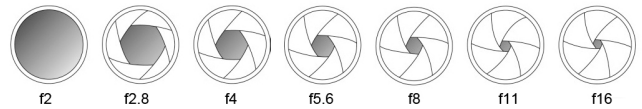


**Light** – Getting the right exposure—a photo that’s not too bright, not too dark, but just right—depends on four factors:

- **Ambient Light** – The light available out there to expose your subject. You have little control over ambient light short of choosing when during the day you shoot or by using your camera’s flash.
- **Shutter Speed** – The length of time the camera’s shutter remains open to expose and capture the image. In most situations, it’s a fraction of a second (1/60<sup>th</sup>, 1/250<sup>th</sup>, 1/2000<sup>th</sup>, etc.) but often expressed on the camera as a whole number: 60, 250, 2000, etc. In order to stop fast action (sports, birds, grandkids) for a photo that’s not blurry, you need a fast shutter, in the range of 1/250<sup>th</sup> of a second or faster (More on this below in the item called Shutter Speed and Motion). Also note that it’s hard to avoid a blurry image from *your own* movement if your shutter speed is slower than 1/30<sup>th</sup> or 1/15<sup>th</sup> of a second. In genuine macrophotography, which magnifies your own movements or shake, you’ll need much faster shutter speeds — at least 1/250<sup>th</sup> for macro lenses and at least 1/100<sup>th</sup> for most point-and-shoots.

- **Aperture** – This is the lens opening (or f-stop). It’s essentially the relative diameter of the hole through which light travels to your camera’s sensor (or to film in the “olden days”). Examples of f-stop values, from wide open to a pin-hole, are 2.0, 2.8, 4, 5.6, 8, 11, 16 and 22.



**The smaller the number, the wider the lens opening.** In darker situations you’ll use a wider lens opening (lower f-stop number) to allow more light travel to your camera’s sensor. More on this later under Depth of Field.

- **ISO** - This is a measure of your camera’s sensitivity to light. Its scale runs roughly like this: 100, 200, 400, 800, 1000, 2000 and higher. (The AUTO setting lets your camera decide the ISO.) ISO is equivalent to film speed, or ASA, in the olden days of film. For standard shooting set your ISO in the range of 100-200 for the best quality. When ambient light is low you can help your camera “see in the dark” by choosing higher ISOs. These higher ISO settings (above 400) can help you get a photo indoors with no flash, in dark woods, at dawn or dusk or in other low-light situations. It’s amazing, like giving your camera night-vision goggles. But you can’t get something for nothing: the tradeoff at high ISO settings is graininess in your image — or noise — in exchange for this greater sensitivity to light.

**Shutter Speed and Motion** – Photographing motion generally requires a faster shutter (a smaller fraction of a second). A slow shutter speed creates motion blur (which is different than being out of focus). If you’re taking photos of sports or dogs or birds in AUTO mode, odds are they will be blurry (motion blur) because the camera often selects a shutter speed that’s *too slow* to freeze the action. So, in order to control your shutter speed, take your camera out of AUTO mode and into **shutter priority** mode (S or Tv on the dial if your camera has a dial) and *choose your own shutter speed* (like we used to do with film cameras). When you do so, the camera then chooses the proper corresponding lens opening (f-stop) in order to get you a properly exposed shot. If your camera doesn’t have shutter priority mode (most cameras without a dial on top don’t shoot in shutter priority mode) then increase your ISO setting; your camera will mostly likely respond with faster shutter speeds. Or choose one of your camera’s **Scene Modes** (such as “Sports” or “Kids and Pets”) to freeze the action. These action scene modes force your camera to choose a faster shutter. To give you a sense of all this, here are a few scenarios and the *approximate* suitable shutter speeds necessary to freeze action:

- Still life - 1/60<sup>th</sup>
- People at a dinner party - 1/100<sup>th</sup>
- People moving at a picnic - 1/150<sup>th</sup> and faster
- Ballroom dancers, joggers - 1/250<sup>th</sup> and faster
- Hand-held Macro - SLRs: 1/250<sup>th</sup> and faster / Point-and-Shoots: 1/100<sup>th</sup> and faster
- Soccer, football, basketball - 1/400<sup>th</sup> and faster
- Birds at the feeder and dogs playing - 1/400<sup>th</sup> and faster
- Race cars or birds in flight - 1/800<sup>th</sup> or faster

**Aperture and Depth of Field** – Remember that aperture (f-stop) is the size of the lens opening through which light passes when you open the shutter for that fraction of a second. So why not use a wide open f-stop to allow the most light and the quickest shutter? Lens opening has an attribute called *depth of field*. Depth of field is the range of space—near to far—that will be in focus in your image. A wide open lens (in the range of f2 to f4 on point-and-shoots) shortens the depth of field, particularly in close-up photography; in this range of f-stops it’s likely that portions of the butterfly on your flower will be out of focus. To get more of it in focus, choose a smaller lens opening, which means a higher f-stop number (such as f8 or f16). Again, get out of AUTO mode and into **aperture priority mode** (A or Av on the dial) so that you yourself select the f-stop; the camera then selects the proper shutter speed for the right exposure. Depth of field is mostly an issue in macro (close-up) photography. For landscapes and general photography, it’s not as critical; to some extent, you can get away with wider lens openings and the resulting shorter depths of field. Sometimes you prefer a short depth of field because it produces a blurry background, a nice effect for portrait shots.

**Metering** – Our cameras are light meters. When you point and press the shutter half-way before taking the picture, you’re actually doing more than focusing. You’re allowing the camera to measure light in order to set itself for the proper exposure (shutter speed and f-stop). Digital cameras “look at” the scene you’re about to photograph in at least three or more ways. These are called **metering modes**. They’re universal in digital photography. Below are the three common options (choices on your camera):



**Grid or Matrix** - Your camera takes note of the *entire scene* you’re about to photograph and computes the average amount of light and dark in order to set the proper exposure (shutter speed and f-stop). This mode is fine for fairly uniform scenes – landscapes (not sunsets), parties and indoors. It’s often not ideal for nature photography, such as a bird in a tree against a back-lit sky.



**Center Weighted** - The camera relies more on what’s at the center of the image in order to measure light and set the exposure. It might base 80% of its decision on what’s in the center and 20% on the surroundings. It’s good for back-lit scenes (a person alone on a beach) or when your subject is small in the frame, such as that bird in the tree or a dark flower blooming in the sand.



**Spot Metering** - Your camera sets the exposure based *only* on the area covered by the spot (which often shows up as a little square or circle in your viewfinder or screen). In this mode, you shine a virtual laser pointer on what you’re about to photograph and tell the camera to get the exposure right for *only that point* no matter what the surroundings. A great example would be a single leaf fallen on snow. Spot and Center-weighted metering is essential in nature macrophotography.

**Remember that metering is not focusing.** *Focusing* is simply adjusting your lens for the proper distance between you and your subject. It’s straightforward and the camera often gets it right. *Metering* is how your camera *measures light* for the correct exposure. This is incredibly important, often the difference between a mediocre photo and a great photo. If you want a good sunset shot, get away from grid or matrix metering and instead spot meter *on the sky* rather than matrix metering on the entire landscape. Try it; you’ll like it.