> pixel art

> objective(s):

Students will create a low resolution sprite of an object or character in a simple environment or background.

> curricular focus:

This lesson emphasizes using a minimal number of pixels and colors to create a recognizable sprite using the Pencil tool.

> specifications:

save as: Pixel Art_LastnameF (example: Pixel Art_MattinglyJ)
dimensions: 40 pixels by 40 pixels
resolution: 72 dpi
mode: RGB
contents: Transparent

> instruction:

- what is a pixel?
  - see *What is a Pixel?* on page 3
- what is pixel art?
  - see *What is Pixel Art?* on page 4
- view examples of pixel art
  - see *Pixel Art Examples* on page 5
  - view additional artwork in the Pixel Art Examples folder
  - notice how each image has shadows or highlights (or both)
- review the most common pixel art mistakes
  - see *Common Mistakes: Doubles* on page 7
  - see *Common Mistakes: Jaggies* on page 8
- review the fundamentals of the Pencil tool
  - set size
    - go to the Brush Preset pull-down menu in the Control Panel (at the top)
    - adjust the size by typing in your value or adjusting the slider
      - for this project we are only using 1 pixel
    - although you can change the hardness settings, the Pencil always paints at 100% (hard edge)
  - set painting mode
    - go to the Painting Mode pull-down menu in the Control Panel and set it to Normal
  - set opacity
    - go to the Opacity pull-down menu in the Control Panel and set the opacity to 100%
- review the fundamentals of the Eraser tool
  - set size
    - go to the Brush Preset pull-down menu in the Control Panel (at the top)
      - for this project we are only using one pixel
  - set erasing mode
    - go to the Erasing Mode pull-down menu in the Control Panel and select Pencil
  - set opacity
    - go to the Opacity pull-down menu in the Control Panel and set the opacity to 100%

see Procedure and Requirements on page 2

> pixel art

> procedure:

- select subject image source and approve with instructor
  - for online images:
    - image cannot already be pixel art
    - select image and approve with instructor
    - download image and save as Pixel Art Source_LastnameF
  - for personal sketches/drawings:
    - take photo with phone (Apple's HEIC files cannot be opened)
    - upload image and rename as Pixel Art Source_LastnameF
  - final artwork must have shadows or highlights (if your source does not have any you need to add some to sketch)
- watch selected videos (see *Video Tutorials* on page 6)
  - *How to Do Pixel Art*
  - *Lines and Curves in Pixel Art*
  - *How to Create a Character Sprite* or *How to Create an Object Sprite* depending on approved selection
- create thumbnail sketch
  - carefully review pixel art *Thumbnail Example* on page 11
  - open and print Pixel Art Thumbnail Template.pdf
  - complete the sketch according to the directions on the document
    - look at examples of existing sprites to see how you want to approach your overall "look"
    - how will your character/object be outlined?
      - see *Outlines* on page 9
    - how will you add shading and/or highlights to your character/object?
      - see *Shading* on page 10
  - (very) lightly sketch subject outlines first then fill in pixels
  - submit sketch(es) for approval with instructor
- create pixel art
  - refer to step-by-step tutorial beginning on page 12
  - approve completed art file with instructor
    - remember!- *never* submit artwork without instructor review first
- create companion JPG
  - all projects require an art file (Photoshop) and a companion JPG for quick view on web and devices
    - go to Image: Image Size and change Width and Height to 40 pixels each
    - make sure Resample is checked (at the bottom) and change setting to Nearest Neighbor
- submit art file and companion JPG

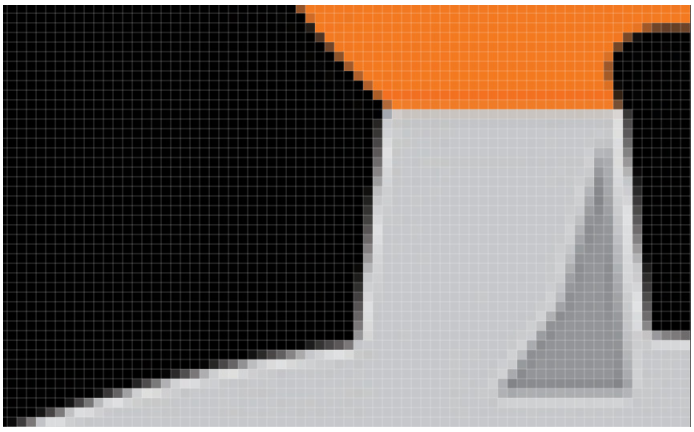
> requirements:

- file specifications are adhered to (see above)
  - file name is Pixel Art_LastnameF
  - document is 40 pixels by 40 pixels
  - document resolution is set at 72 ppi
  - document has only two layers
    - Background (solid white) and Sprite (for character or object)
- sprite
  - 30 pixels tall or minimum 30 pixels wide
  - sprite is centered within document both vertically and horizontally
  - maximum 8 colors used
    - minimum one color used for shading or highlighting
- companion JPG
  - scaled perfectly at 400 pixels by 400 pixels
    - nearest neighbor was used to keep all edges crisp (no blurring of any pixels)
  - file name is Pixel Art_LastnameF
    - computer will automatically add the ".jpg" file tag

> what is a pixel?

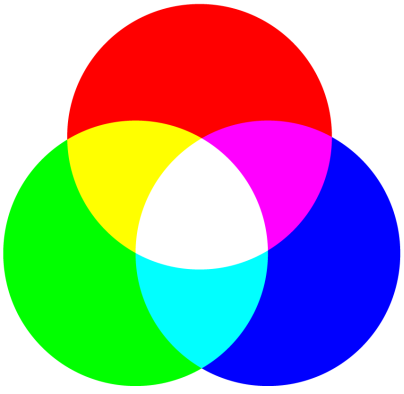
> pixel

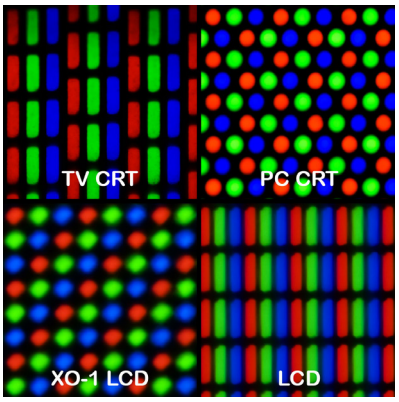
A pixel is the **smallest unit of a raster image**. It is a portmanteau (blended word) of the terms **"picture" and "element."** Pixels, which **can only be only color**, combine together like a mosaic to form a larger image on screens like TVs, monitors, tablets and phones.



> RGB

All **screens** (TVs, phones, tablets, etc.) are comprised of **pixels** that utilize the **RGB additive color model** (below left) to display color. Pixels are made up of three individual tiny dots, one for each of the **primary colors red, green and blue** (below center). Each primary color dot has 256 levels (0-255) and are mixed together at various levels to create 16,777,216 different colors. For examples, see below right.





RGB [255, 0, 0]	RGB [0, 0, 255]
RGB [255, 127, 0]	RGB [75, 0, 127]
RGB [255, 255, 0]	RGB [127, 127, 127]
RGB [0, 255, 0]	RGB [0, 0, 0]

> what is pixel density?

Pixel density refers to the **physical number of pixels within an inch on the screen**. It is expressed as **PPI** (pixels per inch).

> what is a 'megapixel?'

The prefix mega means million, ergo **megapixel means one million pixels**. Megapixels are calculated by multiplying the number of pixels horizontally across an image by the number of pixels vertically in an image. An HDTV's resolution is 1920px by 1080px. If you multiply 1920 by 1080 you get 2,073,600 or approximately 2.07 megapixels.

More megapixels does not mean a sharper image. Image quality is determined by the camera sensor. More megapixels just means that you can take a larger image and this is important when you print an image. Printers need more pixels per inch than screens do to show the same image at the same clarity. That means the larger image you start with, the larger you can print it and it still look hi-res.

mhscg

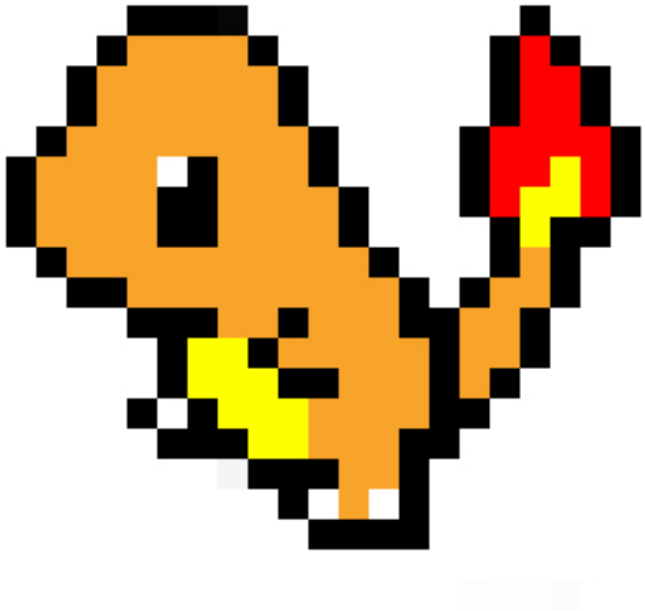
> what is pixel art?

> pixel art

Pixel Art is edited on the pixel level and is created in a small document utilizing a very limited color palette. It is inspired from old school 8-bit video games like those on the original Nintendo Entertainment System.

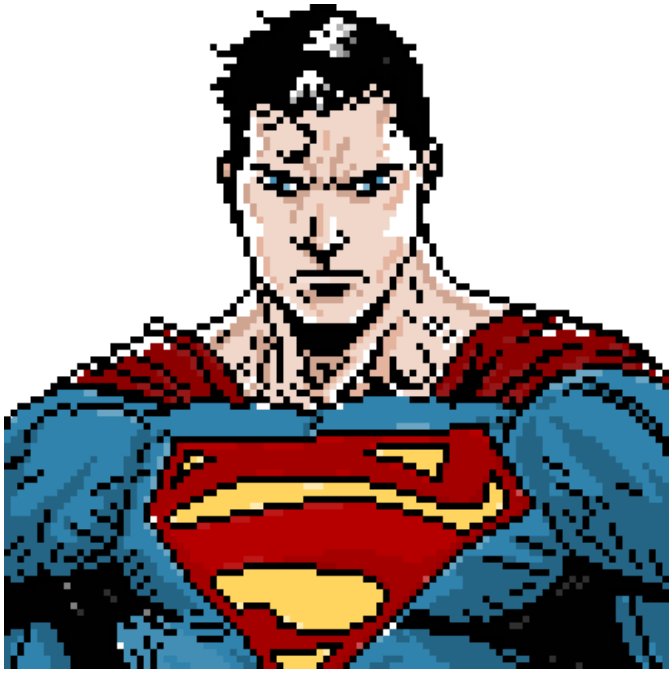
The more pixels you add to an image (and the more colors), the more detailed and realistic it becomes. The only differences between low-res pixel art and hi-res photos are the number of pixel and colors.

18 pixels



50 pixels

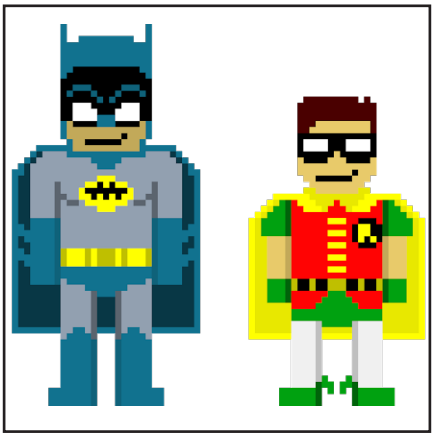
100 pixels



500 pixels

mhscg

> pixel art examples

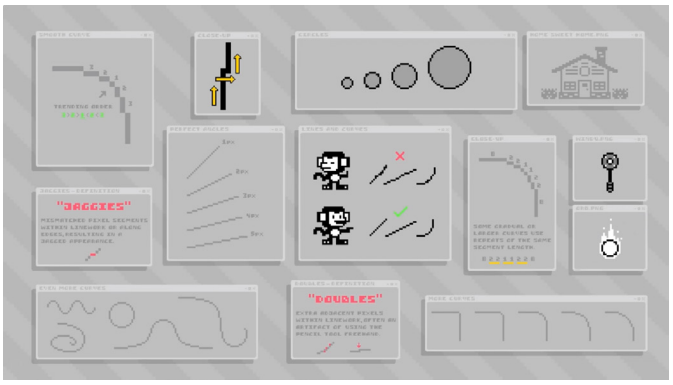








> video tutorials

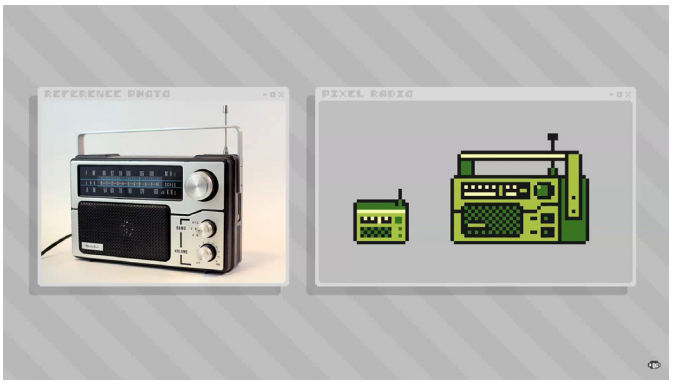
> Watch *Lines and Curves in Pixel Art*. Next, watch either *How to Create a Character Sprite* or *How to Create an Object Sprite*. depending on which type of image you selected. Refer to these videos throughout your creation process. The videos are located at http://www.mhscomputergraphics.com/videos.html.



1. watch *Lines and Curves in Pixel Art* video
   - how to create diagonal lines
   - how to avoid and clean up "doubles"
   - how to create smooth curves
   - how to avoid and clean up "jaggies"

2a. watch *How to Create a Character Sprite* video
   - how to create a character pose using a stick figure
   - how to add interior details
   - how to add color

watch either depending on what type of image you selected

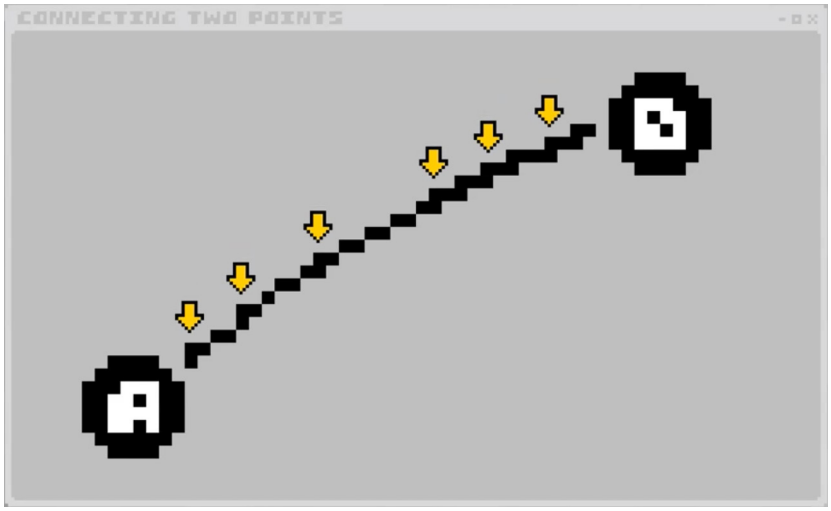


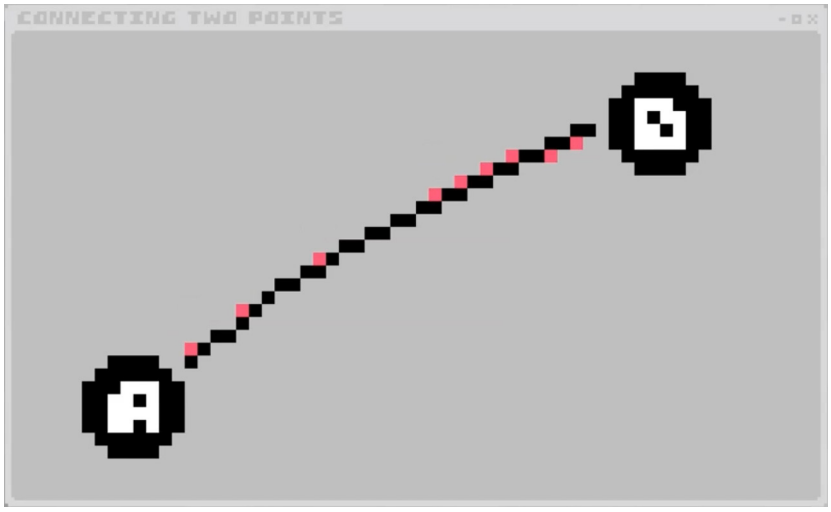
2b. watch *How to Create an Object Sprite* video
   - how to work from a photo
   - how to create interior details
   - how to add shading and highlights
   - how to handle angles/diagonals

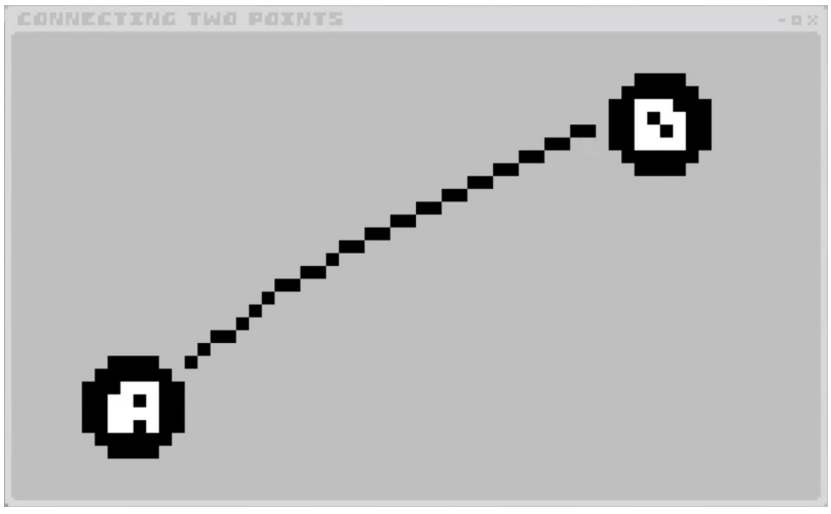
> common mistake: doubles

> doubles

Doubles are extra adjacent pixels usually created when using the Pencil tool freehand and it passes over two separate pixels at the same time. These doubles should always be eliminated.



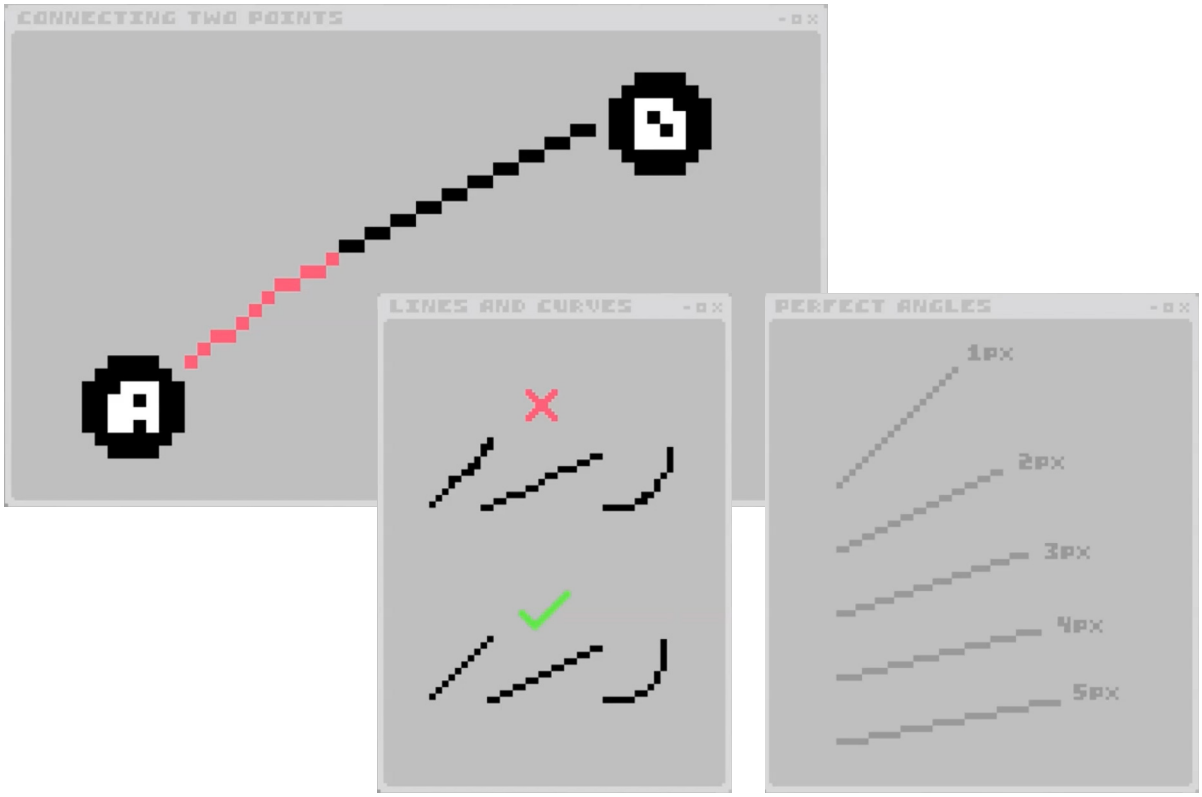


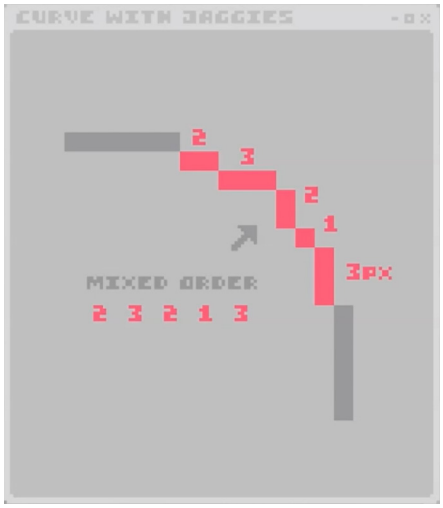


> common mistake: jaggies

> jaggies

Jaggies are mismatched pixel segments along a line resulting in an uneven jagged appearance. Lines and curves should have even and/or mirrored steps.



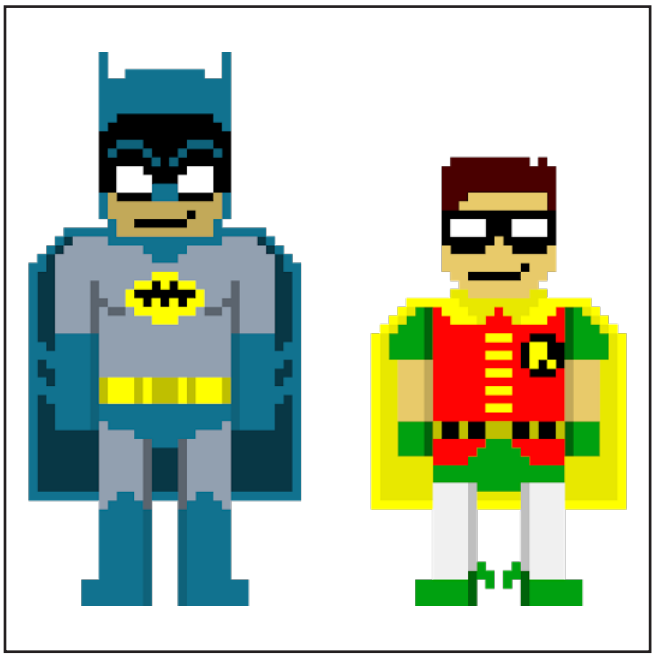


> outlines

> how you will incorporate outlines on your sprite?

- no outlines: just strong contrast of colors separating areas
- exterior outline: outline only around the very outside of the character/object
- selective outlines: outlines only used where needed to separate interior areas
- full outlines: all areas are separated by black or darker value of interior colors

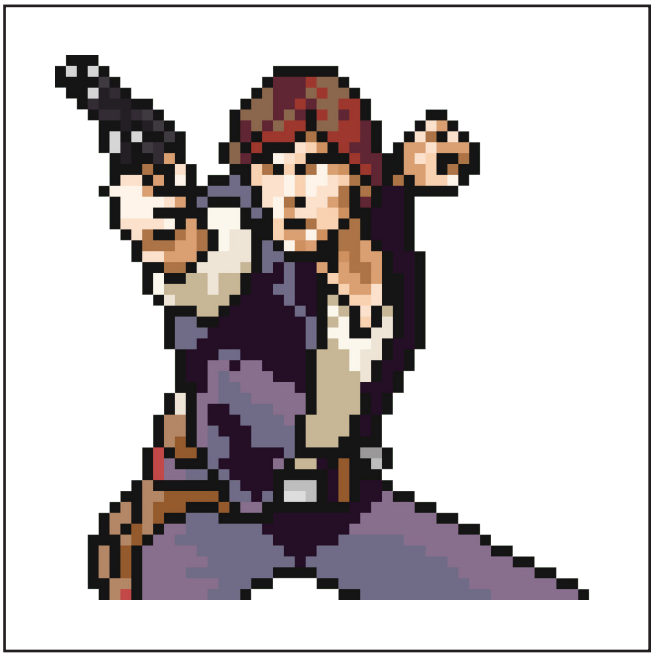
> no outlines



> exterior outlines

> selective outlines

> full outlines

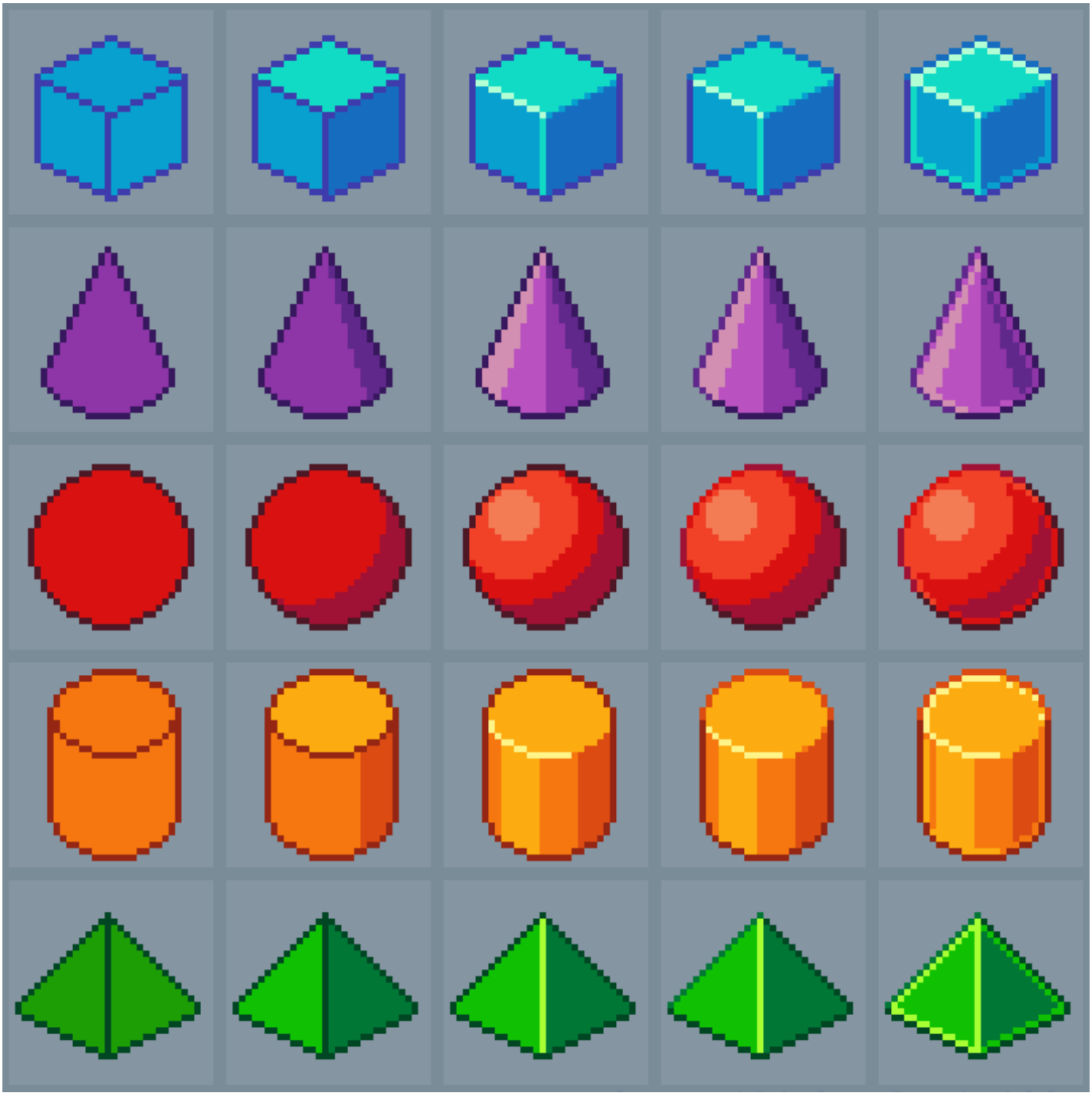


mhscg

> shading

> shade your sprite

- shading is achieved with a tint (slightly lighter) or shade (slightly darker) of the base color
- how much highlight or shading you want will determine how many various 'bands' of color to use
  remember- you must have at least one area of highlight or shade



> thumbnail example

> source image example

> source image

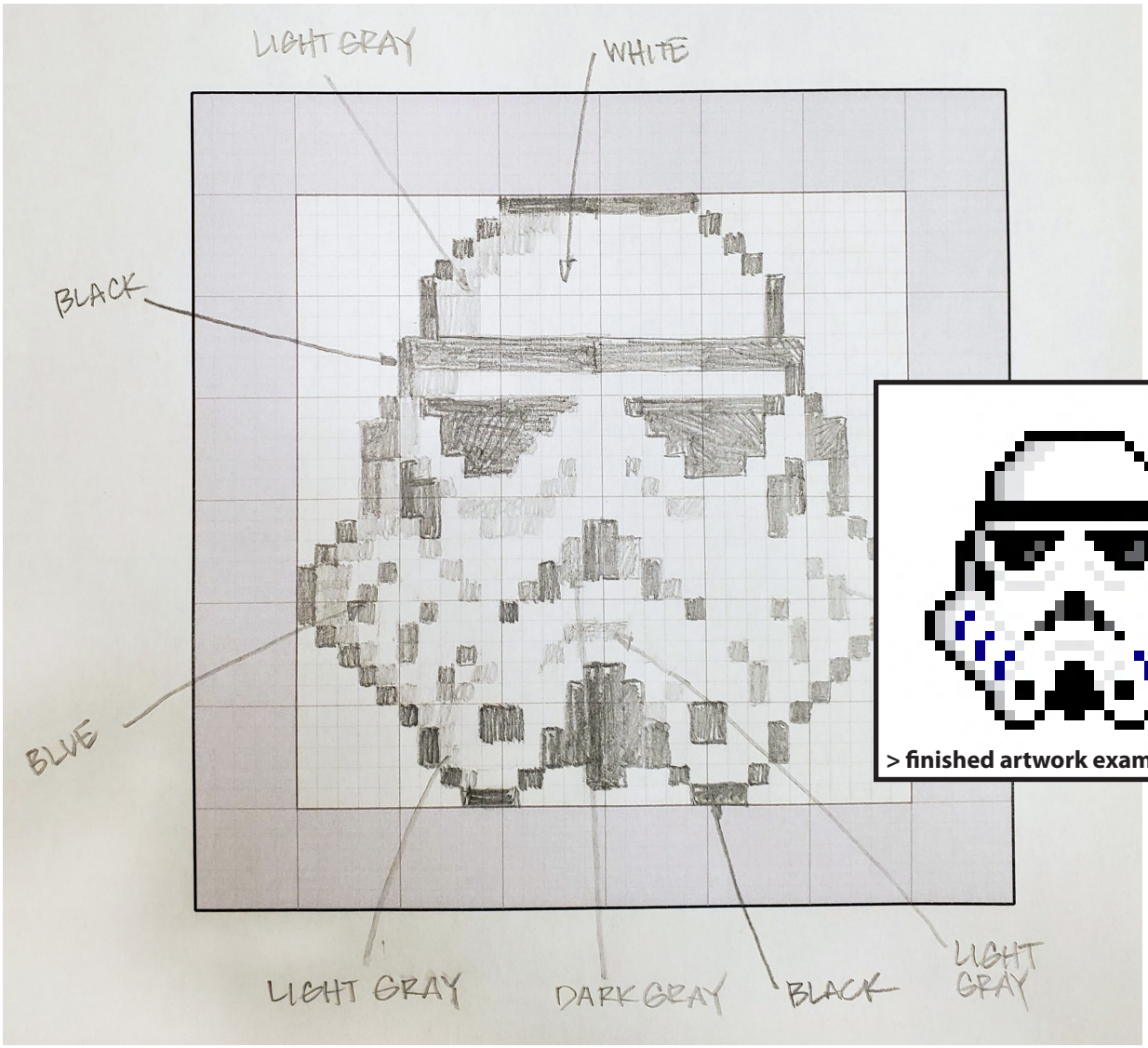
Your source image can be a photo of an actual object/person, or artwork that is ***not*** already pixel art. For example, it can be a photo of a stormtrooper helmet or a drawing of a superhero from a comic book.

> thumbnail sketch

Print Pixel Art Thumbnail Template.pdf. Your sketch must be in pencil. Your sprite (subject) must be 30 pixels tall and/or 30 pixels wide. Label your colors to the outside with arrows pointing to their respective areas (as shown below).

> requirements

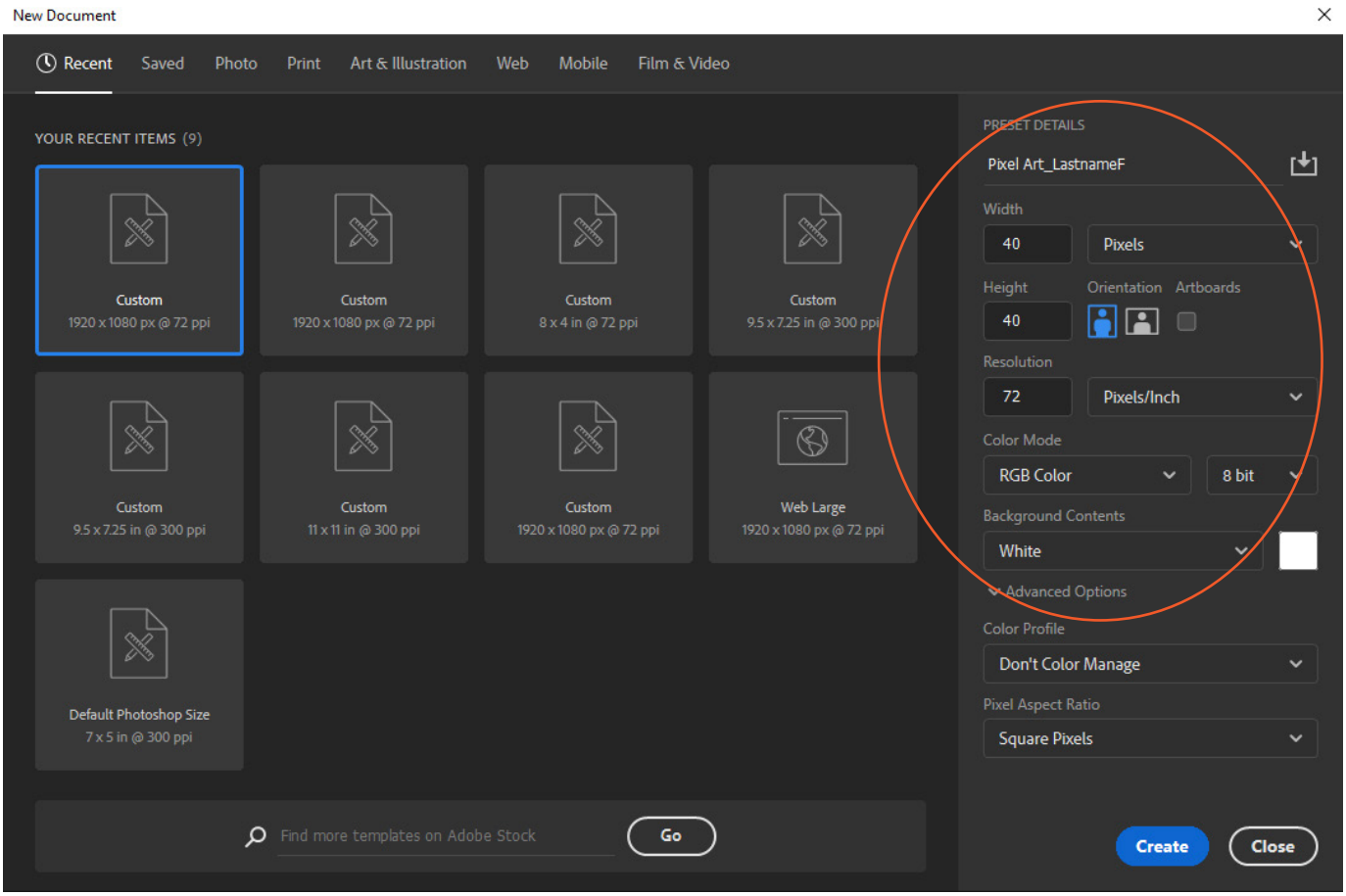
Review "*Create Thumbnail Sketch*" and "*Requirements*" on page two.



> finished artwork example

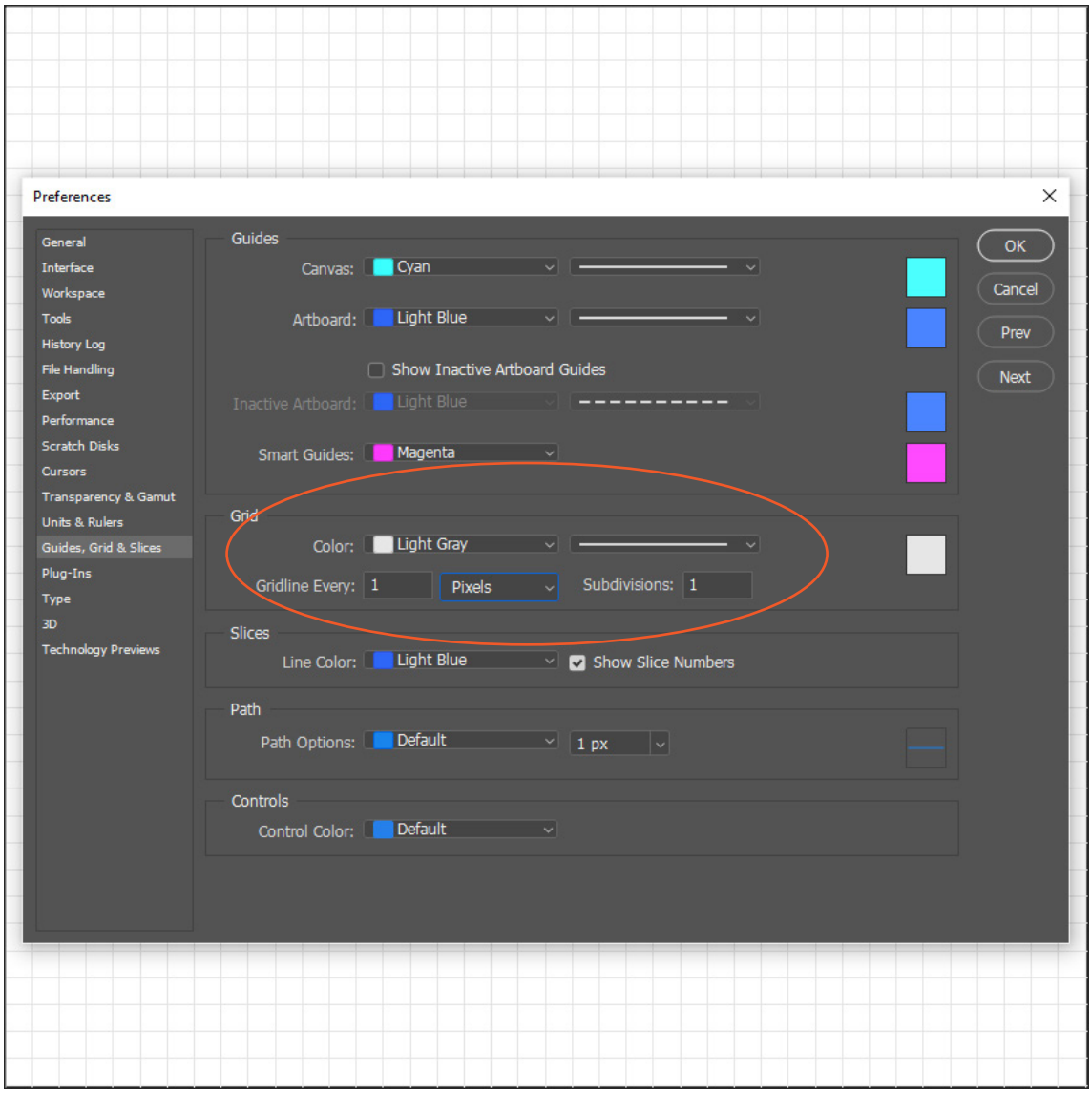
> step 1: create document

- open Photoshop
- select Create New from the left or go to File: New (Ctrl + N)
- enter file specifications
    - Name: Pixel Art_LastnameF
    - Width: 40 pixels
    - Height: 40 pixels
    - Resolution: 72 ppi
    - Color Mode: RGB (8 bit)
    - Background Contents: White



> step 2: set up grid

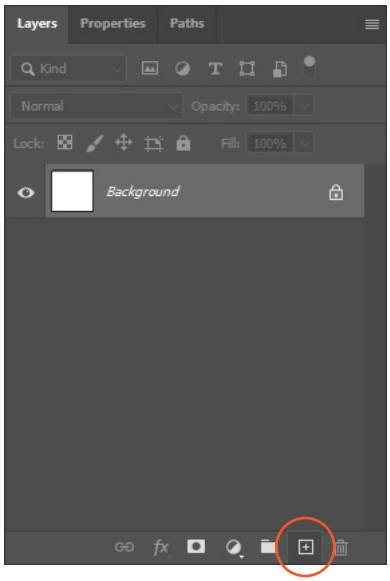
- go to View and select Show Grid
- go to Edit: Preferences: Guides, Grids and Slices
    - set Gridline Every to one (1) pixel
    - set Subdivisions to 1
    - set Color to Light Gray (or whichever is easiest on your eyes)



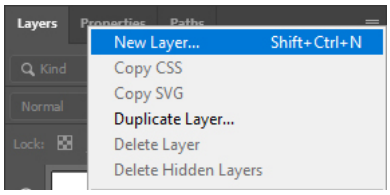
> step 3: set up layers

• create new layer one of three ways

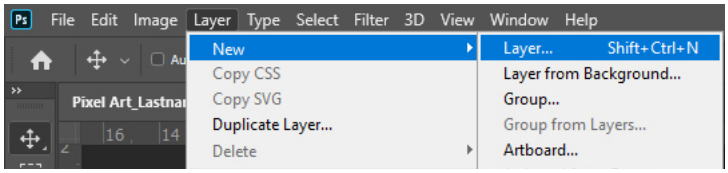
1. go to the Layer window and click on the plus icon [+] to the left of the trash can
   if the Layer window is not showing to the right go to the View menu and select Layers



2. go to the pull down menu in the Layer window and select New Layer
   located in the top right and designated with three horizontal lines

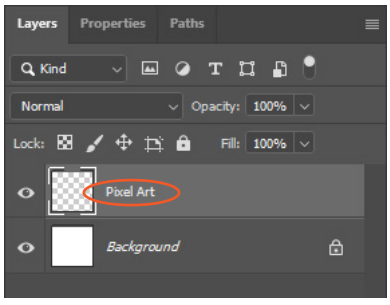


3. go to the Layer menu (at the top) and select New



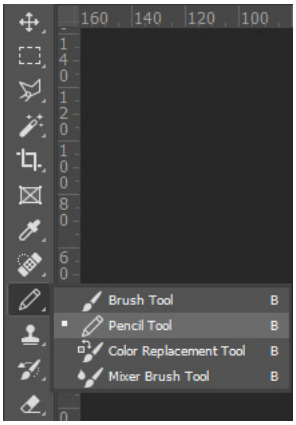
• rename layer Pixel Art

- double click on the text "Layer 1" in the Layer window
- rename layer "Pixel Art:

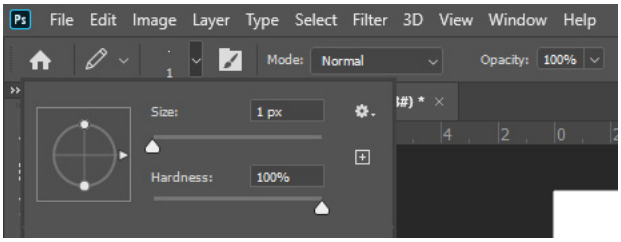


> step 4: set up tools

• set up Pencil tool
- go to toolbar and select the Pencil tool
may be hidden underneath Brush tool
click and hold on Brush tool until the sub menu appears



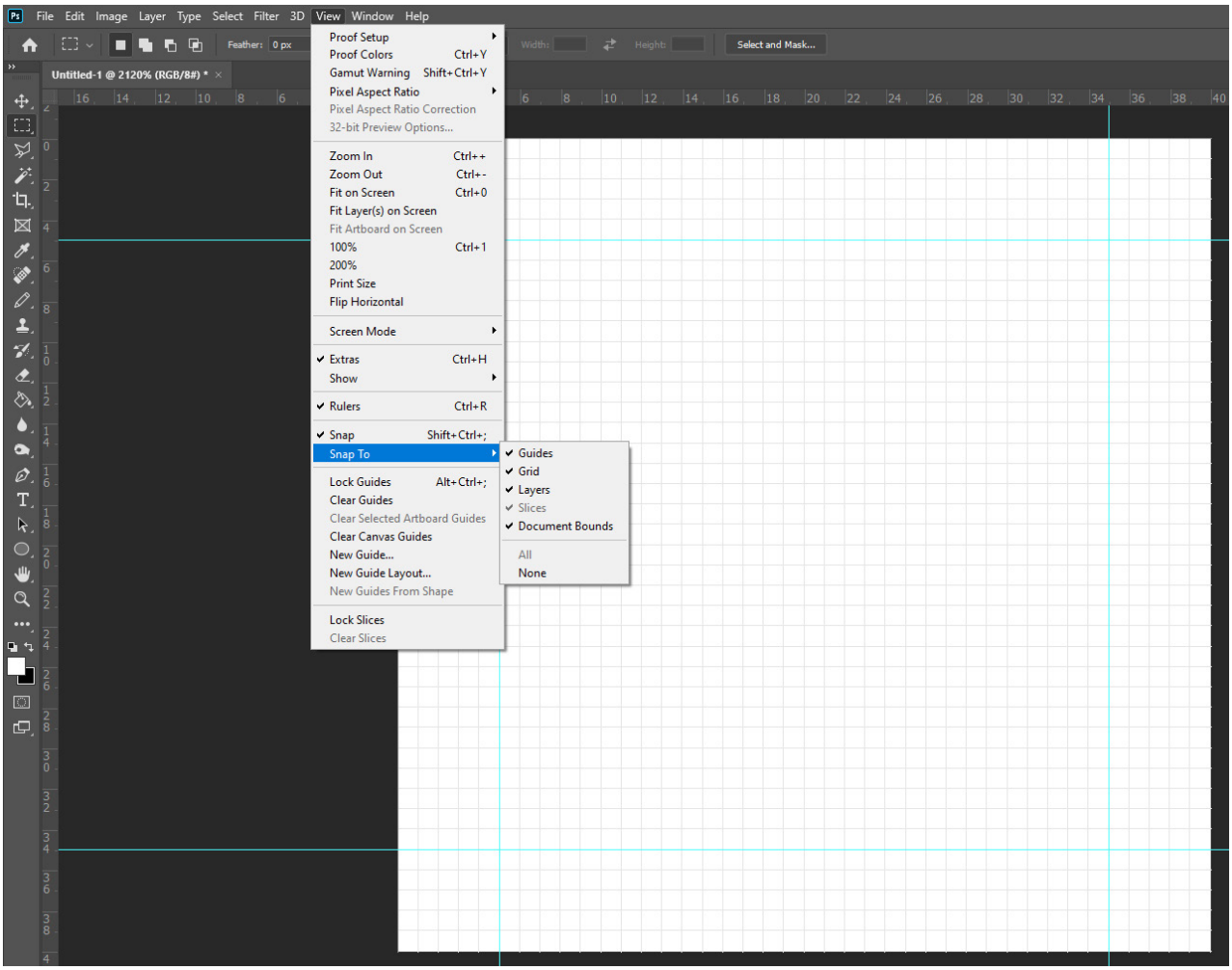
- set size
go to the Brush Preset pull-down menu in the Control Panel (at the top)
adjust the size by typing in your value or adjusting the slider
for this project we are only using 1 pixel
although you can change the hardness settings, the Pencil always paints at 100% (hard edge)
- set painting mode
go to the Painting Mode pull-down menu in the Control Panel and set it to Normal
- set opacity
go to the Opacity pull-down menu in the Control Panel and set the opacity to 100%



• set up Eraser tool
- set size
go to the Brush Preset pull-down menu in the Control Panel (at the top)
for this project we are only using one pixel
- set erasing mode
go to the Erasing Mode pull-down menu in the Control Panel and select Pencil
- set opacity
go to the Opacity pull-down menu in the Control Panel and set the opacity to 100%

> step 5: create guides

- create guides
  - go to View: Rulers or press Ctrl + R to show rulers
  - go to View: Snap and make sure Snap and Grid are both checked
  - move cursor into the ruler, click and hold down and drag ruler onto document
    remember- your sprite will touch the top and bottom margins or the left and right margins



> step 6: begin artwork

- create artwork
  - follow your approved thumbnail sketch
    - minor adjustments are expected but any significant change must be approved by instructor
  - make sure sprite is 30 pixels tall or 30 pixels wide
    - your sprite will touch the top and bottom margins or the left and right margins
  - review tutorial videos
    - refer back to any/all videos listed on the *Video Tutorials* section (page 6)
    - you may also use any online tutorial you find helpful
  - center artwork
    - if your artwork touches...
      - all four sides you do not need to do anything
      - the top and bottom edges then it needs to be centered horizontally (x-axis)
      - the left and right edges then it needs to be centered vertically (y-axis)
    - if you cannot perfectly center (due to odd number of empty pixels) the 'extra' pixel should be up or left
  - approve completed art file with instructor
    - remember!- *never* submit artwork without instructor review first
- create companion JPG
  - all projects require an art file (Photoshop) and a companion JPG for quick view on web and devices
    - go to Image: Image Size and change Width and Height to 400 pixels each
    - make sure Resample is checked (at the bottom) and change setting to Nearest Neighbor
- submit art file and companion JPG