

GETTING THE BASICS RIGHT

AN INTRODUCTION TO BASIC DIGITAL PHOTOGRAPHY

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Getting the Basics Right An Introduction to Digital Photography

- Subjects to be covered
 - How does a digital camera work
 - Types of Cameras
 - Other kit
 - Images in your Computer
 - Lenses and Aperture
 - What is in Focus
 - Shutter speed
 - Sensitivity
 - White Light
 - Driving the camera
 - Exposure Problems
 - Making Images
 - Post Processing
 - Flash



Notes on this Talk

- Please enjoy this talk without taking notes
- My email address is
sinclair.scott@btinternet.com
- Email me
 - All the slides are available for you to see



What Photographs do YOU Take

- Family and Friends
 - Weddings, Birthdays; Children; Grandchildren
- Visits to places of interest
 - Holidays, places and events
 - Property Visits, National Trust
 - Gardens, RHS, Open Gardens Schemes
 - Animals and Birds
 - Scenery



Why do you Take these Photos

- You want to keep a record yourself
- Or show others -
 - The beauty of your experience
 - The interest of the experience
 - The fact that you were where you were
 - Someone may have asked you to take photos
 - You may wish to enter the image in a competition
- In **ALL** these circumstances
 - **You have to achieve a good photo**
 - **Or let the others down**



How does a Digital Camera Work

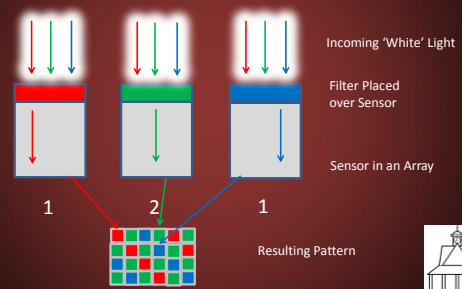


A Sensor

- Modern cameras
 - Between 8 - 25 million individual sensors
 - Each tiny sensor is like a photovoltaic roof panel
 - Producing electricity from exposure to light
 - A mid range DSLR sensor array about 24 x 16mm
 - About 15 million pixels or individual sensors
 - 40,000 pixels/sensors per square mm
 - A compact camera/phone sensor about 6 x 4mm
 - 12 million pixels (up to 20million)
 - 500,000 pixels/sensors per square mm



Camera Sensor



Light Measured

- Sensor ready to receive light
- In 1/50th second a DSLR (compacts take longer)
 - Calculates the light amount
 - Sets the shutter speed
 - Sets the lens aperture size
 - Calculates the white light value
 - Sets all the other options we have keyed in
 - Focuses the image
- The Shutter fires - We have an image !!



How does a Digital Camera Work



Digital Cameras What is Available?



Compact Camera



- Produce great results
 - Sensors 6 x 4mm
 - Lightweight, huge depth of field
 - Little control over the camera
 - Little scope to develop camera skills
- Fully Automatic
 - £100 (Canon Powershot; Nikon Coolpix S01)
 - To £500 (Canon Ixus; Nikon Coolpix P520)
- More advanced models becoming available



Interchangeable Lens Cameras

- Canon M; £500 - £650
- Nikon 1; £330 - £700
 - Flashguns, accessories and lenses – additional cost
 - Immediate image capture – no delay
 - Lightweight – slightly larger than a compact
 - Greater control over the image
 - Larger sensor than a compact
 - Nikon 1 - 13 x 9mm (area 5 x larger than compact sensor)
 - Canon M - 22 x 15mm (14 x compact)
 - Can create RAW images
 - Creative post processing



Digital Single Lens Reflex (DSLR)

- Huge variation in price
- Sold as a body only
 - You choose the lens(es) you require
 - Change lenses as required
 - Complete systems with lens can be bought
- Body from £300 to £5,000
- Lenses from £150 to £15,000 each



DSLR

- Larger sensors
 - Full frame 36 x 24mm
 - Smaller Sensors
 - Canon 22 x 15mm
 - Nikon 24 x 16mm
- Sophisticated software in camera
 - Complete control over all functions
 - Or use as an automatic compact



Where to Buy a Camera

- Cameras are Specialised Kit **AND EXPENSIVE**
 - Do not buy on-line without lots of advice
- Find a Knowledgeable Friend to Advise
 - Join a Camera Club
- Find a shop willing to advise
- Buy the main kit from that shop
 - Often no more expensive than on-line
 - Can go back and ask how it works
 - Can obtain full after sales service



**Digital Cameras
What is Available?**



Other Kit Needed



Other Kit

- 1 or 2 Spare batteries
- Lens Filters
 - Lens protective filters £40/£85 per lens
 - Regular cleaning removes the magnesium fluoride coating on the lens
 - Polaroid Filter reduces reflections, enhances colours
 - Neutral Density Filters create milky water effects



Other Kit

- Memory cards - 8 Gigabyte - good capacity
- Camera bag - must be rain proof
 - Big enough to carry other kit
- Tripod including three way head - £25 to £500
 - Trade off carrying weight against stability
- Monopods
 - Provide a huge increase in stability
 - Requires a tilting head



Other Kit Needed



Photographs in your Computer



Photo Computer File Types

- Most cameras create a .jpg (jpeg) file
 - Joint Photographic Experts Group
- Most DSLRs also may create a RAW file
 - In a RAW state as minimal processing been done
- Tiff and PSD files are created in software
 - Tagged Image File Format
 - PSD file Adobe Photoshop software
 - Both highest quality



Jpg Files

- A jpg file has been 'processed' and compressed
 - Reduced in file size
 - Called a 'Lossy' file as it compresses the data
 - Losing information that cannot be recovered
 - Each time you save a jpg
 - Lose more data information
 - Ideal for compact cameras
 - Cannot give full quality image compared with RAW



RAW Files

- Contain minimally processed information
 - You see a part processed image on the screen
 - Further work in a RAW conversion package
 - Lightroom, Photoshop, camera software
- Allows you to change the file information
 - Exposure, white balance, sharpen etc. etc.
 - Without any loss of information/quality
- Then option to convert to a jpg or tiff
 - Or best quality print direct from the RAW image



Comparison of File Sizes

- For the same image:-
- JPG image file – 8 megabites
- RAW image – 22 megabites
 - Note the jpg file has lost/destroyed 14 megabites (60%) of the original file information
- Tiff image file – 90 megabites
 - Converted from a RAW file
 - Huge file size, over 10x the jpg equivalent
- Many huge files create computer disc storage problems



Storing Your Image Files

- You create images on a Memory Card
- These should be downloaded as soon as possible
 - To avoid losing the images
 - To free up space on the memory card
 - After downloading format the memory card
 - Losing all the images on the card
 - Ready for more images



Storing your Image Files

- All memory systems are liable to failure
- Breakdown, virus, accidental erasure
- All files should be downloaded in at least 2 places
 - 1. Main Hard Disc on a computer
 - 2. A back-up hard disk
 - Maybe 2 of these
 - Some even insist on a third location not in the same property to secure against theft or fire



Storage Systems

- Store images in the MS Windows Filing System
- Libraries
 - Documents, Music, **Pictures**, Videos
 - In Pictures create a **Year** Folder (2014)
 - In the year folder create 'Events' folders
 - Event - e.g. - **04 20 Blenheim Palace**
 - **04** - Month of the Year
 - **20** - Day of the Month
 - **Blenheim Palace** – Location of the images



Other Storage Systems

- Adobe Photoshop Elements or Lightroom
 - Sophisticated filing systems
- You tag (categorise) images with subjects
 - Family, year, landscape, best (poor) quality, etc
 - Each image can have many tags
- Allows you to recall all the e.g. landscapes
 - Or those marked best landscapes
 - Or those landscapes in a certain year



Photographs in your Computer



Lenses



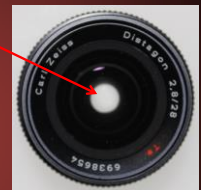
Lens Choice

- Lens choice is most important
- Its quality determines the image outcome
- A £1,500 camera with a £100 lens
 - Poor image quality
- A £2,000 lens with a £250 DSLR
 - Superb image quality
- Ideally create a balance between Camera and Lens Quality



Lens Aperture

- Lens aperture - area of light
- This aperture is variable
- Maximum (largest) aperture
 - Lowest number
 - Defines the lens 'speed'
 - Perhaps f2.8, f4, f5.6 etc
- Highest number is smallest aperture
 - f16, f22, f32 etc



Lens Aperture

- Very best lenses have largest aperture
- Each aperture 'stop' allows half the light of the previous
 - 1.4 2 2.8 4 5.6 8 11 16 32
- We will see later how to use the different apertures
- Lens not sharpest fully open (widest aperture)
 - Close down 1 or 2 stops to be fully sharp



Lens Quality

- Amount of glass in a lens
 - Speed and the Quality of the lens
- Canon f2.8 L IS 70 – 200 zoom lens
 - £1,800 - 1.3kg
- Canon f4.0 L IS 70 – 200 zoom lens
 - £900 - 0.76kg
- Canon f4.5 – 5.6 IS 55 – 250mm zoom lens
 - £200 - 0.4kg



Lens Manufacturers

- Canon or Nikon
- Sigma
 - Tokina, Tamron
 - Make lenses for Canon, Nikon etc
- For ALL Lenses, you pay for what you get
 - Higher price
 - Faster lens, better sharpness
 - More robust construction



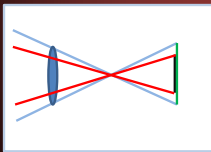
Focal Length

- Focal lengths are a guide to the angle of view of any lens
 - A short focal length e.g. 17mm – wide angle
 - A longer focal length e.g. 200mm - telephoto
- Stated focal lengths relate to a theoretical 36 x 24mm sensor (f35mm film size)
 - Most cameras do not have a 36mm x 24mm sensor



Focal Length

- The size of the sensor in a camera affects the lens's acceptance angle or angle of view.
- A full frame camera has sensor 36mm x 24mm



- Many DSLR cameras have smaller sensors
- Multiply the focal length
 - x 1.6 Canon
 - x 1.5 Nikon



Choice of Focal Length

- You will require a relatively wide angle lens
 - A workhorse, probably zoom \pm 17mm – 50mm
 - Buildings, groups of people, general photos
 - Option to crop unwanted portion from an image
- You may also decide on a telephoto lens
 - 70mm – 200mm
 - To bring far subjects closer - wildlife, sport
- Others special lenses
 - Macro, Super-telephoto, etc



Lenses




What is in Focus




Depth of Field

- Depth of Field
 - Also known as Depth of Focus
- The point of focus is chosen
- Other parts of the image will also be acceptably sharp
 - Gradually going out of focus
 - In front of the point of focus
 - Behind the point of focus




Depth of Field

- Definition is:
 - **Depth of Field is the distance between the nearest and farthest points in an image where the image is acceptably sharp**
- By changing the aperture settings you change the AMOUNT of an image that is sharp
- Therefore by controlling the aperture
 - We control the amount of image that is sharp




Depth of Field

- No simple set rules on depth of field
 - It comes with experience and trial and error
- Depth of Field will be less
 - If the subject is closer
 - OR If the lens is longer
- Normally - acceptable sharpness is
 - Twice the distance behind the point of focus
 - Than in front of the point of focus

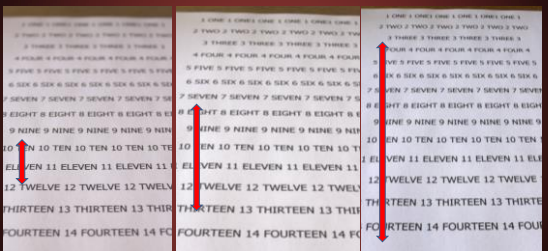


Depth of Field

- The focus depth depends on the aperture
- BUT ALSO:
 - If you are zoomed back - a wide angle shot
 - Lots will be in focus
 - If you are zoomed in - a long distance shot
 - Less will be in focus
- Wide angle increases focus depth
- Close up shots – shallow focus depth



Depth of Field



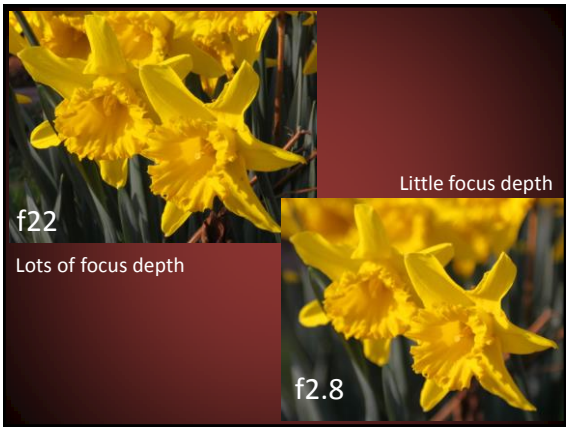
f 2.8
Focus on 11 ELEVEN

f 6.3
Focus on 11 ELEVEN


f 16
Focus on 11 ELEVEN

Depth of Field





What is in Focus




Shutter Speed



Focal Plane Shutter

- All cameras have a device setting the period of time that the sensor is exposed to the image
 - High end DSLRs have a range of about 1/4,000th second to about 30 seconds
 - May also be set to open for many minutes
- Most digital cameras now use some form of focal plane shutter
 - 2 curtains moving vertically downwards over the sensor
- How does this work?




Focal Plane Shutter


- We have a building we wish to photograph at 1000th second




Focal Plane Shutter

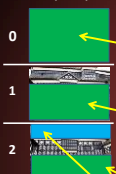


- We have a building we wish to photograph at 1000th second
- Focal plane shutter comprises two vertical curtains
 - Green curtain hides the sensor
 - Blue Curtain is folded up




Focal Plane Shutter

1/1000 s
(1 ms)

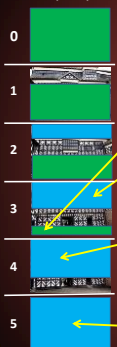


- At 0 milliseconds Shutter is released
- After 1 millisecond
 - Green curtain opens
 - Starts to move down, exposing the sensor to the image
- After 2 milliseconds
 - Green curtain is still travelling down
 - Blue curtain is also now starting to travel down
 - Covering up the sensor to the image




Focal Plane Shutter

1/1000 s
(1 ms)




- After 3 milliseconds
 - Green curtain is moving towards the bottom
 - The Blue curtain is closely following it
 - Covering up the sensor to the image
- After 4 milliseconds
 - Green curtain has completed its travel
 - Blue curtain is nearly covering the sensor
- At 5 milliseconds the exposure of 1/1000th second is complete
 - Blue curtain covering sensor




Focal Plane Shutter

1/250 s
(4 ms)




- At a slower shutter setting – 1/250th second (4 milliseconds)
 - The Green and Blue Curtains take the same time to travel across the sensor (4m/s)
 - But the Green curtain completes its travel before the Blue curtain starts
 - This leaves the sensor completely open to the image
 - For 1/1000th second




Focal Plane Shutter

- When a flash gun is fired its flash lasts \pm 1/1000th second
- The flash has to be timed to fire after the first (green) curtain has finished its travel and before the second (blue) curtain has started
- The fastest shutter speed this can be achieved is called the **flash sync speed**
 - Varies at 1/125th or 1/250th second



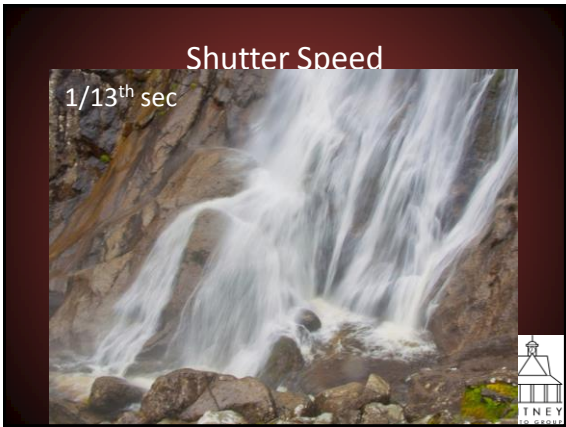

Shutter Speeds

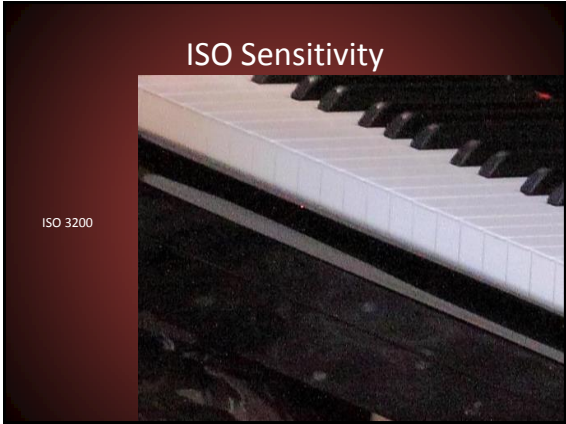
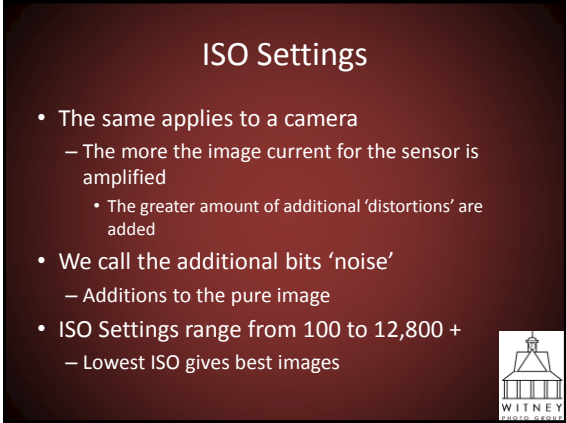
- Why select shutter speeds?
- To ensure the image is sharp
 - If you are photographing a landscape
 - And you see the shutter speed is set to 2 seconds
 - Hand holding for say 2 seconds is impossible
 - Have to reduce the time the shutter is open
- To deliberately blur the image
 - Set a long shutter speed



Shutter Speed – Rough Rule of Thumb

- For reasonably sharp images
 - The shutter speed should be equal to the focal length of the lens
- Examples:-
 - 24mm lens - shutter speed of 1/25th second
 - 100mm lens - shutter speed of 1/100th second
 - 300mm lens – shutter speed of 1/300th second
- Image stabilisers allow these speeds to be ÷ 4
 - 2 Stops





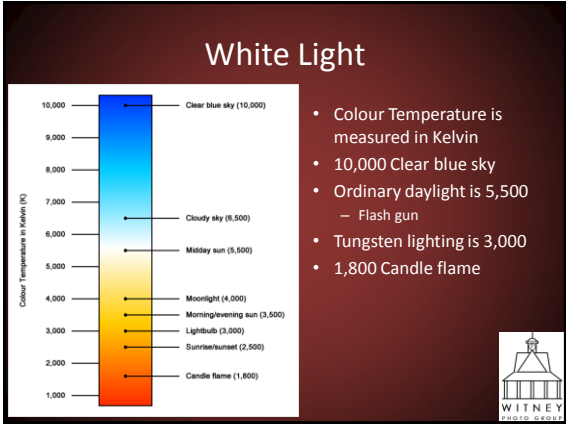


ISO Sensitivity

- Cameras have menu settings that allow you to modify the 'noise' levels at high sensitivity
 - Look in your camera manual
 - Post processing software also can reduce noise
- The lessening of 'noise' levels is normally a trade-off against sharpness
- Normally cameras will give you excellent 'noiseless' results at ISO 800 or below.
 - Depends on the sort of image you are creating


ISO Sensitivity

White Light

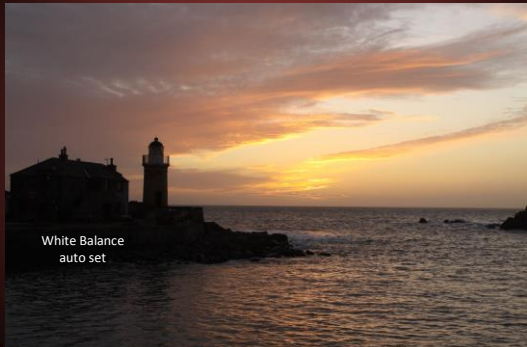


White Light

- Set camera to AWB (Automatic White Balance)
 - Camera finds something white in the image to make a decision
 - Cameras can make a wrong decision
- Or you can select your own white balance
- Problem images?
 - Sunsets, After dark, Mixed daylight and tungsten lighting
- Often easier to adjust in post processing

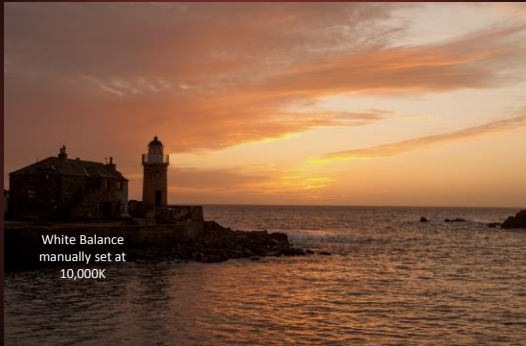


White Balance



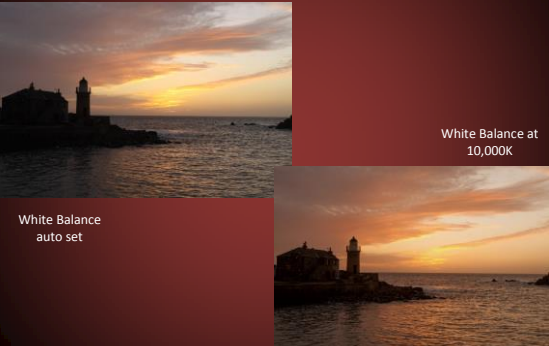
White Balance auto set

White Balance



White Balance manually set at 10,000K

White Balance



White Balance at 10,000K

White Balance auto set

White Light



4000 Kelvin
Camera set on AWB

White Light



3500 Kelvin
Changed from 4000 in Post Processing

