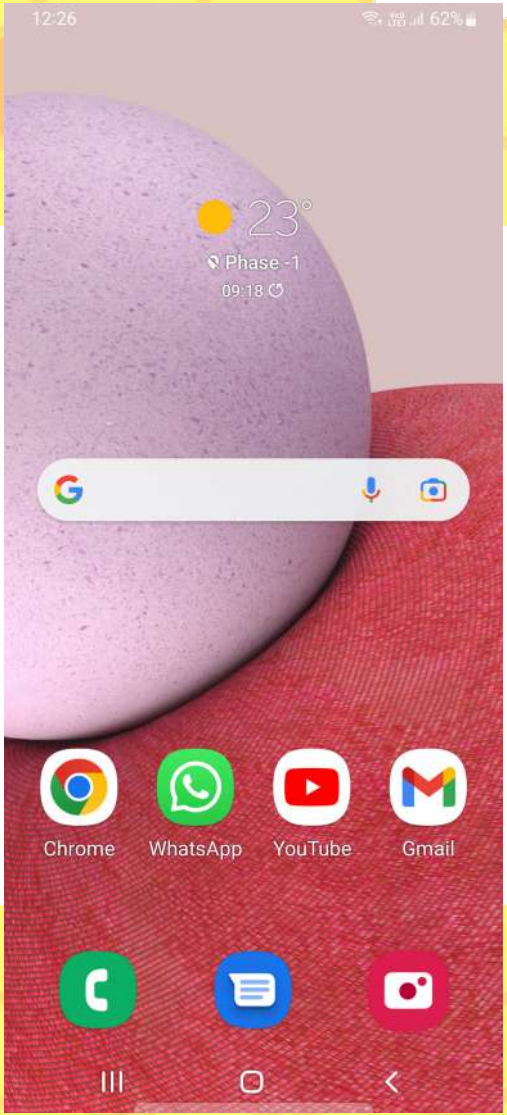
Image Resolution: Pixels Per Inch, Display Size

- Relation between display size and image size
- PPI vs Image Resolution
- Image Resizing and Scaling

Few Misunderstandings

- Pixels are of fixed dimension such as length
- Pixels are physical dimensions such as inch or centimeters
- Pixel sizes are governed by the image files that store image data



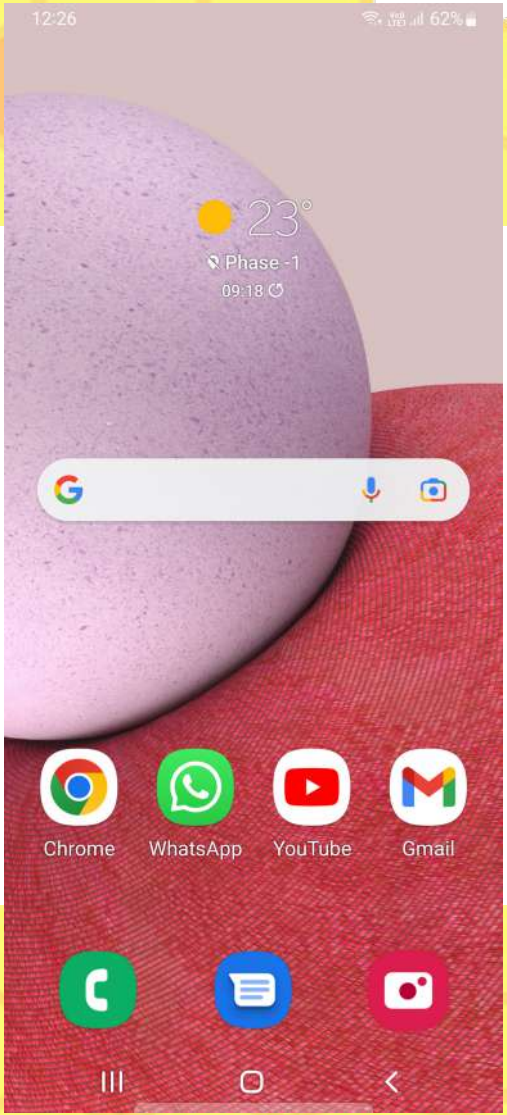
1 -This is the screenshot of a mobile display with published size of 6.60”

2 -The measure width and height of the diplay are 2.6875” and 6.00” respectively

3 -The measured dimension of the screen is 6.57 inch – very close to the published value

4 -When you open this image in any image editing software such as KolourPaint or MS-Paint, the image size in pixels are w x h = 1080 x 2408 pixels

5 -Thus, the PPI of display of the mobile screen is 1080/2.6875 = 402 or 2408/6.00 = 401. Let’s take it as 400 pixels per inch.

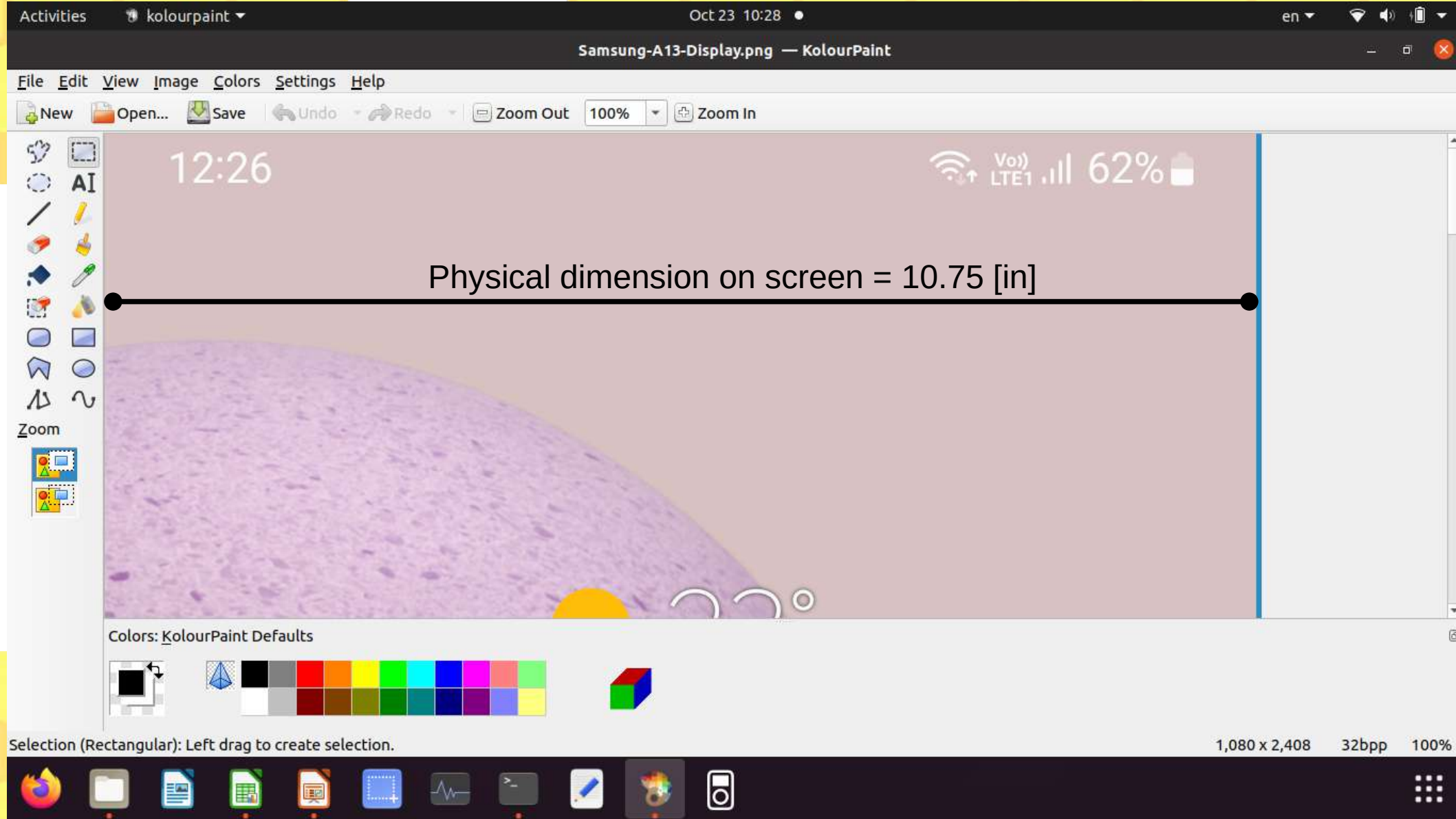


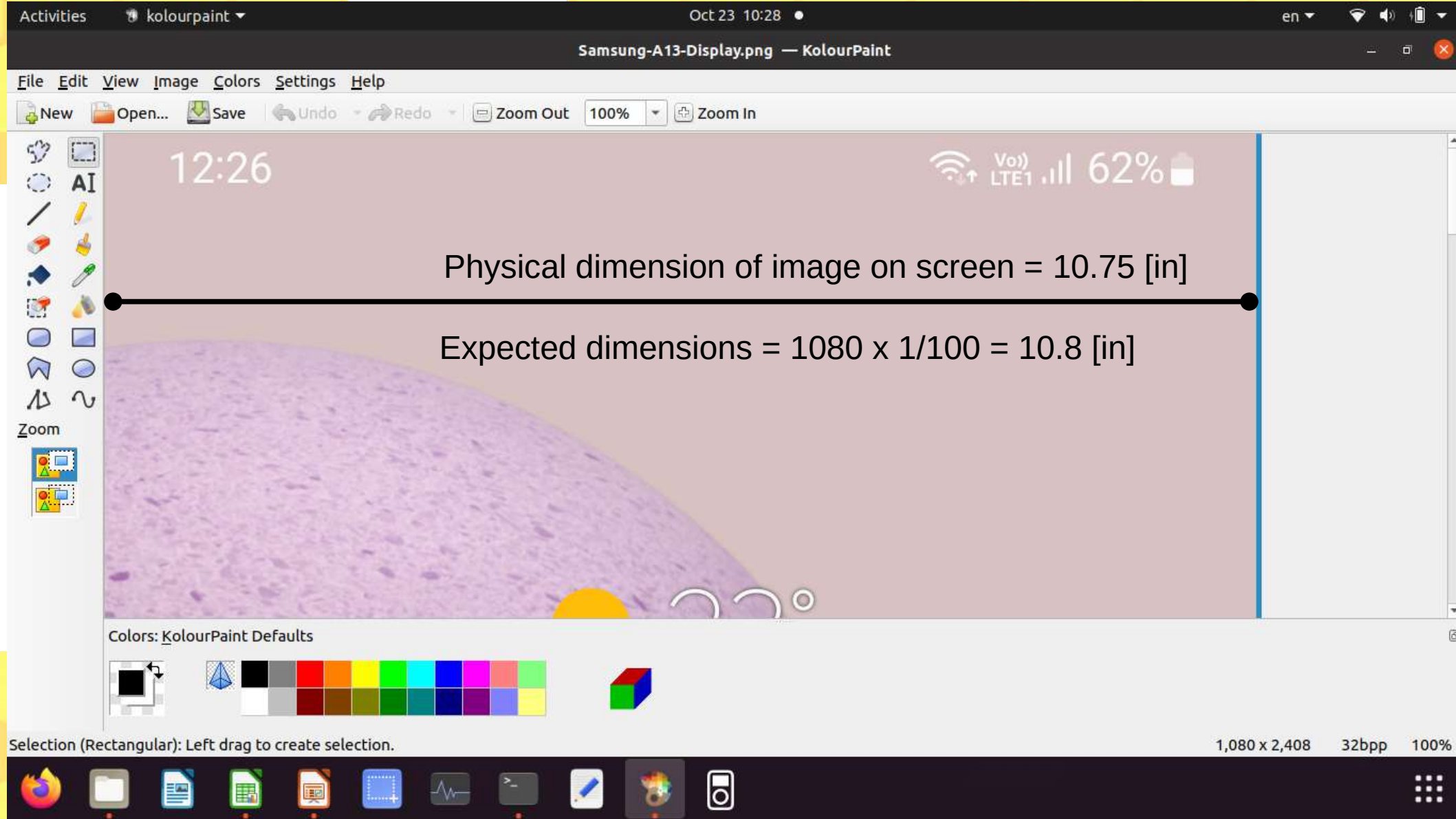
1 -Thus, the display of the mobile has pixel size of 1 [in] / 400 [pixels per inch] = 0.0025 [in]

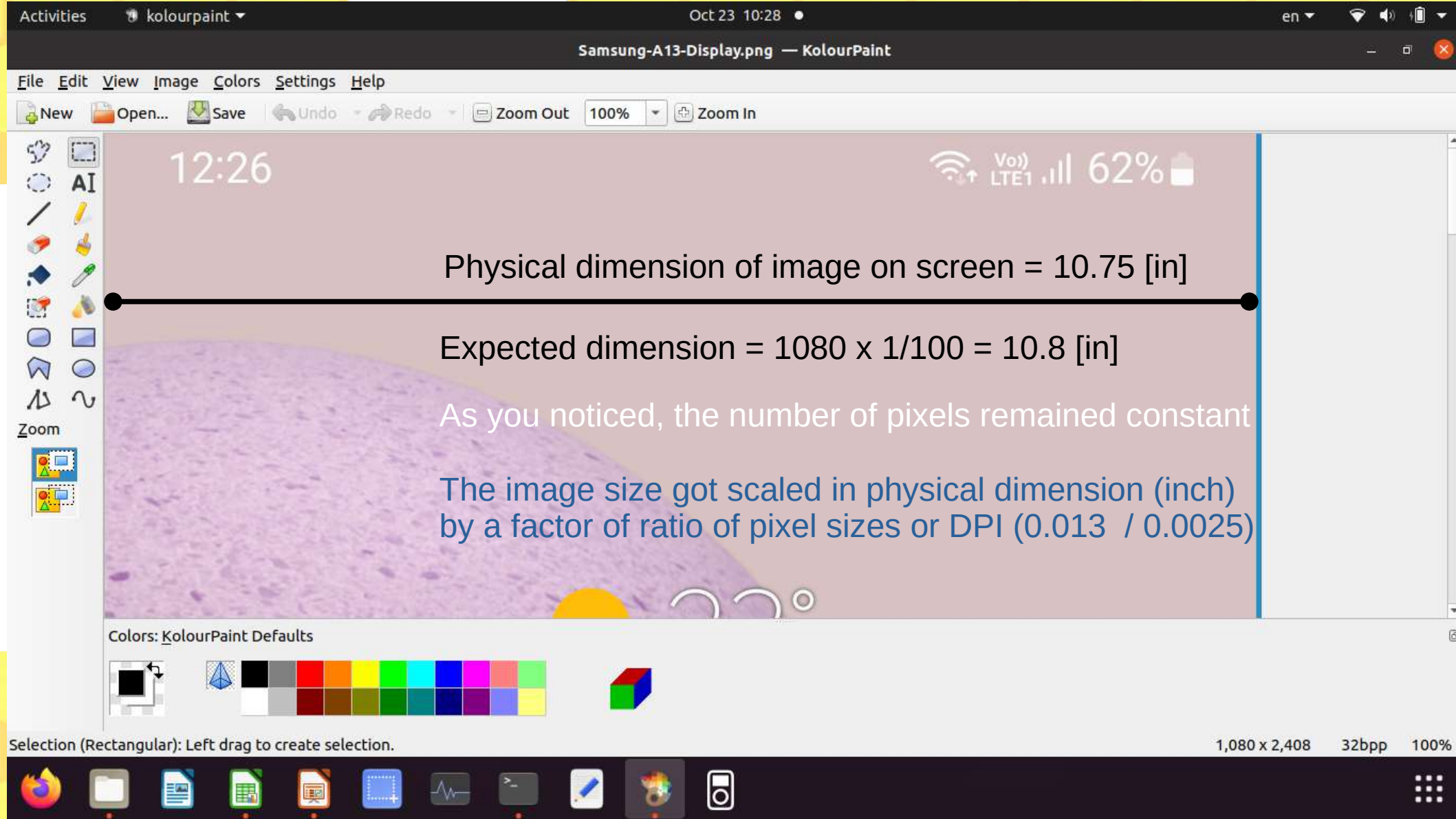
2 -Note that this value is different (and far lower) than the legacy value of 1 pixel = 0.0139 [in]

3 -Thus, the pixels are not a fundamental units like [m], [kg], [s].

4 -Now, let's see how it looks like when this image is opened in a screen of size 15.75 [in] – (this laptop) having width = 13.625 [in] and height = 7.75 [in] with screen resolution of 1366 x 768 [pixels] --> that is **100 pixels per inch (the published value is 96 pixels per inch)**


Activities
kolourpaint
Oct 23 10:28
en
Samsung-A13-Display.png — KolourPaint
File Edit View Image Colors Settings Help
New Open... Save Undo Redo Zoom Out 100% Zoom In
Zoom
12:26
62%
Physical dimension on screen = 10.75 [in]
Colors: KolourPaint Defaults
Selection (Rectangular): Left drag to create selection.
1,080 x 2,408
32bpp
100%


Activities
kolourpaint
Oct 23 10:28
en
Samsung-A13-Display.png — KolourPaint
File Edit View Image Colors Settings Help
New Open... Save Undo Redo Zoom Out 100% Zoom In
Zoom
12:26
62%
Physical dimension of image on screen = 10.75 [in]
Expected dimensions = 1080 x 1/100 = 10.8 [in]
Colors: KolourPaint Defaults
Selection (Rectangular): Left drag to create selection.
1,080 x 2,408
32bpp
100%


Activities
kolourpaint
Oct 23 10:28
en
Samsung-A13-Display.png — KolourPaint
File Edit View Image Colors Settings Help
New Open... Save Undo Redo Zoom Out 100% Zoom In
Zoom
12:26
62%
Physical dimension of image on screen = 10.75 [in]
Expected dimension = 1080 x 1/100 = 10.8 [in]
As you noticed, the number of pixels remained constant
The image size got scaled in physical dimension (inch)
by a factor of ratio of pixel sizes or DPI (0.013 / 0.0025)
Colors: KolourPaint Defaults
Selection (Rectangular): Left drag to create selection.
1,080 x 2,408
32bpp
100%

Conclusion

- **Image resolution** of is dependent on the display resolution of the device which created it (such as camera, scanner, x-ray machine...)
- **Image scaling** refers to increasing of decreasing the dislay dimensions by reducing or increasing the number of pixels in the image – **keeping the actual content of image intact**
- **Image resizing** also increases or decreases the display dimension by deleting the number of pixels – **removing the actual content of the image**

Conclusion

- **Image Display Dimensions** get scaled based on the PPI values of the device which created the image and PPI value of the device which is displaying it
- Increasing the **PPI of image** essentially requires spliting each pixel value into multiple of 4 (note each pixel is a square). This cannot be done in KolourPaint
- **Even if you are able to increase PPI programatically,** the DPI setting of the display device shall determine the size and sharpness of the image.