

LEBANON CAMERA CLUB

What Lenses Should I Buy?

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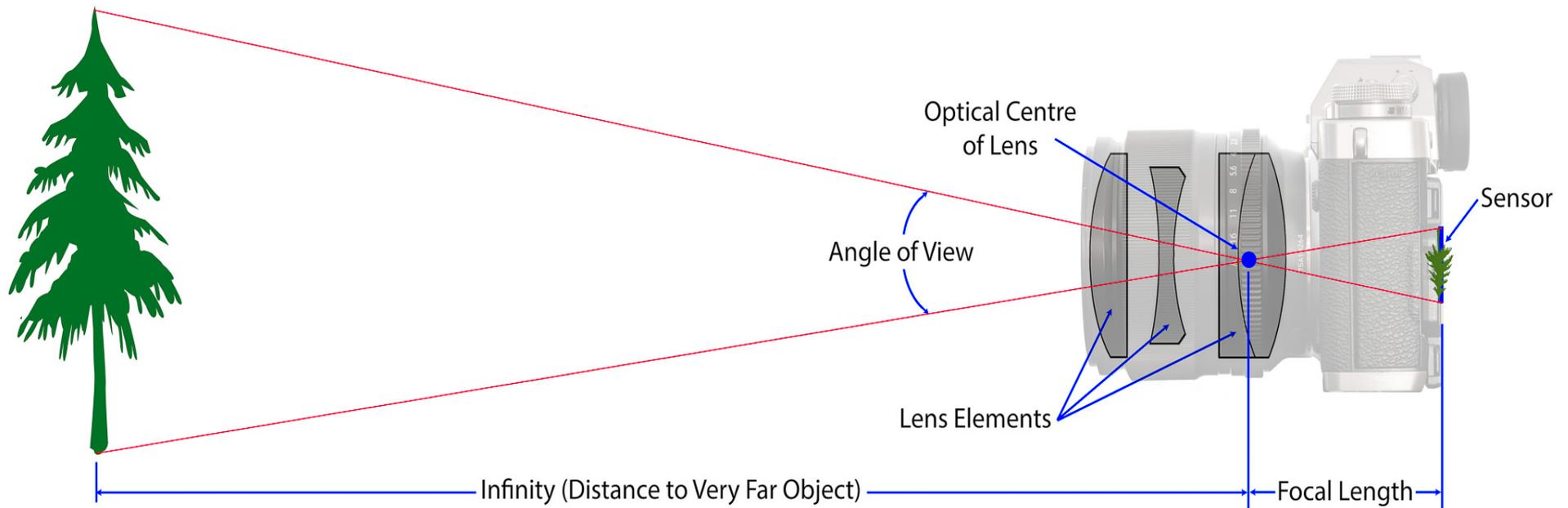
2/1/2022

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What Lenses Should I Buy?

Focal length

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



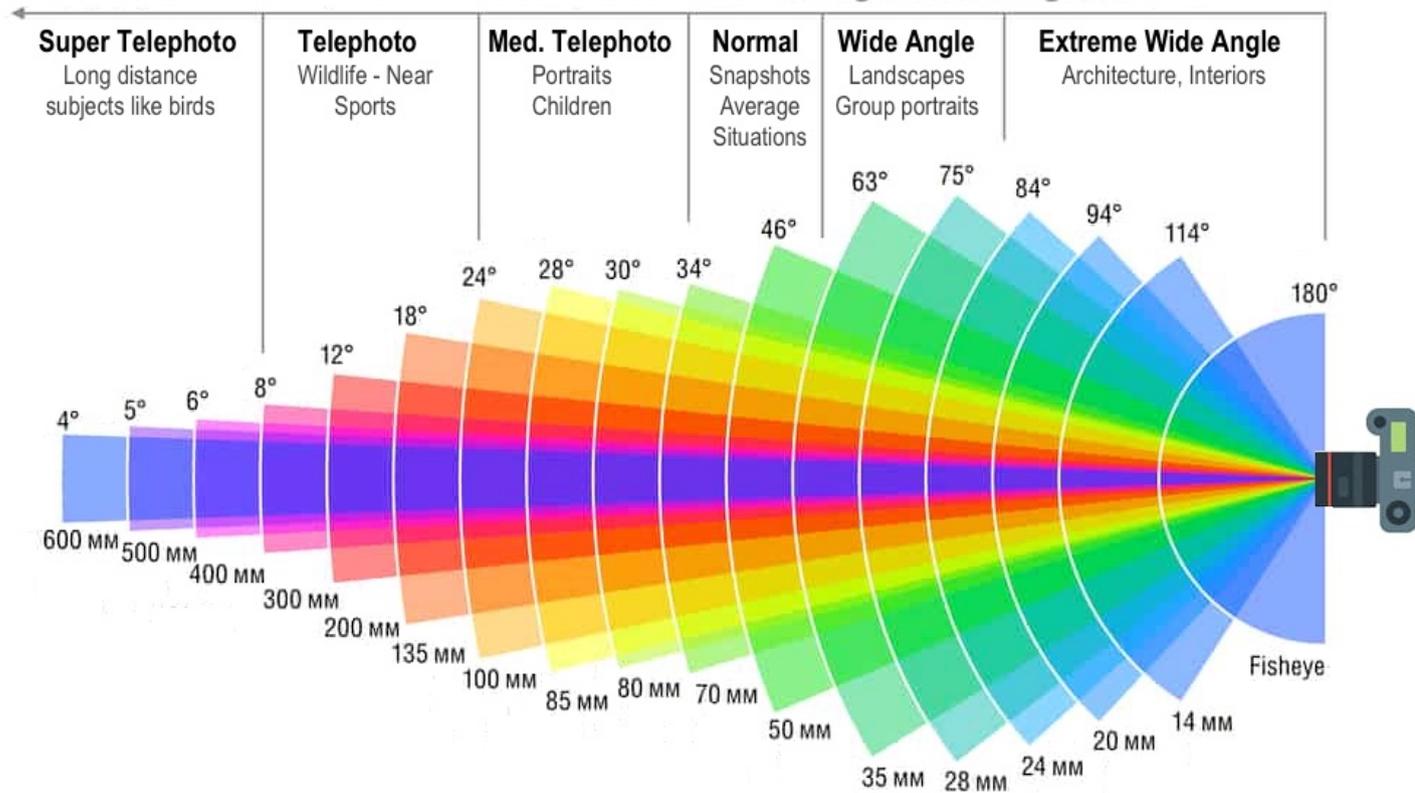
What Lenses Should I Buy?

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 LENGTH & angle of view guide



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 than 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?

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.

Basic kit

- **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, $f/2$ or $f/2.8$, \$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 ($f/2.8$) 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 → $1.4\times$ = \$500 or $2\times$ = \$600
 - Teleconverter tradeoff → $1.4\times$ adds 1 stop, $2\times$ adds 2 stops
 - Example → 135mm $f/2$ + $1.4\times$ 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?

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

What about 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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