Photography

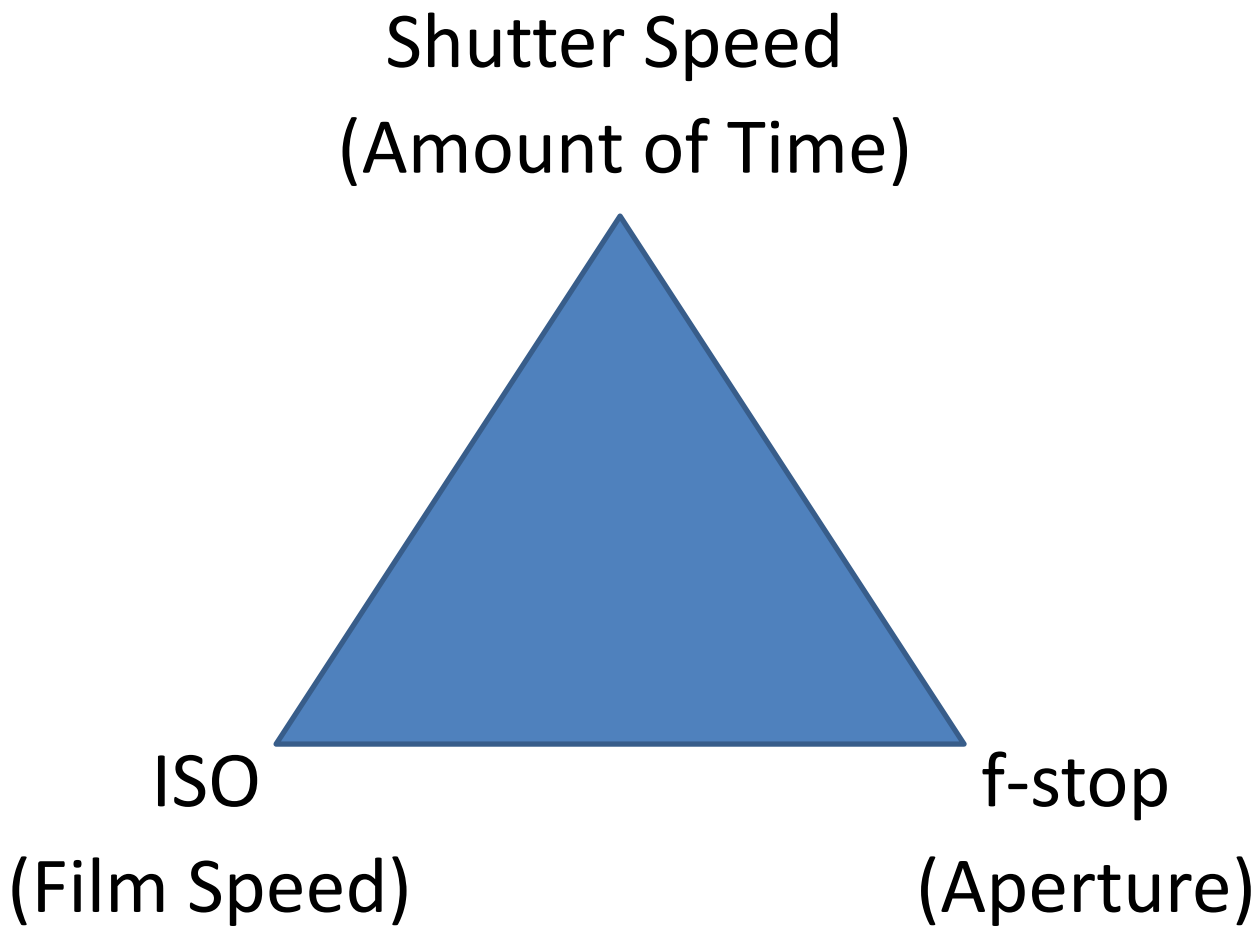
Chapter 3

Exposure

What is exposure?

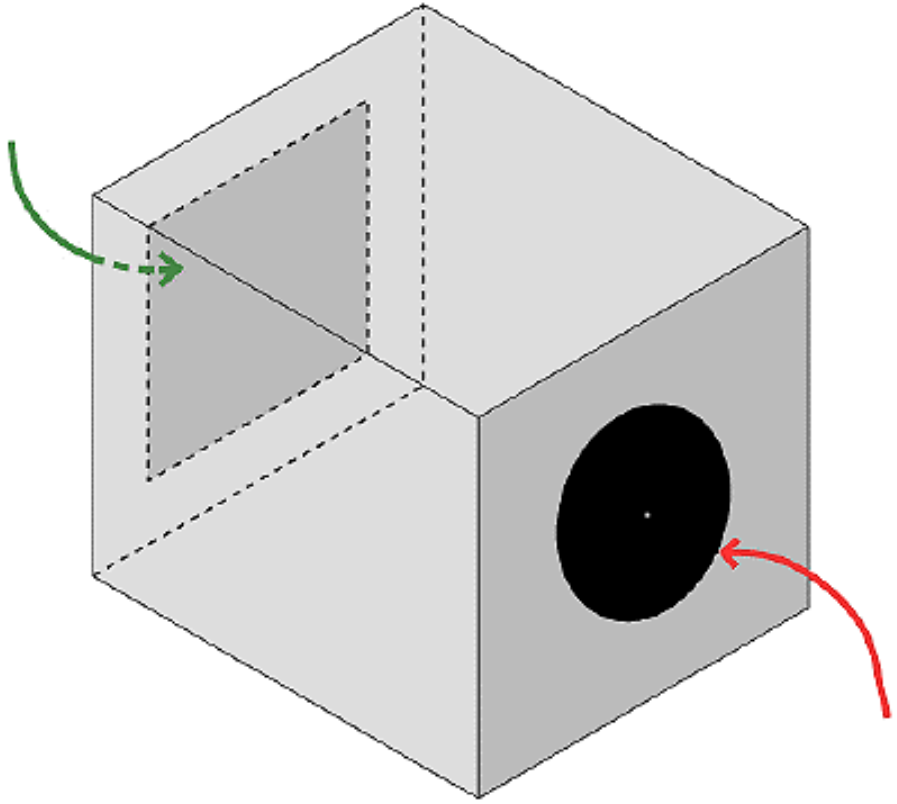
- Exposure refers to how much light is allowed to hit the film or digital sensor when you take the photograph.
- Controlled by shutter speed, ISO, and f-stop

Three things that control exposure:



Exposure: controlled by f/stop (aperture), ISO (film sensitivity), shutter speed (amount of time)

Pinhole Camera



DSLR Simulator

https://camerasim.com/camerasim-free-web-app/

DSLR Simulator

http://www.canonoutsideofauto.ca/play/

Elements of Exposure

- **Exposure:** refers to how much light is allowed to hit the film, or imaging chip in a digital camera.

- Three things control exposure:
  F-Stop (aperture)
  Film Speed (film sensitivity)
  Shutter Time (amount of time)

http://www.youtube.com/watch?v=pzgALhGF8_o

Elements of Exposure

- You can increase or decrease any of these by compensating and changing one of the others
- The idea is to control the exposure
- Exposure is measured in increments called **stops**.

Elements of Exposure

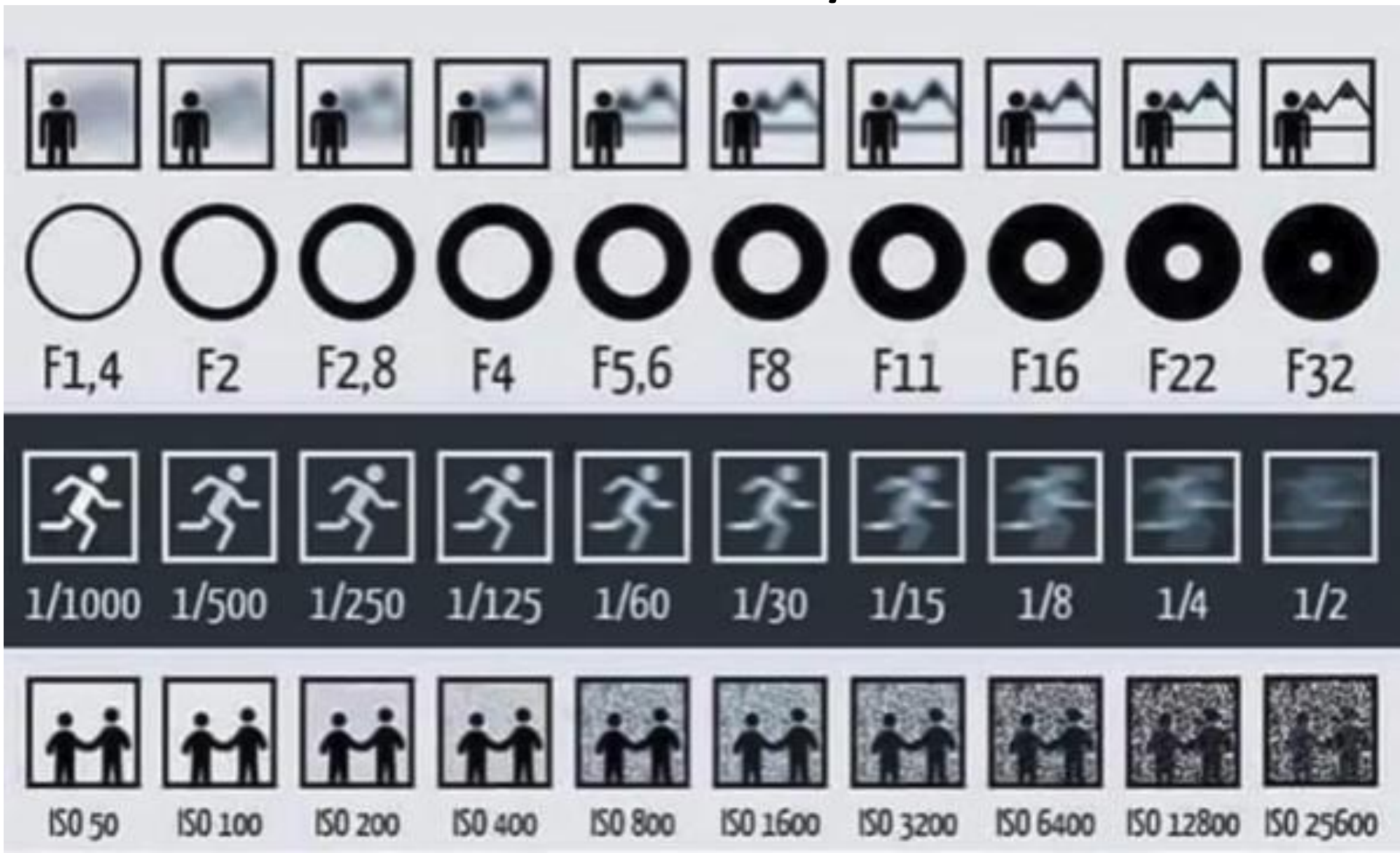
- Increasing an exposure by one whole stop will **double** the total amount of light that reaches the imaging chip/film.

- Decreasing an exposure one whole stop will cut the original amount of light **in half**.

- All three variables of exposures can be measured in stops; f-stops, film speed, and shutter speed.

https://www.youtube.com/watch?v=9DQXlRpY2qc

FILM SPEED/ISO



Film Speed

- **Film speed** tells you how sensitive a particular film is to light.
- There are slow, medium, and fast speeds.
- The speed of the film is indicated by a number called the **ISO**.

Film Speed

- ISO – International Standards Organization; standardized way to measure a film's light sensitivity.

- Slow films have an ISO from 25 – 200
- Fast Films have an ISO from 400 - 3200

Film Speed

- **Slow films need more light, fast films need less**.

- Slow Films: good for capturing the maximum amount of detail, colors are richer and more saturated, and details look sharper.

- Fast Films: useful in low light situations, details appear more coarse, color not as rich (fig 1-30)

Film Speed

Slow Films: good for landscapes, flowers, or still life (color and details)

Fast Films: good for shooting sports and action or low light (quick shots)

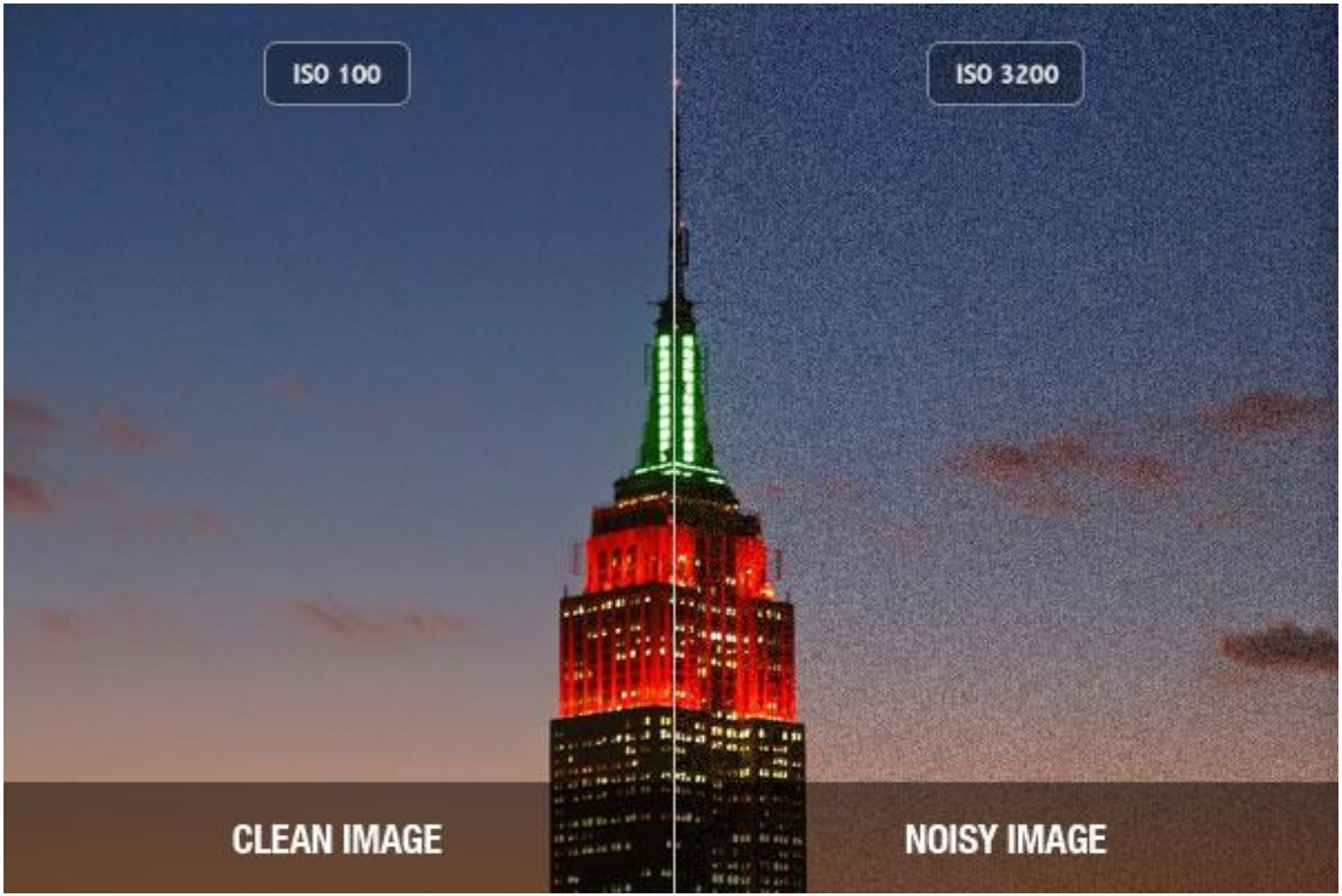
Digital Cameras and ISO

- Increasing the ISO on a digital camera creates **image noise**

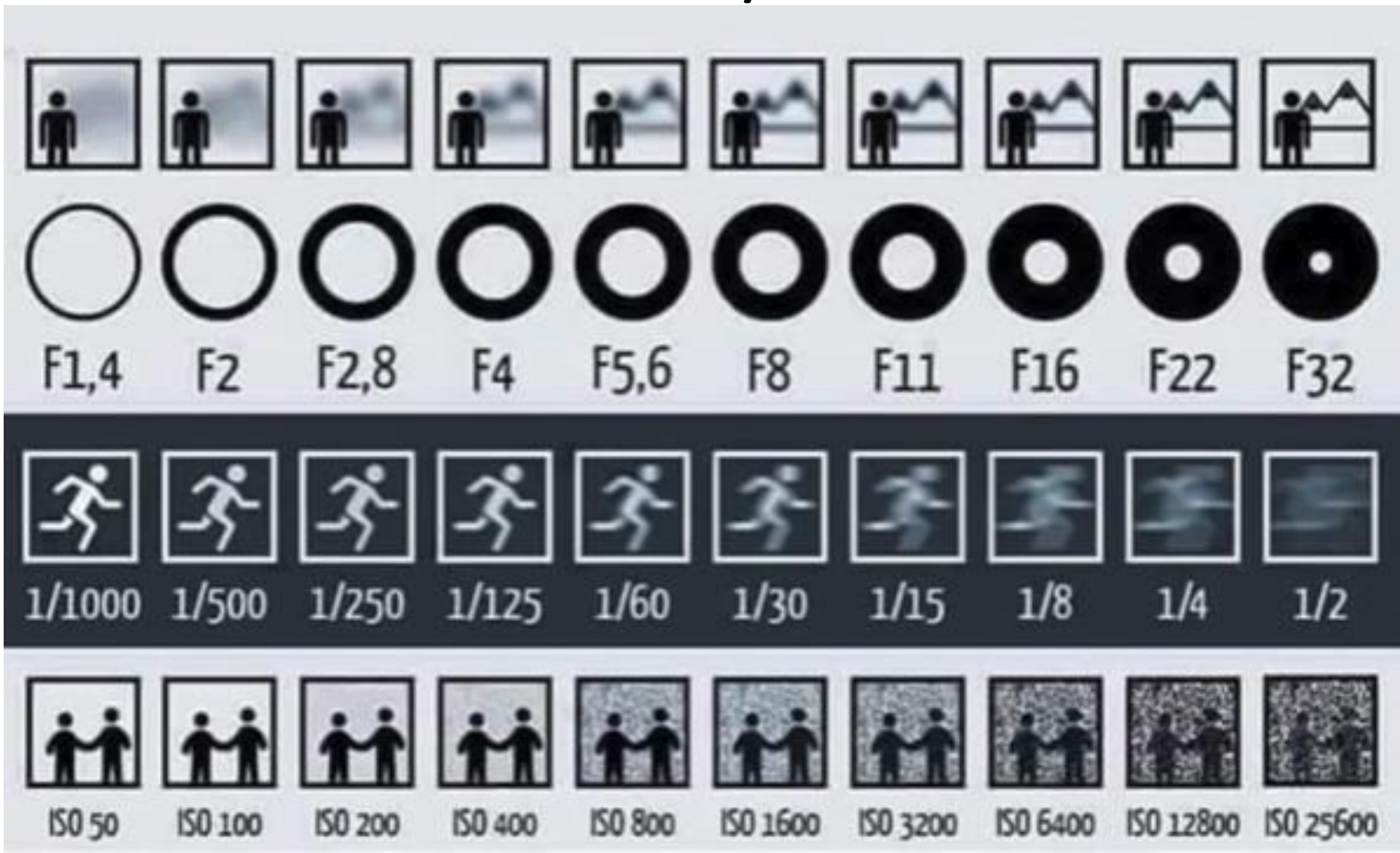
- Image noise is an electrical signal generated by the cameras circuitry (similar to “white noise”) More noise = less detail and lower resolution

- The higher you set the ISO, the more noise (or grain) you get.

Digital Cameras and ISO



APERTURE/F-STOP



Aperture

- **F-Stops** control the amount of light that passes through the lens. This is done by changing the diameter of the lens **aperture**, or hole, made of overlapping metal or plastic blades.

- The **smaller** the f-stop number, the **bigger** the opening or aperture in the lens. The bigger the f-stop number, the smaller the aperture. Larger apertures let in more light. (fig 3-7 to 3-9)

- Which one allows more light? F/2.8 or F/11

f/22 f/18 f/13.5

f/8 f/5 f/2.8

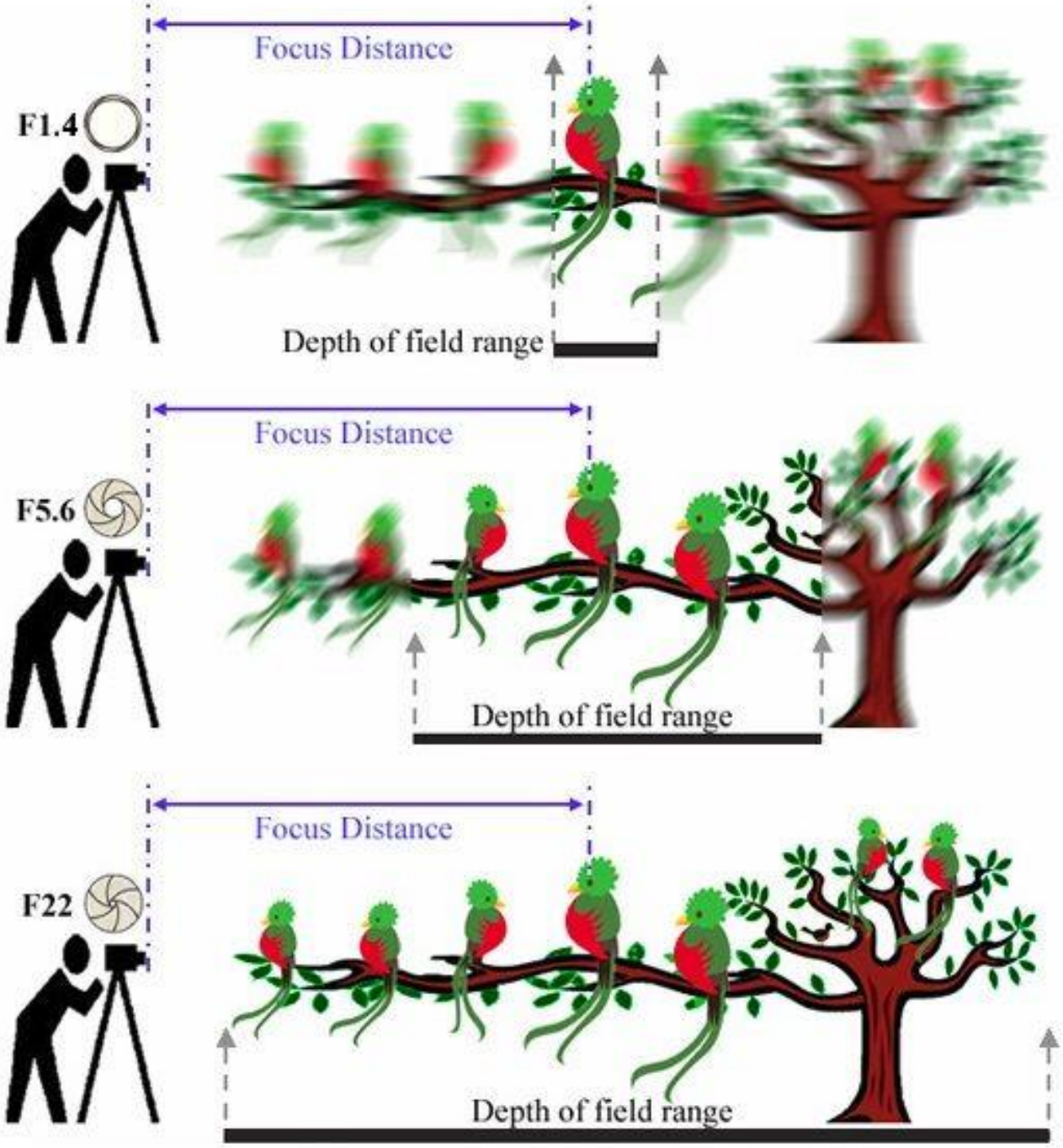
Aperture

- **F-Stops**: Smaller numbers let in more light. Larger numbers let in less light.

- **Depth of Field**: Refers to how much scene is in focus, both in front of and behind the subject.

  (fig 3-10 and 3-11)

- larger the f-stop = greater depth of field (more focused)
- smaller the f-stop = less depth of field (more blurry)


Focus Distance
F1.4
Depth of field range
Focus Distance
F5.6
Depth of field range
Focus Distance
F22
Depth of field range

f/22 - small aperture
Deep Depth of Field

f/2.8 - large aperture
Shallow Depth of Field

Large Aperture = Shallow Depth of Field

(small f-stop number)

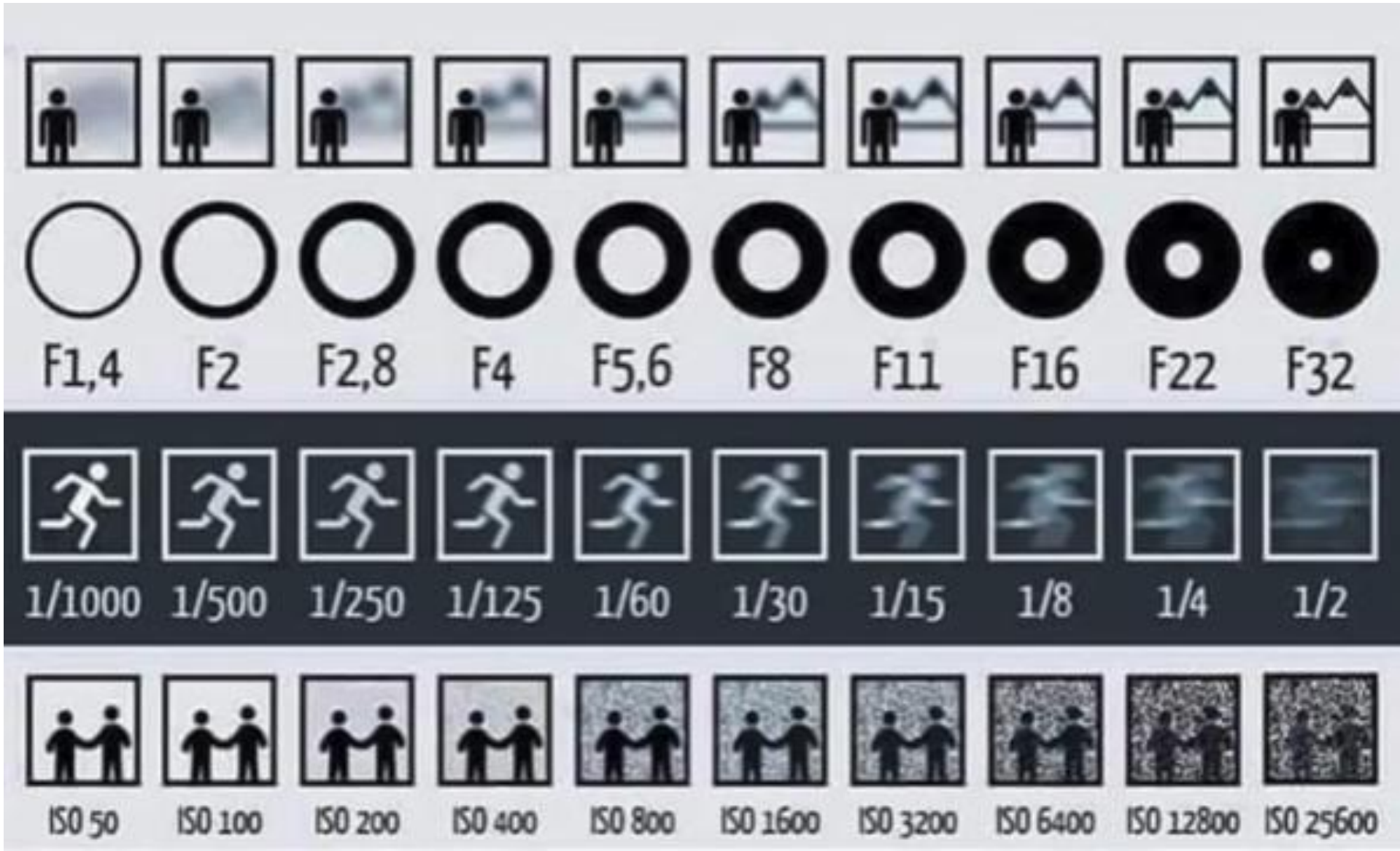
Small Aperture = Deep Depth of Field

(large f-stop number)

Photography Challenge - Bokeh (Shallow Depth of Field)

https://www.youtube.com/watch?v=H2sJIpiqQJQ&list=PLAsUq-kEMSD7PVmdkVmrYuzxKySYH0N0a&index=4

SHUTTER SPEED



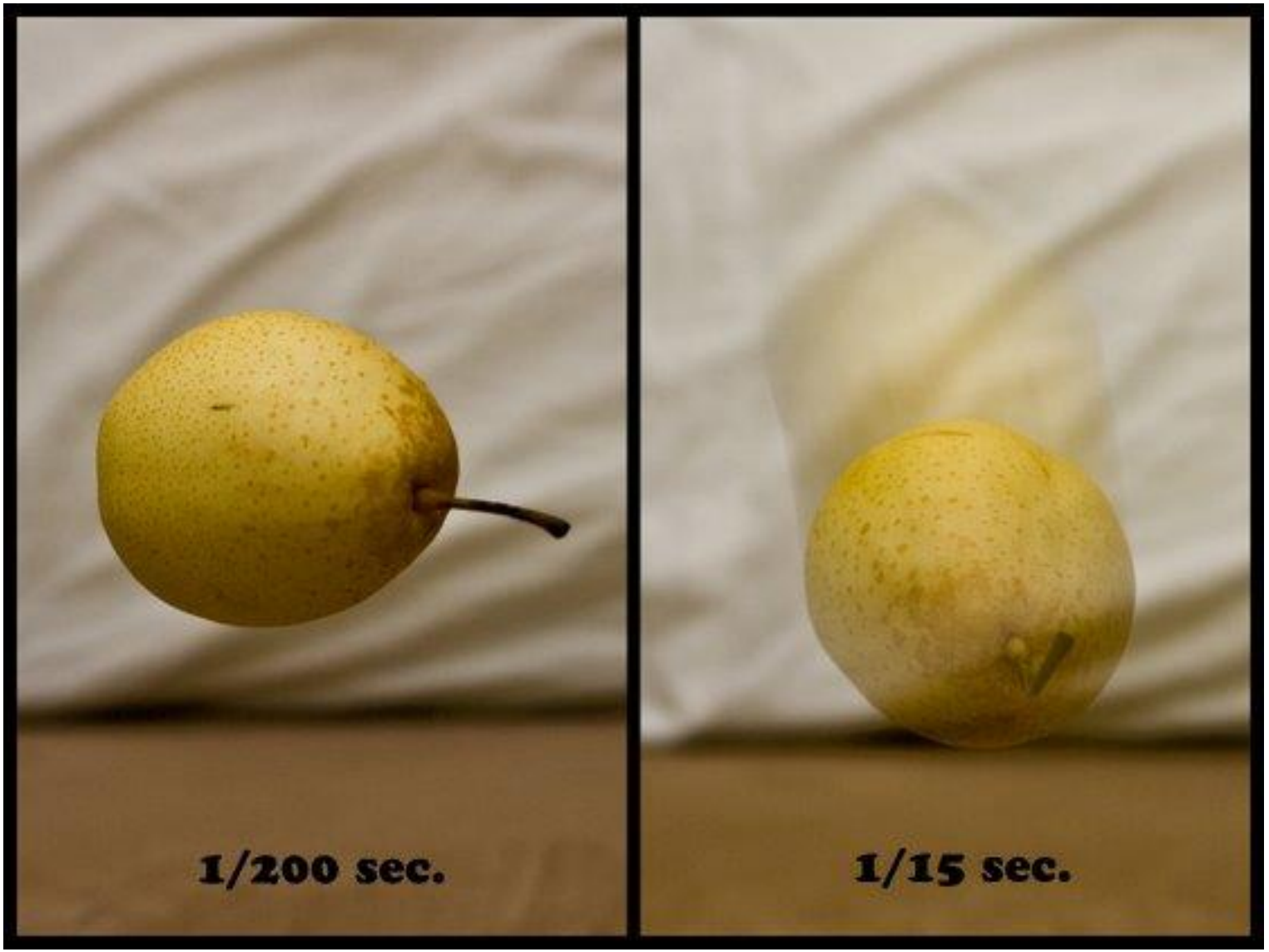
Shutter Speed

- **Shutter speeds** control the amount of time that light is allowed to hit the film or digital sensor.

- Shutter speed can range from 1/8000 of a second to as long as many hours.

- The **longer** the shutter speed, the **more** light is allowed to the film or imaging chip.

Shutter Speed



Elements of Exposure

- Most cameras have a **“B”** setting that stands for **Bulb.** When the Bulb setting is activated, the shutter stays open as long as the shutter release is held down. This is used for very long exposures.

- The faster the shutter speed, the more frozen the action will appear. The slower the shutter speed, the more streaky the action will appear. (fig. 3-14 and fig.3-15)

Fast Shutter Speed

Which aperture setting do you think each of these pictures was taken at to ensure the correct exposure?

Slow Shutter Speed

Elements of Exposure

- **Camera Movement**: If you are using a slow shutter speed while holding the camera, the more likely the picture will look blurry. It's a good idea to use a *tripod* when using slow shutter speeds because of the chance of moving the camera during exposure.

Photography Challenge - Light Painting (Long Shutter Speed)

http://lightpaintingphotography.com/light-painting-history/

Light Painting (Long Shutter Speed)

https://www.youtube.com/watch?v=CFlgMdiZHhc

Exposure Metering

- **Exposure metering** is determining the combination of f-stops and shutter speeds using a light meter that is usually built into the camera. You can either set it manually or have the camera automatically choose your settings for you. (Auto mode vs. Manual Mode)

http://www.youtube.com/watch?v=F8T94sdiNjc

Parts of the Camera

There are 10 basic **camera parts** to identify in today's digital world. Whether you have a digital compact or a digital SLR, these parts will inevitably be found on most cameras.

1. Lens
The lens is one of the most vital parts of a camera. The light enters through the lens, and this is where the photo process begins. Lenses can be either fixed permanently to the body or interchangeable. They can also vary in focal length, aperture, and other details.

2. Viewfinder
The viewfinder can be found on all DSLRs and some models of digital compacts. On DSLRs, it will be the main visual source for image-taking, but many of today's digital compacts have replaced the typical viewfinder with an LCD screen.

3. Body
The body is the main portion of the camera, and bodies can be a number of different shapes and sizes. DSLRs tend to be larger bodied and a bit heavier, while there are other consumer cameras that are a conveniently smaller size and even able to fit into a pocket.

Lens

Body

Viewfinder

Parts of the Camera

4. Shutter Release
The shutter release button is the mechanism that “releases” the shutter and therefore enables the ability to capture the image. The length of time the shutter is left open or “exposed” is determined by the shutter speed.

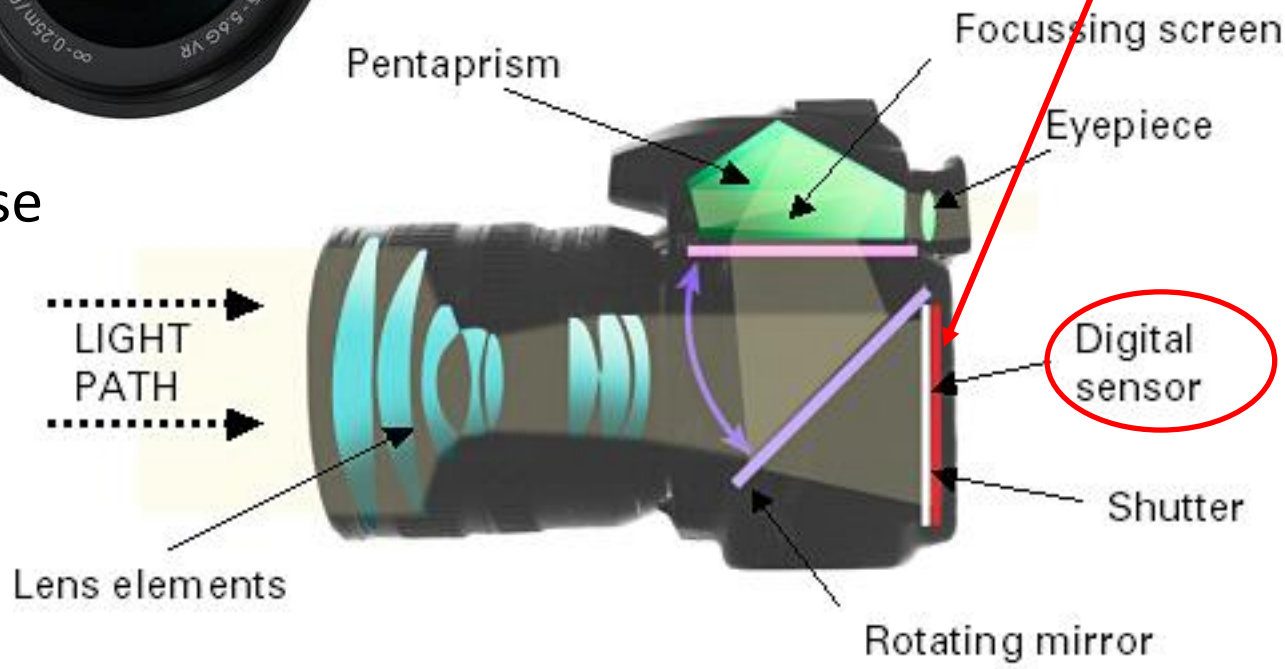
5. Aperture
The aperture affects the image’s exposure by changing the diameter of the lens opening, which controls the amount of light reaching the image sensor. Some digital compacts will have a fixed aperture lens, but most of today’s compact cameras have at least a small aperture range. This range will be expressed in f/stops. For DSLRs, the lens will vary on f/stop limits, but it is usually easily defined by reading the side of the lens. There will be a set of numbers stating the f/stop or f/stop range, ex: f/2.8 or f/3.5-5.6. This will be your lowest settings available with that lens.

6. Image Sensor
The image sensor converts the optical image to an electronic signal, which is then sent to your memory card. There are two main types of image sensors that are used in most digital cameras: CMOS and CCD. Both forms of the sensor accomplish the same task, but each has a different method of performance.

Aperture

Shutter Release

Remember, the **Image Sensor** is in the back of the camera behind the shutter.



Parts of the Camera

7. Memory Card
The memory card stores all of the image information, and they range in size and speed capacity. The main types of memory cards available are CF and SD cards, and cameras vary on which type that they require.

8. LCD Screen
The LCD screen is found on the back of the body and can vary in size. On digital compact cameras, the LCD has typically begun to replace the viewfinder completely. On DSLRs, the LCD is mainly for viewing photos after shooting, but some cameras do have a “live mode” as well.

9. Flash
The on-board flash will be available on all cameras except some professional grade DSLRs. It can sometimes be useful to provide a bit of extra light during dim, low light situations.

10. User Controls
The controls on each camera will vary depending on the model and type. Your basic digital compacts may only have auto settings that can be used for different environments, while a DSLR will have numerous controls for auto and manual shooting along with custom settings.

Flash

Memory Card

User Controls

LCD Screen