Names: _____ _____

_____

Grade	

Active Learning

Pre-Lab Quiz

Record your team's answers as well as your reasonings and explanations.

1.
2.
3.
4.
5.

Part 1: Exploring Astronomical Topics

1. Read and learn about active learning and active learning roles on the main page of the lab webpage for this lab. On the first page of this lab where you wrote your lab group members' names, write the active learning role each person will play today next to their name. Going forward, always note the week's role assignments each time you list your lab partners' names at the top of your lab.

2. Choose a question from the list on Part 1 of the lab webpage for this lab. Using the internet, research it and prepare to share your results with the class by writing a brief summary of the answer to the question in the space below. How did your lab group Scribe ensure you all trusted your findings equally? What potential weaknesses were present in your proposed reporting that your Skeptic probed your group members about?

Part 2: Exploring the Solar System

1. In the table below, list the planets in order by their distance from the Sun. Then look up each planet's average distance from the Sun (in Astronomical Units, AU) as well as its radius (relative to Earth's).

Once complete, associate each ball in the demo with the appropriate planet.

Note: www.wolframalpha.com may prove useful for looking up information. For example, try typing in "Venus radius". Alternatively, check out the *properties of planets* demo on the lab website.

Planet	Distance from Sun (AU)	Radius (Earth Radii)	Ball #
Earth	1.0	1.0	

2. If Jupiter is represented by a watermelon, what fruit would represent Earth? Guess how many of these Earth-fruits would fit inside the Jupiter-watermelon. For the Skeptic of your lab group, can you think of any experience that would lead you to believe that your group members might be overestimating the size of the Earth-fruits? Underestimating them? Share any concerns you may have.

Note: Use your intuition – don't search the internet for answers. We'll calculate the actual value in the next problem and see how well your guess was.

3. Using the equation for the volume of a sphere, $V = 4\pi r^3/3$, as well as the radius of Jupiter in Earth radii, estimate how many Earths would fit inside Jupiter. Show your work.

Note: Remember from math that $(x^a / y^a) = (x / y)^a$; round the radius to a nice number to make the calculation easier. Do **NOT** look up the radius of Earth – it should cancel out in the end.

4. We will scale down the Solar System to fit in Iowa City. If the scaling for this model is 1:1 billion, how far away from the Sun would Earth need to be in meters? What would the diameter of the Sun be? Show your work. How did your lab group Manager keep your group on track as you progressed on this question?

Note: The distance to the Sun is ~150 billion meters while its diameter is ~1.5 billion meters.

5. Assuming the Sun is in Van Allen Hall in this model, using *Google Maps*, find a location to represent Earth's location. (Find something whose distance from the classroom matches the scaled distance from the Sun that you just calculated.) Try to find something that is viewable from the window.

Note: Right click and select "measure distance" to use the distance tool. You can switch between metric and english units by clicking on the scale at the bottom right of the page.

6. We will now scale down the Solar System to fit everything inside Van Allen Hall. Using this new scale, which will be 1:100 billion, calculate the distance of the planets from the Sun in this model and fill in the table below, copying the first two columns from the table in Question 1.

Hint: If there are ~150 billion meters in 1 AU, how can we convert the distances in AU to the scaled distance?

Planet	Distance from Sun (AU)	Scaled Distance from the Sun (meters)
Earth	1.0	

For the Manager of your lab group, how is your group doing on time? Is there enough time left in the lab period for your group to slow down and consider questions more carefully? Or do you need to try to speed up to finish on time? Take notes here as well as share this information with your lab group members.

7. As a class, we will go out into the hallway and place the planets at their scaled distances that we calculated in Question 6. What planet(s) was your group assigned to place? For the Scribe of your lab group, take notes on each group member's initial ideas on what the hallway model will look like, and after looking at the scale model of the solar system, write down some of your thoughts and observations.

8. The nearest star to our Sun is Alpha Centauri, which is 277807 AU away. For our scaled Solar System from Question 6, how far away would Alpha Centauri be in km? Using *Google Maps*, find a city that is roughly this distance from Iowa City.

Hint: It may help to add a new row to the table in Question 6.
Note: 1 km = 1000 meters.