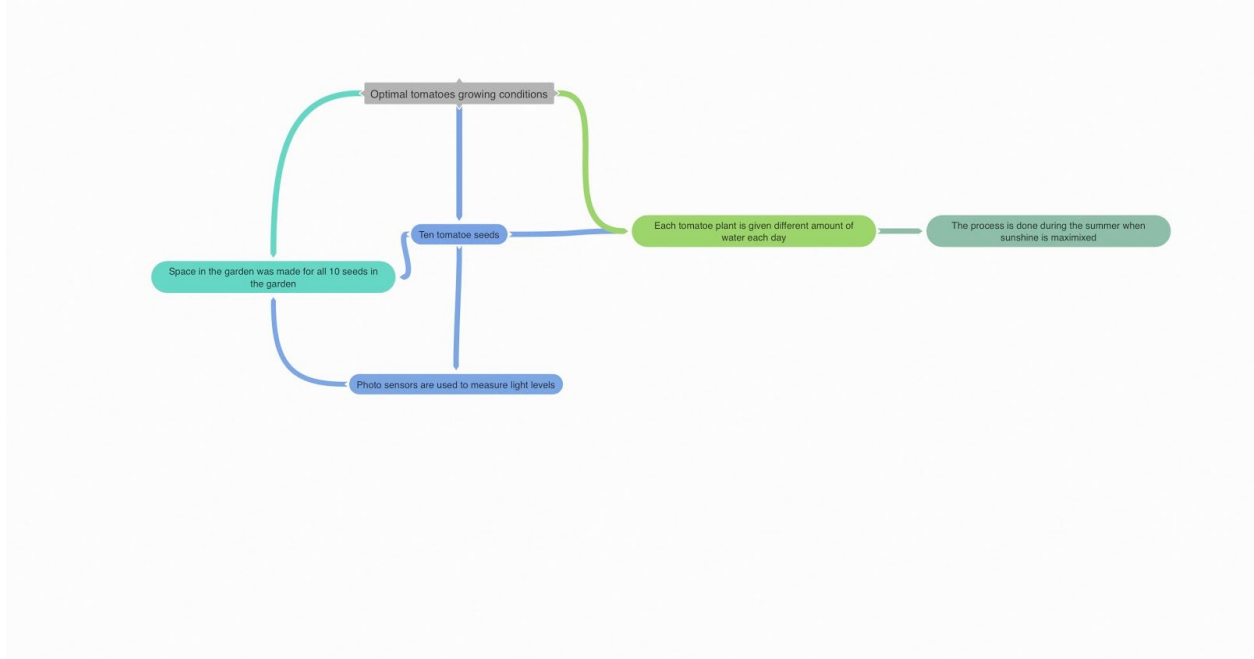
Week 1

1.

(**A**) Scientists use the orbits of the stars to calculate the mass of the object at the center of the galaxy. The object has a mass that is as large as the mass of a black hole.
(**B**) Epidemiologists use a reproduction parameter which is the number of new infections resulting from one new infected person.
(**C**) According to Newton's Laws of motion, things that have different masses and shapes would still accelerate downward at the same rate when dropped.

2.



An experiment was created to find out which is the best way to grow tomatoes. Ten tomato seeds were gathered with each getting different amounts of water in a controlled garden. Everything was conducted in the summer to get the maximum amount of sunlight and results.

Week 2

1.

[1] Stephen Crass. **The IceCube Neutrino Detector at the South Pole Hits Paydirt.** *IEEE Spectrum,* 2018.
https://spectrum.ieee.org/tech-talk/aerospace/astrophysics/the-icecube-neutrino-detector-at-the-south-pole-hits-paydirt

[2] University of Wisconsin-Madison. **IceCube South Pole Neutrino Observatory.** *IceCube.wise.edu*
https://icecube.wisc.edu

The IceCube Neutrino Observatory is a massive detector spread throughout a cubic kilometer of ice in Antarctica.Most of the facility is located under the ice and is where all the equipment is located.The underground is also where all research is conducted. IceCubes goal is to detect neutrally charged subatomic particles or neutrinos from cataclysmic events that have energies a million times greater than nuclear reactions. By detecting neutrinos, IceCube allows researchers to learn more about our universe. A recent neutrino detection by IceCube, known as the 170922A event, was the first time the exact source of a neutrino was able to be confirmed. Data taken from IceCube was used to further research in black matter and magnetic monopoles.

Week 3

1.

- When born, the baby was heavy and long.
- The baby grew quickly, by the time she was 1, she was taller.
- Radio transmission was slow between the Earth and the Moon.
- A hiker walked a 60 km trail in 4 days, making her average speed moderate

2.

This recipe is for a simple but good peanut butter and jelly sandwich. First gather your ingredients, them being peanut butter, strawberry jam, and bread. Starting from the big gray stove in the kitchen head over straight until you hit the cabinets in the middle of the kitchen. Once there open the cabinet to your far right and in the bottom left corner you will see the peanut butter and strawberry jam. Once you have them head to your right from where you got your first ingredients. You should see the 3 black racks that are set up vertically right away. In the middle rack you should see the white and brown bread (pick one). After you have everything, start on the sandwich. First grab your two slices of bread and decide whether you want to toast it or not. After that with a spoon, scoop half a spoon filled with peanut butter and spread it to one slice of bread. Repeat that same step but with the jam. Finally you could place the two pieces of bread together and start eating.

Week 4

1.

The acceleration was measured due to Earth's gravity, g, with a pendulum. First, the measured length of the pendulum was 20 cm. Second, the pendulum was hung straight down and displaced the bob 5 cm to its right. The pendulum was released and recorded the number of times it returned to the same position as it swung back and forth for one minute. It calculated that it returned to its original position every 0.90 seconds. The results were inserted into the formula predicted by Newton's Laws. The result for g was 9.81 m/s2.

2.

The trials were conducted in a room with no air conditioning, and therefore no air flow. The average horizontal distance bacteria travel after a person sneezes was measured. First, a sample of 20 infected people was gathered. Second, petri dishes were arranged in 0.5 meter intervals out to 10.0 meters on the floor in front of the subject. The category of dishes with the largest colonies were the ones corresponding to 8.0 meters. Third, once each subject felt the

urge to sneeze, the subject was required to aim the sneeze down the line without covering their mouth. The height of each subject was required to be within 6 inches of 5 feet 6 inches tall. Fourth, bacterial colonies were allowed to grow in the dishes for one week under ideal conditions. These results inform the epidemiology of spreading bacteria. The results show that when a person sneezes, it is possible to spread infection to someone who happens to be 8.0 meters away.