

# **Photography basic principles**

**DISP Group Meeting**

**游雨婕 2024/11/26**

# Digital camera v.s. Analog camera



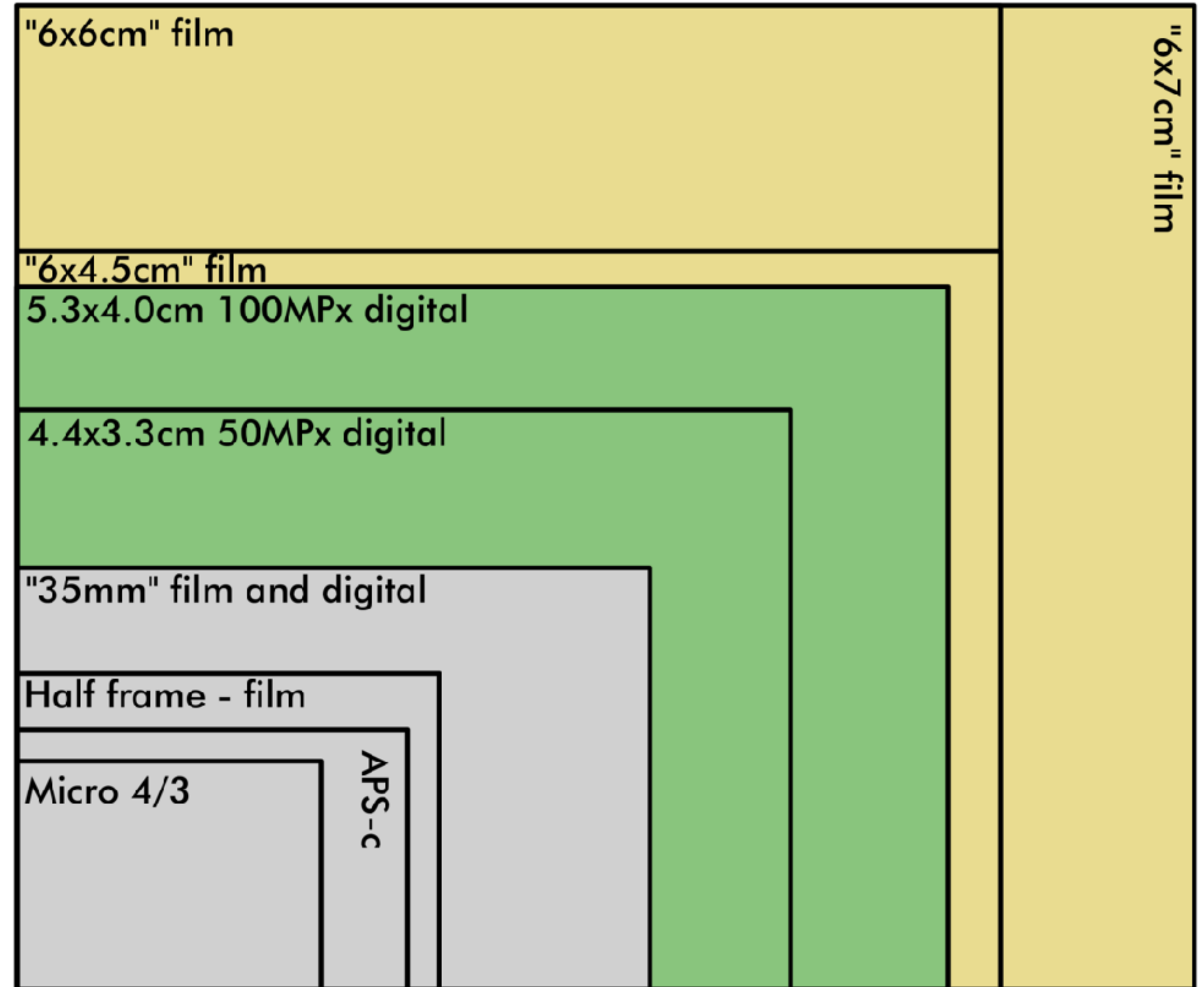
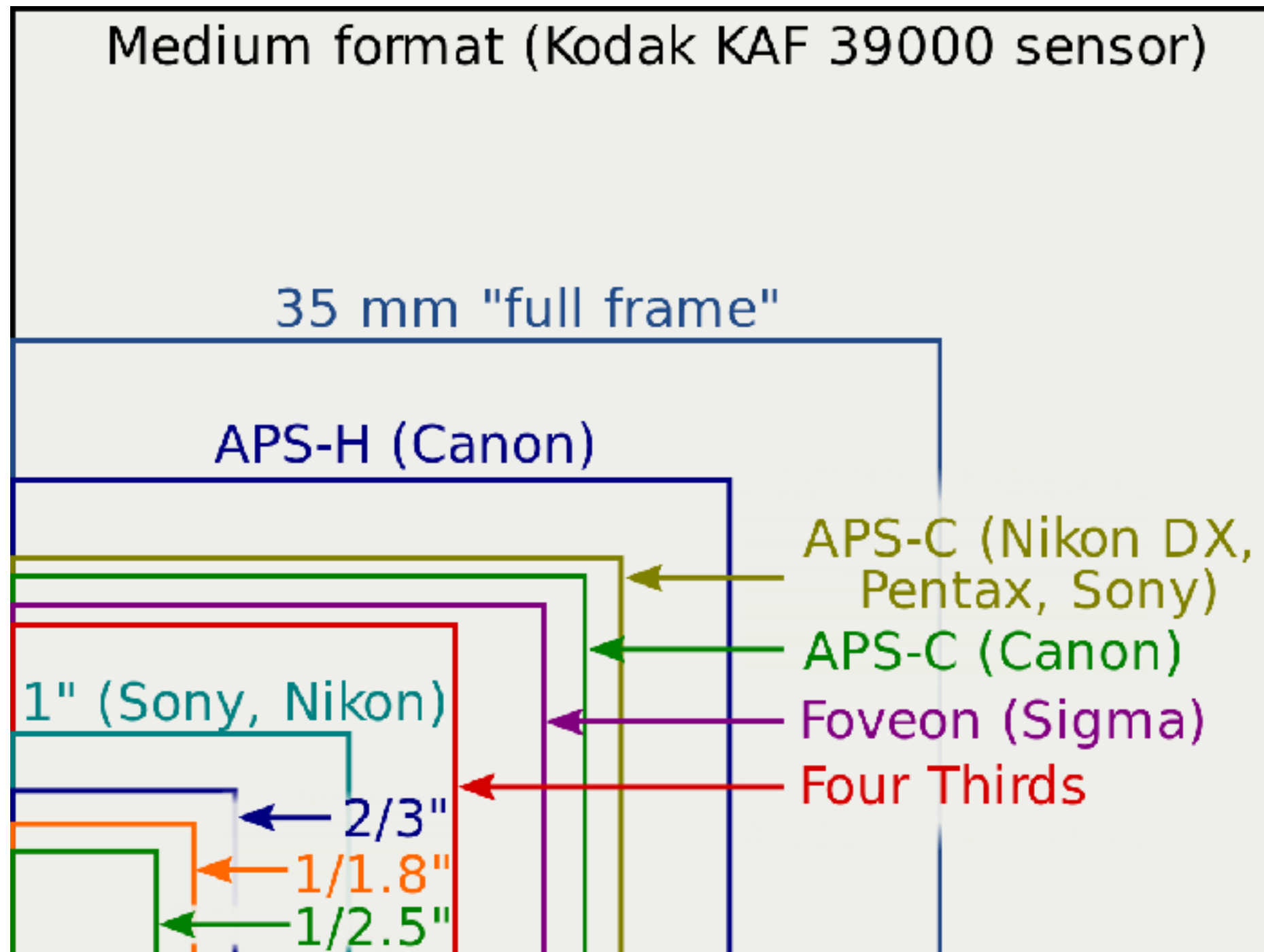
# Digital camera v.s. Analog camera



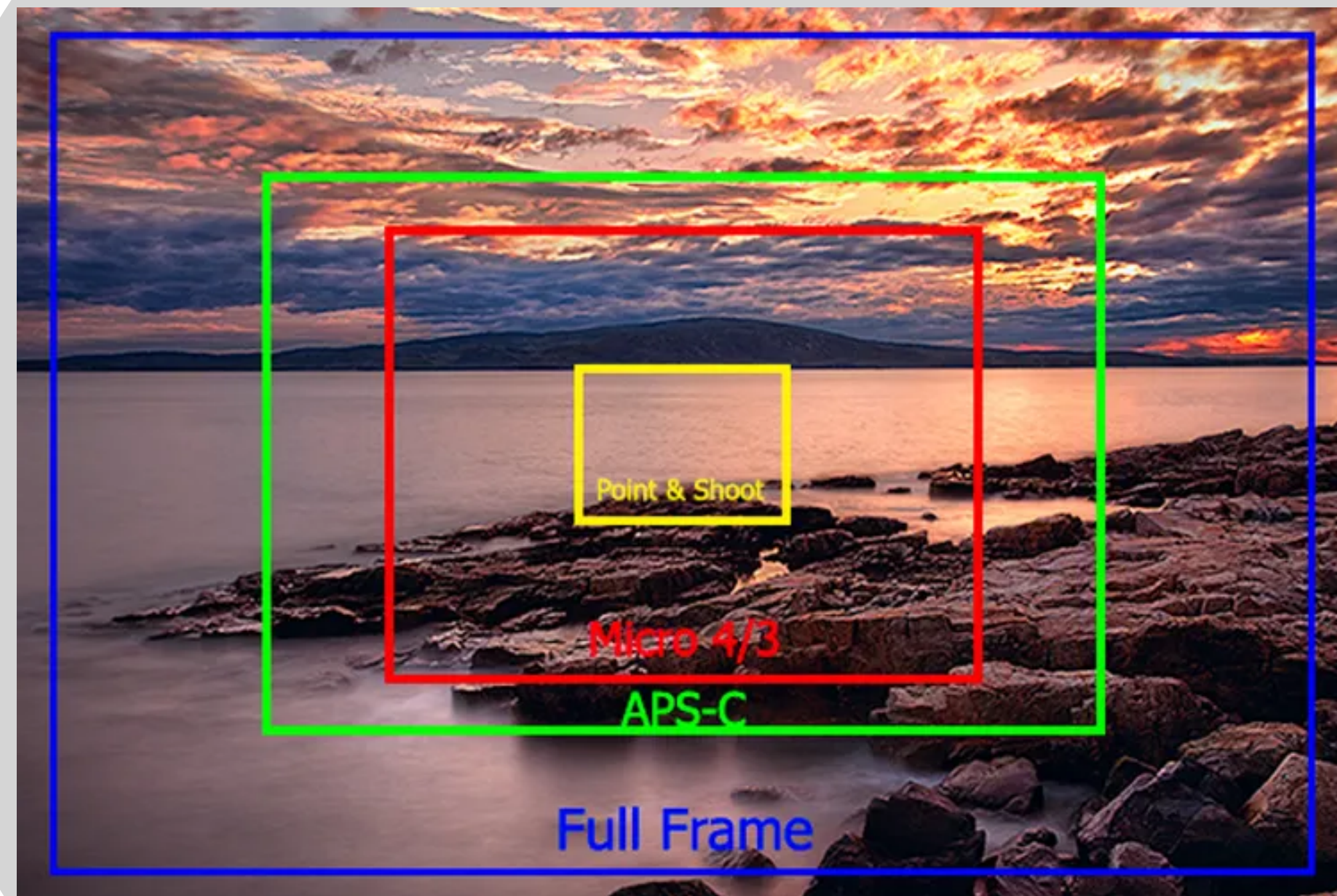
Film

Digital

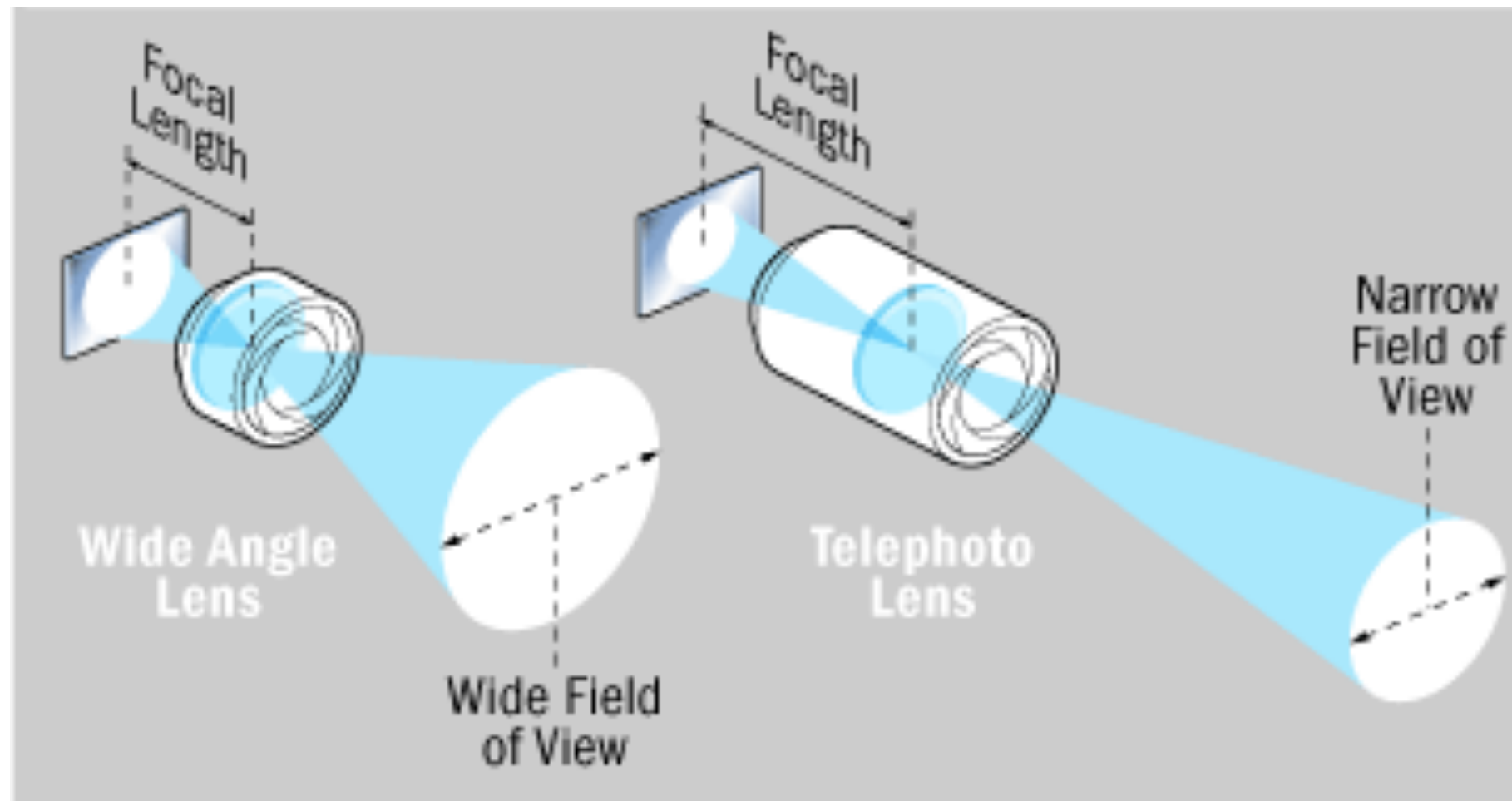
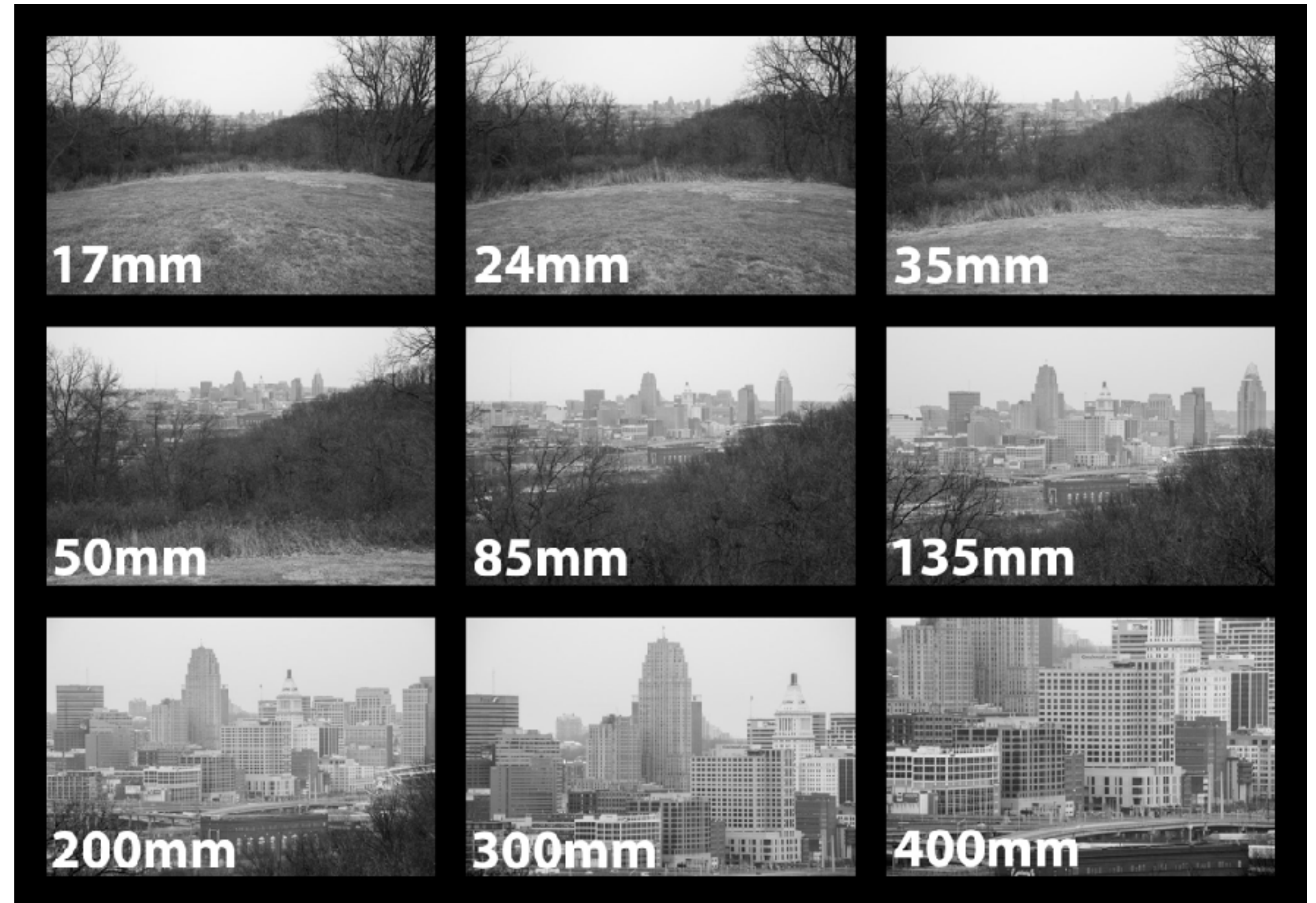
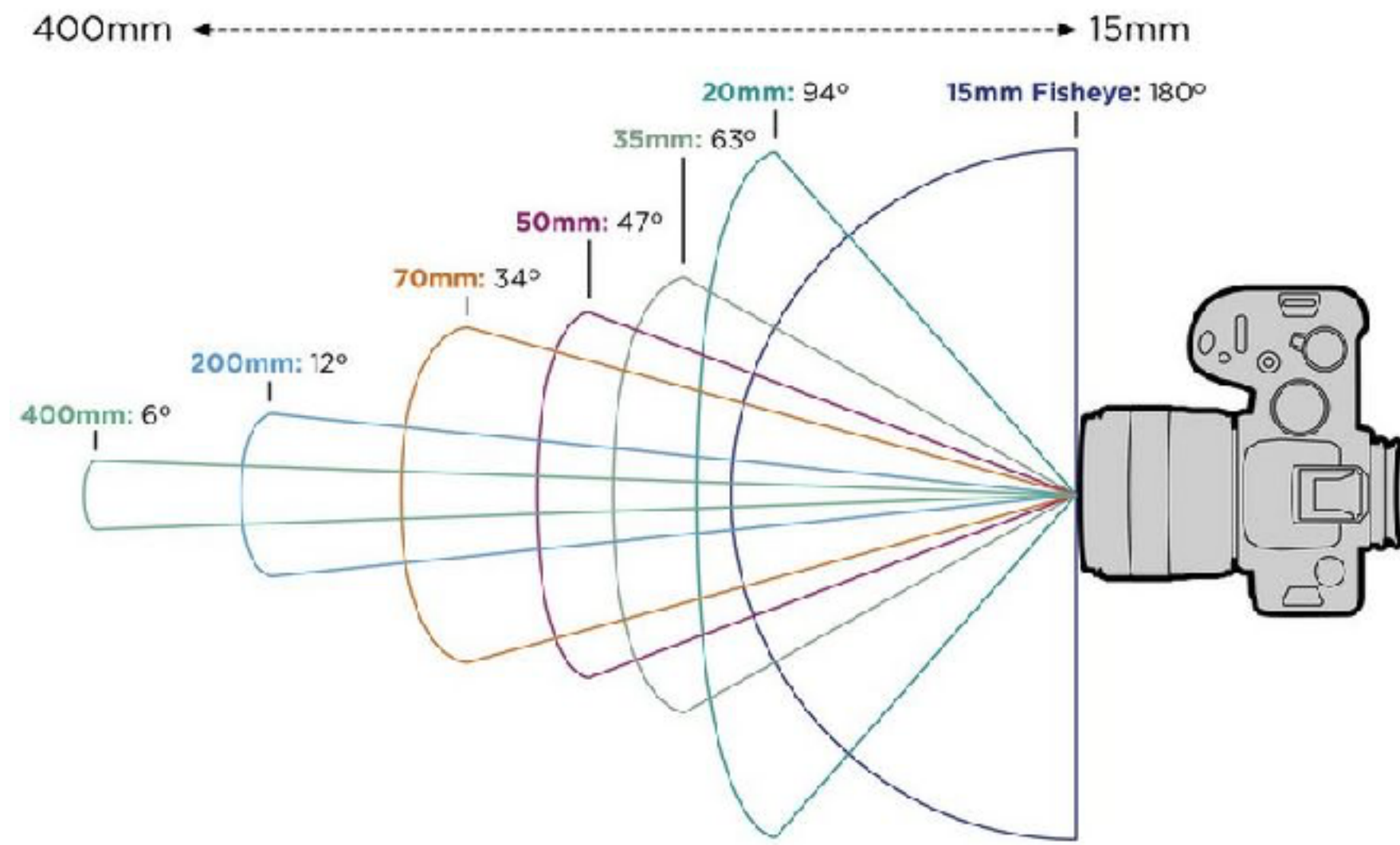
# Image sensor format



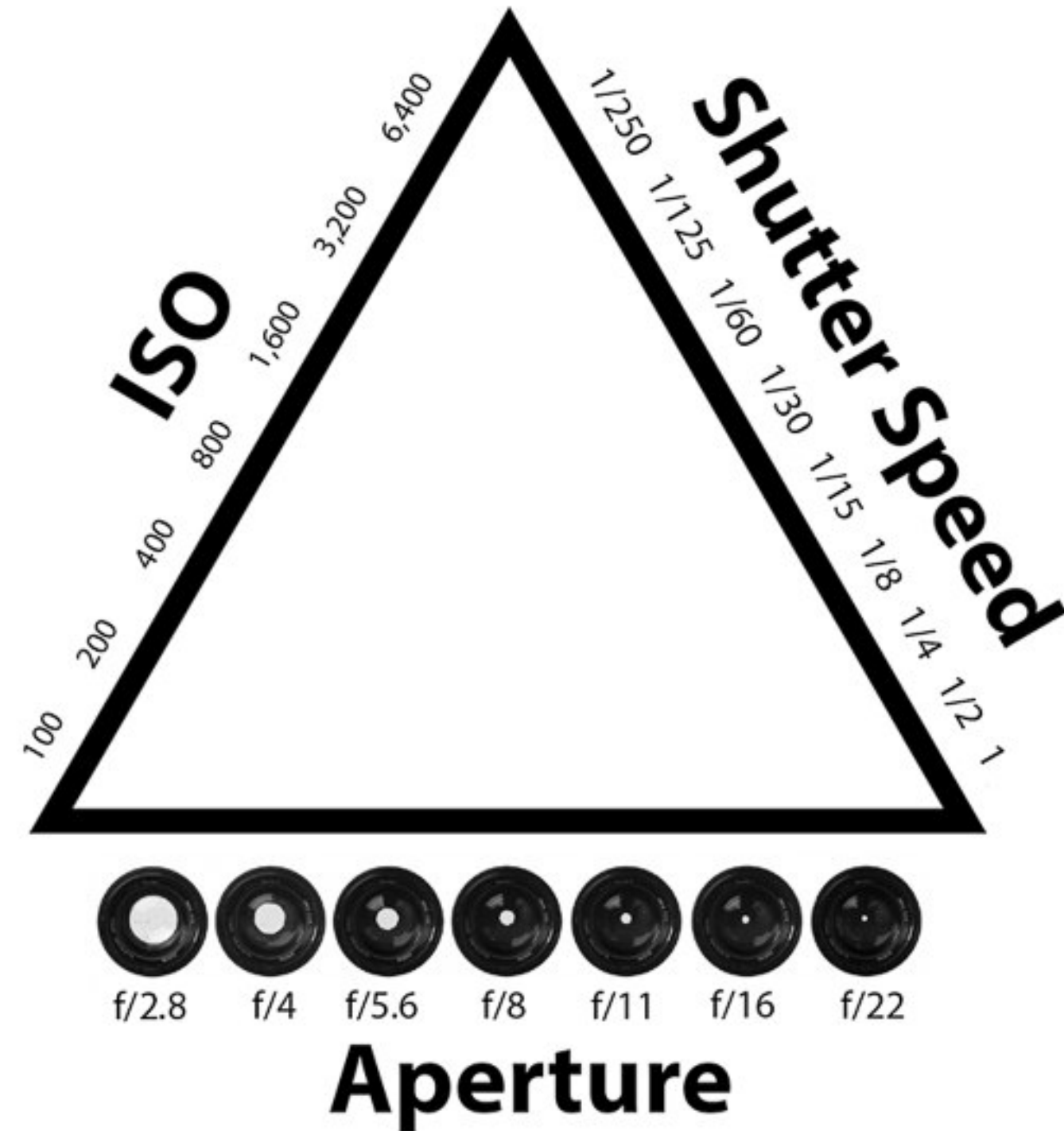
# Crop Factor



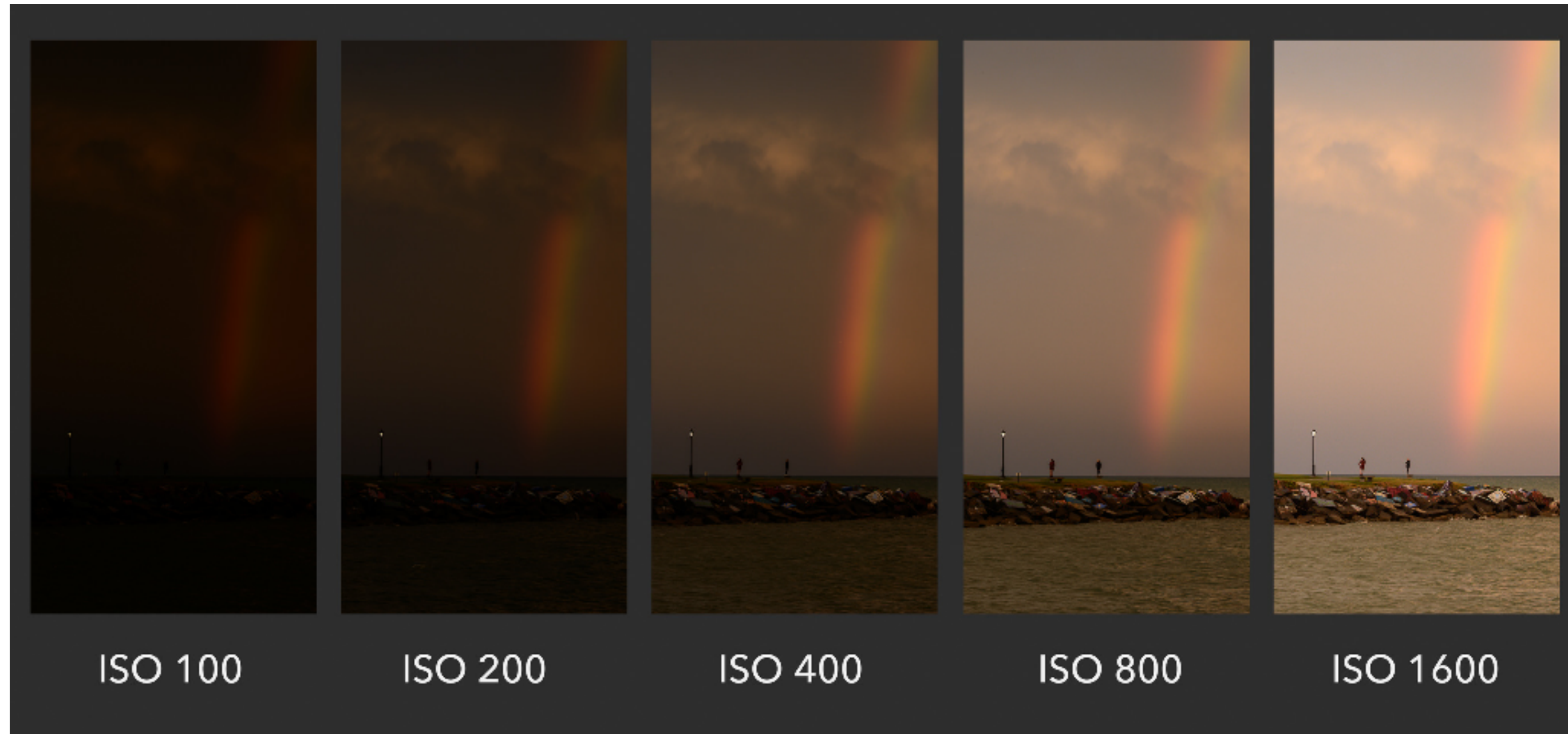
# Focal length



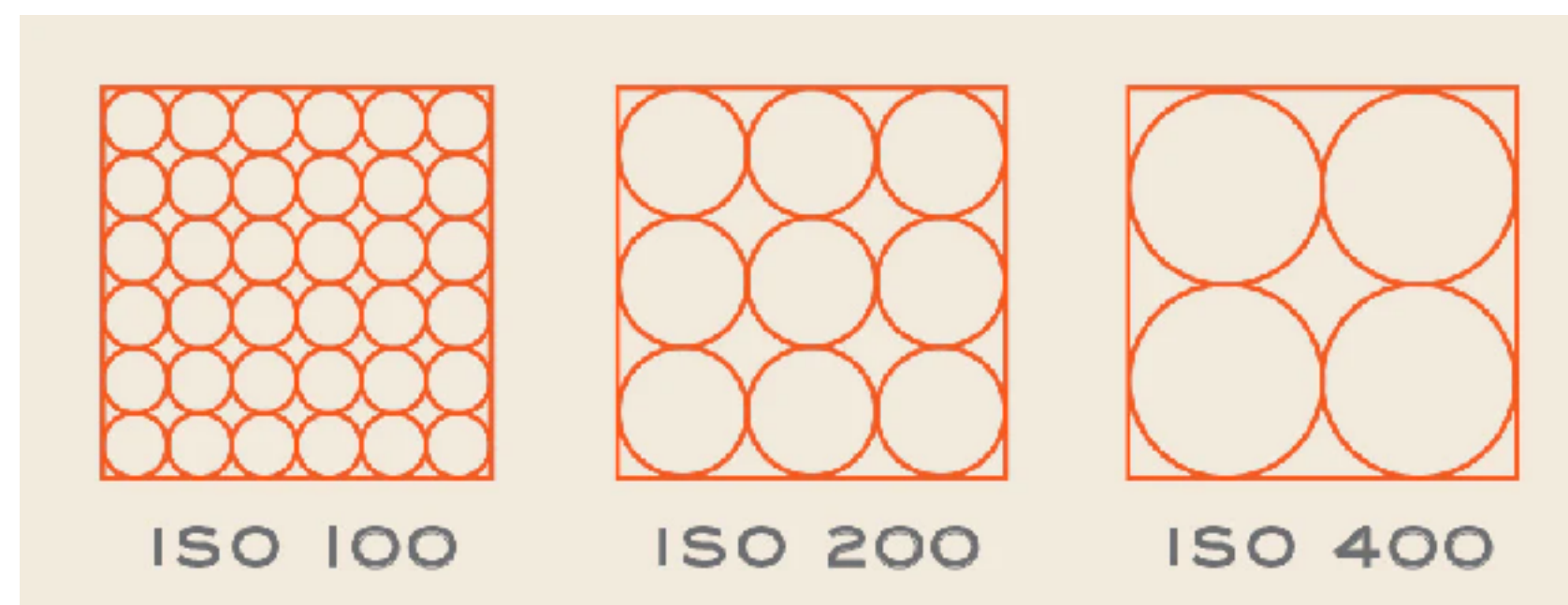
# The exposure triangle



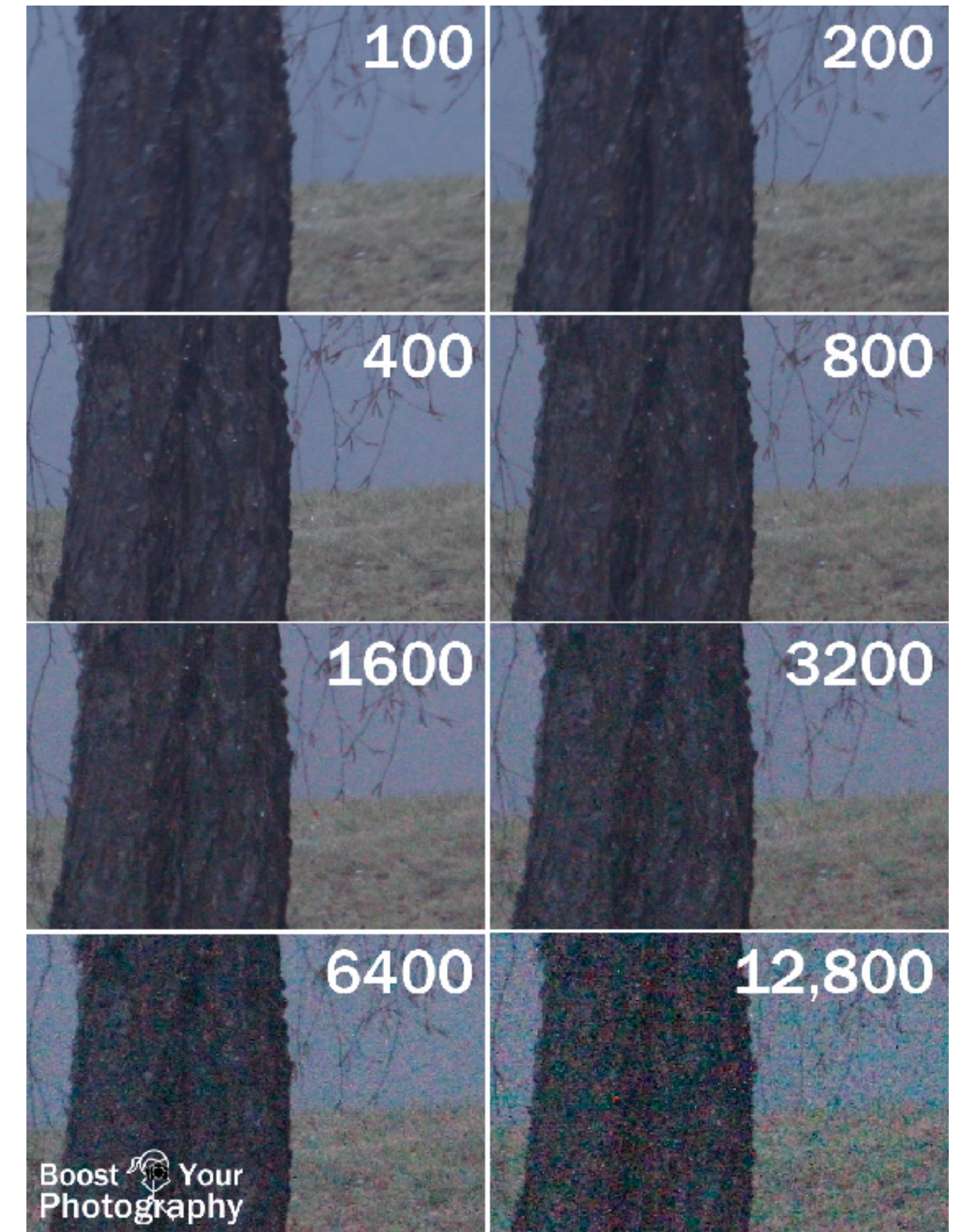
# ISO



Film: Silver crystal size



Digital camera: signal amplifier





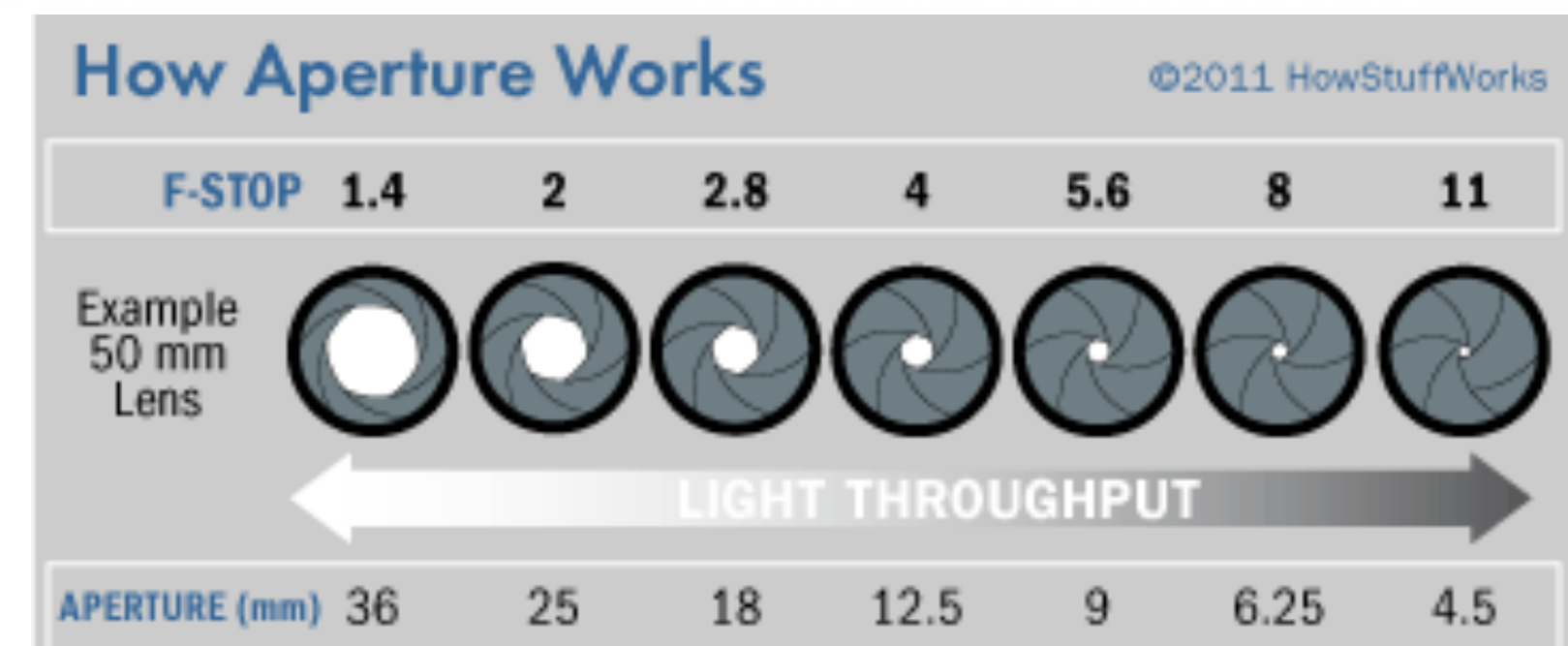
# Aperture



$f/1 = \frac{f}{(\sqrt{2})^0}$	$f/5.6 = \frac{f}{(\sqrt{2})^5}$
$f/1.4 = \frac{f}{(\sqrt{2})^1}$	$f/8 = \frac{f}{(\sqrt{2})^6}$
$f/2 = \frac{f}{(\sqrt{2})^2}$	$f/11 = \frac{f}{(\sqrt{2})^7}$
$f/2.8 = \frac{f}{(\sqrt{2})^3}$	$f/16 = \frac{f}{(\sqrt{2})^8}$
$f/4 = \frac{f}{(\sqrt{2})^4}$	$f/22 = \frac{f}{(\sqrt{2})^9}$

$$f\text{-number} = \frac{\text{focal length (mm)}}{\text{aperture diameter (mm)}}$$

$$\text{aperture diameter (mm)} = \frac{\text{focal length (mm)}}{f\text{-number}}$$



# Aperture – DoF

Aperture Adjustment Sequence - DOF



**f/1.8**



**f/2.8**



**f/4.0**



**f/5.6**



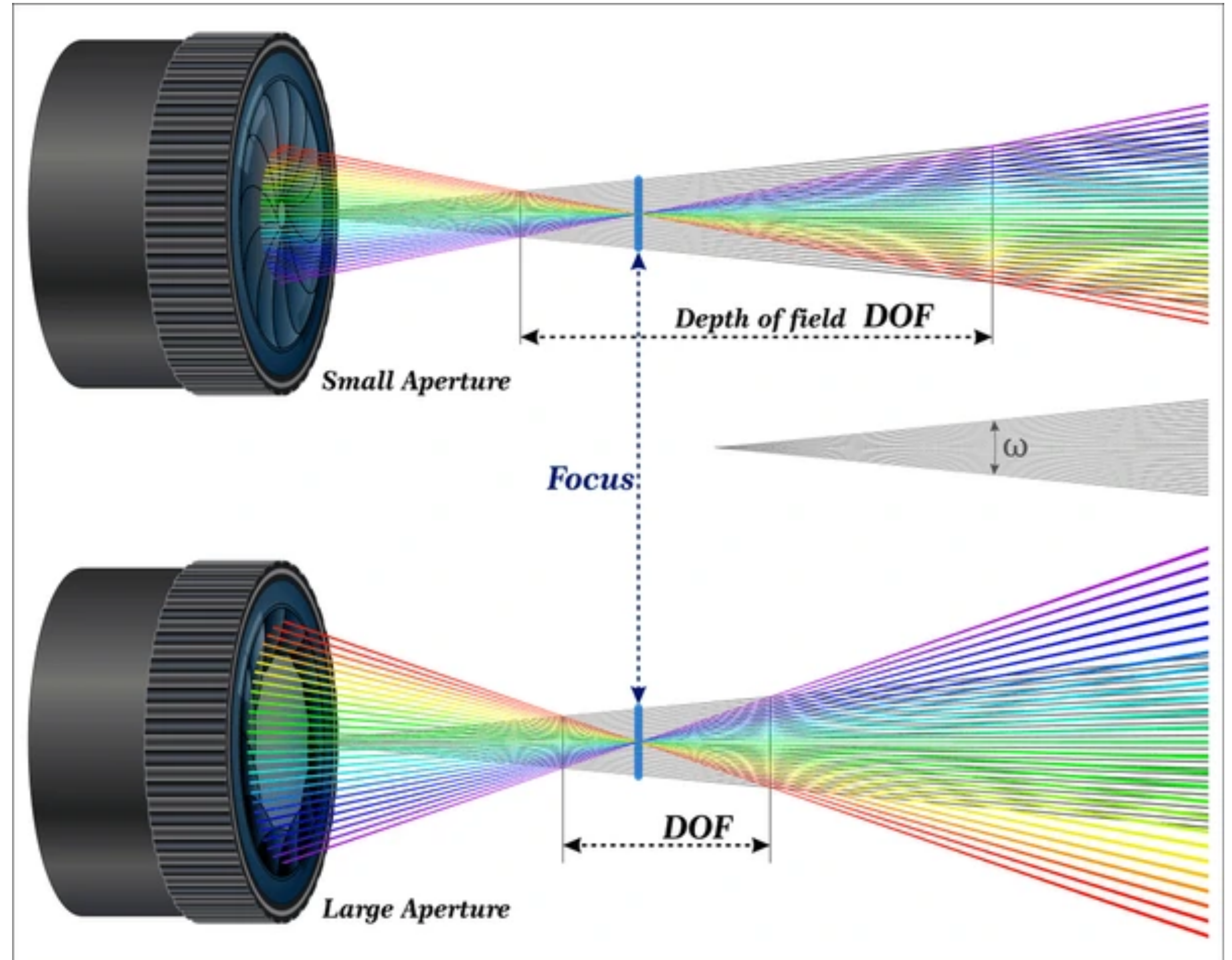
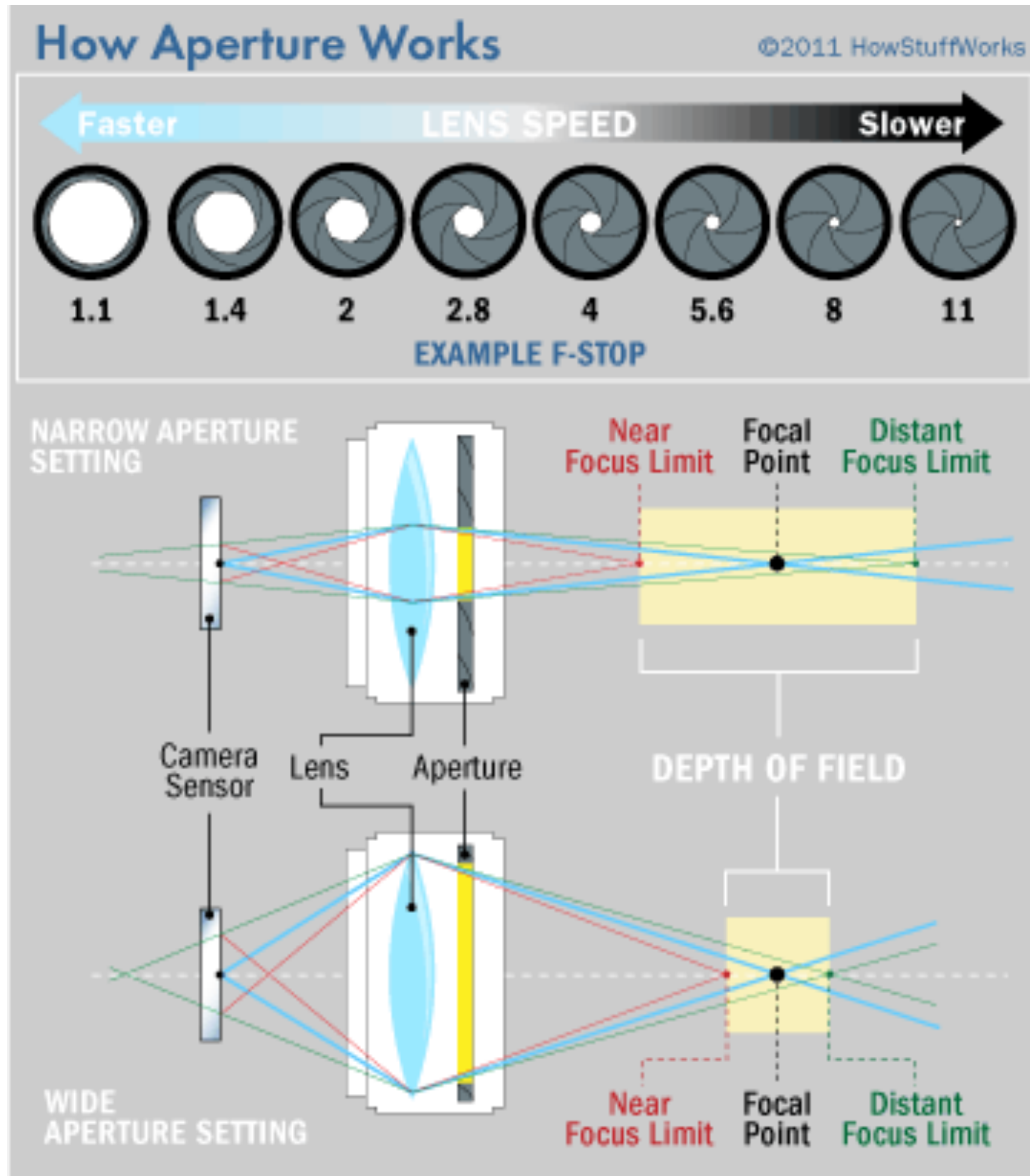
**f/16**



**f/22**

# Aperture - DoF

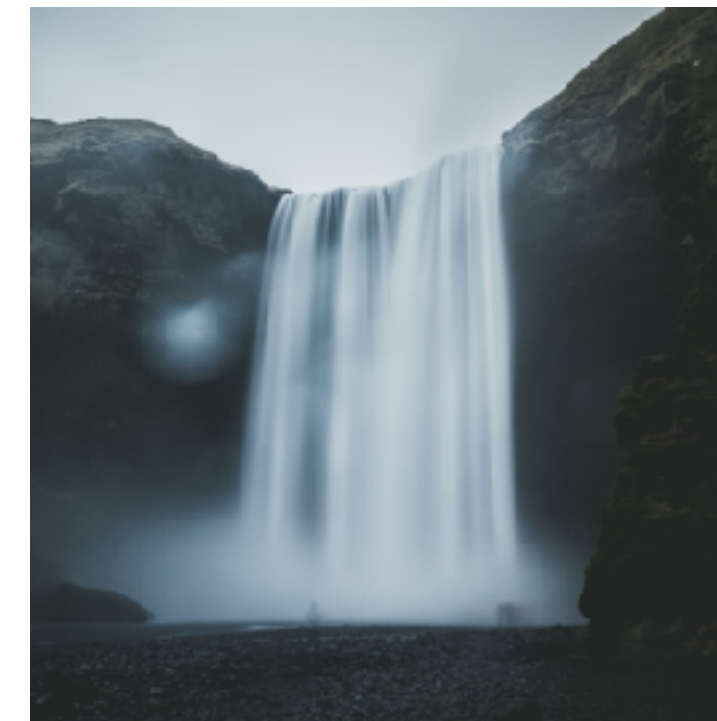
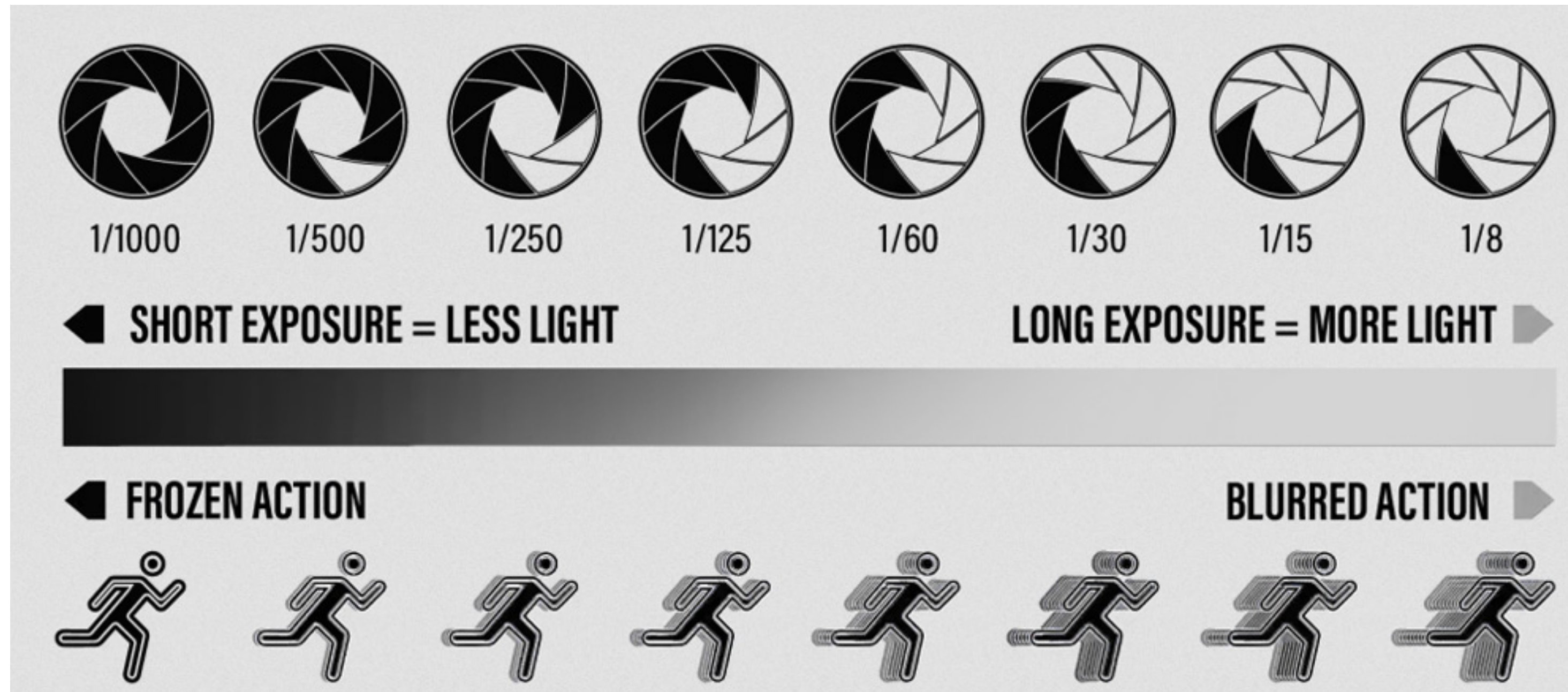
$$DoF \approx \frac{2u^2 N c}{f^2}$$

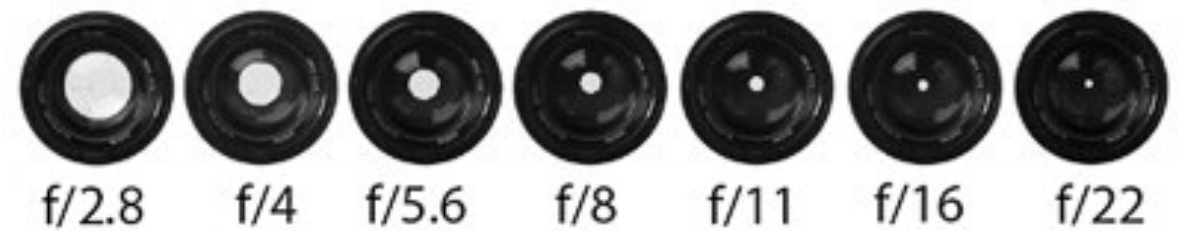
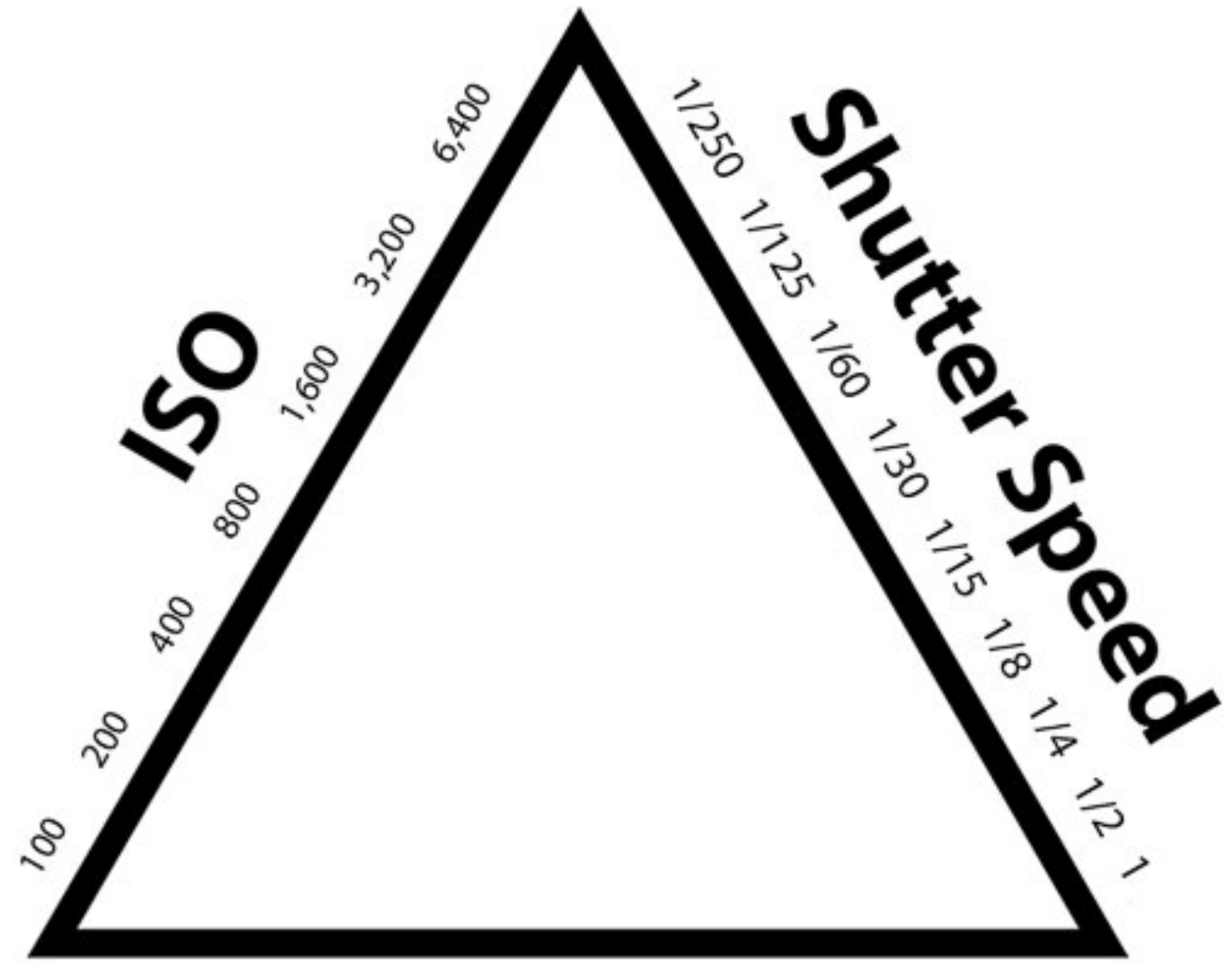


# Aperture – Flare



# Shutter speed










**Aperture**

# The Sunny 16 Rule

**LENS LURKER**

**SUNNY 16 CHEAT SHEET**









 Sunny	 Slightly Overcast	 Overcast	 Extremely Overcast	 Sunset
<b>f/16</b>	<b>f/11</b>	<b>f/8</b>	<b>f/5.6</b>	<b>f/4</b>

Shutter Speed = Inverse of Film Speed  
100 ASA Film = 1/100 Shutter Speed



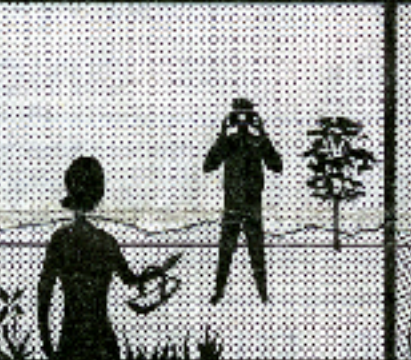
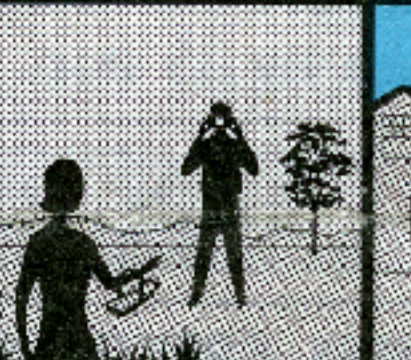

LENSLURKER.COM

Table of shutter speed and aperture for different lighting conditions

ISO	water, sand, snow (sun)	shadows, bright sun	hazy bright sun	poor lighting	cloudiness, no shadows	late sunset
						
100	1/125 f/22	1/125 f/16	1/125 f/11	1/125 f/8	1/125 f/5.6	1/125 f/4
200	1/250 f/22	1/250 f/16	1/250 f/11	1/250 f/8	1/250 f/5.6	1/250 f/4
400	1/500 f/22	1/500 f/16	1/500 f/11	1/500 f/8	1/500 f/5.6	1/500 f/4
800	1/1000 f/22	1/1000 f/16	1/1000 f/11	1/1000 f/8	1/1000 f/5.6	1/1000 f/4
1600	1/2000 f/22	1/2000 f/16	1/2000 f/11	1/2000 f/8	1/2000 f/5.6	1/2000 f/4

**DAYLIGHT EXPOSURE TABLE FOR KODACOLOR II FILM**

**Shutter Speed 1/125 Second**

Bright or Hazy Sun on Light Sand or Snow	Bright or Hazy Sun (Distinct Shadows)	Cloudy Bright (No Shadows)	Heavy Overcast	Open Shade†
				
f/16	f/11*	f/5.6	f/4	f/4

\*f/5.6 at 1/125 second for backlit close-up subjects.  
†Subject shaded from the sun but lighted by a large area of sky.

# Recommendations

Moom bookshop



Aperture Magazine



# Reference

- <https://www.google.com/url?sa=i&url=https%3A%2F%2Fphotographylife.com%2Fwhat-is-iso-in-photography&psig=AOvVaw1vxUIEHQDDLXDBFHitwEHA&ust=1732613693328000&source=images&cd=vfe&opi=89978449&ved=0CBcQjhxqFwoTCPDInZyX94kDFQAAAAAdAAAAABAE>
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**Thank you**