Phet Simulation: Gravity and Orbits  
Follow the directions carefully before answering the following questions while using the Phet Simulation “Gravity and Orbits”. <http://phet.colorado.edu/en/simulation/gravity-and-orbits>

1. Run the Simulation, Keep all the default settings, select the *Earth and Sun option*. Turn *on the gravity force vector arrow and velocity vector arrow options* in the “*Show”* menu, then run and play with the simulation for a while. Which is experiencing a greater gravitational force: The sun or the earth?
2. Pause the Simulation. Hit “Reset”. (not “Reset All”). Alter the mass of the earth. Does the mass of the Earth have any impact on its Orbit? Explain.
3. Pause the Simulation. Hit “Reset.” Click and drag the “v” at the end of the red velocity in order to *decrease* the Earth’s velocity.
   1. What happens when you hit play? Why?
   2. Why doesn’t this happen to planets normally?
   3. What would happen to Earth and all of the planets if there was air resistance in space?
4. Pause the Simulation. Hit “Reset.” Click and drag to *increase* the Earth’s velocity.
   1. What happens when you hit play? Why?
5. Pause the Simulation. Hit “Reset.” Click and drag the Earth itself to move it further away from the sun
   1. What happens when you hit play? Why?
6. Try to create another stable orbit that is further or closer to the sun. Show your instructor or post a screenshot here. What other very important variable is altered with this new orbit?
7. Pause the Simulation. Hit “Reset.” On the top left tabs, change your view so that you are *to scale*. In the *Show* menu, you can now also turn on the “Tape Measure”. Run the simulation, with the path shown.
   1. How far out is the satellite?
   2. How long does it take for the satellite to orbit earth?
8. Switch modes, so that you are now looking at just the earth and the moon.
   1. How far is the moon?
   2. How long does it take for the moon to orbit the earth?
9. Again Switch modes, so that you are now looking at just the earth and the sun.
   1. How far is the earth from the sun?
   2. How long does it take for the earth to orbit the sun?