LEBANON CAMERA CLUB

What Lenses Should I Buy?

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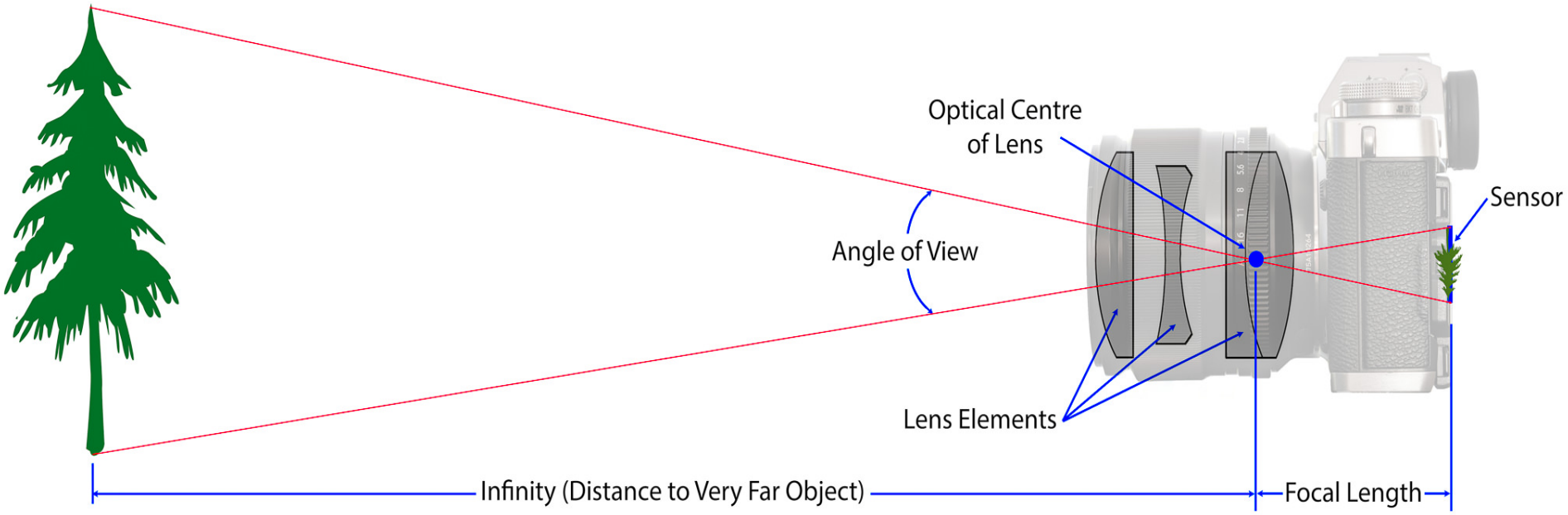
What Lenses Should I Buy?

Focal length

- Determines angle of view
  - Measured in millimeters → 24mm, 50mm, 135mm, etc.

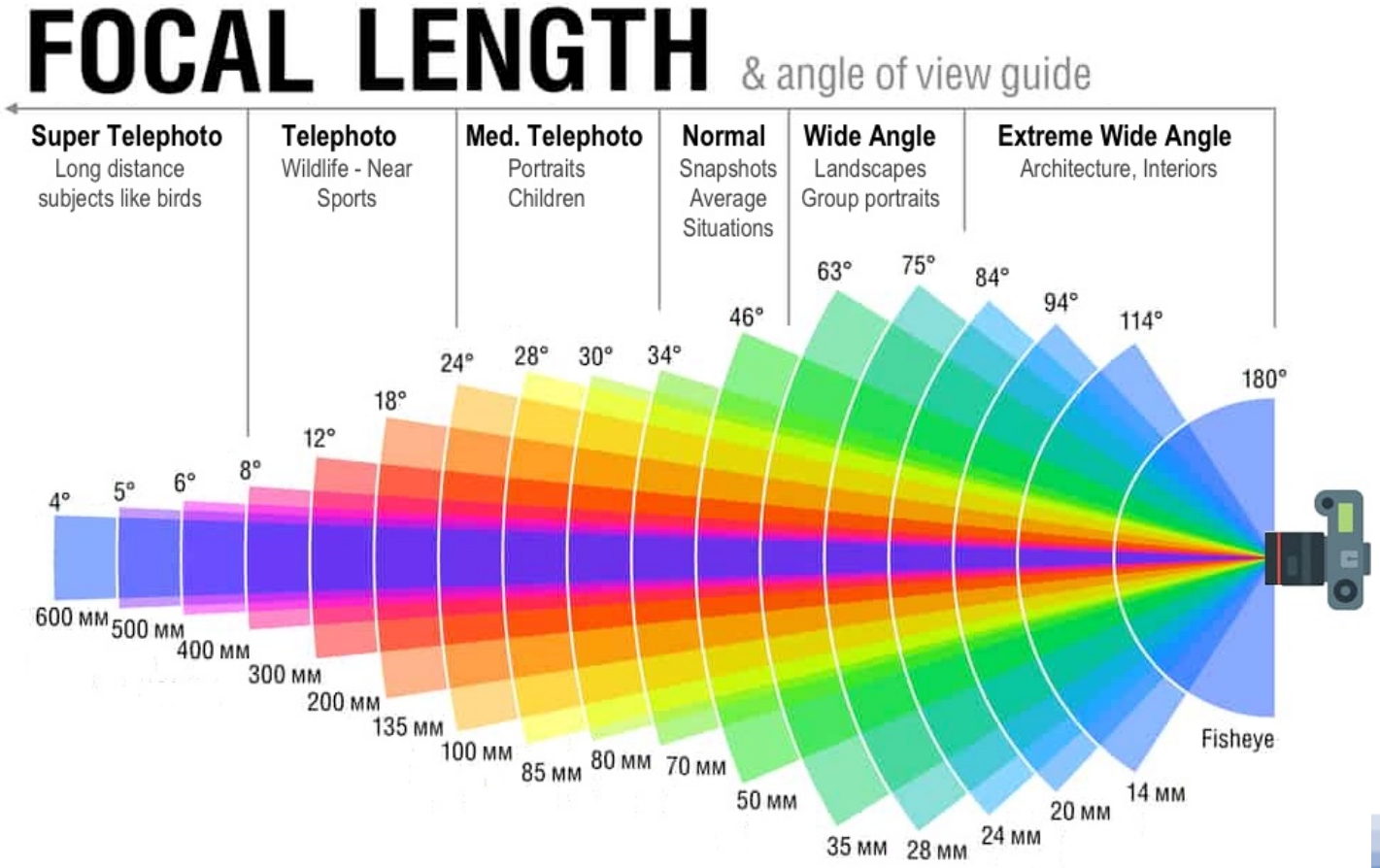


What Lenses Should I Buy?

Focal length

Note: Focal length also affects magnification, along with minimum focus distance (MFD).

- Determines angle of view
  - Measured in millimeters → 24mm, 50mm, 135mm, etc.
  - Shorter focal length = wider angle of view



focal lengths shown for 35mm film and full frame digital sensors

What Lenses Should I Buy?

Focal length

Note: To find the equivalent angle of view for an APS-C sensor multiply by 1.5 → 50mm lens on APS-C is same AOV as 75mm on full frame sensor.

- Different focal lengths for different applications
  - Values often given for full frame (FF) sensors (35mm film size)
    - APS-C (crop) sensor is 2/3 smaller → angle of view is 2/3 smaller

Type	FF Min	FF Max	APS-C Min	APS-C Max	Application
fisheye	8	15	5	10	special effects
ultra wide	12	20	8	13	landscape / architecture
wide	24	40	16	27	landscape / street
normal	45	55	30	37	general
long normal	60	80	40	53	general
short tele	85	135	57	90	portrait / sports
long tele	150	500	100	333	portrait / sports / birds
wide zoom	12 / 16	24 / 35	8 / 11	16 / 23	landscape / travel
normal zoom	24 / 28	70 / 85	16 / 19	47 / 57	general
tele zoom	70 / 100	200 / 300	47 / 67	133 / 200	portrait / sports / birds
ultra tele zoom	100 / 150	400 / 500	67 / 100	267 / 333	birds

What Lenses Should I Buy?

Lens "speed"

Note: Depth of field (DOF) is the range of distances in an image which appear "acceptably sharp" → increases as f-number increases.

- Maximum light gathering ability of the lens
  - Occurs when the lens is "wide open" → minimum f-number
  - "Fast" lenses have a low f-number → 1.2, 1.4, 1.8, 2 (long FL)
    - Lenses are focused wide open → more light = faster & more accurate
    - Bigger, heavier, more expensive, can achieve shallower DOF
    - Possible aberrations wide open (optimized for speed)
  - "Slow" lenses have a higher f-number → 3.5, 4.0, 5.6, 6.3
    - Smaller, lighter, cheaper, minimum DOF is larger
    - May have fewer aberrations if well designed

What Lenses Should I Buy?

Prime lenses vs. zoom lenses

Note: Some prime lenses are very expensive and have exceptional image quality.

- Prime lenses → single focal length
  - Less complex
    - Fewer lens elements (generally) → smaller, lighter, cheaper
    - Easier to design, except for wide angle and very expensive lenses
    - Higher image quality
- Zoom lenses → range of focal lengths
  - More complex
    - More lens elements, often using 'exotic' glass or shapes
    - Bigger, heavier, more expensive (but can replace multiple primes)
    - Harder to design → reduced IQ at one end of the zoom range
    - Image quality usually less then an equivalent prime focal length
  - Zoom range is important
    - Larger range has more compromises
    - Common ranges: 2×, 3×, 5×, 10×

Note: Some zoom lenses are very, very expensive and have IQ that rivals primes.

What Lenses Should I Buy?

Kit lenses

- Often a 'starter' lens sold with a low-cost body
  - Usually low cost to keep the package price down
  - In the film era it was a normal prime
    - 35mm cameras → 50mm lens, easiest to design and build
    - Best price/performance ratio
    - Zooms were not cheap in the film era
  - For digital cameras it has become a zoom
    - APS-C cameras → 18–55mm (equivalent to 24–82.5mm full frame)
    - Modern CAD and plastics make low cost zooms with good IQ possible
    - Image quality still not as high as primes
- FF digital cameras can have high quality kit lenses
  - $1000 zoom kit lenses are common (FF is considered more 'pro')

What Lenses Should I Buy?

Basic kit

Note: Prices given are for new Canon/Nikon full frame DSLR lenses, APS-C where noted. Third party lenses (Sigma, Tamron, etc.) can be much cheaper, mostly for zooms.

- Kit zoom
  - Most people start with kit zoom on APS-C body
    - IQ is decent, but lens is slow → 18–55mm *f*/3.5–5.6
    - Good for general photography
    - May not perform well in low light situations
- Fast normal prime → better low light performance
  - Best lens to add first → 50mm *f*/1.4 or *f*/1.8 (on APS-C: 75mm)
    - Better IQ, reasonably priced: *f*/1.4 = $400, *f*/1.8 = $125
    - APS-C equivalent normal focal length → 35mm *f*/1.8 = $200
    - APS-C users often buy a FF fast prime → more selection, still cheap
    - 50mm on APS-C = 75mm FF → "long normal" (better for portraits)

What Lenses Should I Buy?

Adding lenses → landscape

Note: Photographers often have 'favorite' wide angle focal lengths, it is a personal preference.

- Wide angle lenses for expansive scenes
  - Requirements
    - Do not need to be fast → usually shot stopped down for large DOF
    - Do not need image stabilization → landscape usually shot on tripod
  - Single lens → 24mm *f*/2.8 = $400 or 20mm *f*/2.8 = $600
    - 24mm can be redundant if kit zoom covers 24mm, but higher IQ
    - 20mm gives extra field of view
  - Two lenses → 28mm = $300 & 20mm or 24mm & 14/16mm
    - 28mm isn't that wide for landscape, but can also be used for street
    - <20mm can produce great shots, but use can be limited, and pricey
  - Wide zoom → 16–35mm = $1100 or 12–24mm = $1150
    - Small focal length changes make a big difference for wide lenses
    - Much more convenient to cover most focal lengths with a single lens
    - More expensive, heavier, but replacing the cost of several primes

What Lenses Should I Buy?

Adding lenses → portrait

Note: If the camera is close to the subject the nose can appear larger due to being closer to camera than eyes.

- Short telephoto to long telephoto
  - Requirements
    - Telephoto → good subject isolation (FL may depend on body or head shot)
    - Telephoto minimizes distortion → camera not too close to subject
    - Fast lenses for minimal DOF → face, or just eyes, in focus
  - Single lens → 85mm *f*/1.2, *f*/1.4, or *f*/1.8 (on APS-C: 127.5mm)
    - *f*/1.2 lenses are very high quality and very expensive → $2000
    - *f*/1.4 lenses are high quality and expensive → $1600
    - *f*/1.8 lenses are very good quality and much less expensive → $400
  - Single lens → 135mm *f*/2 or *f*/2.8 (on APS-C body: 202.5mm)
    - More subject isolation, larger, heavier, more expensive → $1000
  - Zoom → 70-200mm *f*/2.8 (on APS-C body: 105-300mm)
    - Versatile in dynamic situation (weddings), quality is very high → $2100
    - *f*/4 is a bit too slow, but could be used for weddings → $1300

What Lenses Should I Buy?

Adding lenses → street

- Maximum light gathering ability of the lens
  - Requirements
    - Small size → people are intimidated by big lenses
    - Does not need to be fast, unless shooting at night
    - Light weight → easy to carry around all day
    - Can be manual focus → set fixed focus distance (can shoot "from the hip")
  - Single lens → 28mm or 35mm, *ƒ*/2 or *ƒ*/2.8, $300–$600
    - Wide angle allows for more framing error (for quick shots)
    - Can crop later
  - Can also use 50mm → more reach for distant subjects
    - Getting too close can upset people
  - Zoom → kit zoom may be best, although a bit slow
    - 'Pro' normal zooms (*ƒ*/2.8) are larger and may be too noticeable

What Lenses Should I Buy?

Adding lenses → sports

Note: Teleconverters do not work on all lenses. There can be IQ loss, since TC's magnify a portion of the image circle.

- Telephoto lenses to capture action at a distance
  - Requirements
    - Fast lenses for higher shutter speeds
    - Image stabilization is very useful (if stabilization is not in the body)
    - Focal length depends on sport and how close you can get
  - Single lens → 300mm *f*/2.8 = $6000 (if you're a pro)
    - Seen at football games, heavy, usually on a monopod
  - Single lens → 135mm *f*/2 = $1000 (on APS-C: 202.5 mm)
    - Much more practical than a 300mm, best on APS-C body
    - Can add a teleconverter for more reach → 1.4× = $500 or 2× = $600
    - Teleconverter tradeoff → 1.4× adds 1 stop, 2× adds 2 stops
    - Example → 135mm *f*/2 + 1.4× TC = 189mm *f*/2.8 (283.5mm on APS-C)
  - Zoom → 70-200mm *f*/2.8 = $2100 (+ teleconverter if needed)
    - 70-200mm *f*/4 = $1200, but adding the TC makes it even slower

What Lenses Should I Buy?

Adding lenses → birds

Note: These recommendations are for general bird photography—if you have birds in your backyard you can use shorter lenses.

- Super telephoto → birds are small and far away
  - Requirements
    - Focal length is primary → 400mm and up
    - A teleconverter can be used with shorter lenses
    - Image stabilization is very useful (if stabilization is not in the body)
  - Prime lens → 400mm or 500mm *f*/8 reflex = $250
    - Reflex lenses use a mirror like a telescope
    - They have issues (bokeh), but they are much less expensive
    - The 'pro' super telephoto primes are very expensive → $3600 and up
  - Zoom → Sigma/Tamron 150–600mm *f*/5–6.3 = ~$1100
    - Affordable super zooms are usually third party
  - Zoom → Nikon 200–500mm *f*/5.6 = $1400
    - Reasonable price if you have a Nikon body

What Lenses Should I Buy?

Adding lenses → travel photography

- Super zoom → all-in-one lens
  - Requirements
    - Large zoom range to minimize lens changes and reduce weight
    - Image quality not as good as multiple lens kits, but a good trade off
    - Image stabilization is very useful (if stabilization is not in the body)
  - Zoom → 18-200mm *f*/3.5-5.6 = $650
    - APS-C equivalent → 27-300mm angle of view
    - Long end IQ might be iffy for large prints (fine for web or competitions)
  - Zoom → 18-135mm *f*/3.5-5.6 = $600
    - APS-C equivalent → 27-202.5mm angle of view
    - Smaller zoom range may provide higher image quality
    - Less reach could be a negative on safari

What Lenses Should I Buy?

Adding lenses → macro

Note: Macro lenses are not as fast as true portrait lenses, and may be less 'flattering' to subjects (postprocessing can help).

- Special equipment for getting close
  - Requirements
    - 1:1 magnification → subject is same size on sensor as in real world
    - Longer focal lengths provide more "working distance"
    - Stabilization not that useful at 1:1 → tripod or flash needed
    - Macro lenses are usually primes, zooms rarely provide 1:1
    - Autofocus is useful at times, but a focusing rail is best at 1:1
  - Prime → 100mm or 105mm *f*/2.8 = $1000
    - Good working distance, best for insects (can also be used for portrait)
    - Shorter focal lengths are lighter and cheaper, but less useful in general
    - Some third party versions about half the price → still good quality
  - Exotic primes can achieve up to 5:1 magnification
    - Very difficult to use, hair thin DOF
    - Some are cheap ($200, low quality?), others can be expensive ($1000)

What Lenses Should I Buy?

Body brand vs. third-party

- Body brand pros & cons
  - Pro: autofocus is likely to be faster and more reliable
  - Pro: higher resale value
  - Con: more expensive
- Third-party pros & cons (Sigma, Tamron, Tokina, etc.)
  - Pro: less expensive, sometimes much more so
  - Con: autofocus can be slower and less accurate
  - Pro: may offer lenses unavailable in body brand
- Third-party pros & cons (Voigtlander, Zeiss)
  - Pro: very high quality, as good or better than body brand
  - Con: only prime lenses available
  - Pro: offer manual focus lenses (for people who like using them)
  - Con: can cost as much or more than body brand lenses

What Lenses Should I Buy?

What about mirrorless?

Note: Last year more mirrorless cameras were sold than DSLRs. The future appears to be mirrorless...

- Mirrorless cameras do not have a moving mirror
  - Viewfinder image is displayed by a small LCD
  - Cameras and lenses can be smaller, but may not be
    - High quality FF lenses are as big & heavy as those for DSLRs
    - The exception is micro 4/3 which has a much smaller sensor
- Focal length choices are the same as DSLRs
  - Initially fewer lenses available, now things are shifting
  - Some brands make certain lenses only for mirrorless
  - Mirrorless cameras are more suited to using legacy lenses
    - Many adapters are available for old manual focus lenses
    - Quality of old lenses can vary greatly
- Prices aren't that much different
  - Some inexpensive lenses and some very expensive lenses

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