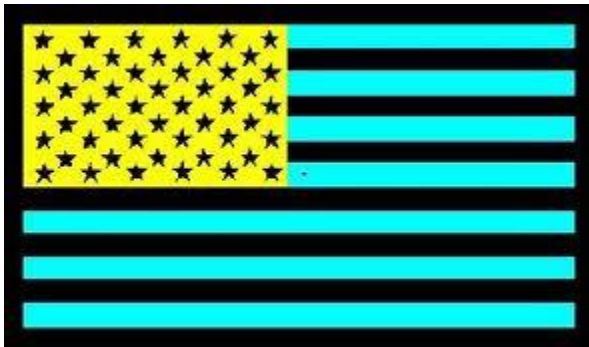


## After Images

Name: \_\_\_\_\_

1. Stare at the dot in the center of the squares while you count to 30 by 1000's. After you're done, look at a blank white sheet of paper (back of this sheet). What do you see? Describe or draw what you saw. *If you don't see a fairly clear color image, you probably need to stare for 45 seconds and make sure you never let your eyes stray from the dot.*
2. Now stare at the circles page for 30- 45 seconds and then look at the blank sheet and describe or draw what you see.
3. Stare at the rectangle with three circles for 30-45 seconds and then describe or draw what you see.
4. Create an American flag that will show the after image in red, white and blue. (use your white sheet of paper.)



5. Read the description of why after images work. Now reword it in a way that an elementary student can understand it. It is written at a fairly high level so may take several readings to sort through. *Note: This is something you'll find yourself having to do as a teacher all the time and it's not an easy skill!*

*Our eyes use three different types of neurons to decide what color we see. These neurons signal the brain whenever they see a color. If you keep seeing that same color, they keep signaling the brain. Eventually they do get tired.*

*To see color our brain has cells that compare red and green, then they compare this result (yellow) to blue light. From this information they can tell what color we are seeing. After images happen when some of these cells get tired from doing the same job over and over. So if you look at a white wall or piece of paper after you have stared at red, then you see all but red because the red comparison is too tired to work. All the color other than red is cyan.*

6. Compose a drawing of your choice (maybe a car or flowers) that looks best as an afterimage. (back of this sheet)

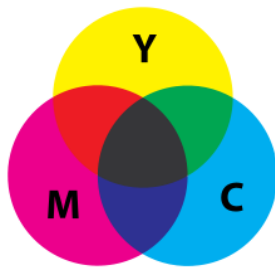
7. What are the primary colors – what colors do printers use?

*Cyan, Magenta, yellow*

8. How can only three colors make all the colors?

*It's because of the way our eyes work. Our eyes see color using three types of rods. The brain compares and contrasts what the different types of rods each see to determine the final color. If our eyes saw color with 4 rods, we'd need 4 primary colors.*

9. What is a color compliment?



*It is the only color that does not include any of the color it is complimenting. The compliment to Yellow is blue. Notice it is the other two colors, magenta and cyan, without yellow. Or the compliment to red is cyan. Red is magenta and yellow so it only leave cyan.*

10. What is the compliment of yellow? (try the color wheel under "Subtractive color" on Wikipedia)

*blue*

11. How about for red?

*cyan*

12. Read the main section of the Wikipedia article on subtractive color and write a description an elementary student could understand.

*Subtractive color is about taking away a color. We see white when all the colors of the rainbow are sent to our eyes from the same spot like from this piece of paper. So if a material does not send one of those colors, we see another color. If you color with a red marker, then that marker must not reflect cyan. If all the colors except Cyan get reflected off the paper, then we see red (magenta and yellow together).*

13. What is the afterimage color for red? How about for yellow?

*blue*

14. Why is the afterimage color the same as the compliment color?

*cyan*

15. Rewrite your description from 5 above using the idea of compliments to help explain what is happening with a person's vision when they see an afterimage.

Our eyes use three different types of neurons to decide what color we see. These neurons signal the brain whenever they see a color. If you keep seeing that same color, they keep signaling the brain. Eventually they do get tired.

To see color our brain has cells that compare red and green, then they compare this result (yellow) to blue light. From this information the brain can tell what color we are seeing. After images happen when some of these cells get tired from doing the same job over and over. After you have stared at red for a while, look at a white wall or piece of paper, then you see all but red because the red comparison is too tired to work. All the color other than red is cyan because red is magenta and yellow together. This is the same as subtractive colors. When we paint or draw we use subtractive colors.

Subtractive color is about taking away a color just like when our eyes quit telling us about a certain color. We see white when all the colors of the rainbow are sent to our eyes from the same spot like from this piece of paper. So if a material does not send one of those colors, we see the other two combined. For example, say you color with a red marker. What was subtracted to make red? Cyan is missing leaving magenta and yellow to make red. If all the colors except cyan get reflected off the paper, then we see red (magenta and yellow together). That means the marker must not reflect cyan back to our eyes.