**Lesson – Types of processors – The GPU**

**Summarize the difference between a CPU and a GPU.**

Make a summary of the key differences between the structure of the CPU and the GPU.

Describe how GPU architecture makes use of SIMD (Single instruction, Multiple Data).

**Activity 1**

Review the Smiley face graphic built using only the CPU.

<https://editor.p5js.org/jonas.dewanckel/sketches/IJvyUK5su>

1. 1. Increase the resolution, what do you notice with the numbers presented on screen? Note you findings below: -

**Activity 2**

Use the following link which shows a Smiley face graphic built using the GPU.

<https://www.shadertoy.com/view/X3fBDj>

1. 2. Besides the syntax, what do you notice is different about the code?

1. 3. What do you notice changing the window size on the GPU generated image (you can do this by zooming in with Google Chrome)?

**Activity 3**

Start with the GPU Smiley face, you will learn a few techniques to include onto this image.

<https://www.shadertoy.com/view/X3fBDj>

To assist you may use this ShaderToy cheat sheet which lists the functions available in the ShaderToy and how to use them. <https://gist.github.com/markknol/d06c0167c75ab5c6720fe9083e4319e1>

For each exercise show a screenshot of the code you have added and outcome on the ShaderToy renderer.

**Exercise 1**

Add a light ball that tracks the mouse click.

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| **Code** | **ShaderToy rendered output** |
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**Exercise 2**

Multiply the dot product between the mouse\_coord and the pixel coordinate and multiply this with the mask what do you notice?

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| **Code** | **ShaderToy rendered output** |
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**Exercise 3**

Try to play around with transforming uv coordinates and see how they affect the image

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| **Code** | **ShaderToy rendered output** |
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**Questions**

1. 4. The image of a computer screen is typically made up of about 1 million pixels at a common resolution setting. Explain why a graphics card will improve the performance of a computer running a 3D game. [2]

1. 5. Other than gaming what other industry would a powerful graphics card be suited to for its graphical abilities. [1]

1. 6. Other than graphics or geometry capabilities what else can a GPU be commonly used for. (Without Bitcoin mining) [2]