

Intro to Photography

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Session 3



Colour
Quantity
Quality
Direction

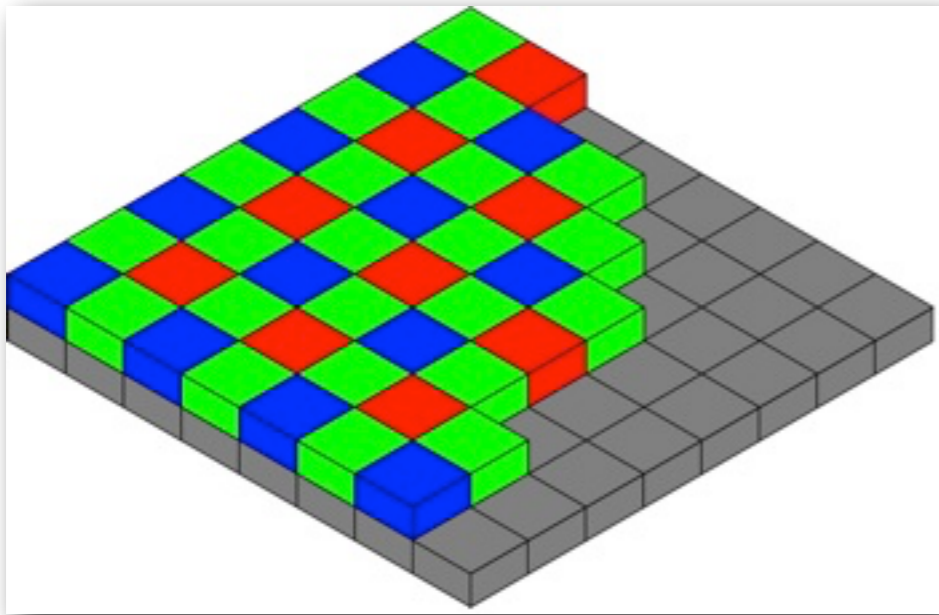


What colour is
light?

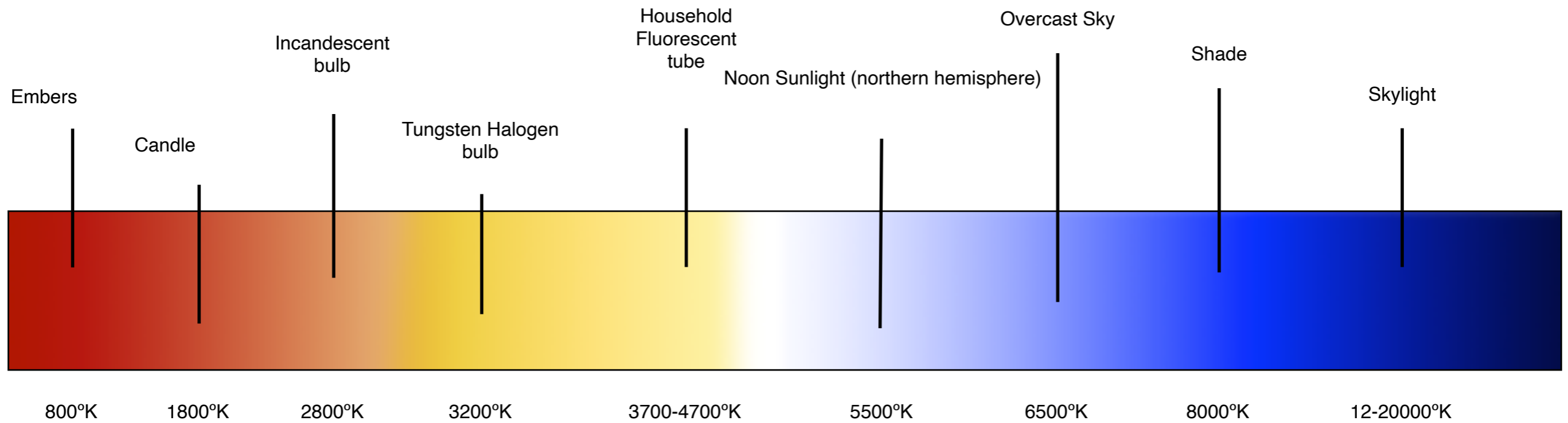


Review to date . . .

Recording Colour

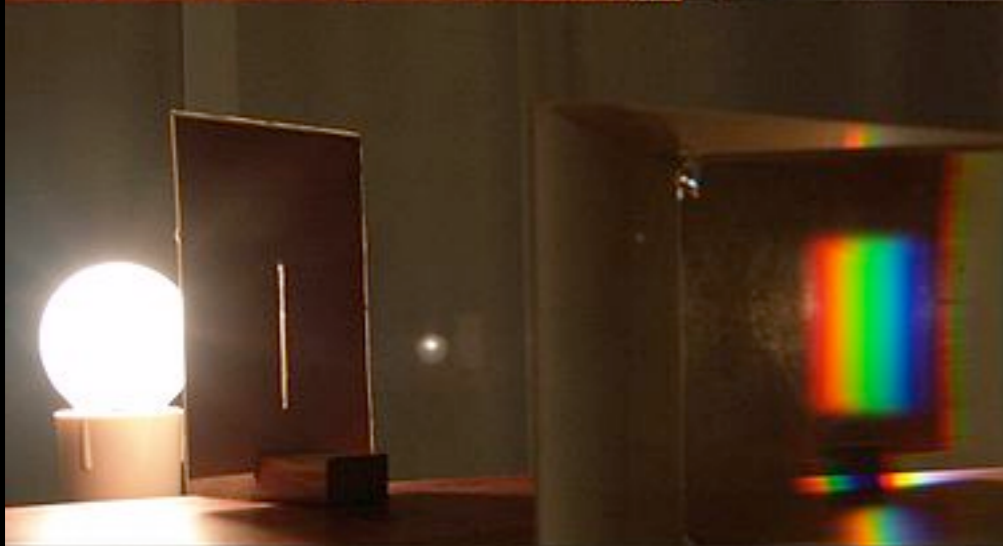


Typical Bayer sensor array



A range of colour temperatures

White Balance



~2700 K

60 W Incandescent

3500 K

13 W Fluorescent



5500 K

13 W Fluorescent



Daylight



Tungsten

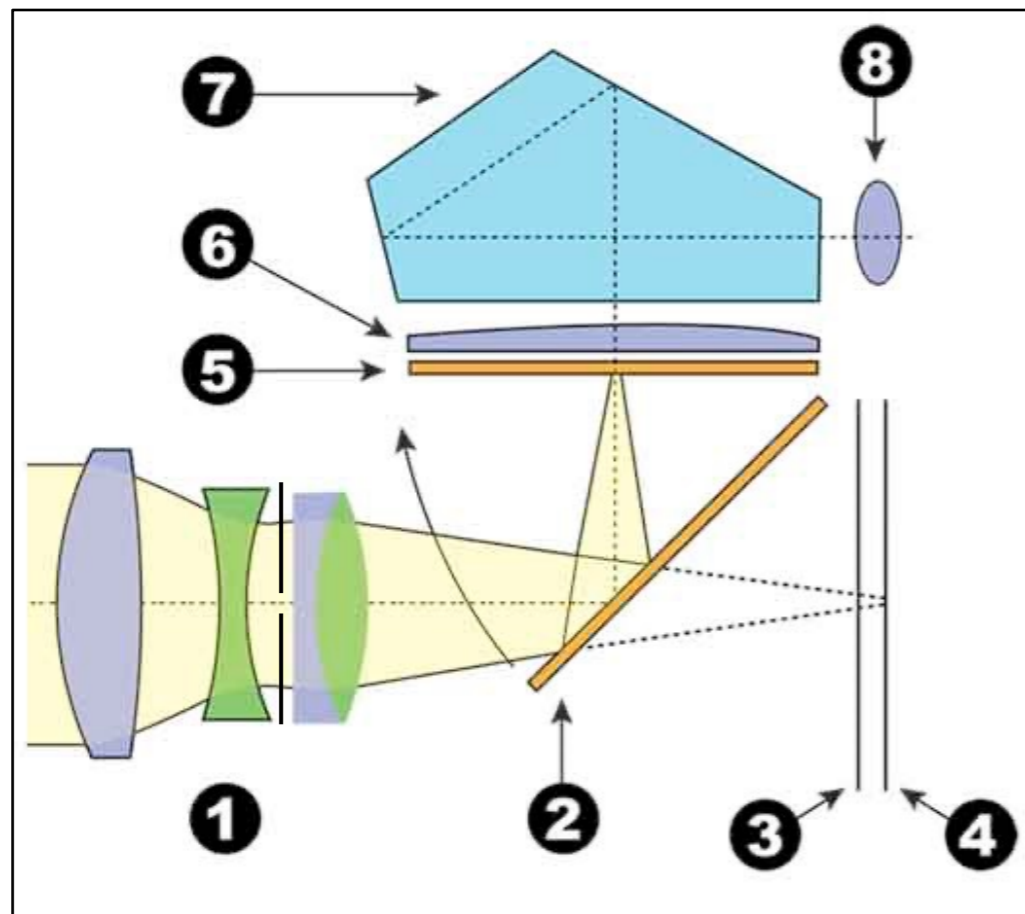


Cloudy

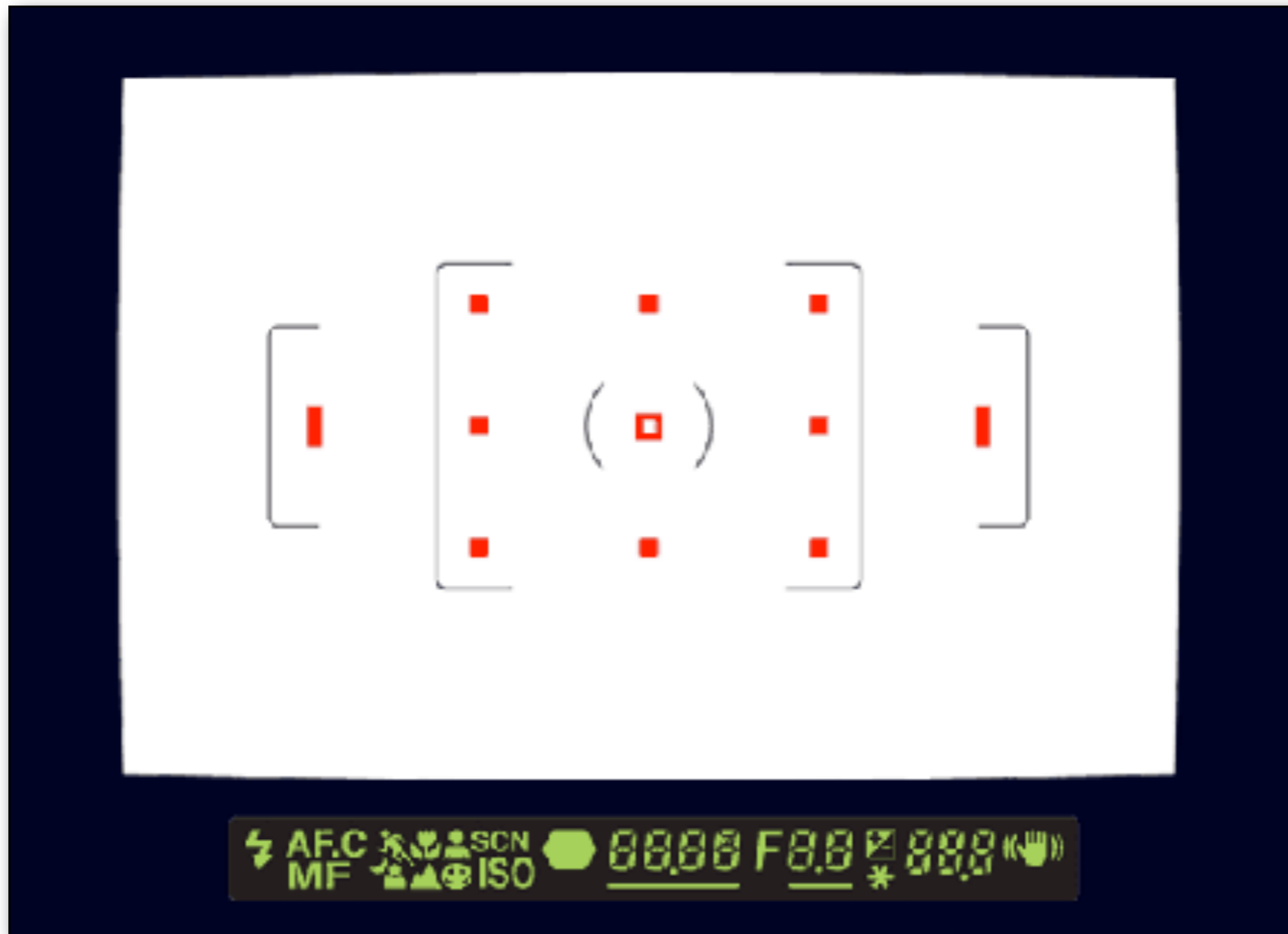


Auto

Mechanics of taking a photo

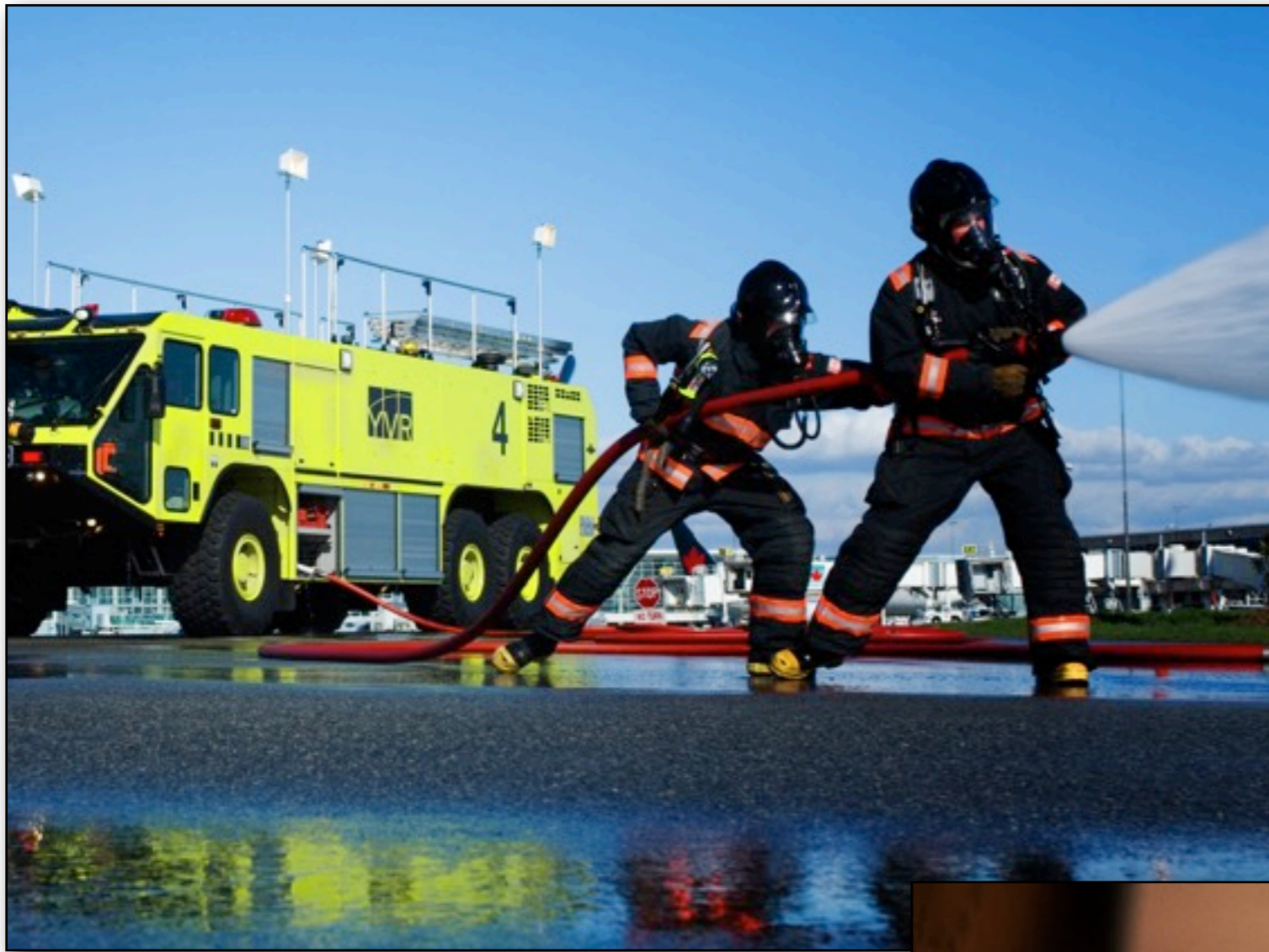


- 1 4-element lens (aperture)
- 2 Reflex mirror
- 3 Focal-plane shutter
- 4 Sensor
- 5 Mirror position during exposure
- 6 Condenser lens
- 7 Pentaprism
- 8 Eyepiece



Autofocus and
the viewfinder

Making an exposure

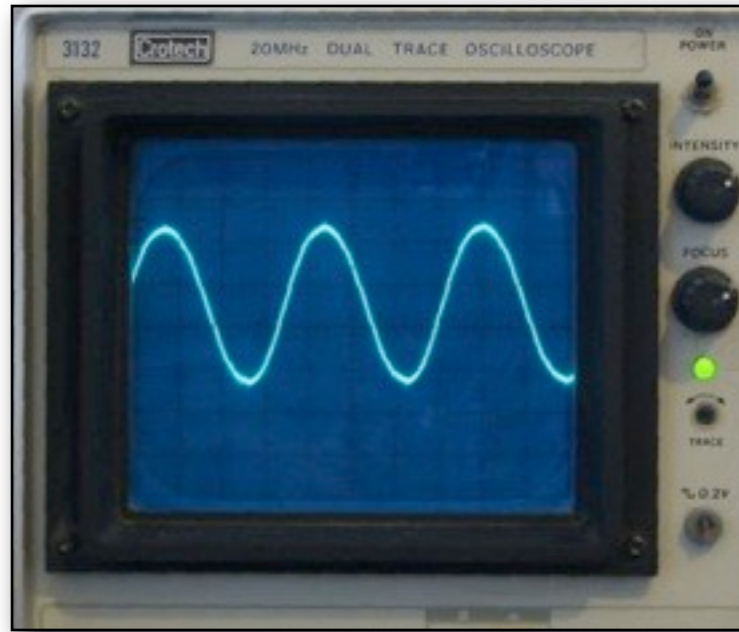


Exposure is a little bit like filling a bucket of water, if you have a large hose it takes less time to fill the bucket.

Exposure is controlled by two variables:

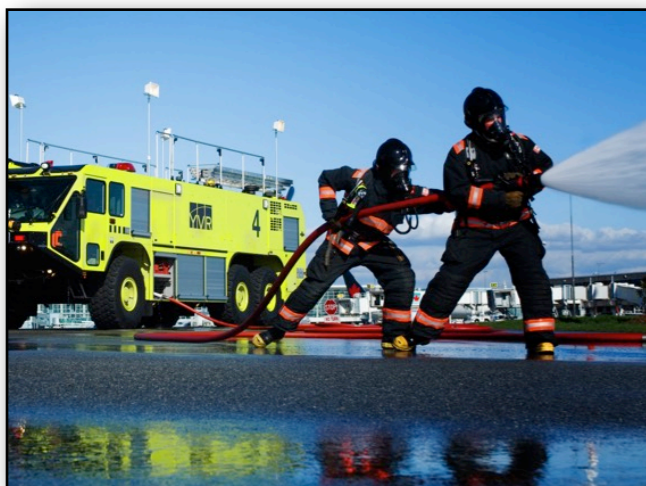
1. The duration of the exposure; controlled by the shutter speed of the camera.
2. The quantity of light; controlled by the aperture on the lens.





ISO = sensitivity
determines amount of signal to noise

Shutter speed = duration of time the sensor is exposed
you use it to freeze motion or blur motion of your subjects



Aperture = volume of light for the duration of the exposure
this varies the quantity of light passing through the lens
and the depth of field of in the photograph

ISO

ISO - Noise



200 ISO

ISO - Noise

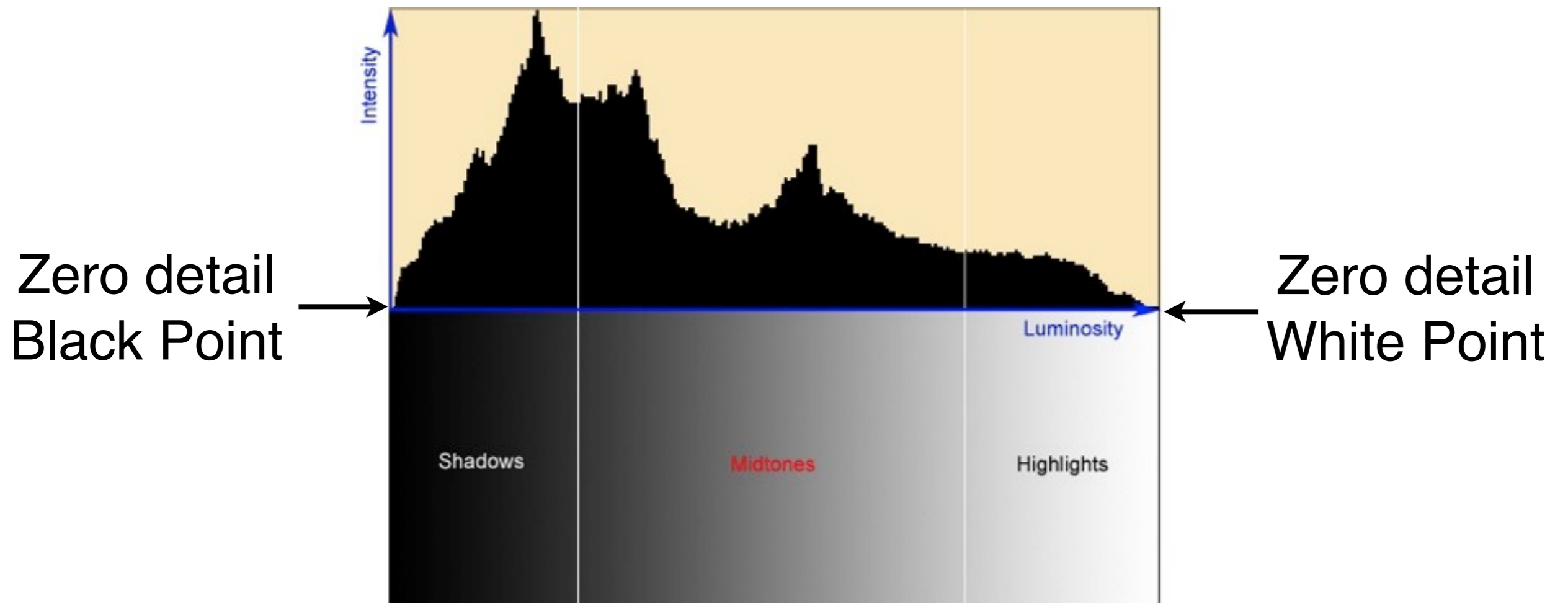


12800 ISO

Auto
ISO

Judging exposure

Exposure and the Histogram



The histogram can be used as a visual indication of correct exposure when viewed in concert with the scene being photographed.

No such thing as an ideal histogram for all situations.

Exposure modes



Camera Exposure Modes

Generally modern cameras have four exposure modes and they range from complete manual control to fully automatic with two semi automatic settings in between.

In Manual mode (M) you are setting the aperture and shutter speed that you feel will give you the best results for the circumstance.

In Aperture priority mode (A) you set the aperture and the camera will set the shutter speed that it determines will give you the correct exposure.

In Shutter priority mode (S) you set the shutter speed and the camera sets the lens aperture to the f-stop that should give the correct exposure.

In Program mode (P) the camera sets both the aperture and shutter speed combination to give the correct exposure. Many cameras let you shift the settings to faster or slower shutter speeds or larger or smaller apertures but the overall exposure remains the same because the camera will adjust the other variable in the exposure equation.

Exposure Compensation Settings

The exposure compensation adjustment usually indicated by a +/- symbol on the camera is a method of increasing or decreasing the amount of exposure in the program or semi automatic exposure modes. It's used

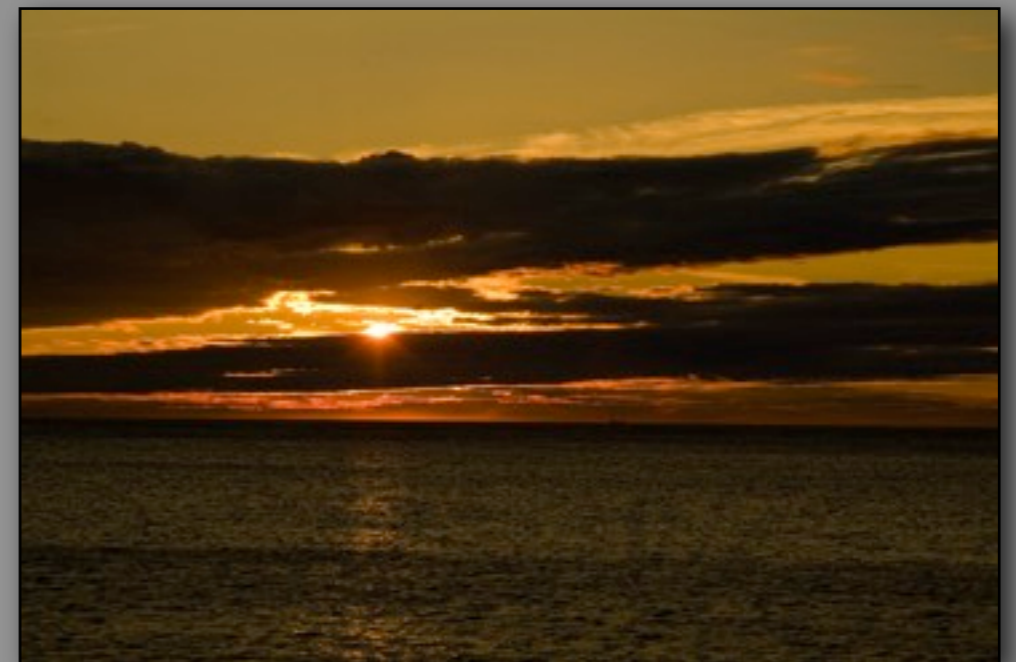
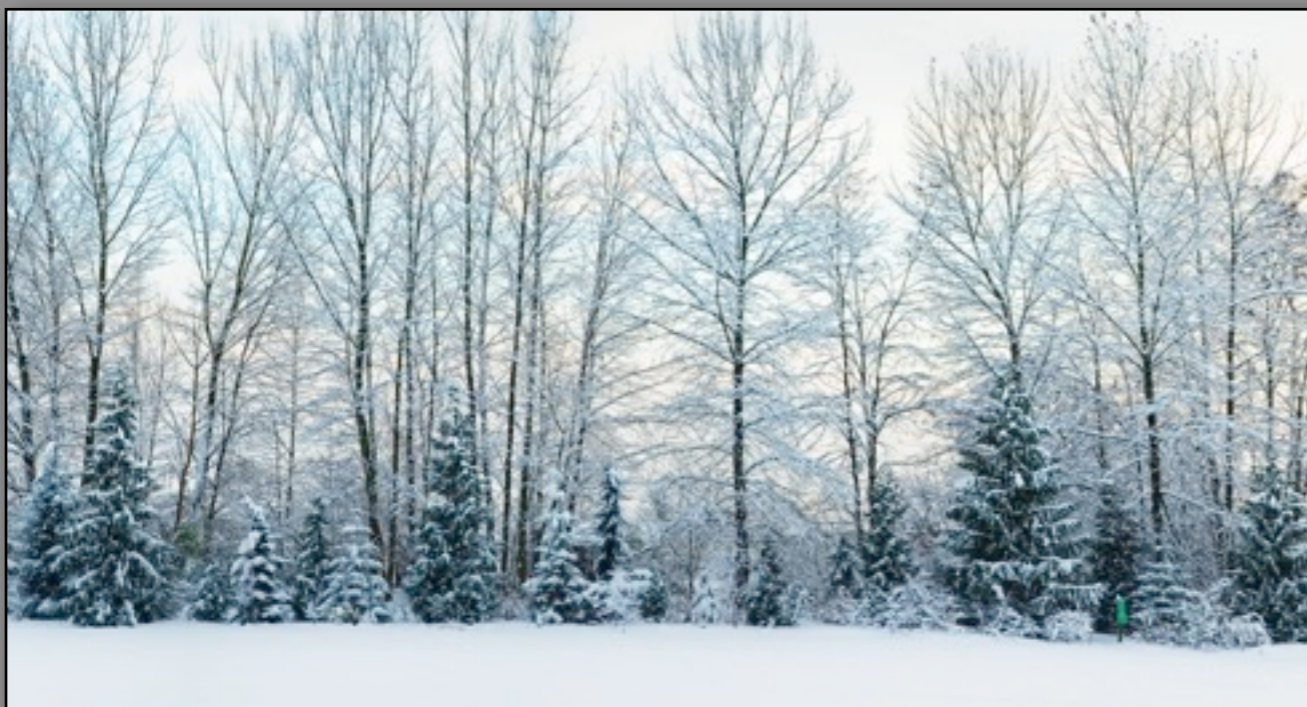
in scenes that would be problematic for the metering system to achieve the correct exposure; backlit or spotlight scenes, or scenes where the tones are predominately lighter or darker than 18% grey.

spotlit scenes



Scenes that include a bright light

snow



**Moving along from
where we left off last
week**

Metering

Metering



Your meter sees everything as 18% or middle grey.

centre weighted average



spot



matrix, evaluative or
multi segment

When the meter gets it wrong.

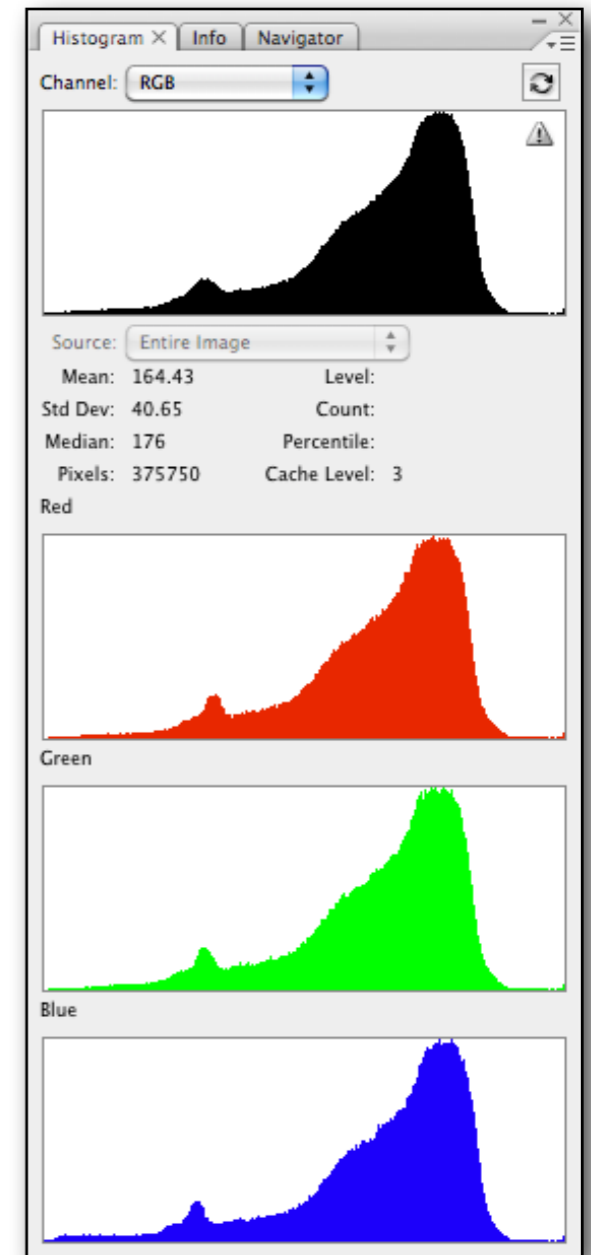
Compensate.

When the meter gets it wrong.



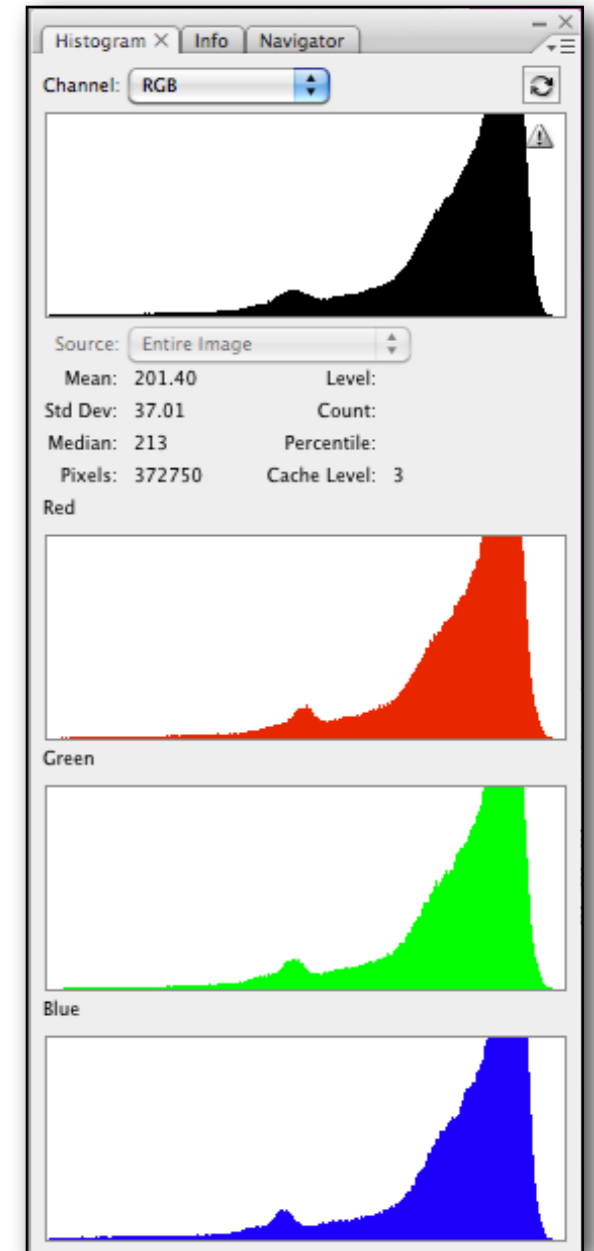
This white wall reflects more light than 18%. The meter will give an exposure that is too dark.

When the meter gets it wrong.



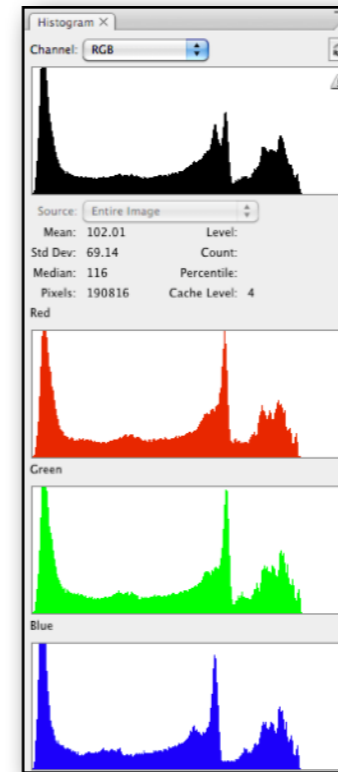
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When the meter gets it wrong.



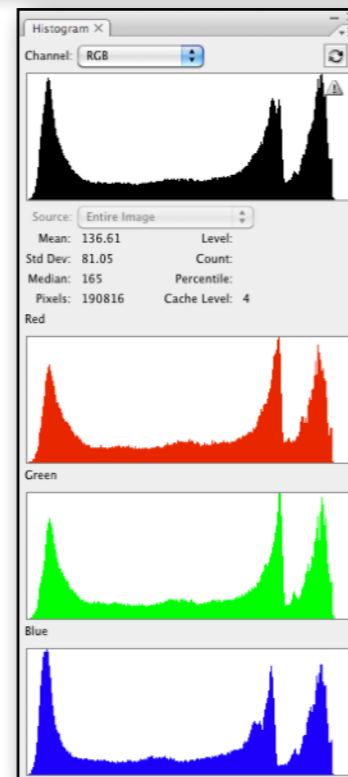
+1 stop exposure compensation makes the wall look brighter.

When the meter gets it wrong.

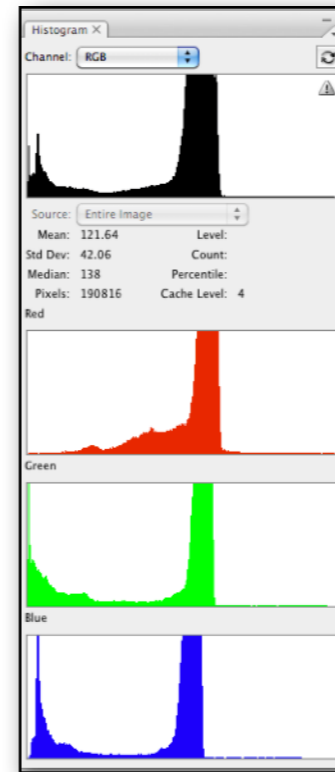


As metered in the camera.

Increasing the exposure corrects the tones.

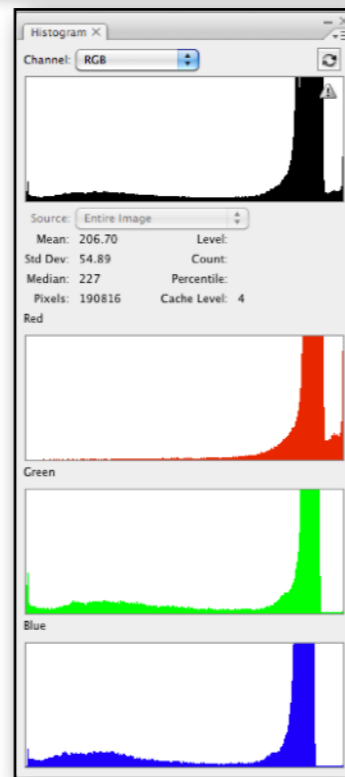


When the meter gets it wrong.

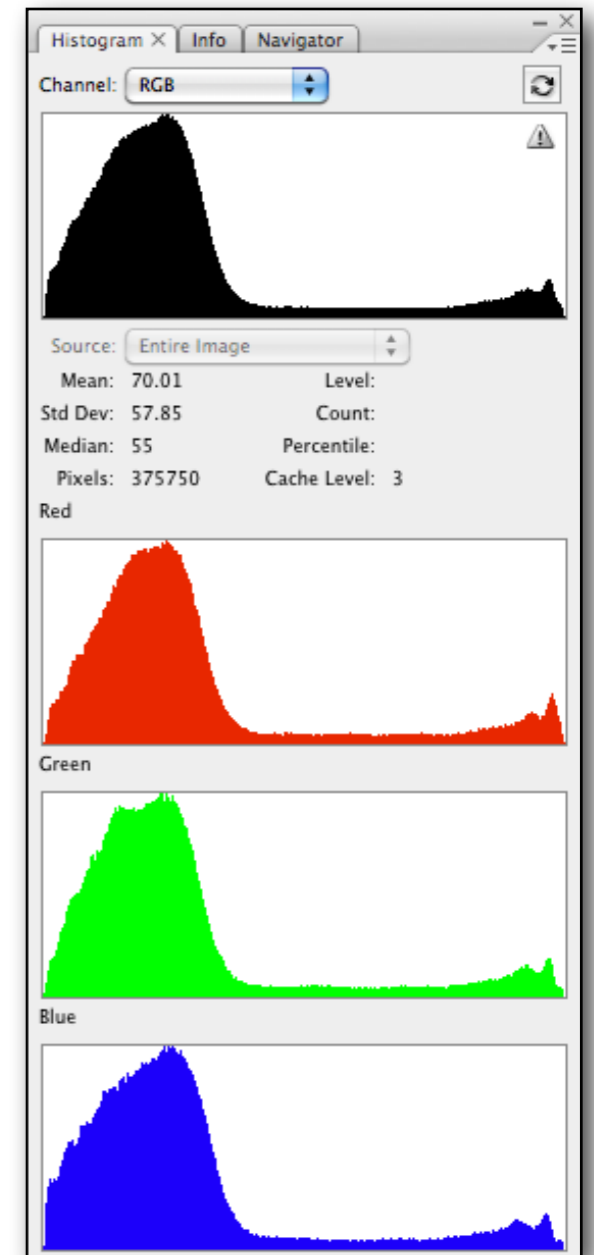


As metered in the camera.

Red channel clipping.

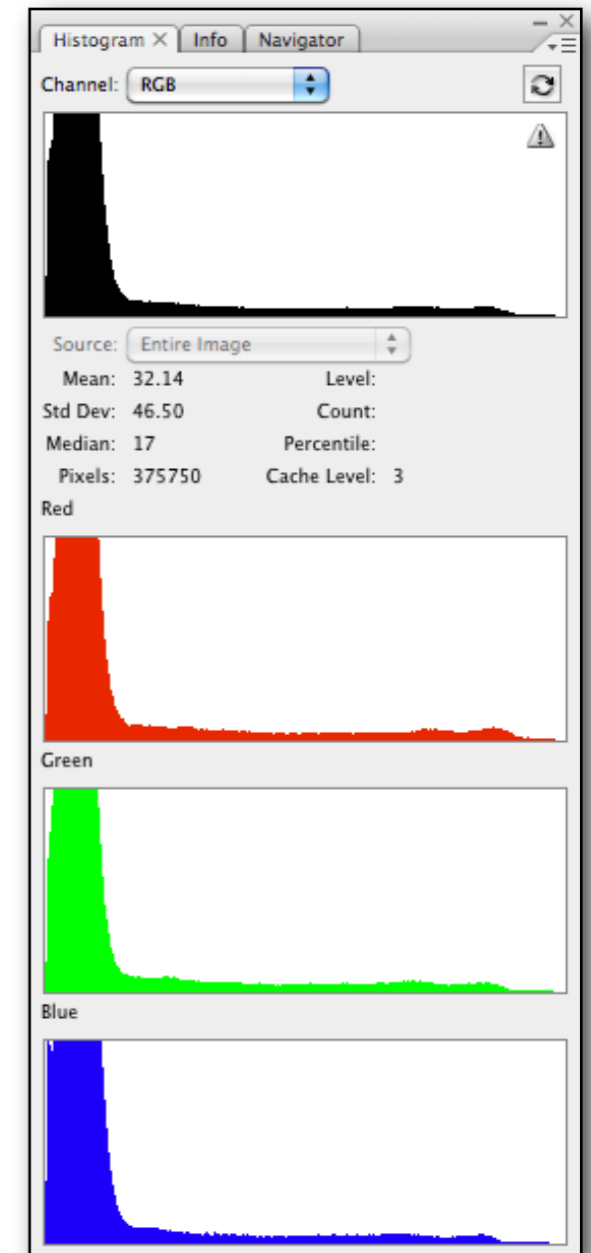


When the meter gets it wrong.

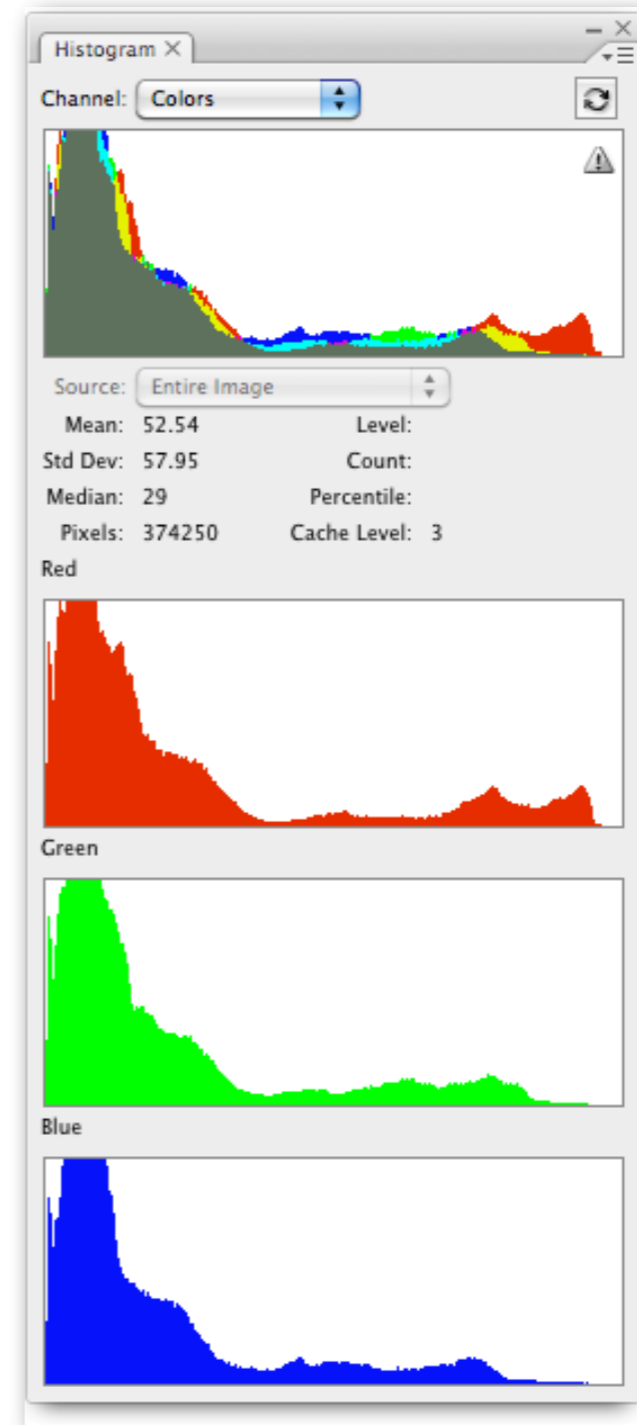


The dog is grey and tan the tones in this shadow should appear darker than 18% grey. The highlights are washed out. The meter gave an exposure that is too light.

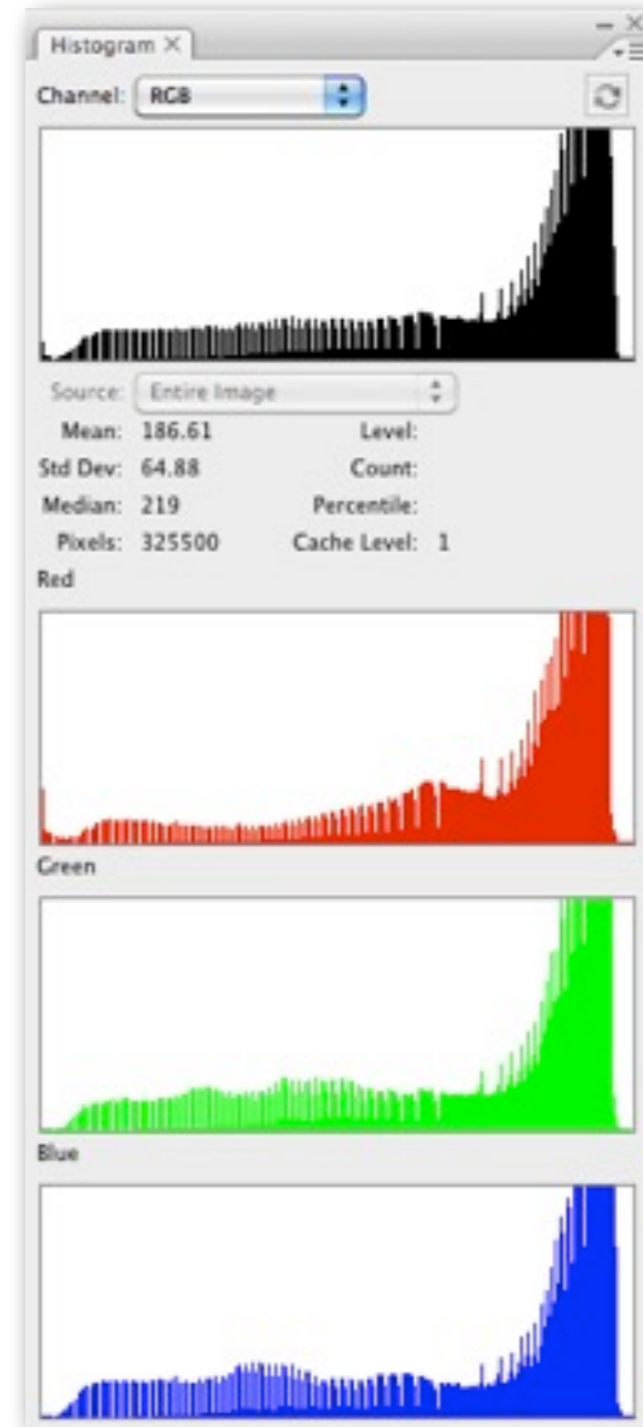
When the meter gets it wrong.



-1 1/3 stop exposure compensation makes the scene look darker and the dog less washed out.



Histogram of a primarily dark scene



Histogram of a primarily light scene

Histogram and white balance



Correct White Balance



Incorrect White Balance.

Histogram and white balance



light transmitted



f:1.4



f:2



f:2.8



f:4



f:5.6



f:8



f:11



f:16



f:22

depth of field

Aperture

Aperture



The aperture in your lens is made up of a number of blades that are linked together. When you select smaller apertures, the blades move in unison to make a smaller opening when the exposure is made.

Aperture



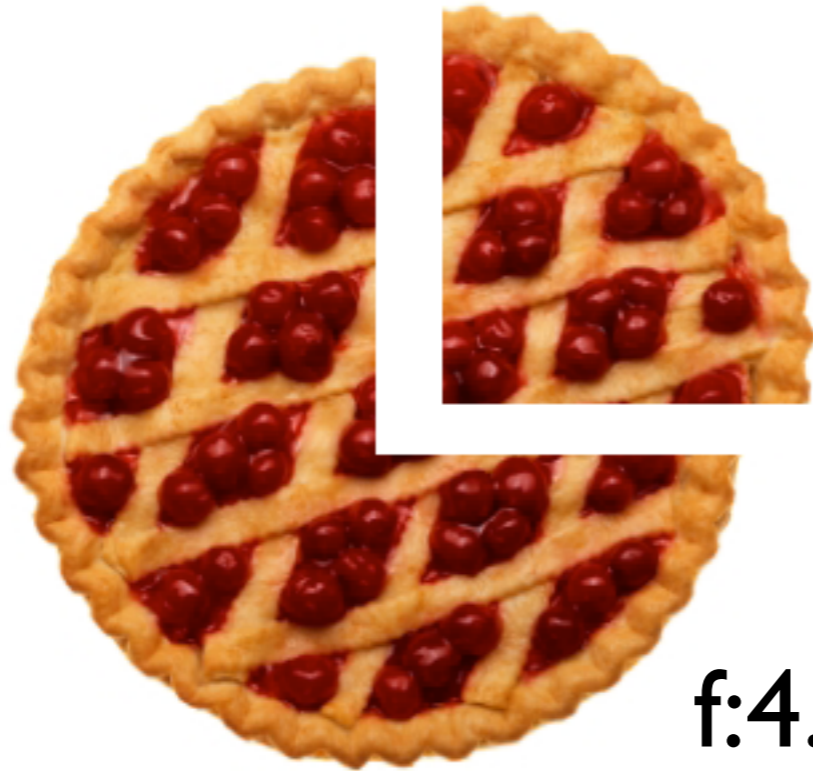
f:4.0



f:22

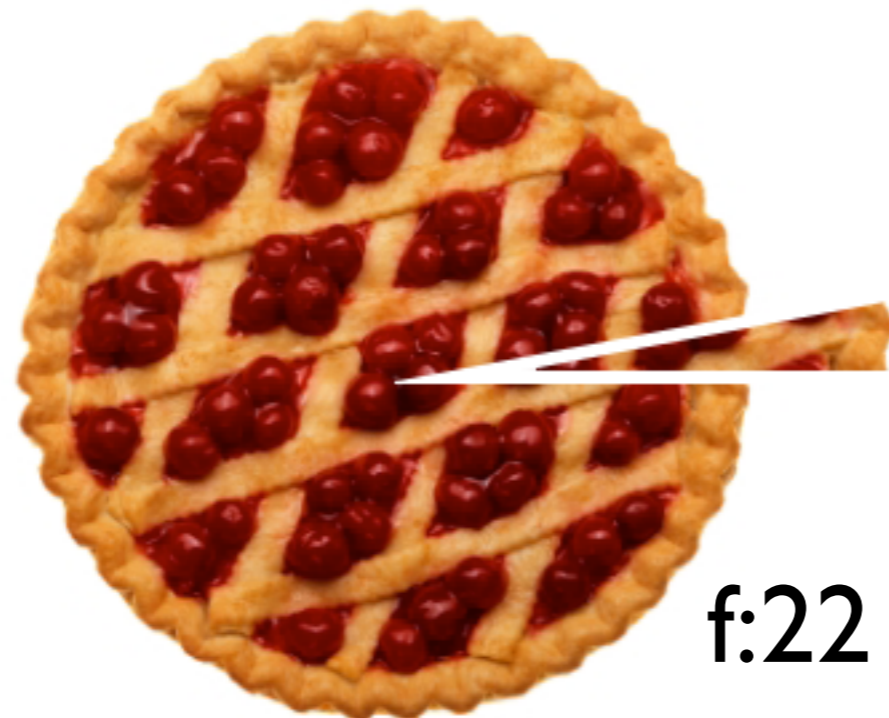
Why such weird numbers?

Making sense of the numbers.



f:4.0

$$\frac{1}{4}$$



f:22

$$\frac{1}{22}$$

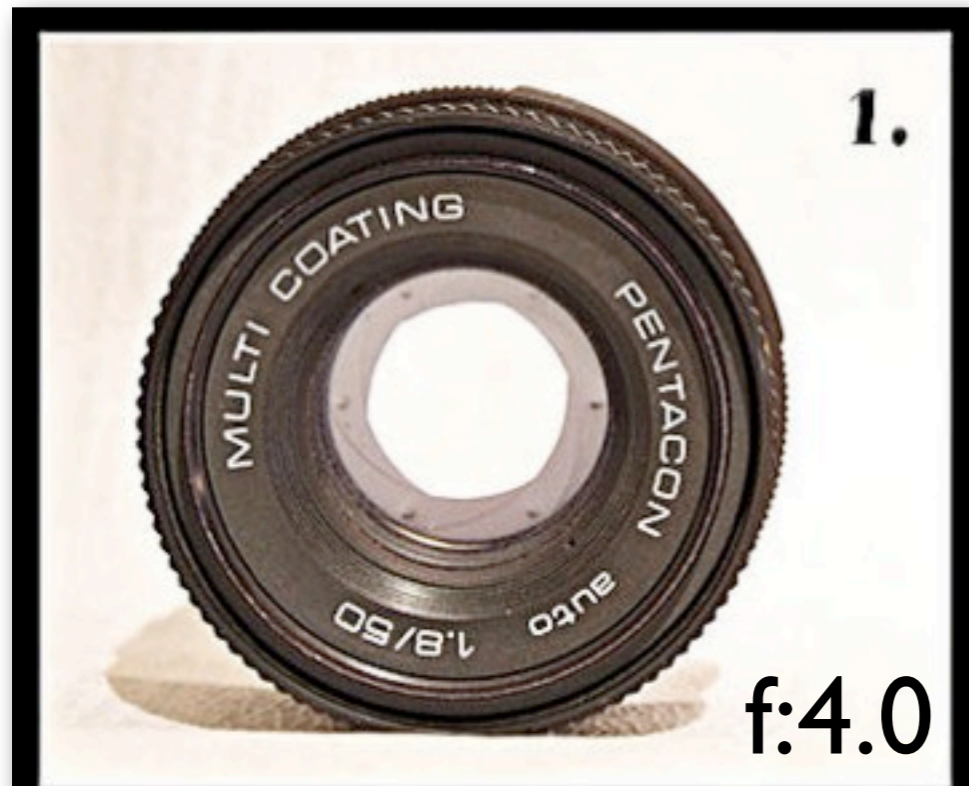
Making sense of the numbers.



At first the F-stop scale makes no sense. Smaller numbers mean larger openings and larger numbers mean smaller openings. It makes a bit more sense when you realize how these numbers come about.

$$\text{F-Stop number} : \frac{\text{focal length of the lens (in mm)}}{\text{diameter of entrance pupil (in mm)}}$$

Making sense of the numbers.



F:4

50 mm focal length

12.5 mm diameter of pupil

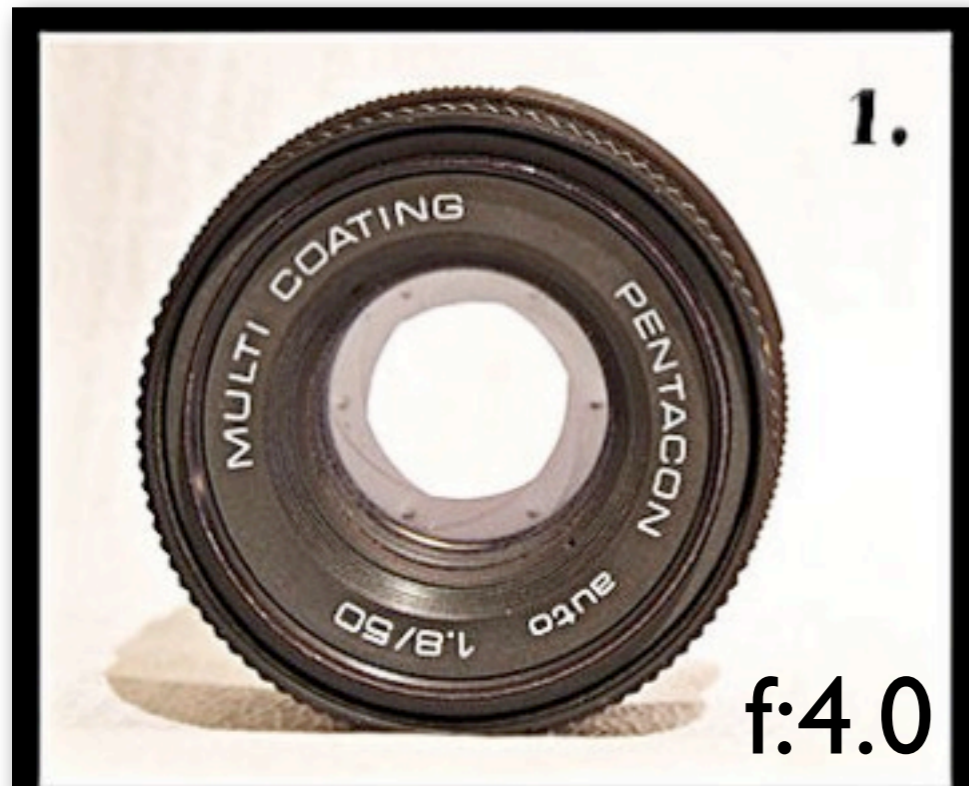


F:22

50 mm focal length

2.27 mm diameter of pupil

Making sense of the numbers.



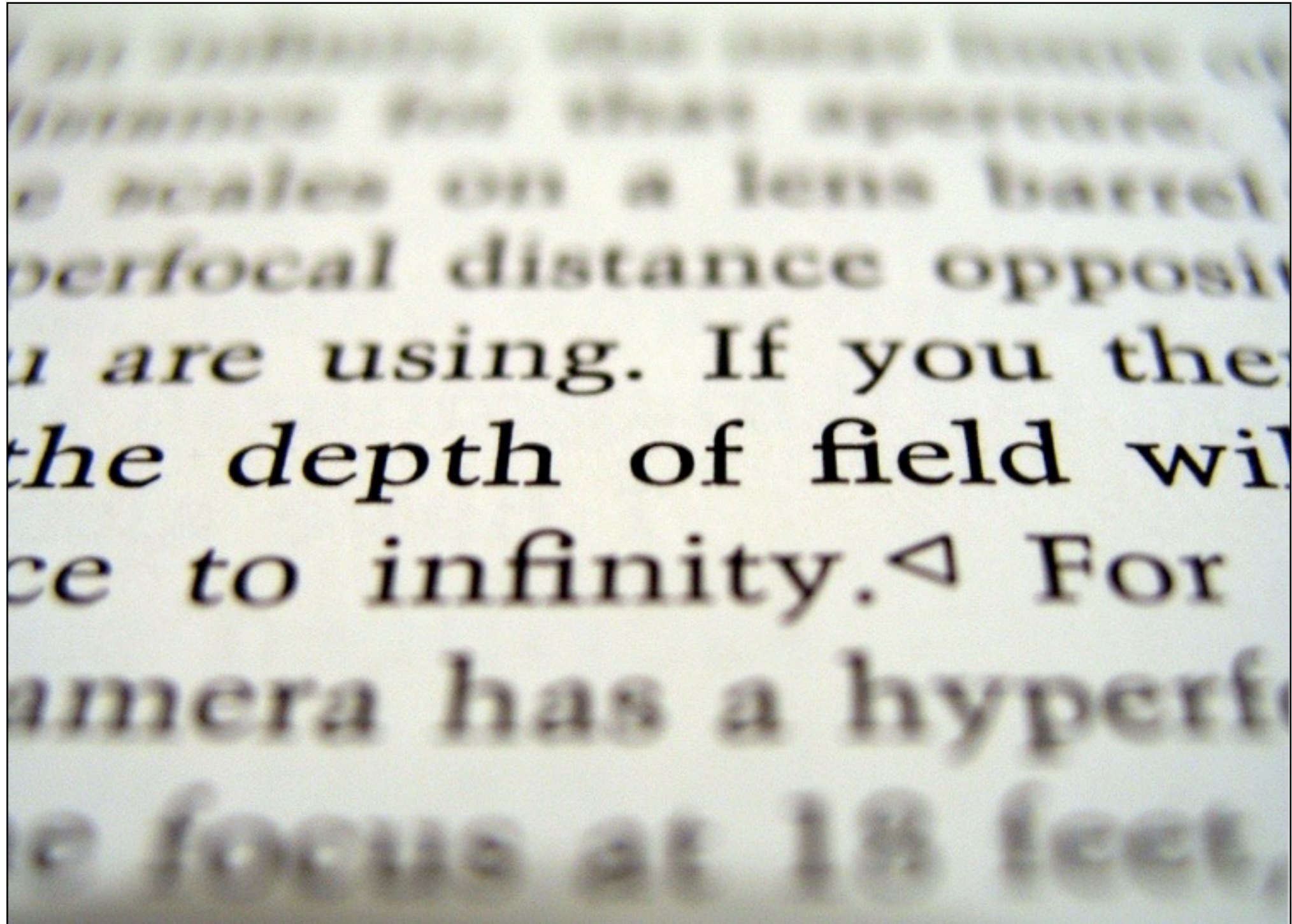
So... the F-stop is just an expression of a fraction

$$f:4 = 1:4 \quad \text{or} \quad \frac{1}{4}$$

$$f:22 = 1:22 \quad \text{or} \quad \frac{1}{22}$$



Aperture and the
circles of confusion



"DOF-ShallowDepthofField". Licensed under Creative Commons Attribution-Share Alike 3.0 via Wikimedia Commons - <http://commons.wikimedia.org/wiki/File:DOF-ShallowDepthofField.jpg#mediaviewer/File:DOF-ShallowDepthofField.jpg>

f:2.0



f:4.0



f:8.0



f:16

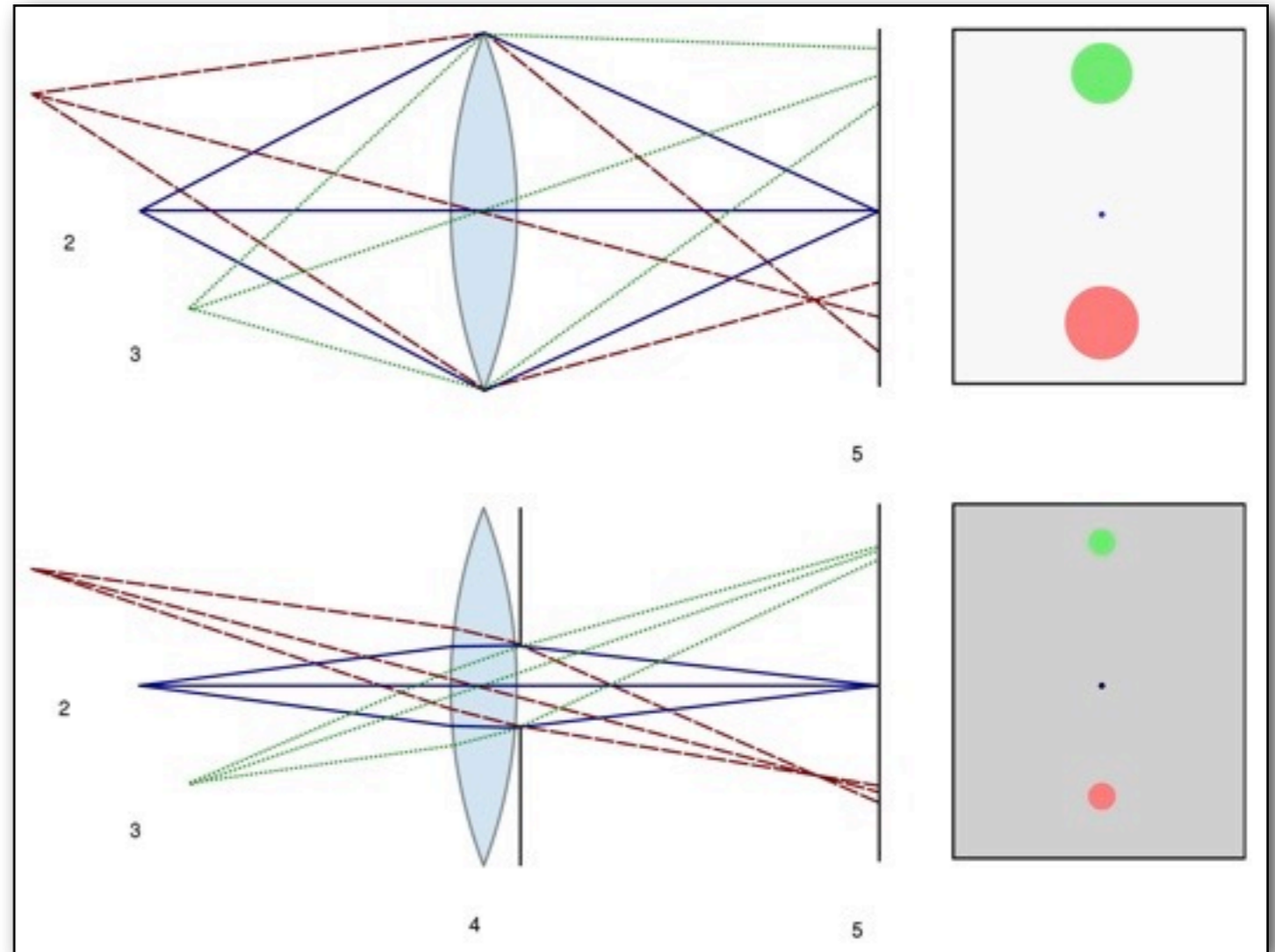


Aperture and Depth of Field



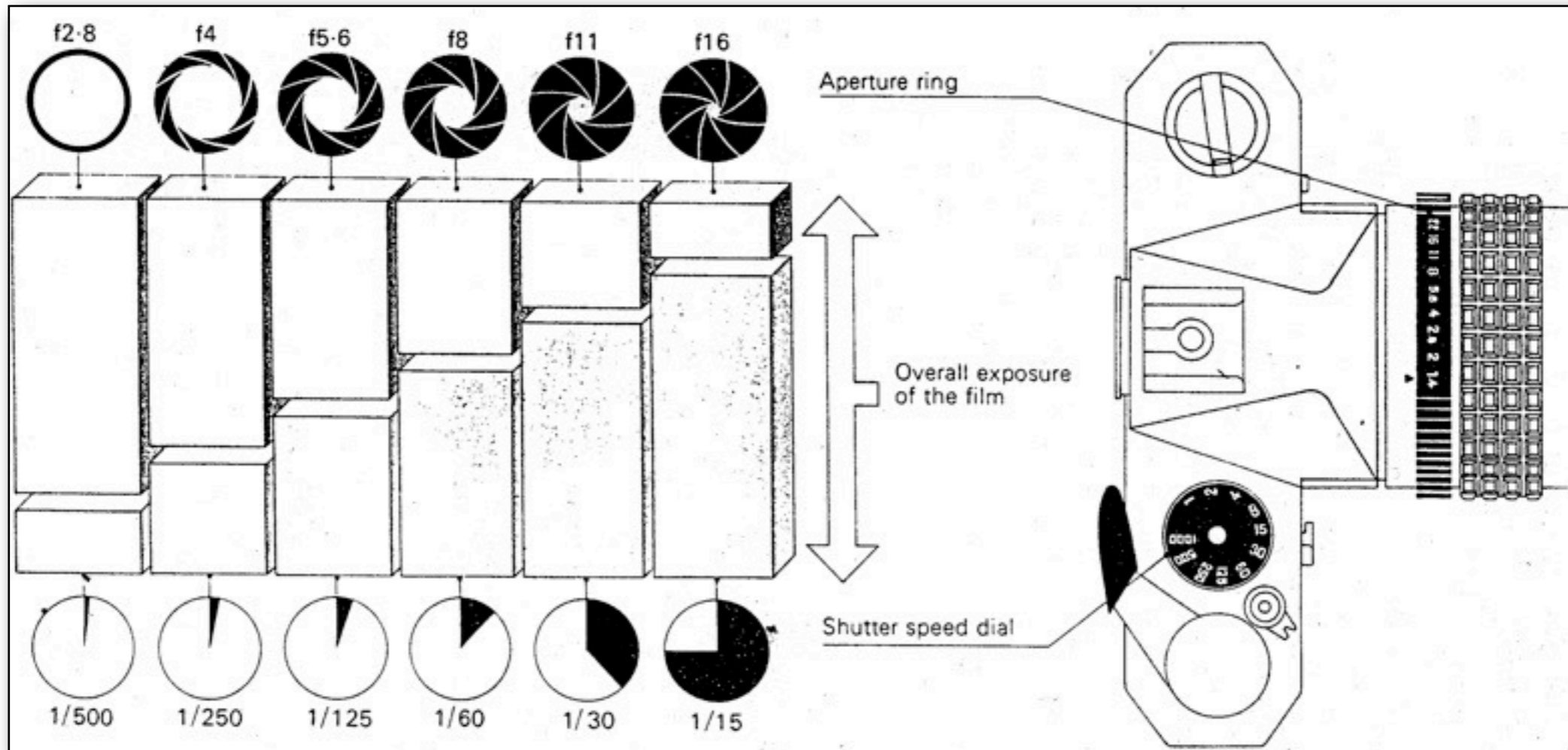
Aperture and depth of field

A lens can only focus at a single point and area of acceptable sharpness in front and back of that point is called the “depth of field”. The aperture on a lens not only varies the amount of light transmitted by a lens, it also plays a role in determining the depth of field in a photo. As an aperture is closed on a lens, the zone of focus in the scene increases in depth. Depth of field is the distance between the nearest and farthest objects in a scene that appear acceptably sharp in an image when viewed from correct viewing distances. It’s used creatively in a number of ways. In portraiture shallow depth of field is used to isolate a subject from a distracting background. In landscape work greater depth of field is used to show an expanse of space or to give a sense of place to a subject in a scene.



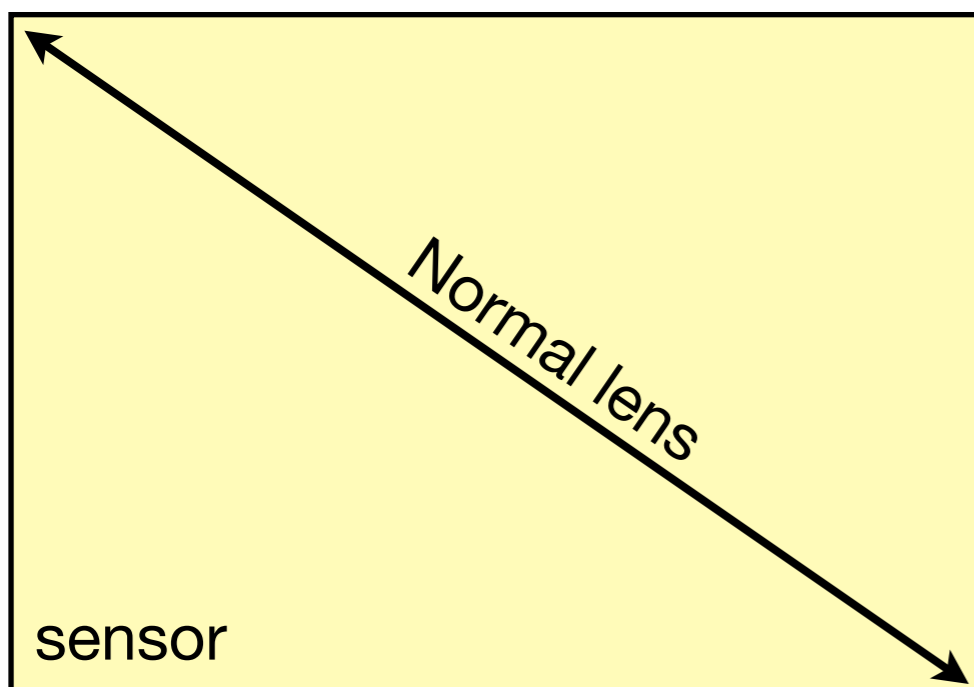
In both examples above, the lens is focused on point 2. This illustration shows the effect of aperture on focus as the aperture is closed. When the lens and image plane are parallel depth of field increases in parallel to those planes.

Shutter and Aperture Relationship



Lenses, angle of view
and perspective.

Wide angle. Normal. Telephoto.



These are the three typical types of lenses used on cameras. Let's start with the normal lens first.

A normal lens is one that most closely approximates the angle of view of the human eye.

To calculate the normal lens for a particular format you take the diagonal measurement of the sensor.

Sensor type	Sensor dimensions	Sensor diagonal	Normal lens focal length
Four Thirds	17.3 × 13 mm	21.63 mm	22 mm
4/3"	18.0 × 13.5 mm	22.5 mm	23 mm
APS-C	22.7 × 15.1 mm	27.3 mm	27 mm
DX	23.7 × 15.8	28.4 mm	28 mm
FX or (35 mm film)	36 × 24 mm	43.3 mm	50 mm

Table of format measurements and normal lenses for popular camera sensors sizes.

Lenses

APS-C or DX Cameras

Telephoto

- 135mm +

Portrait

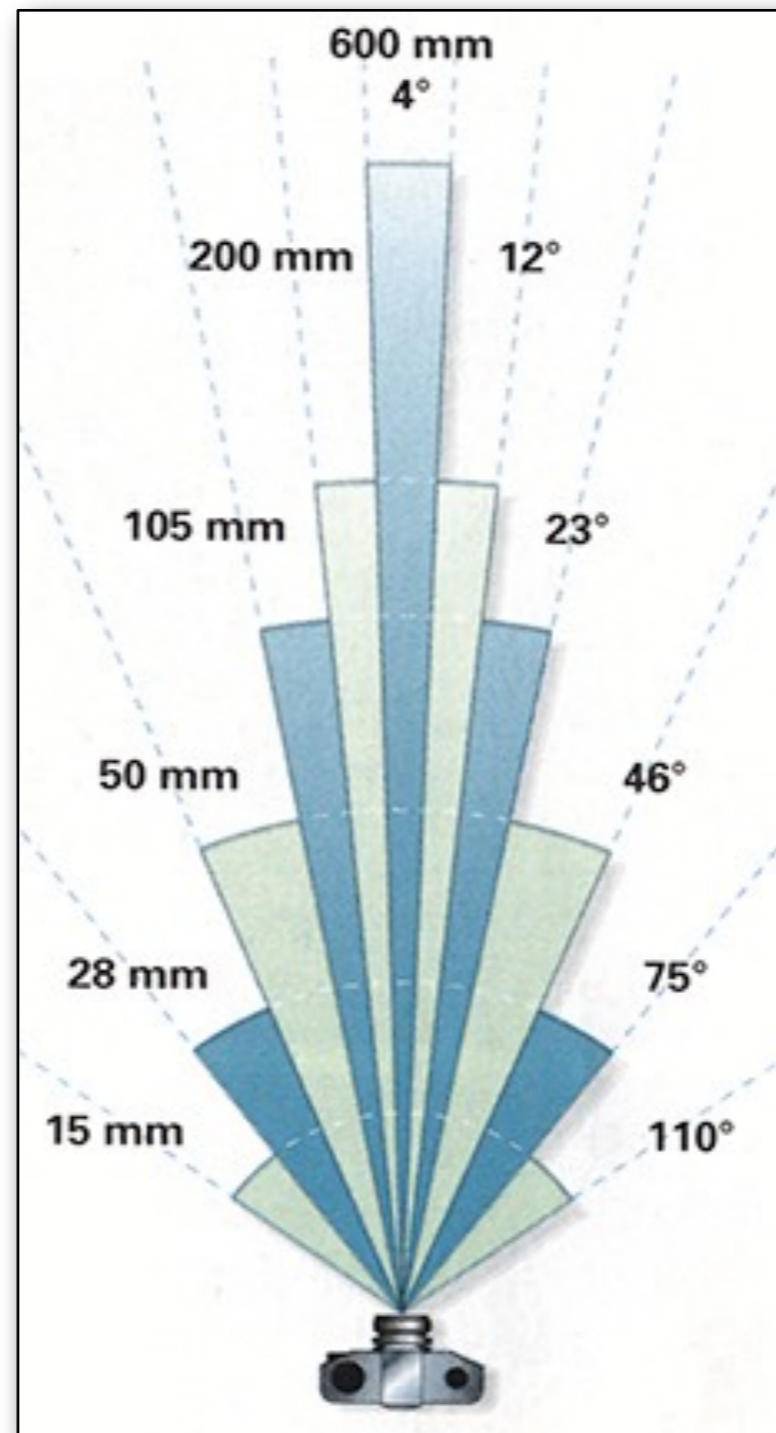
- 55mm to 105mm

Normal

- 30mm

Wide Angle

- 10mm to 28 mm



Full Frame Cameras

Telephoto

- 135mm to 500mm

Portrait

- 85mm to 105mm

Normal

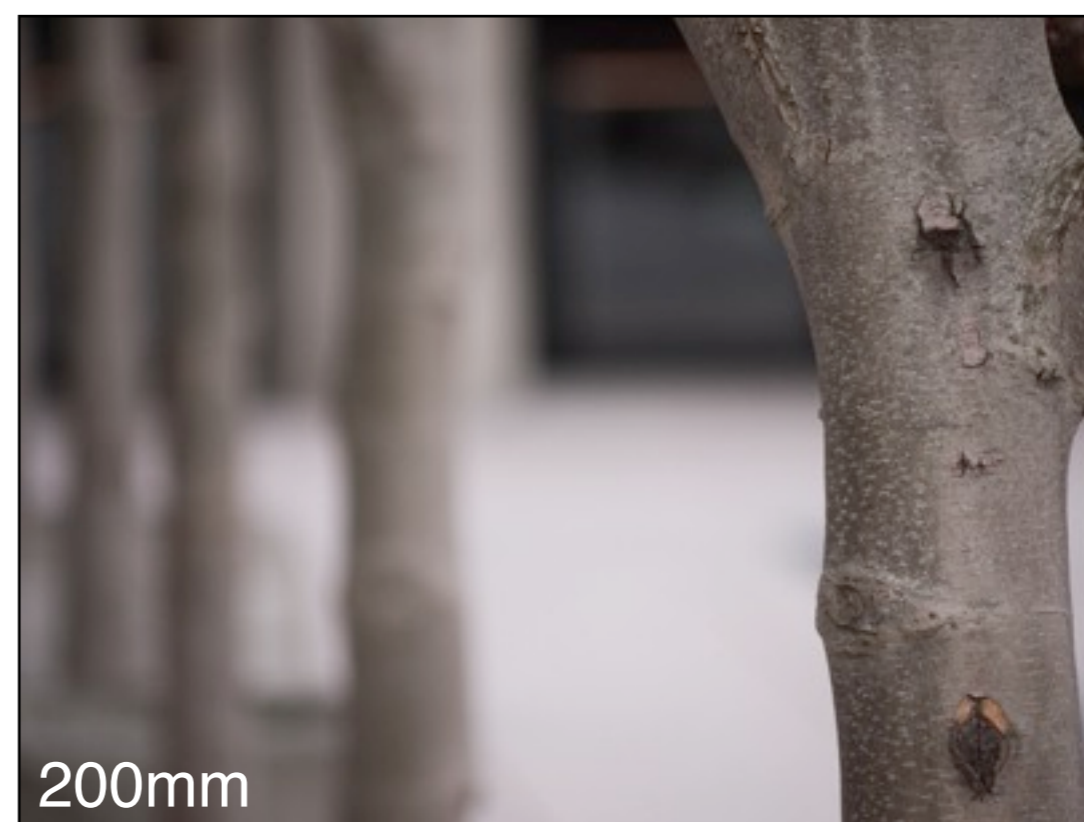
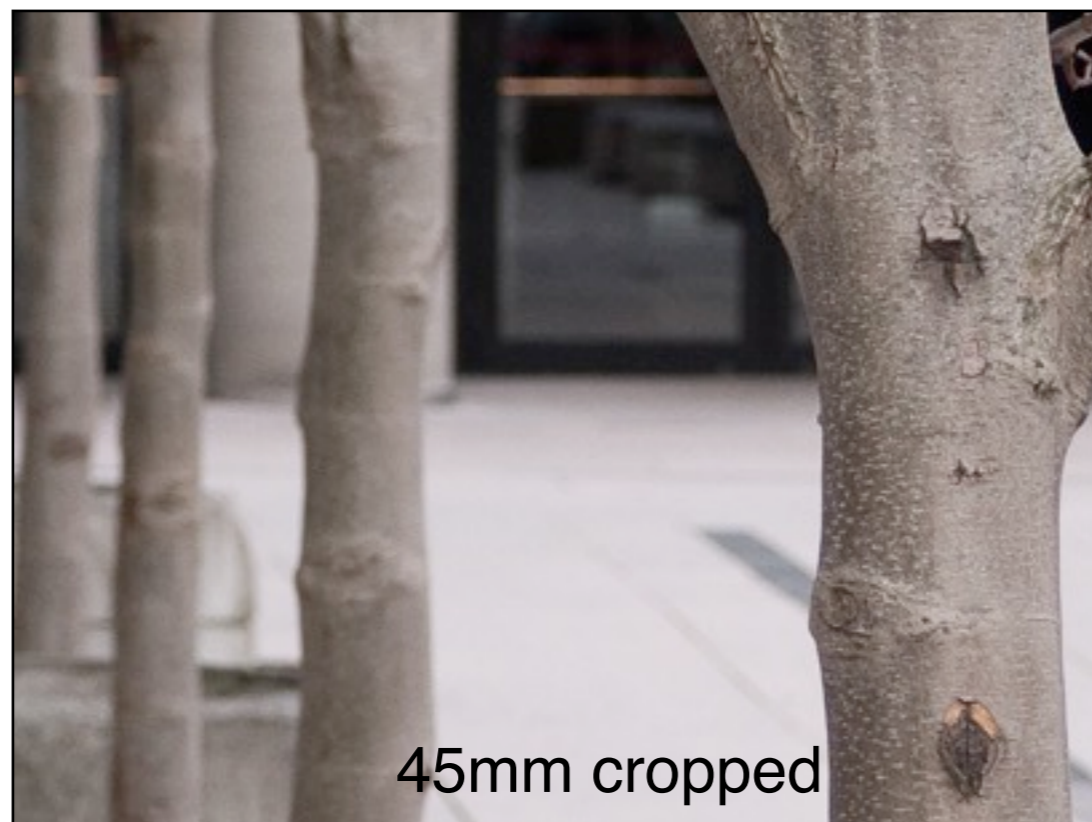
- 50mm

Wide Angle

- 18mm to 35 mm



*All of the exposures were made at f5.6 from the same spot.
Angle of view changes, perspective does not.*



When you crop the photo to match the 200mm framing the images share the same perspective. The depth of field is different and so is the resolution.



The camera position was changed to keep the front tree the same size from photo to photo. This is when the perspective changes.



Portrait Focal Length Lens



Forced perspective in photography is achieved by placing objects in the frame at varying depths and manipulating the relationship of the objects through lens selection, angle of view and proximity to the camera and the other objects.

Forced perspective can be used to exaggerate the relationship of a subject's features. Generally the distorted relationship of those features create comedic characterizations.

When you fill the frame with your subject while using a wide angle lens on your camera you get forced perspective. It might be fine for some purposes but you won't score high for beauty.

Portrait Focal Length Lens



By using a long lens to make these photo of Stefano Giulianetti he's isolated from the background and the features of his face are flatteringly compressed. In both cases the lens was a 180mm on a Nikon D2x the aperture was set to f 6.7





Aperture and Depth of Field