

Mandelbrot Metal 3

Frequently Asked Questions

Version 3 begins with a faster deep-zoom engine and a fair Free + Pro model, then expands into a complete scene and motion system across five qualified releases.

This customer-facing master distinguishes features implemented for v3.0 from later v3.x roadmap work. Prices are U.S. reference prices; the App Store display is authoritative.

Version 3 at a glance

What is Mandelbrot Metal 3?

Mandelbrot Metal 3 is a five-release evolution of the app's rendering and creation architecture. Version 3.0 introduces Infinity Engine v1 and the new Free + Pro model. Versions 3.1 through 3.4 then add deeper acceleration, scene and motion tools, more fractal families, accessibility improvements, and final system qualification.

When will the Version 3 releases arrive?

The roadmap uses an eight-week engineering cadence, with each phase intended to ship as a useful release: 3.0 Infinity Foundation & Commerce, 3.1 Deep-Zoom Acceleration, 3.2 Creation System, 3.3 Breadth & Access, and 3.4 Reliability & Qualification. The cadence is a planning target; performance, fidelity, migration, accessibility, commerce, and App Store review remain release gates.

Which devices and operating systems does v3 support?

The current v3 app target supports iPhone and iPad running iOS or iPadOS 26 or later. Rendering performance, maximum practical output size, and thermal behavior vary by device. Recent Apple-silicon devices provide the strongest deep-zoom and high-resolution experience.

Is there a Mac version?

Not yet. Version 3.0 through 3.4 is focused on iPhone and iPad. A native macOS edition remains a possible direction after the v3 release series is qualified and shipping.

Infinity Engine and deep zoom

What is the Infinity Engine?

The Infinity Engine is Mandelbrot Metal's GPU-first deep-zoom renderer. It builds a high-precision reference orbit on the CPU, uploads that orbit to Metal, and evaluates reference-relative perturbations for each pixel on the GPU. Difficult pixels automatically restart through a higher-precision recovery path, while failed or unusable Metal work falls back to the proven 2.x deep renderer.

What is the Version 3.0 zoom ceiling?

Version 3.0 raises the validated Mandelbrot ceiling from 10^{16} to 10^{25} magnification. Navigation, bookmarks, history, the HUD, and rendering all share that same enforced boundary. Useful detail within the range remains scene-dependent.

Does v3 use arbitrary-precision math?

No. Infinity Engine v1 uses adaptive finite precision: a CPU double-double reference orbit and Metal quad-single expansion arithmetic for per-pixel perturbation and recovery. This goes beyond ordinary Double precision and supports the validated 10^{25} range, but it is not a general arbitrary-precision library.

How much faster is the Infinity Engine?

In a ten-scene, full-frame physical-device benchmark on an iPhone 17 Pro Max, v3.0 averaged 42.419 seconds versus 203.890 seconds for v2.2.3: a 4.81x aggregate speedup and a 79.2% reduction in elapsed time. Earth Elephants improved from 12.245 seconds to 3.714 seconds (3.30x). Shallow GPU scenes remained close to parity. Results vary with device, operating system, scale, iterations, lighting, thermal state, and scene complexity.

What happens if the new renderer is slower or cannot complete a scene?

Correctness comes first. Infinity work is benchmark-gated and monitored. A valid completed frame is kept even when it is slower than a diagnostic target; a failed or unusable Metal command opens a fallback circuit and redraws with the established deep renderer. Shallow and intermediate Metal paths are not replaced unless the new path meets its output and performance requirements.

Do Free and Pro use different rendering quality?

No. Free and Pro use the same rendering engine, precision selection, built-in palettes, and Infinity safeguards. Zoom depth, numerical correctness, and rendering speed are not paid gates. Pro adds authoring, organization, lighting, and production-output capabilities.

Free, Pro, and existing customers

What is included in Free?

Free includes full-speed Mandelbrot and Julia exploration, the validated 10^{25} Infinity Engine range, the complete built-in palette library, up to five saved bookmarks, and canvas-resolution PNG capture. It does not use a reduced-quality renderer.

What does Pro add?

Pro removes the bookmark limit and unlocks photo palettes and custom color tools, 3D lighting, and 4K, 6K, 8K, and custom-size PNG capture. It also includes the v3 Pro creation features as they are released, including scene documents and motion/video tools planned for later v3 updates.

How much does Pro cost?

The current U.S. reference prices are \$2.99 per month, \$19.99 per year, or \$39.99 for a one-time Pro Lifetime purchase. The price shown by the App Store in the upgrade screen is authoritative and may vary by storefront, currency, tax, or future catalog changes.

I already own Mandelbrot Metal 2.x. Do I have to pay again?

No. Customers whose original App Store acquisition is verified as predating the v3 Free + Pro boundary receive permanent Legacy Pro access at no additional charge. Legacy Pro unlocks the same feature set as Pro Lifetime. If the entitlement does not appear automatically, use Restore Purchases from the Pro screen.

What is the difference between Monthly, Annual, Lifetime, and Legacy Pro?

Monthly and Annual provide the same Pro features while the subscription remains current. Lifetime is a one-time purchase that permanently unlocks Pro. Legacy Pro is the permanent entitlement granted to verified pre-v3 owners. The plans differ in billing and duration, not in rendering or feature quality.

Can I cancel a subscription or restore a purchase?

Yes. Monthly and Annual subscriptions can be managed through the App Store, and access continues through the paid period. Restore Purchases asks the App Store to re-check current subscriptions, Lifetime, and Legacy Pro eligibility. Existing bookmarks are preserved if Pro access ends; Free simply prevents creating more once the five-bookmark limit has been reached.

Does Pro support Family Sharing?

The v3 commerce design enables Family Sharing for eligible Pro purchases, subject to the purchaser's Apple Family Sharing settings and App Store rules in the current storefront.

Exploring, creating, and sharing

Which fractals can I explore in v3.0?

Version 3.0 includes Mandelbrot and Julia exploration. A curated collection of additional fractal families is planned for v3.3, with consistent navigation, coloring, bookmarks, scenes, and export rather than a collection of disconnected formula demos.

Can I create or import palettes?

Everyone can use the complete built-in palette library. Pro adds the custom palette workflow, including creating and refining palettes from photos and using imported or saved custom color assets. The command-line photo2palette utility remains available for compatible palette workflows.

How do bookmarks work?

A bookmark preserves the fractal family, precise center, scale, iterations, palette, contrast, Julia parameter, and related appearance state. Free can create up to five bookmarks; Pro has no bookmark limit. Bookmark packs can be exported and imported for backup or sharing, and v3 preserves compensated center data needed for navigation beyond ordinary Double precision.

What image sizes can I export?

Free can save the current canvas as a PNG. Pro can render 4K, 6K, 8K, and custom-size PNG output. High-resolution capture is a new render at the requested dimensions, so it can take longer and use more memory than the live canvas.

Will my v2 bookmarks and palettes still work?

Version 3 reads existing bookmark and palette data and retains legacy defaults when newer precision fields are absent. The migration goal is to preserve coordinates, manual iterations, palette identity, and appearance. Later scene-document releases extend this state rather than invalidating the existing library.

Do I need an internet connection?

Core exploration, rendering, bookmarks, palettes, and local capture run on the device. Internet access is needed for App Store purchases and restoration, downloading app updates, opening online resources, and sharing through online services. Photo access is requested only when you choose an image-based palette or save to Photos.

Will deep rendering heat the device or use more battery?

It can. Very deep, high-iteration, supersampled, 3D, or high-resolution renders are sustained GPU workloads. Version 3 uses bounded Metal scheduling, adaptive quality, and thermal-aware release qualification, but the device may still warm and battery use will rise during demanding work. Performance varies by hardware and thermal state.

The rest of the v3 release series

Are scene documents, animation, and video export included in v3.0?

Not as finished user-facing tools. Version 3.0 establishes the scene schema and entitlement architecture. Version 3.2 is planned to ship complete scene documents, autosave, editable motion and keyframes, deterministic video export, and reusable color and material state. These will be Pro creation features when released.

What is planned after v3.0?

Version 3.1 targets extended reference coordinates, block-linear approximation, orbit reuse, diagnostics, and wider device qualification. Version 3.2 adds the deterministic creation system. Version 3.3 expands fractal breadth, workspace discovery, accessibility, input support, and migration. Version 3.4 freezes formats and completes documentation, device-matrix validation, thermal tuning, and production qualification.

Is v3 localized and accessible?

The v3.0 interface and commerce text are localized across the app's 16 supported languages. VoiceOver, Dynamic Type, keyboard and pointer input, reduced motion, contrast, focus order, and terminology are active engineering requirements, with the complete accessibility and input pass scheduled as a major v3.3 release gate.

Where can I find the technical details?

The Mandelbrot Metal v3 Technical White Paper documents the mathematical model, coordinate mapping, precision representations, perturbation recurrence, Infinity scheduling, fallback behavior, color pipeline, persistence, StoreKit entitlement model, and benchmark method. The public roadmap separates implemented v3.0 behavior from planned v3.1-v3.4 work.

Publishing note

For the website, keep the question wording and FAQPage structured data synchronized. Review release dates, supported operating-system versions, App Store prices, and roadmap status before each public update.