

MassArt PCE - Intro to Digital Photo – Summer 2021- Morrison  
Class 1: 6/8/21

*The Law of Reciprocity,  
The Zone System, Lens Focal Lengths*

# Aperture, Shutter Speed, The Law of Reciprocity

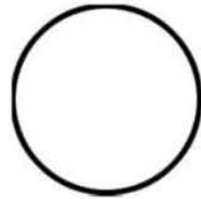
Your lens lets in light in two ways: through aperture (the opening of the lens, which can be various sizes) and shutter speed (the duration of time that the lens is open for the individual exposure). Together, these two variables determine the exposure of the image, and they have a reciprocal relationship.

**The Law of Reciprocity** states: Beginning with a correct exposure “pair” (combination of aperture and shutter speed), if you give the camera (film or digital sensor) twice as much light for half the amount of time, the exposure will remain the same. The inverse is also true (give half as much light for twice the amount of time, and the exposure will remain the same).

Below are some ordered pairs of f-stops and shutter speeds.

|                       |              |            |       |       |       |      |      |      |      |             |
|-----------------------|--------------|------------|-------|-------|-------|------|------|------|------|-------------|
| <b>F-stops</b>        | <b>F:1.4</b> | <b>F:2</b> | F:2.8 | F:4   | F:5.6 | F:8  | F:11 | F:16 | F:22 | <b>F:32</b> |
| <b>Shutter Speeds</b> | 1/2000       | 1/1000     | 1/500 | 1/250 | 1/125 | 1/60 | 1/30 | 1/15 | 1/8  | 1/4         |

**APERTURE:**  
Smaller number = larger opening



**KEY NUMBER:**  
Slower creates shake (blur)

**APERTURE:**  
Larger number = smaller opening



These combinations are correct in a particular lighting situation only: in this case, an overcast sat at approximately ISO 400



f/1.4



f/2



f/2.8



f/4



f/5.6



f/8



f/11



f/16



# ISO



Low ISO (100)

ISO



Low ISO (100)



# ISO



High ISO (3200)

# ISO



High ISO (3200)

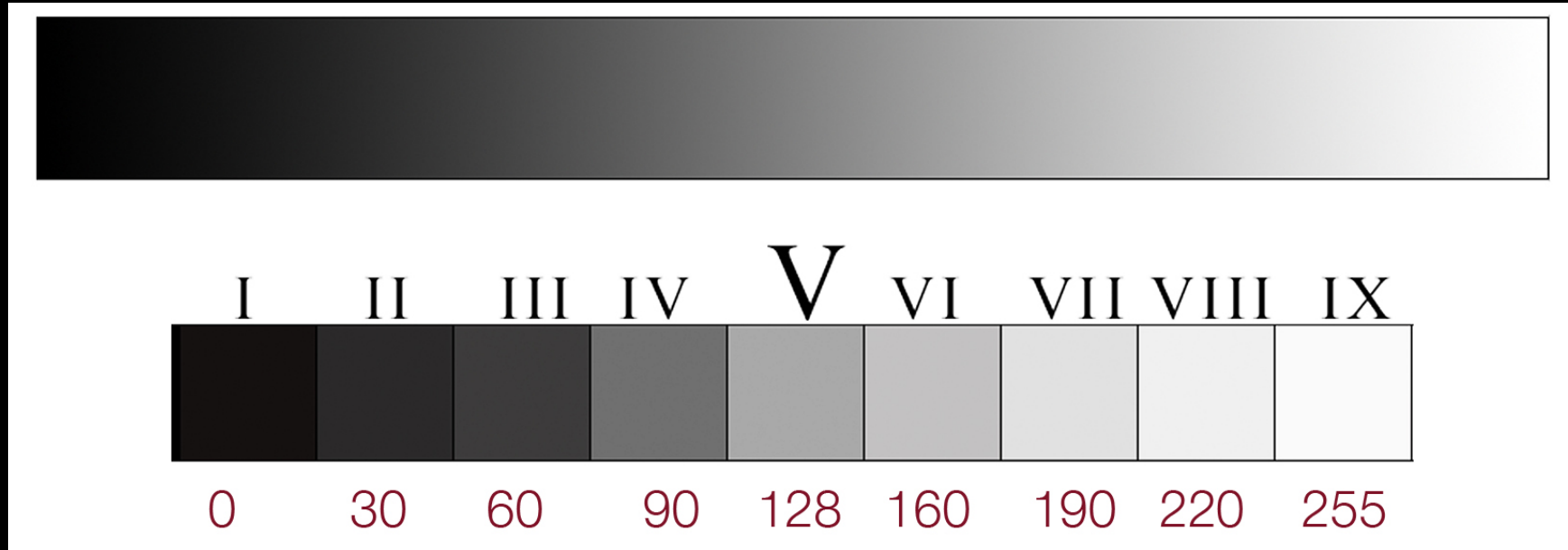




All camera meters read for MIDDLE GRAY (Zone 5 analog, Digital 127)

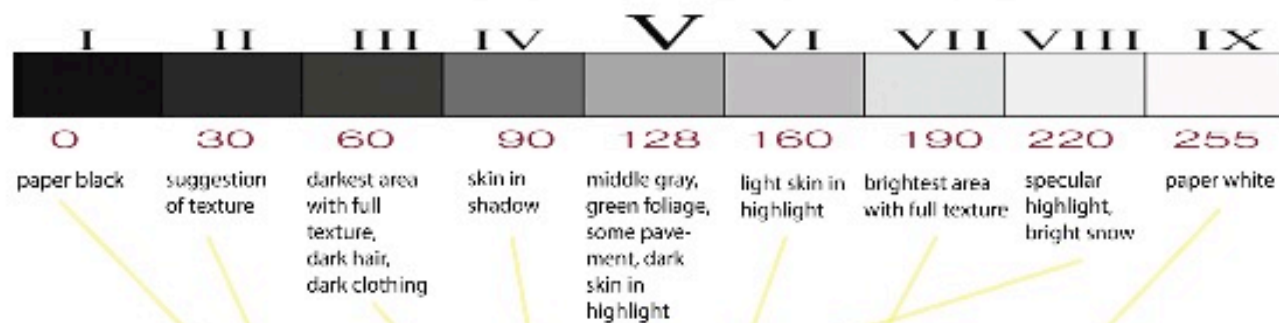
# Camera Metering / The Histogram

## THE ZONE SYSTEM

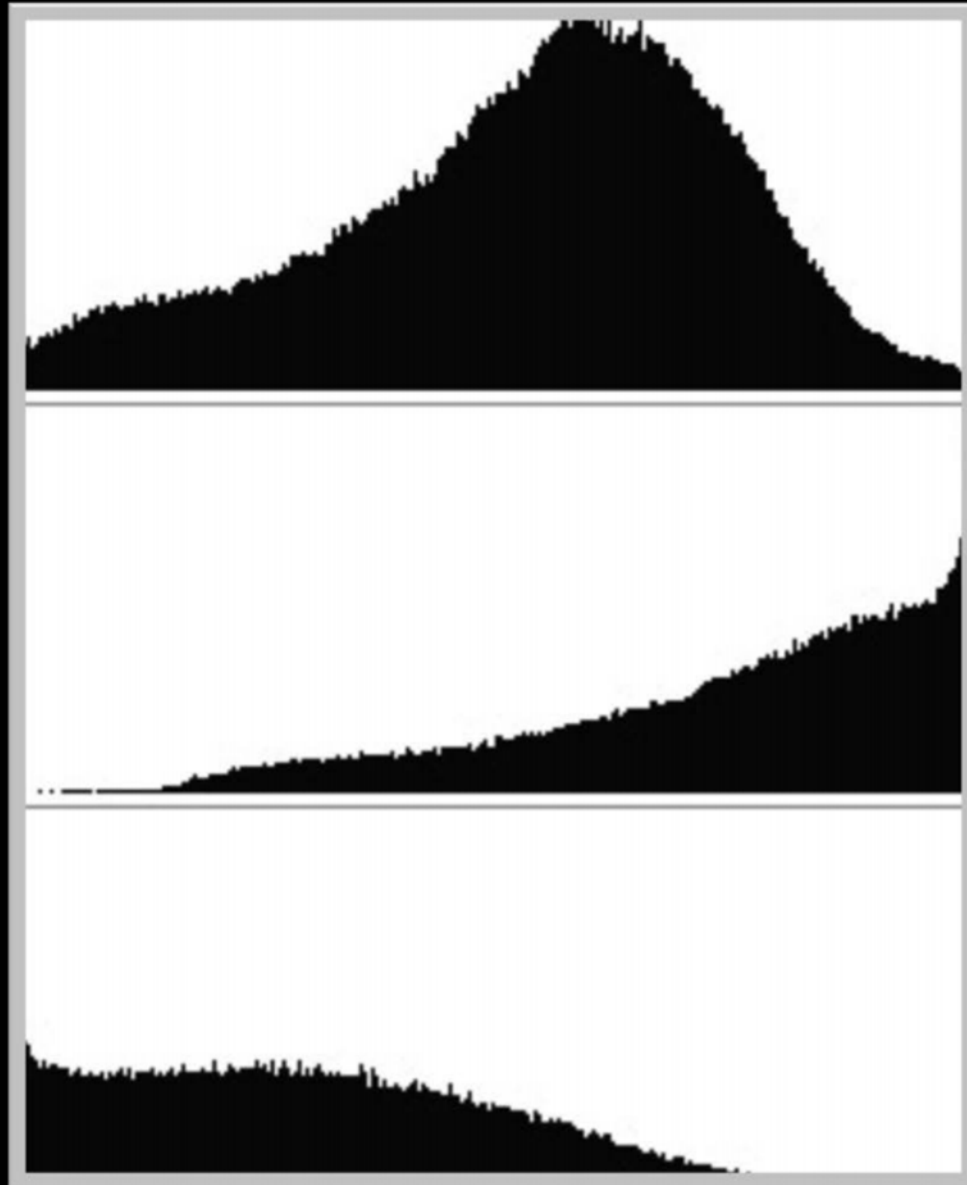


Analog and Digital Numbering Systems

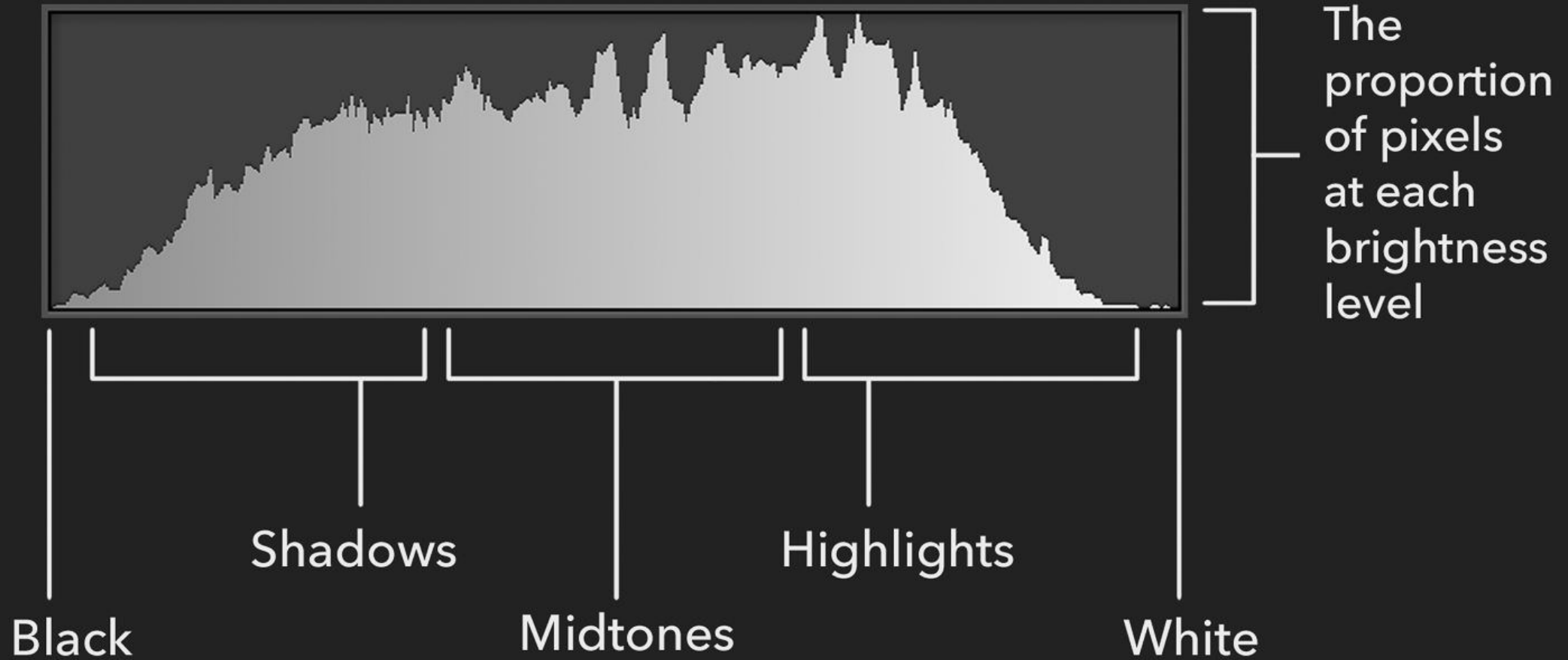
# THE ZONE SYSTEM



# Camera Metering / The Histogram



# The Anatomy of a Histogram







Evaluative (averaged) metering: Centered



## Evaluative (averaged) metering: Centered

A centered meter is not always correct! This scenario would result in a “correct” reading that is toward the “+” side, usually indicating that the image is overexposed, since the frame is filled with highlights.



Evaluative (averaged) metering: toward “+”



Evaluative (averaged) metering:  
A correct reading here would be toward “-”

# LENS BASICS / TERMS

## **Wide , Normal, Telephoto (FOCAL LENGTHS)**

\*Normal lenses see as the eye sees

\*Wide-angle lenses expand space, making things in the frame seem further away

\*Telephoto (long) lenses compress space and make things feel closer

## **PRIME vs. ZOOM (variable focal length)**

\*a prime lens has a single focal length, and a zoom (or variable focal length) lens can change, or zoom between focal lengths. NOT ALL ZOOMS ARE TELEPHOTO.

## **FAST vs. SLOW**

\*Fast lenses open to wider apertures (f2.8, f1.8, f1.4, f1.2)

\*Slower lenses have smaller maximum apertures (f3.5, f4, f5.6)

\*Zoom lenses often have different maximum apertures depending on the focal length



# FOCAL LENGTH



Rania Matar, Samira 15, Bourj El Barajneh Refugee Camp, Beirut 2015

**NORMAL FOCAL LENGTH (35-50mm on a DSLR) (sees as the eye sees)**

# FOCAL LENGTH



Architectural Interior

**WIDE ANGLE (here a 12mm on a full-frame DSLR) (expands space)**



# FOCAL LENGTH



**TELEPHOTO (here a 300mm on a cropped sensor DSLR) (compresses space)**

# CAMERA SETTINGS

1. EXPOSURE on MANUAL
2. QUALITY on RAW (*Not* RAW+JPEG or JPEG only)
3. COLOR SPACE on Adobe RGB (NOT sRGB)
4. FOCUS on AUTO (FLEXIBLE SPOT or SIMILAR)
5. WHITE BALANCE on AUTO
6. Nikon: FILE NUMBER SEQUENCE ON
7. Canon: File Number System: CONTINUOUS (NOT Auto Reset)
8. Playback screen includes Histogram

ALSO: KNOW YOUR LENSES BY NEXT WEEK

(i.e., focal length(s) and maximum/minimum apertures).