

A decorative graphic on the left side of the slide consisting of two overlapping parallelograms. The front one is blue and the back one is a light green. They are positioned diagonally, with the blue one partially covering the green one.

Planetoid Generation

Tristan Larson for CIS 536



Icosahedron



Subdivision

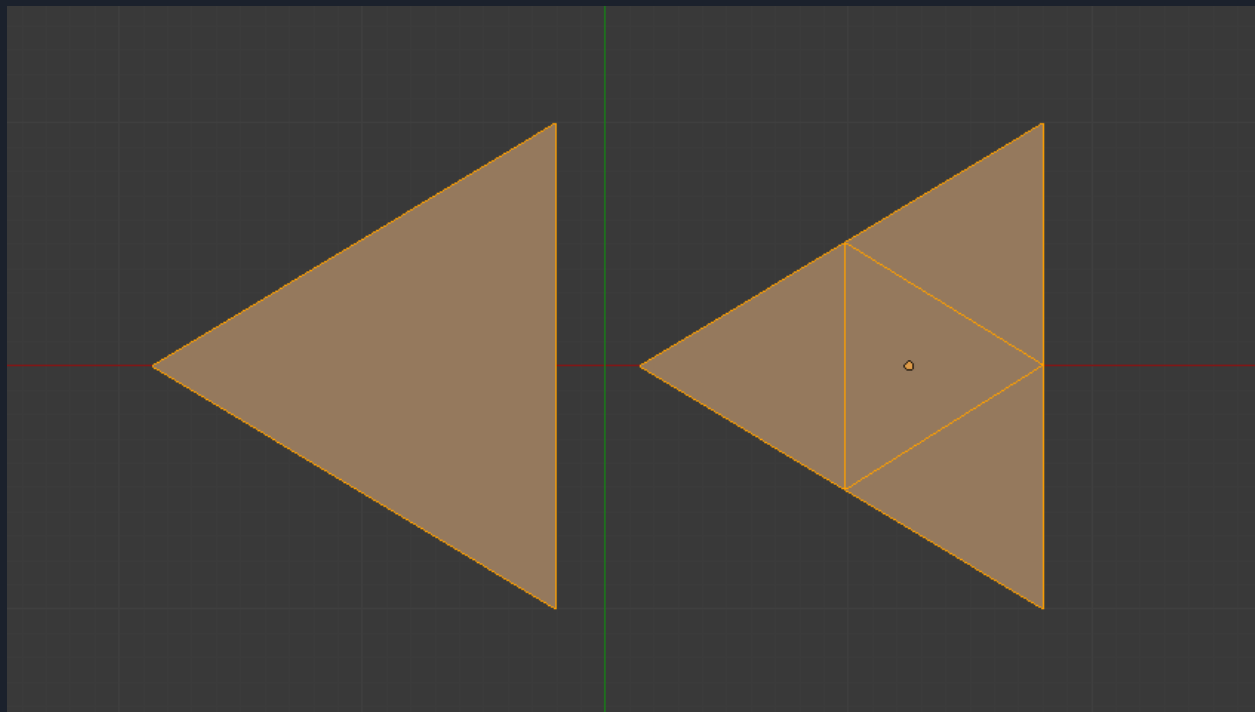
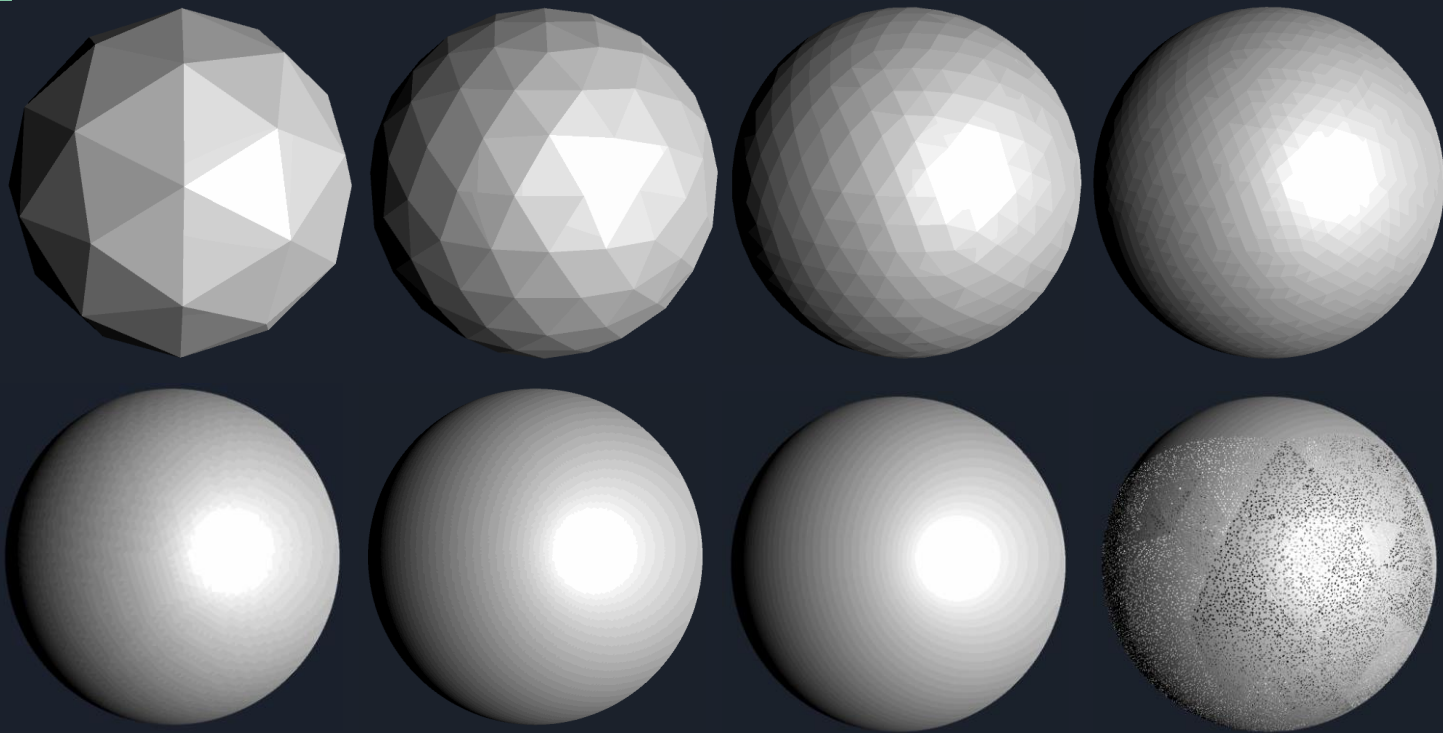


Image from Peter Winslow: <https://peter-winslow.medium.com/creating-procedural-planets-in-unity-part-1-df83ecb12e91>



Icosphere: Subdivided 1 to 8 times





Parameters

- Subdivisions – 0 to 7
- Max_Height
- Min_Height
- Redistribution
- Roughness_Passes
- Height Gen Method – Perlin Noise, Simplex Noise, Fractional Brownian Motion (FBM)
- Coloring
- Offset Vector

Noises for Terrain: Perlin, Simplex, and FBM

4 to 7 subdivisions

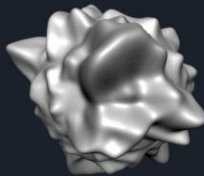
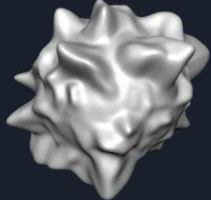
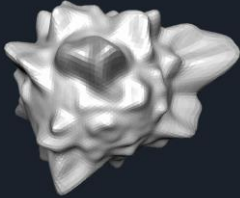
Subdivisions: 4

5

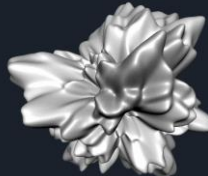
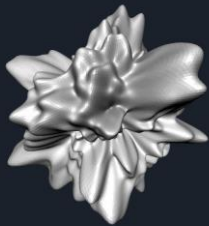
6

7

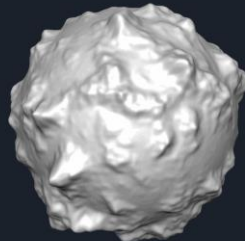
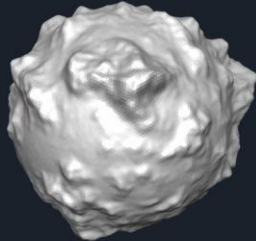
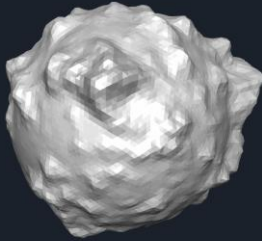
Perlin



Simplex



FBM



Noises for Terrain: Perlin, Simplex, and FBM

Redistribution 1 to 4

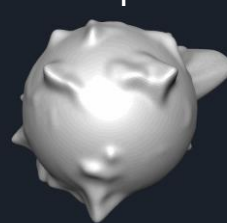
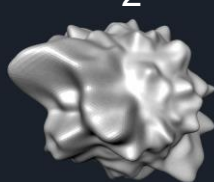
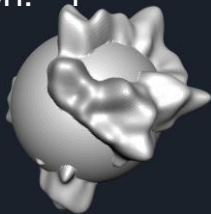
Redistribution: 1

2

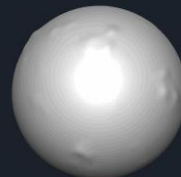
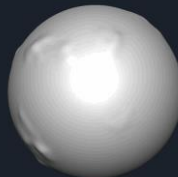
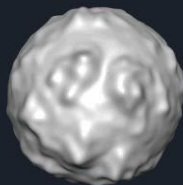
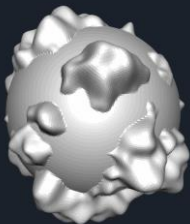
3

4

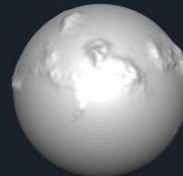
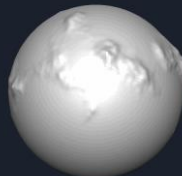
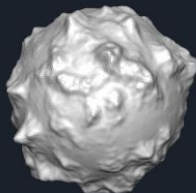
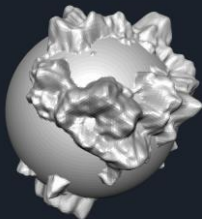
Perlin



Simplex

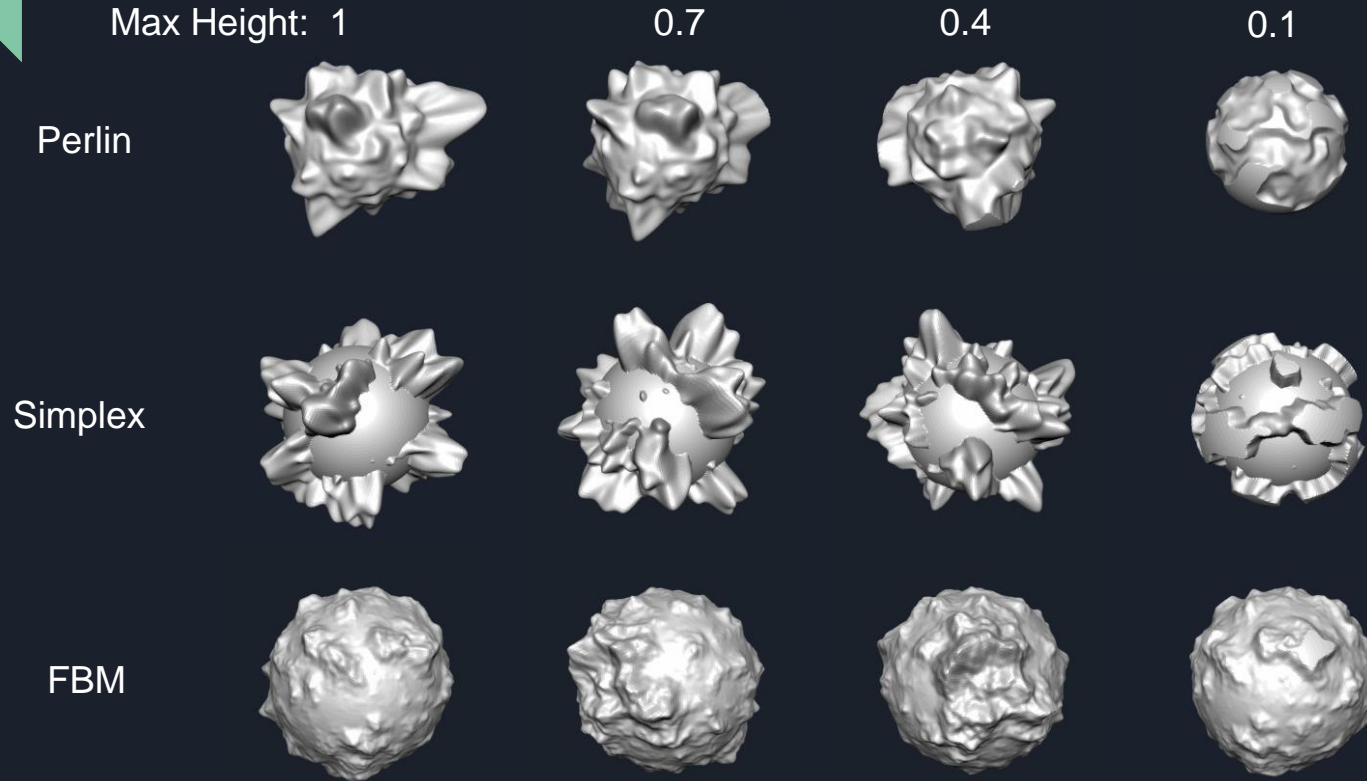


FBM



Noises for Terrain: Perlin, Simplex, and FBM

6 Subs, Min Height 0, Max Height 1 to 0.10



Noises for Terrain: Perlin, Simplex, and FBM

Min Height 0, Max Height 0.10, Roughness 0 to 3

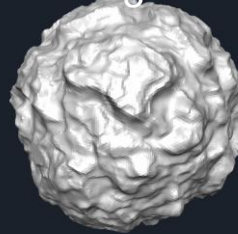
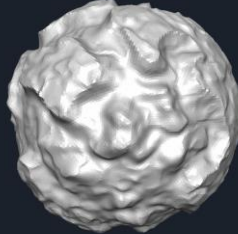
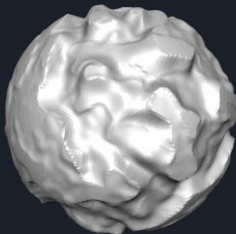
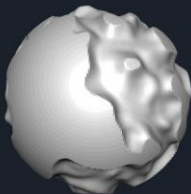
Roughness: 0

1

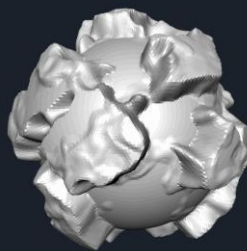
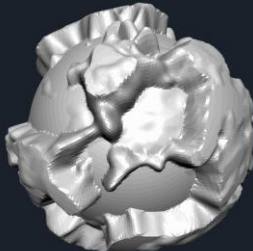
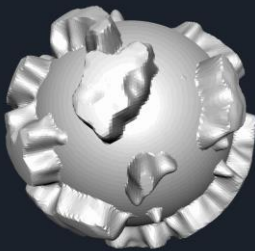
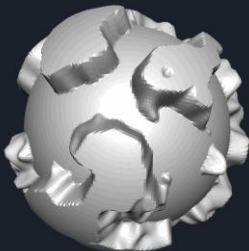
2

3

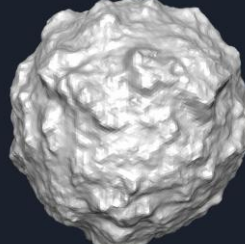
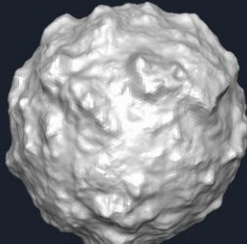
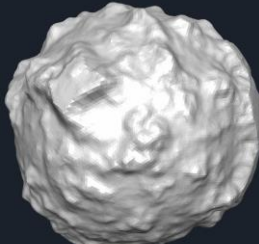
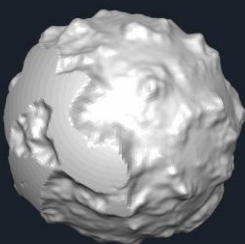
Perlin



Simplex



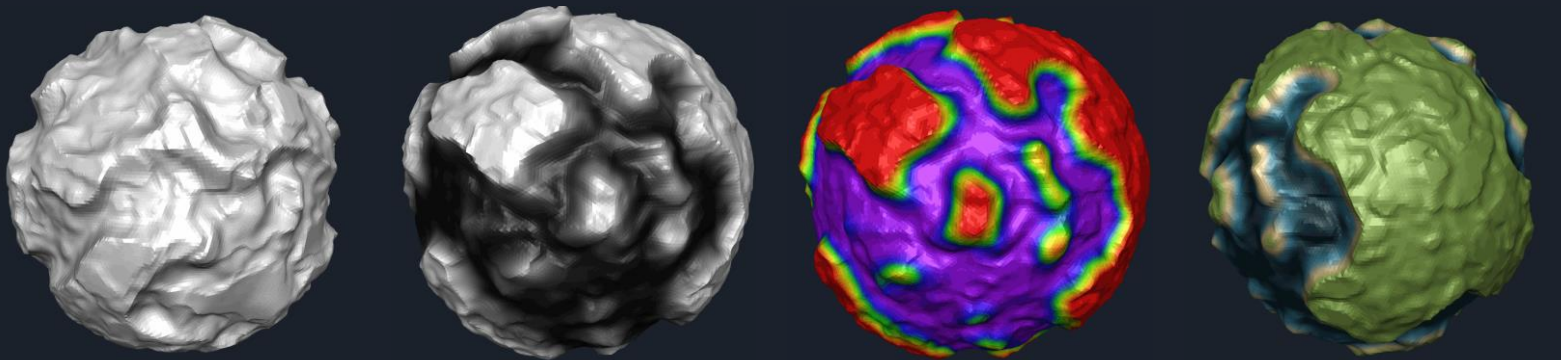
FBM



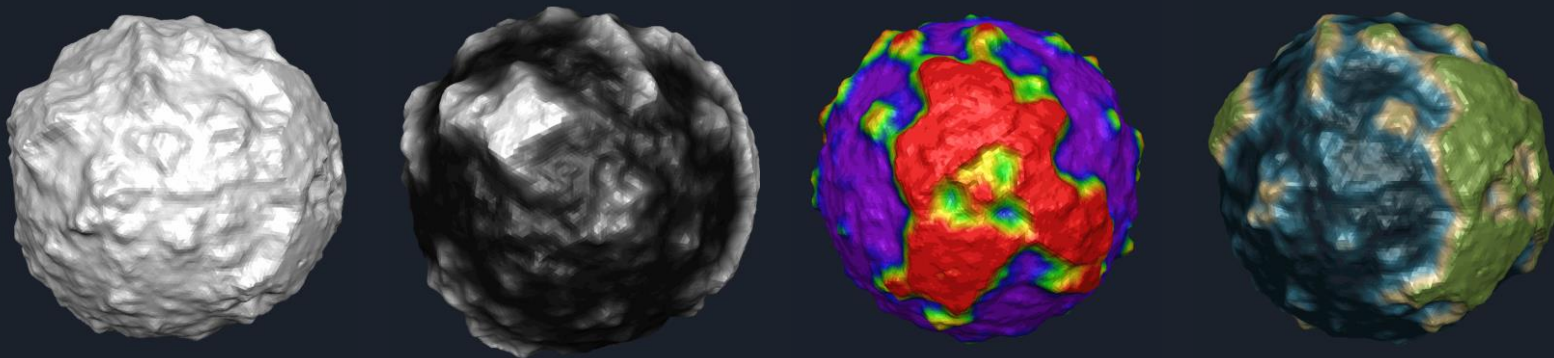
Colorings: Perlin and FBM

Min. 0, Max. 0.10, Roughness 2, Various Colorings

Perlin



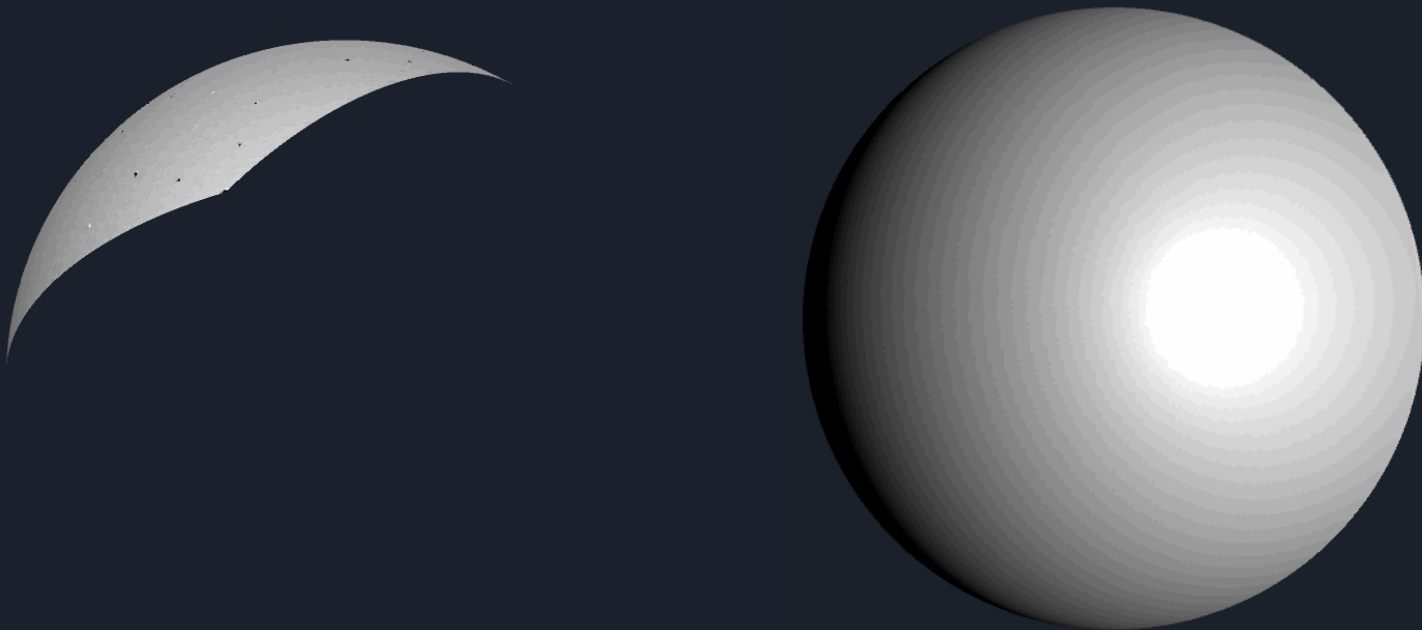
FBM





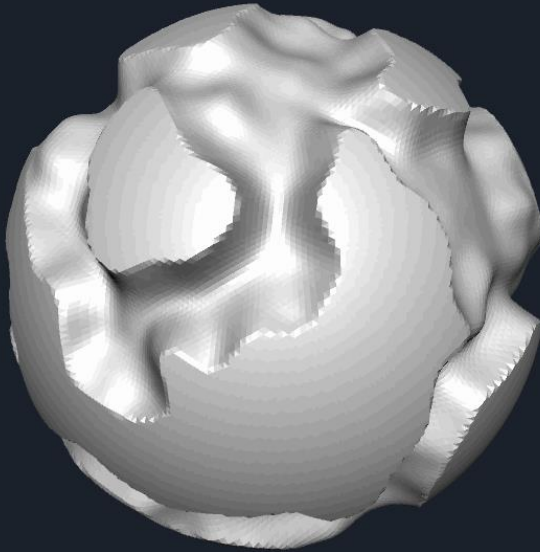
Challenges: Mesh Vertex Limits

Unity meshes default to a vertex limit of 65535 vertices in a mesh because they are indexed with 16 bit ints. This can be changed to a 32 bit int index allowing for ~4 billion vertices.





Challenges: Recalculating Normals





Outside Assets

Flick, J. (2018). Noise derivatives, a Unity C# TUTORIAL. Retrieved May 13, 2021, from <https://catlikecoding.com/unity/tutorials/noise-derivatives/>

Lague, S. (2019, April 8). Procedural planet generation. Retrieved May 13, 2021, from https://youtube.com/playlist?list=PLFt_AvWsXI0cONs3T0By4puYy6GM22ko8

Patel, A. (2020, May). Making maps with noise functions. Retrieved May 13, 2021, from <https://www.redblobgames.com/maps/terrain-from-noise/>

Standen, J. (2016, September 6). Simplex Noise in C# for Unity3D. Retrieved May 13, 2021, from <https://gist.github.com/jstanden/1489447>

Takahashi, K. (2015, December 10). Keijiro/perlinnoise. Retrieved May 13, 2021, from <https://github.com/keijiro/PerlinNoise>

Winslow, P. (2021, January 26). Creating procedural planets in unity - part 1. Retrieved May 13, 2021, from <https://peter-winslow.medium.com/creating-procedural-planets-in-unity-part-1-df83ecb12e91>