

# SPORTS PHOTOGRAPHY

## Tools & Techniques

by Robert Berdan





# WHAT IS A SPORT?

A sport is an organized, competitive, entertaining, and skillful activity requiring commitment, strategy, and fair play, in which a winner can be defined by objective means. Generally speaking, a sport is a game based in physical athleticism. Non-competitive activities may also qualify, for example though jogging or playing catch are usually classified as forms of recreation, they may also be informally called "sports" due to their similarity to competitive games.

(Wikipedia)



# PARTIAL LIST OF SPORTS

Adventure Racing	Diving	Ice Skating	Sailing	Wrestling
Aquatics	Dodgeball	Jai Alai	Scuba Diving	Yoga
Archery	Dog sled racing	Judo	Shot Put	
Auto racing	Down Hill Skiing	Karate	Skateboarding	
Automobile Racing	Equestrian	Kayaking	Skating	
Badminton	Falconry	Kick Boxing	Skeleton	
Ballroom Dancing	Fencing	Lacrosse	Skiing	
Baseball	Field Hockey	Log Rolling	Sky Diving	
Basketball	Figure skating	Long Jump	Snow Boarding	
Beach Volleyball	Fishing	Luge	Snowboarding	
Biathlon	Footbag	Martial Arts	Snowmobiling	
Billiards	Football (American)	Mixed Martial Arts	Snowshoeing	
Boat Racing	Football (Australian)	Modern Pentathlon	Soccer	
Bobsledding	Football (Canadian)	Moto X	Softball	
Body Building	Football (International Rules)	Motor boat racing	Speed Skating	
Bowling	Free diving	Motorcycle Racing	Squash	
Boxing	Frisbee golf	Mountain Biking	Sumo Wrestling	
Bull Fighting	Golf	Mountaineering and Climbing	Surfing	
Camel Racing	Gymnastics	Orienteering	Swimming	
Canoeing	Hand ball	Paddling	Synchronized ice skating	
Canoe-Kayak Racing	Hang Gliding	Para Gliding	Synchronized swimming	
Caving	Heptathlon	Parachuting	Table Tennis	
Checkers	High Jump	Polo	Taekwondo	
Cheerleading	Hiking	Racewalking	Tennis	
Chess	Hockey	Racket ball	Track and Field	
Cricket	Horse racing	Rock Climbing	Triathlon	
Cross Country Running	Horseback Riding	Rodeo	Volleyball	
Cross Country Skiing	Horseshoes	Roller Skating	Wakeboarding	
Curling	Hot Air Ballooning	Rowing	Water Polo	
Cycling	Hunting	Rugby	Water Skiing	
Darts	Ice fishing	Running	Water Snorkling	
Decathlon		Rhythmic Gymnastics	Weight Lifting	



# PHOTO JOGGING

**Is it a Sport?**

**Watch Yes Man Trailer with Jim Carrey  
On YouTube**



# Professional Single Lens Reflex Cameras



**Nikon FM2 1982 Film**

**Canon 5D Digital and HD Video  
21 Megapixels - 2008**

**Nikon D700 12 Megapixels  
2008**



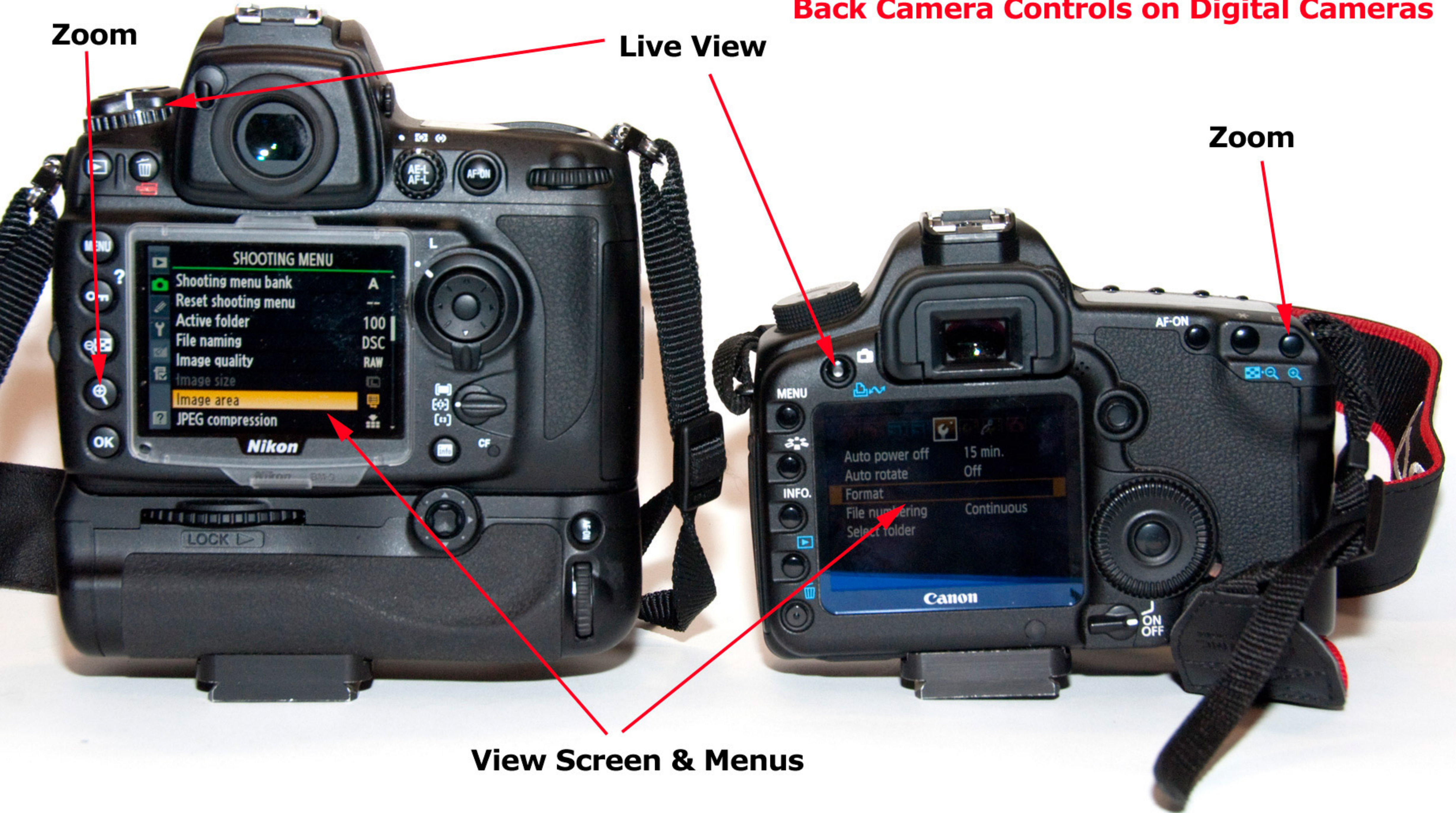
## Back Camera Controls on Digital Cameras

Zoom

Live View

Zoom

View Screen & Menus





**Manual\Auto Focus  
Switch**

**Shooting Mode**

**Hot Shoe for Flash**

**Aperture Control**

**Diopter lens correction**

**Exposure  
Compensation**





# Choose a Camera with a Fast Frame Rate



**8 Frames per second**



**7 Frames per second - 8 with  
additional lithium battery pack**





Lenses come in  
a variety of focal  
lengths:

12-35 mm  
wide angle

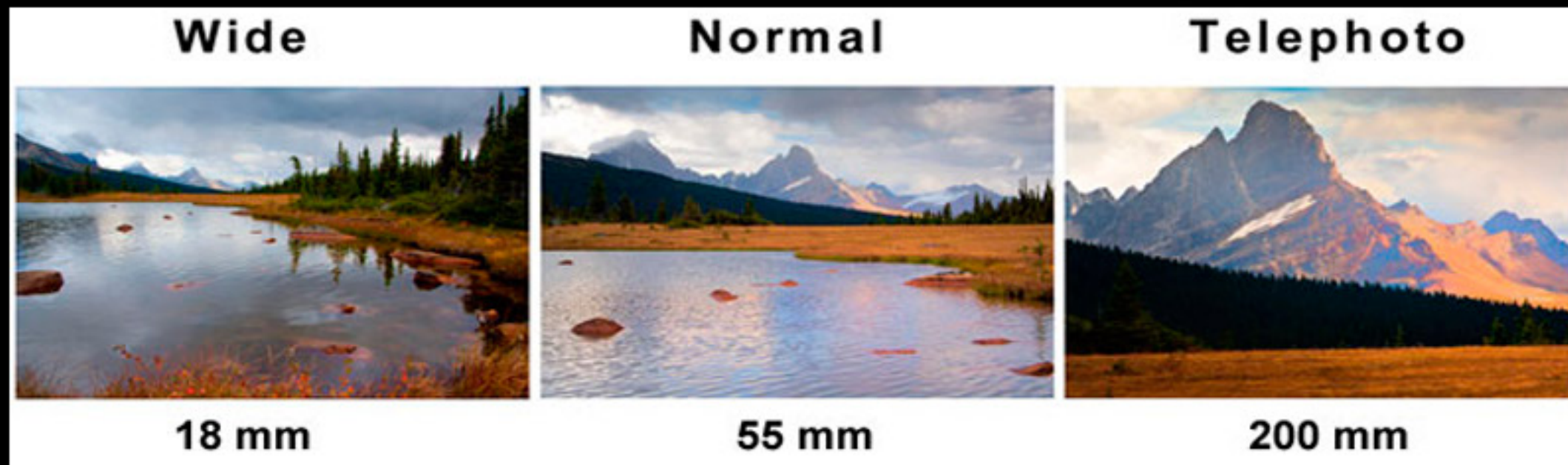
40-70 mm  
Normal perspective

70 - 1200 mm  
telephoto

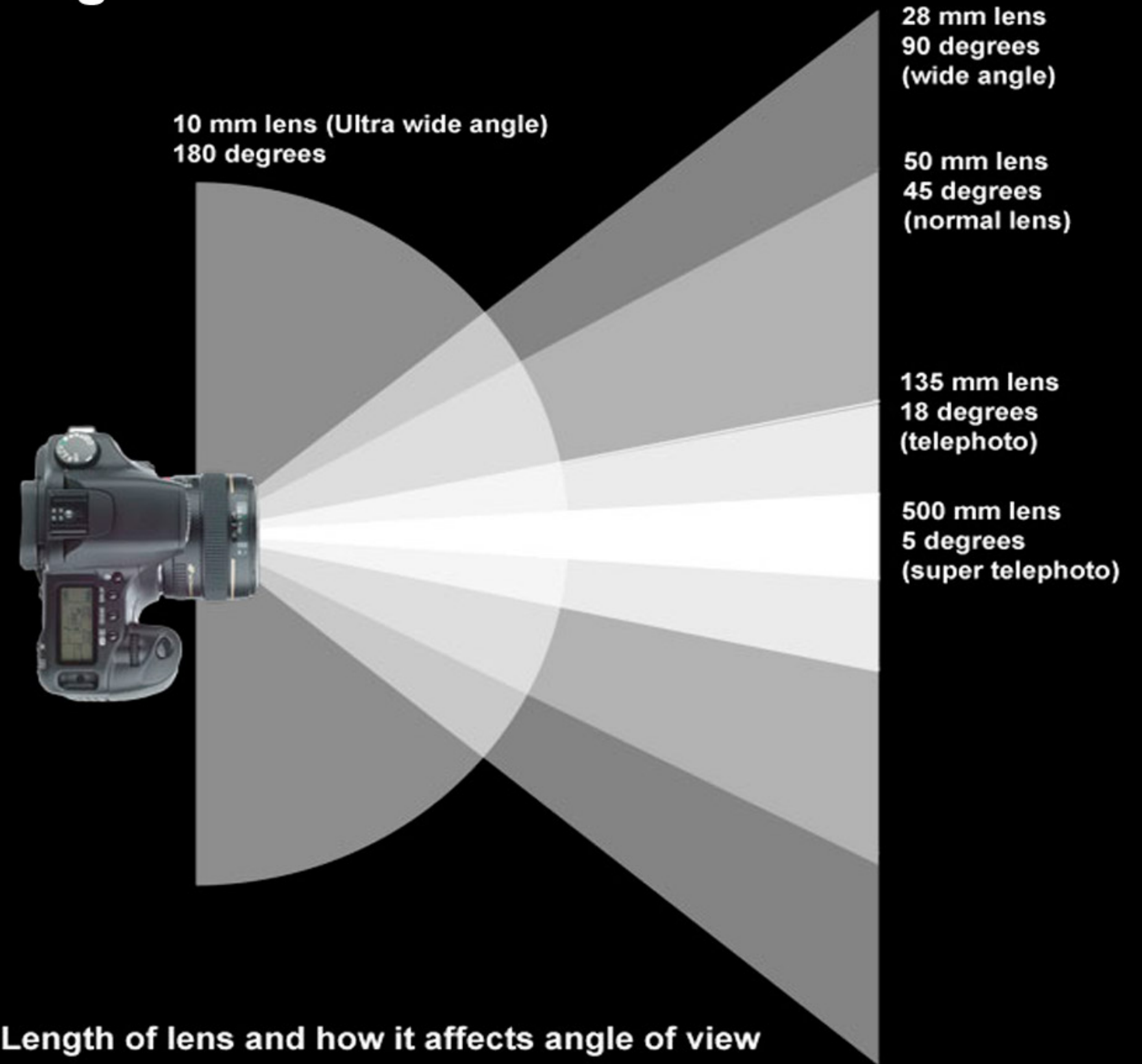
Macro lenses  
designed for  
close-up photography



# Focal Length affects magnification and angle of view



Focal Length of lens and how it affects angle of view





**18 mm F22**



**40 mm F22**



**120 mm F22**



**350 mm F22**





## WIDE ANGLE TO NORMAL LENSES



**16-35 mm F2.8**



**50 mm F1.4**




**24-105 mm F2.8**





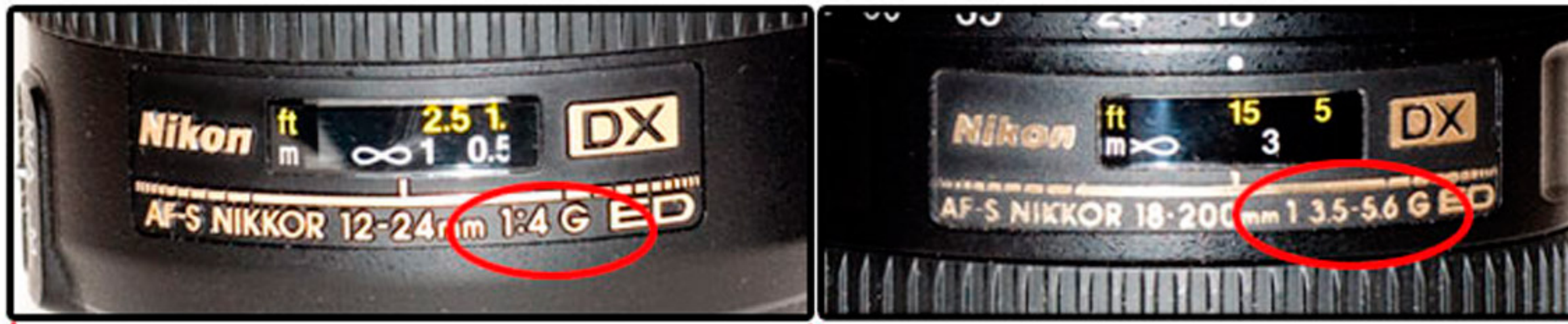
Ultra Wide Angle Lens 10 mm



A wide-angle photograph of a racetrack, likely taken with a 10 mm ultra-wide angle lens. The track is a light-colored asphalt surface with visible tire marks. In the center of the track is a large, circular grassy area. Several tall, thin light poles are positioned around the track. On the left side, there are red and white striped grandstands. On the right side, there are several race cars parked or moving. The horizon is curved, and the sky is blue with scattered white clouds. The text "10 mm Ultra wide angle lens" and "Note the curved horizon when its not positioned in the center of the frame" is overlaid on the bottom left of the image.

10 mm Ultra wide angle lens  
Note the curved horizon when  
its not positioned in the center of the frame





**F4 Lens  
Constant  
Aperture**



**18-200 mm Zoom Lens  
F3.5-5.6 - widest apture  
depends on focal length**



# INTERNAL VS EXTERNAL FOCUSING LENSES

70-200 mm telephoto lens - the lens length does not change when zooming or focusing



Macro lens - the barrel extends when focusing



**Internal focusing refers to a lens in which the movement of the optical elements takes place within the lens barrel and does not involve the movement of the barrel. IF the lens does not change in size during autofocus operation, this allows more compact, lightweight lenses capable of closer focusing distances.**



# Telephoto Lenses

Autofocus with vibration reduction or Image stabilization

Quick release  
plate

Tripod  
Collar

70-200mm F4  
~\$1600

70-200 mm F2.8  
~\$2000

300 mm F4  
~\$1600

300 mm F2.8  
~\$5500

Lens Hood

Prefocus button

VR On or Off

Focus Limiter

Manual or  
Auto Focus

Beep On or  
Off when in  
focus





# 400 mm F2.8 lens - Best Sports Lens?



400 mm F2.8 VR II ~ \$11,000.00



# Big Guns - 600 mm F4 Lenses



**Nikon**



**Canon**



## Super Telephoto Lenses



**1000-1200 mm zoom F5.6**



**1200 mm F5.6**

**Behave like a Telescope  
very narrow fields of view  
can only be used when the air  
is calm - cost \$20,000 or more,  
cheaper to buy a telescope and  
attach your camera e.g. 1500 mm F11**



# Teleconverters



**Nikon 2X**  
**- 2 F-stops**



**Nikon 1.7X**  
**-1.5 F-stop**



**Canon 1.4X**  
**-1 F-stop**



**Canon 2X**  
**-2 F-stops**



Some Telephoto Lenses Have a Focus Limiter - by reducing the focus-range you can speed up the autofocus performance in sports and wildlife photography.

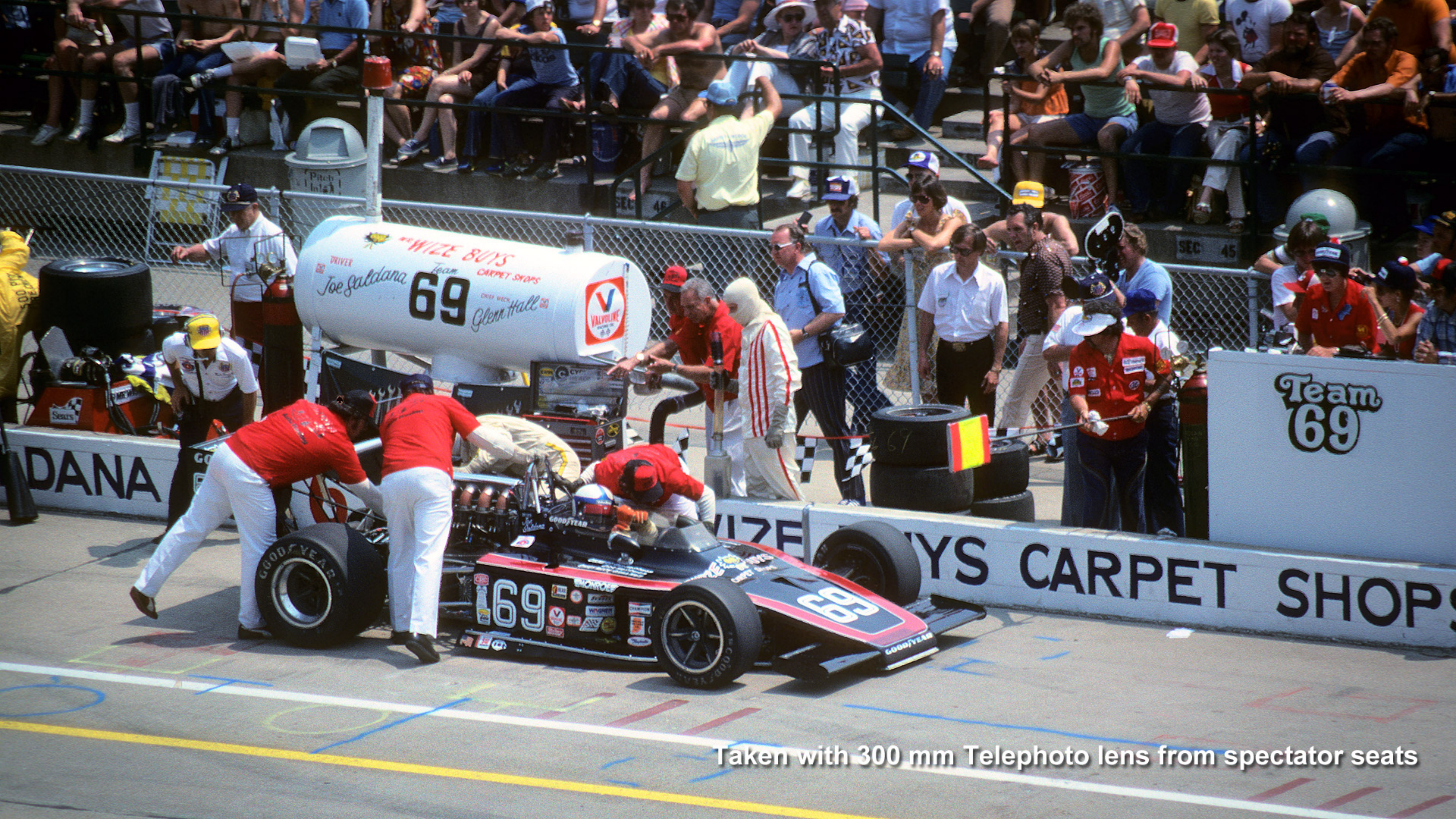




# **Best Lenses for Sports Photography**

- 1. Lenses should be Fast - i.e. F2.8 max aperture (F4 OK in bright light)**
- 2. Wide angle zoom lens 24-105 mm or normal lens e.g. 50 mm F1.4-1.8**
- 3. 70-200 mm F2.8 and 1.5 X Tele-converter - popular for most sports**
- 4. 300-400 mm F2.8 when you can't get close and you have the \$\$\$**
- 5. Telephoto lenses with autofocus, vibration reduction or Image stabilization are better than those without**
- 6. Quality of the lens glass and coatings will also reduce reflections and loss of contrast - use a lens hood at all times. New lenses include coatings on the back of the lens reducing reflections from the sensor**





Taken with 300 mm Telephoto lens from spectator seats





F2.8



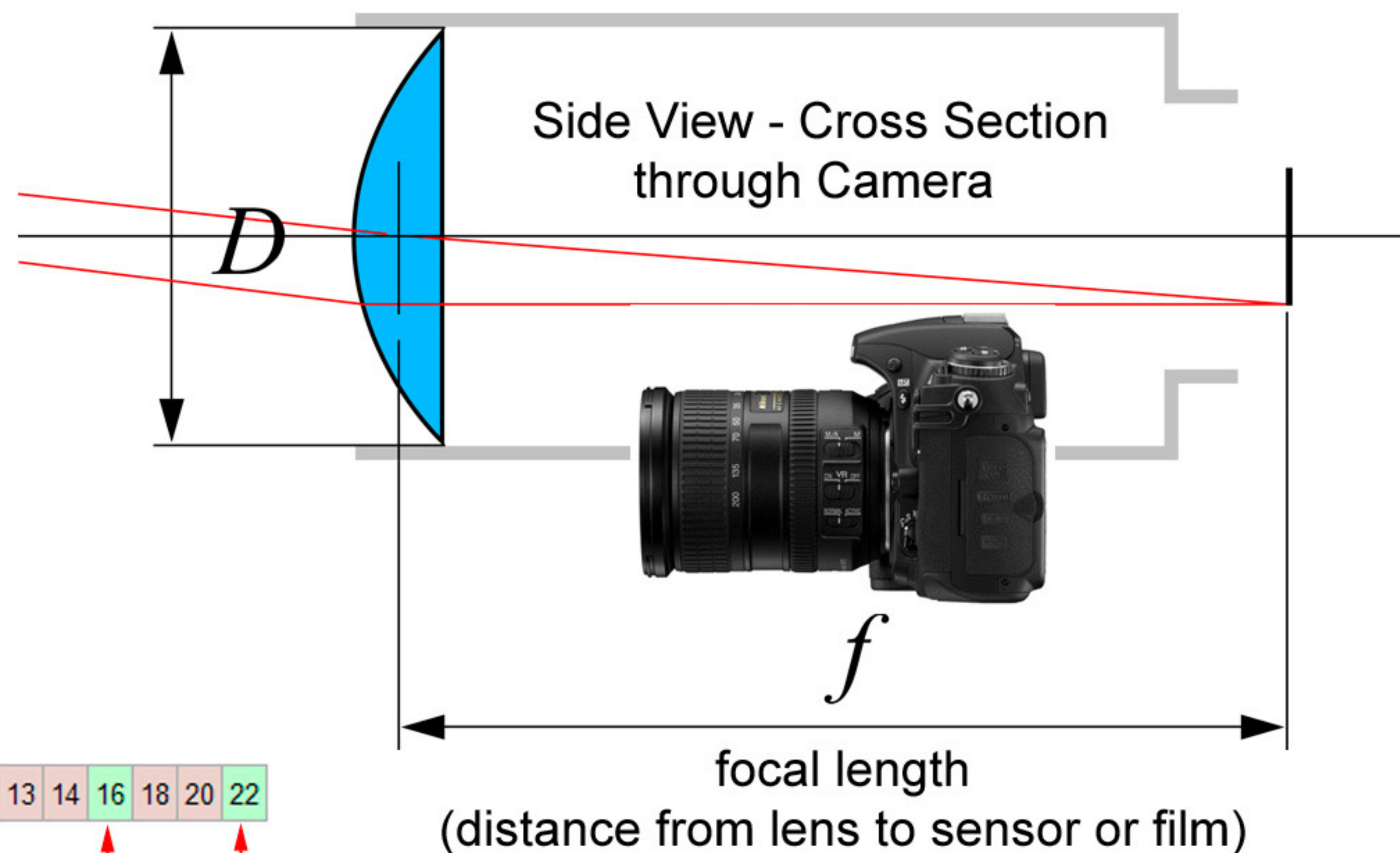
F16



# F - stops Control the Amount of Light and Depth of Field



D - lens opening or diameter controlled by Aperture



Typical one-third-stop f-number scale

<i>f</i> /#	1.0	1.1	1.2	1.4	1.6	1.8	2	2.2	2.5	2.8	3.2	3.5	4	4.5	5.0	5.6	6.3	7.1	8	9	10	11	13	14	16	18	20	22
	↑			↑			↑			↑			↑			↑			↑			↑			↑			↑
	1\1000			1\500			1\250			1\125			1\60			1\30			1\15			1\8			1\4			1\2 s

Each F-stop is equivalent to a 50% difference in light or one shutter speed - change the F-stop you must change the shutter speed and vice versa

$$\text{F - stop (ratio)} = \frac{\text{Focal Length}}{\text{Lens Aperture (Diameter)}}$$



# Autofocus Settings & Drive Modes

- S** - single servo focuses when the shutter is pressed half way, camera will not permit you to shoot unless subject is in focus.
- C** - continuous servo focuses continuously when shutter is pressed half way - release priority - means it will shoot even if subject is not in focus.
- M** - manual focus - use this method if camera can not focus on subject, e.g. if F-stop of lens exceeds F5.6 or subject low in contrast.

**Self Timer** - use to reduce shake or take self portraits

## Moving Subjects

Nikon - use Dynamic Area autofocus to track moving subjects.

Canon - use AI Servo focuses continuously while shutter button is held down.





# TRAP FOCUS

This is a technique where you set your camera to focus on a particular spot and when the subject enters the point of focus the camera fires. It can be useful for sports and wildlife photography. It can only be done by some SLR cameras and the settings vary on different camera models. Check your manual or the web for instructions on how to set Trap Focus with your camera.

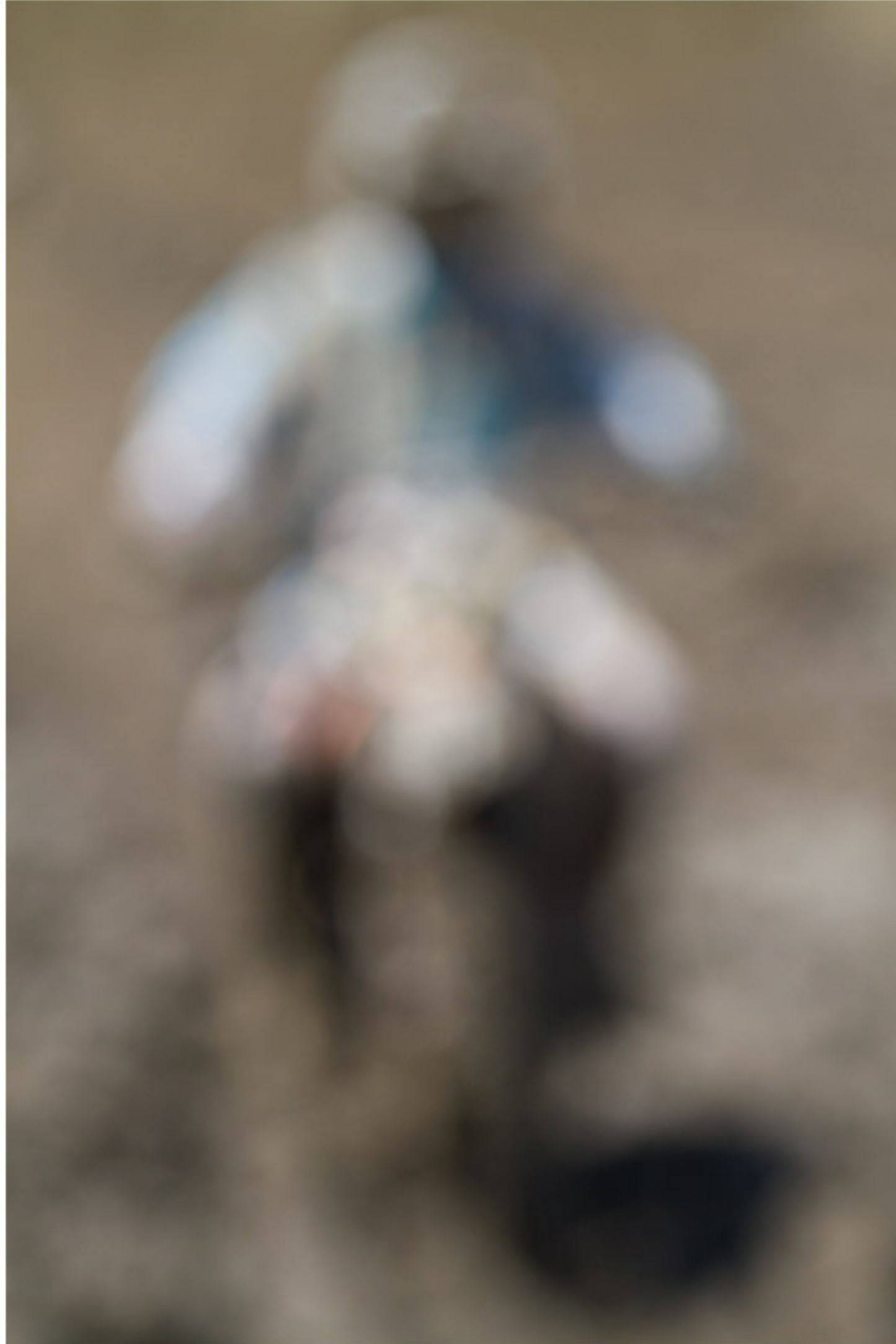
## Basic Trap Focus Set Up

1. Set Camera to AF-S mode single shot and lens to Autofocus mode
2. Set Camera AF mode to Single spot focus mode and select the centre point
3. Press AE-L/AF-ON button while pointing at the “Trap” spot - you need a subject in position to focus on
4. Press the shutter button down and wait until a new subject enters the frame at the “Trap spot”
5. The Camera should fire when the subject enters the focus point or “Trap”

Some Cameras can't do Focus Trap (e.g. Canon 7D). Alternatively there are devices that use infrared beams to trigger a camera to fire when the subject breaks the beam that are sometimes used in sports and wildlife photography.



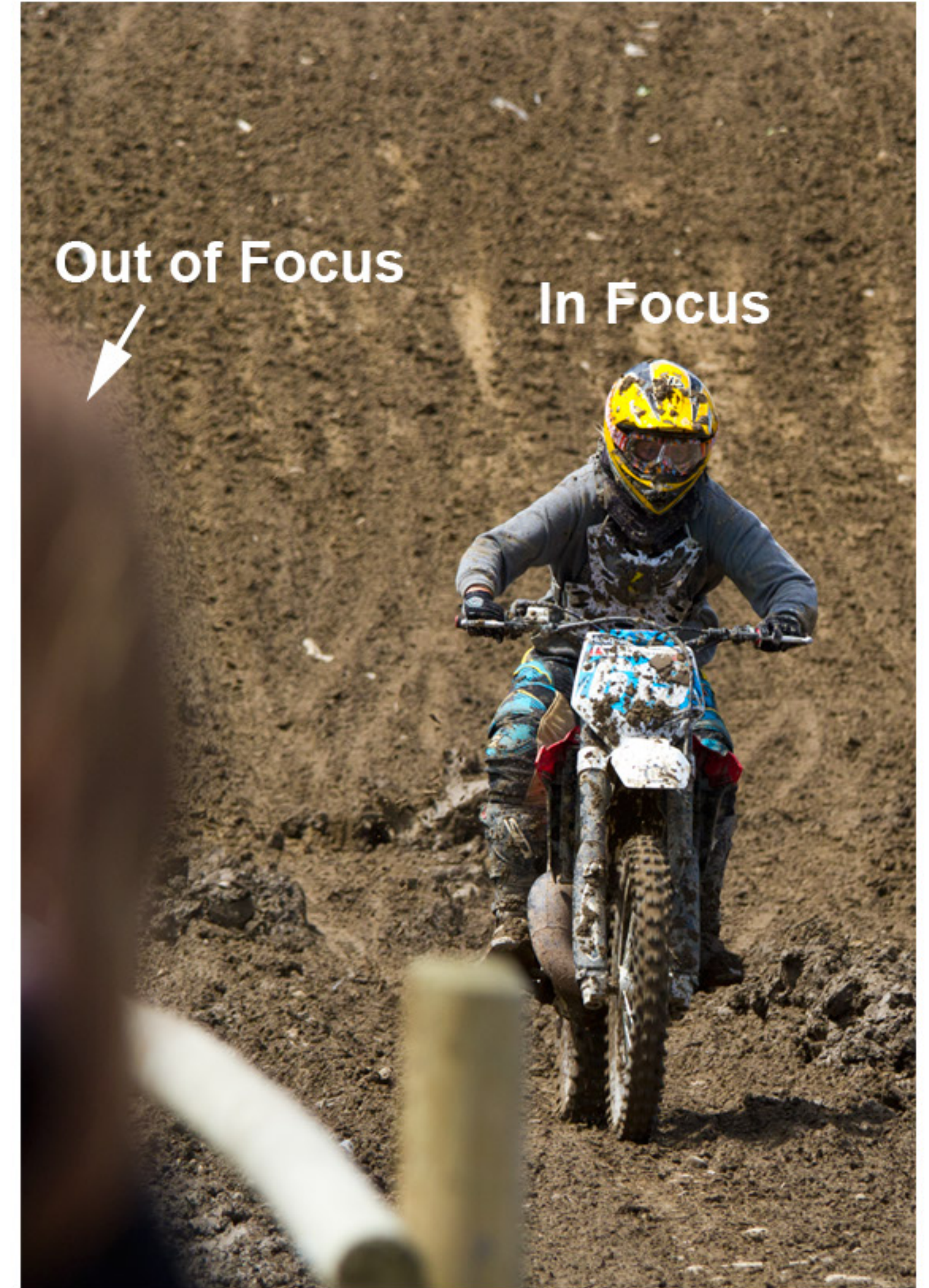
# POINTS OF FOCUS



**Out of Focus**



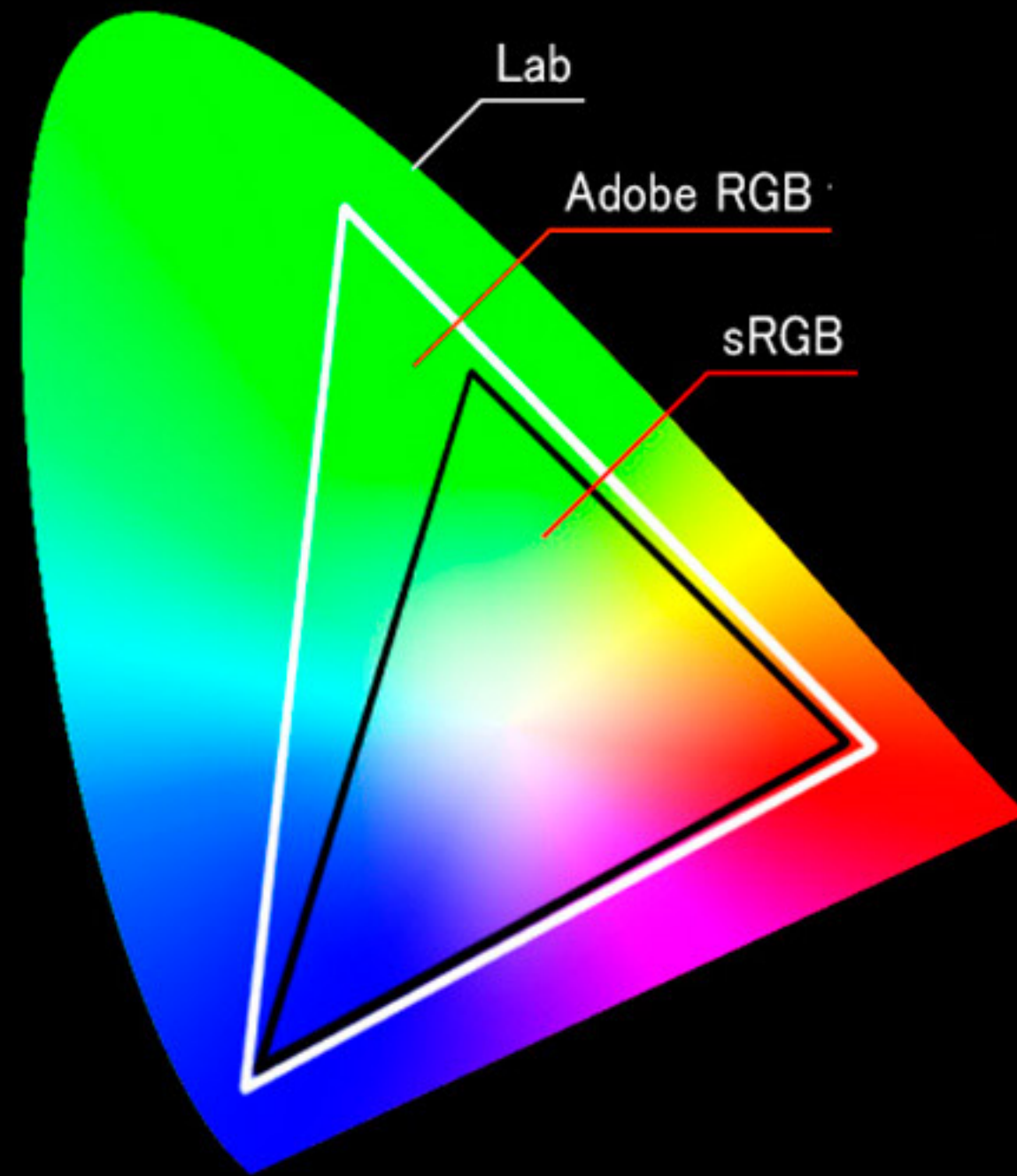
**Follow Focus**



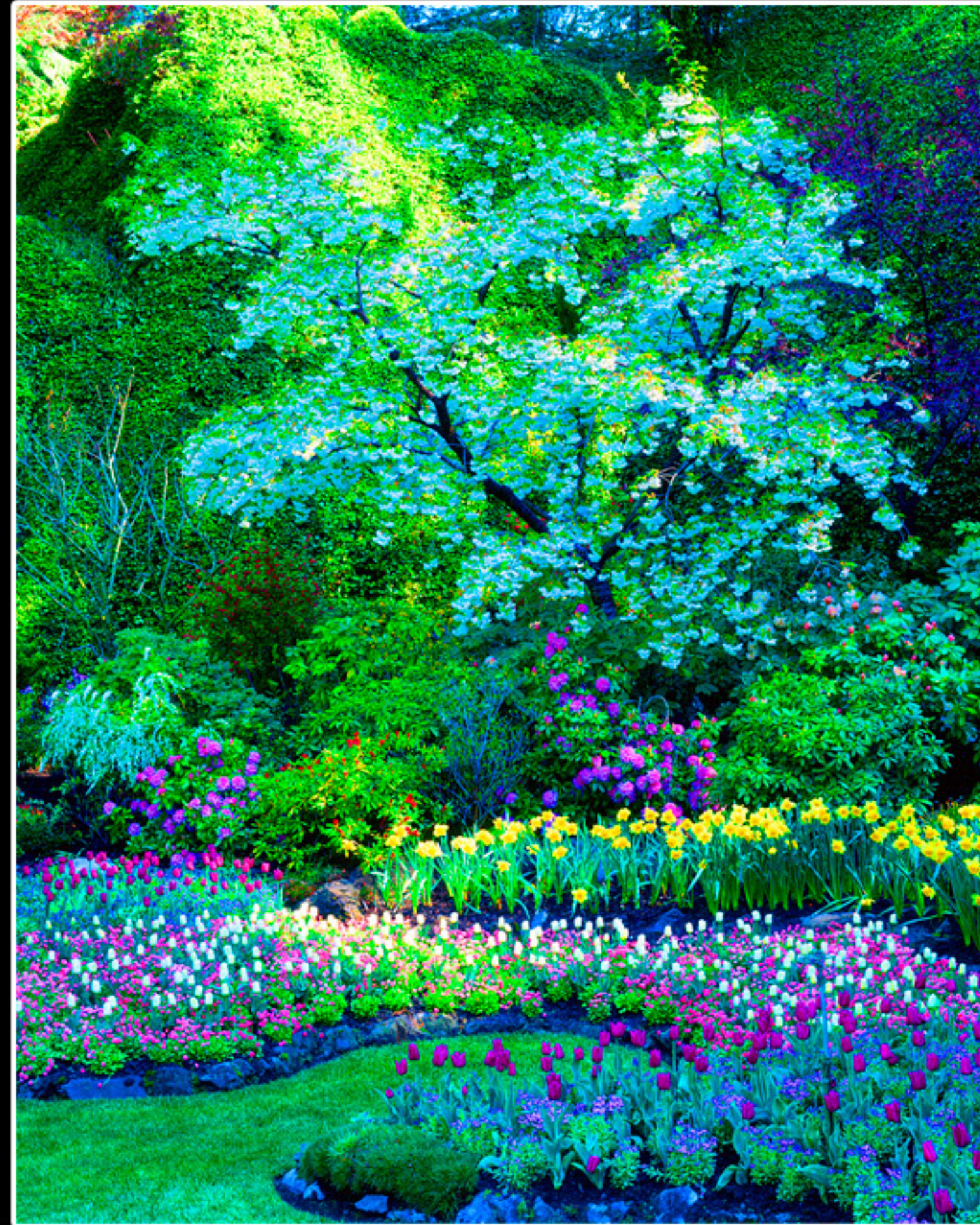
**Selective Focus**



# Color Space

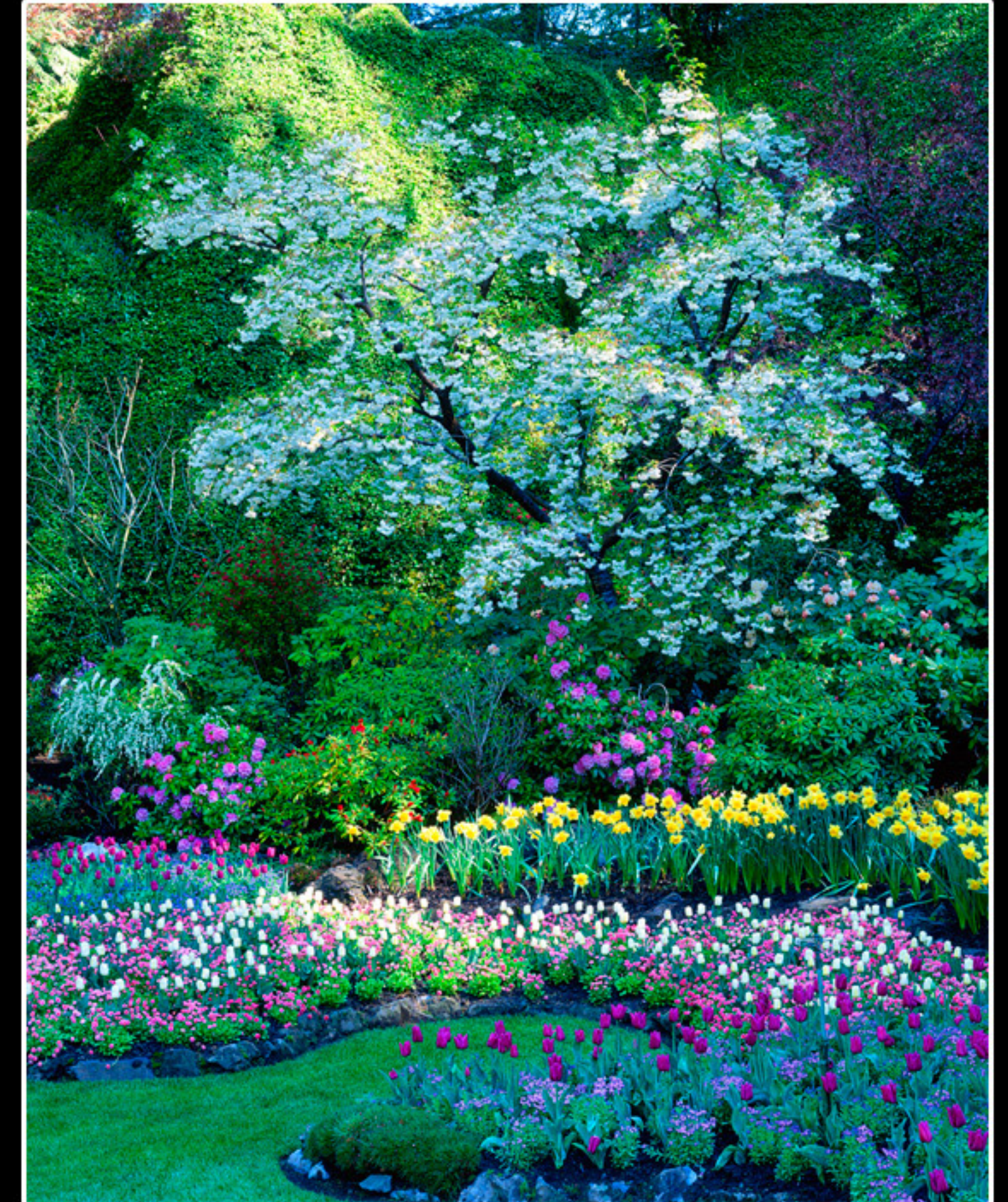


**LAB - range of colors  
average person can see**



**sRGB**

**Best for Web, printing with  
no post processing**



**Adobe RGB**

**Best for shooting RAW Files  
Postprocessing images**



# Camera File Types

	JPEG (.jpg)	RAW
.jpg	Processed in camera	Requires post processing in software
.tif	8 bit color or 256 shades of RGB	12-14 bit color – 4096 to 16,384 shades of RGB - i.e. more and better colors
RAW	Smaller File Size (S, M, L) camera can shoot sequence of images faster (higher burst rate).	Some cameras offer different size RAW files, and or compressed RAW
RAW compressed	White balance must be set correctly	White balance can be modified during post processing
	Enlargement limited to about 25%	Can recover “some” blown out highlights
	Can embed files in email or web page	Exposure can be altered during post Processing +/- 2-3 F-stops (no need to bracket exposures)
	Can be opened in most software and viewed directly on computer	Can enlarge images 100% or more
	nonproprietary file format	Wider dynamic range, approx 2 F-stops
		File size is large and writes to storage medium slower than .jpg– slower burst rate
		Many proprietary file types – often requires software updates or conversion to .DNG

**\*RAW is best for quality and flexibility though it requires post processing with computer and software - processed images best stored as .tif files (keep your RAW files).**





**Raw File after Processing in Photoshop**



**Raw File Unprocessed - Flat**



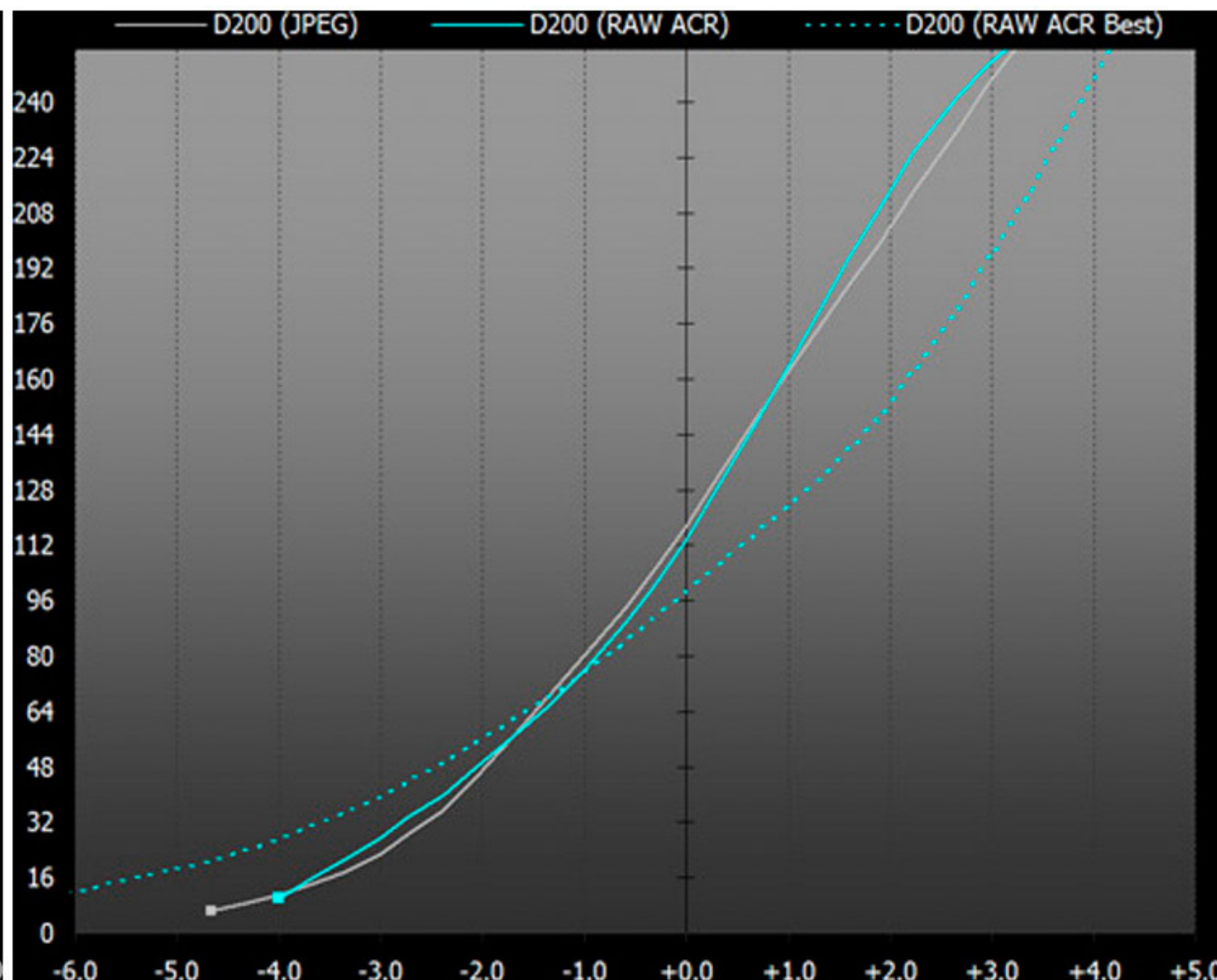
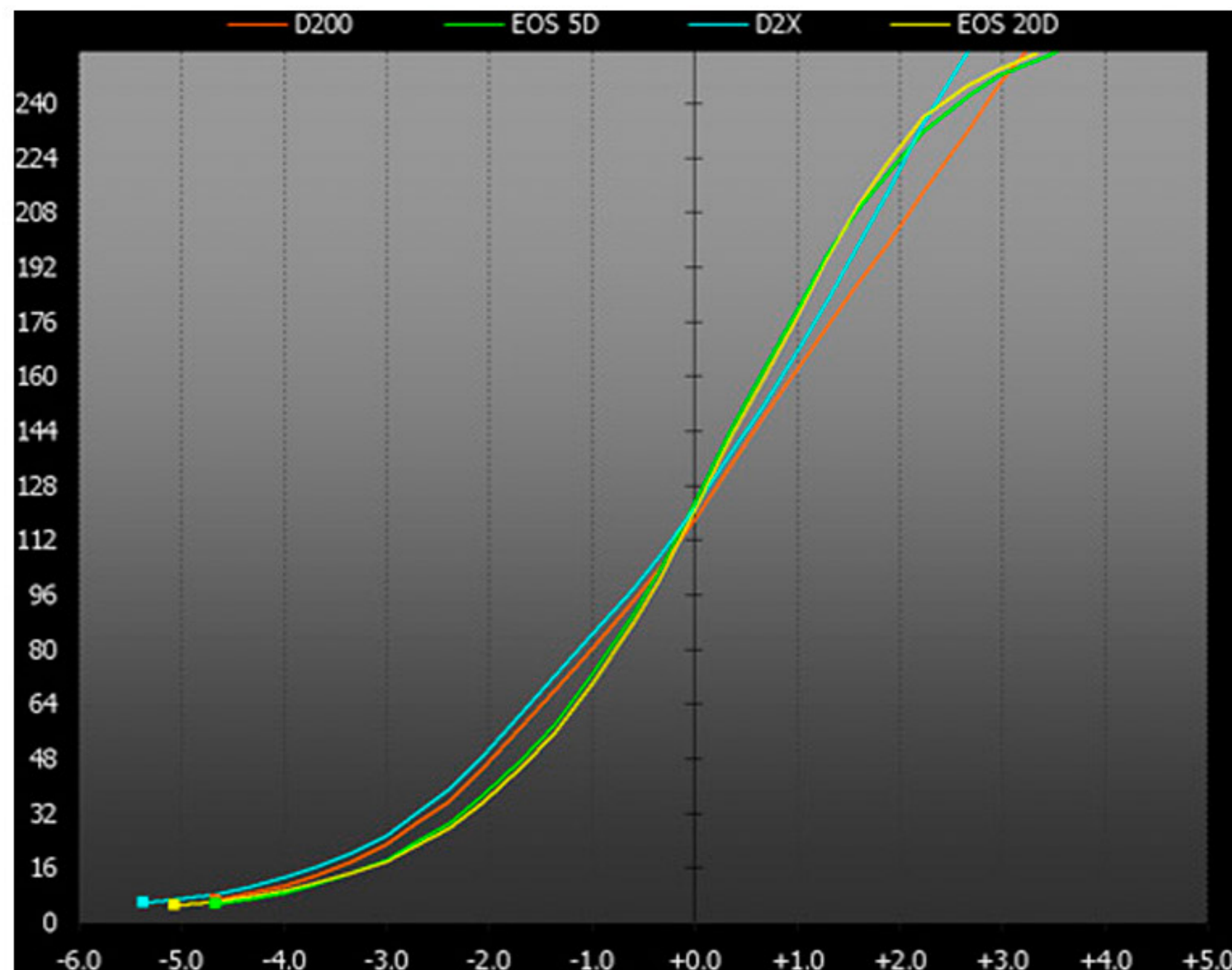
# Measuring Digital Camera Dynamic Range

Dynamic Range measurement system involves shooting a calibrated Stouffer Step Wedge

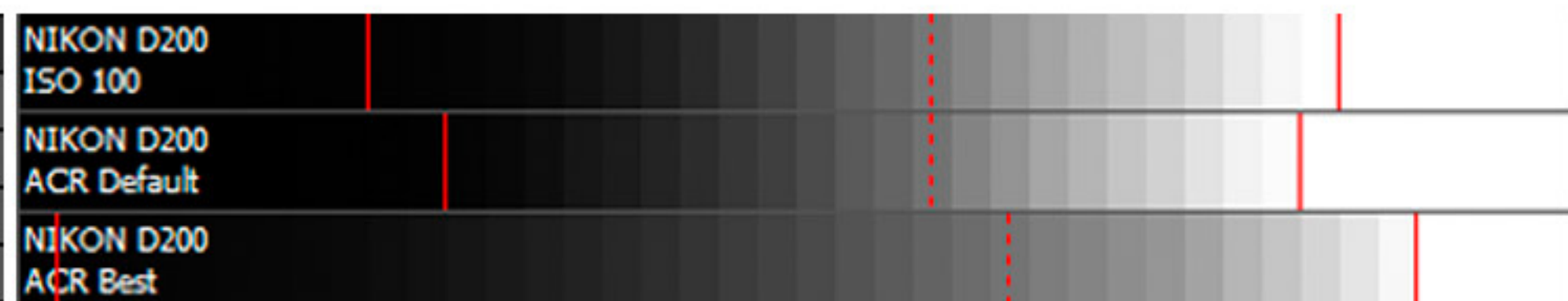
modified from [www.dpreview.com](http://www.dpreview.com)



**SHOOTING IN RAW CAN  
EXTEND the Dynamic Range from  
8.5 to approx. 11 F-stops**



Camera (ISO 100)	Shadow range	Highlight range	Usable range
Nikon D200	-5.0 EV	3.2 EV	8.2 EV
Canon EOS 5D	-4.7 EV	3.5 EV	8.2 EV
Nikon D2X	-5.5 EV	2.7 EV	8.2 EV
Canon EOS 20D	-5.1 EV	3.4 EV	8.4 EV





# Digital Camera Simulated ISO Speed



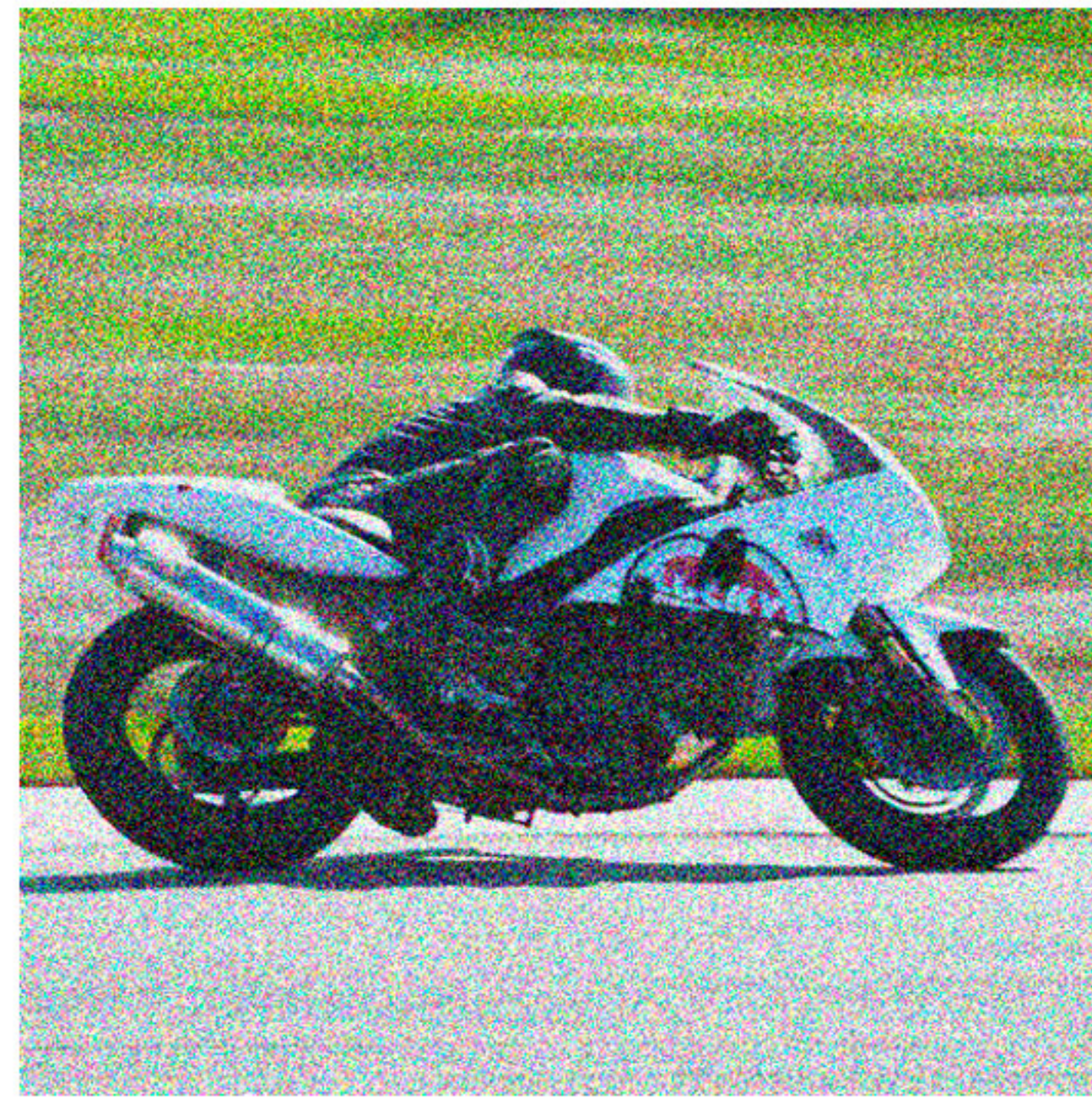
**ISO 200**

Daylight, sunny, light overcast



**ISO 1600**

Low Light - Morning, Dusk, Heavy Cloud,  
whenever you need faster shutter speed



**ISO 25000**

Very Low Light, before sunrise after sunset

**Note:** actual amount of Noise varies with digital camera chip size, camera model, and noise reduction settings, always try to use the lowest ISO speed possible as it is difficult to reduce noise in existing images.



# White Balance



Sunlight



Cloudy\Overcast



Shade



Fluorescent



Tungsten



Flash



Custom



Cool 9000 K



Normal 6500 K



Warm 3500 K





Standard



Vivid



Black & White



Sepia

Always shoot in Color and then convert to BW or Monotone image in Photoshop for maxium control



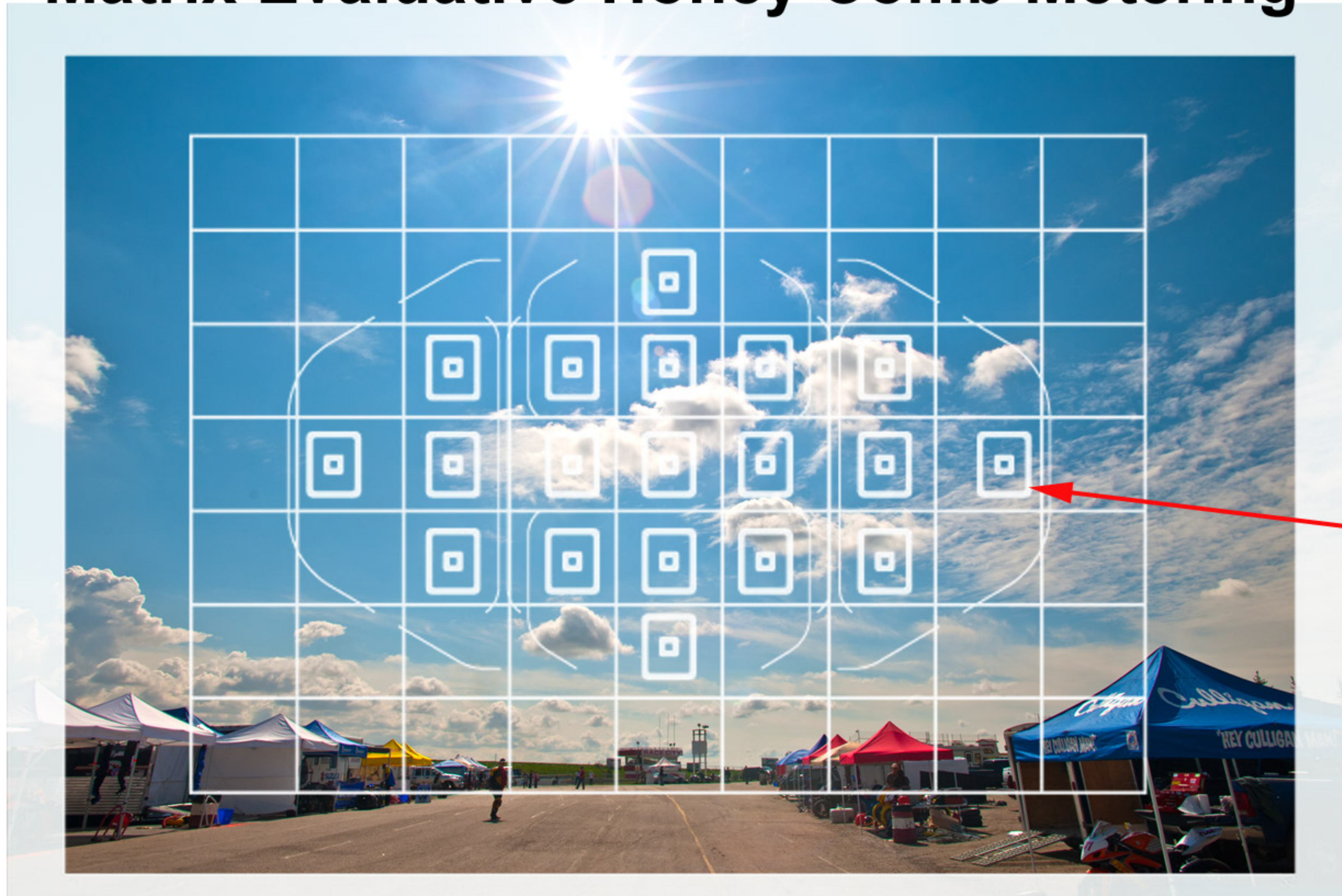
Center Weighted Metering

Spot Metering





# Matrix Evaluative Honey Comb Metering



Focus Points

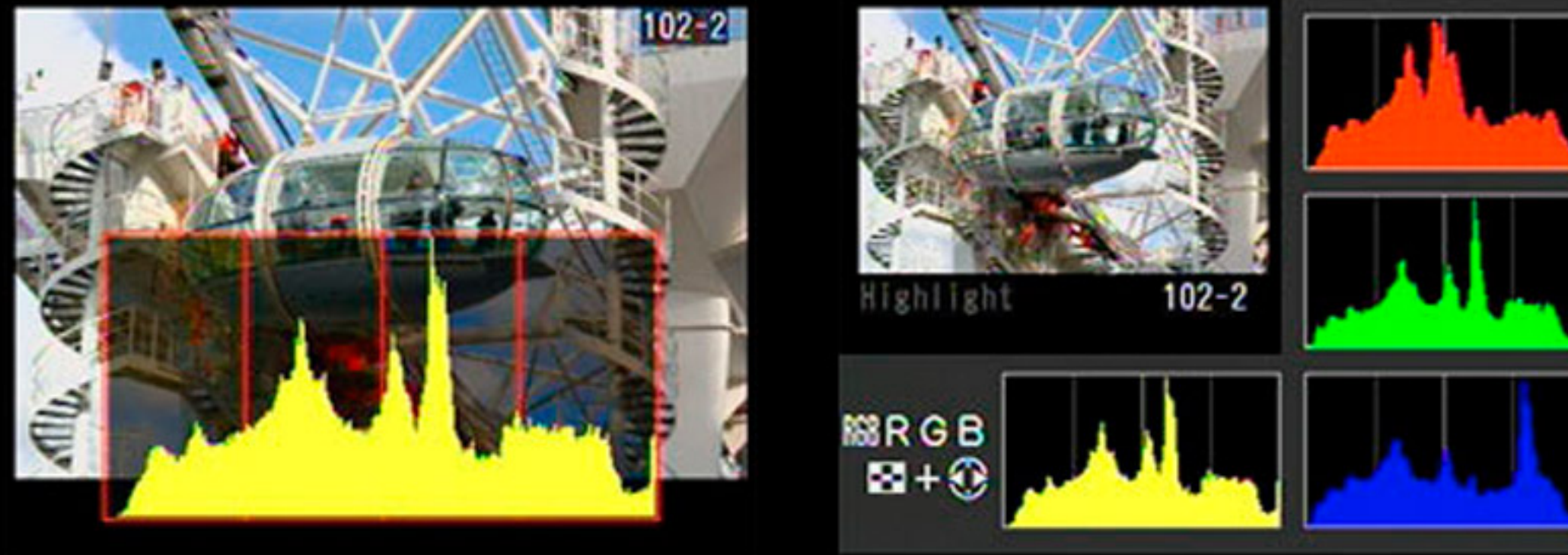
Canon 7D pattern



## Metering Symbols



# Use the Histogram Function to Determine Exposure with Digital Cameras





# Exposure Compensation

Permits overriding the camera meter and lighten (overexpose) or darken (underexpose) the picture.

-2\3 Exposure



Normal Exposure



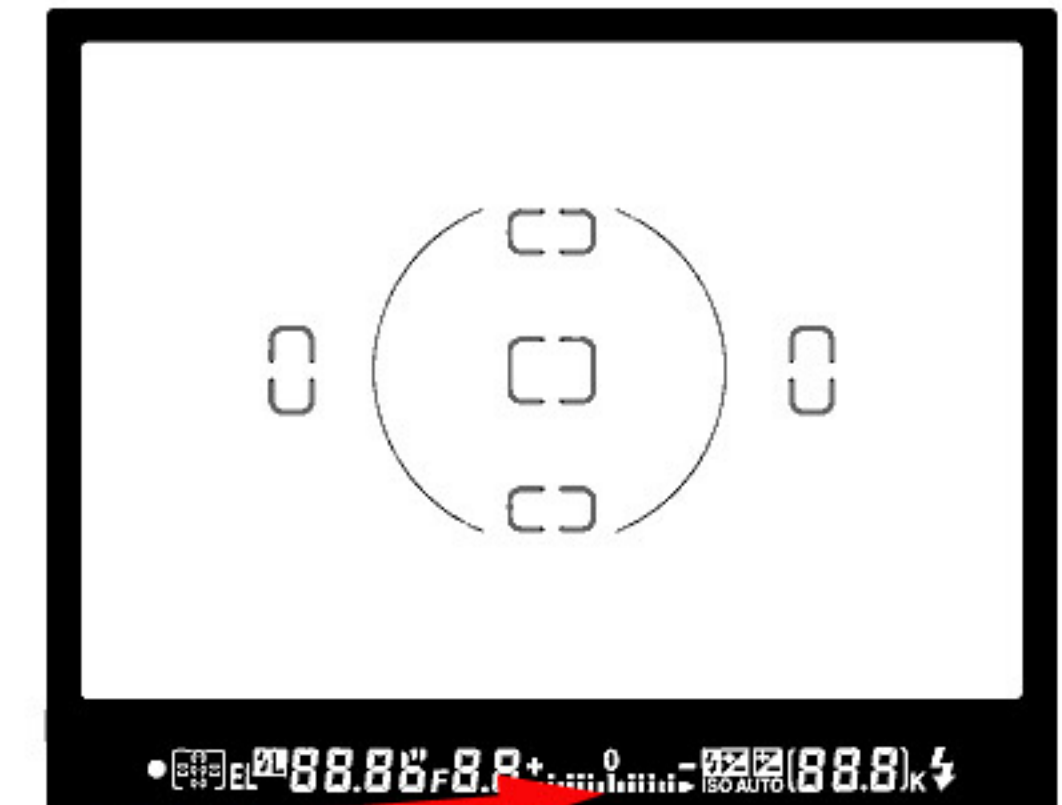
+2\3 Exposure



**EV  
button**



**EV Value**





# Filters for Sports Photography



**No Polarizer**



**With Polarizer lose  
2 shutter speeds**

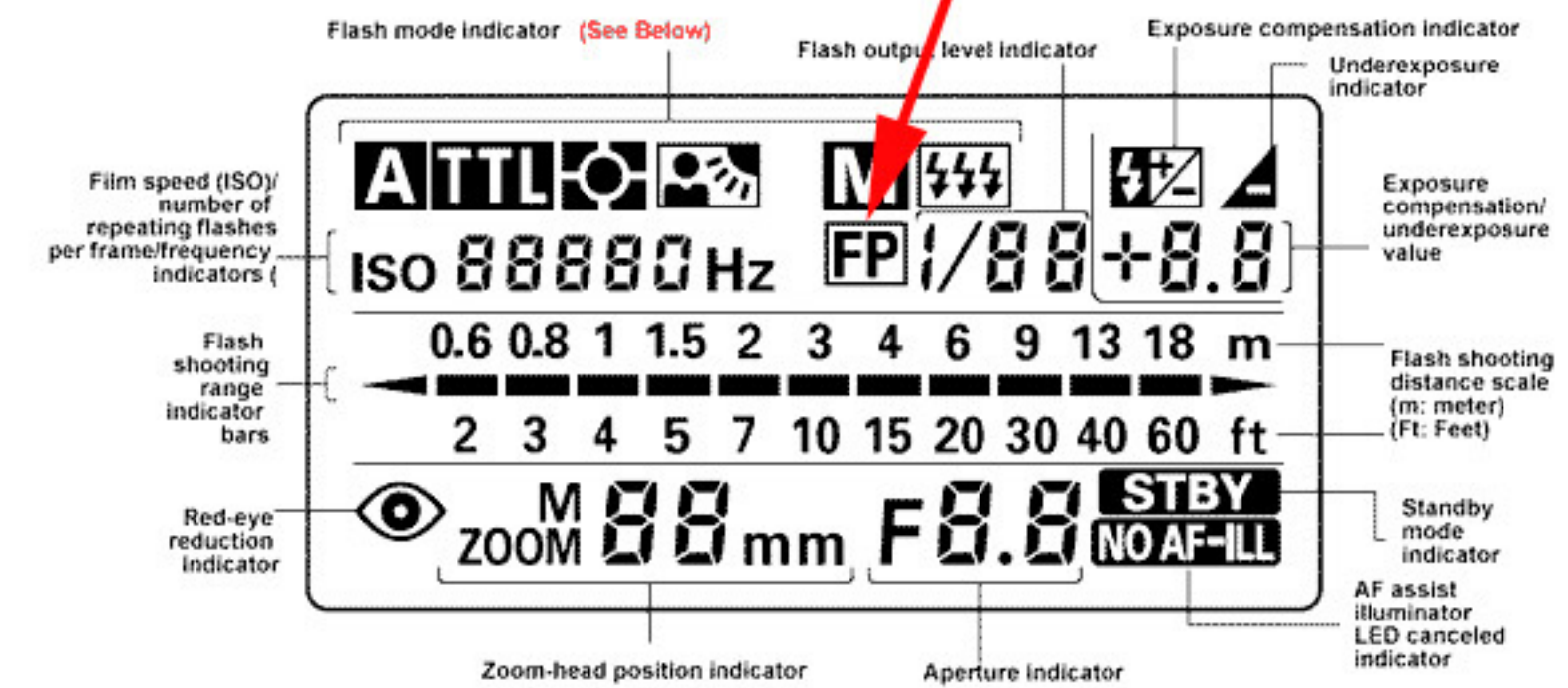
**Generally we do not use filters with DSLR for sports except if you might expose the lens to rain, salt water or sand spray - then use UV filter to protect it. You can use a polarizer or ND filter to lengthen exposure or for out door sports that may not require really fast exposures. For indoor lighting be sure to adjust your white balance or modify RAW files during post processing in photoshop.**



# Using Your Flash



FP Nikon's high speed sync



Guide number (ISO 100, m/ft)

Flash output level	Zoom-head position							
	18mm	20mm	24mm	28mm	35mm	50mm	70mm	85mm
1/1 (full)	18/59	20/66	30/98	32/105	36/118	42/138	48/157	50/164
1/2	12.7/42	14/46	21/69	22.5/74	25.5/84	30/98	34/112	36/118
1/4	9/30	10/33	15/49	16/53	18/59	21/69	24/79	25/82
1/8	6.4/21	7/23	10.5/35	11.3/37	12.7/42	15/49	17/56	18/59
1/16	4.5/15	5/16	7.5/25	8/26	9/30	10.5/35	12/39	12.7/42
1/32	3.2/10	3.5/11	5.3/17	5.7/19	6.4/21	7.5/25	8.5/28	9/30
1/64	2.3/8	2.5/8	3.8/13	4/13	4.5/15	5.3/17	6.0/20	6.3/21

Guide Number =  $\frac{\text{distance} \times \text{F-stop}}{(\text{ISO Sensitivity Factor})}$

ISO Sensitivity Factor  
ISO 100 = 1X, 400 = 2X; 800 2.8X



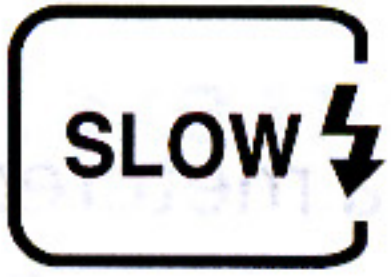
# Flash Modes

## Flash Modes



Front-curtain  
sync

Recommended for most situations. Shutter speed usually set between  $1/250$  and  $1/60$  sec. Some Cameras and flash units allow higher speed shutter synchronization (FP flash e.g. Nikon D300 and D700 cameras). When using this mode in low light - the background tends to be dark or turn black.



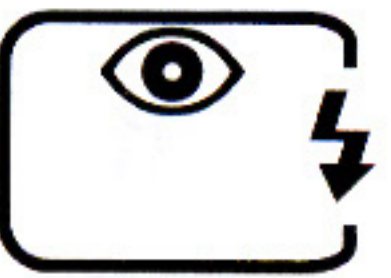
Slow sync

Flash is combined with shutter speeds as slow as 30 seconds. This allows ambient light to be part of the picture. In order to use this mode in shutter speeds less than  $1/15$  sec you will need to place your camera on a solid support like a tripod.



Rear-curtain sync

The flash fires just before the shutter curtain closes and with moving subjects and lights, the light streams behind the subject.

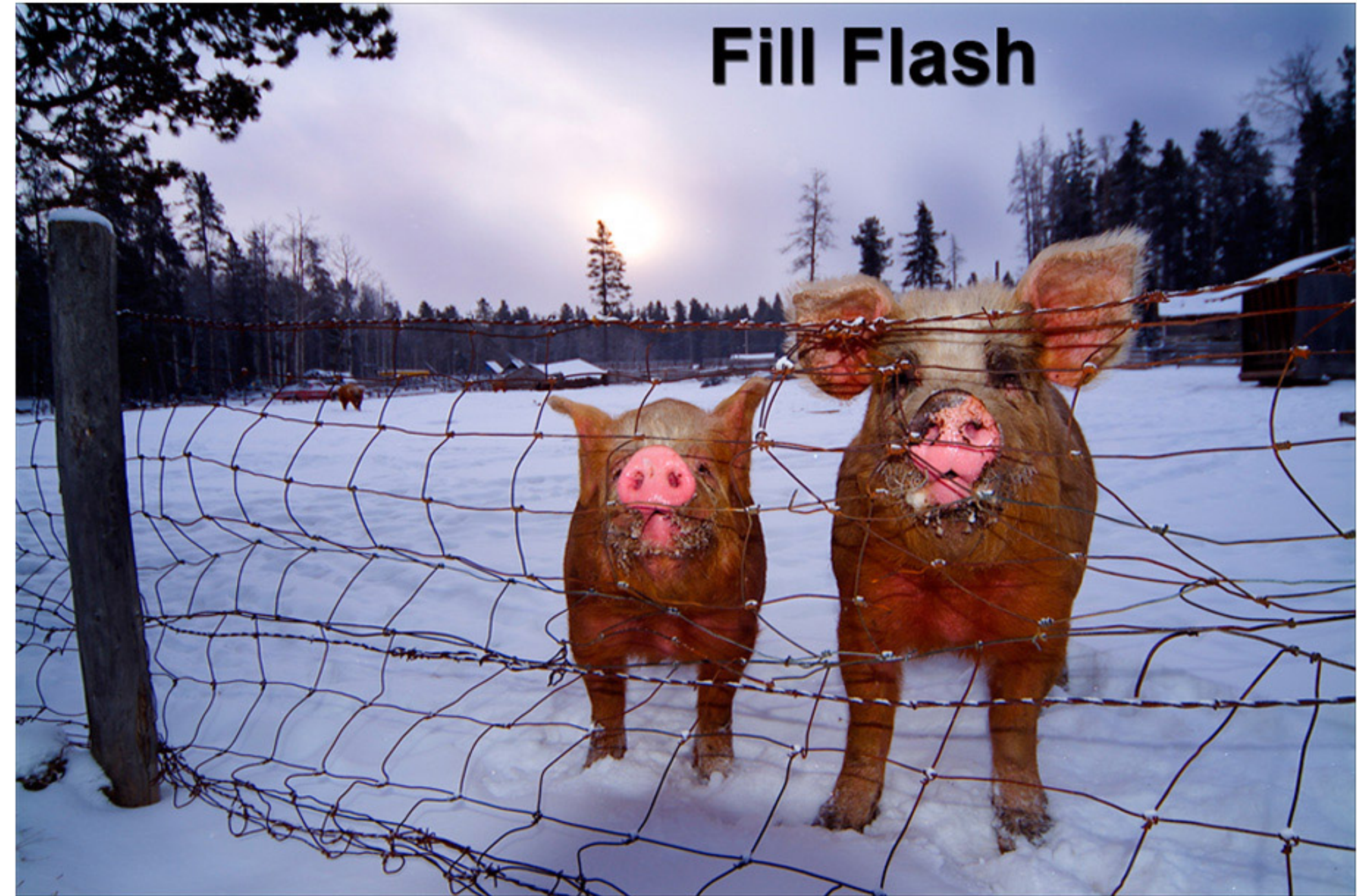


Red-eye  
reduction

The flash fires a burst of low intensity flashes about 1 sec before the main flash fires. This is used primarily in low light and with a built in camera flash. If a flash is moved away from the axis of the lens i.e. above or to one side of the camera, red eye reduction is rarely required. Red eye can also be easily fixed in most image editing programs.



# Using your Camera Flash with Backlighting





**Shooting into the Sun  
and using a Fill Flash**





Group Photo using Fill Flash





# **Choosing a Shutter Speed**

- 1. To stop fast action you will need 1\500 sec or faster.**
- 2. For panning try 1\15 to 1\125 sec, use slower shutter speeds with shorter focal length lenses.**
- 3. The best shutter speed will also depend on the ISO speed start with a slow ISO speed of 100-400 for fine grained images.**
- 4. Experiment with really slow shutter speeds i.e. longer than 1\15 sec to create impressionistic images.**
- 5. Experiment and try both slow and fast shutter speeds to get the effect you want**





**1/30 Second**





1/1000 Second - stops action





1/60 Second Pan









300mm F2.8 1\1000 sec





630 mm F3.2 ISO 1600 1/6400 sec





 **MORGAN STANLEY**







All Ontario High School Pole Vault Championships 1972





300mm F16 1\30 sec







**When Panning - follow the action with your lens and shoot with a “relatively” slow shutter speed - experiment as the best shutter speed to use will depend on how fast the subject is moving.**



**Start with:  
1\15, 1\30, 1\60 up to  
1\500 sec for really  
fast moving subjects.**





1\2 sec exposure Creates impressionistic image





Monopods are good for  
photographing birds and fast  
moving subjects



# Choosing a Tripod and Head



Carbon fiber construction  
legs should go flat to the ground  
legs should have rubber grips  
No center post or remove existing one  
Rubber tipped feet with metal points  
Legs should not lock up when wet



3 - geared head good  
for slow deliberate  
compositions - landscapes



Really right stuff Ball Head  
Quick release - arca swiss  
plates



Wimberly for  
Large Telephoto  
Lenses



# Carrying your Camera Gear





Shooting in the Rain





**Simple way to rain-proof your camera - attach clear plastic using electricians tape - alternatively use rubber bands.**



**Front and back are left open**





**Some sports are not competitive - but still dangerous**





Plastic waterproof cases that float are ideal for out door sports such as Kayaking or shooting in wet weather.



Women's World Soccer Championships Germany  
2011

Sports Photographers

ke.believe

3D

SONY

SONY

ke.believe

SONY

ke.believe

Remote Cameras

Sports Photographer with Camera,  
Microphone and wireless transmitter



# Remote Camera Triggers



**ML-L3 Wireless Remote**

Range ~ 3 meters (16 feet)

~\$25.00



**MC-DC1 Remote Release Cord**

(1 meter) ~\$35.00



**ML-3 Compact Modulite Remote**

Distance 8 meters (26 feet)

~\$260.00



**Laptop Software**



**WT-4A Wireless Transmitter**

Distance 500-800 feet

>\$1,000.00

**Can be used inside a squash court or behind a soccer net**





Videographers

Sports Photographers

Videographers

Womens World Soccer Championships - Germany





**Sports Photography is as competitive as the sport they photograph**



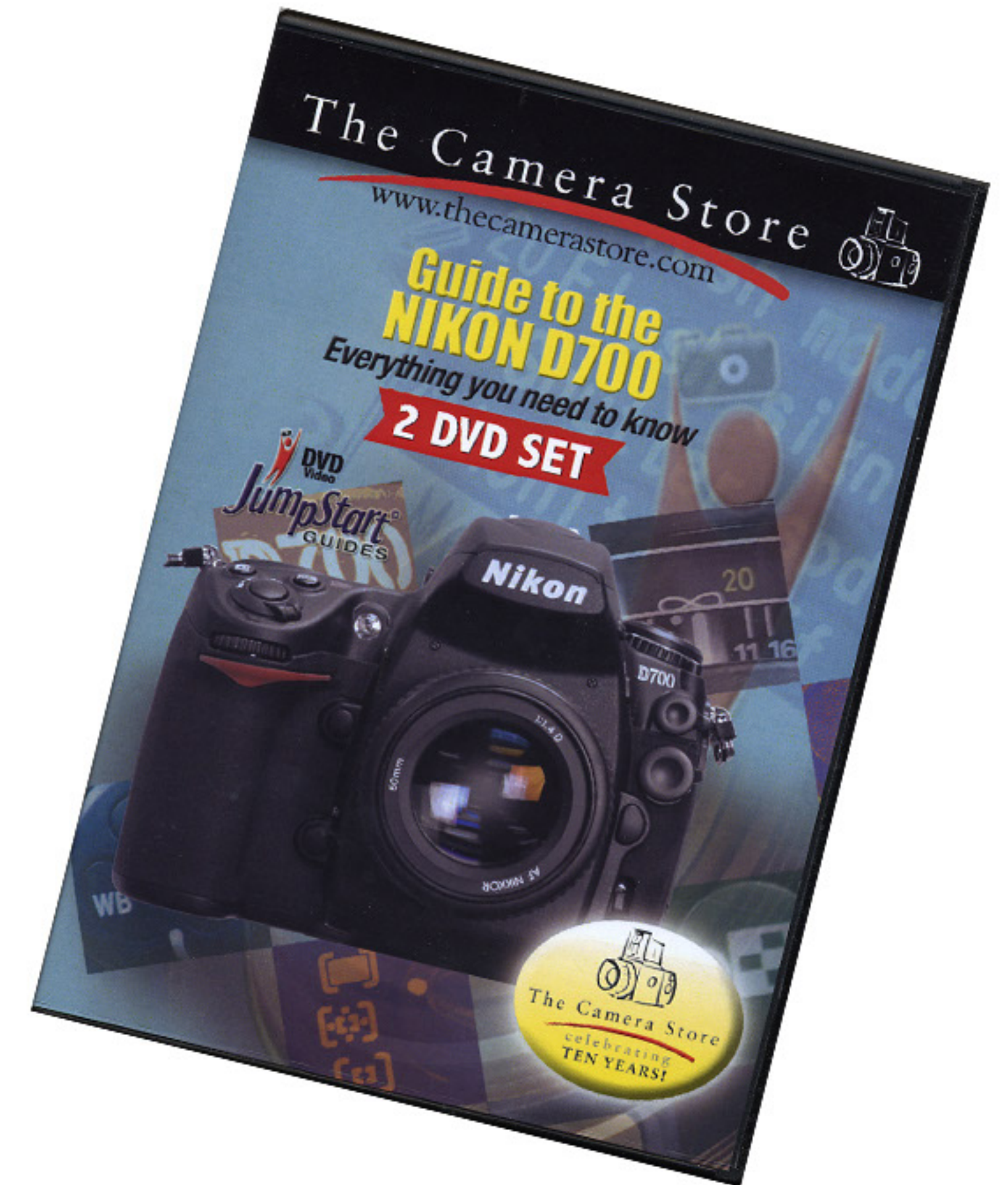
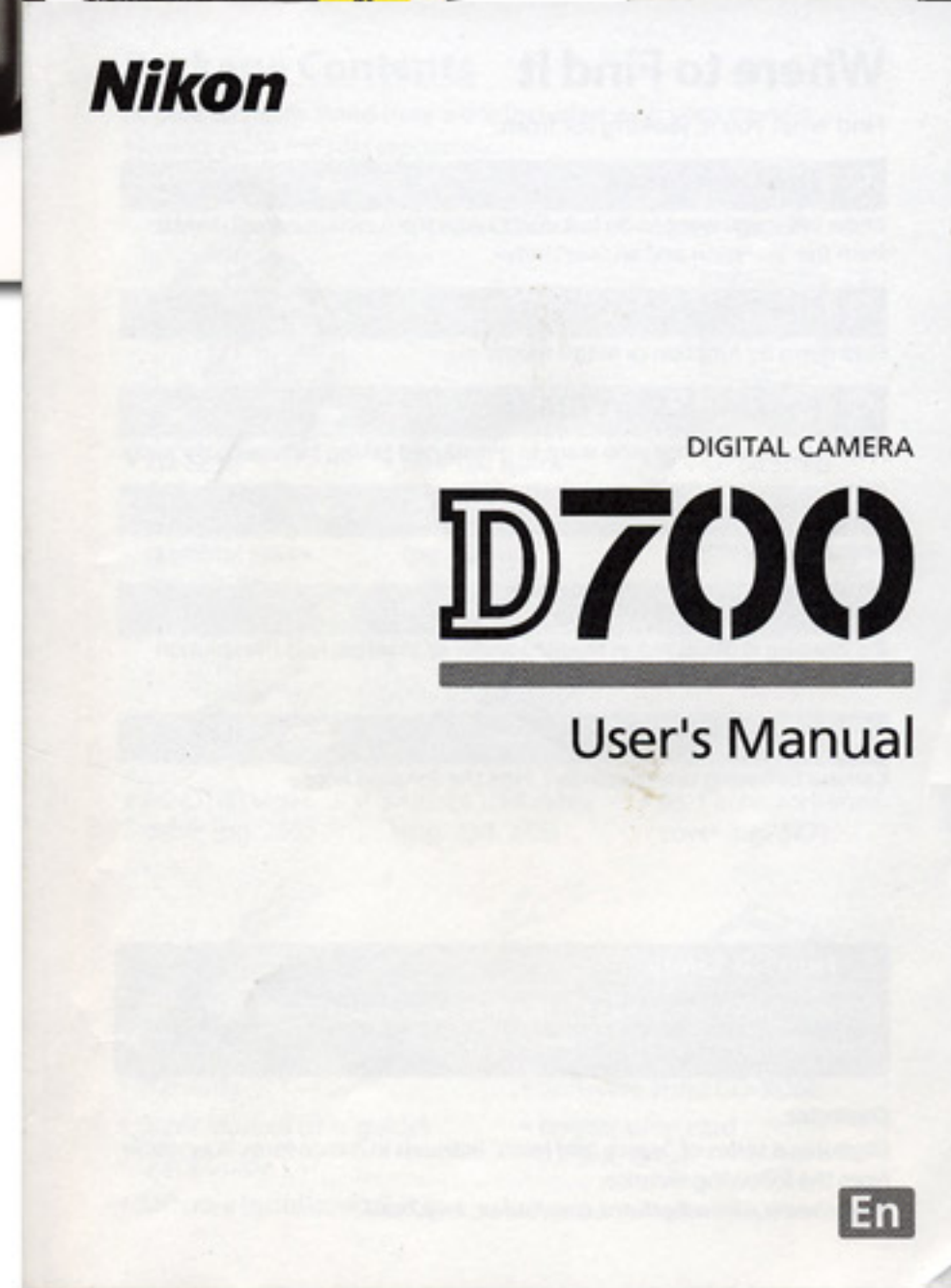
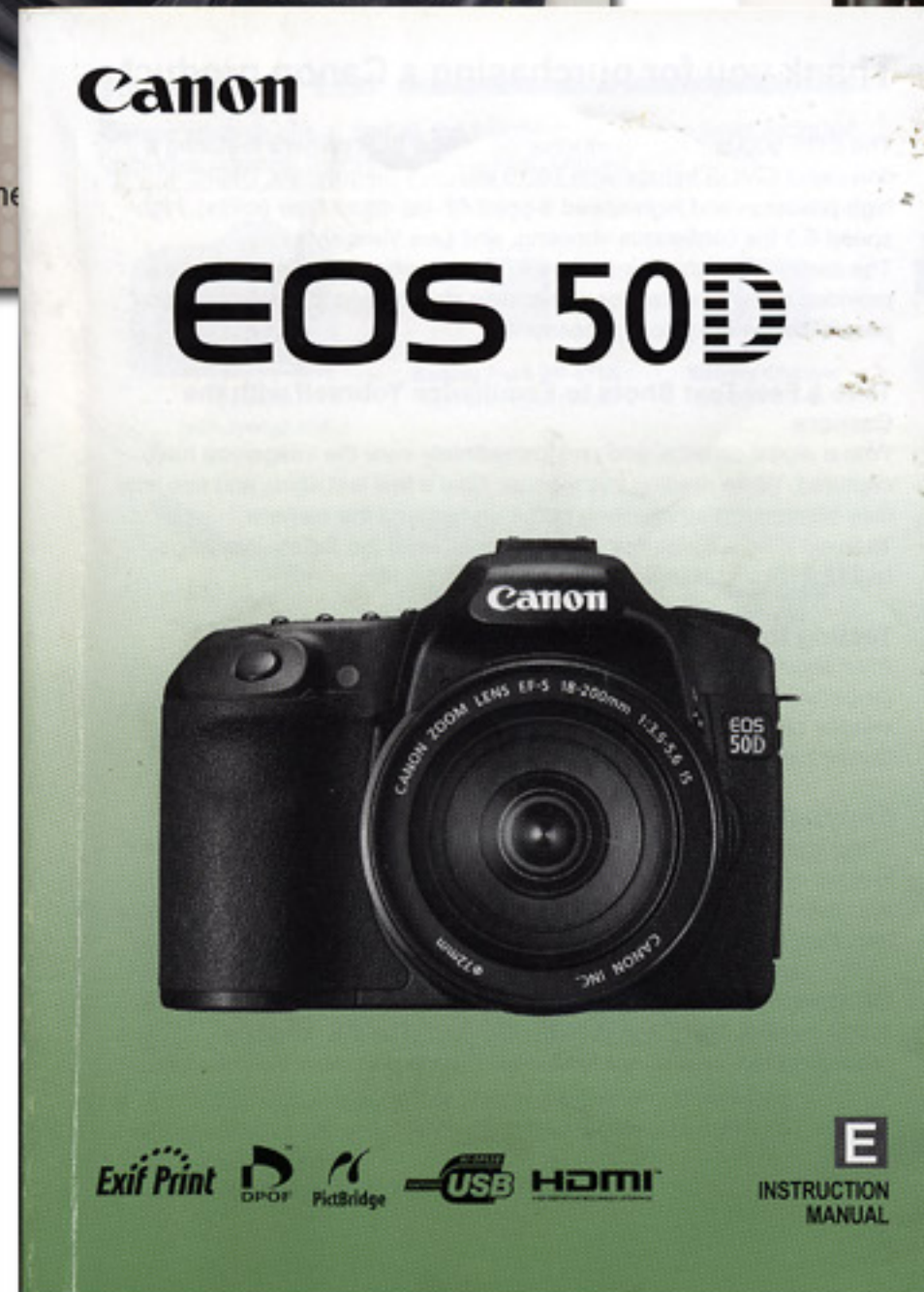
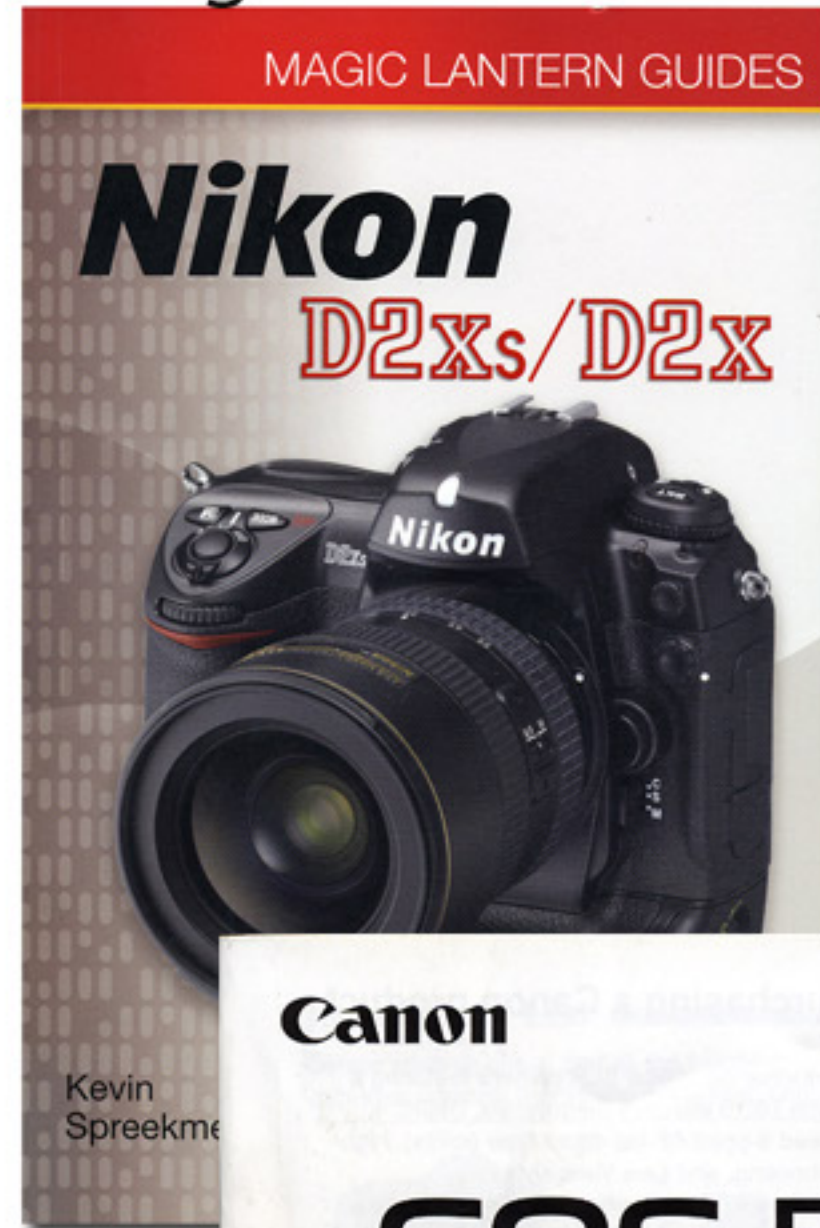


**Digital Studio for processing images**



# Know Your Equipment - Read the Manuals!

Magic Lantern Series Books



227 Pages

444 Pages

Instructional Videos from  
[www.jumpstartguides.com](http://www.jumpstartguides.com)



# **Sports Photography Summary**

- 1. Choose a digital camera that shoots 5-10 frames per second (pros usually have a backup camera)**
- 2. Select a camera that supports high ISO speeds with low noise i.e. ISO 1600 speed or higher**
- 3. Best all round sports lens - medium telephoto (70-200 mm F2.8), add normal or wide angle lens**
- 4. Select telephoto lenses with Image stabilization (vibration reduction) and fast autofocus**
- 5. If you need additional lens stability use a monopod for 300-600 mm telephoto lenses).**
- 6. Always use a lens hood, avoid using filters on your telephoto lens unless required for protection**
- 7. To stop action use 1/500 sec or faster, for panning use a slower shutter speed and follow the action**
- 8. Learn to edit and crop your images using Adobe Photoshop, Lightroom or image editing program**
- 9. Protect your lenses and camera equipment from rain - Pelican case or plastic covers**
- 10. Consider a DSLR camera that shoots video - you can grab single frames or show action in slow motion**