In class Presentation:

Actual Project:
- Planets
- Scaling Factor: 2.87480235*10^(-8)
    - Sun:
        - IG radius: **20.0**m Real: 6.957 x 10^8
        - IG mass: **4.7256 x 10^7** Real: 1.989 x 10^30 kg
DISTANCE FROM SUN = PERIHELION IN METERS SCALED
Inner Circle Planets:
- Earth: Dist from sun: 1.496×10^11 -> **4228.6905**
- Semi Major Axis IN GAME: **4300.6468** IN METERS
    - IG radius: **0.1832** Real: 6.371 x 10^6
    - IG mass: **141.8399** Real: 5.97 x 10^24 kgwhat t
- Mars: Dist from sun: 2.279×10^11 -> **5940.7791**
- Semi Major Axis IN GAME: **6553.2844** IN METERS
    - IG radius: **0.0975** Real: 3.39 x 10^6
    - IG mass: **15.2531** Real: 0.642 x 10^24 kg
- Mercury: Dist from sun: 5.79×10^10 -> **1322.4091**
- Semi Major Axis IN GAME: **1664.7693** IN METERS
    - IG radius: **0.0701** Real: 2.44 x 10^6
    - IG mass: **7.8404** Real: 0.330 x 10^24 kg
- Venus: Dist from sun: 1.082×10^11 -> **3089.8376**
- Semi Major Axis IN GAME: **3110.8236** IN METERS
    - IG radius: **0.4615** Real: 1.60518 x 10^7
    - IG mass: **115.7052** Real: 4.87 x 10^24 kg
Outer Planets:
- Jupiter: Dist from sun: 7.785×10^11 -> **21290.6425**
- Semi Major Axis IN GAME: **22379.7326**
    - IG radius: **2.0098** Real: 6.9911 x 10^7
    - IG mass: **45094.1476** Real:1898 x 10^24 kg
- Uranus: Dist from sun: 2.877×10^12 -> **78559.6088**
- Semi Major Axis IN GAME: **82421.8195**
    - IG radius: **0.7291** Real: 2.5362 x 10^7
    - IG mass: **2062.2613** Real: 86.8 x 10^24 kg
- Saturn: Dist from sun: 1.433×10^12 -> **39026.9943**
- Semi Major Axis IN GAME: **41168.3483**
    - IG radius: **1.6741** Real: 5.8232 x 10^7
    - IG mass: **13494.9820** Real: 568 x 10^24 kg
- Neptune: Dist from sun: 4.503×10^12 -> **128533.8505**

- Semi Major Axis IN GAME: **129795.9749**
    - IG radius: **0.7078** Real: 2.4622 x 10^7
    - IG mass: **2423.3947** Real: 102 x 10^24 kg

- Gravitational Physics:
    - Calculate attraction between the sun and the other planets

    $$F_g = G\frac{m_1 m_2}{r^2}$$

    where
    - F_g is the force
    - G is the gravitational constant (6.674×10^{-11} $m^3.kg^{-1}.s^{-2}$)
    - m_1 and m_2 are the masses of the objects
    - r is the distance between the centers of the objects

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    1. F(g) is the gravitational force = velocity
    2. Determine acceleration of planet (a = Force/mass)
    3. Update planet velocity over time (newV = oldV + acc * time.DT)
    4. Update planet position over time (newP = oldP + newV * time.DT)
- Orbital Mechanics:
    - *Keplers Law 1:*
        - Planets move in elliptical orbits with the sun at ONE focus
    - *thKeplers Law 2:*
        - A line segment connecting a planet to the sun sweeps out equal areas in equal time intervals
    - *Keplers Law 3:*
        - The square of a planet's orbital period is proportional to the cube of the semi major axis of its orbit. (the further from the sun the orbit, the longer one orbit takes)
- Video Recording of technical demo