My Solar System—Lab and WS Name__Skyler D. Grable-Gibson___

1. Go to: http://phet.colorado.edu/en/simulation/my-solar-system

2. Select RUN

3. Move the slider all the way to accurate, click on the tape measure and the grid.

4. Click the radio button for 4 objects and run the simulation until the purple planet (body 2) has made one complete orbit (one year).

5. After the first orbit (year), turn off the traces (show traces box) and watch another orbit (year) of the purple planet (body 2).

Question One:

> Is blue moon (body 3) circling the yellow sun (body 1) or the purple planet (body 2)? Explain your answer.

The Blue moon (body 3) is circling the yellow sun (body 1) at a larger radius and orbital period, but the blue planet (body 1) is also circling the purple planet (body 2) at a smaller radius and orbital period. The blue planet is also circling the other two bodies.

6. Increase the mass of the sun (body 1) to 400 and allow the simulation to run for one complete orbit of the purple planet (body 2).

7. Decrease the mass of the sun (body 1) to 175 and allow the simulation to run for one complete orbit of the purple planet (body 2). (~90 seconds)

Question Two:

> How do the orbits of the planets change when the mass of the sun is increased or decreased? Why? Explain your answer.

When the suns mass is 400 the other three will move faster in their orbits and closer together which will cause a collision that is shown on the simulation. When the suns mass is at 175 there is not much change from the original simulation just does orbit somewhat slower.

Question Three:

Why does the sun (body 1) follow a circular path? How does the path change as its mass changes? Why? Explain your answer.

The sun follows a circular path because the sun also has its own orbit just like the rest of the planets. When the mass is bigger the circular path gets smaller but when the mass of the sun is smaller (175) the circular path is larger.

8. **Choose the preset for Sun and Planet from the pull-down menu.**

9. Complete the data table below by changing the mass as shown and recording the length of the year in seconds, and also measuring the distance from the planet to the sun at the closest point (perihelion) and farthest point (aphelion). (Make sure slider is set to most accurate)

Mass of Sun (body 1)	**Mass of Planet (body 2)**	**Time of One Orbit (planetary year)**	**Closest Distance to Sun (perihelion)**	**Farthest Distance to Sun (aphelion)**
200	10	7.9	150	159
400	10	3.1	53	150
600	10	2.1	31	150
800	10	1.7	21	150
1000	10	1.5	16	150
150	10	16.9	150	312
200	1	9.1	150	173
200	20	7.2	144	151
200	50	5.4	114	150
200	100	3.8	86	150
200	200	2.4	55	150

Question Four:

When is the planet moving fastest? Why?

When the planet is closest to the sun (body 2).

Question Five:

What makes the length of the year increase and decrease? Why?

The bigger of each bodies the faster the rotation.

Question Six:

A planet in a circular orbit would always be the same distance from the sun. What do you notice about orbits with the shortest years? Why?

With the shortest year body 2 will orbit around body 1 at a faster rate and not at a circular orbit.

10. **Choose the ellipses preset from the pull-down menu.**

11.You may move the slider bar about 2/3 of the way towards fast for this simulation.

12. Run the simulation until the green planet (body 4) returns to its starting point (one planetary year)

Planet	**Time of One Orbit (planetary year)**	**Closest Distance to Sun (perihelion)**	**Farthest Distance to Sun (aphelion)**
Purple Planet (body 2)	2.3	54	85
Blue Planet (body 3)	7.5	54	251
Green Planet (body 4)	14.6	54	420

14. Change the y velocity of the blue planet (body 3) to 90 and the green planet (body 4) to 70.

15. Run the simulation again until the green planet (body 4) returns to its starting point (one planetary year)

Planet	Time of One Orbit (planetary year)	Closest Distance to Sun (perihelion)	Farthest Distance to Sun (aphelion)
Purple Planet (body 2)	2.3	54	85
Blue Planet (body 3)	12.1	171	250
Green Planet (body 4)	26.8	294	420

Question Seven:

How does the year of a planet closer to the sun compare with one that is farther away? Why?

Bodies that are closest to the sun will have a shorter orbital year compared to a planet that is farther away.

Question Eight:

How can an orbit be made more circular? Explain your answer.

It would depend on both planets spherical shape

More true the planets better circular orbit

If everything was centered

Question Nine:

In your own words describe what an orbit is and what factors affect the size, speed and time (period) of an orbit.

An object that revolves around another object. Collision with other objects would affect all sizes, speed, and time. If there was no orbit, objects would collide wore often.