

4K in Photography

No Matter How Big Your Computer Monitor Is, Its Still Tiny!

- ▶ Full HD is currently the primary standard for good quality computer monitors, projectors, videos and TVs
- ▶ Full HD at 1920 x 1080 has about TWO MegaPixels. Let's call them **'Display MegaPixels'**
- ▶ Many cameras produce at least SIXTEEN MegaPixels. Those are **'Image MegaPixels'**
 - ▶ 4000 x 3000 = 12 MP (4:3 aspect ratio)
 - ▶ 5200 x 3900 = 20 MP (4:3)
 - ▶ 5200 x 3100 = 16 MP (16:9)

Let's compare the 'pixel size'.

HD Display
1920 x 1080
TWO Display MegaPixels

16 MP image
5310 x 3000
SIXTEEN Image MegaPixels

No matter how big your monitor is in inches, at HD resolution it is still TINY in comparison to your image, in term of pixels.

So How does 16 MP fit in 2 MP?

16 MP Reduced to 2, by
a RESIZING ALGORITHM

2 of 16
Image MP

14 of 16 Image MP

Two MP
HD
Display

To shrink your 16 MP image down
to a 2 MP HD display

14 MP of information gets tossed.



Warning! Your image has been compressed by a factor of EIGHT! 14 out 16 MegaPixels GONE!

NO WORRIES! It still looks OK.

Hmm....I want it to look GREAT, not OK.
Maybe I need a new camera?

That's it, I'll buy a new 40 MP camera. More pixels has to help!

There are lots of reasons to buy a nice new camera. Is this one of them?

HD Display
1920 x 1080
TWO Display MP

40 MP image
8425 x 4760
FORTY Image MegaPixels

With all this data the image should look great, right?

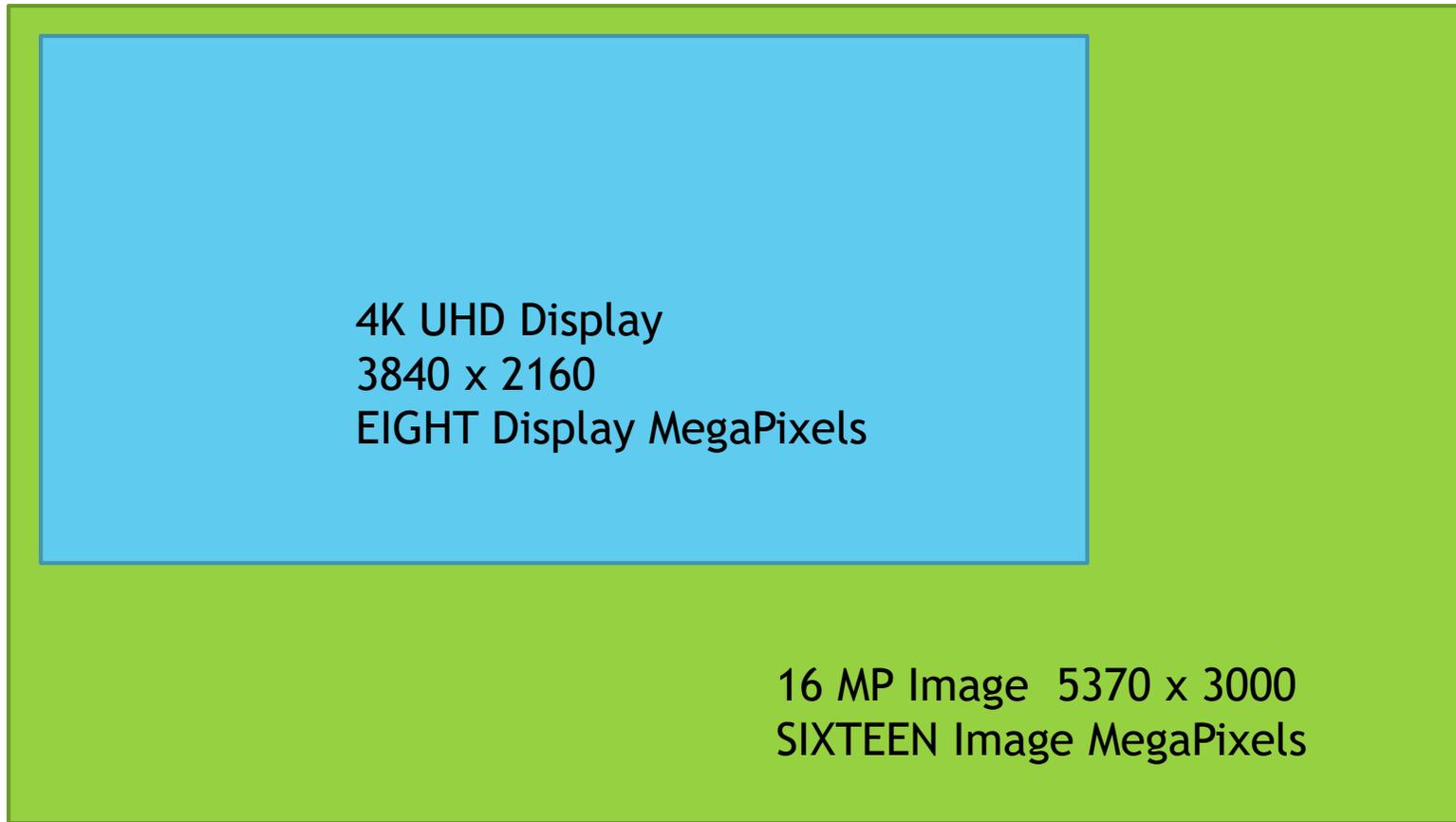
Unfortunately, NO. The difference is now you dump 38 of your 40 image MegaPixels to fit on your 2 MP Display.

Result : Image looks pretty much the same.

- With an HD display you can get a nice image, even with all that data missing
- But to really see that data you need to zoom in to ‘100%’ where there is one Display Pixel for every Image Pixel.
- Only a small section of your image can fit on the Display at once. **ANNOYING!**

Now there is an **ALTERNATIVE! 4K!**
4K or UHD (Ultra High Def) is 3840 x 2160.
That’s **EIGHT MegaPixels.**

“But there’s too little 4K content!”
What about all of your images?



Independent of its physical size, a 4K Display shows a 16 MP image at a 1:2 ratio (50%).

Yes, we are still tossing eight MP of image data BUT we have four times more image data than HD.

Overall Image Quality Depends on Several Factors

- ▶ **DISPLAY TECHNICAL QUALITY**- contrast, color consistency, edge handling
- ▶ **RESIZING ALGORITHM** - Image Pixels  Display Pixels
- ▶ **RESOLUTION** - more resolution = more pixels = more detail
- ▶ **SIZE** - BIGGER Better, Smaller Worser (for seeing detail)
- ▶ **DISTANCE** - CLOSER! See more detail!
- ▶ **VIEWING ANGLE** - COLOR, SATURATION may decrease at wide angles
- ▶ **COMPRESSION LOSS** - Saving as a low-medium quality jpeg results in data loss even at higher resolutions

Display Technical Quality

- ▶ **Contrast** - Blacker Blacks, Whiter Whites. Since black is the absence of light, projectors which work on light, struggle here.
- ▶ **Color Consistency** - Projectors have a tiny screen inside, and bend light to make it bigger. Flaws get bigger too.
- ▶ **Edge Control** - Sharp edges means more visible detail
- ▶ **Resizing Algorithm** - Your COMPUTER and DISPLAY control how pixels are handled in reducing your image to fit on a display.

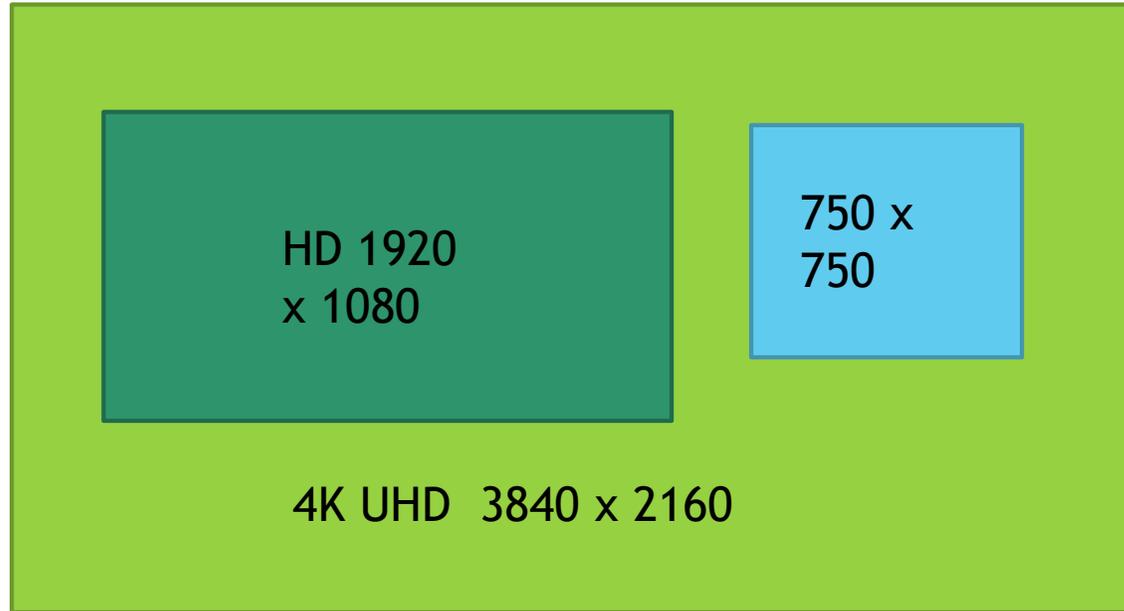
How can I pick out a good display and skip the technical mumbo-jumbo?

Easy Way To Get A High Quality Display, Without too much Technical Stuff? Buy on PRICE, REPUTATION. Buy BETTER!

The Samsung Line of UHD TVs (as an example - 2016 line).

FAIR	GOOD	BETTER	BEST
Series 6	Series 7	Series 8	Series 9
UHD (4K)	UHD + HDR	SUHD + HDR1000 'Quantum Dot'	SUHD + HDR1000 + 'Bells + Whistles?' 'Quantum Dot'
~\$400-600	~\$700-\$1000	~\$900-\$1200	~\$2000-\$4000

Resolution



Display Dimensions	Name	X	Length	Width	MegaPixels
HD (1K)		1	1920	1080	2
4K		4	3840	2160	8
8K (should be called 16K)		16	7680	4320	33

Beyond 33 MP, our eyes may not distinguish a difference.

Display Size - BIGGER Better!

- ▶ BIGGER displays allow you to see more DETAIL (if its there!)
- ▶ With 4K, 50” is on the LOW END, 100” is ‘BIG’ - so projectors shine here
- ▶ SMALLER screens: 4K and HD look the same to our eyes
- ▶ On a cell phone nearly all resolutions look the same to our eyes
- ▶ Laptops - 4K won’t be much better than HD so screen quality very important AS WELL AS VIEWING DISTANCE

Distance to Display: CLOSER is BETTER

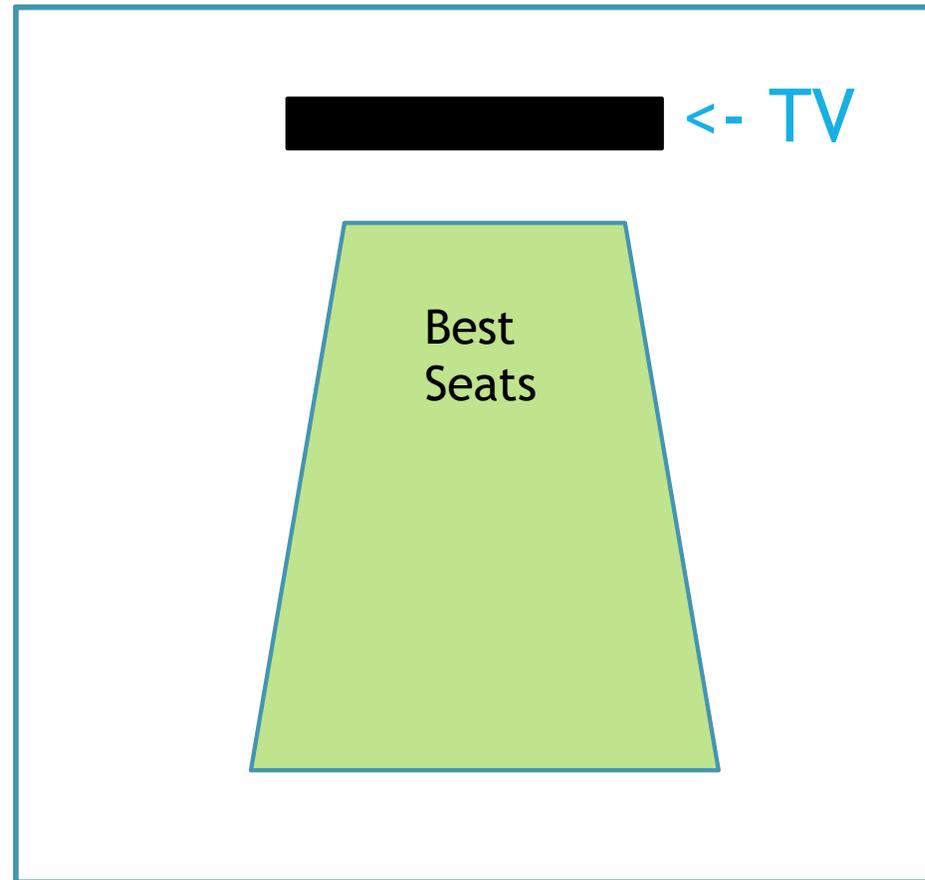
- ▶ 55 inch Display: beyond 15-20 ft, 4K loses detail, approaching HD. Image quality is still SUPERIOR!
- ▶ 4K is EXCELLENT for EDITING your photos because you sit close. There is NO DANGER in sitting 2 feet away. BIGGER is BETTER, at least 32" screen. 40-55" recommended.
- ▶ A 4K projector would have a serious advantage over a 4K TV here, because they can project larger - over 100" - so you see detail more than 20 feet away. Cost of 4K projectors is still high.

If I'm far away, why have 4K if it might look like HD?

Screen Quality - The best technology is the newest, found in 4K TVs, not HD. Large Screen HD is history.

Viewing Angle

The best seats are directly in front of the TV. Color and Saturation may decrease at wide angles. Projectors have the advantage here.



Compression Loss

Use High Quality when saving JPEGs, Beware email!

4K and Your Photography

- ▶ A 4k monitor allows you to see 4 times more detail than HD. You see more beauty AND more ugly.
- ▶ TV vs Monitor -
 - ▶ A TV is a monitor with a tuner and WiFi, so you can watch cable, cast from mobile devices, use apps like Netflix and You Tube.
 - ▶ Today's TVs have excellent image quality and resolution
 - ▶ Monitors max size is ~32" - Small for 4k, so you MUST BE CLOSE.
 - ▶ TVs can be 40"+ so you can see 4k detail from across a room
 - ▶ TVs are CHEAPER!

Will your computer handle a 4K display? Two?

- ▶ Separate ('Discrete') video card recommended, especially for video.
- ▶ 7th Gen Intel processors ('Integrated', eg. i5-7300) handle multiple 4K.
- ▶ VGA and standard DVI connections can't handle 4K resolution. HDMI 1.4 or 2.0a, Display Port 1.2+, USB-C(Thunderbolt) connections are best
- ▶ Newer cables support high resolution
- ▶ Easiest test - hook to a 4K display and check screen resolution settings
- ▶ General rule - computers over 3-4 years old, probably not
- ▶ Older Operating Systems (OS) and software may not handle 4K well. You need to be able to Scale Icons and text, otherwise they will be tiny
- ▶ Photoshop CC and Lightroom CC on latest OS scale very well!

Second Monitor?

- ▶ Even if your first monitor is BIG, a second monitor is very useful.
- ▶ Especially if your editing software shows your full image on the second screen while you edit on the main screen (like Lightroom).
- ▶ You may be able to use your HD monitor as your main screen and a 4K TV as the second.

Let's look at a setup with a 40" UHD TV as the main monitor, and a 49" SUHD TV as a second monitor.



Pop Quiz! What is the easiest way to make your images look better?

1. Buy a new camera
 2. Take college classes in Photoshop
 3. Go on a safari
 4. Buy a 4K TV/monitor for editing and display
- 4? You Graduate! Thanks for 'Tuning In'!**