**Intended animation**

Our animation is a scene that depicts outer space. We have planets, asteroids, and UFOs flying around. The planets translate and there is a flag on the planet that waves. The asteroids move through space, and there are flames coming off of the asteroid that flicker independently. The UFOs move around the scene and have missiles flying around them. The objects move around for an infinite amount of time.

**Hierarchies**

The Planet object has two levels of hierarchical grouping: the planet itself and the flag that is on the planet. Each subgroup has different animations, described above. The flag is animated in a waving motion using the shearX and shearY functions; the planet moves with the flag through space. There are 2 instances of the Planet object, where the planet and flag have different speeds and directions.

The Asteroid object’s two levels of hierarchical grouping are the asteroid itself and the flames coming off of the asteroid. They have different animations as mentioned above, and there are 2 instances of the Asteroid object that have different speeds and colors. The flames flicker using commands in the draw() function. The move() function shared by Asteroid and Flames allows them to return to the opposite side of the screen when they go out of view, making it look like multiple asteroids are flying around.

The UFO object’s two levels of hierarchical grouping are the UFO itself and the missiles around the UFO. They have different animations, described above, and the different instances of the UFO have different sizes and speeds. When the UFO moves off the screen, it comes back onto the scene with the same velocity beginning from the opposite side of the screen (Pacman style).

**Group work**

Braxton created the Planet object, Jade created the Asteroid object, and Jack created the UFO object. The separate pieces are instantiated with appropriate sizes onto the same canvas, which is an image of a galaxy in outer space. The asteroids move faster than the other objects, and the planets are bigger than the asteroids and UFOs. Items move in front of and behind each other without bumping into one another.

The sound of a UFO flying around has been added as background noise.

**Unexpected Challenges**

Braxton: Using the shearing function and animating it in a looping fashion without affecting the other classes was a challenge for me. I also struggled a little bit with using Matrix stacks but eventually came to an understanding of them and subsequently implemented them in my classes.

Jade: Animating the flames to move independently of the asteroid was an unexpected challenge, specifically keeping them aligned on the canvas. When implementing the flickering feature, the asteroid and flames would gradually separate once they moved out of view and returned to the screen. Figuring out how to keep them aligned made me more familiar with manipulating the X and Y coordinates of multiple objects at once.

Jack: Figuring out the equations for the if statements that made the UFO move to the other side of the screen when moving out of bounds took some thinking and experimenting. At first, the movement was too choppy.