If you look closely at the background patterns in these paintings, you will note that each painting has the same 14 'tiles' rearranged differently. What allows these tiles to be rearranged in an almost-endless number of ways is that they rely on unique mathematical properties of the **Golden Ratio**, ø.

Definition of Golden Ratio:

In Mathematics, two quantities are in the Golden Ratio if their Ratio is the same as the Ratio of their sum to the larger of the two quantities.

With two quantities, a and b, a > b > 0, the Golden Ratio, $ø = \frac{a}{b}$ *when* $\frac{a}{b} = \frac{a+b}{a}$

The Golden Ratio is frequently found in patterns in nature, such as spiral arrangements in shells and plants.

ø is an irrational number with a value of $\frac{1+\sqrt{5}}{2}$ *= 1.6180339887....*

Note that $\frac{a}{b} = \frac{a+b}{a} = \frac{a}{a} + \frac{b}{a} = 1 + \frac{b}{a}$ *In other words* $ø = 1 + \frac{1}{ø}$

While the Golden Ratio (see Wikipedia) itself is often mentioned in art (e.g. Leonardo Da Vinci used it to compose his paintings), architecture (the Greeks used it to design their buildings), and nature (mathematical basis for naturally occurring patterns), less well-known is the fact ø has some fascinating mathematical properties.

For example starting with $ø = 1+\frac{1}{ø}$ (see above), we can derive:

- (Multiply both sides by ø) $ø^2 = ø + 1$
- (Multiply both sides again by ø) $ø^3 = ø^2 + ø$

Using such derivations, we see that a **Geometric Series** based on ø, (that is, a series where every element is obtained by multiplying the previous element by ø)

$$\ldots, \frac{1}{ø^2}, \frac{1}{ø}, 1, ø, ø^2, ø^3, \ldots$$

also happens to be a **Fibonacci Series**, in which the sum of any two consecutive terms generates the next term.

A property that then emerges from this **Geometric Fibonacci** series is that sums of many different terms in the series can equal the sums of many other terms in the series. E.g.:

$$ø + ø^2 + ø^3 = 2ø^3 = \frac{1}{ø} + 3ø^2 = 2ø + 2ø^2 = 2 + 4ø \text{ etc.}$$

The Swiss architect Le Corbusier, in a quest to design easily-reconfigurable modular buildings, realized that a set of ø-series based tiles, i.e. tiles whose sides were members of the ø series, would allow for combinations with large numbers of permutations and combinations for any given fixed space.

These paintings incorporate, in their backgrounds, tiling patterns created using TWO INTERLACED ø-series, one series of which is formed by taking the arithmetic mean of consecutive terms of the other – that is the elements of one series, lie halfway between the elements of the other series, which increases the number of possible ways in which the elements may be combined to add up to other combinations of elements.

All the paintings have the exact same 14 tiles in the background. Every edge of every tile relates to every other edge in the painting by multiples of golden ratios.

If the Golden Ratio is truly a natural number wired into nature, these tiling patterns should feel naturally aesthetic.

The juxtaposition of a whimsical, form on top of the more rigid geometric pattern hopefully creates an anachronism that draws the viewer in to look at the image again and again.