Digital Image Preparation

Ian Wilson ARPS

Things to get right…

- File Type
- File Naming
- Image Dimensions (scaling)
- Image Quality (compression)
- Colour Space & Embedded Profile

Most are straightforward…

*…but **scaling** causes enormous confusion*

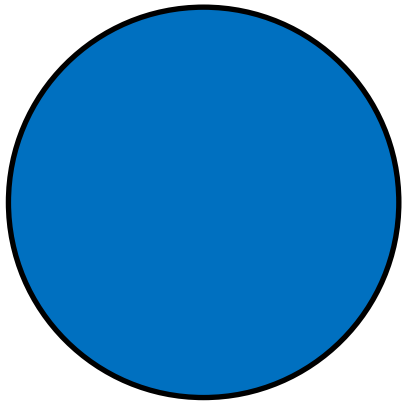
Three aspects of Image Scaling

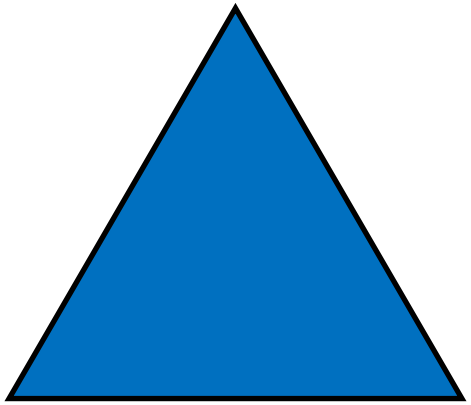
- Shape
- Pixel Dimensions
- Physical Size

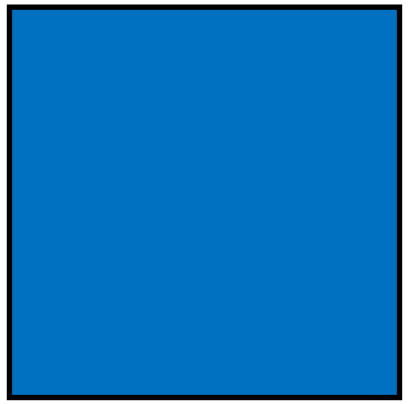
Shape

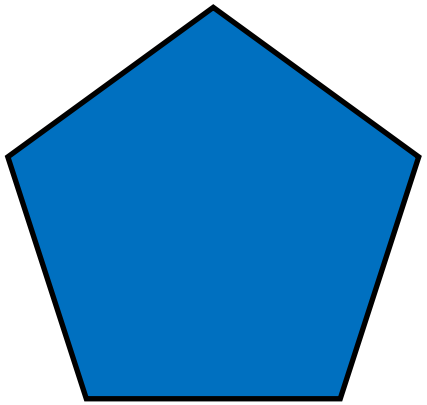
Size isn’t everything…

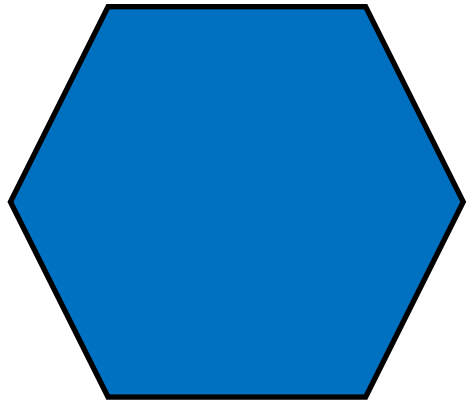
Shapes



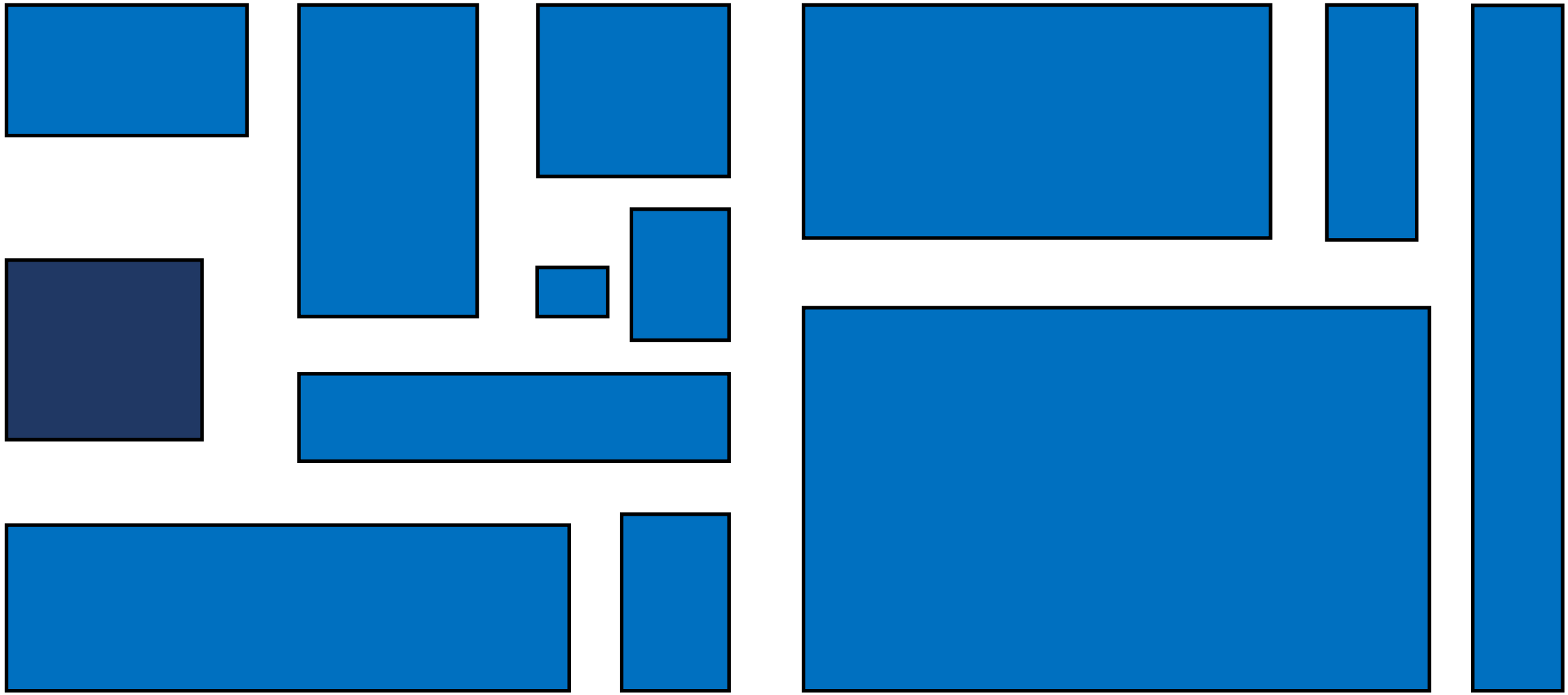








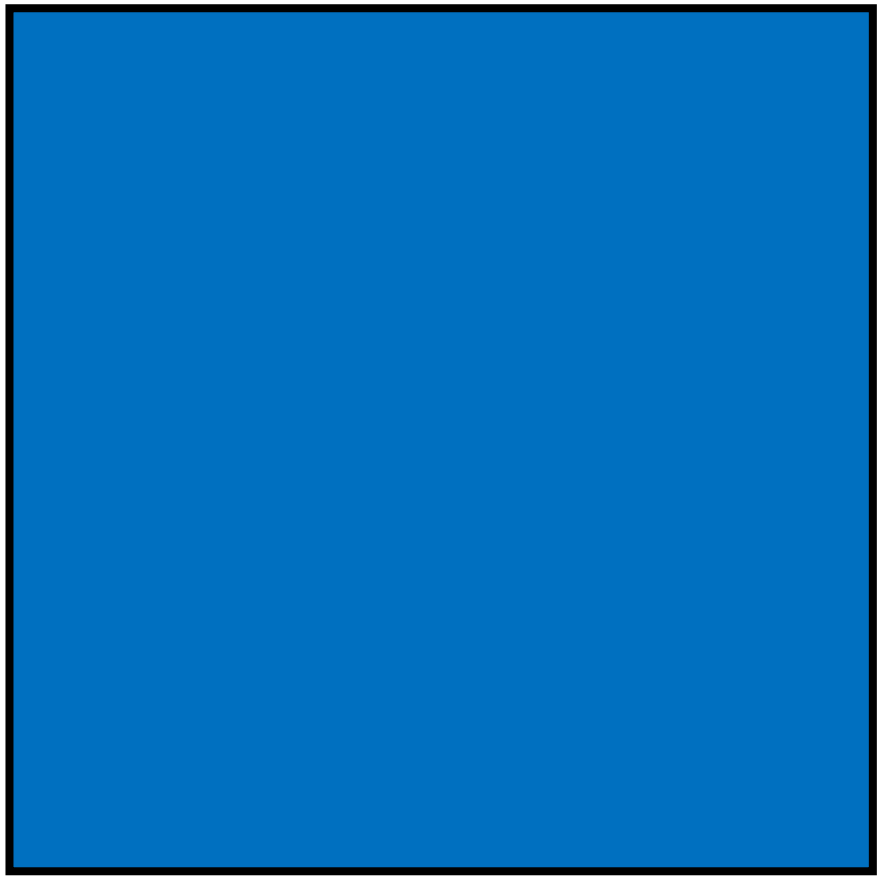
Rectangles



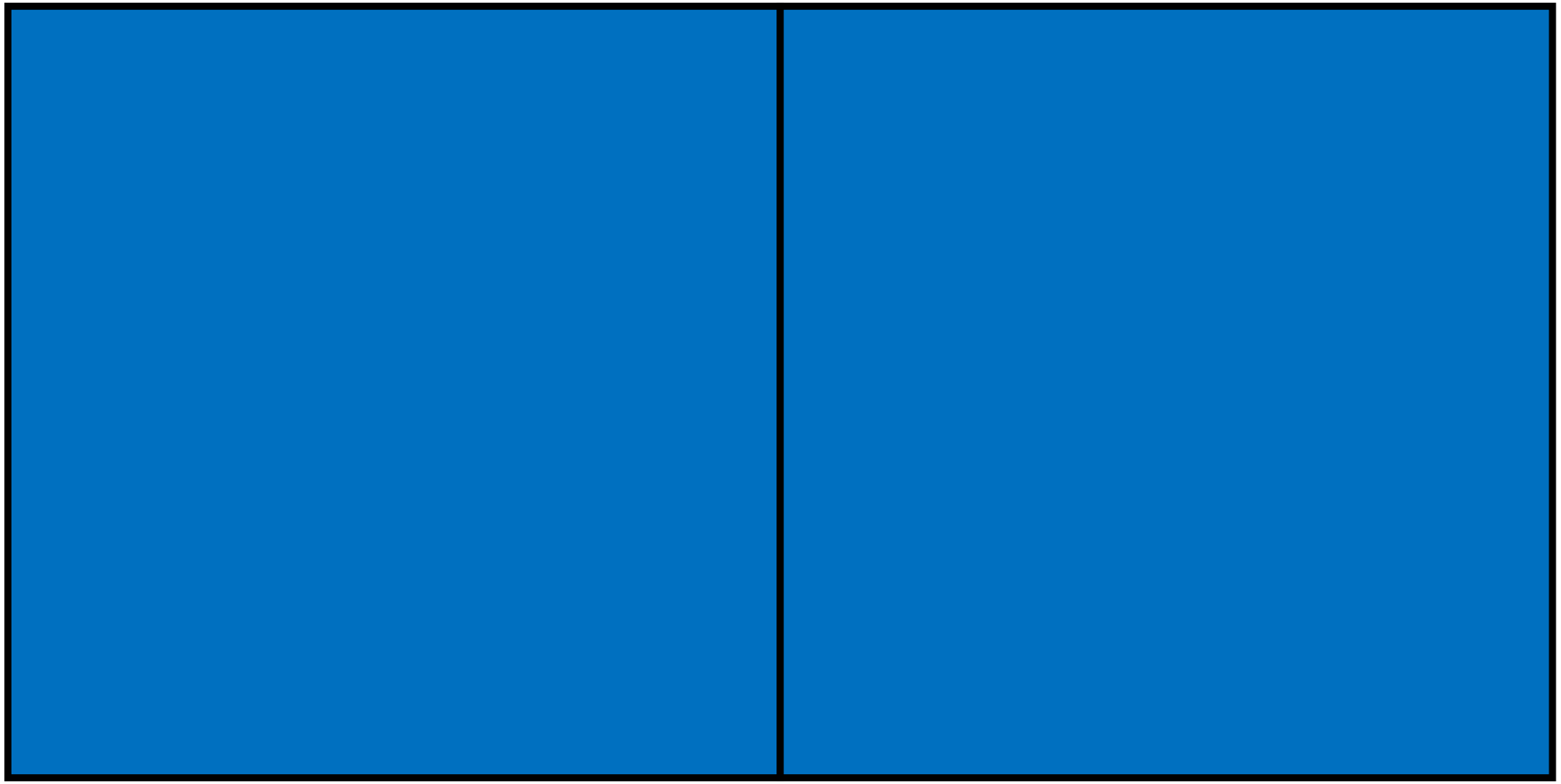
How to characterise a Rectangle?

$$\textit{Aspect Ratio} = \frac{\text{Rectangle } \textit{Width}}{\text{Rectangle } \textit{Height}}$$

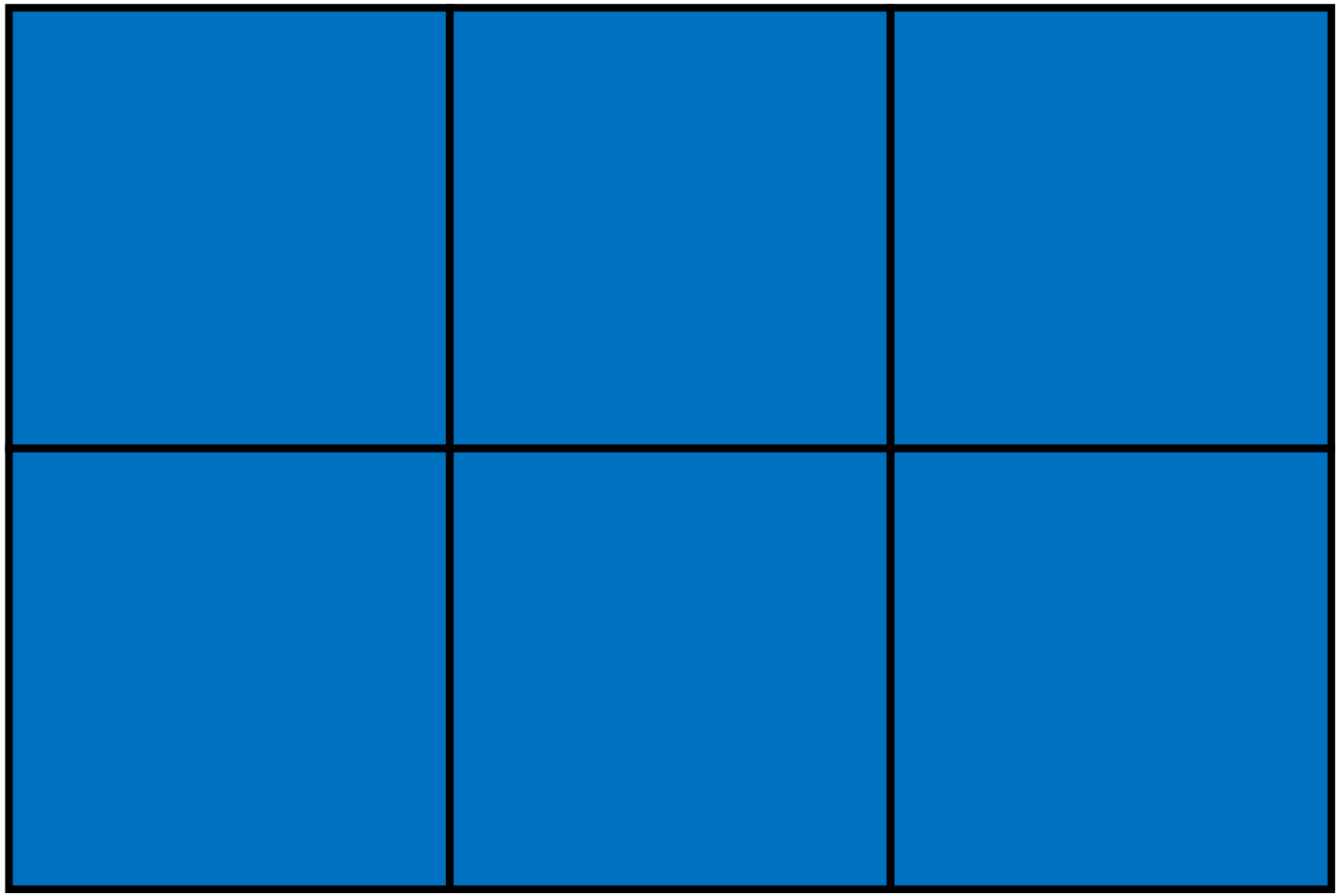
1:1



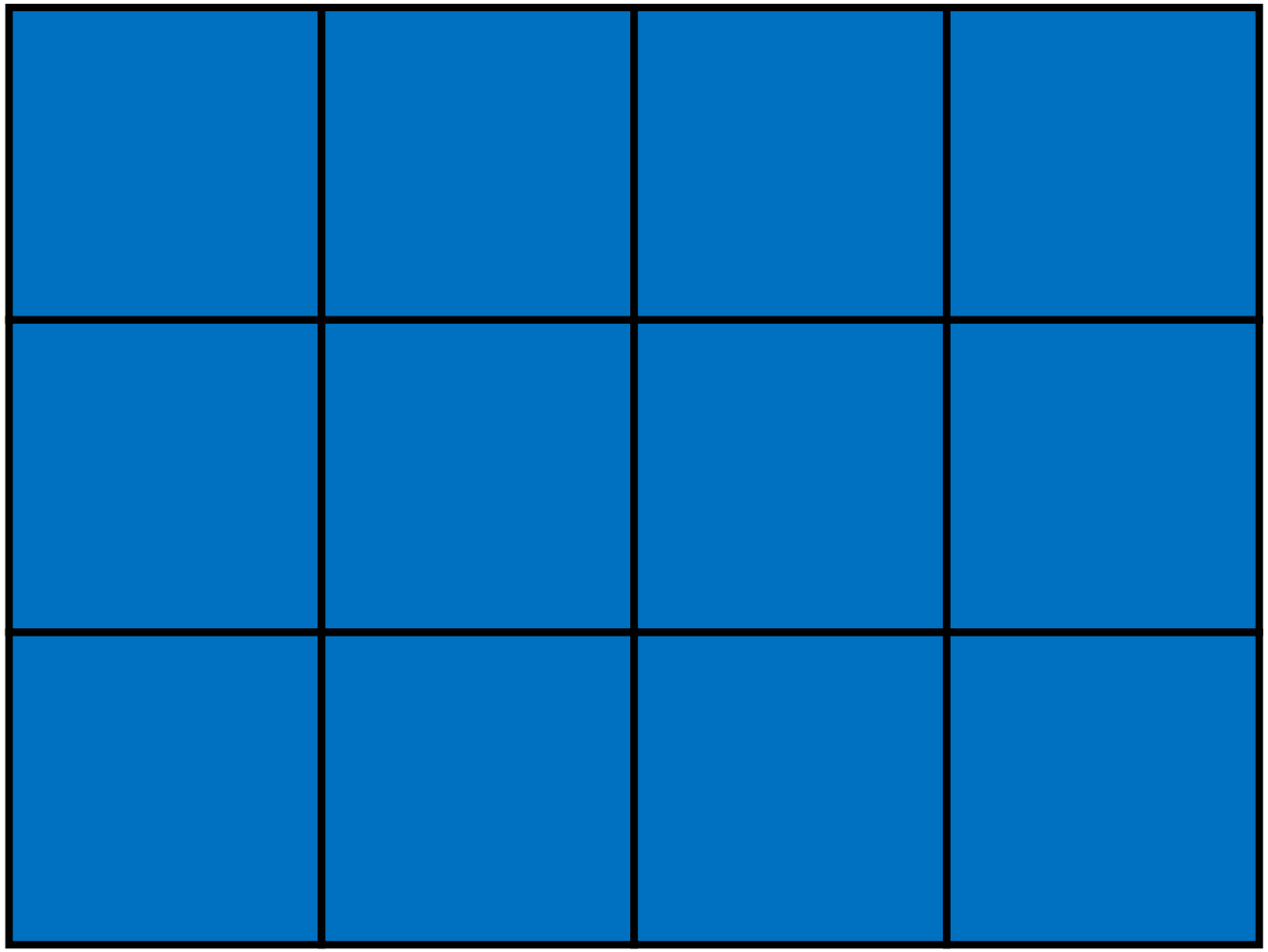
2:1



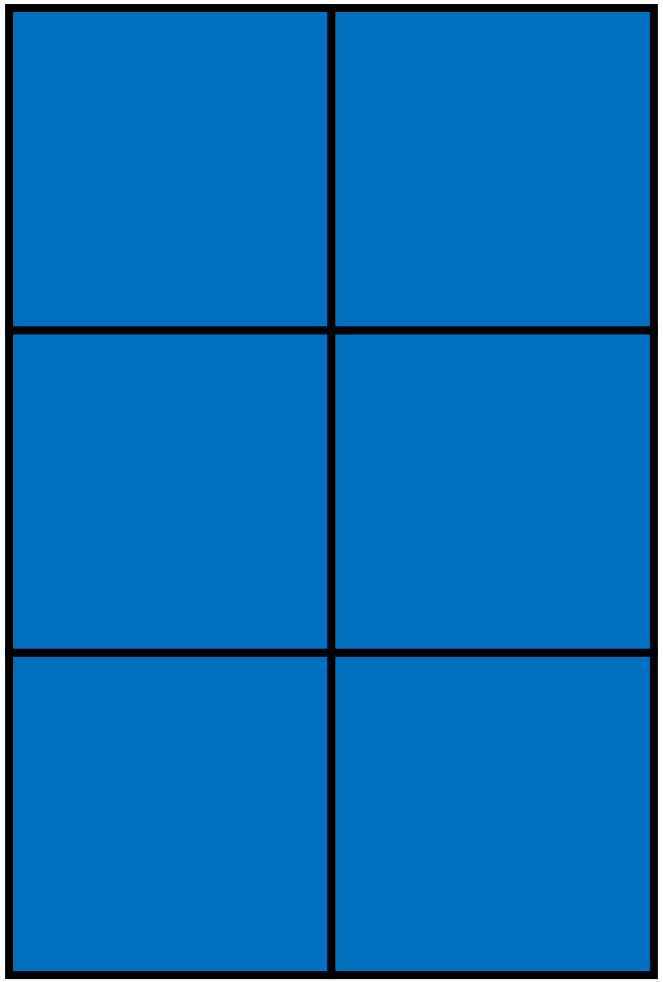
3:2

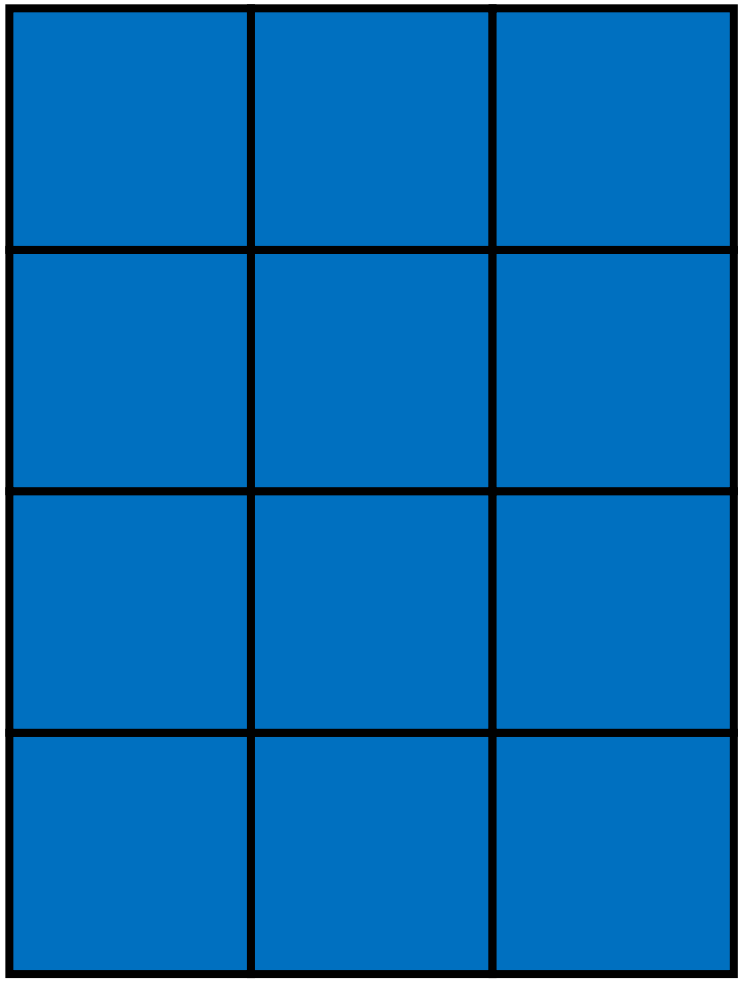


4:3

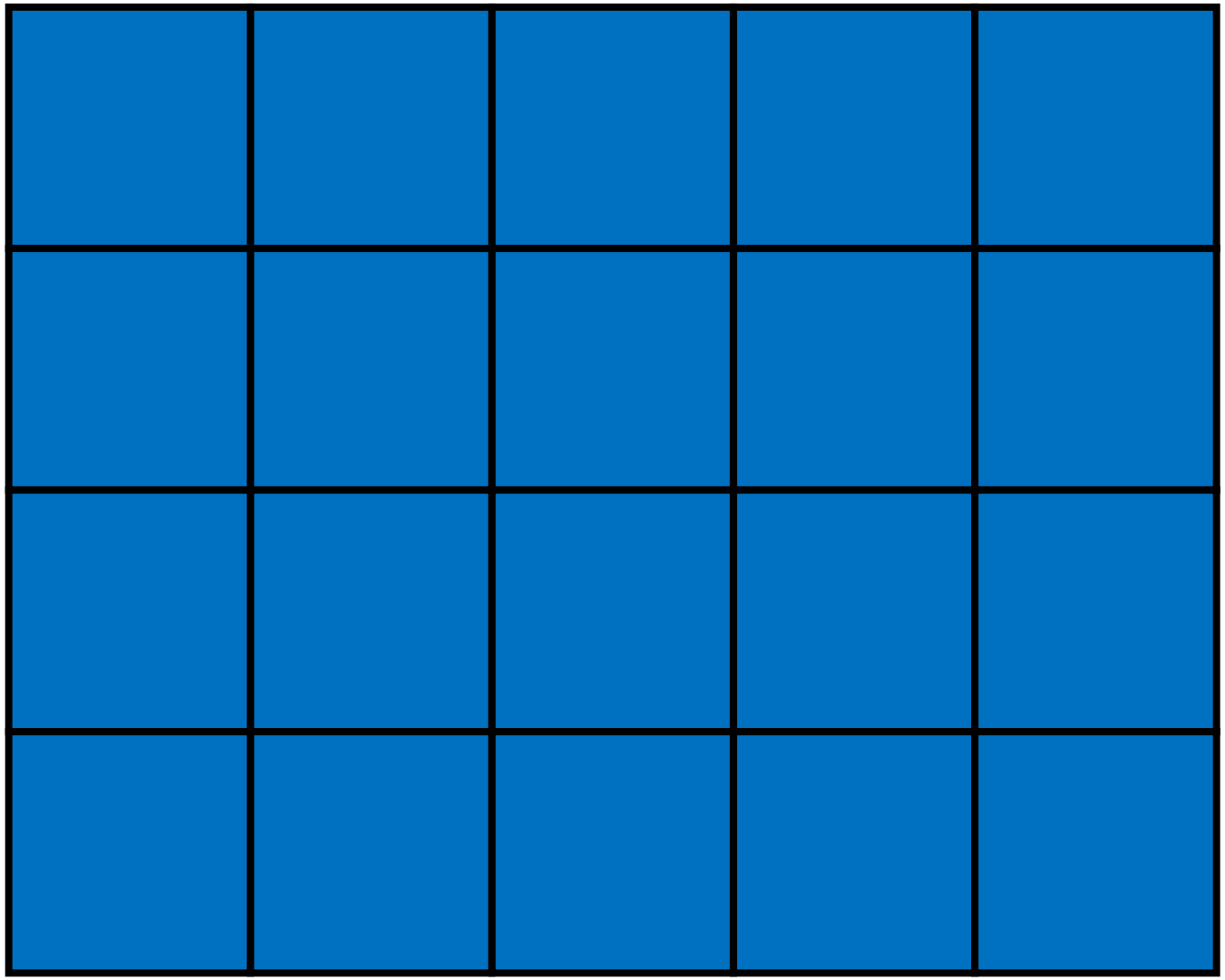


2:3 and 3:4

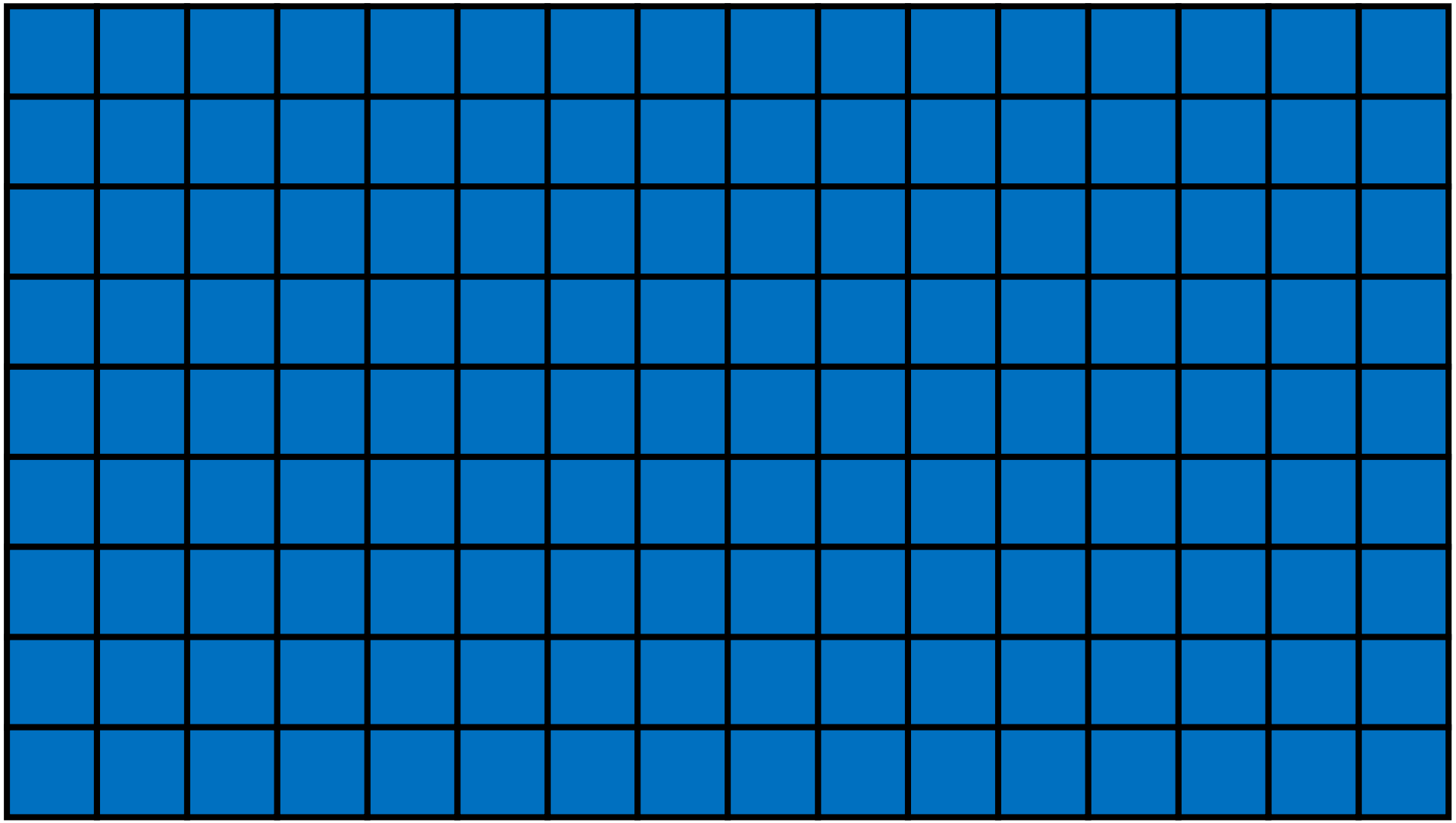




5:4



16:9

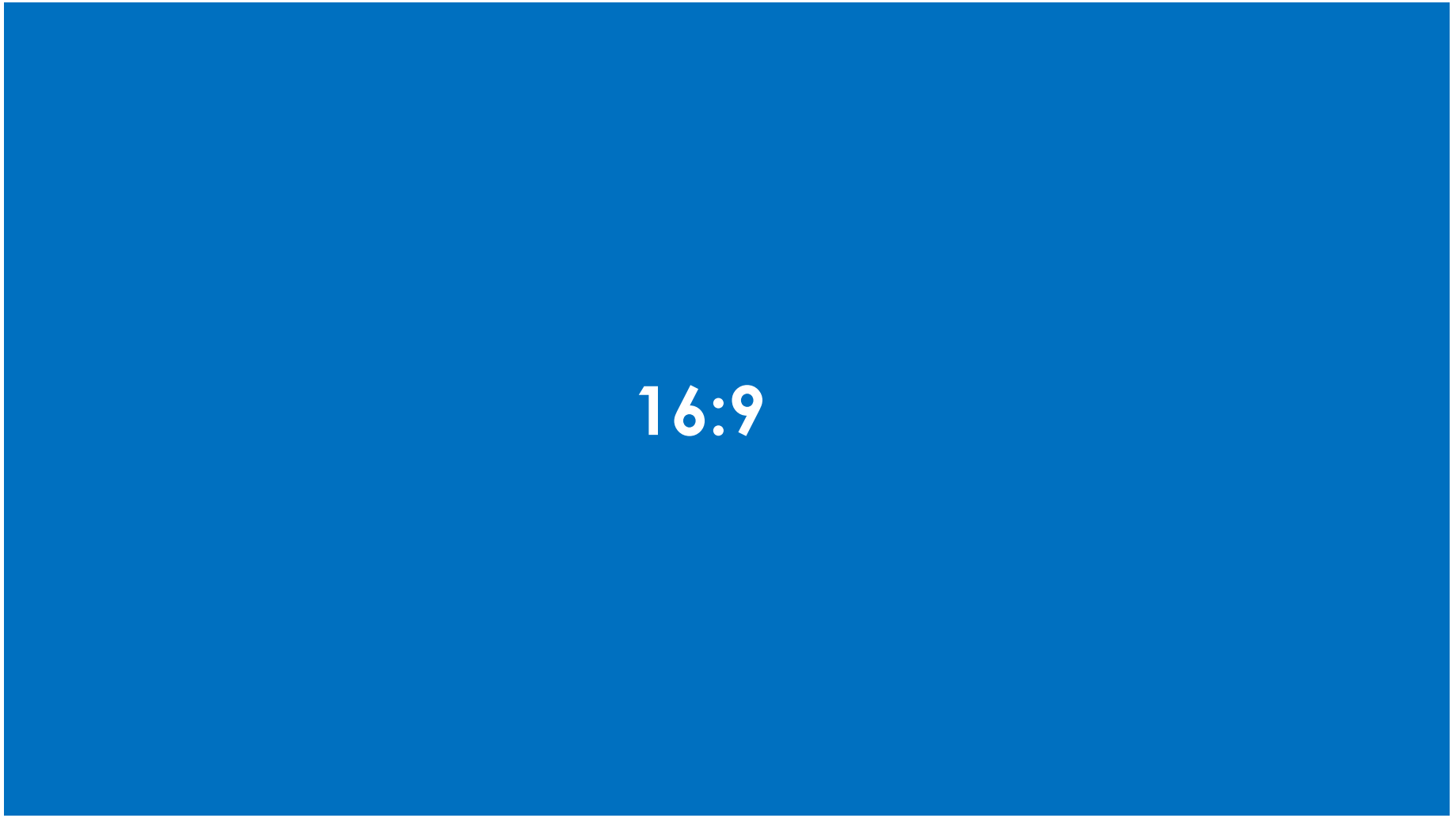


Matching Two Aspect Ratios

- Nomenclature
  - *Bounding Box*
  - *Canvas* and *Paint*

- Matching Methods
  - *Fit*
  - *Fill*
  - *Stretch*

The problem...



3:2

2:3

2:1

16:9

“Fit” may leave blank canvas

“Fill” may crop the image

“Stretch” may distort the image

Pixel Dimensions

How size and shape interact

Pixel Dimensions

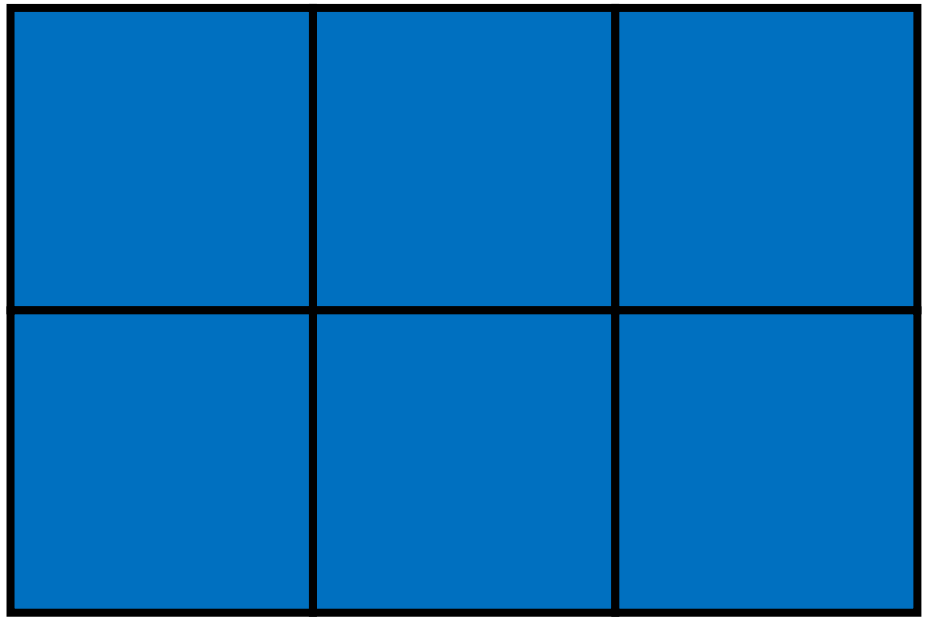
Good News:

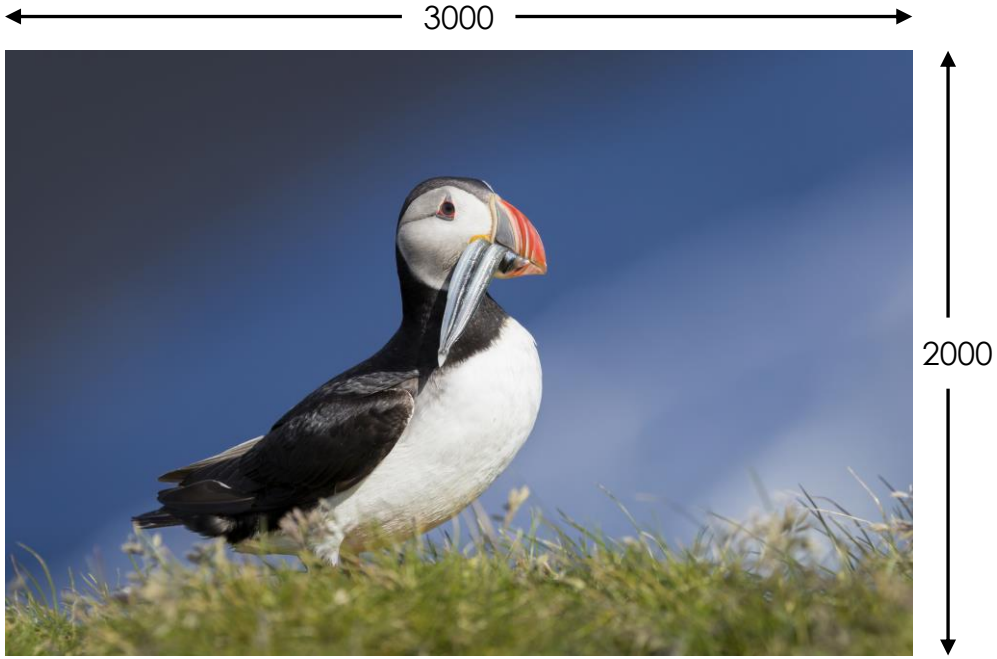
In Photography **pixels are square**

$$\textit{Aspect Ratio} = \frac{\text{Image Width } \textbf{in Pixels}}{\text{Image Height } \textbf{in Pixels}}$$

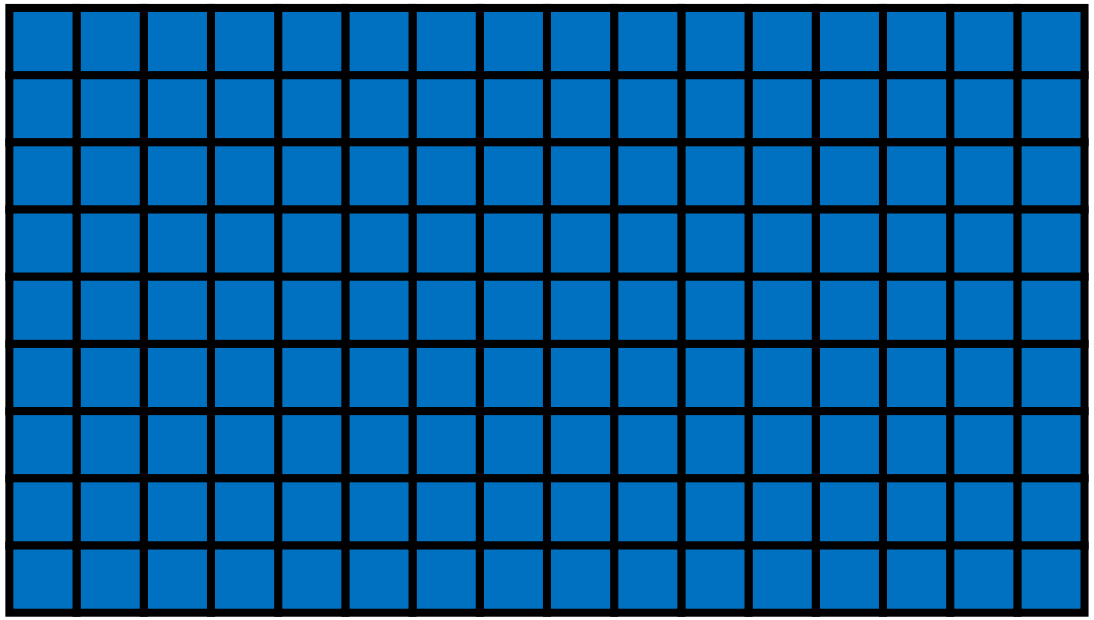
Note: "Pixel Dimensions" are sometimes referred to as "Resolution"

3:2





16:9



Other 16:9 sizes

- 1920 × 1080
  - "Full HD" (*HD* or *FHD*)

- 3840 × 2160
  - "Ultra HD" (*UHD*)

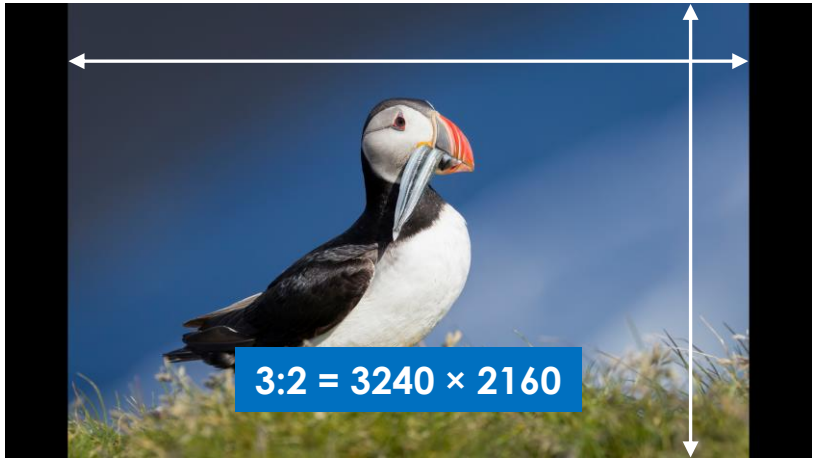
Note:

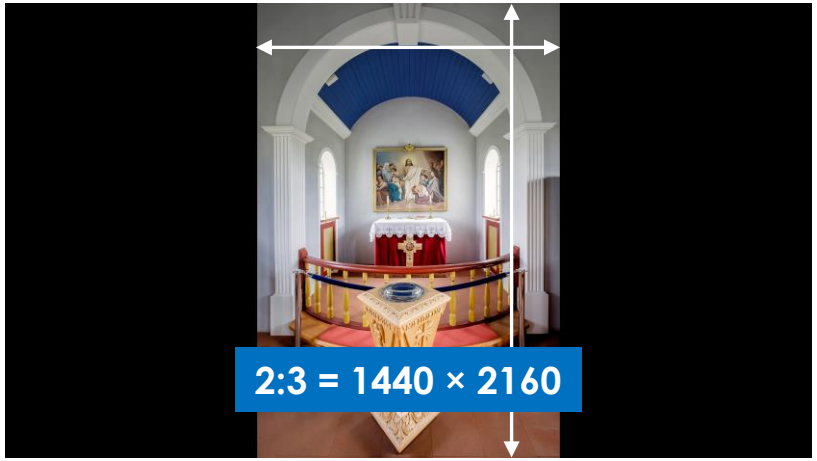
"2K" — Width ≈ 2000px
"4K" — Width ≈ 4000px

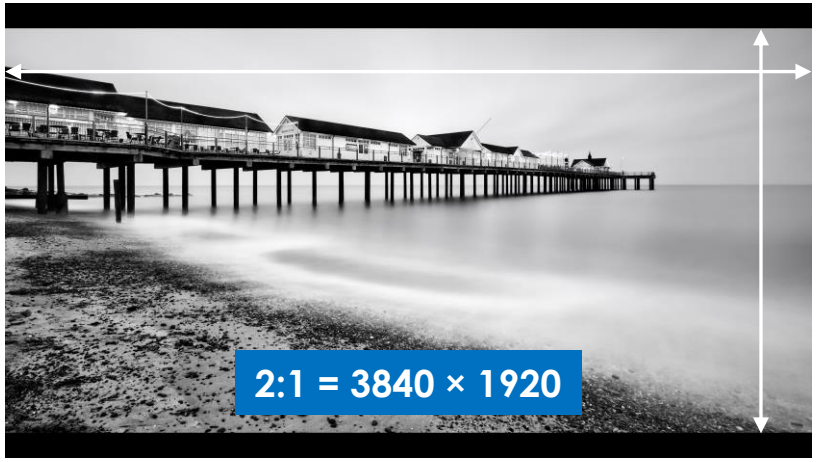
Common Monitor/Projector dimensions

- **4:3**
  - 1024 × 768
  - 1400 × 1050
  - 1600 × 1200
- **16:9**
  - 1920 × 1080
  - *3840 × 2160* ← *RPS Projector*
- **16:10**
  - 1920 × 1200

“Fit” dimensions for a 3840 × 2160 Canvas







Dimension Limitations — 16:9 canvas

Height limited:

2 ÷ 3 = *0.6666*

3 ÷ 4 = *0.75*

1 ÷ 1 = *1.0*

5 ÷ 4 = *1.25*

4 ÷ 3 = *1.3333*

3 ÷ 2 = *1.5*

16 ÷ 10 = *1.6*

Width limited:

2 ÷ 1 = *2.0*

Canvas

16 ÷ 9 = *1.7777*

Dimension limitations — 4:3 canvas

Height limited:

2 ÷ 3	=	*0.6666*
3 ÷ 4	=	*0.75*
1 ÷ 1	=	*1.0*
5 ÷ 4	=	*1.25*

Width limited:

3 ÷ 2	=	*1.5*
16 ÷ 10	=	*1.6*
16 ÷ 9	=	*1.7777*
2 ÷ 1	=	*2.0*

Canvas

4 ÷ 3 = *1.3333*

Physical Size

Pixels displayed in the real world

Same *Pixel Dimensions*, different *Physical Size*

To scale:

13" Laptop
27" Monitor
RPS Projection

3840 × 2160 image at 1:1

Resolution? What Resolution?

- Actual “Resolution” values (3840 × 2160)
  - 13” Laptop ≈ 340ppi
  - 27” Monitor ≈ 164ppi
  - RPS Projection ≈ 27ppi

Clearly…

Embedded “Resolution” metadata value is being ignored!

Same monitor size, different pixel dimensions

27” UHD (3840 × 2160)

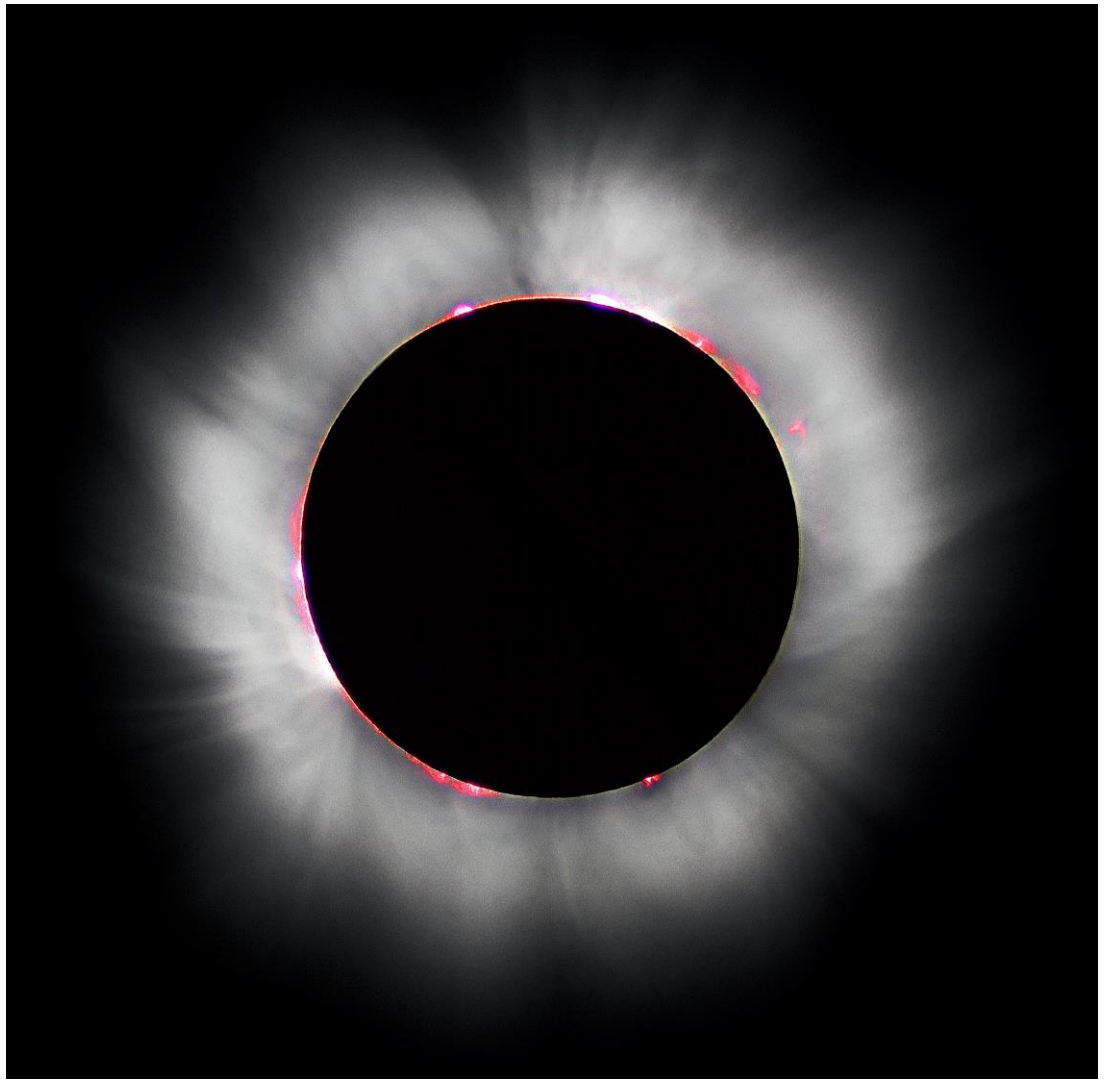
164ppi

3840 × 2160 image at 1:1

27” FHD (1920 × 1080)

82ppi

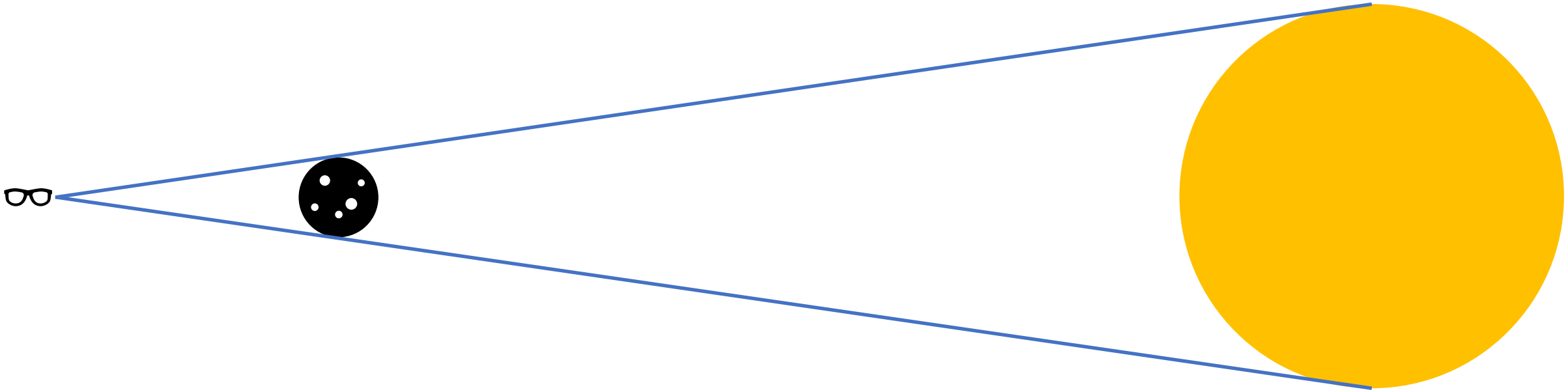
A sense of perspective…



Solar Eclipse 1999

(Image: Wikimedia Commons)

Solar eclipse, viewed from Earth



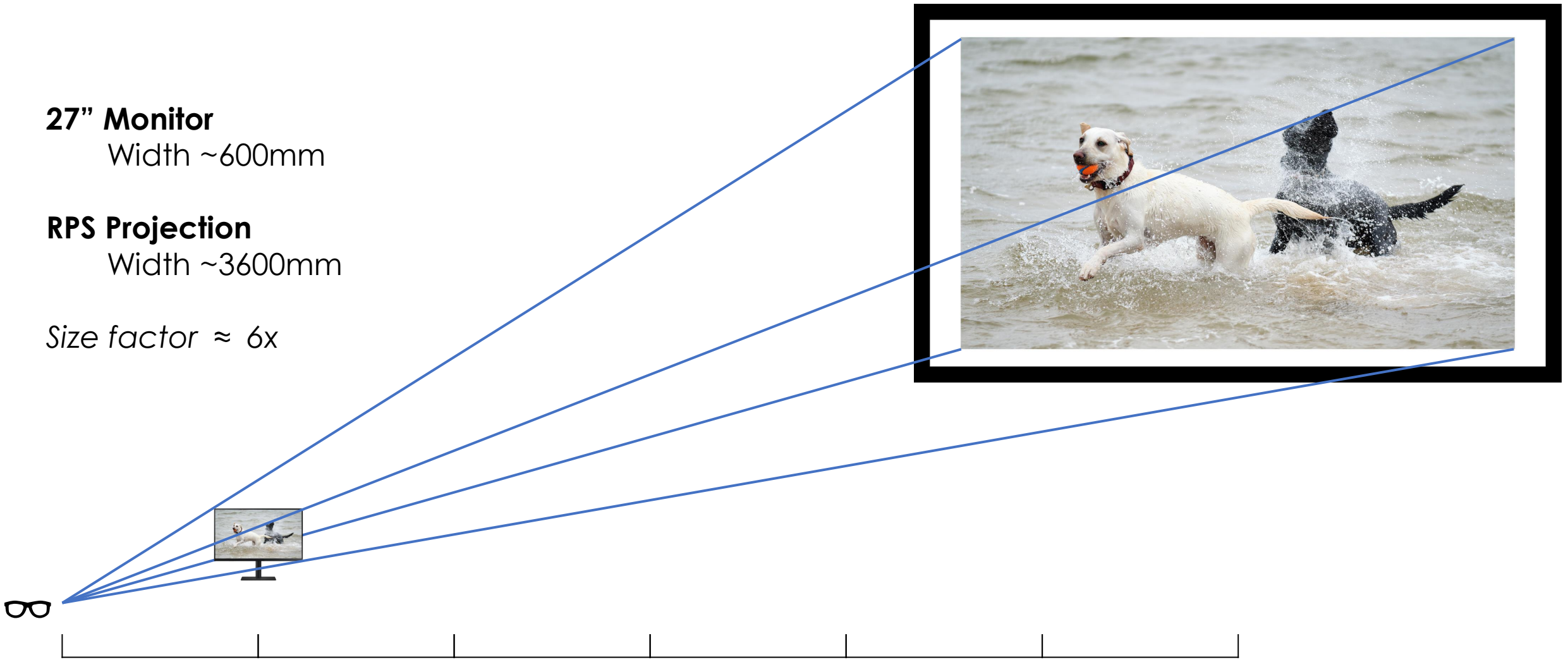
Not to scale!

Monitor “eclipse”

27” Monitor
Width ~600mm

RPS Projection
Width ~3600mm

Size factor ≈ 6x



Quality: it's all relative…

RPS Projection Screen is viewed from ~*3.75m*

Equivalent viewing distance for 1:1 display (size factor ~6x)

27" 3840 × 2160 Monitor

(3.75m ÷ 6) = *625mm*

27" 1920 × 1080 Monitor

(3.75m ÷ 6) × 2 = *1250mm*

Some other equivalent viewing distances

- 42” 3840 × 2160 Television
  - Size factor ~4x *viewing distance ~900mm*
- 55” 3840 × 2160 Television
  - Size factor ~3x *viewing distance ~1200mm*
- 24” 3840 × 2160 Monitor
  - Size factor ~7x *viewing distance ~500mm*
- 24” 1920 × 1080 Monitor
  - Size factor ~7x *viewing distance ~1000mm*

Checking Image Quality

Lightroom

View at **1:1**

Photoshop

View at **100%** magnification

Viewing distance

Depends on monitor **size** and **pixel dimensions**

Digital Image Requirements

The six commandments…

1. File Type

JPEG

- Not
  - TIFF
  - PNG
  - PSD
  - JPEG2000
  - JPEG-Stereo
  - *…or anything else!*

2. File Naming

<2digits>.jpg

- Examples
  - 01.jpg, 02.jpg, 03.jpg, …
  - 10.jpg, 11.jpg, 12.jpg, …

- Not
  - 1.jpg, 2.jpg, 3.jpg, …
  - 01.jpeg, 02.jpeg, 03.jpeg, …
  - o1.jpg, o2.jpg, o3.jpg, …

3. Maximum Dimensions

3840px (wide) × 2160px (high)

- In other words…
  - Not **wider** than 3840px ***AND***
  - Not **taller** than 2160px

Smaller images projected *as is*, padded with **black**

(Minimum recommended: 1920px × 1080px or ¼ of the projection area)

4. Image Quality

Maximum

- Highest value available
  - 100% in Lightroom, Capture One, etc.
  - 12 in Photoshop

(Lower values may introduce posterization or JPEG "block" artefacts)

5. Colour Space

RGB

- Not
  - Greyscale
  - CMYK
  - Lab
  - *…or anything else!*

6. Embedded Colour Profile

sRGB

- Not
  - AdobeRGB
  - ProPhotoRGB
  - DisplayP3
  - *…or anything else!*

(Wrong — or missing — colour profile may result in unpredictable or inaccurate contrast and colour rendition)

The dreaded “Resolution” value…

- Simply a piece of metadata, stored in the file
  - **Ignored during projection!**
- Only used for two things
  - Printing
  - Text
- Set to **300ppi** if requested

Image Preparation Checklist

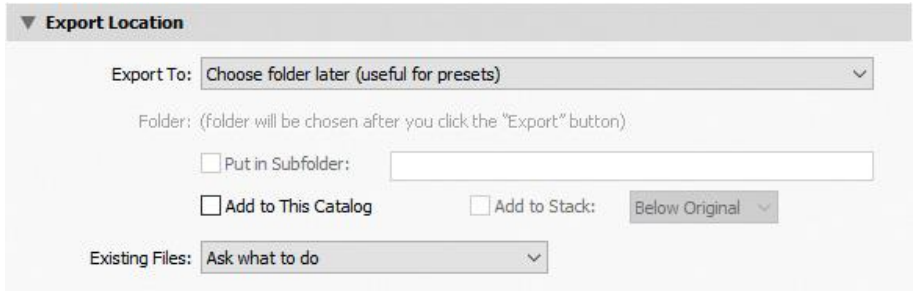
✓	Property	Value	More Information
✓	**File Type**	**JPEG**	Please do not send *TIFF*, *PSD*, *PNG* or any other file type
✓	**File Naming**	**01.jpg 02.jpg** **03.jpg 04.jpg** etc.	**Two digits** with "**.jpg**" suffix **10** files for **LRPS** **15** files for **ARPS** **20/21** files for **FRPS**
✓	**Maximum Dimensions**	**3840 x 2160**	**Not wider** than **3840** pixels ***AND*** **Not taller** than **2160** pixels
✓	**Image Quality**	**Maximum**	**100%** in Lightroom, Capture One, etc. **12** in Photoshop
✓	**Colour Space**	**RGB**	Please do not send *Greyscale*, *CMYK*, *Lab*, or any other colour space
✓	**Embedded Colour Profile**	**sRGB**	Please do not send *AdobeRGB*, *ProPhotoRGB*, or any other colour profile
✓	**Resolution**	***(any)***	The "Resolution" metadata value is ignored, but please set it to **300ppi** if a value is requested

Lightroom

Configuring the “Export” function

Lightroom: File Location & Naming

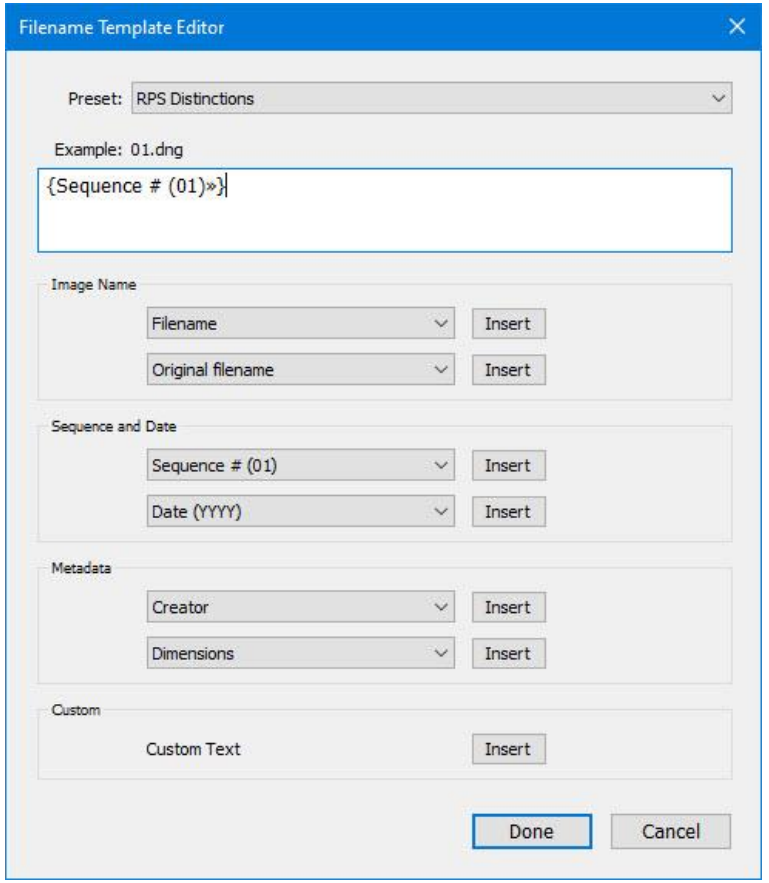
1. Choose Output Location



2a. Rename later *or*

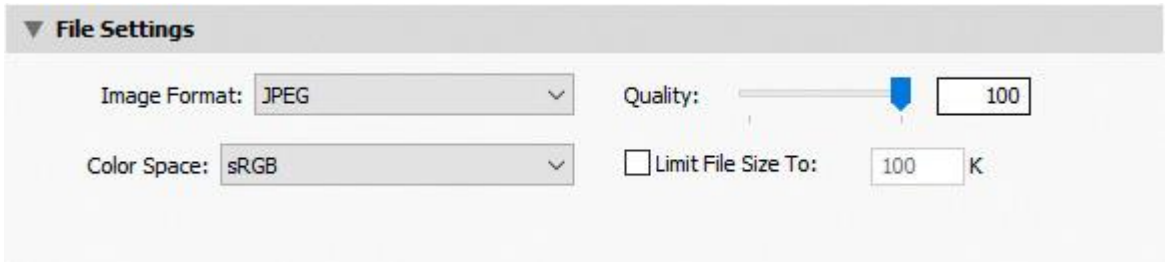
2b. Rename during Export

3. Create a Rename Preset

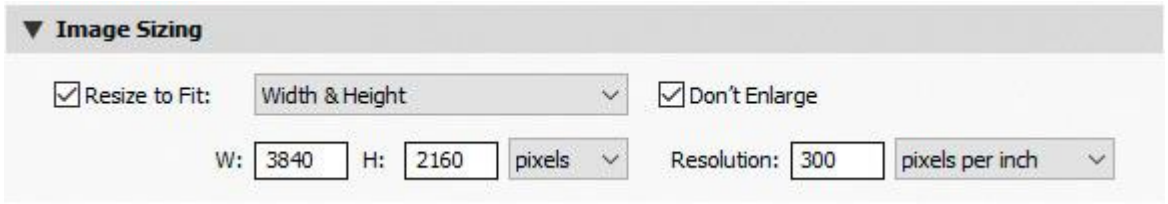


Lightroom: File Settings & Image Sizing

4. JPEG, 100% Quality, sRGB Colour "Space"



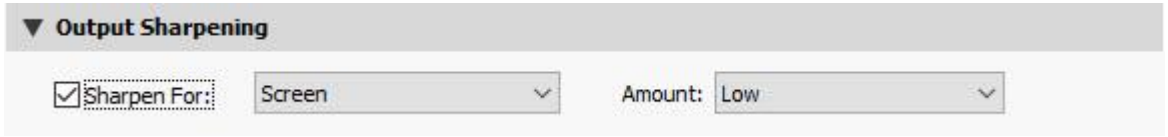
5. Resize Width & Height to 3840px × 2160px (fit), Resolution 300ppi



Lightroom: Output Sharpening

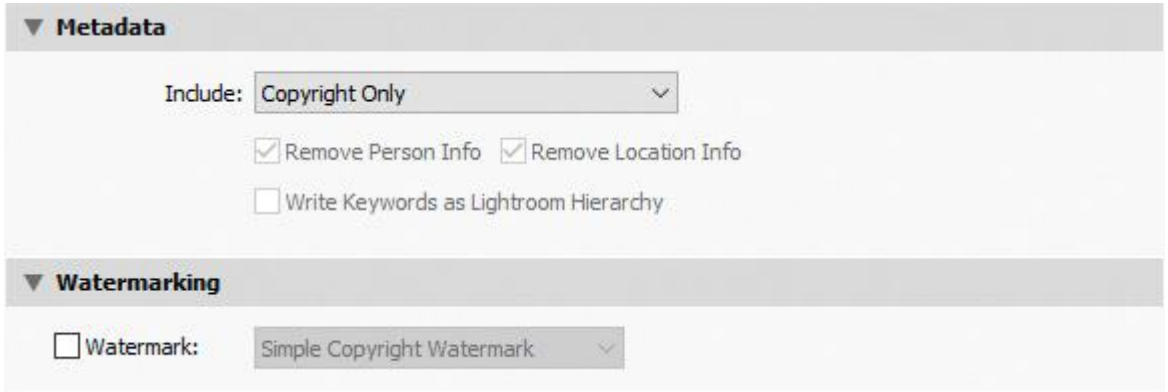
6a. Disable Output Sharpening *or*

6b. Enable Output Sharpening for "Screen" (choose appropriate amount)



Lightroom: Metadata & Watermarking

7. Restrict Metadata (recommended) & Disable Watermarking

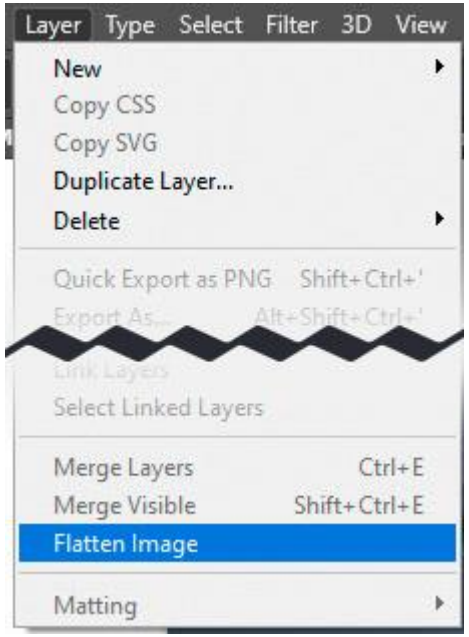


Photoshop

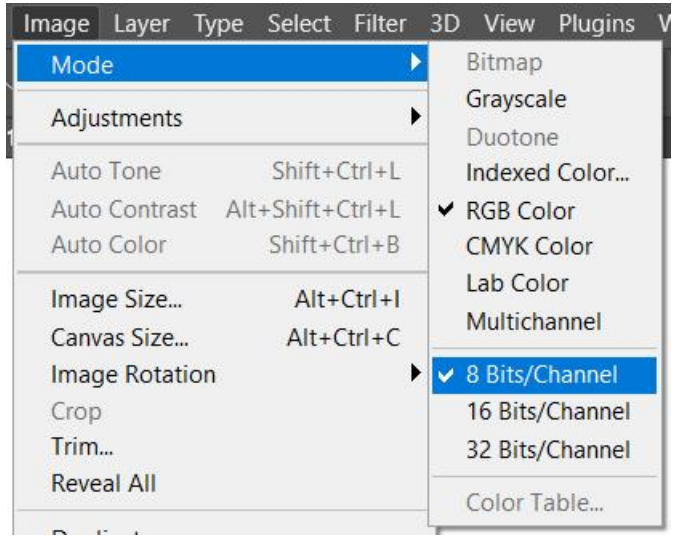
Individual Image Export

Photoshop: Flatten & Image Mode

1. Layer > Flatten Image

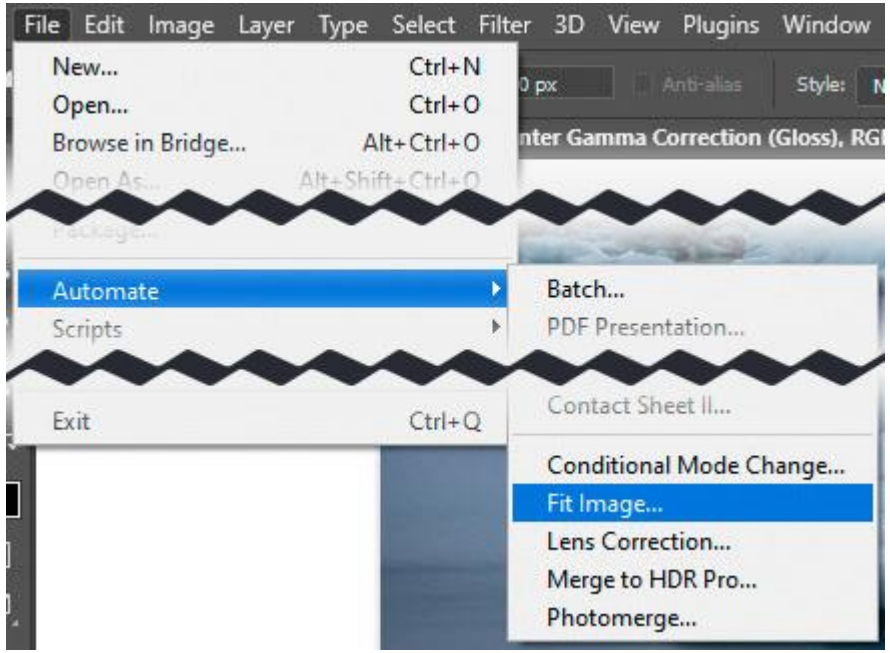


2. Image > Mode > (RGB Colour, 8 Bits/Channel)

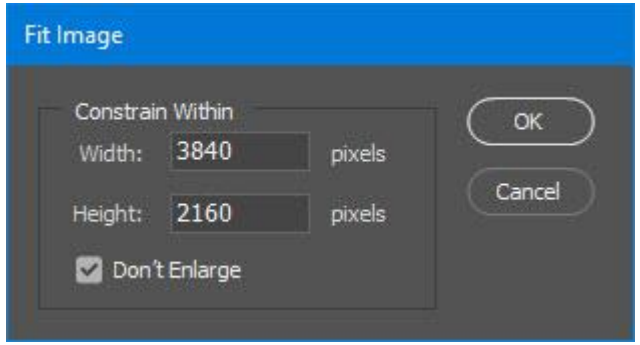


Photoshop: Fit Image

3a. File > Automate > Fit Image…

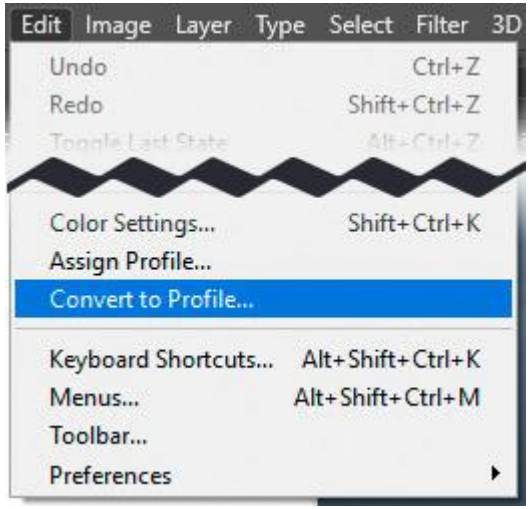


3b. Fit Image to 3840px × 2160px

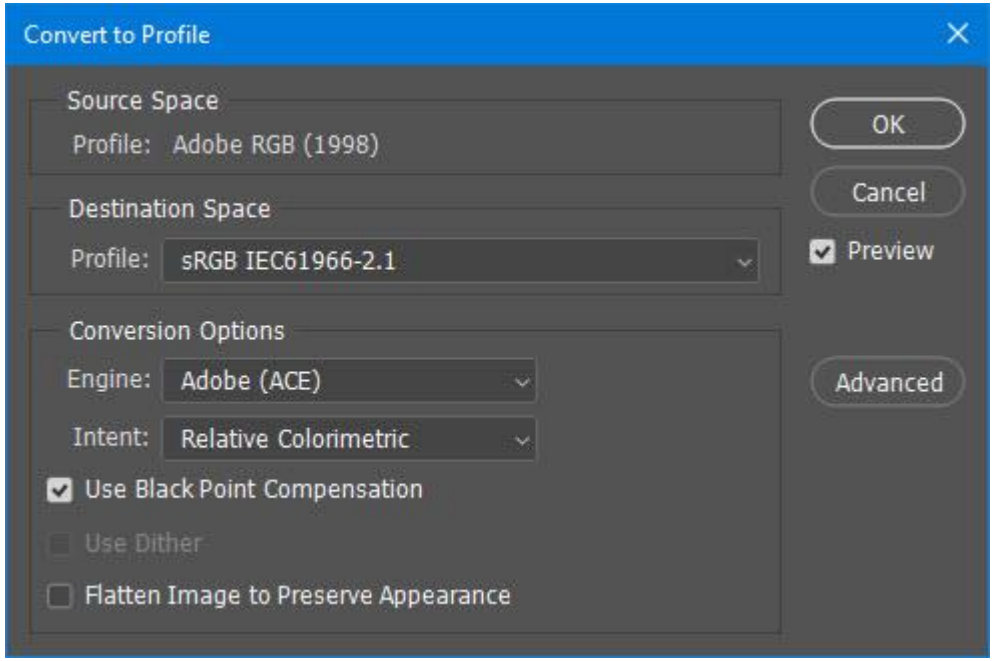


Photoshop: Convert to Profile

4a. Edit > Convert to Profile



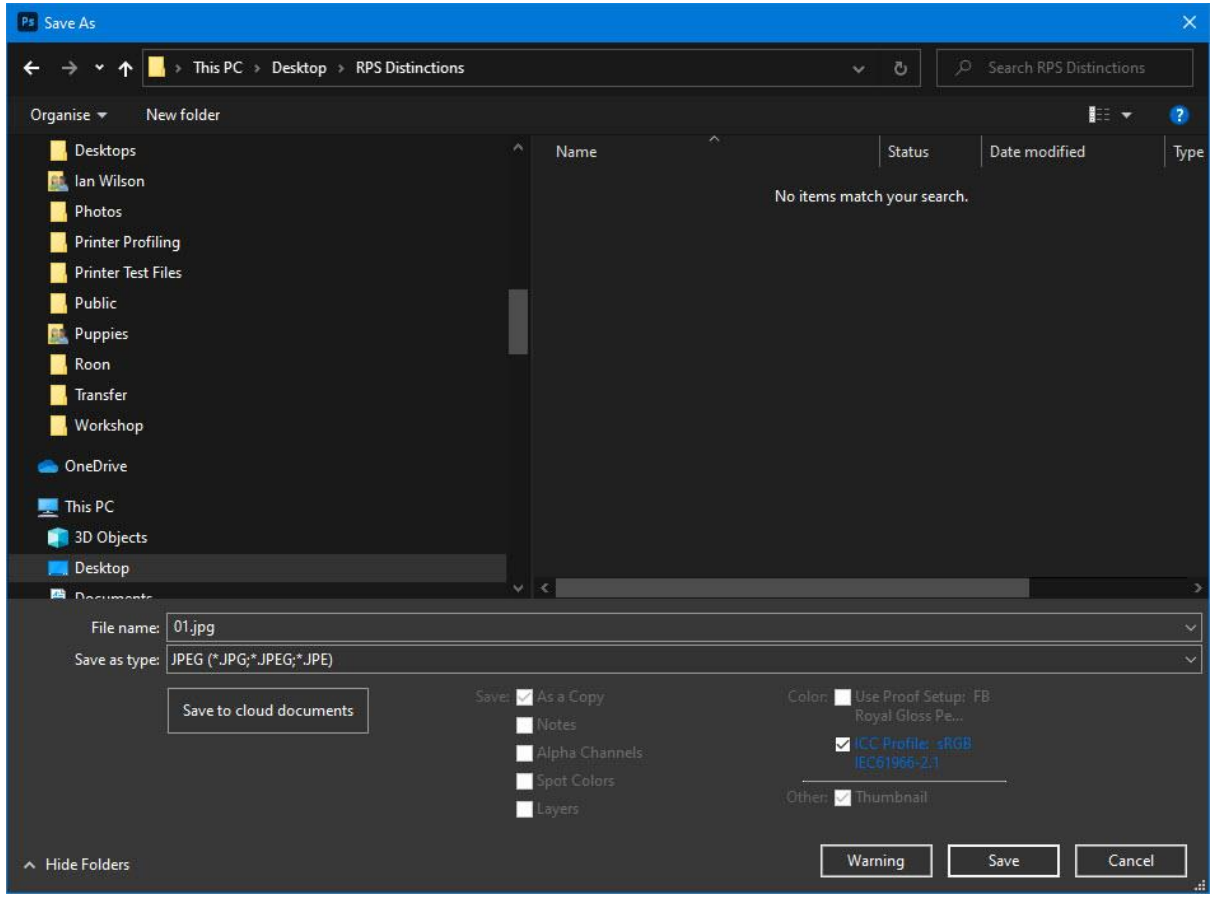
4b. Colour Profile "sRGB", Rendering Intent, Black Point Compensation



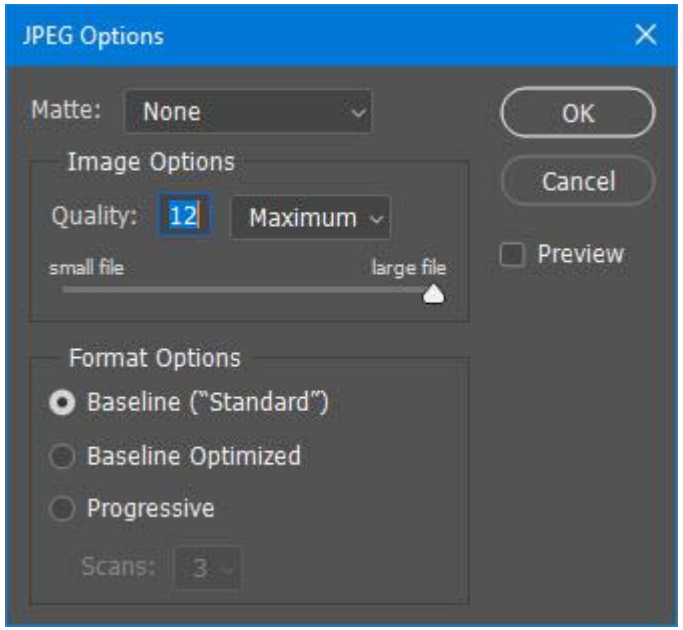
Rendering Intent: "Relative Colorimetric" or "Perceptual", depending on the image

Photoshop: Save As (or *Save a Copy*)

5a. File > Save As… ("JPEG" with filename)



5b. Image Quality "12", Baseline Format

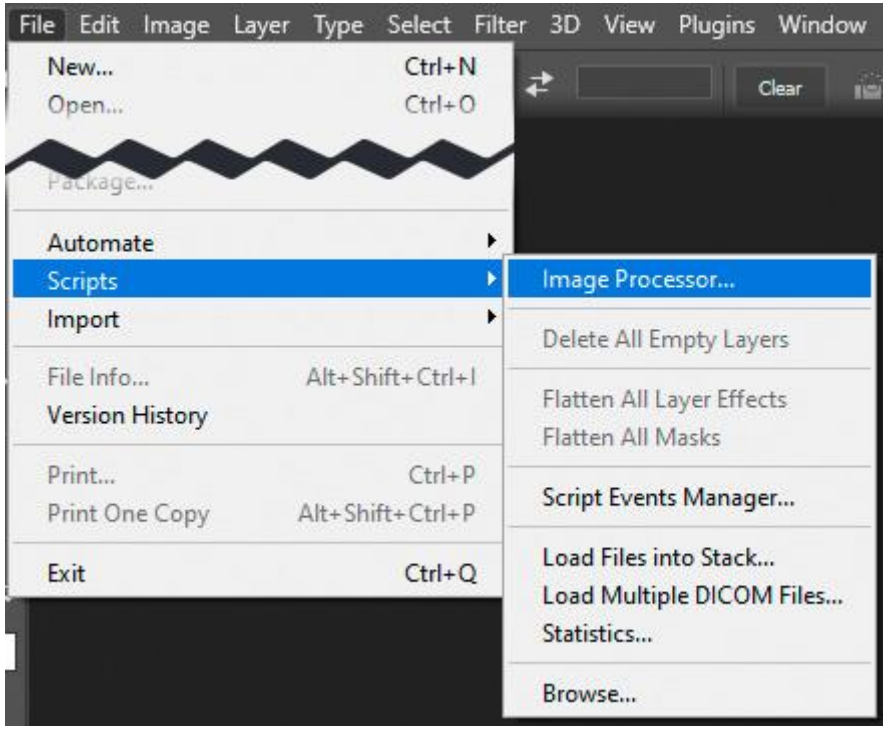


Photoshop

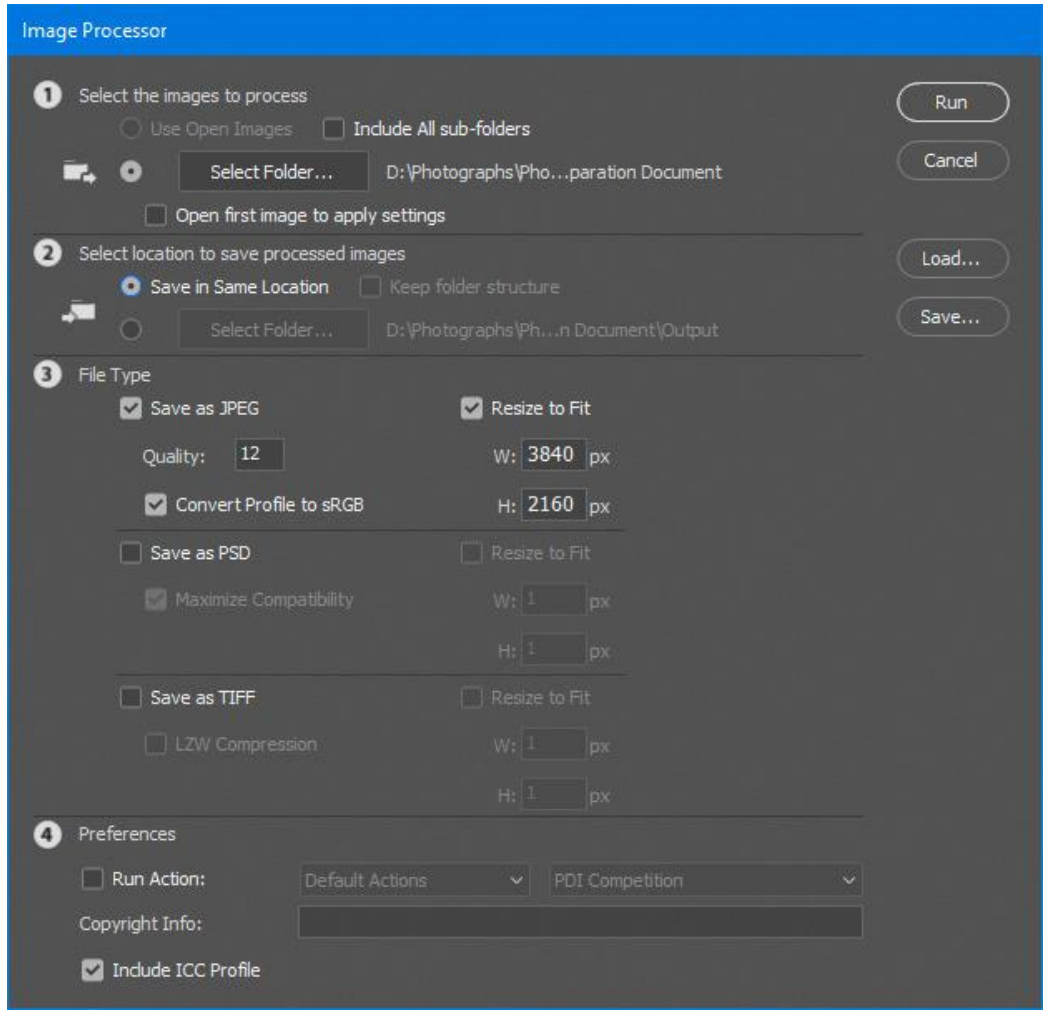
Batch Export using the Image Processor

Photoshop: Image Processor

1. File > Scripts > Image Processor



Photoshop: Image Processor Options



2. Choose the *Source* folder

3. Choose the *Destination* folder

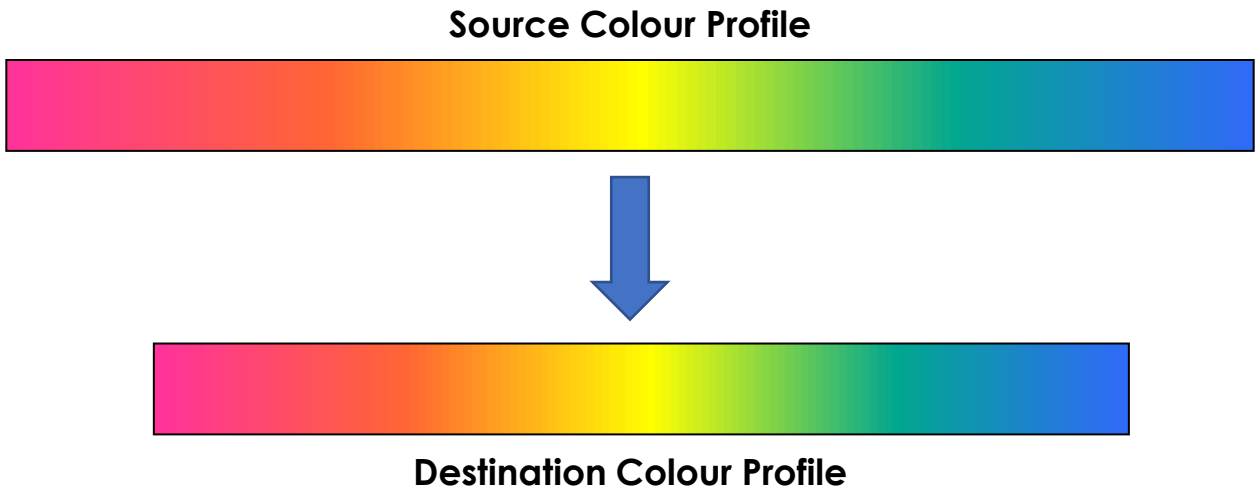
4. Save as JPEG
5. Quality 12 (maximum)
6. Resize to Fit, 3840px × 2160px
7. Convert Profile to sRGB

8. Include ICC Profile

Colour Profile Conversion

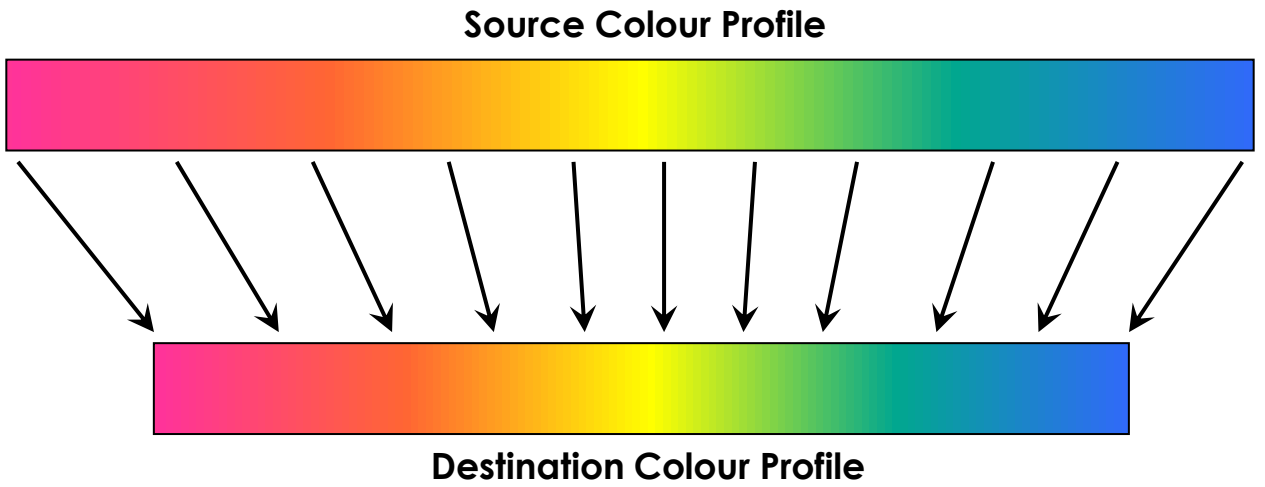
Perceptual or Relative Colorimetric?

The problem

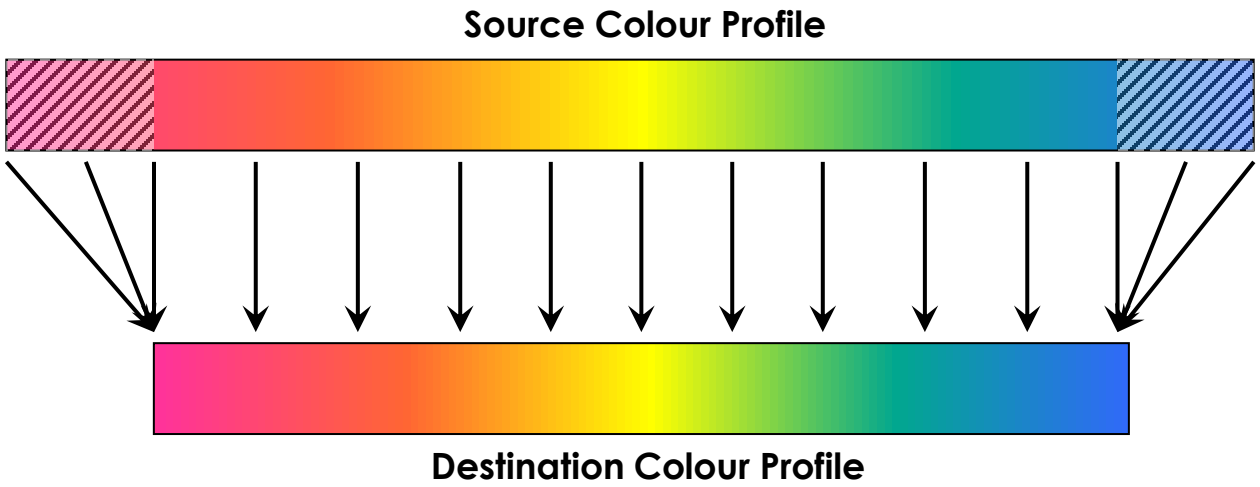


Can't fit a quart into a pint pot!

Perceptual conversion



Relative Colorimetric conversion



Which colour conversion?

- Perceptual
  - Preserves **colour differences**
  - May shift individual colours
  - Use if lots of highly saturated colours

- Relative Colorimetric
  - Preserves **colour accuracy**
  - May clip “out of gamut” colours
  - Good general choice, but beware…

Sharpen after Scale?

Why and by how much?

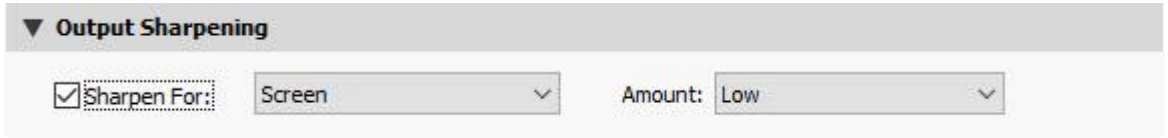
Scaling artefacts

- Different scaling algorithms
  - Preserve smooth gradients
  - Preserve fine details
  - Preserve sharp edges

- Possible artefacts
  - Aliasing
  - Posterization
  - Loss of detail
  - Softening of sharp edges

Post-scale sharpening?

- Lightroom
  - Part of the *Export* process



- Photoshop
  - Must be done manually…
    - …or as part of an Action
  - Not in the *Image Processor*
    - *Filter > Sharpen > Smart Sharpen*

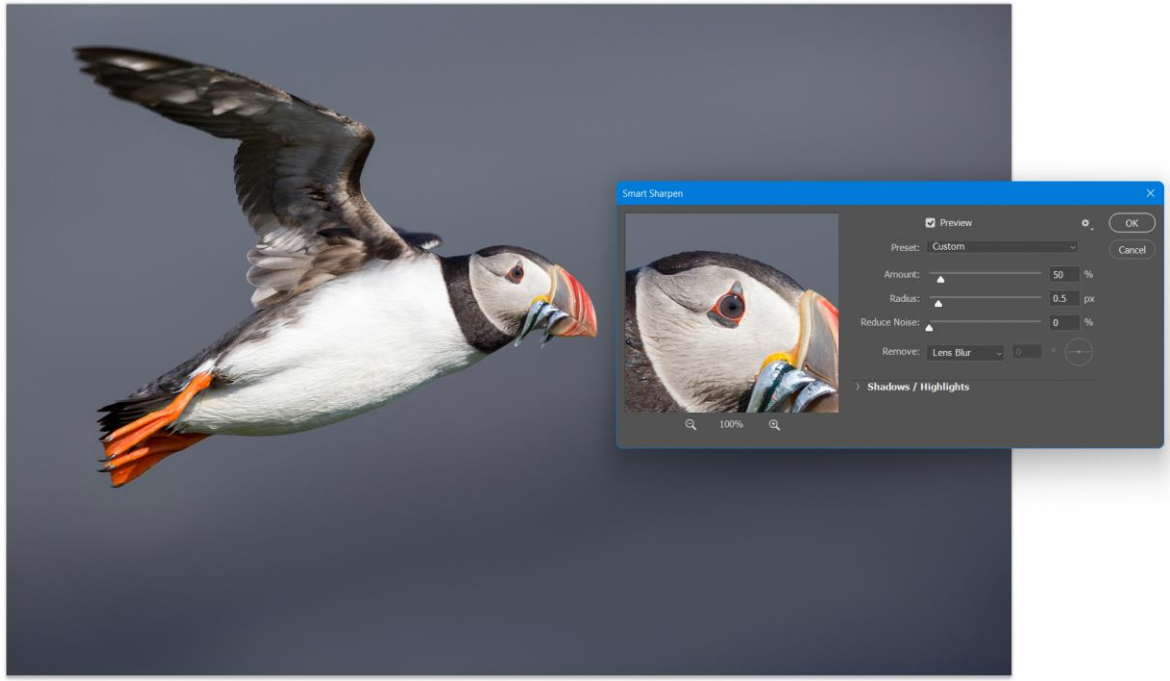


Image dependent!

No magic formula…

Presentation

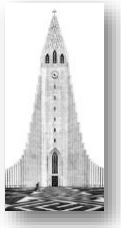
Artistic considerations

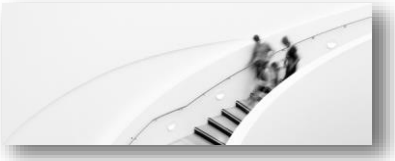
Panel A







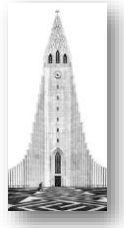


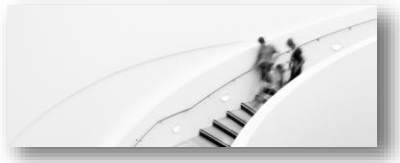
Panel B





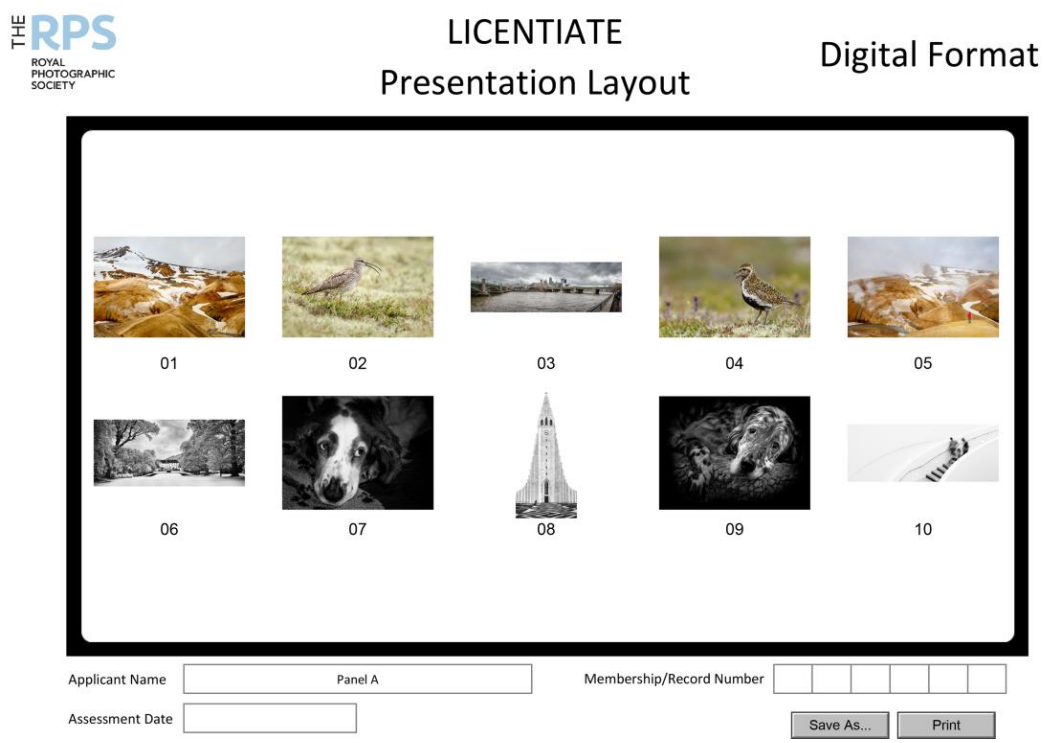


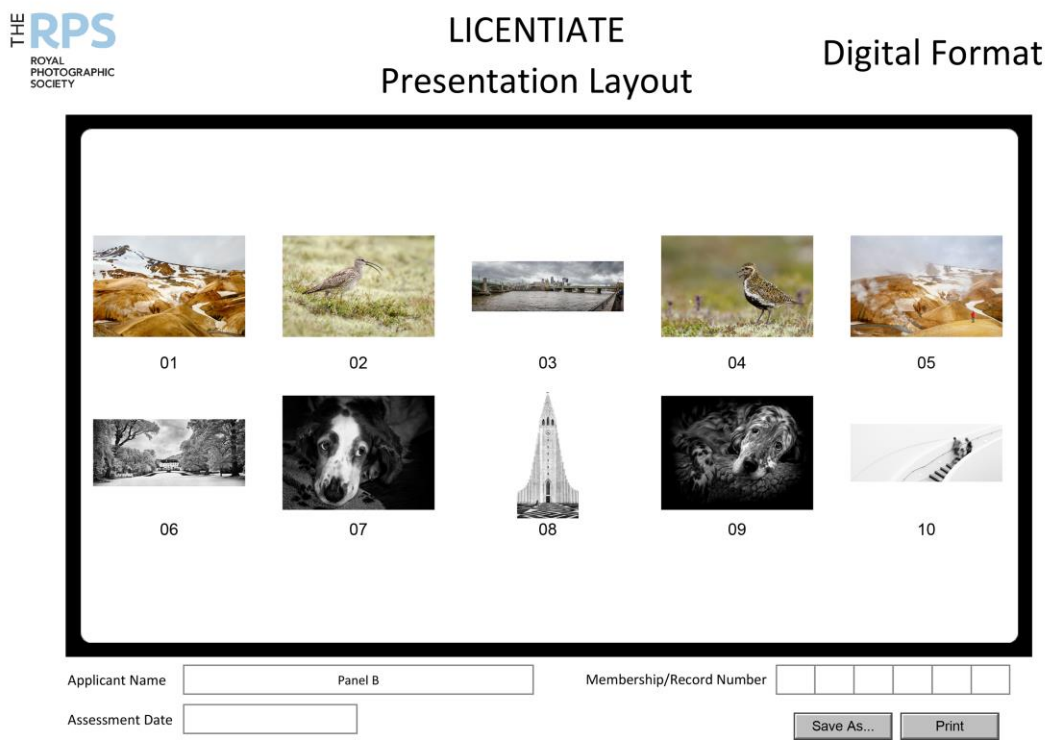


Layouts appear identical…

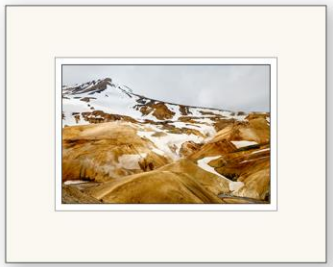
Panel A



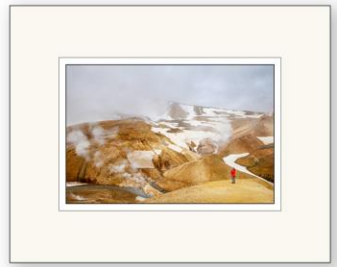
Panel B

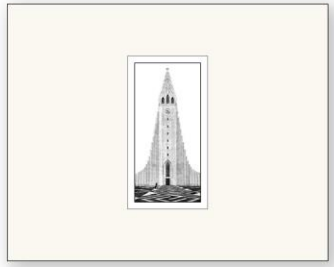


Print Panel A





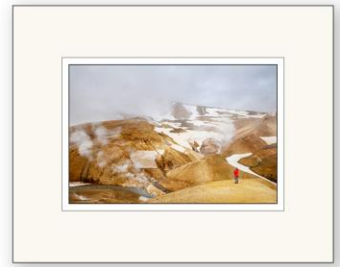


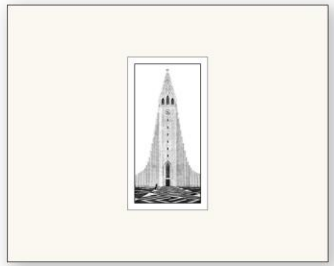



Print Panel B

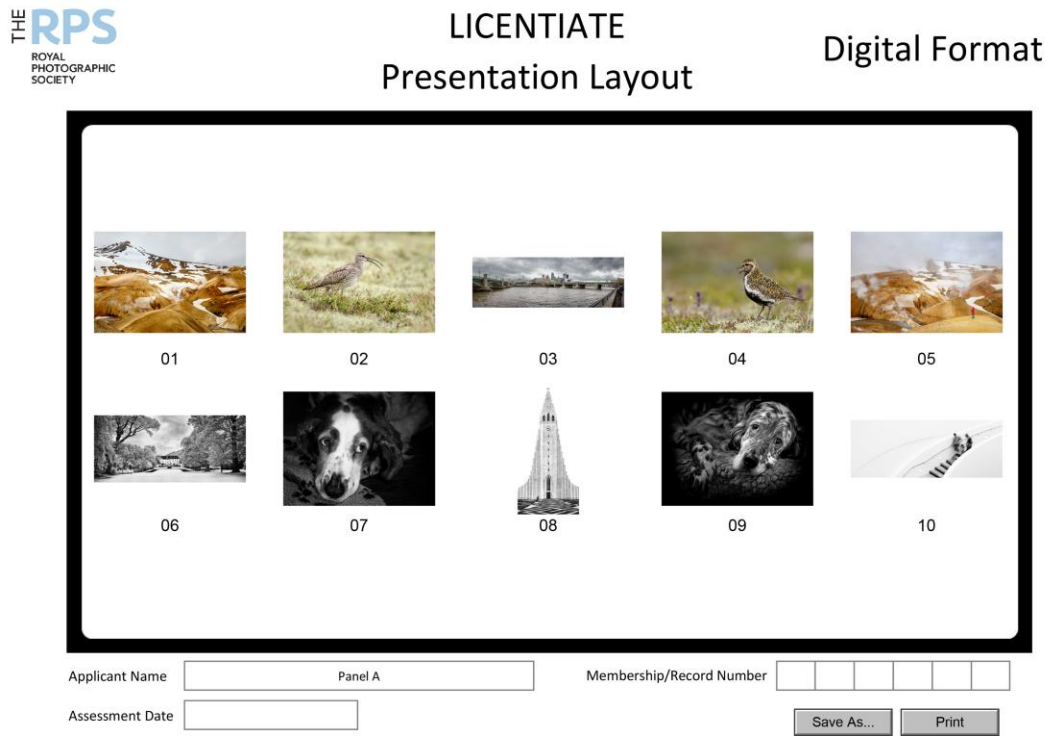






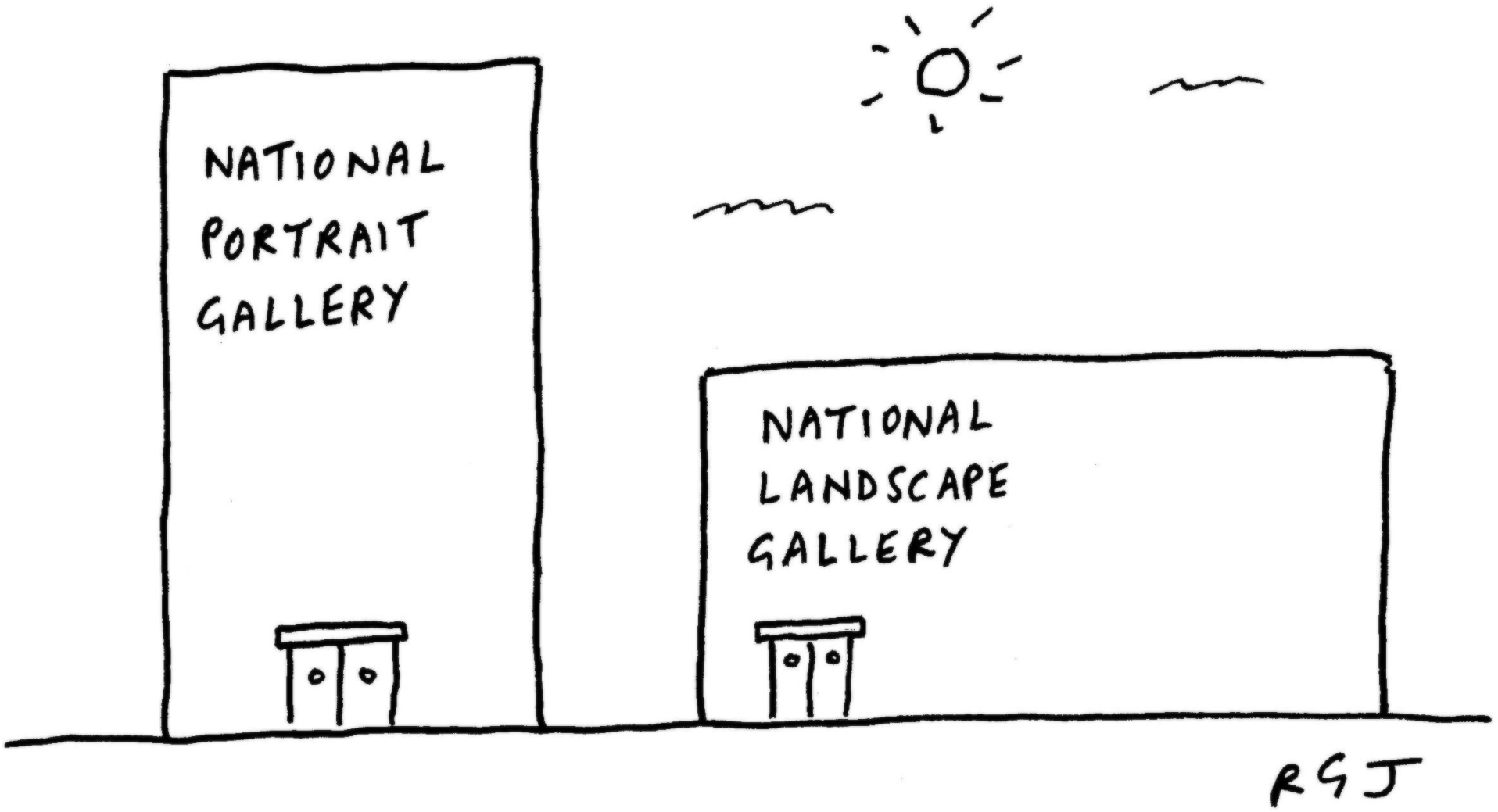
Layout versus Projection



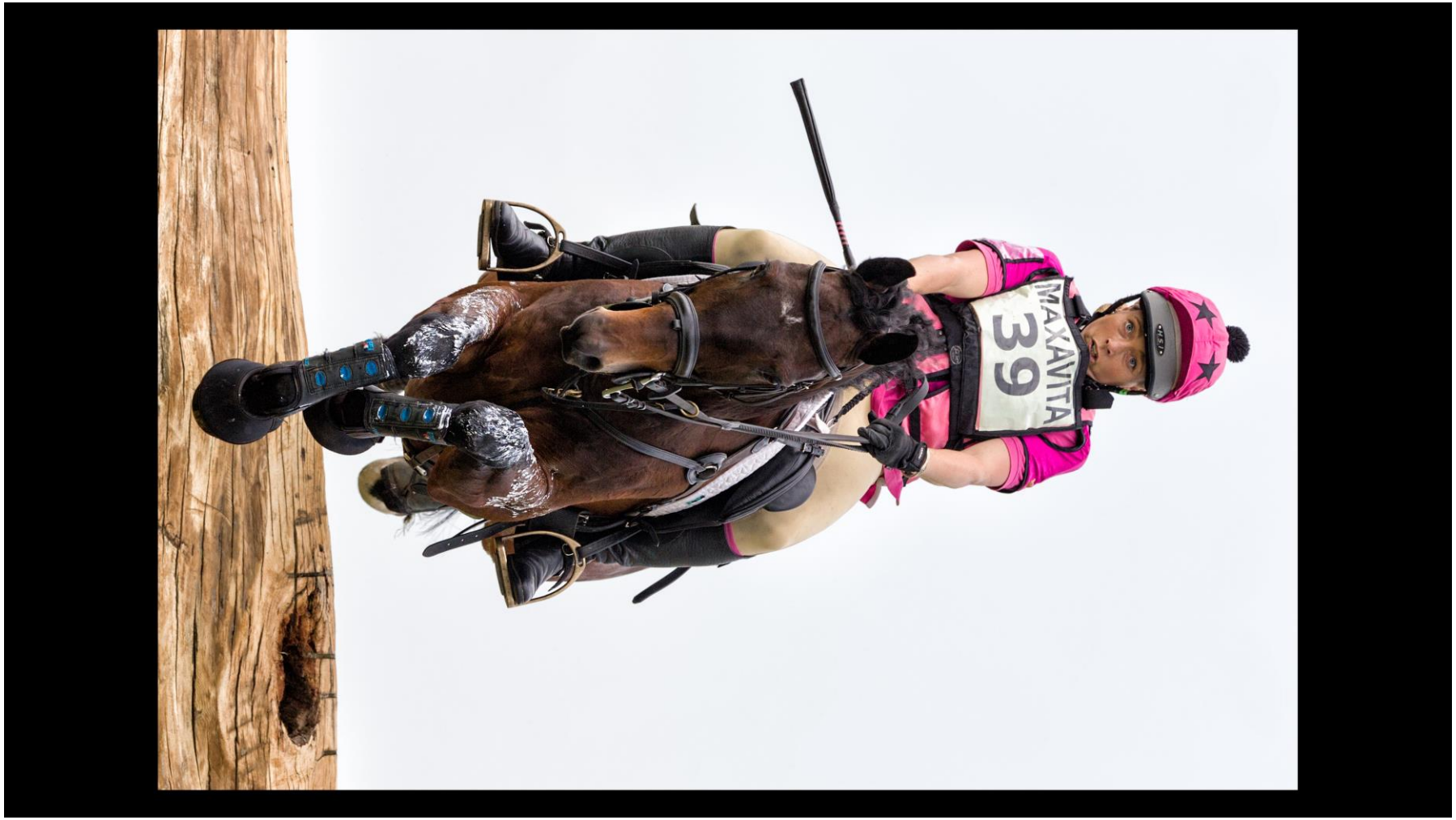
With Keyline (1px, mid-grey)

Common Mistakes

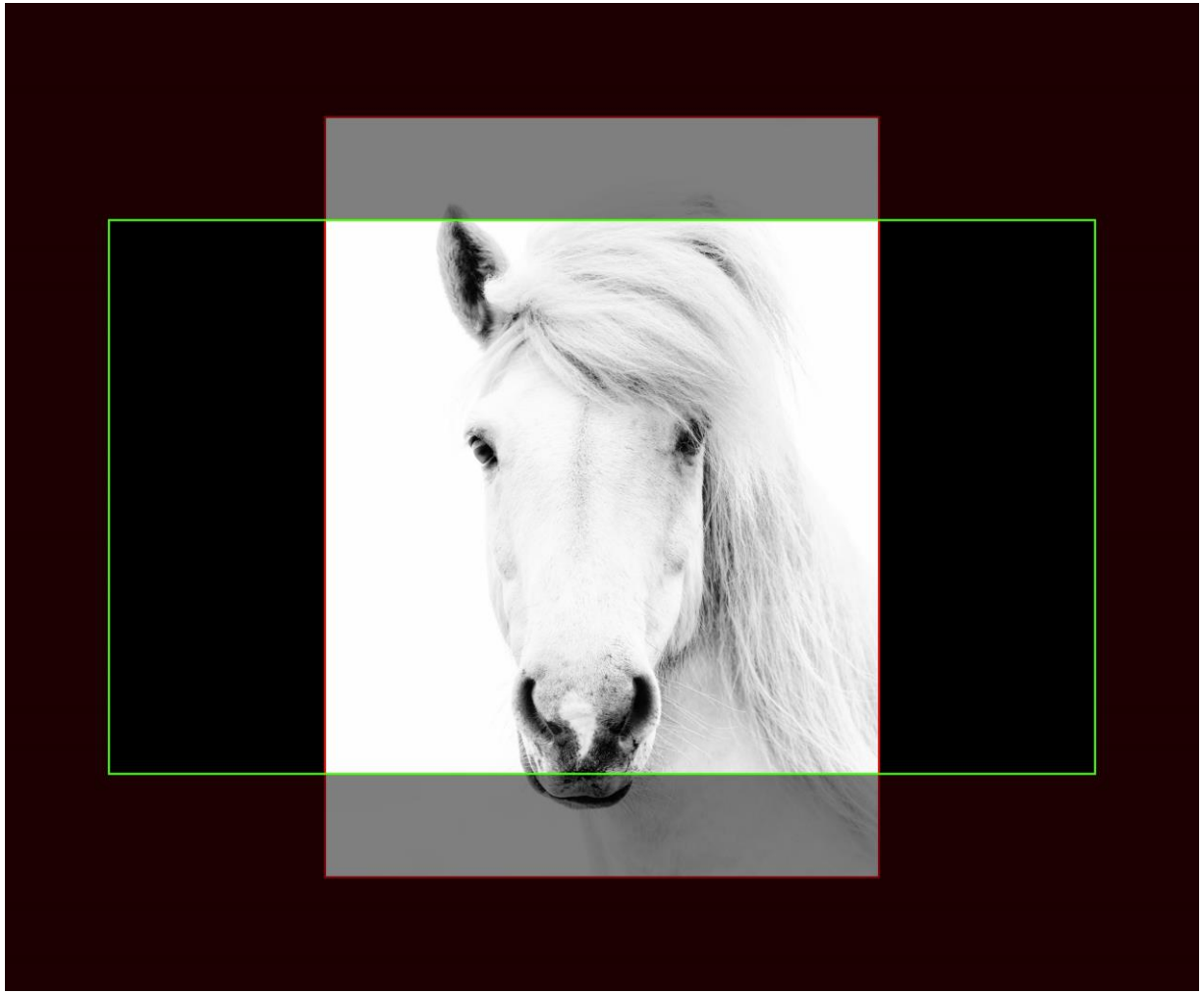
When projection goes bad…



It fits better!

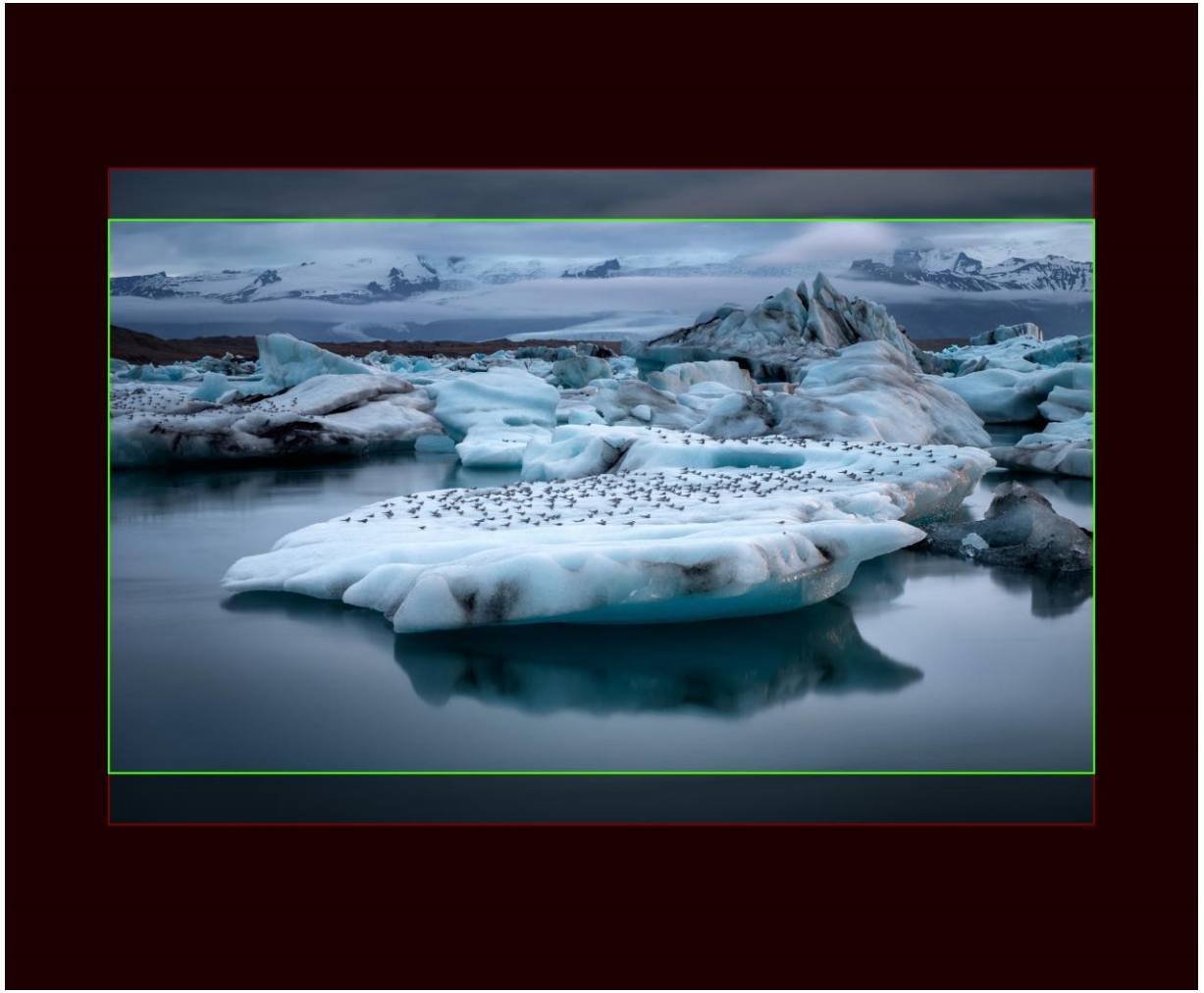


Width & height are interchangeable



Only the long edge matters

Landscape images are width-limited



And, of course…

- Wrong file type
- Wrong file name/suffix
- Wrong colour space
- Wrong (or missing) embedded colour profile
- Wrong image quality

We've seen them all…

The End

Any questions?