

Lesson 3.3: Images: Resolution and Storage Requirements

Objectives

In this lesson, students will:

- ❖ Gain an understanding of image resolution and image dimensions
- ❖ Learn about image quality and what determines it
- ❖ Understand the relationship between image resolution and storage requirements to save the image.

Agenda

1. Image Resolution and Dimensions	15 mins
2. Student Activity: Image Resolution and dimensions	15 mins
3. Image Resolution and Storage Requirements	10 mins
4. Student Activity: Image Resolution and Storage Requirements	10 mins
5. Wrap Up and Reflections (time permitting)	5 mins

Preparation

- Projector and speakers for video
- Student activity worksheet printouts (one per students or one per student pair)

Resources & Links

- Image Resolution and Dimension <https://tinyurl.com/yb8fdngb>

1. Image Resolution and Dimensions



Display the tiger images on your screen. They are available in exhibit A.

Engage students in an interactive demonstration and instruction:

What do you notice about the 2 images of the tiger head ? **Prompt** students for answers.



"Tiger Face" By [microugly](#). October 2008
<<https://openclipart.org/detail/176055/tiger-face>>

The one on the left appears fuzzy. The image on the right is clearer. You could say the image on the right is of higher quality.

Can you think of reasons the image on the right is clearer than the one on the left?

When an image is of higher quality, it typically means it has more pixels per inch. The image is of higher resolution. When an image has lower resolution, it has fewer pixels per inch resulting in a fuzzier image as we saw with the tiger image on the left.

Resolution refers to the number of pixels in one inch of the image. Image resolution is typically described in **PPI**, which refers to how many pixels are displayed per inch of an image. PPI stands for **P**ixels **P**er **I**nceh.

Changing the resolution of an image means you are saying how many pixels you want to be in each inch of your image.

If we look at an image with very low resolution, we can actually see the pixels. Can you still recognize what it is? (eye of the tiger). (Use exhibit B)



If we look closely, we can count the pixels. 15 pixels across and 12 pixels high. This image is 15 x 12 pixels. This is called pixel **dimensions** of the image or simply image dimensions.

Sometimes images are also referred to as having 180 pixels, which is 15 X 12. It just means you multiplied the dimensions to obtain the total pixel count of the image. You have probably heard about this with higher resolution images when people talk about a 5 megapixel

photo or camera.



Let's watch a video to learn more about image resolution.

<https://tinyurl.com/yb8fdngb>

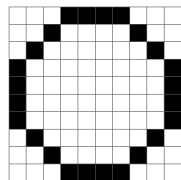
2. Student Activity: Image Dimensions and Resolution



In this activity students will fill in pixels and answer questions about images. Since this can be a confusing topic, it is recommended that you review the answers with your students. Distribute Activity Worksheet: Image Dimensions and Resolution

Answers:

1.



2. In reference to image A and B, let's test your resolution knowledge.

- a. What are the dimensions of image A?
20 x 20 pixels
- b. What are the dimensions of image B?
10 x 10 pixels

- c. What are the PPI (pixels per inch) for image A?
20 ppi
- d. What are the PPI (pixels per inch) for image B?
10 ppi
- e. Why is the circle in image **A** smoother (higher quality) ?
Because it has more pixels per inch, it has a higher resolution.



3. Image Resolution and Storage Requirements



Going back to the 2 images of the tiger. When we save the file to a computer, which file do you think would require more storage space ?

Right, the higher quality image on the right. And why? Because it has more pixels per inch, also sometimes referred to as pixel density as we learned in the video.

Let's take a look at the 2 files for the tiger image: (exhibit C). The file name is descriptive of the file.

Name	Size	Kind
 tiger_20ppi.jpg	12 KB	JPEG image
 tiger_72ppi.jpg	38 KB	JPEG image

Which file do you think is the tiger on the right, the crisp image? What observations can we make about these 2 files?

Prompt students for as many answers as possible.

It is recommended to review each item in the list below.

1. The file format for both images is a JPEG
2. tiger_72ppi.jpg is the file for the tiger on the right, tiger_20ppi.jpg is for the one on the left. Why? See number 3
3. The resolution of the first file is 20 ppi (20 pixels per one inch) which is a lower resolution than the image on the right which has a resolution of 72 ppi. That explains why the image on the left is fuzzier.
4. The image with the higher resolution (tiger_72ppi) requires more storage, namely 38 KB. Which by the way is how many bytes?
5. The image with the lower resolution or pixel density requires less storage, namely 12 KB

4. Student Activity: Image Resolution and Storage Requirements



In this activity students answer a few more questions about images.

Answers:

1. In reference to image A and B.
 - a. What are the dimensions of image A ? 13 x 14
 - b. What are the total number of pixels for image B ? 72 pixels (9x8)
 - c. Which image requires more bytes (storage) when you save it to a file on your computer? Image A, the one with the higher resolution.

2. Image A

3. Check everything that is true about PPI
 - PPI stands for pixels per image
 - PPI is used to describe image resolution
 - PPI stands for pixels per inch
 - PPI is used to describe image dimensions

5. Wrap Up and Reflections



Reflection Points:

- What did you learn today?
- How would you describe image resolution?
- What does image resolution say about an image?
- How would you describe image dimensions?



Exhibit A



Exhibit B: (Eye of the tiger)



Exhibit C:

Name	Size	Kind
 tiger_20ppi.jpg	12 KB	JPEG image
 tiger_72ppi.jpg	38 KB	JPEG image

Student Activity 3.3A : Image Dimensions and Resolution

Show off your image knowledge !

1. Fill in pixels in Image B to represent a circle.

_____ 1 inch _____

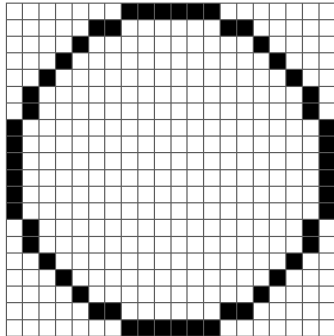


Image A

_____ 1 inch _____

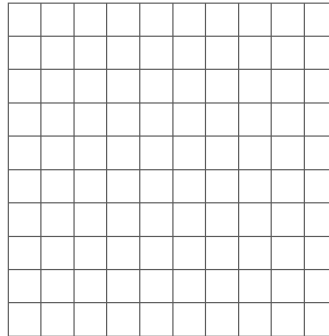


Image B

2. In reference to image A and B, let's test your resolution knowledge.

- a. What are the dimensions of image A?

- b. What are the dimensions of image B?

- c. What are the PPI (pixels per inch) for image A?

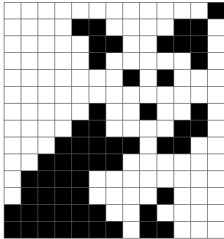
- d. What are the PPI (pixels per inch) for image B?

- e. Why is the circle in image A smoother (higher quality) ?

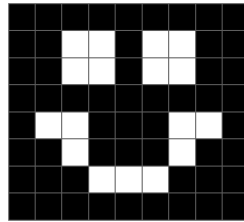
Student Activity 3.3B: Image Resolution and Storage Requirements

Let's see if you are an image buff!

1. In reference to image A and B.



A



B

- a. What are the dimensions of image A ? _____
- b. What are the total number of pixels for image B ? _____
- c. Which image requires more bytes (storage) when you save it to a file on your computer? _____

2. Which image requires more bytes (storage) when you save it to a file on your computer?

_____ 1 inch _____

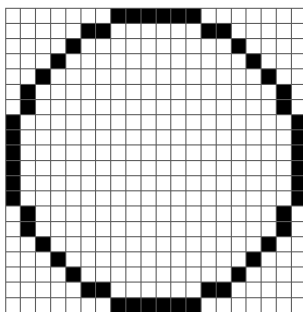


Image A

_____ 1 inch _____

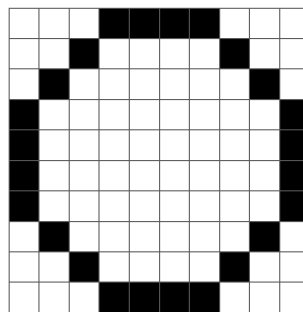


Image B

3. Check everything that is true about PPI. Read each carefully.

- PPI stands for pixels per image
- PPI is used to describe image resolution
- PPI stands for pixels per inch
- PPI is used to describe image dimensions