

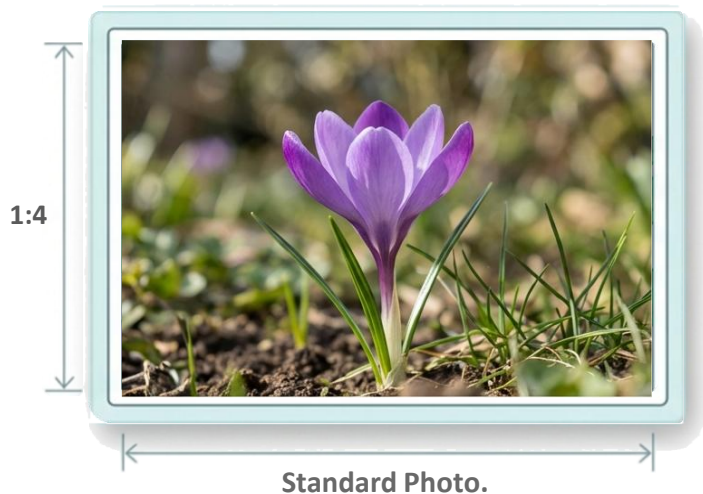
THE MACRO WORLD

Images at 1:1 Magnification.

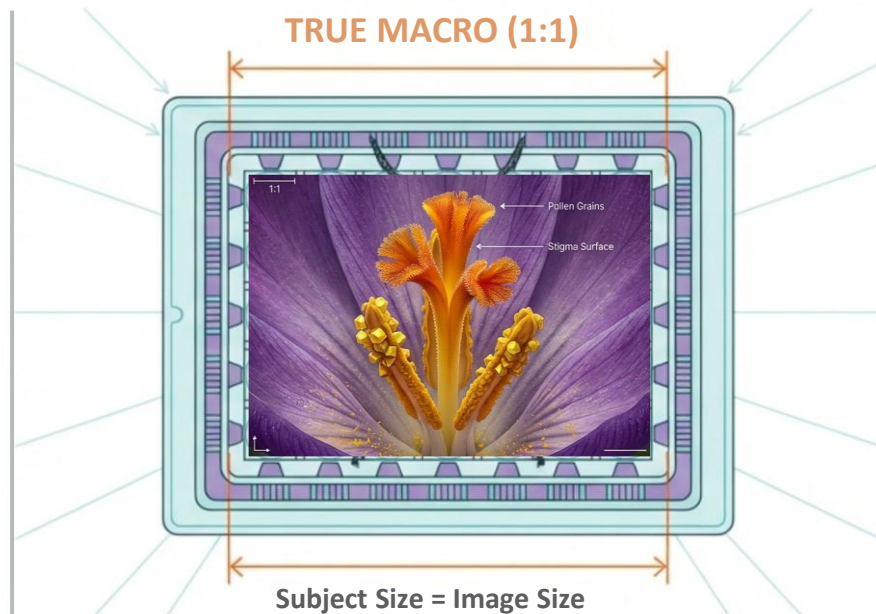


Defining the Mission: 1:1 Magnification

CLOSE-UP (1:4)



TRUE MACRO (1:1)



1:1 RATIO:

Life-size magnification where subject size equals sensor projection.

THE GOAL:

Revealing architectures invisible to the naked eye.

THE CHALLENGE:

At this scale physics puts up barriers.

Physics Barrier #1: The Light Crisis

High Magnification

Effective Light



THE 'BELLOWS FACTOR'

As the lens moves away from the sensor to focus closer, light intensity drops according to the inverse square law.

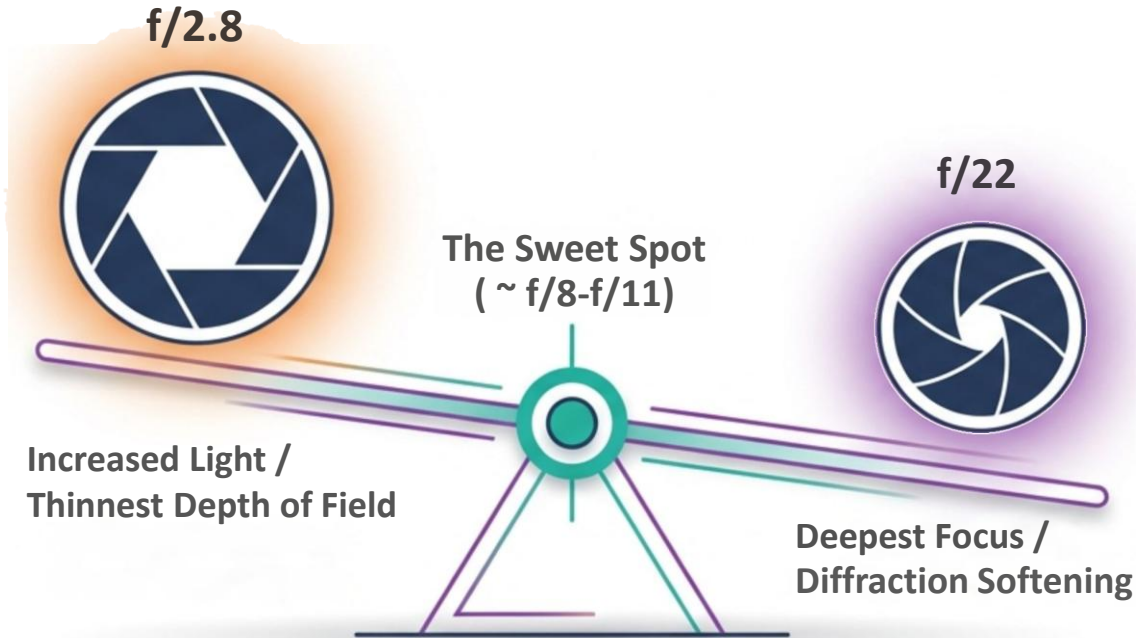
An aperture of $f/2.8$ behaves like $f/5.6$ or $f/8$ in terms of light transmission at 1:1.

But mitigating this has a cost:

Increasing ISO introduces noise, reducing clarity

Extending shutter speeds risks blur from camera vibration or a moving subject

Physics Barrier #2: The Depth vs. Diffraction Trap

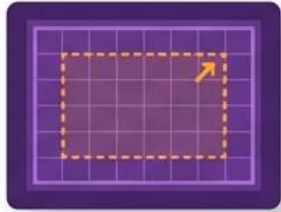


- **THE DILEMMA:** You want everything in focus, but physics demands a compromise.
- **THE RAZOR'S EDGE:** At 1:1, depth of field is measured in fractions of a millimeter.
- **THE COMPROMISE:** Closing the aperture increases depth but destroys sharpness due to interference (Diffraction).

Equipment Options



The Entry Level: Filters & Crops



Technique A: The Crop

Concept: Shoot wide with high-res sensors, crop in post.

Pro: Free and offers the easiest depth of field.

Con: Massive loss of resolution and file detail.

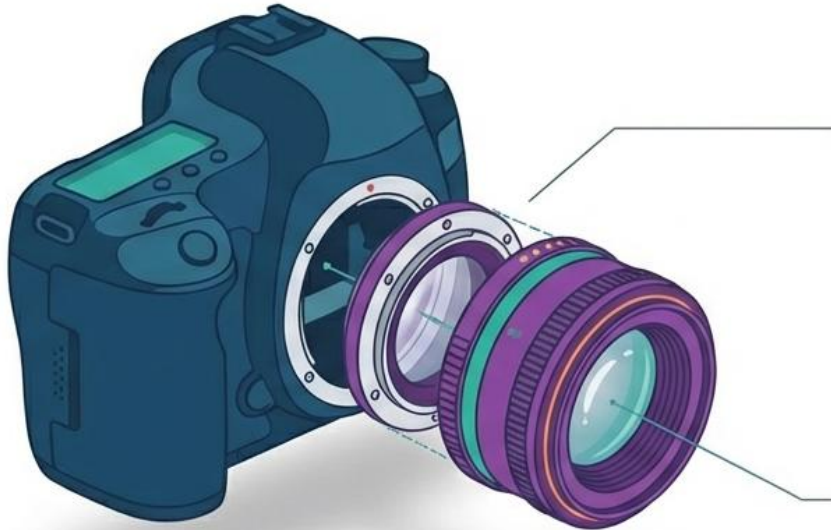


Technique B: Diopters

Concept: A 'magnifying glass' for your lens front element.

Trade-off: Keeps auto-functions but softens edge sharpness.

The Optical Hacks: Reversing & Coupling



The Reversing Ring

Mounts a standard 50mm lens backward.

Result: High magnification

Cost: Exposed rear element, no aperture control, manual focus only.

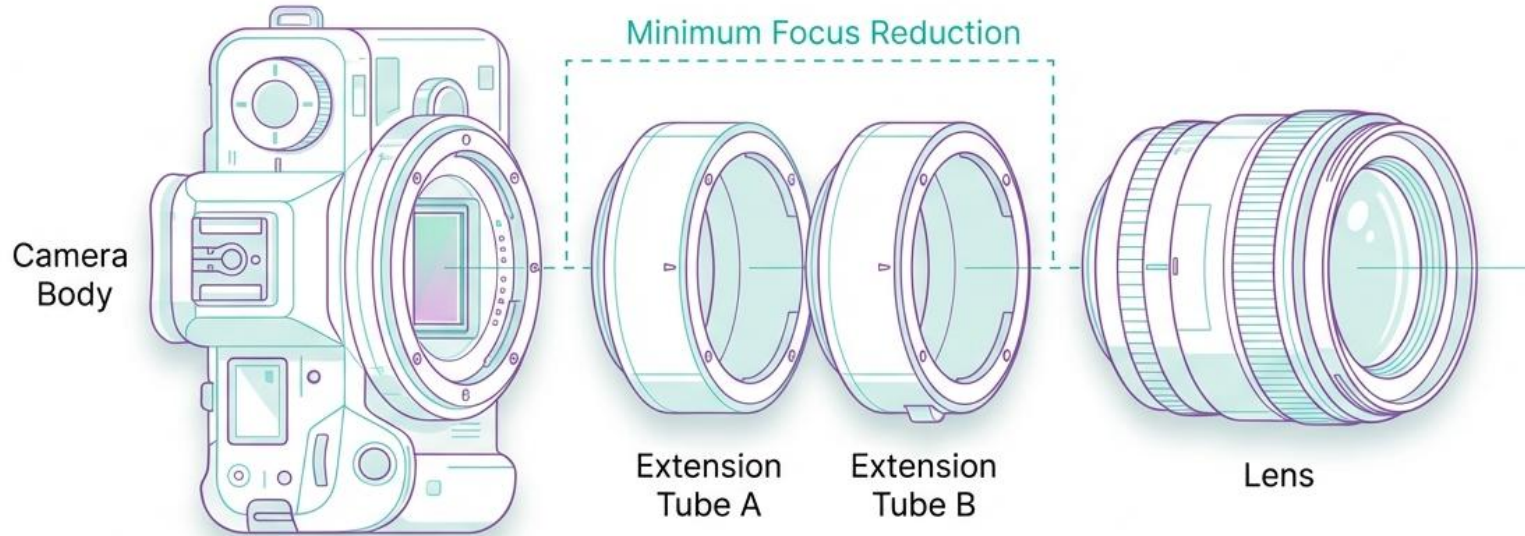
The Coupling Ring

Mounts a reversed lens face-to-face onto a telephoto lens.

Result: Extreme microscopy levels.

Cost: The **Bellows Factor**—dark viewfinder, heavy vignette, extremely difficult handling.

The Gap Bridgers: Extension Tubes



- **The Air Advantage:** Tubes contain no glass; optical quality is preserved.

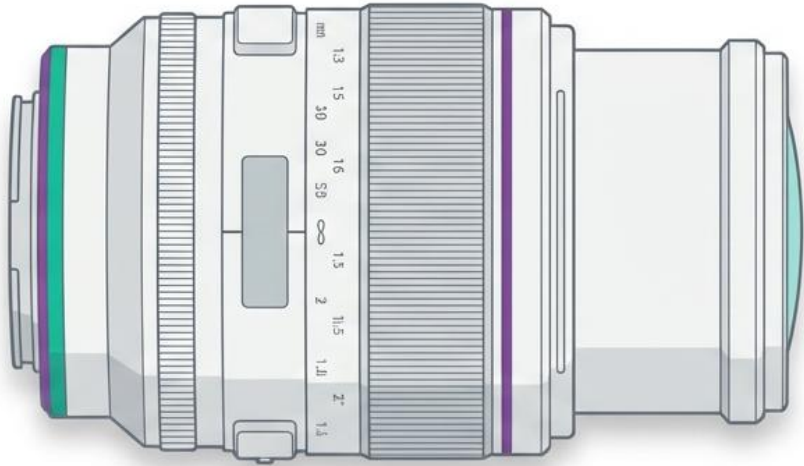


- **The Physics Tax:** Significant light loss (Bellows Factor).



- **Focus Limit:** Loss of infinity focus; macro work only.

The Gold Standard: Dedicated Macro Optics



Dedicated Macro Lenses are designed for flat-field sharpness at 1:1, offering the sharpest results and easiest workflow.

Your Best Friends

Whatever your choice of optics, these will help to get better results

Flash

Adds light and freezes motion.

Tripod

Stabilise the camera. Use a beanbag as an alternative.

Remote Release

Hands-off the shutter button. Otherwise use the timer.

Electronic Shutter

Avoid shake from the mechanical shutter.



Your Mission This Month



Training Ground: The Kitchen Safari



Field Work: The Garden Safari

Environmental Challenges

1. **WIND:** The enemy of macro. Wait for the lull or clamp the stem.
2. **TEMPERATURE:** Shoot early morning when insects are cold and dormant.
3. **ETHICS:** Respect the subject. Never freeze, chill, or glue insects for a shot. The welfare of the subject > The shot.



Remember the pitfalls!



A millimeter of shake looks like an earthquake.

The Fixes



Tripod, beanbag etc.:
Fix the camera position, then focus.
or use

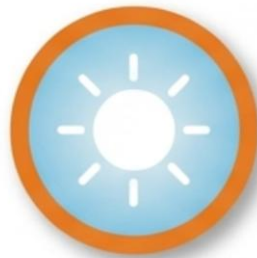


The Rocking Technique:
Set manual focus and gently rock your body to find the focus point.
Hold your breath!



Stop Shutter Shock:
Use the timer or a remote Release, and/or electronic shutter if That's an option.

Direct Flash



Strong colour
but
Specular highlights
and black shadows

Diffused Light



Natural colour and shadow
but
More exposure needed