

15 Week

THE COLOR OF LIGHT

As a photographer, you need to be attuned to how different light sources and their colors will affect your photos. Although this may sound slightly daunting, it is a remarkably easy skill to learn. By the end of this module, you should be well on the way to understanding and appreciating the color of light.

In this module, you will:

- ▶ **take a look** at different light sources;
- ▶ **understand what is meant** by the color of light;
- ▶ **apply your new knowledge** and experiment with white balance settings;
- ▶ **practice** with different light sources and white balance;
- ▶ **review your photos** to see how you've used light;
- ▶ **enhance an image** by altering white balance and color tone;
- ▶ **go over your understanding of light**, and see if you're ready to move on.

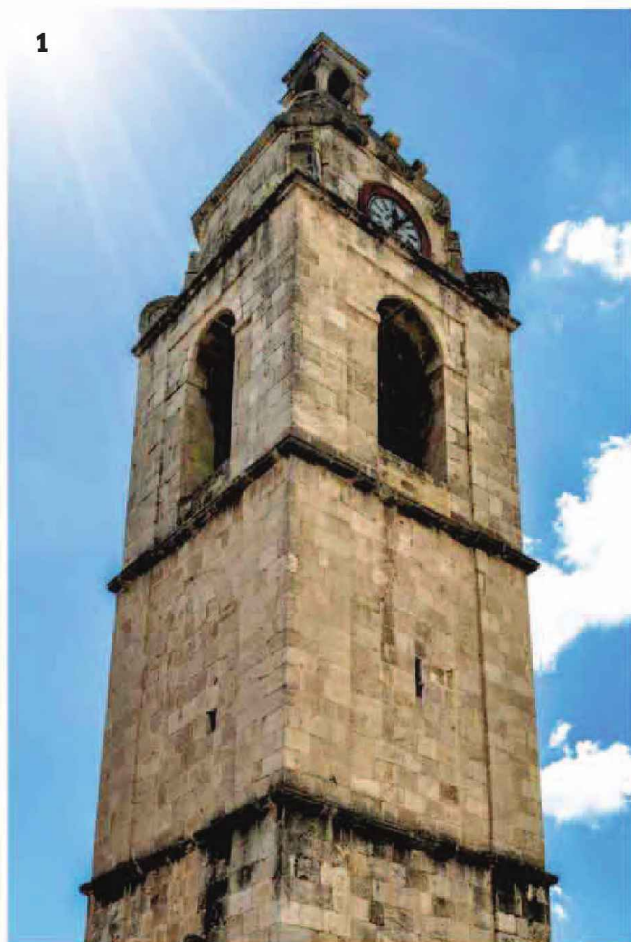
Let's begin...





▶ TEST YOUR KNOWLEDGE

The quality of light



Thinking about light is a crucial part of preparing to shoot a photo. It's important to recognize what type of light is illuminating a scene. Can you match the light sources listed here with the relevant image?

A Candlelight: The light from a flame has a very orange tint.

B Incandescent lighting: Traditional domestic light bulbs are biased toward orange.

C Fluorescent lighting: Light from a fluorescent bulb or tube can have a subtle green tint.

D Daylight: In photography, this refers to the neutrally colored light of the sun at midday.

E Sunrise/sunset: The sun is close to the horizon and the light is heavily biased toward red.

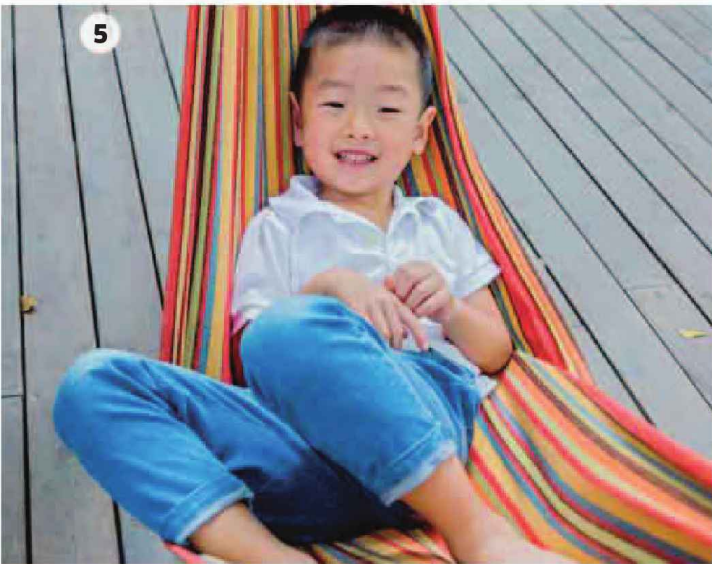
F Overcast: Sunlight is softened when it is cloudy. Overcast sunlight is biased toward blue.

G Open shade: The scene is lit by ambient light only, which produces soft shadows ideal for portraits.

H Twilight: The ambient natural light at this time of day is extremely blue.

ANSWERS

- A/3: Holding a prayer candle
- B/7: Modern hotel room
- C/6: Climbing an escalator
- D/1: Bell tower in Gargano, Italy
- E/4: Deer on a misty morning
- F/2: Kenai Fjords National Park
- G/5: Boy relaxing in a hammock
- H/8: Pistol River beach, Oregon



NEED TO KNOW

- We often don't notice that light has a color tint because our brain corrects the way light is perceived, so it appears neutral in color. It is only when a color tint is strong, or when there are two lights with different tints, that we notice.
- The color of light can be broadly split into three groups: "warm" has a red-orange bias, "cool" has a blue bias, and neutral light has no bias. Neutral light is also known as pure white light.

- The color of sunlight changes over the course of the day. The term "Golden Hour" refers to the hour after sunrise and before sunset when the sun's light is red-orange in color. This is because the sun is low in the sky and the Earth's atmosphere scatters its light, giving it a red-orange color. Once the sun has set, natural light becomes very blue during twilight.



Review these points and see how they relate to the photos shown here



▶ UNDERSTAND THE THEORY

Color and white balance

Light is rarely neutral in color. It often has a color bias that affects how your subject is recorded in a photo. Color bias is not necessarily a bad thing, since it can be used creatively, to add ambience. The key is knowing when to compensate for the color bias of light and when to leave well alone.

Color temperature

The two most common color biases are red and blue. The degree of bias between red and blue is measured on the Kelvin scale, which indicates the color temperature of light in degrees.

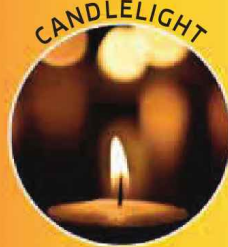


WAVELENGTH

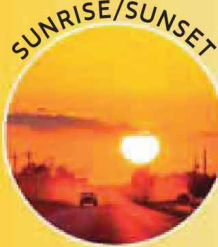
Visible light is a small section of the electromagnetic spectrum. It comprises a range of relatively long wavelengths starting at 750 nanometers (nm): this corresponds to the color we see as red. The wavelengths then shorten as they run through the spectrum of colors to 380nm, the shortest visible wavelength, which corresponds to violet. When light is made up of an equal mix of the wavelengths, it is known as neutral or white light. If one of the wavelengths dominates, the light will be heavily biased to the corresponding color.



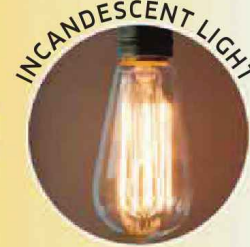
Candlelight, which is a very red light, has a Kelvin value of approximately 1,850K. The Kelvin scale starts at zero. A low value indicates that the light is very biased toward red.



1,850K



2,000K



3,000K



4,000K

White balance

A camera function known as white balance (WB) corrects for the color bias of light. For instance, a white surface in a scene will not appear as a neutral white when illuminated by light that has a color bias. White balance is the correction that a camera makes to an image in order to remove the color bias.

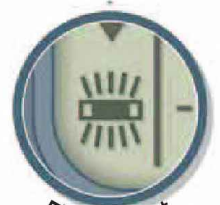


Auto White Balance (AWB) is the simplest preset—the camera automatically calculates which corrections to make.

White balance presets are a step up from Auto White Balance, but less sophisticated than Custom White Balance. These are settings designed for color accuracy when shooting under specific types of light.



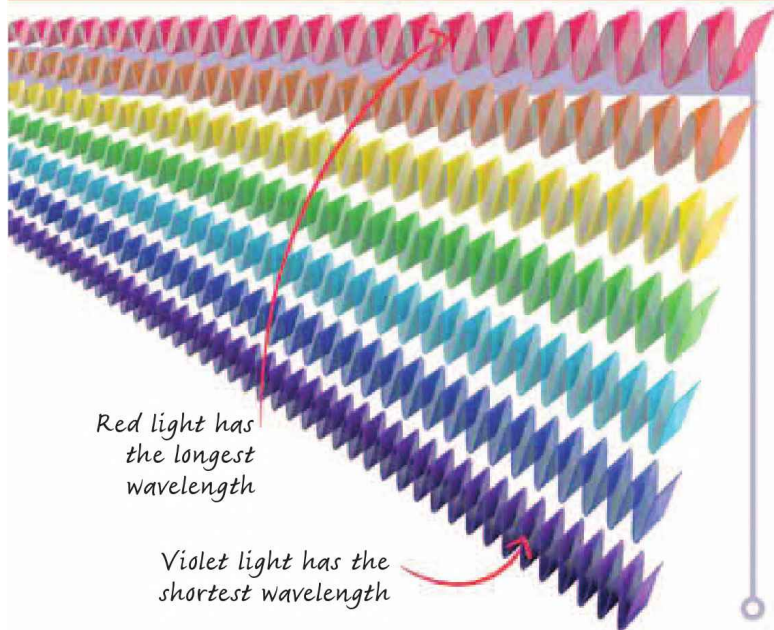
Tungsten



Fluorescent

Pro tip: You would normally set the right white balance for a particular light source. However, there are some types of light—such as candlelight or a sunset—where you would normally want to retain the attractive color of the light.

Pro tip: If you don't want to adjust for the color of the light, set the white balance preset to Daylight. Since this is a neutral setting, it will not apply any correction to the light.



i CORRECTING COLOR BIAS

To correct for a particular color bias, another color must be added. Blue must be added to a photo to correct for an orange/red bias, as shown in the image below. A green bias (such as when shooting under fluorescent lighting) requires the addition of magenta. The same effect as white balance can be achieved using color filters.



Red is the color bias

A red bias requires the addition of blue to make the photo more neutral



The shady setting corrects for the blue bias of open shade, which has a value of around 7,000K. At 10,000K, light is as blue as the color of blue sky and has no red component.

Flash provides a neutral light, with neither a red nor blue bias and a Kelvin value of 5,500K. As the Kelvin value climbs to 5,000K and beyond, light is progressively less red and more neutral in color.

i CUSTOM SETTINGS

More accurate than Auto White Balance is Custom White Balance. This is a setting that allows you to create a white balance setting specifically for the light you are shooting under. Some cameras also allow you to set Kelvin values, which can be selected to match a specific light source.





▶ LEARN THE SKILLS

Setting white balance



The selection of the correct white balance setting for a scene will make a big difference to your photos. Color can appear more accurate and pleasing, which is particularly important when people are your subject. A cool skin tone is not flattering and can even make your subject look slightly unhealthy.



1 Assess your location

Look at how your location is illuminated. Is it lit by natural or artificial light? And, if it's natural, where is the sun and what type of light is there?



Snow



Sea and sand



Sunset



Midday



2 Use a tripod

Attach your camera to a tripod. This will keep the camera in the same place as you shoot, and allow you to compare photos more easily.



6 Select a white balance preset

Choose the white balance preset that you think most closely matches the light that is illuminating the scene.



This image is lit by sunlight and would benefit from using the daylight setting.



7 Shoot again

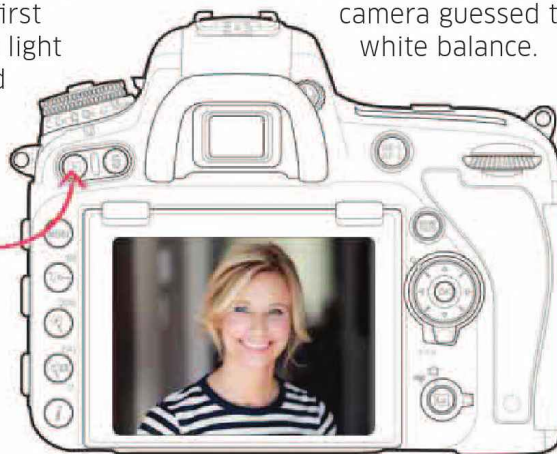
When you're happy with your preset, shoot the scene again. Altering white balance does not affect exposure. The exposure should be exactly the same as the first image, unless the light level has changed between the two shots.

Compare your images in Playback



8 Compare photos

Look at the two photos in Playback. Look to see how similar they are in terms of color. The closer they are, the more likely that both you and your camera guessed the best white balance.



Where to start: Shoot a portrait in an interior and an exterior setting and experiment with white balance presets to adjust the color temperature of the final image.

You will learn: The difference between using Auto White Balance and a white balance preset, and the effects different settings will have on your photo.



3 Set the mode

Adjust your camera mode to something other than fully automatic. Use Program, Aperture, or Shutter Priority instead.

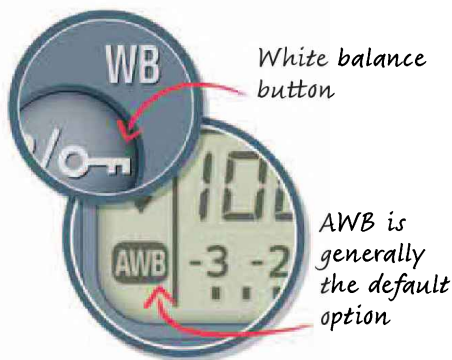


If you use a fully automatic camera mode, you will not be able to alter white balance



4 Select Auto White Balance

Set the Auto White Balance (AWB) preset. AWB is a useful time-saver since it is often able to choose the right white balance correction.



5 Take a shot

Set the exposure: select the required aperture if you're shooting using Aperture Priority or an appropriate shutter speed if you're using Shutter Priority. Focus on your subject and take a photo.



Image with effects of white balance presets applied.

WHAT HAVE YOU LEARNED?

- It's important to assess the type of light that is illuminating your subject.
- Your camera needs to be set to a program other than fully automatic in order to alter the white balance.
- You can alter the white balance without adjusting the exposure settings, unless the light conditions change between shots.



▶ PRACTICE AND EXPERIMENT

Using white balance

We respond emotionally to color in images. Taking control over white balance is a great way to influence how your photos appear. By the end of these assignments, you will have a better understanding of light and color, and how they can be used creatively.



EASY

2 HOURS

BASIC + tripod

INDOORS AND OUTDOORS

SCENES WITH DIFFERENT LIGHT SOURCES

The white balance presets offer a simple way to adjust white balance.

- **Start** in an interior that uses artificial lighting. Compose a shot with your camera set up on a tripod.
- **Set** white balance to the first preset after Auto on your camera. Focus and shoot a photo. Retake the same shot multiple times using all of the presets.



MEDIUM

1 HOUR

BASIC + tripod

INDOORS

AN INTERIOR LIT BY ARTIFICIAL LIGHT

Generally, the white balance presets are accurate for most types of shooting. However, using a Kelvin value will allow you to be even more accurate.

- **Attach** your camera to a tripod in an interior setting with artificial lighting.
- **Set** white balance to Color Temperature (or K). If the interior is lit by incandescent bulbs, set the Kelvin value to 2,800K. If it has fluorescent lighting, set the Kelvin value to 4,000K.
- **Shoot** and review the shot. Assess whether the white balance looks accurate. Increase the Kelvin



Overcast light is blue-biased and the Cloudy preset would warm this image up.

- **Move** to an exterior scene lit by sunlight. Work your way through the presets as before.
- **Review** your photos and note how the color changes through the sequences.



Getting the right white balance is important if you want your colors to be accurate, especially where the lighting varies, as in this interior setting.

value by 500K and reshoot. Decrease the value by 1,000K and shoot again. See which setting you think best reflects the scene itself.

Pro tip: The white balance setting used for a shot will be displayed on the camera's LCD when you select the camera's detailed Playback mode.



GETTING IT WRONG

EASY

30 MINUTES

BASIC + tripod

INDOORS OR OUTDOORS

A WELL-LIT SCENE

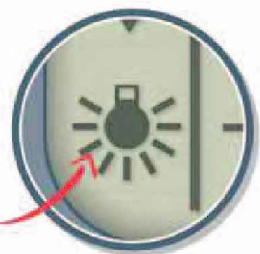
Selecting the right white balance for a light source will make colors more accurate in the final photo. However, you can often have more fun by deliberately choosing an incorrect white balance.

■ **Compose** a shot with your camera on a tripod. Study the lighting that illuminates your chosen scene and then set the white balance preset that you think is correct.

■ **Set** the exposure, focus, and shoot.

If you're shooting under artificial light, select the Shade preset. If you're shooting outside, select the Tungsten preset.

■ **Take** another shot using a different white balance preset. Compare the shots.



Using the Tungsten preset has rendered the woodland scene blue

WHAT HAVE YOU LEARNED?

- The white balance presets offer a wide range of ways to alter the overall color tint of a photo.
- There is often no right or wrong choice for white balance. Often the white balance can be "wrong," but it will produce a result that is striking or aesthetically pleasing.
- The Kelvin values offer a greater range of adjustment than the white balance presets.



CUSTOM WHITE BALANCE



DIFFICULT



INDOORS OR OUTDOORS



30 MINUTES



A WELL-LIT SCENE



BASIC

Creating a custom white balance will give you the most accurate setting for a particular light source.

- **Shoot** a photo of a white balance target (see opposite), which should be illuminated by the same light as the scene you intend to shoot afterward.
- **Hold** the white balance target in front of your camera lens so that it fills the frame.
- **Set** exposure so that the white balance target is close to white. You may need to set +1 to 2 stops positive exposure compensation.
- **Shoot** so that your camera records and analyzes the white balance and then set the Custom White Balance preset on your camera.



The lights in the bottom display have a different color temperature from those behind the woman and will require a Custom White Balance setting.



CONTROLLING THE MOOD



EASY



INDOORS OR OUTDOORS



1 HOUR



A MODEL



BASIC + tripod

We associate warm colors, such as red, with happiness and energy. Cooler colors, such as blue, have more negative associations, such as sadness. White balance can be used to affect a photo's mood.

- **Sit** your model on a chair. Set your camera on a tripod and ask your model to pose so that they appear sad.
- **Set** white balance to a low Kelvin value so that the image on Live View is a very cool blue. Set the exposure, focus, and shoot.
- **Repeat** the shot, this time increasing the Kelvin value so that the image on Live View is a very warm yellow-orange.



Cool blue tones of water and sky imply negative emotions.

- **Repeat** the shots, but ask your model to pose so that they look happy.
- **Compare** the four shots and decide which is the most effective.

SHOOT IN MIXED LIGHTING

MEDIUM

OUTDOORS

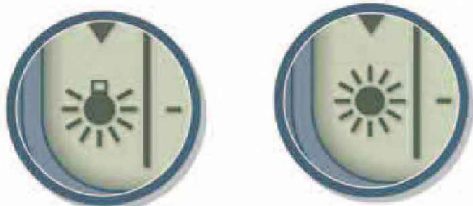
30 MINUTES

CITY SCENE AT DUSK

BASIC + tripod

Mixed lighting occurs when you have two or more light sources with different color temperatures illuminating a scene. This happens at dusk in cities when the cold blue ambient light of the sky is mixed with the oranges and yellows of street lighting.

- **Set** up your camera on a well-lit street approximately 25–35 minutes after sunset. Use a tripod and a low ISO setting to maintain image quality.
- **Move** the white balance to the Tungsten preset. Set the exposure, focus, and shoot.
- **Set** the white balance to Daylight. Set the exposure, focus, and take another shot. Compare the two shots.
- **Experiment** with other white balance presets to see the effects these have on your dusk photos.



Take photos using both the Tungsten (left) and the Daylight (right) white balance presets.



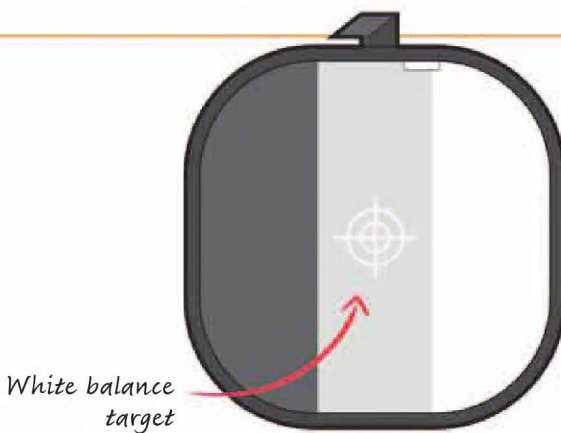
City lighting is far more orange than standard household lighting.

WHAT HAVE YOU LEARNED?

- Color accuracy is dependent on setting a precise white balance at the time of shooting.
- There is no right or wrong white balance setting when shooting in mixed lighting.
- Color helps to reinforce any body language signals in a portrait photo.

GEAR: WHITE BALANCE TARGET

To create a custom white balance you need to shoot a photo of a neutral-white (or gray) surface. This is known as a white balance target. Your camera will analyze this photo to calculate how much white balance correction is needed. The target has to be completely neutral: any color in the surface will make the custom white balance inaccurate. You should use a white balance target when color accuracy in the final photo is very important.





▶ ASSESS YOUR RESULTS

Reviewing your shots

Once you've completed the assignments, spend some time looking carefully through your best photos. Pick out the shots that you feel are the most interesting and review them in light of the points raised on these pages.

⏏ **Are your shadows too blue?**
On cloudless days, ambient light adds some light back into shadows. Because the sky is blue, shadows often take on a blue tint, as in this image. Correct this by using a slightly warmer white balance.



⏏ **Was your WB preset correct?**

There are two ways to set white balance—it can be either technically correct or aesthetically pleasing. This photo has a blue bias, which, though not “correct,” is still pleasing.

⏏ **Did AWB get it right?**

AWB is a useful white balance setting, although it is not infallible. Strong, dominant colors in a scene can fool AWB. Overcast light is another situation that can trick AWB. This photo features both and required a custom white balance.



⏏ **Is your photo too “cold”?**

There is nothing incorrect about a photo that has a blue tint: it is only wrong if this does not suit your subject. This photo of candy is tinted blue. Cool-toned photos of food are unappetizing, so the WB is arguably wrong.

“ Wherever there is **light**,
one can **photograph**. ”

ALFRED STIEGLITZ

15

WEEK



⦿ **Was your custom WB correct?**

If you create a custom white balance, it is only applicable for the light source it was created for. A custom white balance created for this scene would need to be updated if the weather changed.

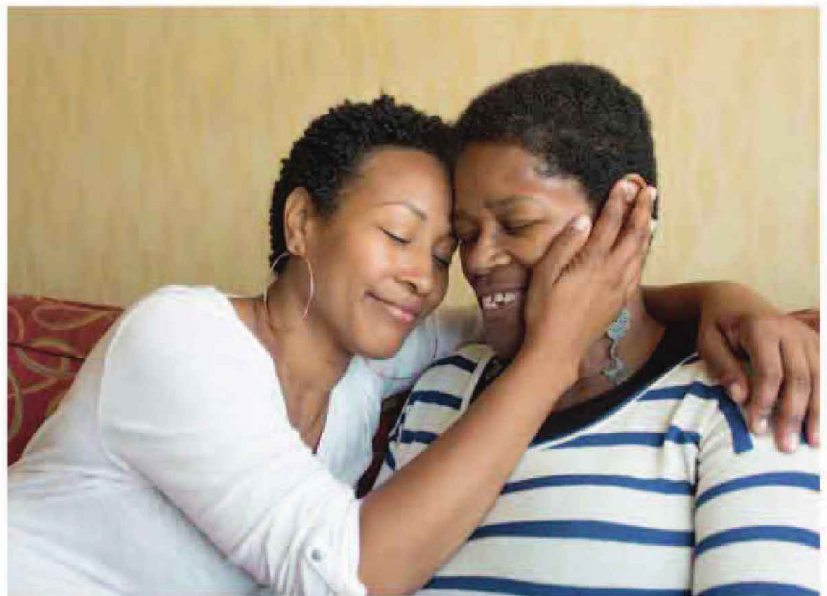
⦿ **Does your WB help to convey emotion?**

You need to think carefully about how you want your photo to be perceived and then pick a suitable white balance. This photo has a warm color bias that helps to emphasize the pair's close bond.



⦿ **Is your photo too “warm”?**

There is also nothing wrong with a picture that has a warm, orange tint. However, it can make a photo look too sickly sweet if the tint is too strong. Do you think this photo is too warm?





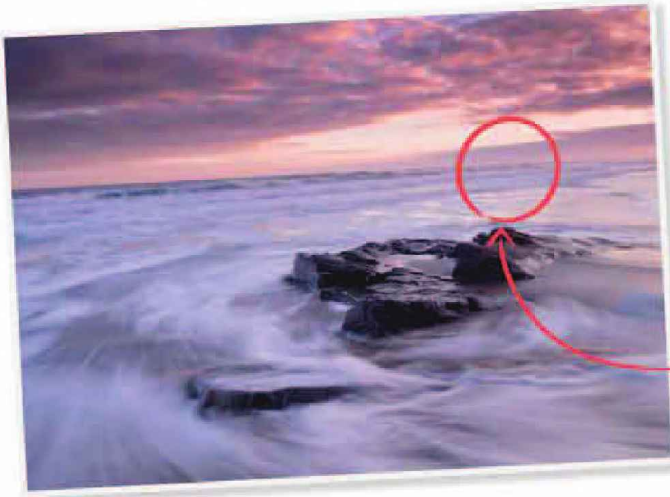
▶ ENHANCE YOUR IMAGES

The Color Balance tool



The Color Balance tool lets you adjust the color tint of photos. You can increase the intensity of a color tint—by adding yellow to make an image warmer, for example. You can also remove

a color tint by adding the tint's complementary color to the photo.

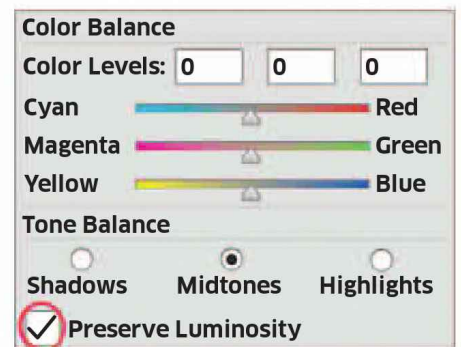


This photo has a strong magenta tint



1 Alter Color Balance

The Color Balance tool in Adjustments shows three sliders: cyan/red, magenta/green, and yellow/blue.

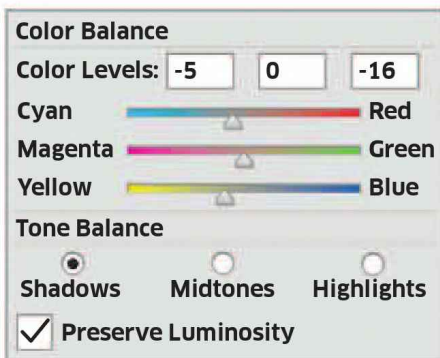


Leave Preserve Luminosity checked so that the tonal range of the photo doesn't change



5 Modify the shadows

Click on the Shadow button to adjust the color tint of the darkest tones.



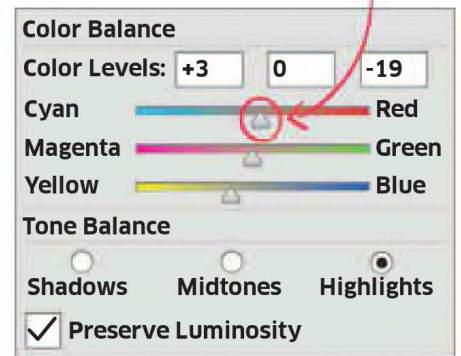
Shadows are often too blue—add red or yellow (or both) to warm them up



6 Change the highlights

Select the Highlights button to adjust the color tint of the lightest tones in your photo. Click OK to apply Color Balance.

Increasing the amount of red and yellow in the highlights will increase their warmth



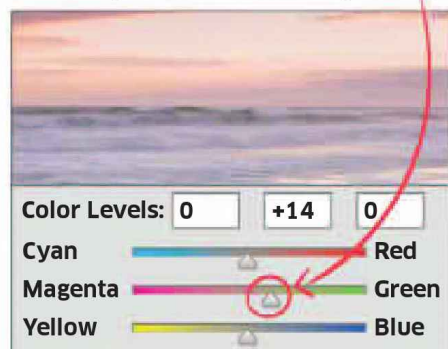
Pro tip: An easy way to see the overall color tint of a photo is to set the Gaussian Blur filter to a very high pixel value (400 or above). Press Cancel to exit Gaussian Blur so that you don't blur your photo.



2 Move the sliders

If you want to remove a color tint from your photo, click on the slider control for that color and drag it toward the complementary color opposite.

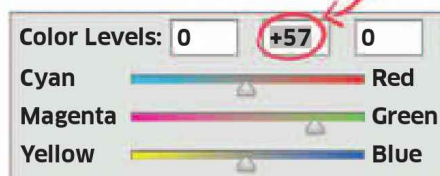
Pull the slider toward green to remove magenta



3 Type in a number

You can also move the sliders by adding numerical values into their respective boxes above the sliders—a negative value up to -100 or a positive value up to +100.

The higher the positive green value, the more green is added to a photo



4 Shadows, Midtones, and Highlights

The Shadows, Midtones, and Highlights buttons control which part of a photo's tonal range is adjusted by the sliders.

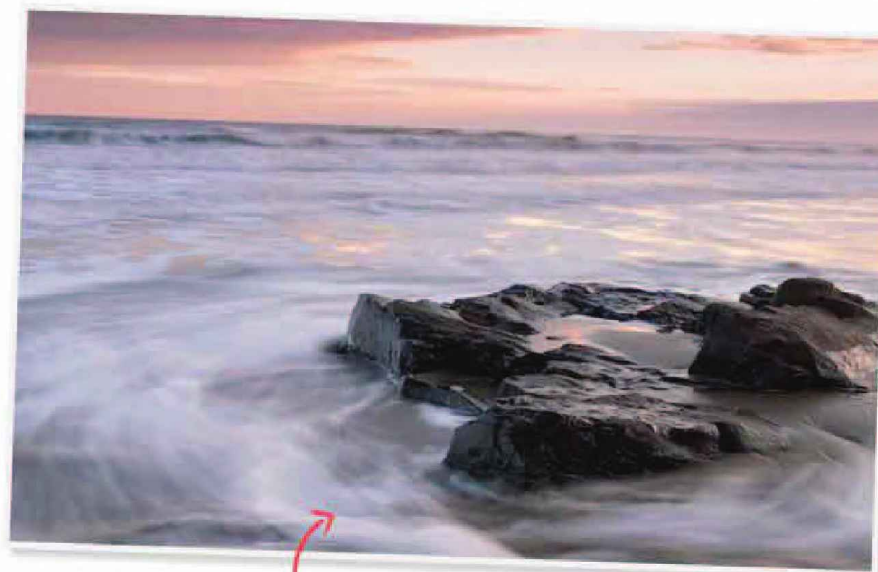
Selecting Midtones will allow you to adjust the mid-range parts of your photo



WHITE BALANCE

If you import a RAW file into Adobe Camera RAW or Adobe Lightroom, you will be able to very finely adjust the white balance. You can either use a white balance preset (including Auto), or adjust the color temperature using a Kelvin scale slider.

The Kelvin scale slider can be adjusted between 2,000K, which adds a lot of blue, and 50,000K, which adds a lot of red. Typically, however, you would use values between 2,800K and 7,000K, which is the Kelvin range of most light you encounter normally.



Shadows and highlights in the water appear warmer