Basic Photography
Class 1: Introduction

Dallas Camera Club
and
Plano Photography Club

Presented by Dennis Fritsche

Purpose

This class is being developed with those new to photography in mind. Those with more experience may also benefit from the classes. At the end of the classes, you should be able to identify your intent and know how to use your equipment to achieve your intent and we hope you have fun along the way.

Classes will be held once a month online via zoom. Homework will be assigned. Photography requires practice to master the skills necessary to have fun and produce images you are proud of. The first of each class will be dedicated to reviewing your homework and answering questions about prior lessons.

Structure

- Class 1 – Introduction to the class and photography
- Classes 2 and 3 – The Capture Process
- Classes 4 and 5 – Composition
- Class 6 – Processing
- Classes 7 – Tips and Tricks
- Classes 8 – 10 – To be determined based on what we learn

What is Photography?

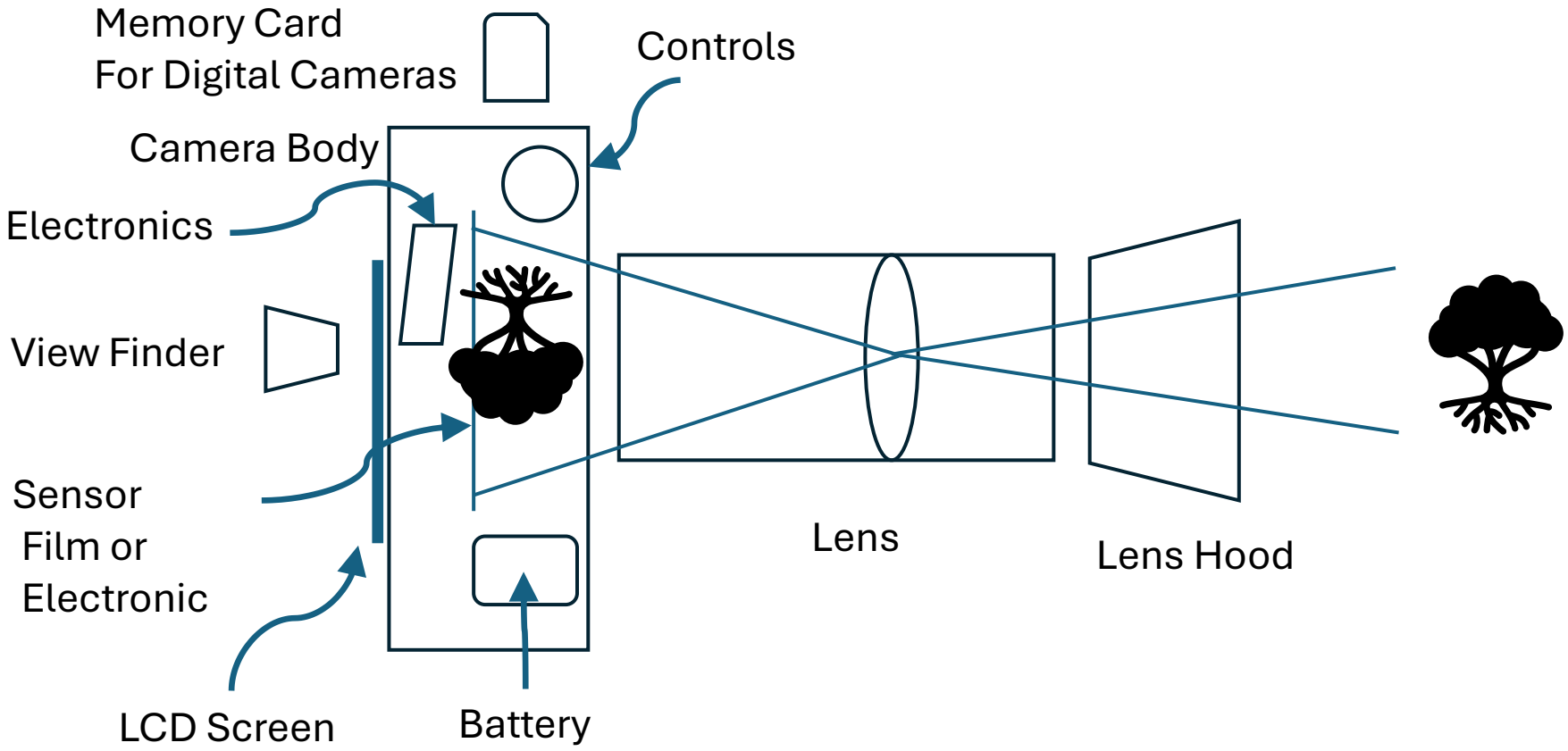
- From the Greek “drawing with light”
- In practice, photography is the art, application, and practice of creating images by recording light, either electronically by means of an image sensor, or chemically by means of a light-sensitive material such as photographic film.
- Photography captures a moment in time to record history, document nature and science, save cherished moments with family and friends, and most often, to create a piece of art that is meaningful to the photographer and hopefully his audience.
- While much of this information is applicable to all capture methods, the emphasis is on digital photography.

References

- Your camera manual.
- There are countless websites, YouTube videos, classes, and workshops.
- The answer to any question is readily available online. Be cautious and look for multiple sources. (Never trust the AI summary.)
- An excellent reference is available from the website *Photography Life* Photography Life
- Check out their tutorial *Photography Basics*

Photography Basics: The Complete Beginner's Guide

Parts of the Camera




Nikon
Fn1
Fn2


Fn3
DISP
AF-ON
OK
MENU


85 70 50 35 28 24
NIKKOR
24-120/4 S
Nikon
OFF ON
ISO
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WB
MODE
M 250 F4
AF-C
ISO 64
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Fn3
DISP
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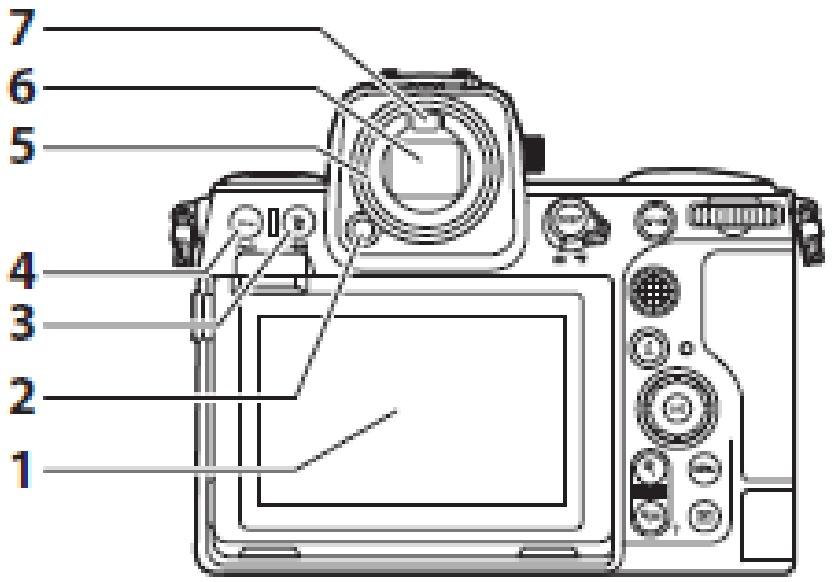
SanDisk
128GB

Your Manual Will Descibe all the Features of Your Camera



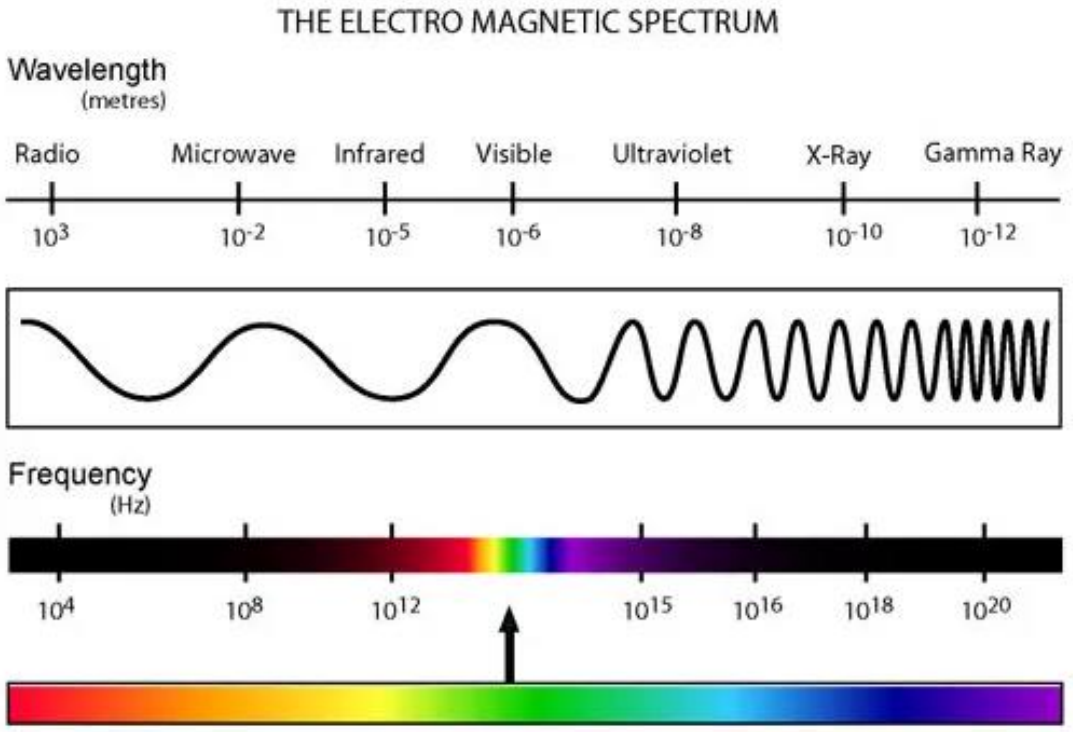
1 Monitor (□□ 54, □□ 115)
2 Eyepiece release (□□ 864)
3 Delete button (; □□ 98, □□ 243)
FORMAT button (; □□ 710)
4 Protect button (; □□ 235)
Fn3 button (**Fn3**; □□ 175)
5 Rubber eyecup (□□ 864)
6 Viewfinder (□□ 46)
7 Eye sensor (□□ 50)

The Digital Camera Sensor

- Just as the retina in the human eye captures light and translates it into nerve impulses that the brain can interpret, the sensor captures light as photons and converts into an electrical signal that is then processed to form a digital image.
- A pixel is short for a picture element, the individual light gathering electronics
- The sensor is made up of a matrix of these pixels.
- The resolution of a sensor is expressed in megapixels (MP).
- A 24MP camera is formed by a matrix of photosensitive elements with 6000 pixels horizontally and 4000 pixels vertically.
- The aspect ratio is the ratio of the horizontal to vertical pixels.
- This 24MP sensor has an aspect ratio of 6000/4000 or 3:2 (the most common aspect ratio)

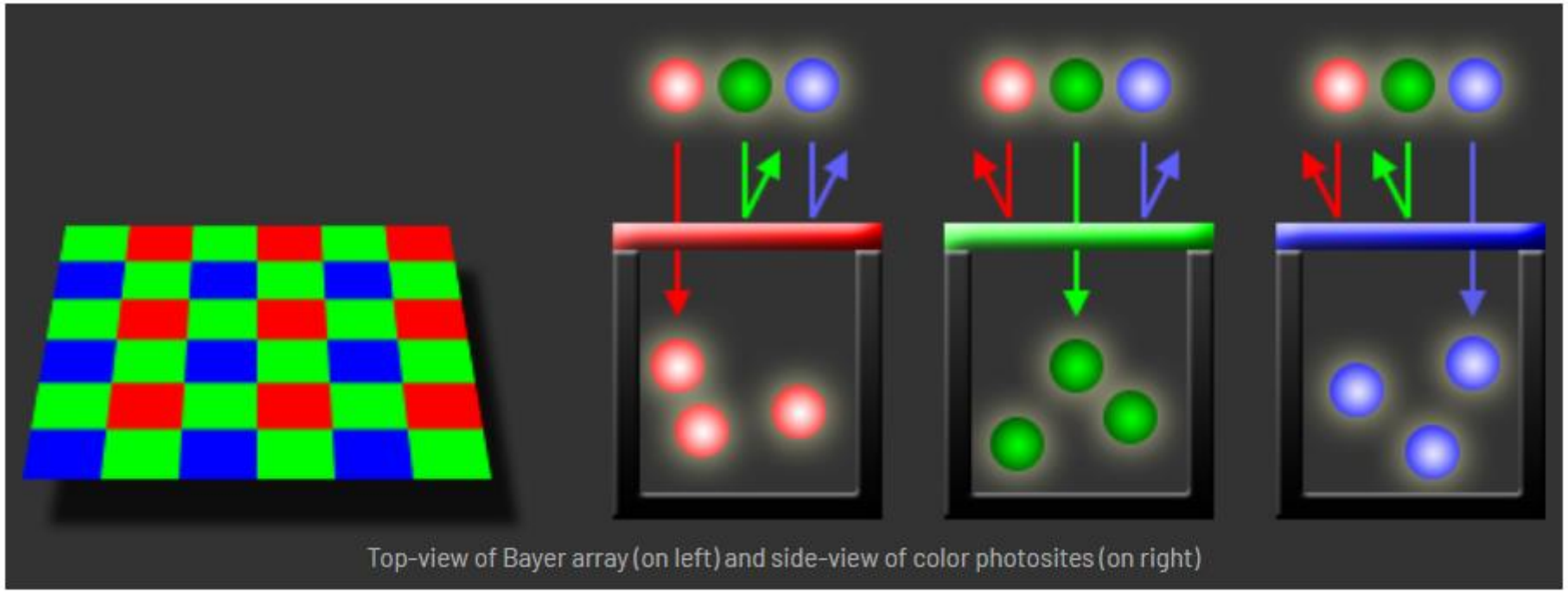
The Photon

- Light is made up of photons which are both a particle and a wave.
  - The particle portion accounts for the light
  - The wave portion accounts for the color



Color

- A sensor cannot detect the wavelength of the photons and hence does not see colors.
- A Bayer filter is placed over each pixel so that only photos of a certain wavelength or color are collected at each pixel.
- The color and intensity information in this form is referred to as RAW data.



Combining the Colors in Camera

- Your camera evaluates the RAW data from each pixel and its neighbors to calculate what the Red (R), Green (G), and Blue (B) value of each pixel should be.
- In your camera the individual colors are converted to an RGB digital image usually as a jpeg (Joint Photographic Experts Group) where each pixel has RGB data.
- Each manufacturer has their own secret sauce for converting the data and usually offer a variety of interpretations.
- You can download these jpeg files to your computer, phone, or other device to share or process further.

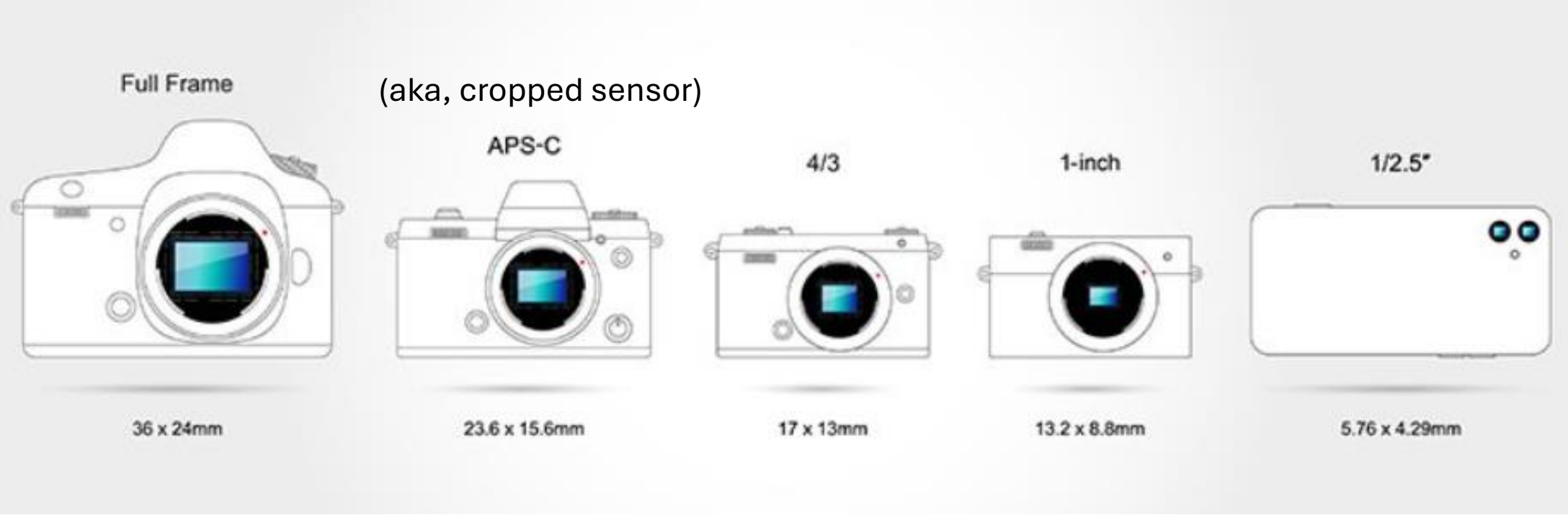
Combining the Colors on the Computer

- The camera can also provide the RAW data to your computer to be converted to other formats.
- Your camera's manufacturer supplies a program to process both jpeg and RAW images. This is always a great place to start learning about processing.
- Other software such as Adobe Lightroom, Adobe Photoshop, DXO, On1, etc. can be used.
- Each of these will provide their own interpretation of the RAW data conversion and usually with a variety of interpretations.
- Which format to use?
  - Jpeg gives greatest compatibility and ease of use.
  - RAW provides the greatest quality and flexibility.

File Formats

- A guide to image file formats and image file types | Adobe Acrobat
- Jpeg - Joint Photographic Experts Group
- HEIF - High Efficiency Image File Format
- TIFF - Tagged Image File Format
- PSD – Photoshop Document
- RAW
  - NEF – Nikon
  - CR2 – Canon
  - ARW – Sony
  - ORF – Olympus
  - RAF – Fuji Film
  - DNG – Adobe, Leica, Sigma
- GIF - Graphics Interface Format
- PNG - Portable Network Graphics
- BMP - Bitmap

Digital Camera Sensor Size



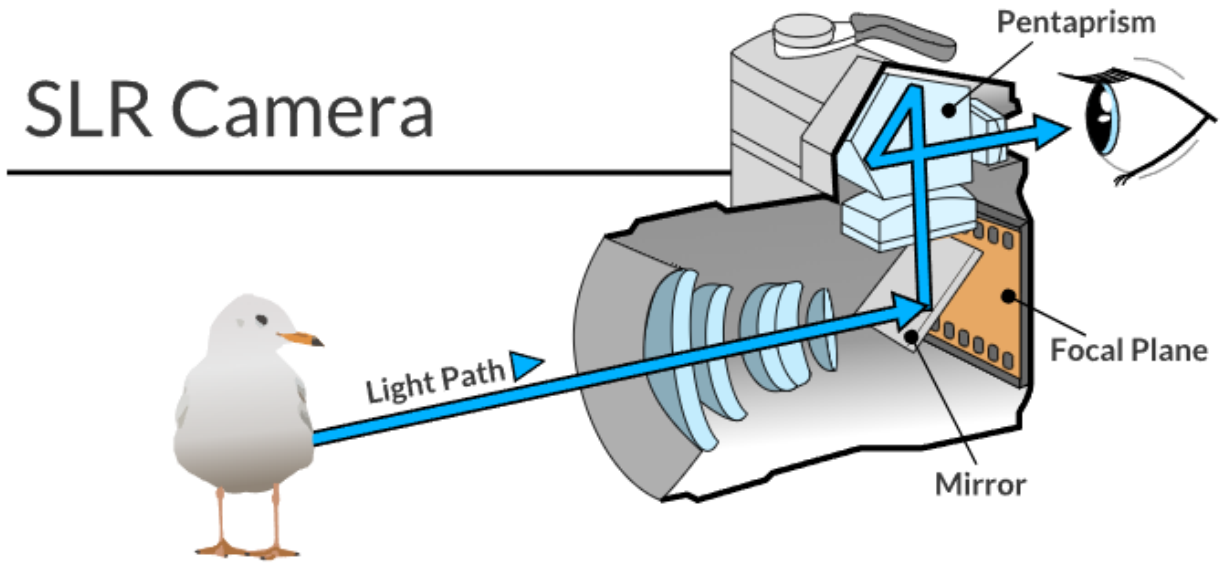
Sensor Size and Features

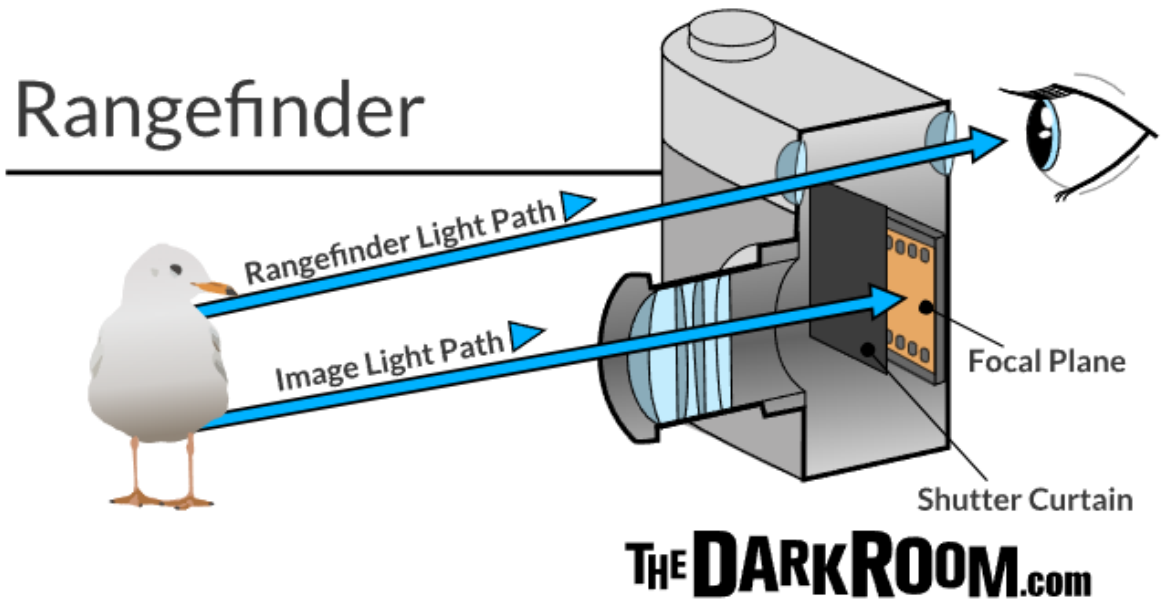
Sensor Size	Makers	Pros	Cons
Full Frame	Nikon, Canon, Sony, Leica, Fuji Films	Potential for more resolution or larger sensor sites	Larger body and lenses
APSC	Nikon, Canon, Sony, Leica, Fuji Film	Smaller size body and lenses. Good compromise on resolution and sensor sites.	Practical limit to resolution
Micro 4/3	Olympus, Panasonic	Very small size body and lenses.	Practical limit to resolution and senor site size
1 Inch	Mostly Sony	Very small size	Practical limit to resolution and senor site size
Phone	Ubiquitous	Very Small Size	Practical limit to resolution and senor site size

Styles of Digital Cameras

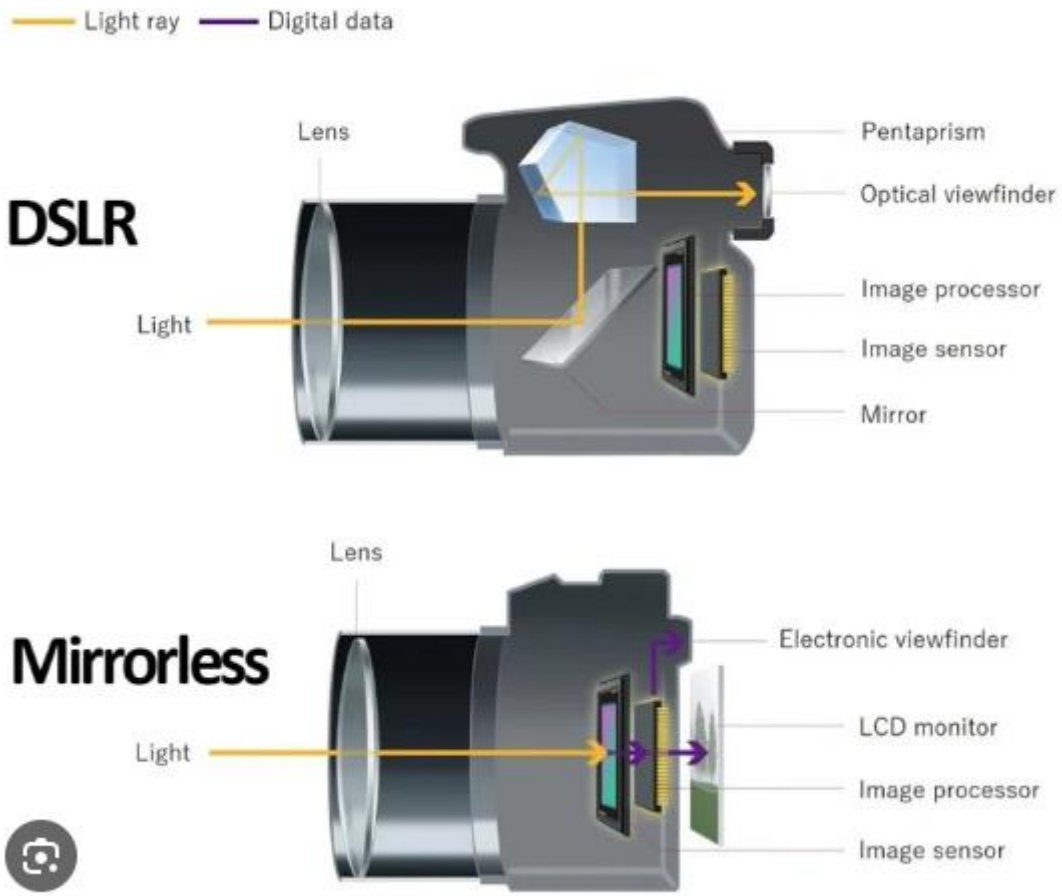
- Interchangeable Lens Cameras (ILC)
  - Film
    - Range Finder – smaller, accurate manual focus
    - SLR – Single-Lens Reflex – Larger, more lens choices
  - Digital
    - Digital Single Lens Reflex (DSLR)
      - Pro - Versatile, large lens choice, built on a long tradition
      - Con – Can be larger/heavier
    - Mirrorless
      - Pro - Versatile, large lens choice, sensor sees image directly, functionality
    - Con – View finder not as bright
- Fixed lens – zoom or fixed focal length
  - Pro – Smaller, no changing lenses
  - Con – Only one lens
- Point and Shoot
  - Pro – Small, discrete
  - Con – Lack of versatility
  - iPhone – ubiquitous
- Phone

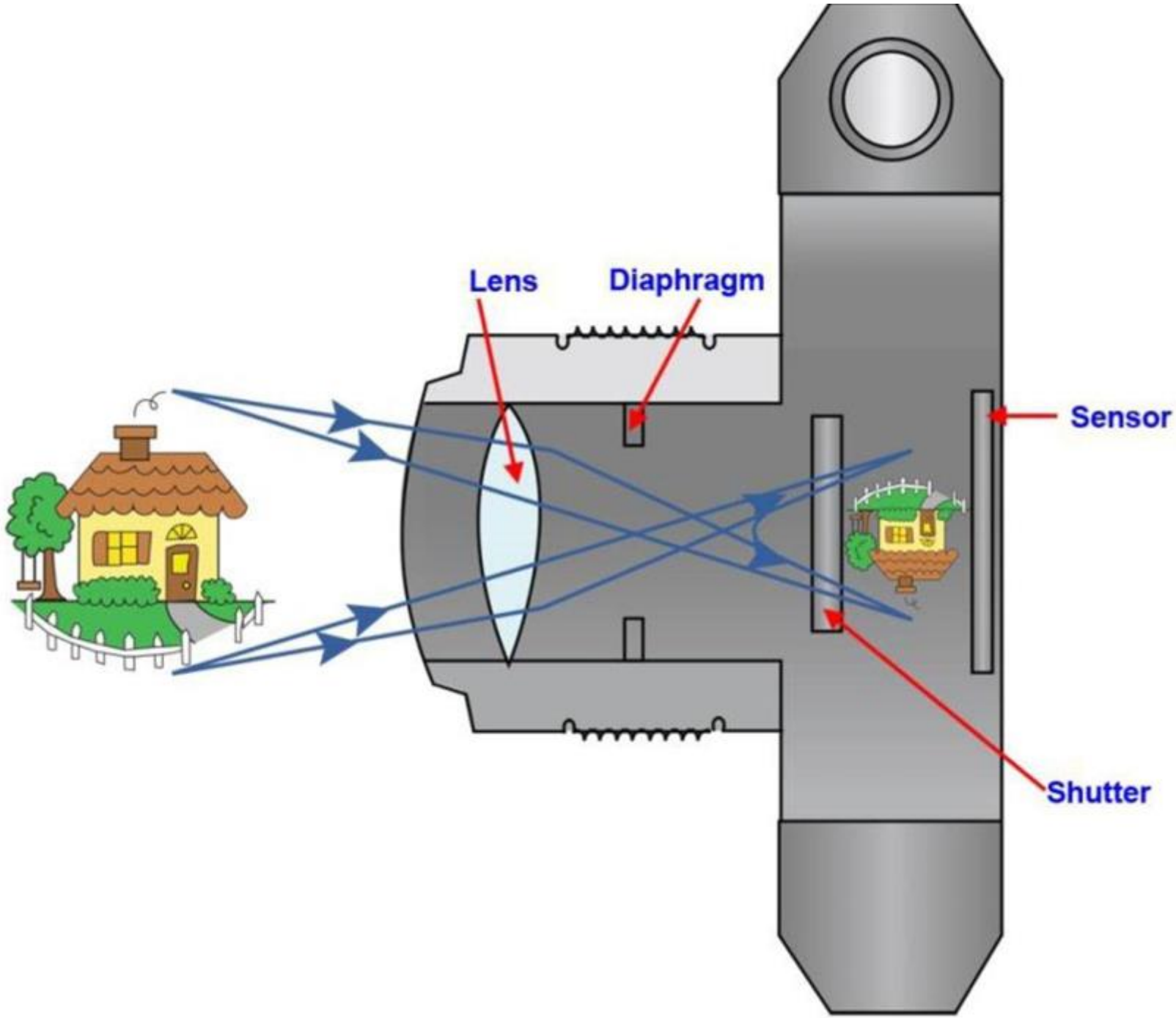
Film ILC


SLR Camera
Pentaprism
Light Path
Focal Plane
Mirror


Rangefinder
Rangefinder Light Path
Image Light Path
Focal Plane
Shutter Curtain
THE DARKROOM.com

Digital ILC


Light ray
Digital data
DSLR
Lens
Pentaprism
Optical viewfinder
Light
Image processor
Image sensor
Mirror
Mirrorless
Lens
Electronic viewfinder
LCD monitor
Light
Image processor
Image sensor


Lens
Diaphragm
Sensor
Shutter

Exposure

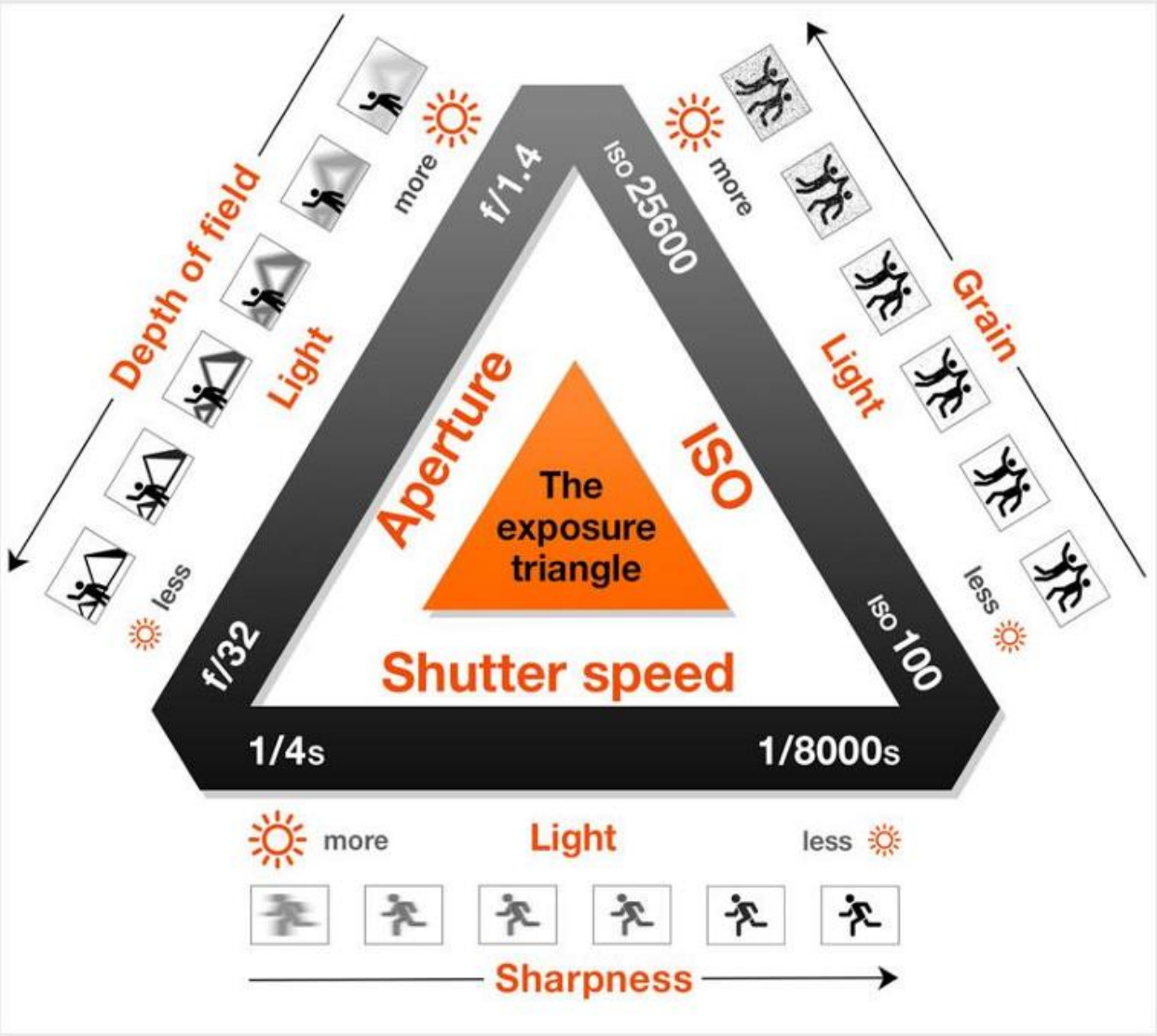
- Exposure refers to getting enough light to the image sensor to make a photograph with the desired brightness.
- The two ways to vary the amount of light reaching the sensor are
  - Flow of Light
  - Time

From Photography Life's Photography Basics

- **Shutter speed:** The amount of time your camera sensor is exposed to the outside world while taking a picture.
- **Aperture:** Represents a "pupil" in your lens that can open and close to let in different amounts of light.
- **ISO:** Technically more complex at a physical level, but you can think of it as being like the sensitivity of film. More sensitive film = better in low light. You could also think of it as similar to brightening or darkening a photo in post-processing.

The technical aspects of photography amounts to balancing choices with adverse effects.

Exposure Triangle

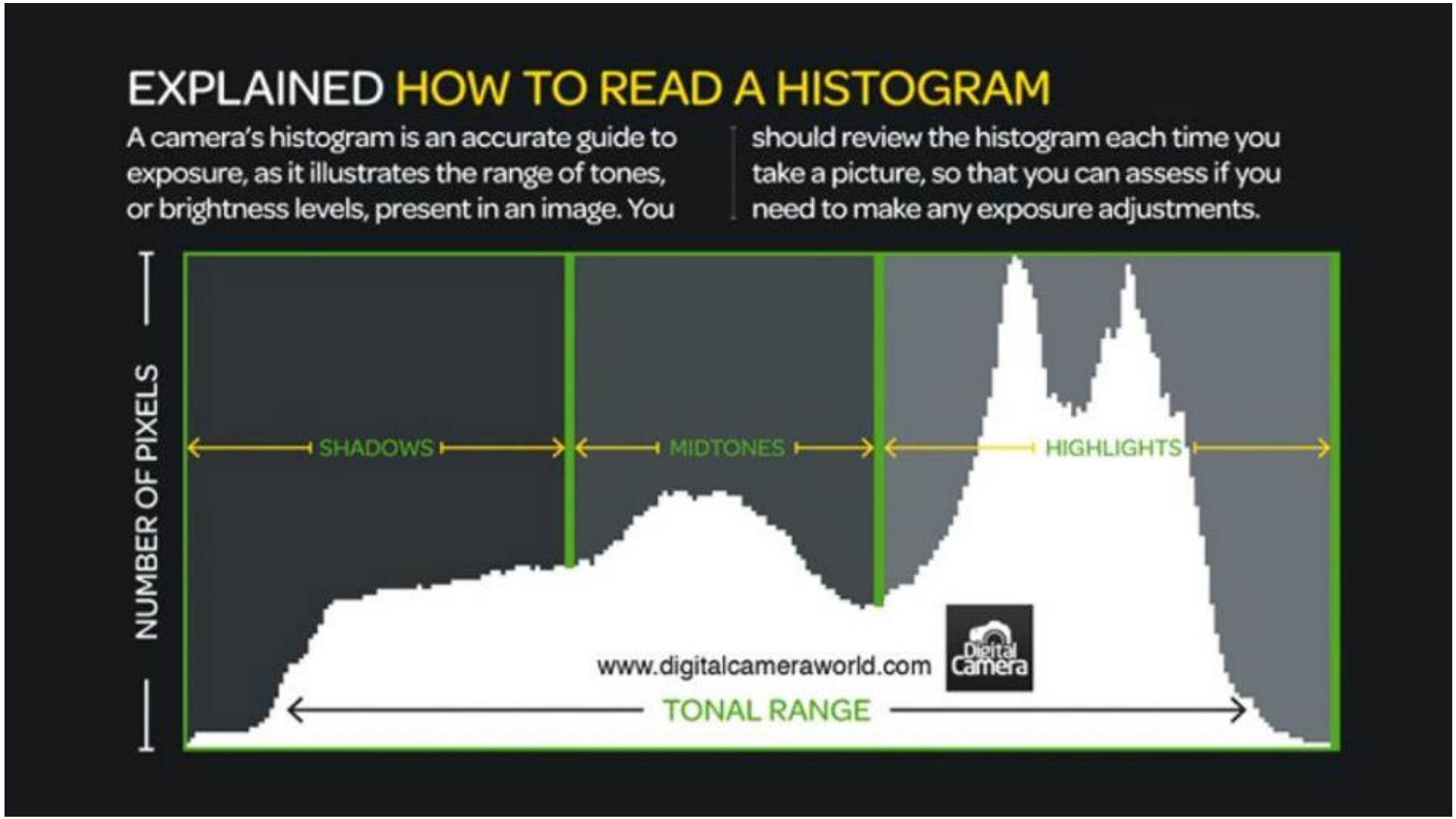


- Aperture expressed as f/8.
  - Stop down – close aperture to larger number meaning less light
  - Open up – Open aperture to smaller number meaning more light.
- Shutter Speed expressed as 1/(time shutter open)
- ISO expressed as a value, e.g. ISO 200. Higher number more brightness and lower number less brightness.

Histograms

- In photography, a histogram is a graph showing the distribution of light in an image.
- Most cameras can display a histogram for each image stored on the camera's memory card.
- Some DSLR cameras allow you to see a live histogram before you take the shot.
- All mirrorless cameras allow you to see a live histogram in the view finder and rear LCD. This is a most powerful feature

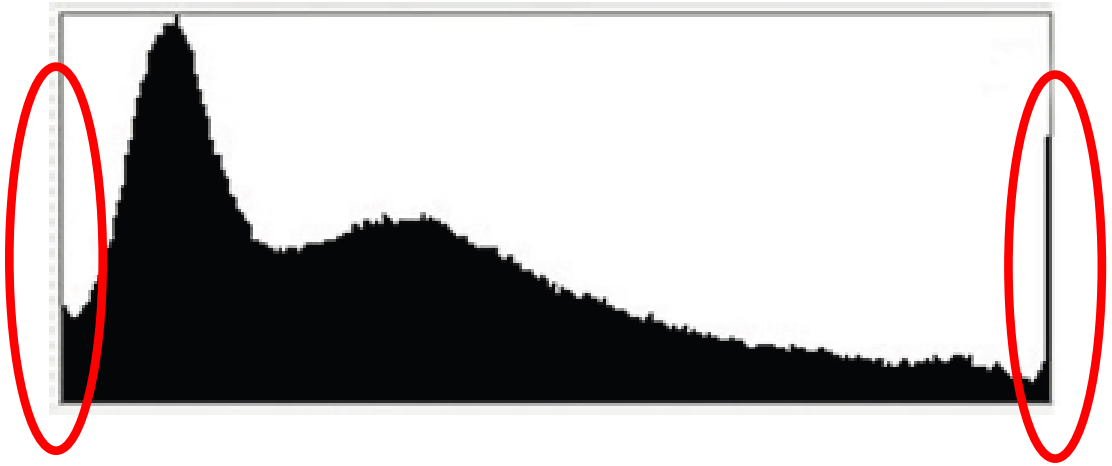
Histograms


EXPLAINED HOW TO READ A HISTOGRAM
A camera's histogram is an accurate guide to exposure, as it illustrates the range of tones, or brightness levels, present in an image. You should review the histogram each time you take a picture, so that you can assess if you need to make any exposure adjustments.
NUMBER OF PIXELS
SHADOWS
MIDTONES
HIGHLIGHTS
www.digitalcameraworld.com
Digital Camera
TONAL RANGE

Reading the Histogram

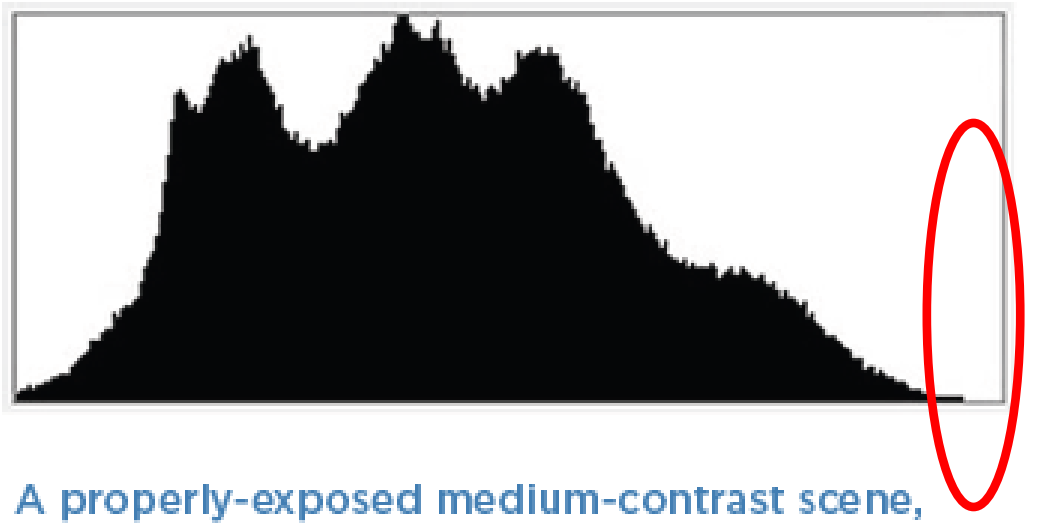
Blocked Up Shadows

Blown Out Highlights



The most important parts of a histogram are the right and left edges. This histogram shows pixels pushed up against both edges, indicating overexposed highlights and underexposed shadows.

Always favor proper highlights



A properly-exposed medium-contrast scene, with nothing pushed up against either end of the histogram.

From Michael Frye *Exposure for Outdoor Photography*

Lenses

- A lens is a tool used to bring light to a fixed focal point. In a film camera, the lens sends the light to the film strip, while in a digital camera (like DSLRs or mirrorless cameras), the lens directs light to a digital sensor. Camera lenses are made up of a series of glass plates that are convex (curved outward) or concave (curved inward).
- It houses the aperture diaphragm.

Lens Terminology

- The focal length of a lens is the distance between the plane of the sensor and the optical center of the lens. This determines the lens's angle of view.
- Focal length is expressed in mm (millimeters)
  - Normal is 50mm – field of view the human eye sees
  - Telephoto is typically 100mm or more – narrow field of view
  - Wide and is 24mm and shorter – wide field of view
- Prime lenses have one focal length such as 35mm
- Zoom lenses have a range of focal lengths such as 24-70mm
- The maximum aperture a lens with fixed aperture is shown as 24-70mm f/2.8
- For lenses with variable aperture shown as 100-400mm f/4.5-5.6
- Lenses with larger apertures (i.e. smaller f/number) are said to be brighter since they let in more light for focusing and exposure.

Questions?

Homework

1. Review the handout material.
2. Review chapters 1 and 2 of Photography Life's *Photography Basics*

   Photography Basics: The Complete Beginner's Guide
3. Send me an email dennisfritsche@verizon.net
   1. Is there anything in this class that needs more explanation?
   2. What do you want to get from this class?
   3. What specific subjects (pertaining to basic photography) do want to see covered?
   4. Due January 29