Lesson 3 – Cameras – Transcripts

* If you have made it this far, congrats and thank you for sticking with it.
* This begins a deep dive in to our Tier 2 lessons focused more photography specific aspects and some cool hands on experiments.
* Let’s get started, cameras are instruments to capture images.
* Images as we have already realized are just focused light reflected off of objects.
* In essence if light is reflected off of it, a camera can capture it. Whether it does on a film or an image sensor.
* This is a Canon 80D, it is the camera being used to film most of these videos and will be the camera I will be working with since it’s the one I have.
* We will make sure that everything talked about here is generic enough that you can take it to your own personal camera or to a camera simulator.
* This Canon is a DSLR – a digital single reflex lens camera.
* Modern cameras are incredibly complex pieces of equipment. In essence however a DSLR is just a complex lens system combined with reflex optics. Basically, a mirror, a pentaprism and a glass screen. This setup allows the light to be reflected up to the glass screen here the user can see it form the viewfinder.
* A DSLR is just an SLR that captures digital images as opposed to images on a physical film.
* Almost all modern cameras now shy away from using film and almost all smaller cameras even use a scaled down version of this mechanism.
* There is a good chance that the camera in your phone is theoretically similar to the one in your travel ag be it a point and shoot, or a DSLR.

Lesson 3.1 – Cameras – Film and Sensors – Transcripts

* Most modern cameras don’t use a physical film.
* It is cumbersome, delicate, and very easy to ruin. Plus, there is only a very limited about out of the roll.
* Cameras well into the 2000’s used film regularly, but that practice has been all but abandoned.
* In film cameras the physical photo sensitive film would be momentarily exposed to the object and it would capture a negative of the object. This film would later have to be taken to a lab to be developed and turned into a photograph. It was a long and cumbersome process and fraught with opportunities to ruin the shot inadvertently.
* Image sensors work in much the same way without the hassle.
* The image sensor is the soul of the modern digital camera.
* It determines the size, intensity, vibrancy, quality, low light performance and the physical size of the camera.
* There are multiple types of sensors – CCD and CMOS, a discussion about which is well outside the realm of this course.
* Suffice to say that nowadays they are very comparable and each manufacturer has a vibrant that works well.
* The most important piece we need to talk about is pixels. Each image sensor is split up into tiny dots called pixels. The size and number of the pixels usually impacts the quality of images you get.
* There is a long debate regarding the number of pixels crammed onto the sensor, but in general, a camera with the larger pixels, even if they are a lite fewer than another will provide more vivid photographs.
* The main reason to think about this is to understand that the next time someone says the camera is 24 mega pixels, or 24 million pixels, you need to understand that it is a 6000 x 4000 array of pixels.

Lesson 3.2 – Cameras – Lens – Transcripts

* We talked about complex lenses before and now is a good time to remember that camera lenses are incredibly complex lens systems.
* Here we have two canon lenses – one is a 50mm lens the other one is an 18-135mm lens.
* The 18-135 is the one we will be focusing on initially and one on which most of videos will be recorded.
* Each camera manufacturer had their own set of compatible lenses with some third-party manufacturers making cross compatible lenses.
* Though you can always find a lens that is roughly the same across the range.
* This 18-135mm lens is very complex and has close to 14 individual pieces including the motors.
* The number 18 and 135 represent the achievable focal length of the system.
* 18mm is the least possible focal length, this is when the system will have a large field of view, basically the smaller the focal length the more there will be in your image.
* The 135mm is the far end of the spectrum with the lens at maximum zoom. Basically, the larger the focal length the smaller the field of view but sharper in focus the subject will be. Less of the stuff in your image.
* Another analogy is that it’s easy to take a photograph of a group at a low focal length but you’d probably be taking a head shot at max focal length.

Lesson 3.3 – Cameras – Activities – Transcripts

* Alright, let’s talk about something fun now. We have talked about the makeshift lens using the glass jar and even calculated its focal length.
* We talked about the light dispersion in a rainbow. This is a picture I took of a double rainbow. I would recommend zooming into this image and observing the color spectrum.
* The fun bit, let’s talk about a diy pinhole camera.
* Cameras have evolved from something called a camera obscura. Which is a camera without lenses.
* In camera obscura we create images without a lens, using a pinhole to focus the image from a scene on to a screen in a dark room.
* The image formed will be mirrored and inverted but it should be exact.
* Refer to the appendix for a link to the National Geographic video regarding setting up a dark room and a camera obscura.
* I will walk you through my setup and recommend you do something similar.
* First off darken the room, use dark paper to cover off the windows. Minimize the light leakage as best as you can.
* The window doesn’t need to look pretty, just good at blocking light.
* Cut a small hole through the chart paper.
* Make sure your overlooking screen / wall is clean.
* A sun light scene outside your window will help.
* Turn off the lights.
* Let your eyes adjust.
* You should see an image on the wall opposite the window.
* If you don’t try darkening further.
* Use a camera to actually capture the image. You will need a camera with a manual mode to capture a long exposure to get a lot of the light.
* My settings: F-3.5, ISO 1600, Time – 15 seconds.

Appendix:

* Demystifying Pixels - <https://www.techhive.com/article/2052159/demystifying-digital-camera-sensors-once-and-for-all.html>
* Camera Obscura National Geographic - <https://youtu.be/gvzpu0Q9RTU>
* Camera – Wikipedia - <https://en.wikipedia.org/wiki/Camera>
* Settings for the camera for a capture of the image from the camera obscura - F-3.5, ISO 1600, Time – 15 seconds.