



THE COLOR WHITE BALANCE OF LIGHT

White Balance: Why Light Has Color & How to Control It

White balance is your camera's way of understanding the color of the light in your scene. Even though our eyes adapt automatically, different light sources actually produce very different color tones. Your camera needs guidance so it can render colors accurately, especially whites, skin tones, and anything neutral.

Understanding white balance helps you make creative choices, avoid strange color casts, and gain full control over the mood of your images.



The Colors of Light: Color Temperature

Light isn't just "bright" or "dim" — it has color. This color is measured in Kelvin (K), a scale that runs from warm orange/amber light to cool blue light.

Here are common lighting situations and their approximate color temperatures:

Light Source	Color Appearance	Approx. Kelvin
Candlelight	Very warm orange	~1800K
Tungsten / Household Lamps, Soft white LEDs	Warm yellow/orange	~2800–3200K
Sunrise / Sunset	Warm golden	~3500K
Fluorescent	Greenish or cool	~4000–4500K
Daylight (midday sun), also the color of most speedlights & flash	Neutral	~5200–5600K
Shade	Cool blue	~6500–7500K
Overcast Sky	Very cool blue	~8000–9000K



Warm light (lower Kelvin) looks orange or yellow.

Cool light (higher Kelvin) looks blue.

Your camera's white balance setting can compensate for these shifts.

WHAT WHITE BALANCE ACTUALLY DOES

White balance tells your camera:

“This is the color of the light I’m photographing in – please adjust for it.”

- If the light is warm, the camera adds blue to neutralize it.
- If the light is cool, the camera adds warm tones to balance it.

When white balance is correct, whites look white, grays look gray, and all other colors fall into place naturally.



Correct Neutral White Balance: Daylight

WHAT HAPPENS WHEN YOU CHOOSE THE CORRECT VS. INCORRECT SETTING

Correct White Balance

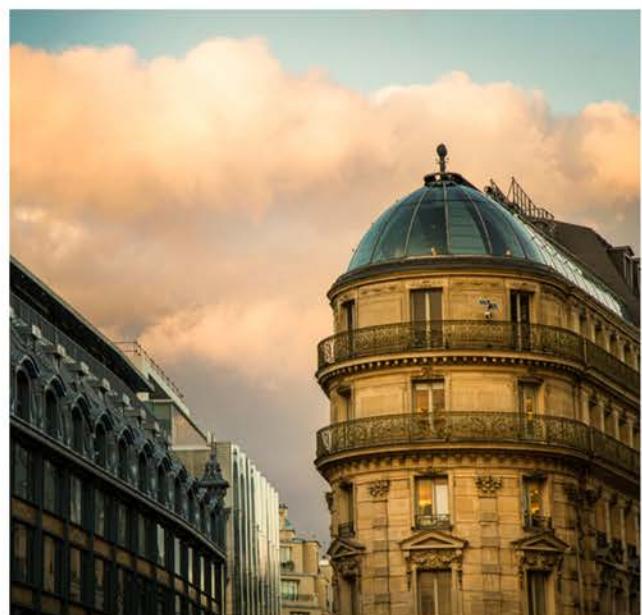
- Colors look natural and believable
- Whites appear neutral
- Skin tones look healthy
- The image matches the real scene

Incorrect White Balance

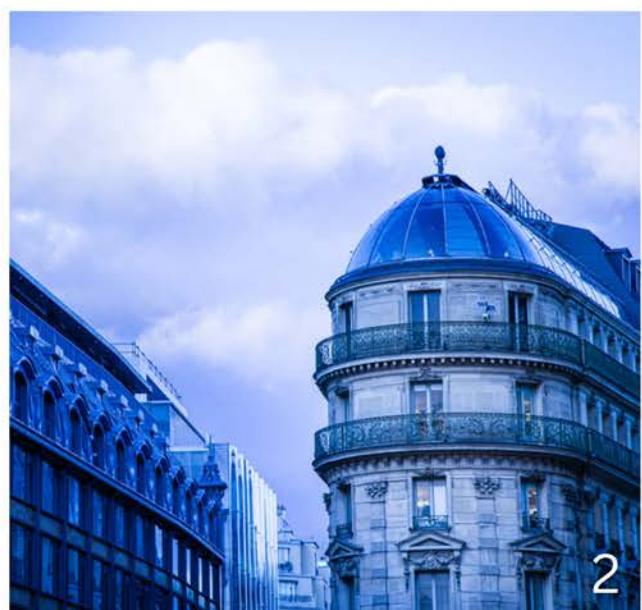
- Tungsten/halogen light captured with “Daylight” → image turns orange
- Shade captured with “Tungsten” → image turns blue
- Fluorescent captured with “Cloudy” → image may look greenish
- Daylight captured with “Shade” → image becomes too warm

Incorrect settings are not always “wrong”, they can simply be creative choices when used intentionally.

The photo on the right, set to shade, showcases a warm, sunset color tone. While it may not represent the “correct” white balance, it effectively conveys a pleasing warm sunset ambiance.



Daylight scene, set to “Shade” - could be too warm



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Daylight scene, set to “Tungsten” - too cool/blue

WHITE BALANCE IN JPEG VS. RAW

JPEG

- White balance is baked into the file
- Limited ability to correct color later
- Best to get WB right in-camera
- Picture Styles also influence color

RAW

- White balance is not permanent
- You can change WB freely in post-processing
- Ideal for learning and experimenting
- Stores full color data for maximum flexibility

For the included exercise, using JPEG will help you see the differences more clearly because the camera commits to the WB choice. The RAW file option will allow you to see how white balance is more flexible and can be correct/adjusted more easily in post-processing



AWB

Automatic White Balance
Daylight (5600K)
Shadow (7000K)
Cloudy (6000K)
Tungsten (3200K)
Fluorescent (4000K)
Flash (5500K)
Custom White Balance
User Defined

HOW TO CONTROL OR ADJUST WHITE BALANCE

Use In-camera Preset White Balance Modes

- Auto WB
- Daylight
- Shade
- Cloudy
- Tungsten
- Fluorescent
- Flash
- Custom WB
- K – a specific number

These are quick and easy starting points.

Kelvin (K) Mode

Some cameras allow manual Kelvin selection.

- Lower numbers (2500–3500K) → add blue
- Higher numbers (6000–9000K) → add warmth

This is the most precise way to match the color of the light, but will require more practice and understanding of the color of light.

A gray card gives the camera a neutral reference point.

GRAY CARD

When working on the exercise or any photo session, including one frame with a gray card will make it easier to more accurately adjust the color later.

*See the info section on gray cards and how and why to use it.

WHAT IS A GRAY CARD?

A gray card is a neutral-colored card, usually 18% gray, that reflects light evenly across the spectrum. It doesn't add any color cast — it's perfectly balanced between warm and cool tones. That's why cameras and editing software use it as a reference point to correct color.

Why Use a Gray Card?

- White balance accuracy: It helps your camera understand what "neutral" looks like in the current lighting.
- Consistent color: Especially useful when shooting in mixed lighting or changing conditions.
- Post-processing precision: If you shoot RAW, you can use the gray card frame to set perfect white balance later.

How to Use a Gray Card (In-Camera)

- Place the gray card in the same light as your subject.
- Don't just hold it up — make sure it's catching the same light your subject is.
- Fill the frame with the gray card or at least 90% of the frame should be the gray card.
- Take a photo of just the card. This will be your reference photo.
- Use your camera's custom white balance setting.

- Most cameras let you select a photo (like your gray card shot) to set white balance manually. Check the manual or search online for guidance on the setting for your specific camera.
- Photograph your scene.
- Now your camera knows how to neutralize the color cast in that lighting

How to Use a Gray Card (In Editing)

If you photograph in RAW:

1. Include the gray card in one frame of your scene.
2. You don't need to fill the frame — just make sure it's visible.
3. Open the image in editing software (Lightroom, Photoshop, CaptureOne, etc.).
4. Use the white balance eyedropper tool.
5. Click on the gray card in the image. The software will adjust the colors based on that neutral reference, if the color doesn't look good, try it again.
6. Apply the same white balance to other images captured in the same light.

Pro Tips

- Use the gray card every time the light changes.
- You can also use a white card, but gray is more reliable for exposure and color.
- If a gray card isn't available, a neutral (gray) section of the image could be used.



Shade scene, white balance set to shade, fine tuned, using the gray sidewalk to set the WB point for more visually appealing color in Lightroom

WHITE BALANCE EXERCISE

This exercise trains the eye to recognize color casts and understand how to control them.

INSTRUCTIONS

- Set your camera to **Manual** Exposure mode. **M** in the mode setting
- Alternatively, you can use **Aperture Priority** mode - **A** or **AV** (on Canon).
- Use your **in-camera light meter** to adjust shutter speed and/or aperture for correct exposure at each White Balance setting. You want the in-camera meter to be set in the **0** (center) position, if it fluctuates a notch above or below, that is fine.
- Shoot highest-quality **JPEG** and a **RAW** file of each lighting situation
- Set the **White Balance - WB to Auto**, capture a frame, and then **try each of the WB camera presets** on the same photo.
- Photograph in a variety of lighting conditions: daylight, shade, inside with artificial household lights, mixed lighting (combination of daylight and some type of artificial light).
- The subject or scene doesn't matter a lot, we are only looking at these to compare how the white balance affects the overall image
- The subject should not be: a solid wall, a very detailed or textured scene. It can be an interesting object – but not a close-up.
- Do not photograph people or animals or moving objects for this, you want something that is consistent so you can easily compare the results.
- Choose one subject and keep the framing identical for every image in each of the varied lighting conditions (the image and framing will be different when you change locations).
- Include a gray card (or a sheet of white paper if you don't have a gray card) in one frame per lighting setup.
- Ensure something in the frame is sharply in focus—no blur or camera shake.
- You can use auto focus or manual focus just be sure the focus is always on the same object in each image frame.

SELF-REVIEW: EVALUATING YOUR WB TEST IMAGES

Once you've completed your White Balance series, take time to review the images carefully. This step helps you see how the white balance affects color, brightness, and detail in real-world conditions.

1. Download Your Images

- Save all of your White Balance test files to your computer or laptop. Keep them in one folder so you can easily compare them.

2. View the Images

- Open the images –using your preferred photo viewer or editing software - if you didn't make a note of the white balance for each group, you can look in the EXIF metadata from the camera to see what was selected.
- Look for changes in:
 - Overall brightness
 - Contrast
 - Color shifts
 - Detail and clarity

3. Compare Them Side by Side

- Most viewing programs allow you to place two or more images next to each other
 - How are the colors and overall image in the correct or near correct white balance?
 - What do they look like and what can you correct if the in-camera WB was set to give the best overall color results
 - This helps you see how to set and adjust WB in your photos.

4. What Processing Changes Can be Made

- Look at the difference between the Jpegs and RAW files and how the adjustments are made to the white balance in each type.
- Notice the limitations on the jpegs and the extra control you have with the RAW files.