# Back to Basics:
# *LENSES – SELECTION & USE*

*Orleans Photo Club*

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# *LENSES, LENSES EVERYWHERE …AND NOT A PHOTO TO TAKE!*

# What we will talk about

- *What they do*
- *Terminology*
- *Types of lenses*
- *Selecting lenses*

# *What we **won't** talk about*

- *Canon vs Nikon vs Sony vs …*
- *"Is this a good lens for me?"*

# The main job of a lens is to orchestrate the light!

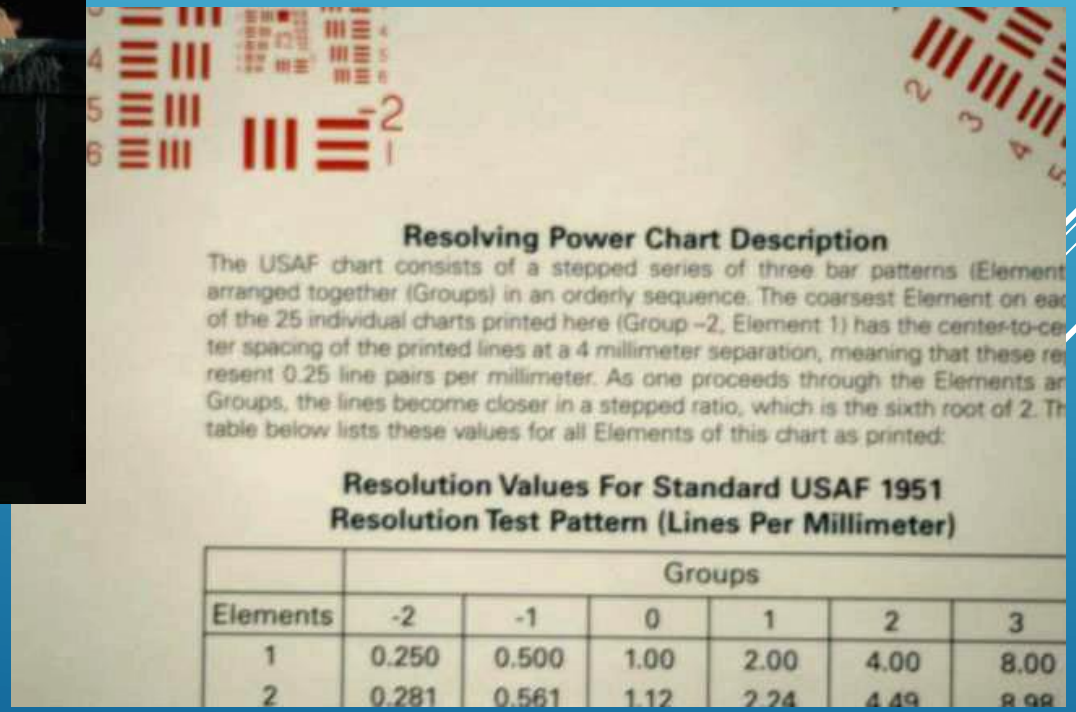
- *Focus*
- *Control the amount*
  - *Aperture*
  - *Shutter (some)*
- *Change magnification (zoom)*
- *Hold filters*
- *Vibration reduction*

# Front Element

- *Size determines the maximum amount of light that can enter*
- *Always use a lens hood*
- *Holds filter*
- *Protective filter?*

# Should I use a protective filter?

*From:* *https://www.lensrentals.com/blog/2008/10/front-element-scratches/*

**Resolving Power Chart Description**

The USAF chart consists of a stepped series of three bar patterns (Element arranged together (Groups) in an orderly sequence. The coarsest Element on ea of the 25 individual charts printed here (Group –2, Element 1) has the center-to-ce ter spacing of the printed lines at a 4 millimeter separation, meaning that these re resent 0.25 line pairs per millimeter. As one proceeds through the Elements ar Groups, the lines become closer in a stepped ratio, which is the sixth root of 2. Th table below lists these values for all Elements of this chart as printed:

**Resolution Values For Standard USAF 1951 Resolution Test Pattern (Lines Per Millimeter)**

| | Groups | | | | | |
|---|---|---|---|---|---|---|
| Elements | -2 | -1 | 0 | 1 | 2 | 3 |
| 1 | 0.250 | 0.500 | 1.00 | 2.00 | 4.00 | 8.00 |
| 2 | 0.281 | 0.561 | 1.12 | 2.24 | 4.49 | 8.98 |

# The actual lens that took the pictures

*Using the proper lens hood will protect lenses from most bumps and damage*

# Lens Terms

- **Mount**
  - *What brand of camera will it fit*
    - *May change with time*

- **Focal length**
  - *Mid-point of lens to focal plane*
  - *Measured in mm relative to full frame*
  - *Controls magnification*
  - *Fixed = prime, Variable = zoom*

- **Image Circle**
  - *Area of image produced by lens*

# Lens Terms

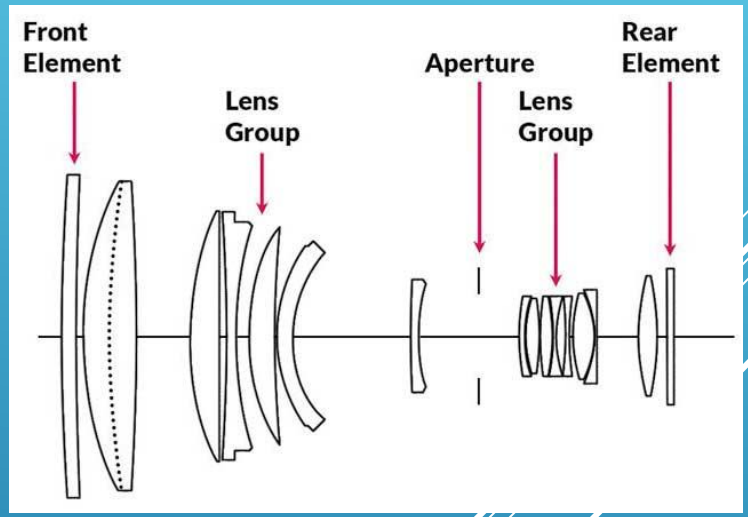
- **Focal ratio – f/stop**
  - *Focal length ÷ aperture*
  - *Larger number = smaller aperture*
  - *Smaller number = more light!*


- **Maximum aperture**
  - *Largest aperture available (f/2.8,f/5.6)*
  - *Affects maximum light into camera*

- **Fast vs slow**
  - *"Fast" lenses have max aperture <=f/2.8*
  - *For some zoom, the max aperture changes with focal length*

# Lens Terms

- **Elements/Groups**
  - *Cameras use many lenses (elements)*
  - *Two or more lenses together = group*
  - *Can affect max aperture*
  - *Generally, more elements/groups, better quality lens*




*<u>24mm f/1.8 lens</u>*

*Amazon – 5 elements, 3 groups $69*

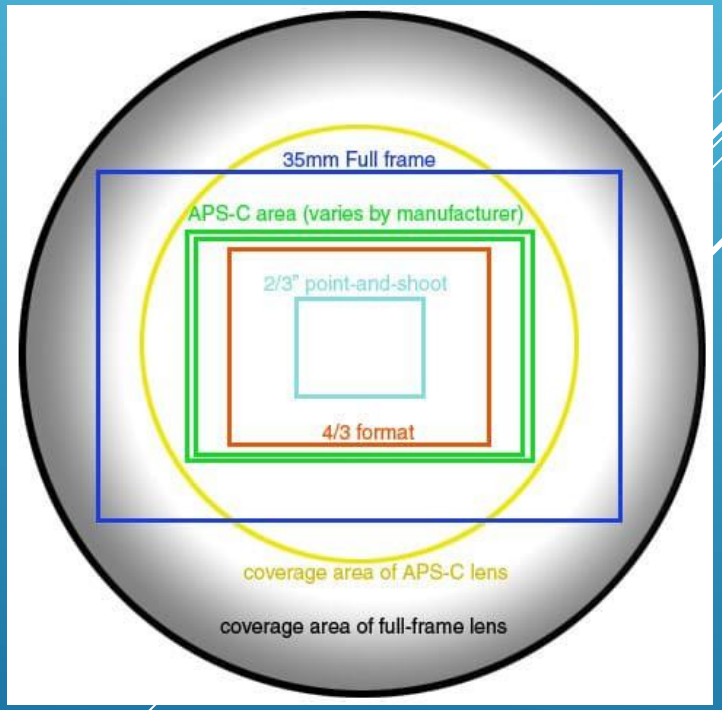
*Brand name – 12 elements, 9 groups $950*

*Depends on what you want!*

# Lens Terms

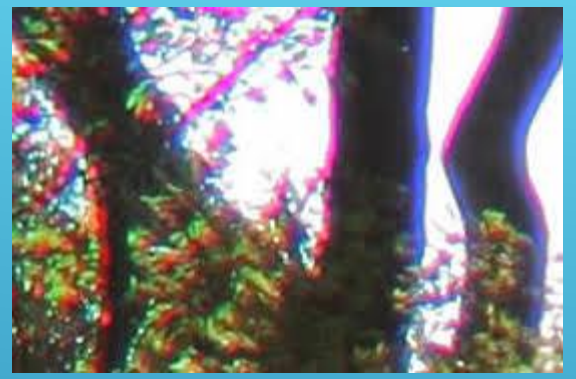
- **Full Frame**
  - *Sensor size equivalent to 35 mm film*
  - *24 mm high by 36 mm wide image size*

- **Crop factor**
  - *Based on camera sensor - depends on camera brand – 1.5 to 1.6*
  - *Alters effective focal length (50 mm x 1.5 CF = 75 mm effective)*



# Lens Terms

- **Chromatic Abberation**
  - *Minimal or no coatings on lenses*
  - *All colours do not focus to same point*
  - *"Fringing" on objects in photo*



- **Vignetting**
  - *Reduction in brightness in corners and edges*
  - *May be caused by:*
    - *Lens design*
    - *Improper lens hood*
    - *Filters*

# Lens Terms

- **Internal focus**
  - *Shift focus by moving internal lens group*
  - *Front element does not rotate*
  - *Useful with polarizer filters*

- **Angle of view**
  - *Depends on focal length*
  - *Greater focal length = smaller angle of view*
    - *24 mm wide angle = 65.5°*
    - *50 mm normal = 39.6°*
    - *200 mm telephoto = 10.3°*

# Lens Terms

- **Bokeh**
  - *A measure of the quality of the out-of-focus area at wide aperture*
  - *Good bokeh is prized in portraiture ($$$)*

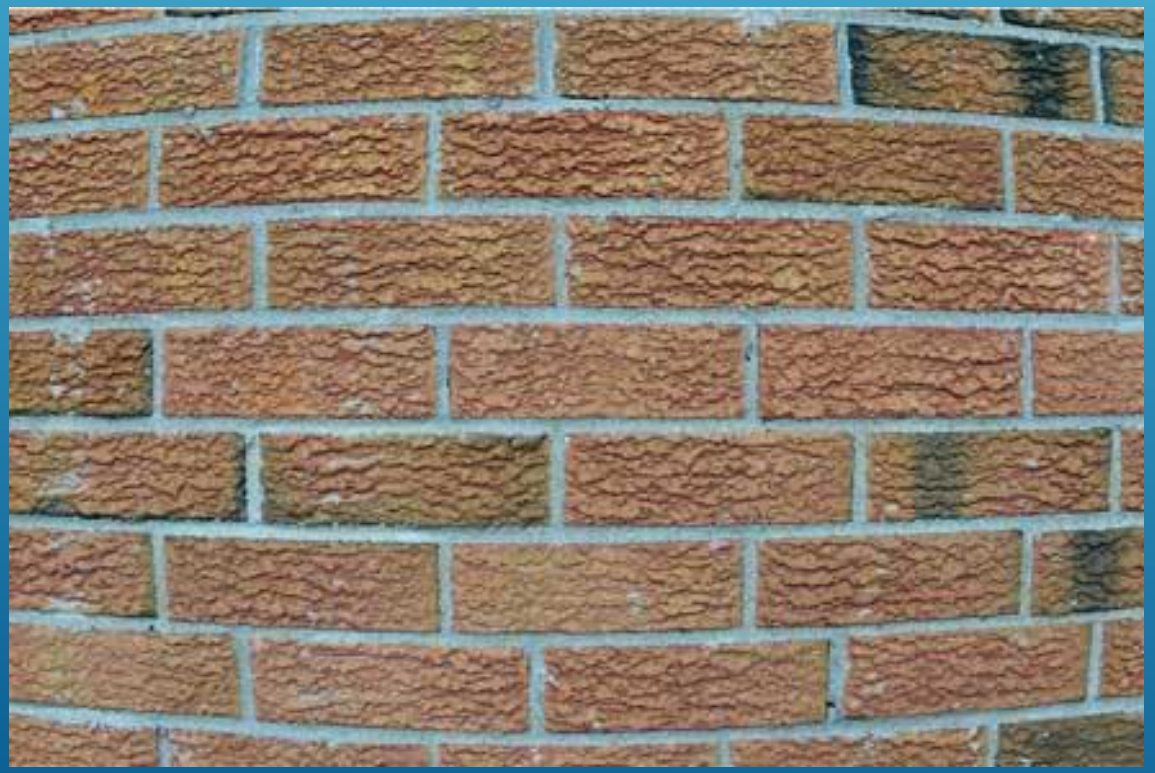
- **Blades (aperture)**
  - *Control the size and shape of aperture*
  - *Affects shape of out of focus elements*
  - *More blades, better quality lens*
  - *Rounded blades, better bokeh*

# Lens Terms

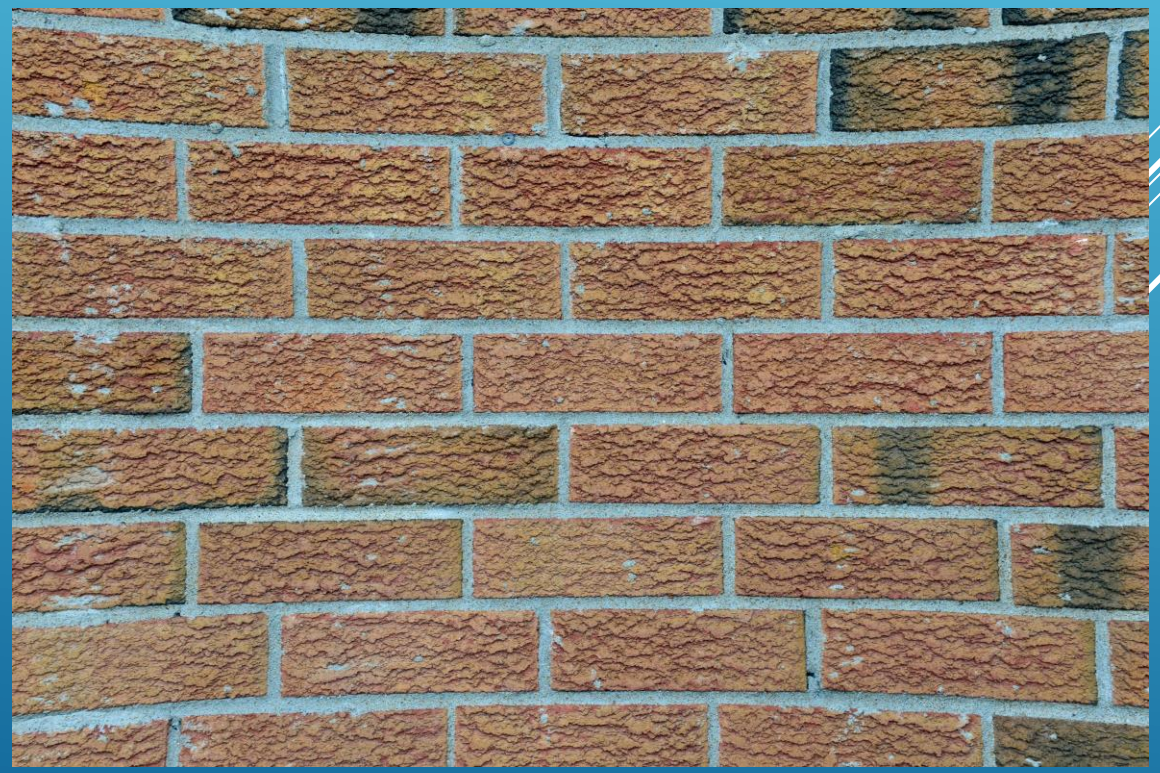
## Distortion

*Normal*

*Barrel*



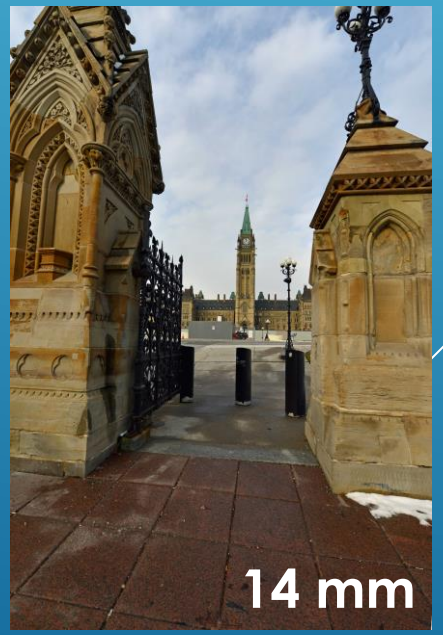
*Pincushion*



# Lens Terms

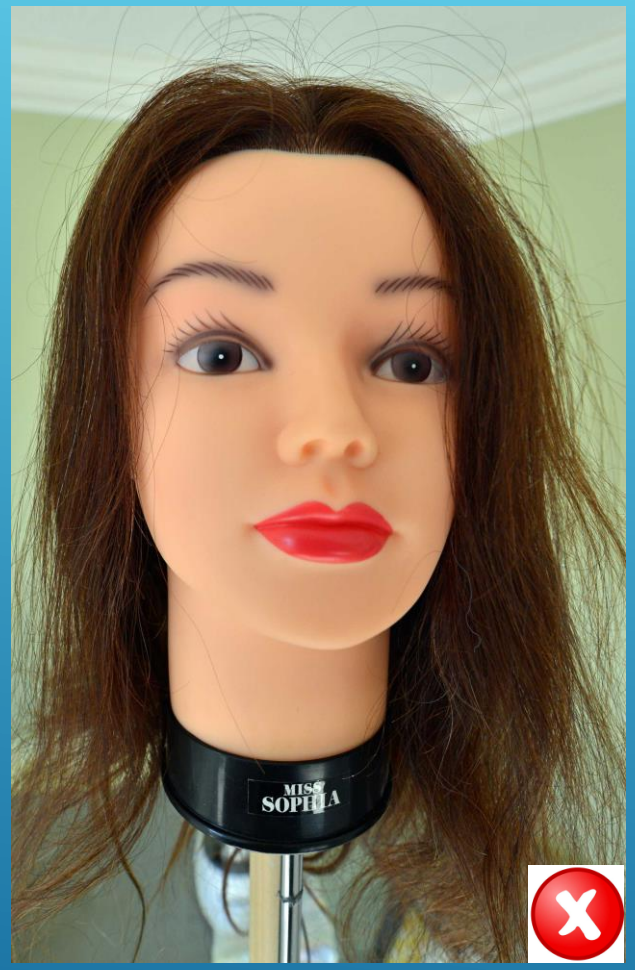
**Compression**

- *Apparent separation between objects in photo*
- *Wide angle lenses have little compression – stretch objects*
- *Telephoto lenses have lots of compression*
- *Can be used for dramatic effect*

# Compression – *don't use short focal length for portraits*


*Telephoto Lens*




*Wide Angle Lens*

# Lens Terms

- **Kit lens**
  - *Sold with body to satisfy most photo work*
  - *Usually short zoom 18-55 mm, f/3.5-5.6*

- **Minimum focus distance**
  - *Minimum distance from front element to achieve focus*
  - *Most important for macro lenses*
    - *105 mm = 1.0 m*
    - *105 mm macro = 0.3 m*

# Lens Terms

- **Tripod ring**
  - *Preferred tripod attachment site for long lenses*
  - *Reduces strain on mount*

NO

YES

# Lots of Other Lens Terms

- *Nano coating*
- *Extra-low dispersion glass*
- *UMM, SWM, HSM, etc*
- *Fluoride elements*
- *Aspherical*
- *G, D, E lenses*
- *VR, IS*
- *ASC*


*It's why God invented* Google

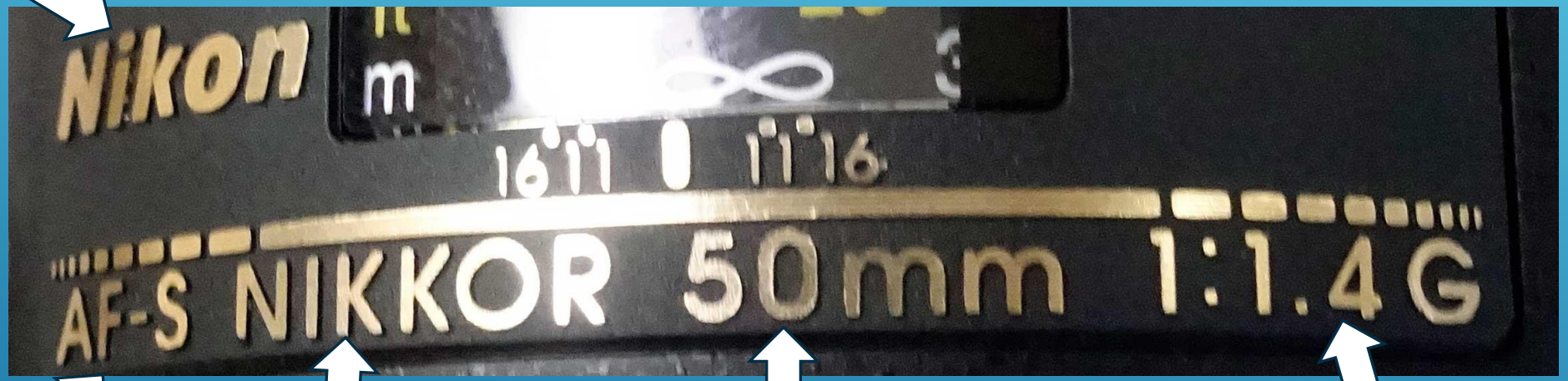
# Now that you know the words…

## Have you read a good lens lately?

*Most lenses have a lot of information on them:*

- *Focal length or zoom range*
- *Maximum aperture*
- *Filter size*
- *Serial number*
- *Optical features*
- *Manufacturer*
- *Country of Origin*

# Lens Markings – Prime Lens




*Manufacturer*

*Auto Focus*

*Brand*

*Focal Length*

*Maximum Aperture*

# Lens Markings – Zoom Lens


*Manufacturer*

*Auto Focus*

*Brand*

*Variable Focal Length*

*Maximum Aperture*

# Lens Markings –Zoom Lens for Crop Sensor


*Manufacturer*

*For crop sensor*

*Auto Focus*

*Brand*

*Variable Focal Length*

*Variable Maximum Aperture*

# Lens Markings – Bottom markings


*Manufacturer*

*Focus Motor Type*

*Lens element design*

*Lens Coating*

*Country Of Origin*

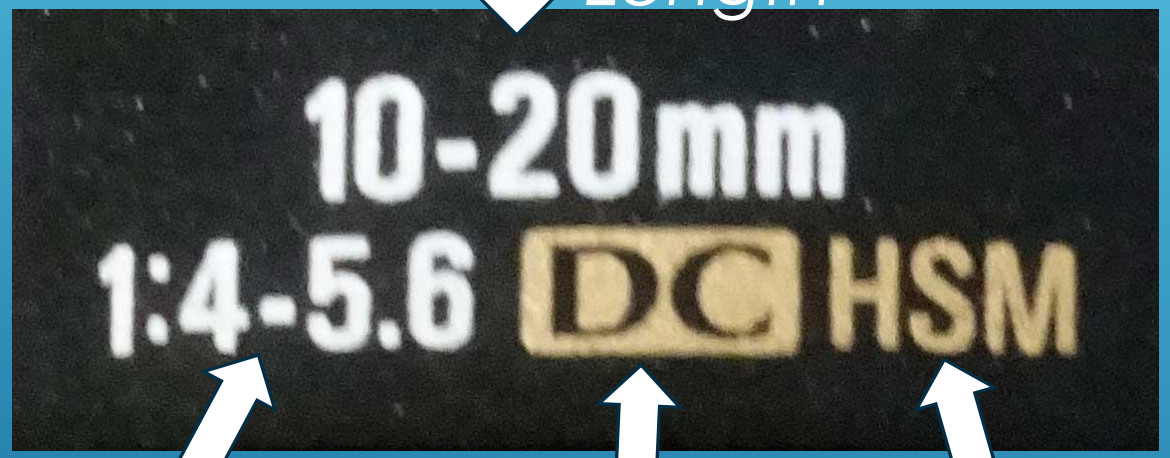
*Internal Focus*

*Filter Size*

# Lens Markings – Crop Zoom Lens

*Other Manufacturer*

*Sigma*




*Variable Focal Length*

*Variable Maximum Aperture*

*For crop sensor*

*Auto Focus Motor*

# Lens Markings – Older Lens


*Maximum Aperture f/3.5*

*Manufacturer*

*Focal Length*

*Focal Length*

*Brand*

*Maximum Aperture f/2*

# Types of Lenses

- *Prime vs Zoom*
- *Autofocus vs Manual*
- *Focal lengths*
  - *Fisheye*
  - *Superwide*
  - *Wide*
  - *Normal*
  - *Telephoto*
  - *Supertelephoto*

*50mm lens view*

# Types of Lenses

**Prime** – *fixed focal length*

**Zoom** – *variable focal length*
– *may have variable maximum aperture*

**Autofocus** – *via focus motor*
– *manual also available*

**Manual** – *use lens ring*

# Types of Lenses

**Fisheye** – *less than 20 mm on full frame*

- *Specialty wide angle lens where distortion is wanted*
- *Circular or rectangular distortion*
- *Can provide creative views or scientific*
- *Limited use (?)*

*Nikon 6mm 220° View*

*Rectilinear fisheye*

*Circular fisheye*

# Types of Lenses

**Super wide** – *14 to 24 mm on full frame*

- *Landscapes (vistas)*
- *Building interiors*
- *Usually can't use filter – especially polarizer*
- *Careful of what you include in the photo*


14mm


50mm

# Types of Lenses

**Wide** – *24 to 45 mm on full frame*


- *Typical of what is considered wide angle*
- *Landscapes and architecture*
- *Building interior*
- *When you can't back up enough to get everything in one picture*


28mm


50mm

# Types of Lenses

**Normal** – *usually 50 mm on full frame*

- *Approximates normal vision*
- *Good for general photography*
- *Usually inexpensive*
- *Can get a very fast version (f/1.2)*


50mm

# Types of Lenses

**Medium telephoto** – *70 to 200 mm on full frame*

- *Portraiture lens*
- *Street photography*
- *Isolate elements*


120mm


50mm

# Types of Lenses

**Super Telephoto** – *300 mm or more on full frame*

- *Bird or wildlife photography*
- *Isolate elements in a view*
- *Compress the scene*

**Watch for zoom creep**

*Nikon 2000 mm f/11*


500mm


50mm

# Specialty Lenses - Macro

- *Close focussing*
- *Allows for magnification of 1:1 or greater*
  - *Dedicated lens*
  - *Extension tubes*
  - *Reverse ring*
  - *Close up lens*

*Issues*

- *Shallow depth of field*
- *Lighting issues*
- *Require tripod*

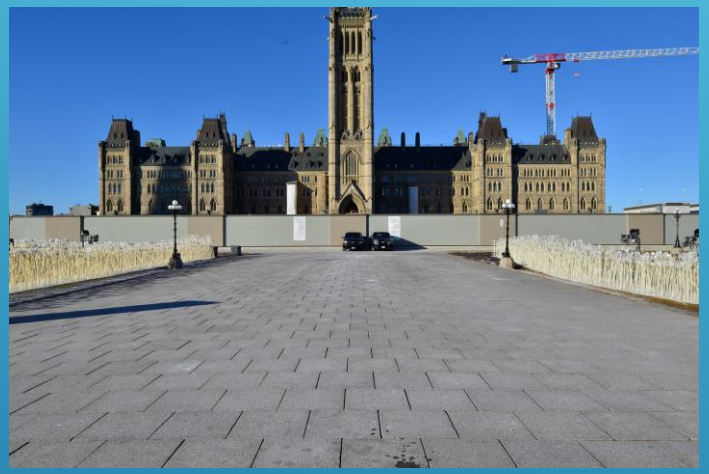
# Specialty Lenses – Tilt/Shift

- *Used in architectural photography or landscape with large depth of field*
- *Keep vertical lines – vertical*
- *Lens has a large image circle*
  - *Shifting lens up allows to capture buildings with correct perspective*

*Issues*

- *Expensive*
- *Manual focus, sometimes manual aperture*
- *Normally need tripod*

# Specialty Lenses – Tilt/Shift



# Lens Accessories

- *Lens hood*
  - *Must use*
- *Extension Tubes*
  - *For macro*
- *Teleconverter*
  - *1.4x or 2x*
- *Filters*
  - *Polarizing*
  - *Neutral Density*


# Choosing a lens

- *Subjective – why do you need it?*
- *What can't you do?*
  - *Available light*
  - *Minimize distortion*
  - *Macro*
  - *Wide angle or telephoto*
- *Camera compatibility*
  - *Mirrorless, full-frame, crop sensor?*
- *Budget*
  - *New vs Used*
  - *Brand-name vs third-party*

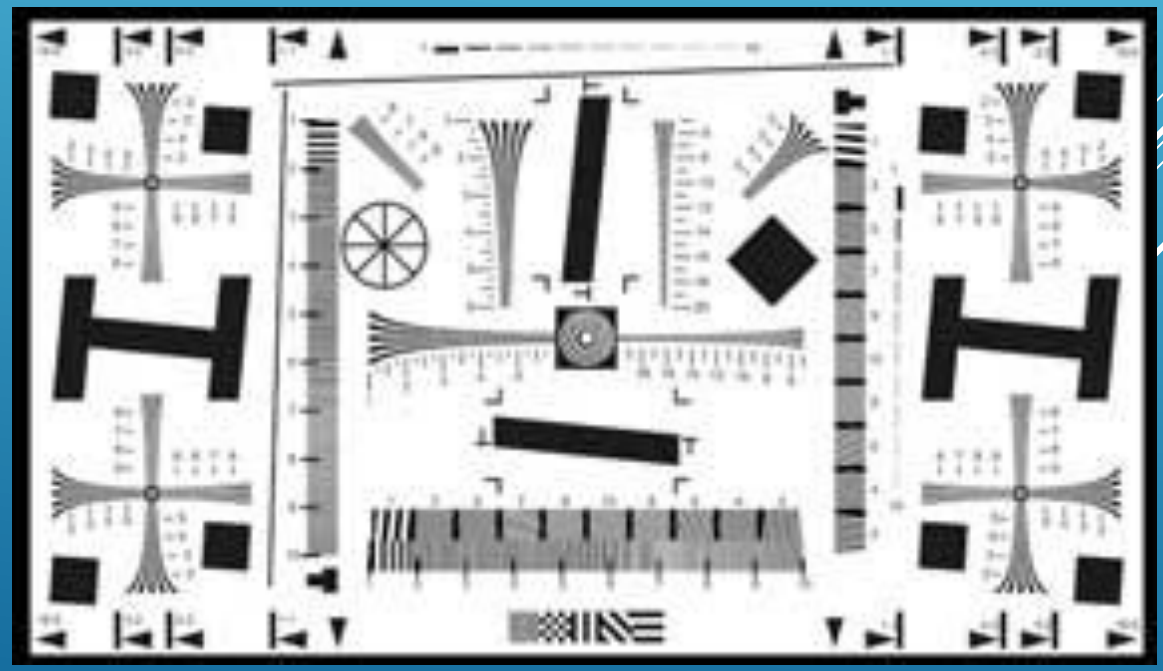
# Choosing a lens

- *Focal length*
- *Zoom or Prime*
- *Maximum aperture – does it change?*
  - *Aperture type*
- *Weight*
  - *Construction*
  - *Tripod needed?*
- *Filter size – can you use existing filters?*
- *On-line reviews – watch for paid sites!*

*Not recommended!*

# Choosing a lens

- *Image quality – performance across aperture range*
  - *Sharpness*
  - *Distortion*
  - *Chromatic aberration*
  - *Vignetting*
  - *Bokeh*
- *Focussing*
  - *Manual vs Auto*
  - *Close focus*
- *Lens Flare*



# Summary

*Camera lenses:*

- *Available in a wide variety*
- *Affect how the image looks*
- *Change elements in the image*
- *Impact image quality*
- *Are a tool for the photographer to choose*

*What are you going to photograph next?*

# QUESTIONS?