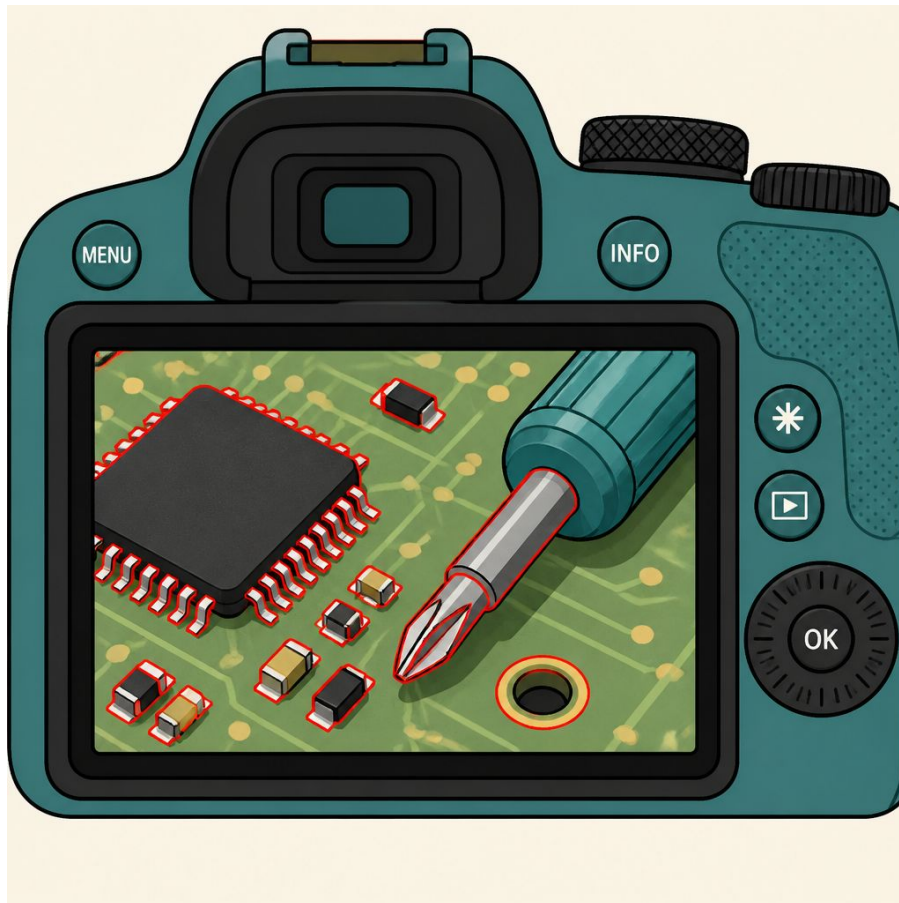


Canon R10:

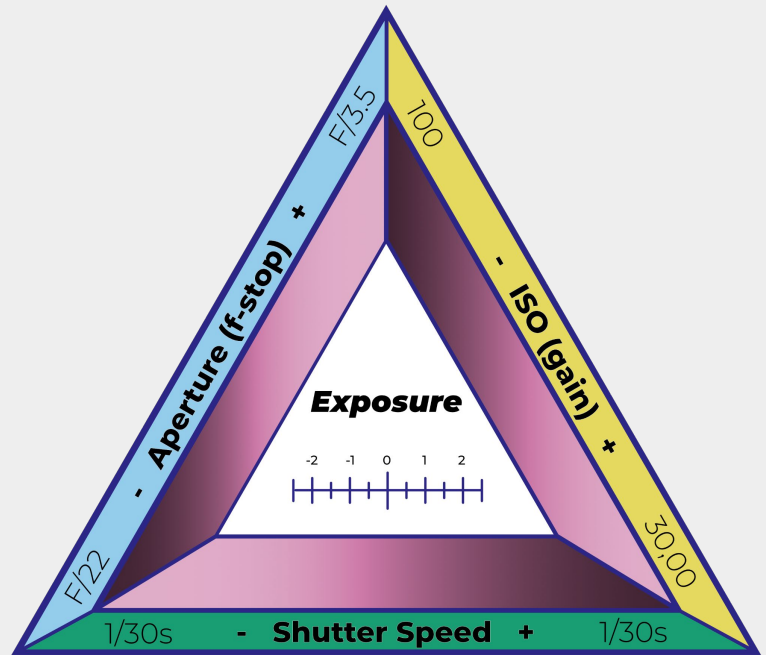
Fundamentals for Technical Photography

Makerspace Student Employee Guidebook
FS 2026



Fundamentals for Technical Photography

1. Introduction
2. The Exposure Triangle
3. Two Photo Challenges
4. Composition
5. Two Photo Challenges
6. Quick Photo Editing
7. Edit a Challenge
8. Reflection and Self-Assessment
9. Feedback
10. Optional Extra Challenges



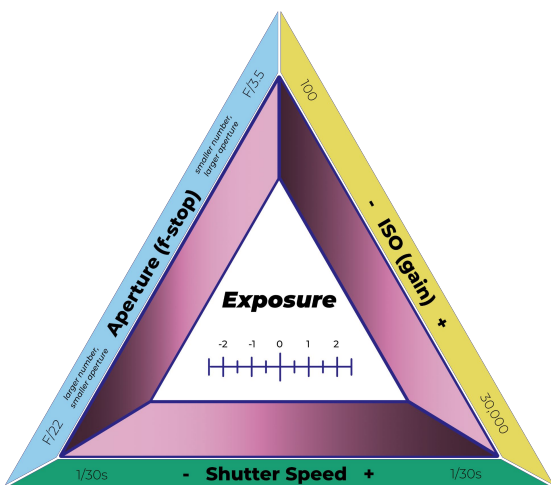
Introduction

To create effective makerspace tutorials your media must articulate the right concepts. This means **the viewer should immediately understand what they are looking at and what action** that is being performed.

The Canon R10 is our newest mirrorless camera, you'll use the R10 to explore and experiment with controlling the **"Exposure Triangle"** using **ISO**, **Aperture**, and **Shutter Speed**. You will create technical photographs that are clear, well-exposed, and focused on the right details!



Canon EOS R10 Mirrorless Camera with 18-150mm Lens. Photo from B&H Photo.



The exposure triangle, adapted by Jamie Moriarty for CEP 813.

The Exposure Triangle demonstrates that these three values are *interconnected*.

Key Terminology

ISO

The sensor's amount of sensitivity to light. Higher ISO introduces electronic noise and creates a grainy texture on the image but allows more light in.

Aperture or F-Stop

Aperture or F-Stop is the diameter of the lens opening. A larger hole increases field of depth and decreases light to the sensor. A larger hole creates a shallow depth of field but allows for more light.

Shutter Speed

The amount of time that the lens is opened and the sensor is exposed to light. Longer shutter speeds can show blur especially when used without a tripod.

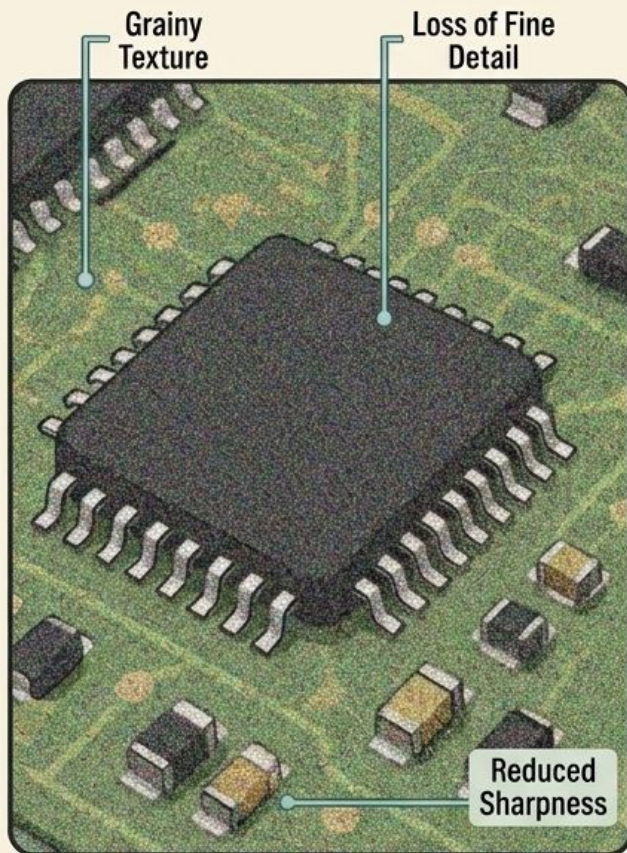
ISO PERFORMANCE COMPARISON: GRAIN vs. CLARITY

HIGH ISO (ISO 12800)

EXCESSIVE DIGITAL NOISE



High ISO



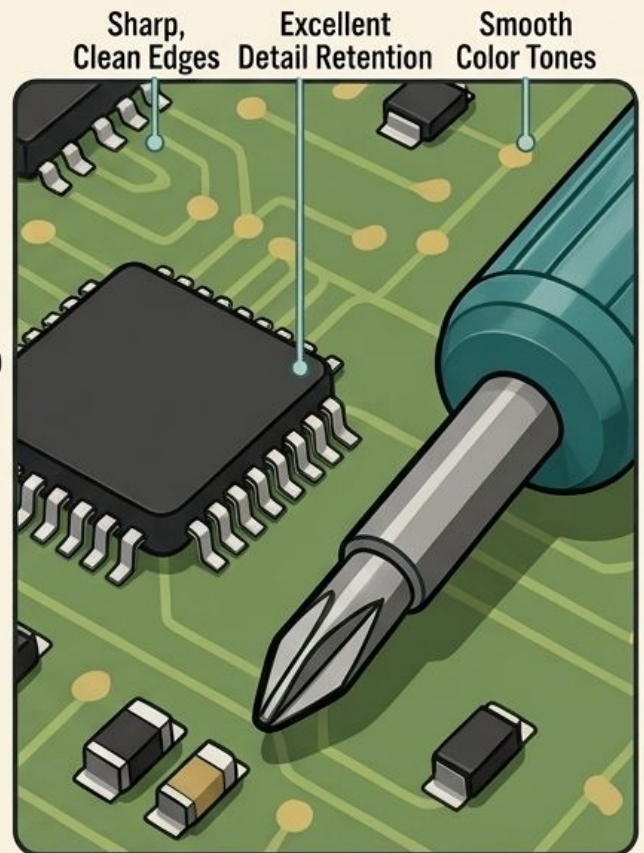
EXCESSIVE DIGITAL NOISE



Low ISO

LOW ISO (ISO 100)

CLEAR & SMOOTH IMAGE



CLEAR & SMOOTH IMAGE

IMPROVED
IMAGE
QUALITY

Higher ISO settings introduce electronic noise, creating a grainy texture and reducing clarity. Lower ISO settings minimize noise, resulting in clear, sharp, and smooth images.

Instructional Goal	Recommended Setting	Why this works for the learner
Showing what a tool looks like	ISO 100	Provides a crisp clear image. Since the photo is staged, you can add as many lights as necessary to maintain the low ISO value.
Demonstrate how to make a photo look "vintage"	ISO 1,600	Creates a lot of noise in the photo like an old film camera sort of look.

APERTURE PERFORMANCE COMPARISON: MACRO DEPTH OF FIELD & BOKEH

HIGH APERTURE (e.g., f/16)

**LARGE DEPTH OF FIELD
(FULL CLARITY)**



Small Aperture

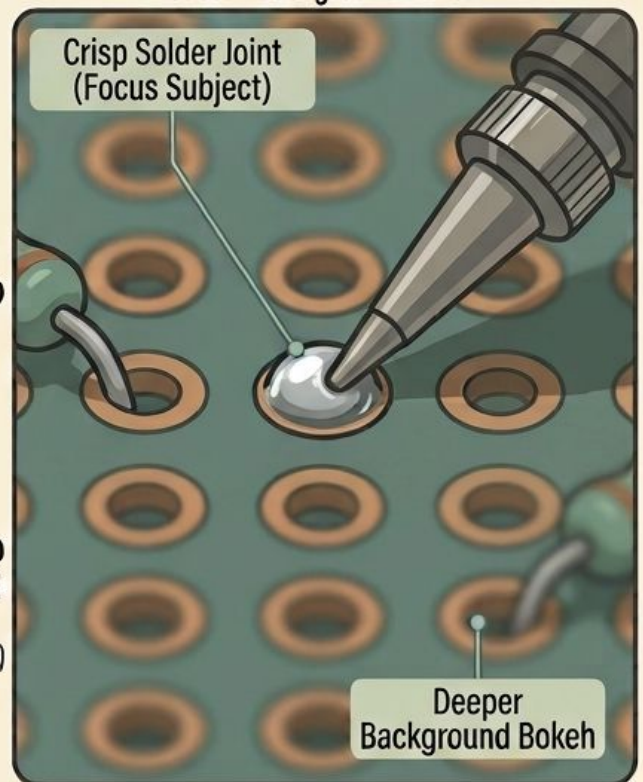
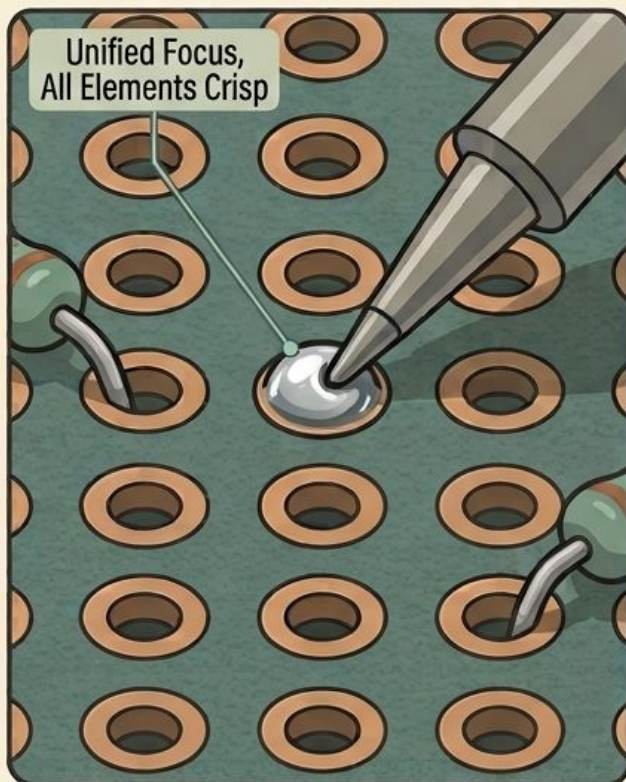


Large Aperture

LOW APERTURE (e.g., f/2.8)

**SHALLOW DEPTH OF FIELD
(FOCUS GUIDANCE)**

Pleasant Background Bokeh



←
INCREASED
DEPTH
OF FIELD

INCREASED
SELECTIVE
FOCUS
(EYE GUIDANCE)
→

Instructional Goal	Recommended Setting	Why this works for the learner
Isolate a specific button or dial	f/3.5 (large diameter)	Creates 'bokeh' (background blur) to reduce cognitive load, forcing the eye to the sharp subject.
Show all components of a tool assembly	f/11 (small diameter)	Increases depth of field so that objects in the foreground and background are both in focus. Values beyond 11 often have diminishing returns.

SHUTTER SPEED PERFORMANCE COMPARISON: MACRO MOTION vs. FREEZE

LONG SHUTTER SPEED 2"

**MOTION BLUR
(CONTINUITY & FLOW)**



Long Exposure



Fast Snap

FAST SHUTTER SPEED 1/1000

**FREEZE MOTION
(ACTION CAPTURE)**



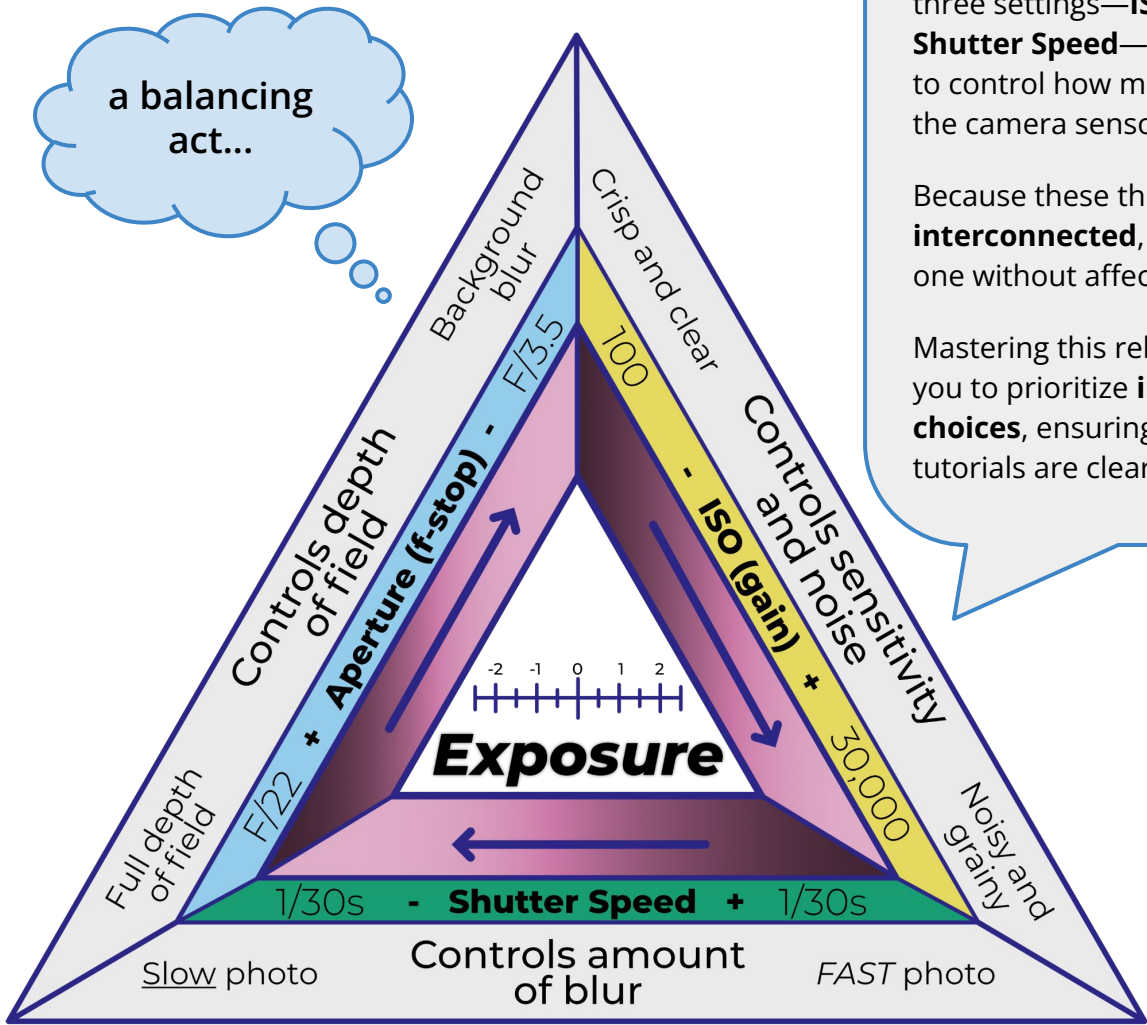
REDUCED
MOTION BLUR
INCREASED
ACTION FREEZE

INCREASED
MOTION BLUR
CONTINUITY
OF MOTION



Instructional Goal	Recommended Setting	Why this works for the learner
Show proper hand placement when sewing	1/1000 (fraction of a second)	A quick shutter speed will freeze the action in the moment without any blur which might make the image confusing to understand.
Demonstrate that the needle of a sewing machine moves faster than the fabric it sews	2" (2 full seconds)	Will show a lot of motion blur on the needle while the fabric is minimally burred. The machine stays still so it will be crisp and clear in the photo.

The Exposure Triangle



In technical photography, achieving the perfect image is a **balancing act**. The Exposure Triangle consists of three settings—**ISO**, **Aperture**, and **Shutter Speed**—that work together to control how much **light** reaches the camera sensor.

Because these three elements are **interconnected**, you cannot change one without affecting the others.

Mastering this relationship allows you to prioritize **instructional choices**, ensuring your makerspace tutorials are clear and professional.

If you need more light in your photo, there are **pros** and **cons** to each change you could make!

Setting	Pro	Con
↑ ISO	Increased ISO brightens up the scene.	Digital noise or grain. Can distort fine details.
↓ Aperture	Low number lets in more light. Creates a blurry background.	Harder to keep everything in focus. Shallow depth of field.
↓ Shutter Speed	Decreasing the shutter speed lets in more light.	Movement creates blur in the photo. You may need a tripod to keep the camera still.

The Exposure Triangle

Imagine: you are taking a photo of a 3D printer nozzle which is in the shadow of the printer itself. You need a fast shutter speed to freeze the motion, but the image is still too dark. If you keep your shutter speed fast, what setting would you adjust next, and what is the technical risk of that choice?

...add your response here...



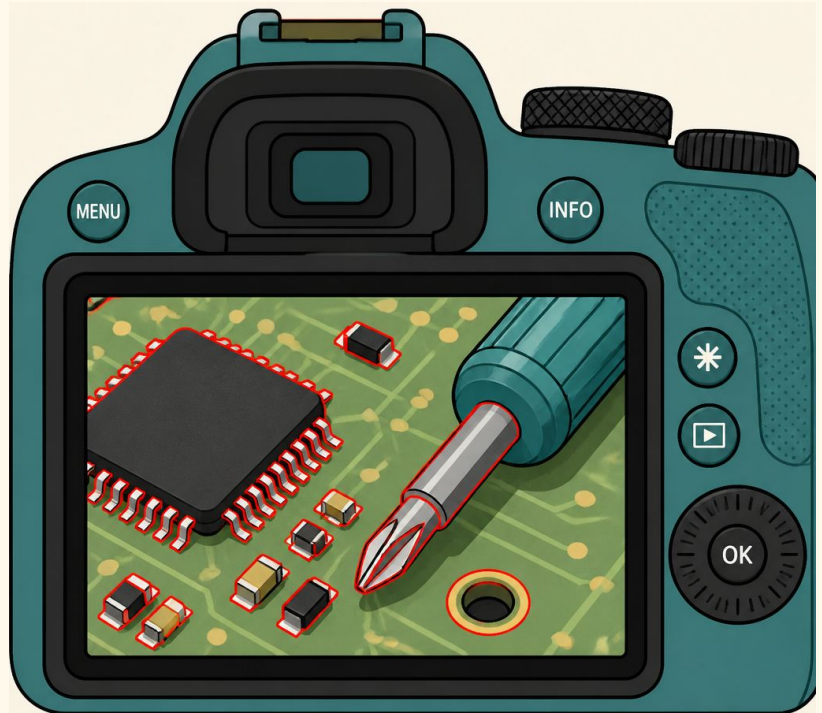
Pro-Tip!

Manual Focus with Focus Peaking

For small components like circuit boards or 3D printer nozzles, autofocus may struggle.

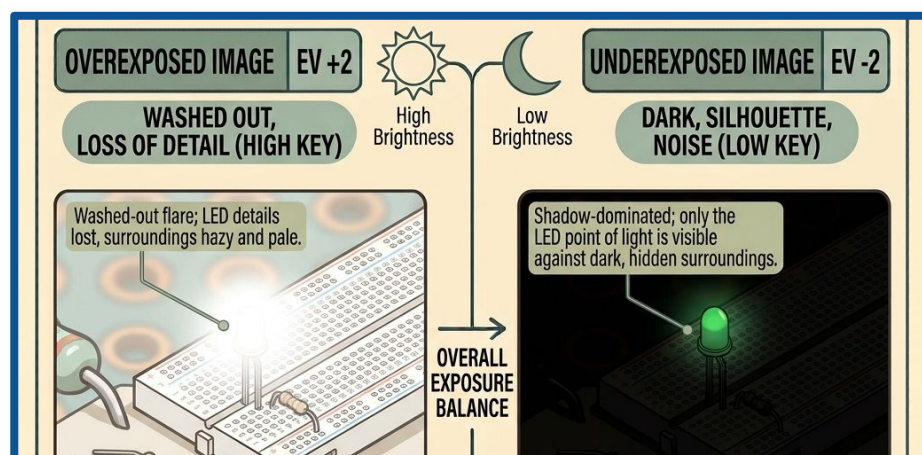
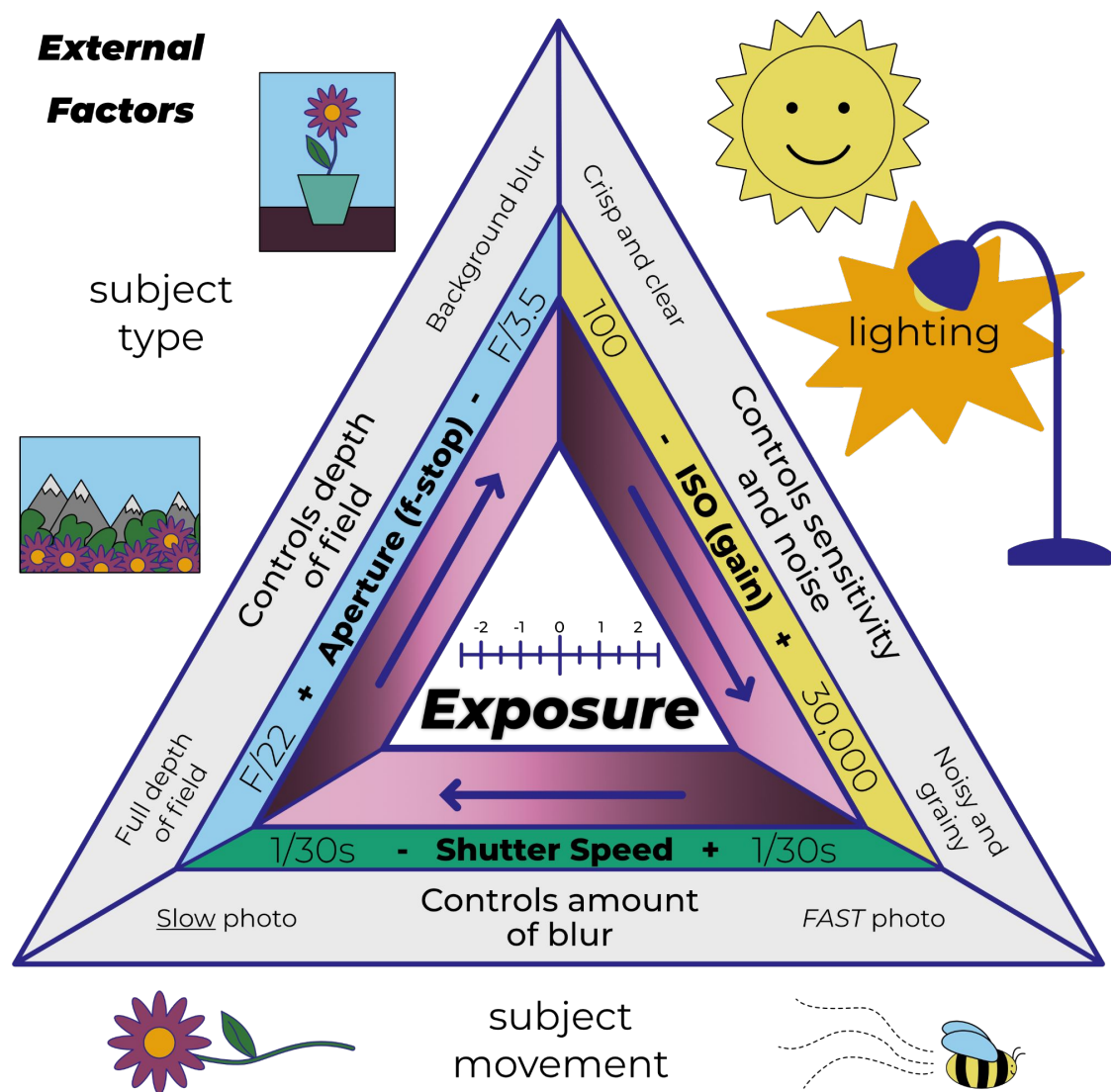
Switch your lens to **MF (Manual Focus)**. Enable **Focus Peaking** in the camera menu.

This feature highlights the edges of objects that are in sharp focus with bright pink (can be other colors) on the screen, ensuring your instructional focal point is perfectly crisp.



You'll likely need to adjust settings on the LCD screen, and with a button or switch on the front of camera and sometimes on the lens.

The Exposure Triangle: Putting it all together



Exposure can really make or break the shot!

Challenge 1: Maximum Depth of Field (Broad Focus)

Instructional Goal: Produce an overview of a multi-component workspace (e.g., a laser cutter bed or sewing) where every element from the immediate foreground to the extreme background remains in sharp focus to provide spatial context.

Technical Constraints:

- **Aperture:** Fixed at **f/11** or higher.
- **ISO:** Maintain at base (**ISO 100-400**) to minimize digital noise.
- **Exposure Compensation:** Adjust shutter speed or external lighting to maintain an even exposure.

Technical Documentation: Attach/Describe Image Output

Lead &/or Supervisor Feedback

Challenge 2: Subject Isolation

(Deep Focus)

Instructional Goal: Isolate a critical safety component (e.g., an 'Emergency Stop' toggle or zone of hazard) by utilizing a shallow depth of field. The goal is to eliminate visual clutter and direct the viewer's attention exclusively to the target component.

Technical Constraints:

- **Aperture:** Fixed at **f/3.5** (or the maximum wide opening of the lens). When zooming in, the maximum lens opening is reduced.
- **Proximity:** Get close to your component rather than using zoom (where safe to do so) in order to maximize background compression and 'bokeh' effect.

Technical Documentation: Attach/Describe Image Output

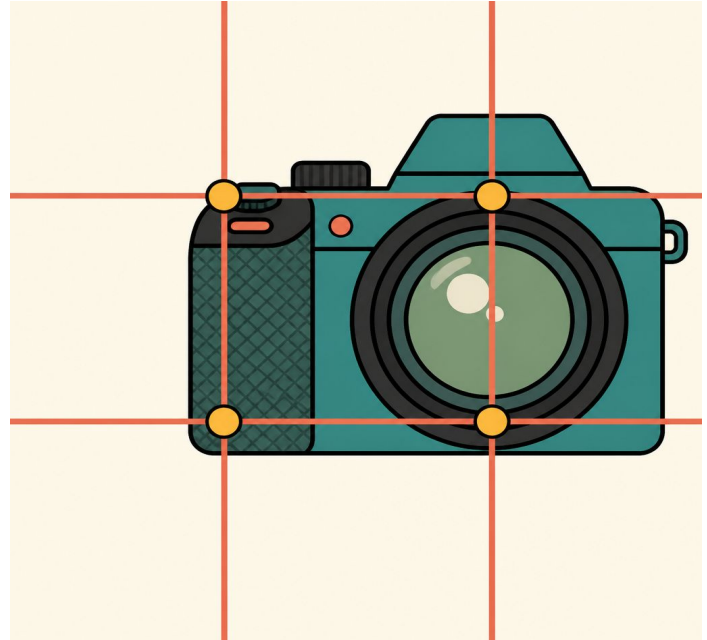
Lead &/or Supervisor Feedback

Composition: The Rule of Thirds

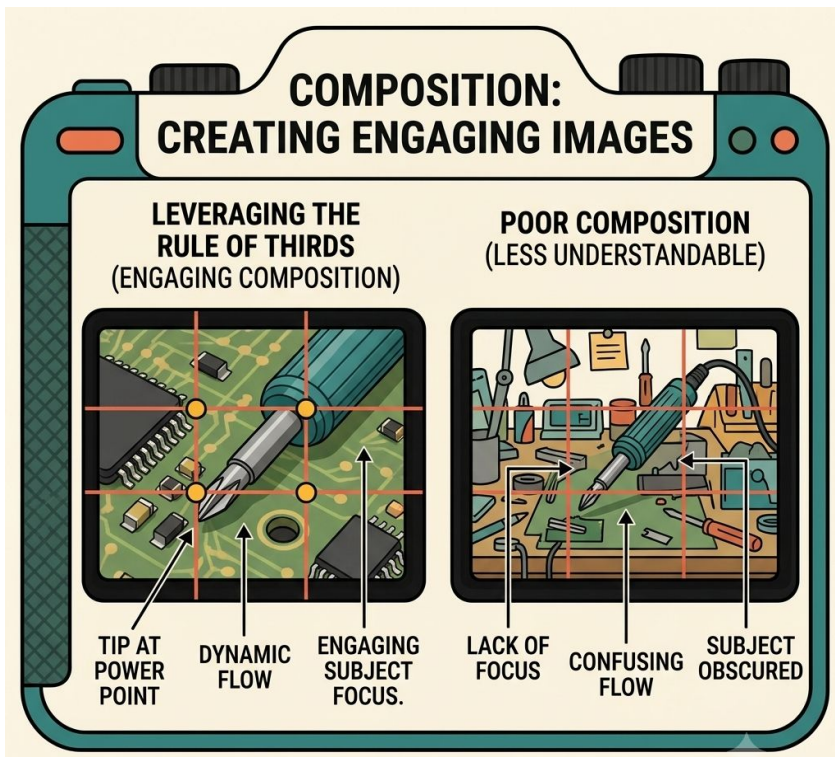
The **Rule of Thirds** is not merely an aesthetic choice but a **cognitive tool**.

By placing the primary subject—such as a specific solder joint or interface port—at the intersections of a 3x3 grid, you can **leverage natural eye-tracking patterns**. This placement allows for the inclusion of environmental context in the adjacent sectors of the frame without increasing the viewer's total **cognitive load**.

*Grid alignment for the **Rule of Thirds***



Gemini generative AI image illustrating proper composition and improper composition.



What do you think about the accuracy of this image? How could you improve either composition?

Answer or draw...

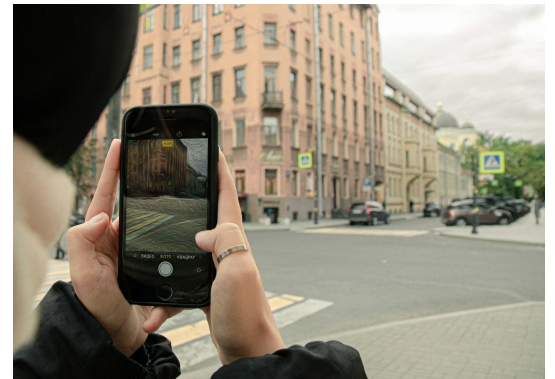
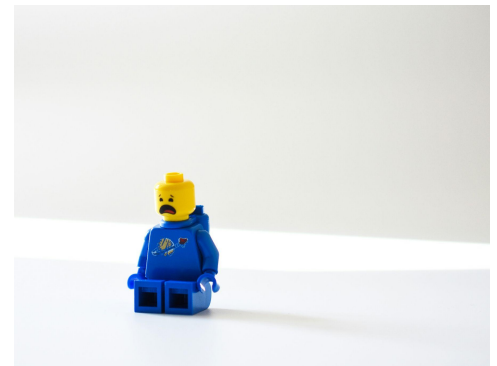
Composition

Beyond basic grid alignment, technical media requires active management of the viewer's visual processing.

Leading Lines utilize physical elements within the environment—such as a soldering iron, a probe, or even linear wiring—to create a line that points directly toward the primary subject or action. This reduces the time required for a learner to locate the focal point of an instruction.

Negative Space involves the deliberate use of 'empty' or low-detail areas within the frame. In complex assemblies, visual overstimulation can lead to cognitive fatigue; by isolating critical components against a neutral, uncluttered background, the communicator ensures that the signal (instructional data) is not lost in the noise (environmental clutter).

Perspective & POV choices define the learner's relationship to the task. Utilizing a **User-Perspective** angle—often achieved by shooting over the shoulder—helps learners map the 2D image directly onto their own 3D physical workspace, facilitating a more seamless transition from observation to execution.



Cognitive Load Reduction Summary

Leading Lines: Directs visual attention via environmental vectors, minimizing search time.

Negative Space: Isolates critical data points by removing non-essential visual stimuli.

User-POV: Reduces the mental rotation required to translate images to physical actions.

Composition Check

Technical Check: When photographing makerspace technologies for a tutorial, why is it important to prioritize a low ISO setting on the Canon R10? Discuss the potential drawbacks of using a high ISO and how these might negatively affect the 'high quality digital content' objective.

Answer or draw...

Technical Analysis: You are documenting a high-speed robotic arm in a low-light lab. You have set a fast shutter speed to ensure temporal clarity, but the resulting image shows significant luminance noise. Analyze the reciprocity required to improve image fidelity while maintaining the freeze-frame effect on the robot's motion.

Answer or draw...

Challenge 3: Capturing Time

(slow shutter speed)

Instructional Goal: Capture a high-velocity moving part (e.g., a sewing machine needle or 3D printer extruder) in mid-operation with zero motion blur. The image must provide the impression that something is moving while the surrounding environment is still.

Technical Constraints:

- **Shutter Speed:** Maximum **1/15s** or lower.
- **Exposure Balance:** Compensate for the increased light by increasing ISO or aperture. Reduce environmental lighting if needed.
- **Use a tripod:** You will not be able to stay still enough for this photo!

Technical Documentation: Attach/Describe Image Output

Lead &/or Supervisor Feedback

Challenge 3: Precision Focus

Manual focusing

Instructional Goal: Demonstrate technical precision by focusing on a micro-component (e.g., a specific solder joint or surface-mount resistor) where autofocus may hunt or fail.

Technical Constraints:

- **Focus Mode:** Manual Focus (MF) only.
- **Assist Tools:** Utilize **Focus Peaking** (High sensitivity) and **Focus Magnification** (5x or 10x) via the R10 electronic viewfinder to ensure critical sharpness on the target plane.

Technical Documentation: Attach/Describe Image Output

Lead &/or Supervisor Feedback

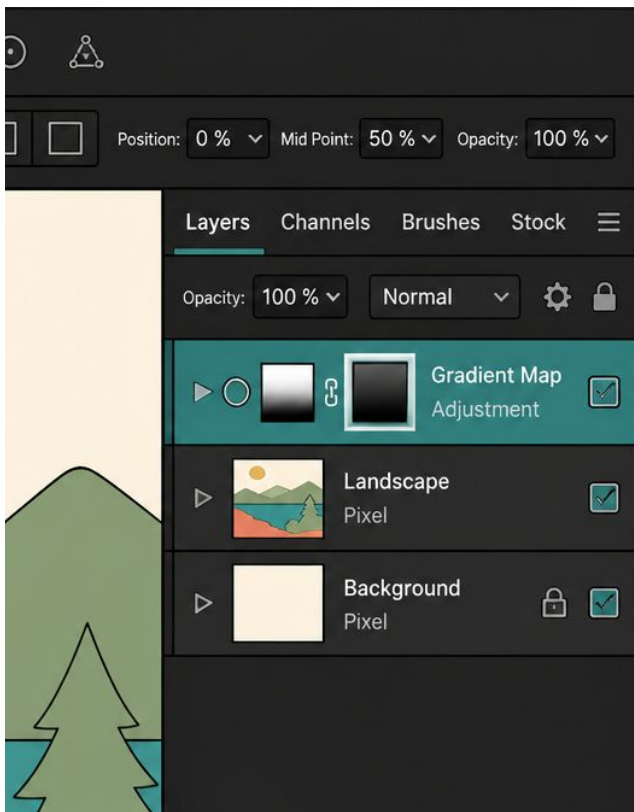
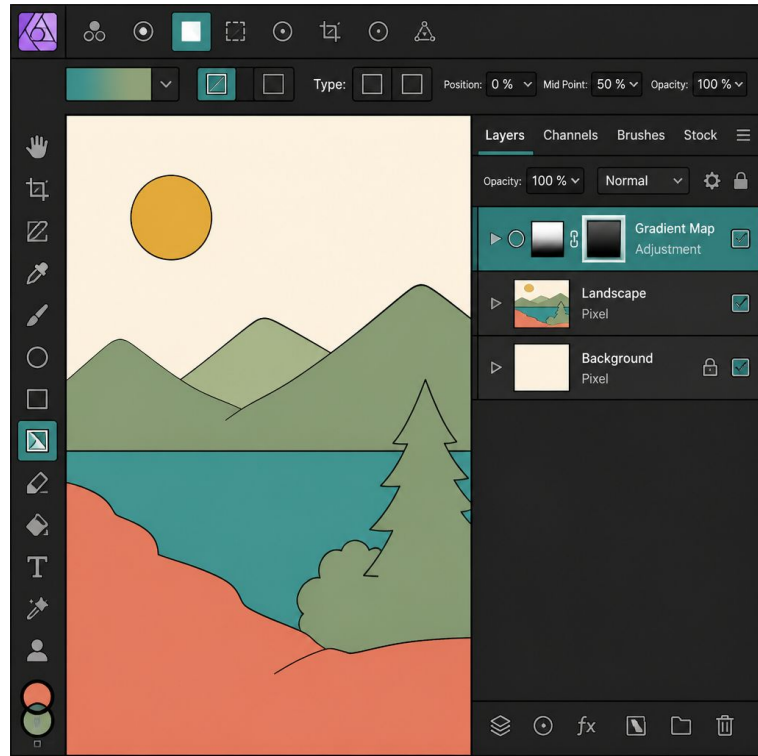
Post-Processing: Editing for Clarity

Photo software

Even with professional camera settings, photos often require adjustments to serve as effective instructional tools. After all, you can't control **everything**.

Using photo editing software like Affinity, Photoshop, [PhotoPea.com](https://www.photopea.com), Gimp, or others – you can take an almost amazing photo and make it exceptional!

We hope you haven't used photo editing software up until this point for the challenges. **If you did...** that's okay but you'll need to take new photos or use different photos for the next challenge.



If you'd like more tutorials for editing your photos in Affinity - comment and tag your supervisor!

Please take a moment to learn about this mega power tool combo:

1. Adjustment layers

Brightness/Contrast

Curves

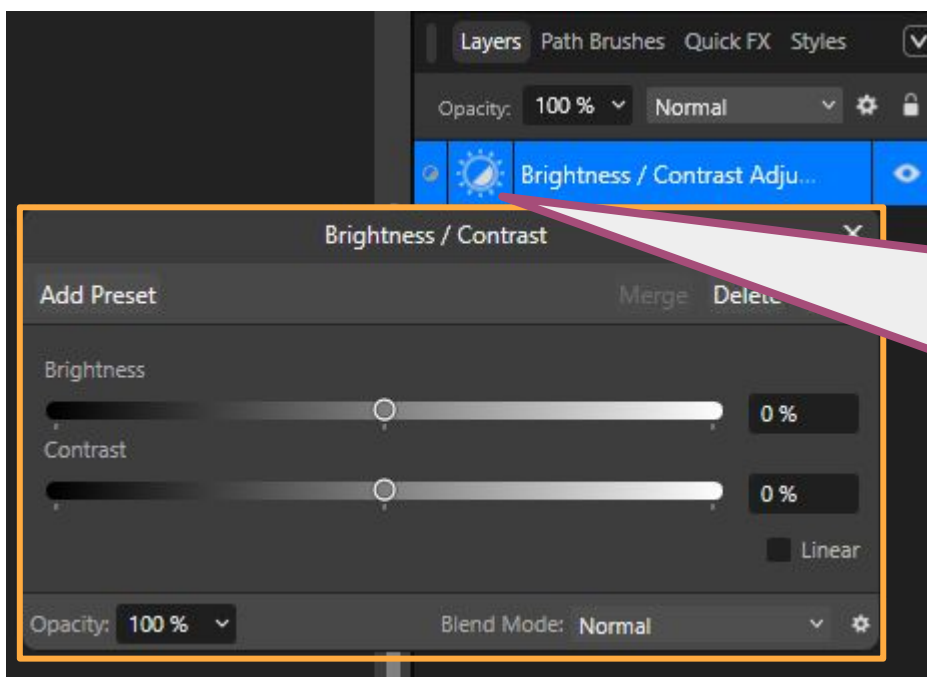
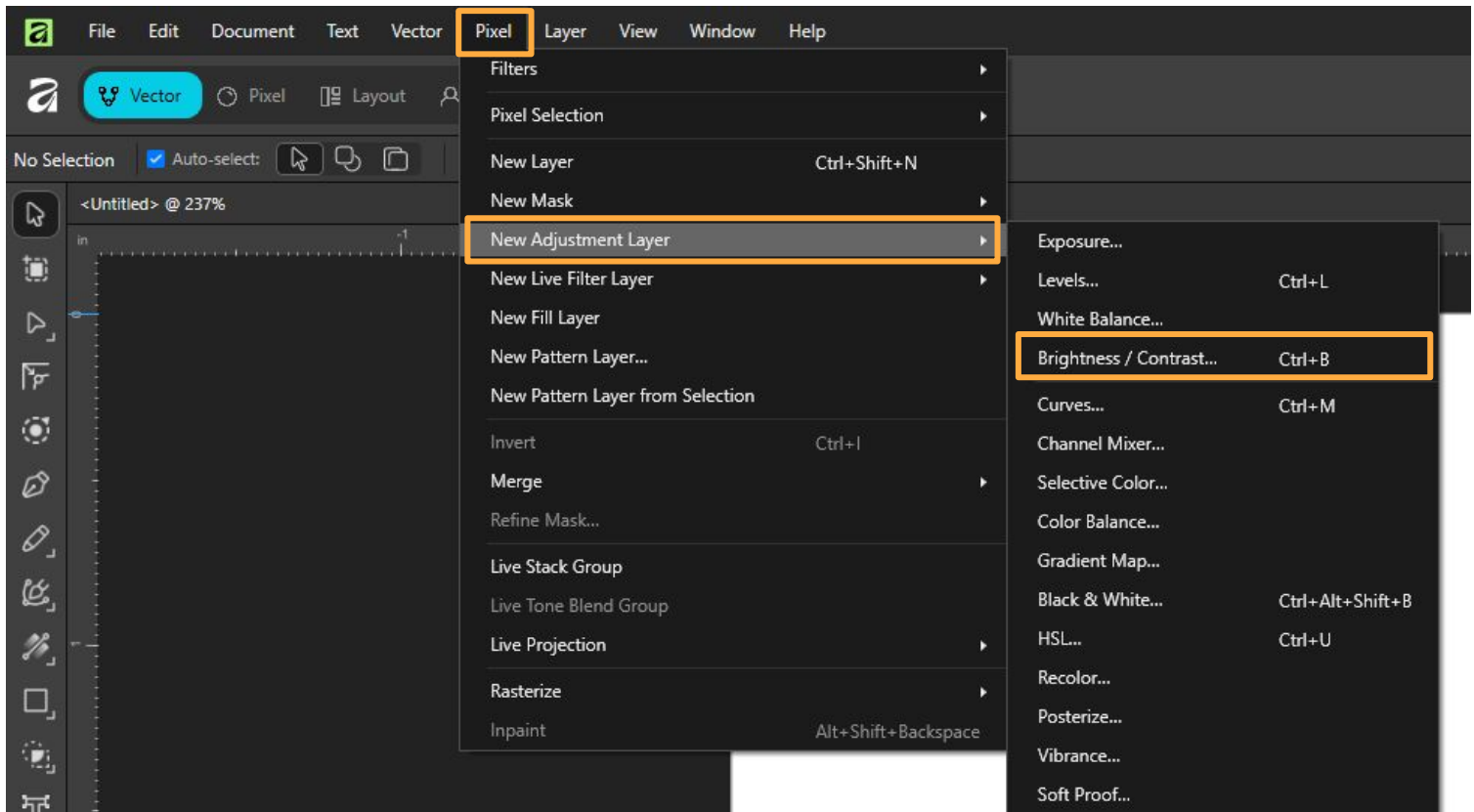
Color Balance

2. Masking layers

Using a gradient fill

Adjustment Layer

Affinity: Pixel -> New Adjustment Layer -> Brightness / Contrast...

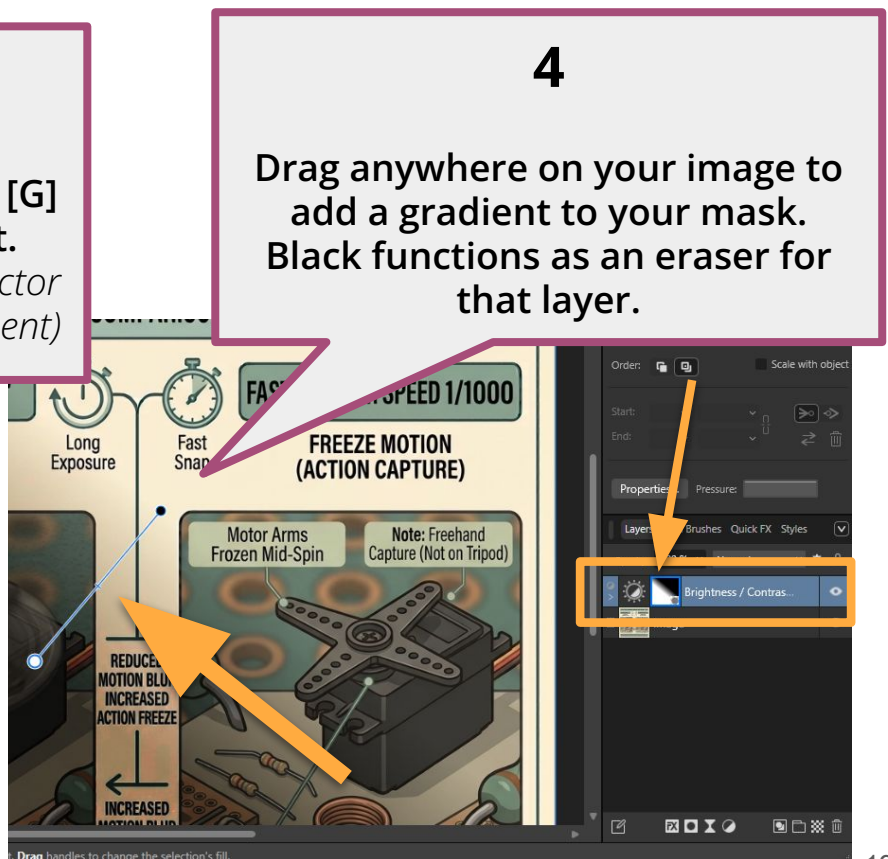
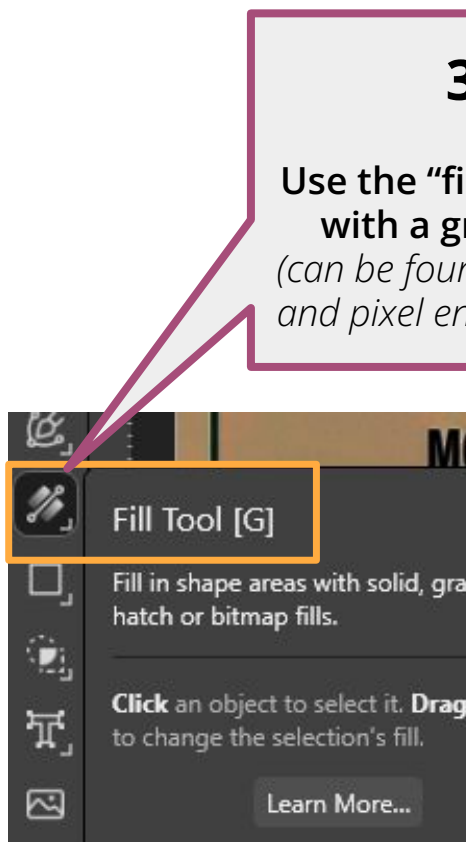
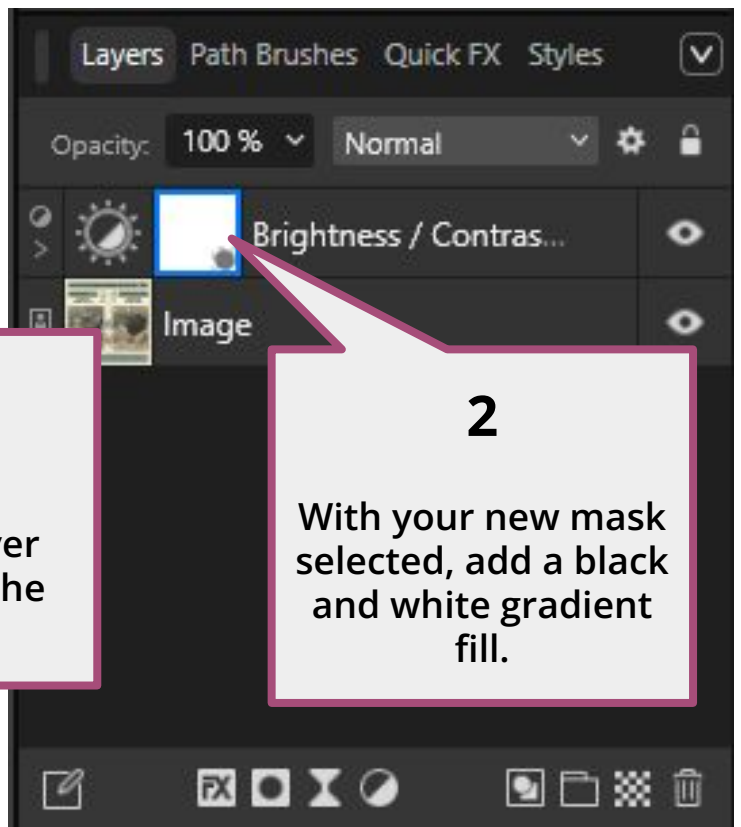
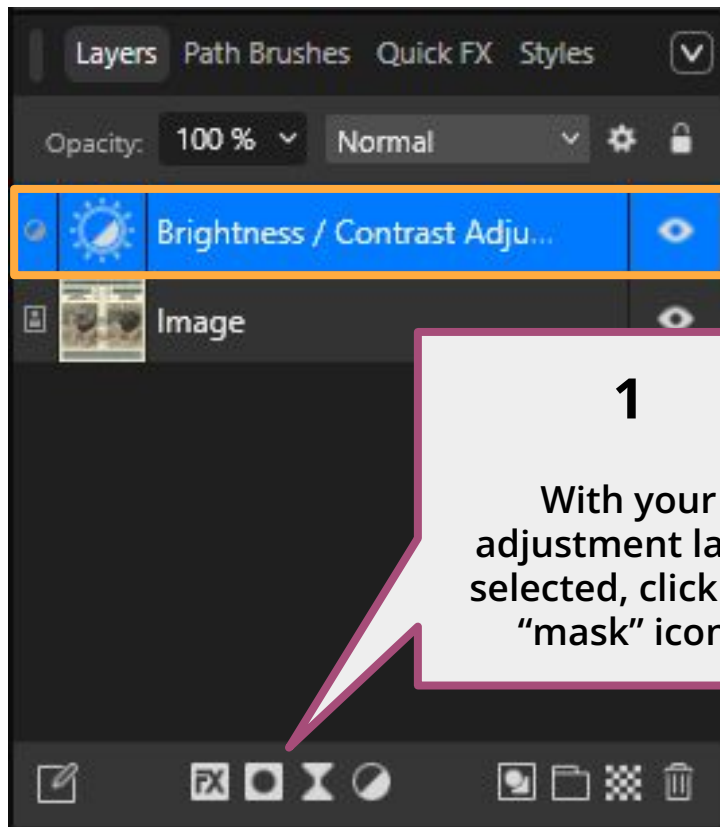


Try adjusting the brightness and contrast.

(can be found in vector and pixel environment)

You can reopen the adjustment menu at any time by clicking on the layer icon.

Add a mask to the adjustment layer



Picture Perfect: edit one of your prior challenge photos

Instructional Goal: Demonstrate software comprehension by correcting exposure, clarity, color, or composition using Affinity or a similar photo editing software that uses **adjustment layers**.

Technical Constraints:

- **Adjustment layers:** Use a photo editing software with adjustment layers to correct exposure, focus, and noise.
- **Use online tutorials:** If you get stuck, use the “Learn more...” buttons in Affinity, or search for online tutorials or videos to help guide you.

Technical Documentation: Attach photo, and describe what you changed.

Why might 'local exposure adjustments' be superior to a global brightness adjustment for instructional clarity?

Synthesis, Reflection, and Feedback

Now that you've gone on an experimental journey with photography, consider the following prompts and questions to synthesize what you have learned, and reflect on where you are going next.

Describe one image you will need to capture for your makerspace technology tutorial.

Perhaps a detail for operating the technology, a comparison of two things made in different ways or with different materials, etc. If you can't think of anything, start with how to turn on the equipment – or the very first step.

Consider the point of view, depth of field, motion, lighting, and composition. What is the main focus of the image? What is the first thing the viewer should notice?

High Level Self Reflection

Consider your challenge photos. Conduct a high-level analysis of how your specific technical choices (Aperture, Shutter Speed, and ISO) facilitated learner comprehension.

How did these choices eliminate ambiguity for the novice user?

Synthesis, Reflection, and Feedback

Self-reflection: Technical Proficiency Checklist

For each of the following categories, mark yourself as “need help” “need practice” or “ready to go.”

Technical Skill	Need Help	Need Practice	Ready to Go
Optimization of ISO settings to minimize digital noise while maintaining exposure balance.			
Strategic use of Aperture (f-stop) to control depth of field for instructional emphasis.			
Calibration of Shutter Speed to accurately capture motion without unintended blur.			
Precision manual focusing (with or without utilizing focus peaking) to ensure critical instructional components are sharp.			
Technical choices (ISO/Shutter) result in a clean, professional image free of distractions or technical errors.			
Depth of field and composition choices successfully isolate the subject to reduce learner distraction.			
The overall production quality aligns with standards for educational and corporate media.			
Other feedback or comments....			

What is one skill you'd like to continue practicing?	
What is one thing that can't be fixed using digital photo editing software?	

Synthesis, Reflection, and Feedback

Feedback from your Supervisor

Objectives	Comments
By the end of this workbook, you will be able to create high quality (good exposure, in focus, compositionally clear) digital content that will support their online tutorial.	
High quality digital content: Good Exposure	
High quality digital content: In Focus	
High quality digital content: Compositionally clear	
High quality digital content: Would support a tutorial	
<i>Overall Feedback...</i>	

Reflect	
How can proficiency with the triangle of exposure help you develop quality tutorial content?	
What is one way that you plan to reduce cognitive load through tutorial photography?	

Feedback for your supervisor

Feedback about this assessment	Comments
What was great?	
What could have been better?	
Did you learn what you hoped to learn?	
Did you learn what you needed to learn?	
What major are you in? In what ways has your prior educational experience prepared you for this guidebook?	
Feedback about this assessment	Remove any stars to rate how much this workshop helped you with each goal
Can adjust the ISO, aperture, and shutter speed to take a well exposed photo.	    
Can adjust the composition of a photo to have a clear focal point in the picture.	    
Can use the Canon R10 to capture quality media for my online tutorial	    
This was a good balance of supports and challenge.	    
This was a manageable workload.	    
The pacing was engaging, not boring and not overwhelming.	    
Overall Feedback...	

Optional Challenge 5:

High Dynamic Range (HDR)

Instructional Goal: Capture a clear, detailed image of a high-contrast subject (such as a backlit LCD interface in a dimly lit area, or highly contrasting colors such as a bright white piece of equipment next to a dark black piece of equipment...) without losing detail in the highlights or the shadows.

Technical Tip: Utilize the **histogram** to ensure no clipping occurs. Experiment with **AEB (Auto Exposure Bracketing)** or **HDR (High Dynamic Range)**. Preserve the educational focus of the image.

Technical Documentation: Attach/Describe Image Output

Lead &/or Supervisor Feedback

Challenge 6: Precision Focus

Auto Focus Tracking with Video

Instructional Goal: Capture a brief video that shows moving subject matter. Use the Canon R10 Auto Focus intelligent tracking to take a brief video of a moving component. Ensure the subject matter is in focus throughout the video clip.

Technical Tips:

Explore the auto focus measuring, metering, and tracking features. Search on the Canon knowledge base pages or on youtube for further info.

Technical Documentation: Attach/Describe Image Output

Lead &/or Supervisor Feedback