Topic	Hexadecimal numbers and color design	
Class Description	**Students learn about hexadecimal number system and use hexadecimal numbers to design colors. They also learn about the different CSS selectors and CSS properties which can be modified in a website.**	
Class	**C51**	
Class time	**45 mins**	
Goal	● Learn about hexadecimal numbers and how to convert hexadecimal to decimal number system and vice versa. ● Learn to design different colors using a hexadecimal number system. ● Use different CSS selectors and their properties to add a personalized touch to the portfolio website.	
Resources Required	● Teacher Resources ○ Laptop with internet connectivity ○ Earphones with mic ○ Notebook and pen ● Student Resources ○ Laptop with internet connectivity ○ Earphones with mic ○ Notebook and pen	
Class structure	**Warm Up** **Teacher-led Activity** **Student-led Activity** **Wrap up**	**5 mins** **15 min** **15 min** **5 min**

CONTEXT

- **Hexadecimal numbers and their use in generating/representing RGB values.**

Class Steps	Teacher Action	Student Action
Step 1: Warm Up (5 mins)	Hey! We are going to use some Maths today while we are finishing our portfolio website.	

	We will be using numbers to generate colors. But they are not going to be the normal numbers which we are used to. We will be using Hexadecimal numbers. Ever heard of them?	The student explains what they know about hexadecimal numbers.
	Do you know the number system we use in our everyday life?	ESR: Decimal Number System
	Do you know why is it called decimal? Decimal means 10 Our number systems contains 10 different digits - 0 to 9 Also, each place value in a number is 10 raised to some power. Example 56 = 50 + 6 = 5 X 10^1 + 6 X 10^0 123 = 100 + 20 + 3 = 1 X 10^3 + 2 X 10^1 + 3 Note: Any number raised to the power 0 is 1. 10^0 = 1	ESR: varied
	So, our number system is based on the system of 10s. But a number system can be based on any number. What if we use only 2 digits - 0 and 1. and every place value is 2 raised to some power? Our numbers will only contain 0 and 1.	

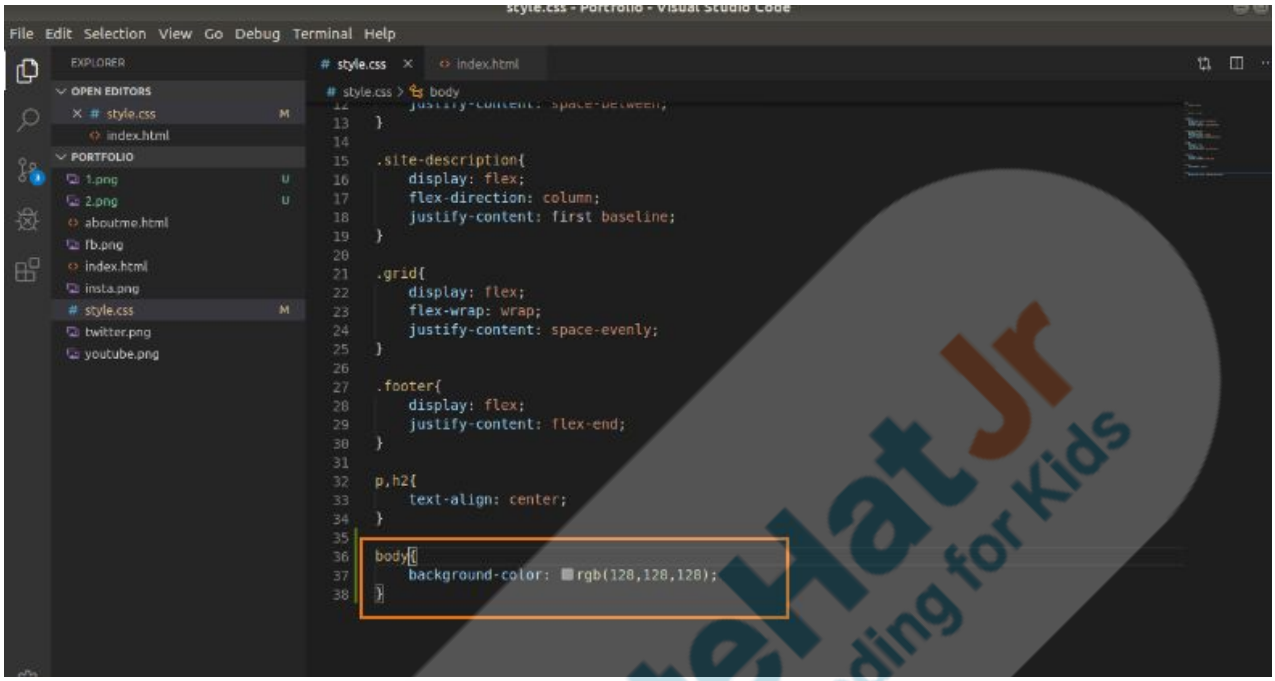
	What will 101 mean in such a number system? Note: Drop hints to the student if she/he is struggling.	ESR: 101 = 1 X 2^2 + 0 X 2^1 + 1 X 2^0 = 5
	Awesome! Do you know what this number system is called?	ESR: Binary number system
	Good. We have several number systems in computers based out of different number of digits used. One popular number system is called Hexadecimal number system. Hexadecimal number system is based on 16 digits !! Hex (6) + Dec (10) But we have symbols of numbers only for 10 digits - 0 to 9? So how would we represent 16 digits? Any ideas?	ESR: Student surprised ESR: varied
	We use alphabets to represent numbers after 9. A : 10 B: 11 C: 12 D: 13 E: 14 F: 15 From 0 to F, we have 16 digits which can be used to represent hexadecimal number system!!	Student listens.

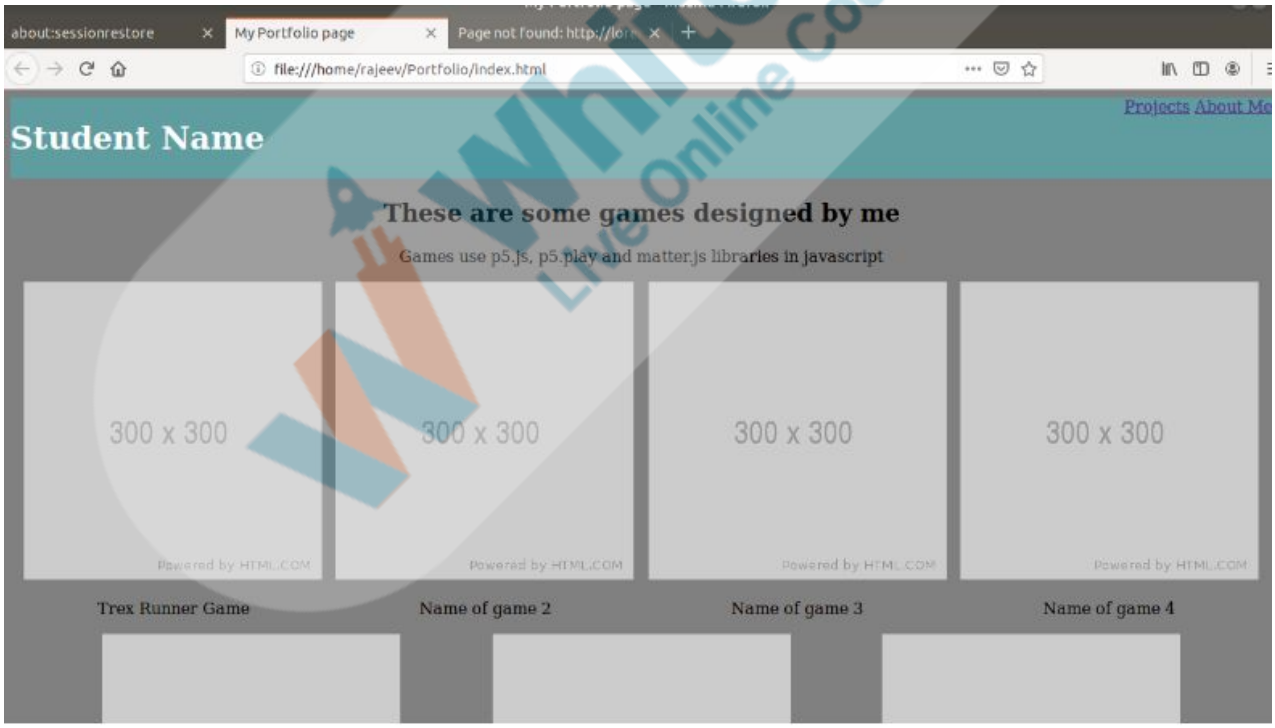
	Ok, what would the number AD mean in hexadecimal number system?	ESR: AD = A X 16^1 + D X 16^0 = 10 X 16 + 13 X 1 = 160 + 13 = 173
	What would number FE mean in hexadecimal number system?	FE = 15 X 16 + 14 = 254
	Very smart. How would you write 255 in hexadecimal number system? Hint: Divide 255 with 16 255 / 16 => Quotient 15 (F) and remainder 15 (F) So, the hexadecimal number is FF = 15 X 16 + 15	FF
	Great! Now let's see how hexadecimal numbers are used to generate colors!	
Teacher Initiates Screen Share		
CHALLENGE • **Add suitable colors (background, font colors etc.) to the portfolio website using hexadecimal numbers**		
Step 2: Teacher-led Activity (15 min)	Do you remember how any color can be generated using red, green and blue colors? Note: Get the student to recall the generation of color using RGB values.	ESR: Each color - red, green and blue has 256 different shades ranging from 0 to 255. When different shades of red, green and blue are combined, different colors are generated.

	Awesome! Great recollection! Let's quickly try to use them once again. Let's generate some color to set the background for the image gallery using rgb. Teacher clones and opens the portfolio website - **Teacher Activity 1**.	Student listens.
	Teacher opens the index.html and style.css pages on visual code studio. Can you figure out which css selector we will use if we want to turn the entire website of a particular background color?	ESR: body
	How do you think we can add a background color to the body? Which CSS selector property can we use? You can refer to the CSS property list on your student activity link.	ESR: Student refers to the **Student Activity Link 1** CSS selector: body CSS property: background-color
	Great! Which color should we use for the body background? I would also like you to think why would you choose that particular color?	ESR: The student comes up with different responses.
	There is a whole science to the choice of colors in a website. In fact, there are color engineers whose job is to choose colors for different projects.	

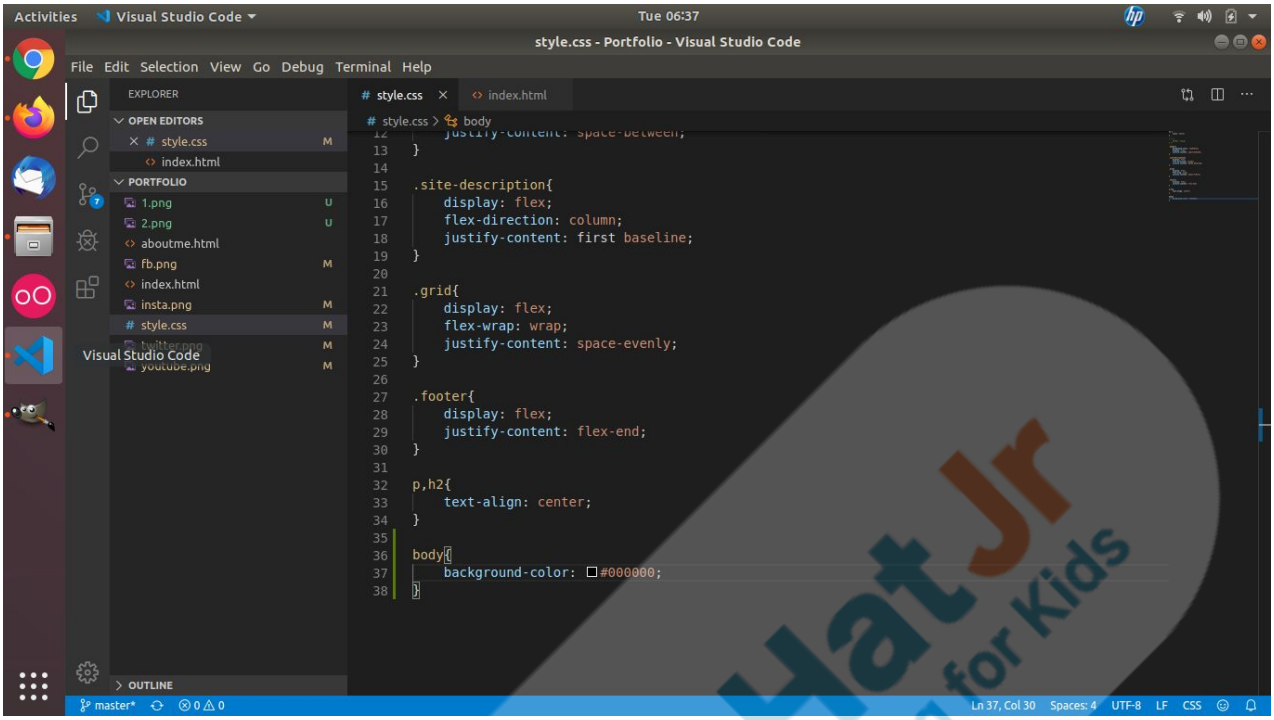
	The choice of color ranges from how different colors make people feel to the effect the colors have on the content of the website. You can choose any color which you like or colour that makes your portfolio site look good. I will go for a more scientific use of color. For example: White background color reflects more light to our eyes. It makes our iris close a little bit to allow only limited light inside our eyes. Since our eyes allow limited light, images on the website will appear a little darker than they are. Images on white background will appear to be darker. Do you want to guess what happens when the background color is black?	ESR: Black background color reflects no light. It allows our iris to open wider to allow more light to come in. Images on black background color will appear lighter than they are.
	To make the images appear as they are, we can go for 50% gray. Do you know how to make the background 50% gray? Make a guess? Hint: If you combine all the colors with their darkest shade, you get white. If you combine 0 of all the colors, you get black.	ESR: 50% of each color red, green and blue maximum is 255 - so each color could be 128, 128 and 128.
	Awesome! So in rgb color scheme, we could write: background-color: rgb(128,128,128)	Student observes and learns.

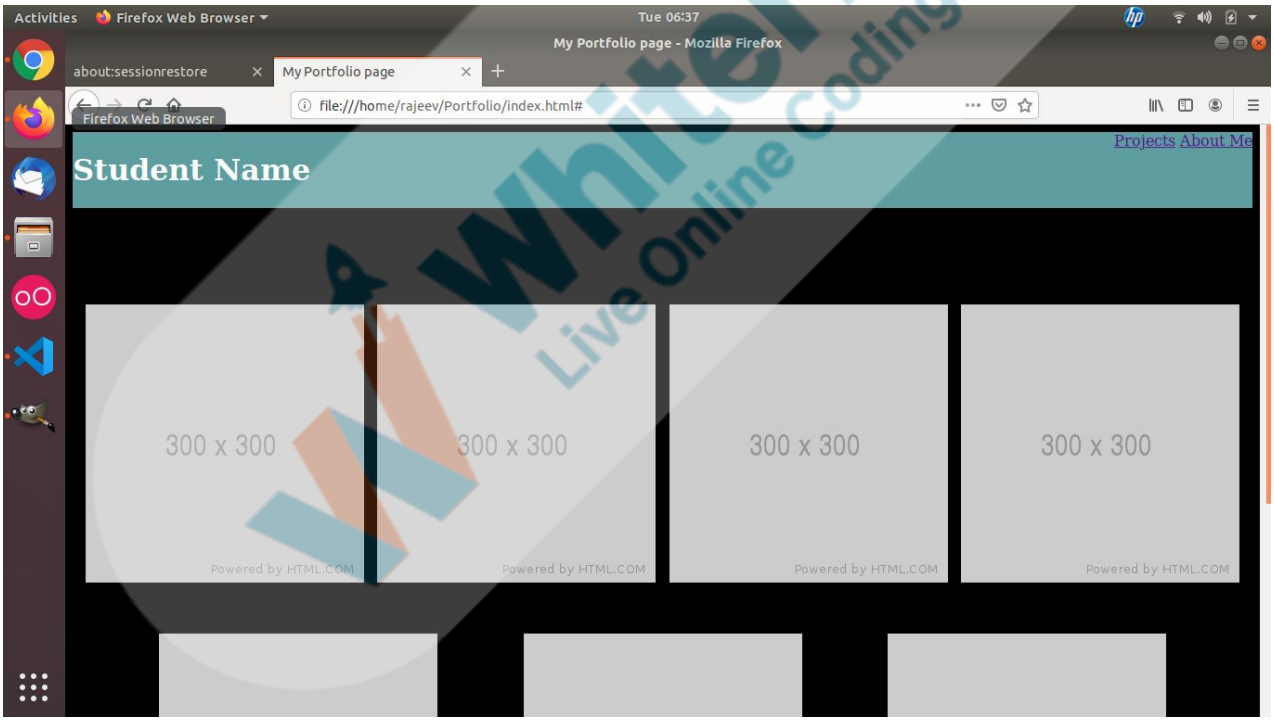
	Teacher writes code to change the background color of the website.	





	For computer programmers and color designers, it is faster to use hexadecimal numbers to represent colors. We add '#' before a hexadecimal number to tell the computer that it is hexadecimal. 0 in hexadecimal is 00 255 in hexadecimal is FF The first two digits are used to represent red, the next two digits are used to represent green and the last two digits are used to represent blue. In hexadecimal: Black is represented as : #000000 White is represented as: #FFFFFF Note: Show the student through practical examples by changing the color of the website.	The student observes, learns and asks questions.

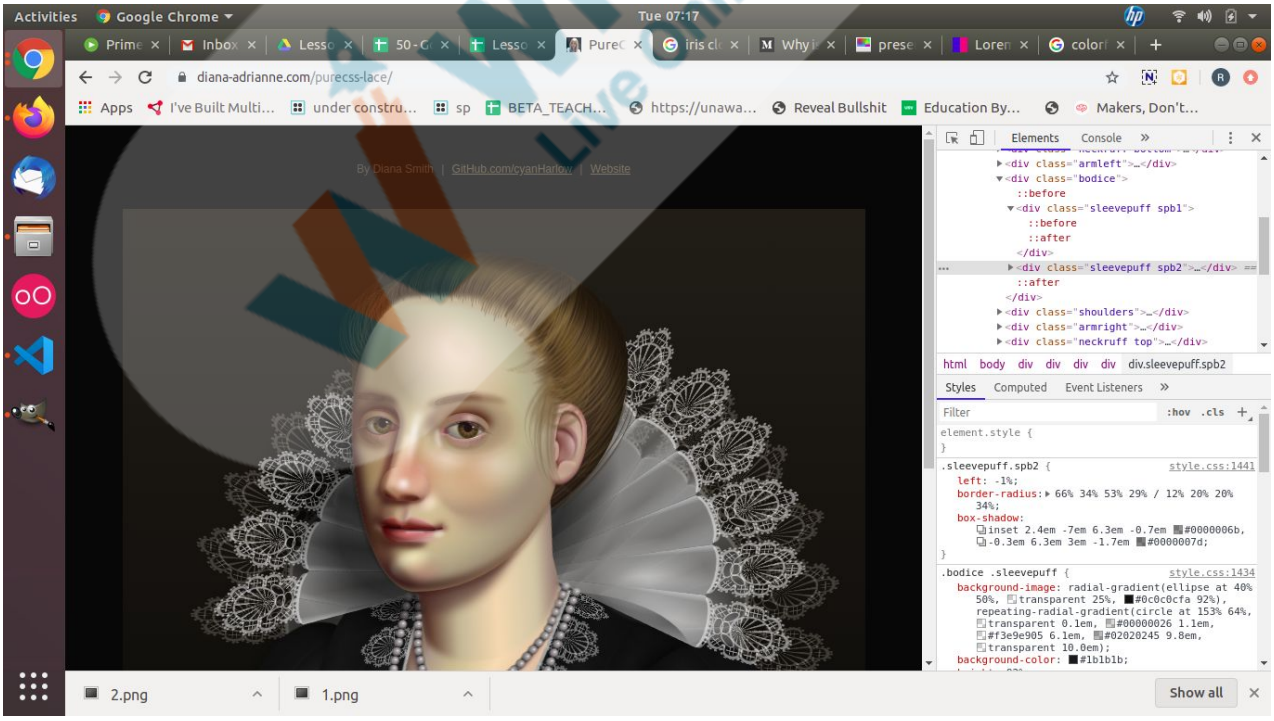




	Ok, now I want you to think and change the background color of the website to 50% gray using hexadecimal.	

	Ready?	ESR: yes!
Teacher Stops Screen Share		
	Now it's your turn. Please share your screen with me.	
• **Ask Student to press ESC key to come back to panel** • **Guide Student to start Screen Share** • **Teacher gets into Fullscreen**		
ACTIVITY • **Change the colors on the portfolio website using hexadecimal numbers**		
Step 3: Student-Led Activity (15 min)	Teacher guides the student to open their portfolio project from the previous class.	The student continues with his/her portfolio website. He/She opens up the code on Visual Code Studio
	So you have to represent rgb(128,128,128) in the hexadecimal number system. How would you represent 128?	ESR: Divide 128 with 16 Q: 8 R: 0 Hexadecimal number: 80
	Each of the colors - red, green and blue should be 80 then. How would you represent it in hexadecimal system?	ESR: #808080
	Let's do it.	Student changes the color and checks the output.

	Ok, now you know the use of hexadecimal numbers and how they are used to generate colors. I want you to use them to change the other colors on your portfolio website. You could change the color of the header to your choice. You can also choose the colors for the fonts used in the website.	The student spends some time playing with the colors of the portfolio website.
	Once the student is done playing with colors, help the student explore some random CSS properties by applying them on their portfolio website. Some CSS properties which you could help the child explore: - background - border - margin - padding - font-color - font-size	-
Teacher Guides Student to Stop Screen Share		
FEEDBACK ● **Encourage the student to make reflection notes in markdown format.** ● **Complement the student for her/his effort in the class.** ● **Encourage the student to experiment with other CSS selectors and find out what they do.**		
Step 4: Wrap-Up (5 min)	Today, we saw the number systems other than the decimal number system which we are used to. We saw how hexadecimal numbers can be used to represent colors.	Student listens.

	Hexadecimal number is the most common way to represent colors.	
	Today, you also personalized your website to use the colors you would like in your portfolio website. Colors are a great tool to give different effects to your website. I want to show you something amazing. Click on the Student Activity Link 2. The portrait that you see is not an image. It is completely drawn using CSS. Note: Teacher can ask the student to right click and press "Inspect" to show the student the different div and their colors.	Student checks the link and presses 'Inspect' to see the colors of different components.
		

	Other than colors, which different CSS properties did you explore today?	Student lists down the different CSS properties explored after color exploration.
	In the next class, we will use CSS properties to add the game name OVER the image. We will program it so that when we hover our mouse on the image, the name of the game is visible. We will also explore the use of margin and padding, two important css properties to adjust spacing on our website. Till then, you can continue to explore more css properties. You can also re-design your “about me” page to add color scheme of your choice.	-
Project Overview	**Origami Website Design Part 3** **Goal of the Project:** Today, you have learnt how to work with customized colors using hexadecimal codes and more advanced properties like margins and paddings. In this project, we will use the same concepts to make a more efficient website. **Story:** Honey has an origami studio.She is creating a website to explain the process of making origami	Students engage with the teacher over the project.

	You have already made the basic structure of the website and then improved on its design. Now in this project let's make the website more user-friendly with different colors and margins. I am very excited to see your project solution and I know you both will do really well.	
	Brace yourself! The capstone class is here! In the upcoming class, we will add margins, padding and mouse hover functionalities to complete the Portfolio Webpage. Please request your parents to join the class. Bye Bye!	
Teacher Clicks 		
Additional Activities	Help the student experiment and explore the different CSS properties.	Student explores additional CSS properties using **Student Activity Link 1**
	Encourage the student to modify the about me page to add a thoughtful color scheme.	Student adds a thoughtful color scheme to their website

Activity	Activity Name	Links

Student Activity 1	CSS Properties	https://htmldog.com/references/css/properties/
Student Activity 2	A portrait using css	https://diana-adrianne.com/purecss-lace/
Teacher Activity 1	Previous class link	https://github.com/whitehatjr/StudentPortfolio1.0