

## Whole, Half, And Third Stops

It's critical to understand whether your camera breaks up f/stops into halves or thirds. Many digital cameras can go either way. If you have the choice, I suggest that you set your camera for third-stops as it gives you just a bit more control.

| WHOLE STOPS | HALF STOPS | THIRD STOPS |
|-------------|------------|-------------|
| f/1         | f/1        | f/1         |
|             | f/1.2      | f/1.1       |
|             |            | f/1.2       |
| f/1.4       | f/1.4      | f/1.4       |
|             | f/1.7      | f/1.6       |
|             |            | f/1.8       |
| f/2         | f/2        | f/2         |
|             | f/2.4      | f/2.2       |
|             |            | f/2.5       |
| f/2.8       | f/2.8      | f/2.8       |
|             | f/3.3      | f/3.2       |
|             |            | f/3.5       |
| f/4         | f/4        | f/4         |
|             | f/4.8      | f/4.5       |
|             |            | f/5.0       |
| f/5.6       | f/5.6      | f/5.6       |
|             | f/6.7      | f/6.3       |
|             |            | f/7.1       |
| f/8         | f/8        | f/8         |
|             | f/9.5      | f/9         |
|             |            | f/10        |
| f/11        | f/11       | f/11        |
|             | f/13       | f/13        |
|             |            | f/14        |
| f/16        | f/16       | f/16        |
|             | f/19       | f/18        |
|             |            | f/20        |
| f/22        | f/22       | f/22        |

**Figure 2.4** The important point to remember when changing apertures is that the numbers changing in your viewfinder or LCD are partial and not whole f/stops.

## GEEK SPEAK

### —The Geometry Of F/Stops—

Ever wondered why whole f/stops follow the pattern of alternating between multiples of 1 and 1.4? It has to do with a bit of geometry and the square root of two—which happens to be 1.4142136.

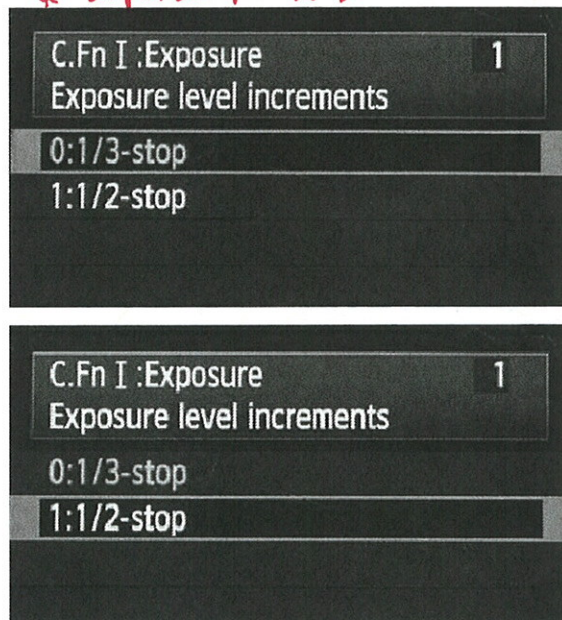
You know that opening the aperture by one f/stop means that the area of the aperture has been doubled. From high school geometry, you might remember that the area of a circle is pi times radius squared ( $\pi \cdot r^2$ ).

So, if the radius of the aperture is 1, then the area of the aperture is ( $\pi \cdot 1^2$ ) = 3.14. If we double the radius of the aperture to 2, then the area of the aperture is ( $\pi \cdot 2^2$ ) = 12.56—which is four times 3.14, not twice.

*Here's the math:* to double the area of the aperture, instead of increasing by a factor of 2, the radius has to increase by a factor of 1.4142136 (which photographers round off to 1.4).

*Here's the proof:*  $\pi \cdot 1.4142136^2 = 6.28$ , which is twice what you get from  $\pi \cdot 1^2 = 3.14$ . So, to get the progression of whole f/stops—1, 1.4, 2, 2.8, 4, 5.6, 8, 11, 16, 22, 32, 45, 64, 90, 128—you multiply the preceding f/stop by 1.4 (with a tiny bit of rounding along the way) to get the next stop.

*\* superscript x 2*



**Figure 2.5** Check to see if your camera has the option to set the increment of the aperture. For precise control, set it to the smallest increment available. Shown above are the menu options for the Canon EOS 5D Mark II.