

THE M



Companion Notes

The mathematics is the composer.

Foreword

Listening to Mathematics

Music has often borrowed from mathematics.

Rhythm is measured. Harmony is proportional. Structure emerges from repetition, symmetry and transformation. Mathematical ideas have influenced composers for centuries, whether consciously or intuitively.

This work begins from a different question.

What if mathematics were not merely an influence upon music, but the composer itself?

Rather than attempting to describe mathematical concepts through melody or lyrics, each composition begins with a single mathematical idea. That idea is examined not for its notation or formal proof, but for its *behaviour*. How does it grow? How does it repeat? Does it resolve? Does it divide? Does it continue without end?

Those behavioural observations are then translated into a set of compositional constraints. No narrative is imposed. No emotional direction is prescribed. The resulting music is allowed to emerge from the mathematics as faithfully as possible.

Some concepts produce ordered structures. Others generate instability, absence or ambiguity. None were selected because they were expected to produce beautiful music. They were selected because they posed interesting questions.

The album makes no claim that these interpretations are definitive.

They are simply one attempt to answer a single, rather unusual question:

If this mathematical idea were capable of organising sound, what would it choose to hear?

Methodology

Every composition within $\vdash \mathbf{VEI\emptyset M}$ was created using the same underlying process.

The objective was not to compose music *about* mathematics, nor to translate equations directly into notes. Instead, each track began with a single mathematical concept and an attempt to describe how that concept behaves.

An axiom implies rather than proves.

Prime numbers resist subdivision.

The empty set derives significance from absence.

The Golden Ratio grows naturally without instruction.

Chaos is deterministic, yet unpredictable.

Infinity never arrives.

These behavioural observations were then converted into compositional instructions. Rather than specifying melodies, harmonies or rhythms, the prompts described processes, constraints and relationships. The intention was to allow the mathematical principle to become the organising force behind the composition.

Each concept generated multiple independent interpretations. Those interpretations were evaluated not by how conventionally musical they appeared, but by how convincingly they embodied the behaviour of the mathematical idea from which they originated.

Only then were the final selections made.

The resulting compositions should therefore be understood not as musical illustrations of mathematics, but as experiments in allowing mathematical behaviour to organise sound.

Whether the listener perceives those behaviours is intentionally left unresolved.

The mathematics is the composer.
The composer merely described the rules.

Track Notes

1. $\vdash$ — Axiom

Concept

An axiom is a statement accepted without proof. It is not demonstrated; it is assumed. From that assumption, an entire mathematical framework may be constructed.

Behaviour

An axiom does not seek attention. It quietly establishes the conditions under which everything else becomes possible. It is stable, self-consistent and foundational. Nothing within the system precedes it.

Interpretation

The opening composition introduces a stable musical environment rather than a conventional theme. Musical events emerge from an already established order, giving the impression that the piece has not truly begun, but has simply become audible. It exists not to resolve ideas, but to permit them.

2. $\emptyset$ — The Empty Set

Concept

The empty set contains no elements, yet it remains one of the fundamental objects of modern mathematics. It represents absence while still possessing structure and definition.

Behaviour

Emptiness is not absolute. Instead, the composition approaches the threshold at which individual musical events become significant precisely because so little else exists around them. Silence frames each sound rather than replacing it.

Interpretation

Rather than presenting literal silence, the composition explores the musical consequences of near-absence. Sparse events punctuate an otherwise open landscape, allowing each sound to exist with unusual clarity and weight. The intention is not to represent nothingness, but to examine how meaning emerges when almost everything has been removed.

3. $\mathbb{P}$ — Prime Numbers

Concept

Prime numbers are divisible only by themselves and one. They appear irregularly, yet their distribution is governed by profound mathematical structure.

Behaviour

Each event exists independently. Patterns almost emerge before dissolving again. Silence separates musical objects rather than connecting them, reflecting the indivisible nature of prime numbers.

Interpretation

The composition avoids continuous development, favouring isolated sonic events that appear without warning. Clusters may form briefly, but never settle into predictable rhythm. Hidden order remains present, although it is never made explicit.

4. ϕ — The Golden Ratio

Concept

The Golden Ratio is an irrational constant that appears throughout geometry, biology, architecture and art. It is frequently associated with natural growth and self-organising proportion, not because it is imposed, but because it often emerges from simple processes repeated over time.

Behaviour

Nothing expands suddenly. Growth occurs through continual adjustment, each new stage relating naturally to what came before. Balance is achieved without symmetry, and proportion replaces repetition as the governing principle.

Interpretation

Rather than building towards a conventional climax, the composition grows as though it were unfolding according to an internal law. Musical density increases gradually before reaching a point of maximum convergence, after which the structure recedes with the same measured inevitability. The intention is not to express beauty, but to demonstrate proportion.

Growth remembers its own proportions.

5. $\subset$ — Fractals

Concept

Fractals arise when simple rules are applied repeatedly. Their defining characteristic is self-similarity: structures that resemble themselves across many different scales.

Behaviour

Small gestures generate larger structures without changing their essential character. Patterns recur, evolve and branch, yet always retain a recognisable relationship to their origins. Complexity is accumulated rather than designed.

Interpretation

The composition develops through recursive transformation rather than conventional thematic variation. Musical ideas reappear in altered forms, expanding and contracting while preserving their underlying identity. The listener is invited to experience scale rather than progression.

The smallest fragment still remembers the whole.

6. $6i$ — Imaginary Numbers

Concept

Imaginary numbers extend mathematics beyond the real number line by introducing the quantity i , defined as the square root of negative one. What first appears impossible becomes entirely consistent within a broader mathematical framework.

Behaviour

The familiar gradually gives way to a new geometry. Existing rules are not abandoned; they are extended. Relationships that seemed contradictory reveal themselves as perfectly coherent when viewed from a different perspective.

Interpretation

This composition deliberately shifts the listener away from conventional expectations of musical space. Harmonies, textures and movement suggest that another dimension has quietly become available. Nothing supernatural occurs. The system itself has simply become larger than it first appeared.

The track number itself is presented as $6i$, reflecting the moment at which the album steps beyond the purely real.

Reality quietly acquires another dimension.

7. π

Concept

The constant π expresses the relationship between a circle's circumference and its diameter. Its decimal expansion continues without repetition or termination, making it both irrational and transcendently familiar. It appears throughout mathematics, physics and engineering wherever curvature and periodic behaviour emerge.

Behaviour

Motion continues without exact repetition. Familiar patterns return altered, suggesting cycles that never quite close. The journey possesses continuity without completion, giving the impression of travelling around a path whose destination is perpetually deferred.

Interpretation

The composition avoids exact loops while maintaining a strong sense of continuity. Musical ideas evolve rather than repeat, creating the impression of perpetual motion around an invisible centre. The displayed duration of the track has been set to **3:14**, a small acknowledgement of the constant from which it derives its identity.

The accompanying artwork quietly references the classical approximations $\approx 22/7$ and $\approx 355/113$, reminders that while π may be approximated, it is never fully captured.

The circle always closes. The number never does.

8. ☞ — Chaos

Concept

Chaos describes deterministic systems whose long-term behaviour becomes extraordinarily sensitive to tiny changes in their initial conditions. The governing rules remain simple; prediction does not.

Behaviour

Order is continually present, yet increasingly difficult to perceive. Small events produce disproportionate consequences. Apparent randomness emerges not through chance, but through the accumulation of deterministic interactions.

Interpretation

The composition develops through continual divergence. Familiar structures repeatedly begin to form before being redirected by subtle alterations elsewhere in the musical landscape. The listener may sense underlying organisation without ever becoming entirely certain of it.

The rules never changed. Only the consequences did.

9. $\aleph_0$ — Countable Infinity

Concept

Aleph-null ($\aleph_0$) denotes the smallest infinity: the cardinality of the natural numbers. Although infinite, its members remain individually identifiable and may be placed into one-to-one correspondence. It is an infinity that can still be counted, even though the counting never concludes.

Behaviour

Expansion never reaches completion, yet every individual element retains its place within the structure. New arrivals require no reconstruction; accommodation is always possible.

Interpretation

Inspired in part by Hilbert's famous thought experiment, the composition continually suggests that additional musical events can be incorporated without disturbing those already present. Growth is limitless, yet remains remarkably orderly. Infinity appears not as overwhelming vastness, but as perpetual accommodation.

There is always room for one more.

10. ∞ — Infinity

Concept

Infinity is not a destination but an idea. It resists completion, measurement and finality. Unlike countable infinity, it no longer concerns individual elements, but the absence of any meaningful boundary.

Behaviour

No beginning or ending possesses special significance. Scale becomes irrelevant. Progress ceases to imply arrival, and continuation becomes the defining characteristic.

Interpretation

The final numbered composition abandons the notion of finite destination. Musical development occurs across immense spaces without suggesting conclusion or closure. When the composition ends, it does so only because the recording ceases, not because the mathematical idea has been exhausted.

The horizon never arrives.

11. $e^{(i\pi)}+1=0$

Concept

Euler's Identity is frequently described as one of mathematics' most remarkable relationships. Within a single equation it unites five of the most fundamental constants and operations in mathematics:

- e — exponential growth
- i — the imaginary unit
- π — geometry and periodicity
- 1 — unity
- 0 — nothingness

Ideas that appear unrelated are revealed to be different expressions of the same underlying mathematical reality.

Behaviour

The composition does not introduce another mathematical world. Instead, it allows previously separate behaviours to converge. Distinctions gradually lose their importance as independent structures reveal an unexpected compatibility. Complexity is not removed; it is recognised as belonging to a single coherent system.

Interpretation

Unlike the preceding tracks, this composition is intentionally retrospective. It is less concerned with presenting a new concept than with suggesting that the concepts already encountered may never have been entirely separate.

Nothing within the album is quoted directly. No previous composition is repeated. Yet the hidden track attempts to leave the listener with the impression that every mathematical landscape explored throughout the album may have been viewed through different windows onto the same underlying structure.

For this reason the track carries no descriptive title.

Only the equation itself.

Separate truths quietly discover they have always been the same truth.

Marginalia

The following observations are intentionally non-essential.

Their absence would not alter the music.

Their presence may reward curiosity.

- Track 6 is identified as **6i**, reflecting the transition into the complex plane.
- Track 7 has a displayed duration of **3:14**.
- The artwork for π contains the historical approximations $\approx 22/7$ and $\approx 355/113$.
- Several illustrations contain subtle mathematical references beyond those described here.
- The hidden track is identified only by its equation.
- The artwork becomes progressively more complex throughout the album, mirroring the increasing abstraction of the mathematical ideas explored.
- The track order follows an intentional progression from foundational mathematical assumptions toward increasingly abstract structures before converging in Euler's Identity.



Every proof begins with an assumption.