**1. Describe your process.**

For this final project, I began by defining the objects to understand what I wanted to accomplish, and how the user would interact with the program. After planning, I visualized it all through a flowchart to organize the structure of my code. This helped me to map out of the functionality and flow of my code. I found it best to have one main application, and the games in their own respective classes. This kept things much more organized, and easier to read. For the images and icons, I utilized Photoshop to design the symbols for Counting and Color & Shapes game. For the Alphabet game, I sourced many of the images online, which made the program much more appealing.

**2.Indicate any problems you encountered and how you resolved them, if you did.**

My largest problem that I encountered was in the development of the Colors and Shapes game. The game involves selecting an image based on two attributes: color and shape. However, I often found that the correct option, an image that matched either the specified color or shape, was not in the choices that appeared. I believe the problem was fixed by tweaking the logic in the ‘newQuestion’ method. Now, it combines the attributes together to form the correct answer for the round, then finds the image with the correct combined attribute to display. Before, I had it only search for one attribute, instead of a combined one.

Another problem, that I never got around to solving, was the score/high score for each game. My intention was to create another class to store all the scores and high scores, which would be presented after a set number of rounds in each game. However, much of my time was spent on tweaking and finishing the game mechanics first.

I also believe ‘checkAnswer’ methods to be unpolished/unfinished in the Alphabet and Shapes & Colors game. I wanted to have the image of the correct option pop-up alongside the message whenever you chose an incorrect option. However, much like the scores/high scores, my time was spent on tweaking and finishing the game mechanics first.

**3. What you learned from this process.**

I learned quite a lot from this project, to which I believe has made me a better programmer.

This one’s pretty simple, but I discovered that I can use JOptionPanes to display brief messages or get inputs very quickly and efficiently. I primarily used this in obtaining the name of the user and to display whether the person was correct or incorrect in their answer.

Another small thing that I’ve learned was that I developed my knowledge and use of the ‘?’ operator. It almost acts like an if-else statement, but is a bit more efficient. I utilized this in my ‘checkAnswer’ methods, and when combining the two attributes in my Colors and Shape game.

I also consider the importance of time management and prioritizing different areas of the project as something I have learned. Especially when it comes to figuring out what’s most important in the program.

**4. What resources you used.**

I used various online forums, like Stack Overflow, as well as browsed a variety of different GitHub projects for inspiration and to see how others went about different problems.  
  
Alongside that, I also used Photoshop to create some of the images.

**5. If I had more time...**

If I had more time, I would like to work on implementing those items I talked about in question #2. More specifically, the scores/high scores and adding to the ‘checkAnswer’ method. I would also like to polish up the program by including more images and styling elements to improve the look of the program. I would also probably have others test my program and gather feedback from that. If I had an endless amount of time, I would love to add a way to adjust the difficulty of the game.