

## HOW MUCH RESOLUTION DO YOU NEED FOR PRINTING

Depending on print size and type of printer, here are the calculations for what you need, **assuming no cropping from the original capture:**

**Note: There is an important difference between pixels per inch and dots per inch. Pixels per inch refers to the resolution and is used for both projection and printing.**

**Dots per inch refers to the number of micro ink dots that a printer uses to make the individual pixels it is printing.**

### A3 Size print on an Epson Printer (360ppi)

Epson printers want 360 pixels per inch to print optimally. If you send more or less than this the printer will either ignore (too many pixels) or interpolate (not enough pixels) to make the dots (points per inch or ppi) it uses to make the print. If you don't set the output size prior to printing, the printer will decide what to print and what not to print, so it is infinitely preferable to send the correct size to the printer.

For an A3 size print, we are assuming a print size of 360mm x 240mm (3 to 2 aspect ratio). To work out how many pixels we need, we have to convert pixels per inch to pixels per millimetre. Converting the pixels per inch to metric works like this:

One inch = 25.4mm.

360 pixels per inch / 25.4 gives us pixels per mm = 14.17 pixels per mm

So, for a print 360 mm wide x 14.17 = 5101.2 pixels for the long side

With 240 mm on the short side x 14.17 = 3400.8 pixels

**Therefore, for a 360 x 240mm Epson print you need 17.348 Mega pixels**

Given that most cameras in use today are 20Mp or higher in resolution, to make an A3 size print optimally, you are going to down sample the full file slightly (by around 18%)

### A3 Size print on a Canon printer (300ppi)

The settings for a Canon printer differ slightly as Canon printers have a native resolution of 300 pixels per inch.

So, using the calculations for an image 360 x 240mm at 300 pixels per inch we work out the numbers like this:

One inch = 25.4mm.

300 pixels per inch / 25.4 gives us pixels per mm = 11.81 pixels per mm

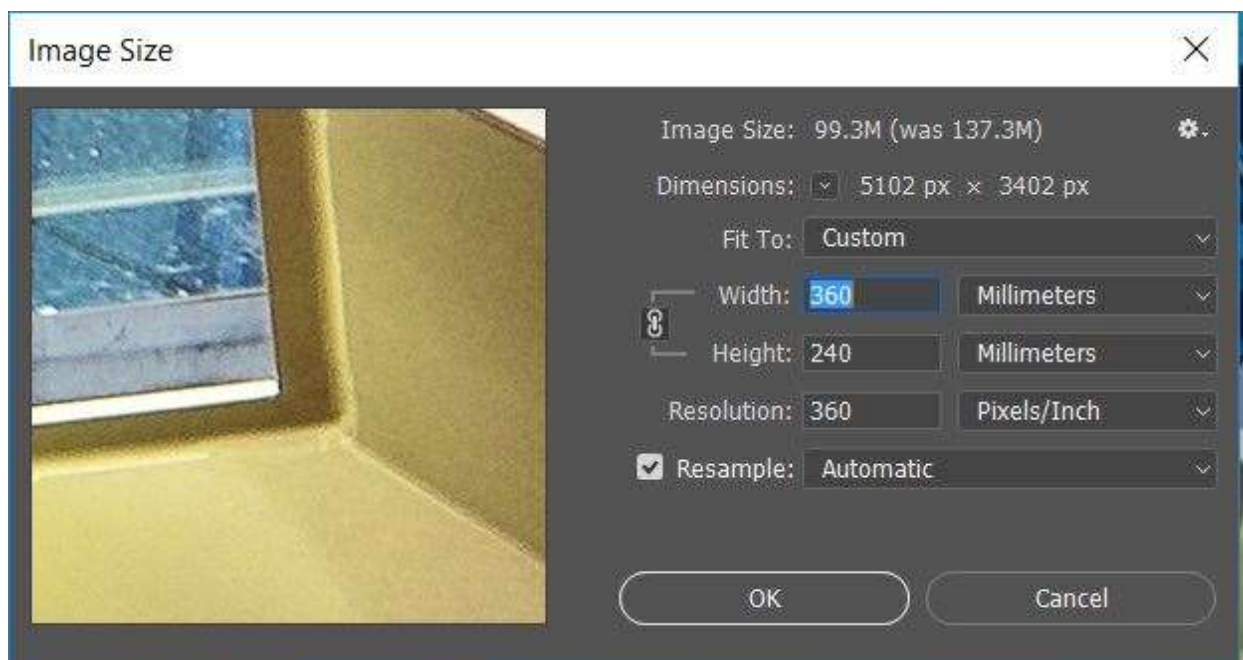
So, for a print 360 mm wide x 11.81 = 4251.6 pixels for the long side

With 240 mm on the short side x 11.81 = 2834.4 pixels

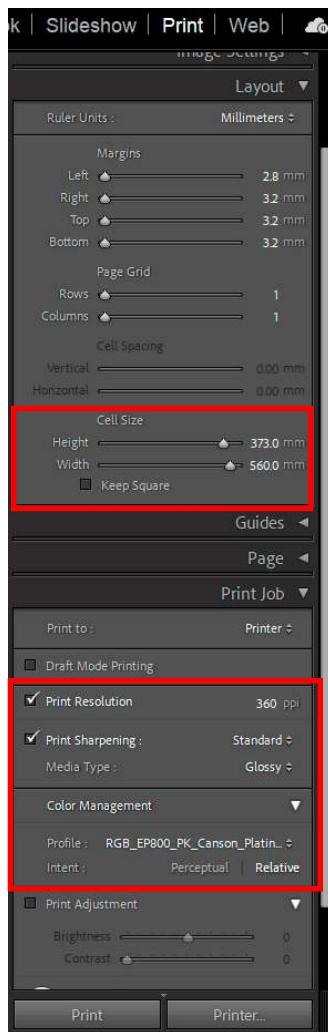
**Therefore, for a 360 x 240mm Canon print you need 12.05 Mega pixels**

Given that most cameras in use today are 20Mp or higher in resolution, to make an A3 size print optimally, you are going to down sample the full file by around 40%.

Setting the optimal size for printing is done via the **Image>Size** menu in Photoshop or setting the output size and resolution in Lightroom (see over page).



**Above:** The Image Size menu box in Photoshop with the correct details for printing on an Epson printer. For Canon, use 300 Pixels per inch.



**Left:** The print settings in Lightroom are determined in a different way from Photoshop. First in the **Print** Tab you select the page size (bottom of Left Hand menu – not shown) and then set the image size and resolution on the right hand menu.

There are simplified options for output sharpening and the only way you can see the result of the re sampling of your image is when you view the print.

### A2 Size print on an Epson printer (360 ppi)

The same calculations are used for an A2 print as for an A3 print, except that in this instance the print size we are using is 560 x 373mm (3 to 2 aspect ratio).

So, for a print 560 mm wide x  $14.17 = 7935.2$  pixels for the long side

With 373 mm on the short side x  $14.17 = 5285.4$  pixels

**Therefore, for a 560 x 373mm Epson print you need 41.90 Mega pixels**

For many cameras with a resolution of around 24 Mega pixels, you would need to up sample the file by around 75% to provide full resolution to print. Higher resolution cameras (45Mp and above) would still be down sampling to print.

As an alternative to dramatically up sampling with software like Topaz Gigapixel, an option is to use the next most optimal print resolution of 240 pixels per inch. Given that the viewing distance for an A2 size print is much larger, the drop in resolution is acceptable.

### A2 Size print on a Canon printer (300 ppi)

The same calculations for a canon printer apply here:

So, for a print 560 mm wide x 11.81 = 6613.6 pixels for the long side

With 373 mm on the short side x 11.81 = 4405.1 pixels

**Therefore, for a 560 x 373mm Canon print you need 29.13 Mega pixels**

There is no real difference in quality between a Canon printer at 300 ppi and an Epson printer at 360 ppi, it is just that they each use different technology to achieve a similar result.

Here is a comparison of an image correctly resized and sharpened for printing and one just printed from a low resolution original:



**Above Left:** An image not resized

For printing.



**Above Right:** An image resized

Correctly for printing.

The left hand image has lost a lot of detail and looks very soft. The correctly sized and sharpened image retains all the detail of the original.

It should also be remembered that these calculations do not take into account any cropping of the original image data, so if cropping has taken place, some further resizing will be necessary.

Of course, you can print any size print from any size original, its just that the quality will be very poor if you try to print a low resolution image to a large size, but some people won't notice the difference (see above).

***One final point, these settings are for optimal quality in printing, but do not include things like output sharpening and tonal adjustments for different papers, all of which are included in our printing master class notes.***

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