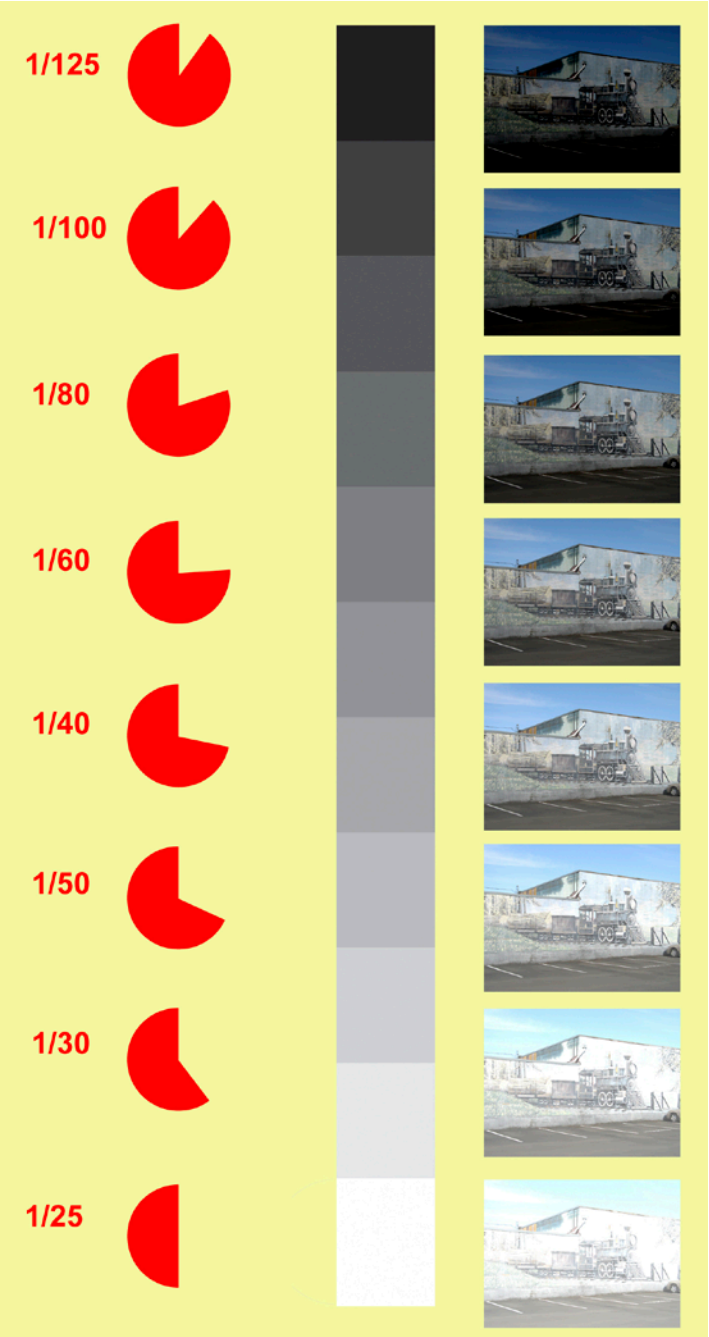
The Shutter Controls Light and Motion

The shutter is normally closed to keep light out of the camera but opens during an exposure so light can expose the image sensor. In respect to just exposure, faster shutter speeds let less strike the image sensor so the image is darker. Slower speeds let in more light so an image is lighter.

As the shutter speed gets slower, the image gets lighter. The reason you don't usually see this effect in your images is because in most exposure modes when you or the camera change the shutter speed, the camera changes the aperture to keep the exposure constant.



Animation

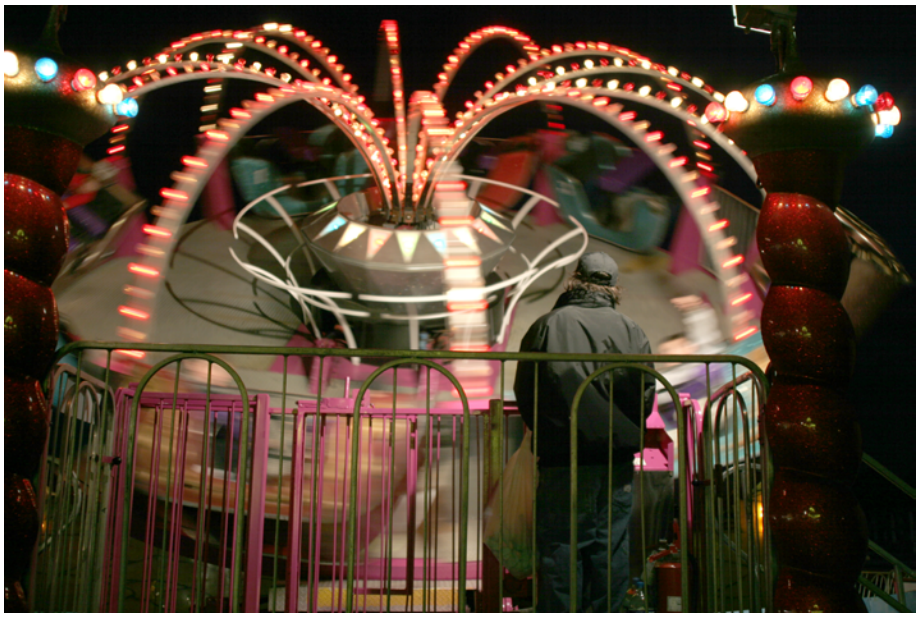
Click to explore the effect of shutter speed on exposure.

TIPS

- Depending on the available light, you may have access to only some of the camera's shutter speeds. To access faster shutter speeds, increase the ISO. To access slower shutter speeds, use a neutral density filter.
- The term "stop" goes back to the earliest days of photography. When there was too much light, plates with holes drilled in them were inserted into the lens to "stop" some of the light from entering.

In addition to controlling exposure, the shutter speed is the most important control you have over how motion is captured in a photograph. The longer the shutter is open, the more a moving subject will be blurred in the picture Also, the longer it's open the more likely you are to cause blur by moving the camera slightly. Although you normally want to avoid blur in your images there are times when you may want to use it creatively.

A fast shutter speed (top) opens and closes the shutter so quickly a moving subject doesn't move very far during the exposure. A slow speed (bottom) allows moving objects to move sufficiently to blur their image on the image sensor.



Animation

Click to explore how the shutter speed affects the capture of moving subjects.

At slow shutter speeds, especially with point and shoot cameras, noise can build up and degrade image tones.

Shutter Speeds

1	0"8	0"6
	0"7	
1/2	0"4	0"3
	0"3	
1/4	1/5	1/6
	1/6	
1/8	1/10	1/13
	1/10	
1/15	1/20	1/25
	1/20	
1/30	1/40	1/50
	1/45	
1/60	1/80	1/100
	1/90	
1/125	1/160	1/200
	1/180	
1/250	1/320	1/400
	1/350	
1/500	1/640	1/800
	1/750	
1/1000		

Shutter speeds

Although digital cameras can select any fraction of a second for an exposure, there are a series of settings that have traditionally been used when you set it yourself (which you can't do on most point and shoot cameras). These shutter speed settings—called *stops*—are arranged in a sequence so that each setting lets in half as much light as the next slowest setting and twice as much as the next fastest. Some of the traditional shutter speeds are listed in the first column in the table to the left although many cameras have both faster and slower speeds.

• Speeds faster than 1 second are fractions of a second and many cameras display them without the numerator. For example, 1/2 second is displayed as 2.

• Speeds of 1 second or slower are whole seconds and many cameras indicate them with quotation or inch marks ("). For example, 2 seconds is displayed as 2".

A leaf shutter.

Many high-end digital cameras have added one or two settings between each of the traditional ones. This allows you to adjust exposure in one-half or one-third stop increments for finer exposure control. In the table on the previous page one-half and one-third stops are shown in the second and third columns in the table.

Types of shutters

There are three different kinds of shutters used in digital cameras—leaf, electronic, and focal plane. Leaf and focal plane shutters are both mechanical and have moving parts—leaves or curtains.

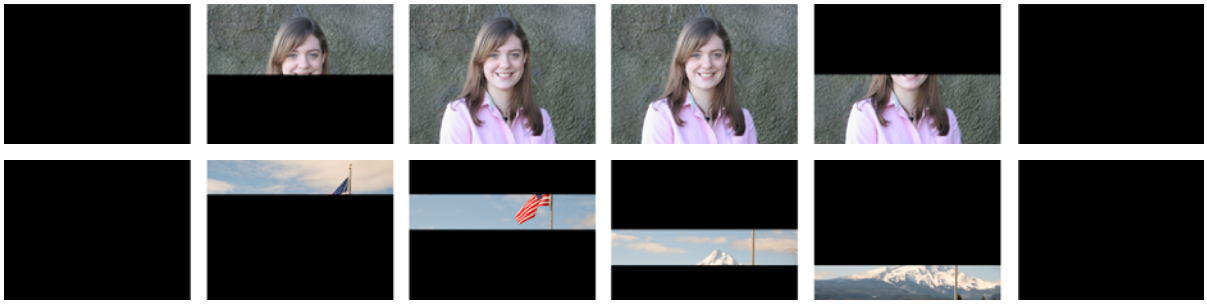
Animation

Click to explore the different types of shutters used in digital cameras.

• **Leaf shutters**, alone or combined with an electronic shutter, are used on some point and shoot cameras. On some inexpensive cameras, the shutter also acts as the aperture by varying how far it opens.

• **Electronic shutters** simply turn the sensor on and off to capture the exposure. It's like turning a vacuum cleaner on to start accumulating dust and off to stop. These shutters are found in the cheapest cameras, but ironically also in the most expensive. When precision designed they can be exceptionally accurate.

• **Focal plane shutters**, found in all digital SLRs open one curtain to begin an exposure and close another curtain to end it. On newer cameras the curtains run vertically. This makes them faster than older shutters that ran horizontally because they have less distance to cross. This faster speed makes it possible to have a faster flash sync shutter speed.



At slow shutter speeds (above, top) the first curtain fully opens to expose the sensor before the second curtain closes to end it. At high shutter speeds (above, bottom), the second curtain starts to close before the first curtain has fully opened so there is a slit between the two curtains moving across the image sensor (below, bottom).

On the Great Plains a slow shutter speed was used to blur the blades on a spinning windmill.