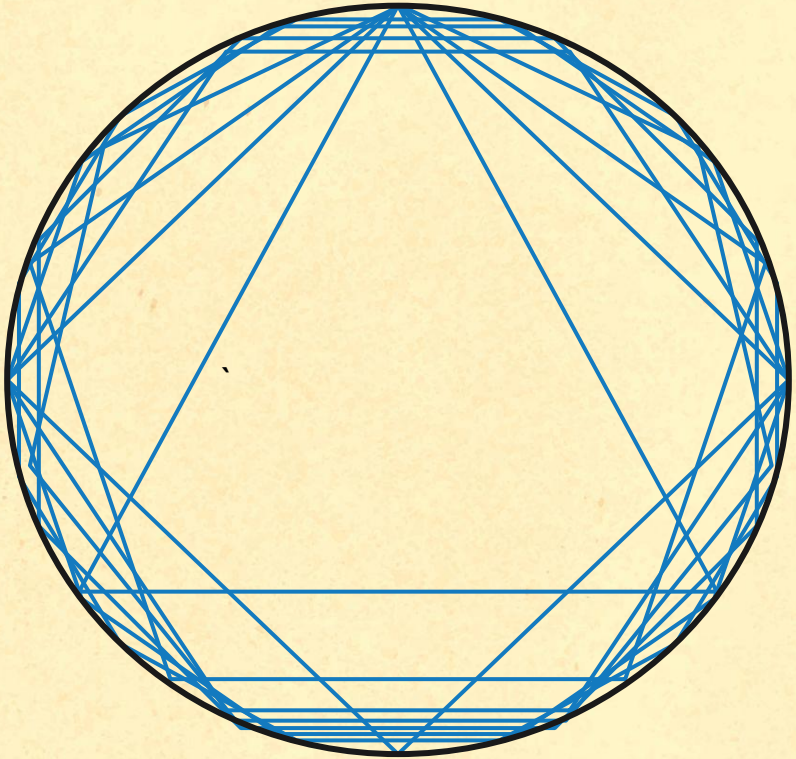
What is Pi (π) and Phi (Φ)

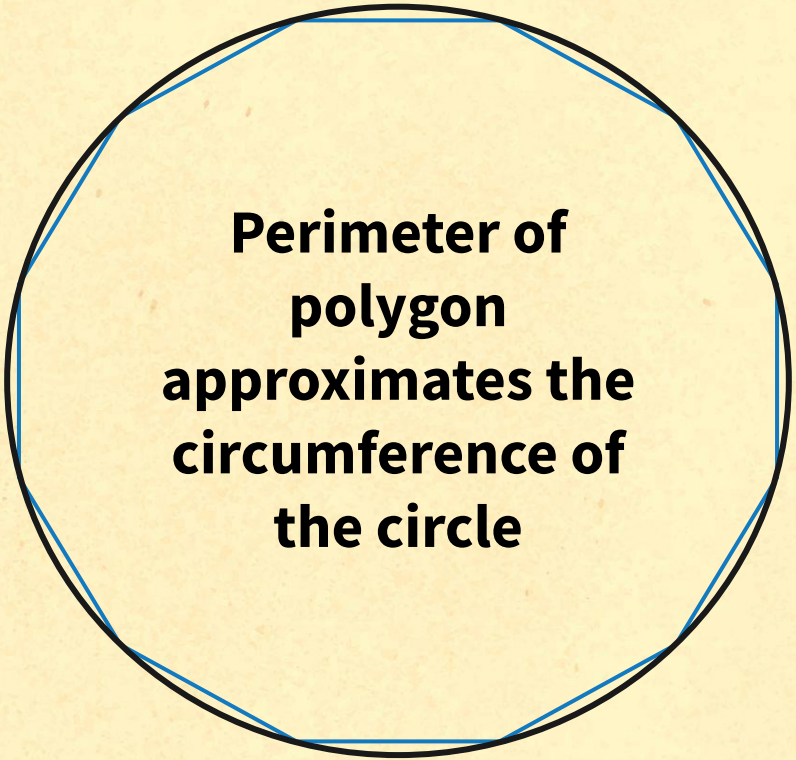
- Pi (π) = the ratio of the circumference of a circle to its diameter
  - Pi = 3.14…
  - Irrational number thus the decimal doesn't end nor is repetitive

- Phi (Φ) = the ratio of line segments when a line is divided in a very unique way
  - Phi = 1.68
  - Irrational number

Deriving Pi (π)



Deriving Pi (π)



Perimeter of polygon approximates the circumference of the circle

Deriving Pi (π)

Angle between = 360/n

θ = (360/n) / 2

θ = 180/n

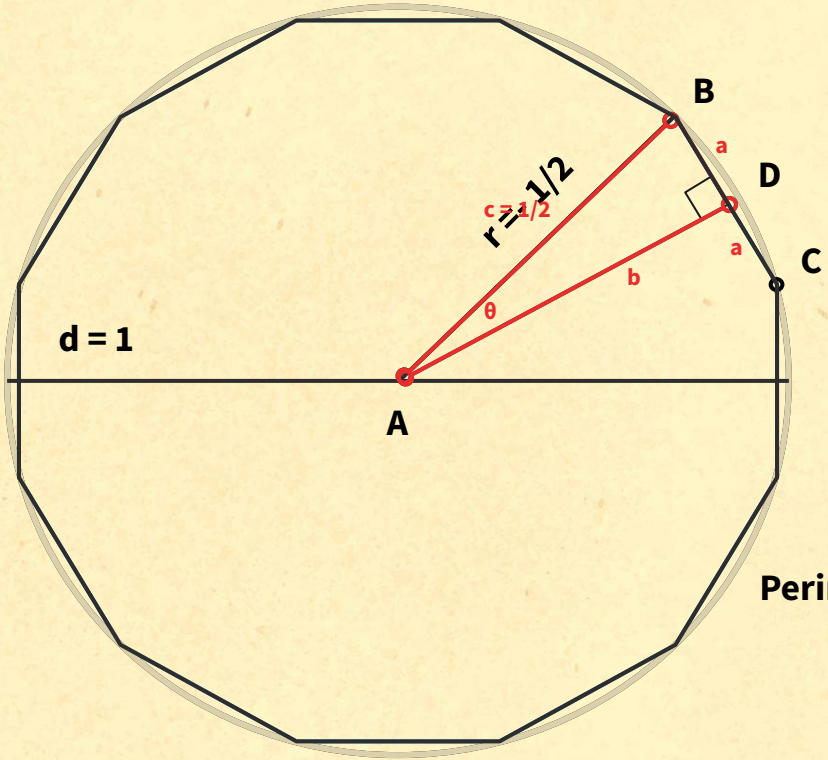
BC = BD = Sin(180/n)

When n = 12: 3.10582

When n = 24: 3.13262

When n = 576: 3.14157

When n = 100,000: 3.14159



AD ⊥ BC

BD = DC

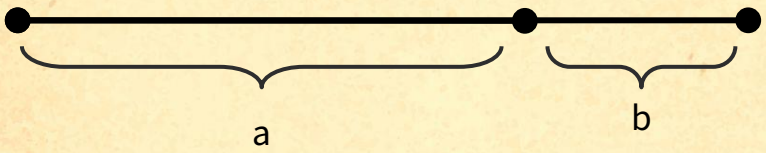
BC = Sin θ

side = Sin θ

Perimeter = n(sides) x side length

Perimeter = n · Sin θ

Deriving Phi (Φ)



Assume a > b
a & b > 0
Let Φ = a / b

$$a / b = (a+b) / a$$

$$a / b = (a / a) + (b / a)$$

$$\Phi = 1 + (1/\Phi)$$

$$(\Phi)\Phi = (1 + (1/\Phi))(\Phi)$$

$$\Phi^2 = \Phi + 1$$

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

$$\Phi = (1 \pm \sqrt{(5)})2$$

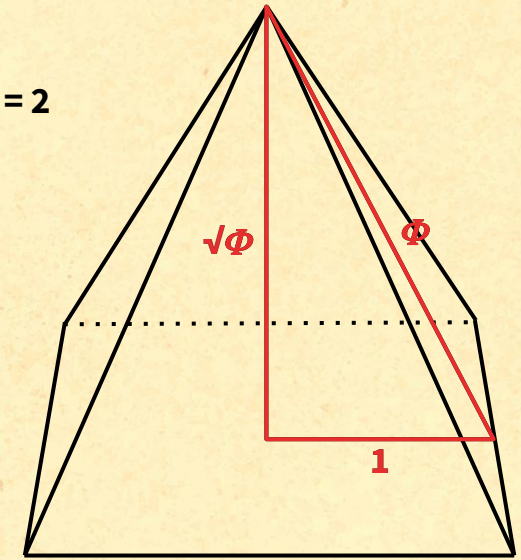
$$\Phi = (1 + \sqrt{(5)})2 = 1.618034....$$

$$\Phi = (1 - \sqrt{(5)})2 < 0$$

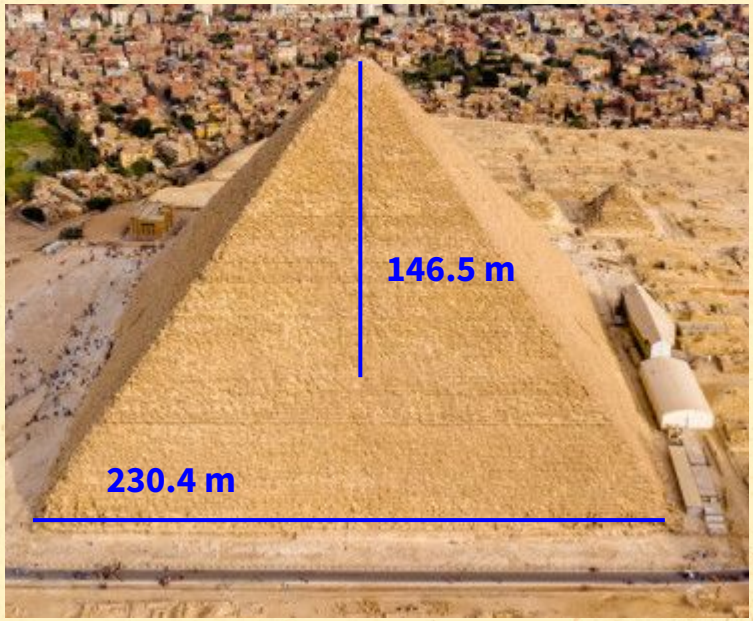
Phi (Φ) Based Pyramid

Φ + 1 = Φ^2
1.618 + 1 = (1.618)^2 = 2.618

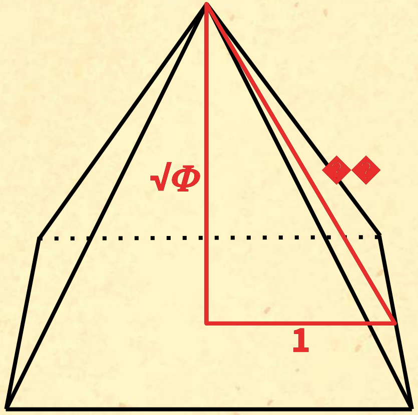
This means:
Pyramid Base Width = 2
Height = √Φ = 1.272
h:b = 0.636



Pyramid of Giza
Base Width = 230.4 m
Height = 146.5 m
h:b = 0.636
0.0367 m difference = 0.025% difference



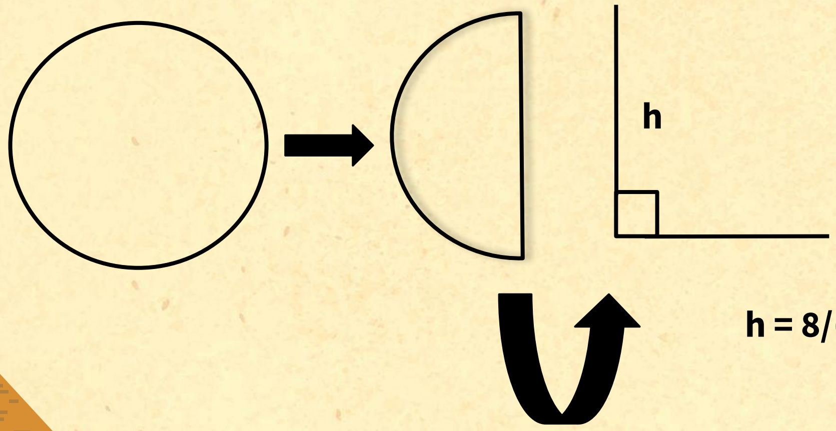
Pi (π) Based Pyramid



h = √Φ = 1.272

Pyramid with base width 2:
Perimeter of base = 4w = 8 units

Circle with circumference of 8:



h = 8/(π/2) = 1.272

8w/h = 2π
8/√Φ = 2π

Same method applied to the dimensions of the Pyramid of Giza:

% Error for Calculated 2π compared to actual 2π: 0.14%

% difference between height of both pyramid and semi circle = 0.01%

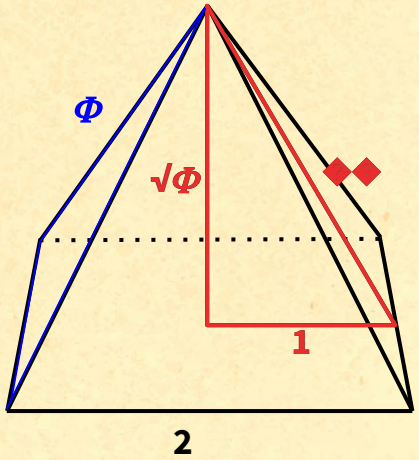
Phi (Φ) Based Pyramid

Surface area of base = w^2 = 4
Area of face = ½hb = ½(Φ)(2) = Φ

Divide A(b) by 4(A(f)) = w^2 / 4A

(2)^2 / 4(Φ) = 4/4Φ = 1/Φ

1/Φ = Φ - 1



% Error for Calculated Φ-1 compared to actual Φ-1: <0.01%

Phi (Φ) in Nature