**Duchesne Academy 8th grade NDC Pilot Ideas**

1. **Electricity Experiments**
2. **W.A.S.P- Water and Static Proposal** In its simplest form, it is an experiment based off of static electricity and water that has multiple justifications. It can save equipment and peoples’ homes on the ISS and Mars. Proposal/Experiment/Steps

1. There will be five needles in a rotating servo and motor.

2.  A machine that can shoot water. The water would need to be strongly propelled because there is no gravity to pull it towards the object in space.

3. The water will orbit the needle or not and the experiment will take place.

4. After the cycle is complete the water will be pulled into a water collection storage system by a vacuum. There will be another vacuum across the Ardulab.

5. The charge will be be created by a positively charged material. Then the water will create a visual interpretation of what is going on.

6. Materials that create a negative charge will slow the process.

Materials Needed-Velcro:Styrofoam-Nylon:Brass-Aluminum:Silicon-Wool:Vinyl -Paper:Teflon

1. **Currents/Insulators** Test currents/Insulators in space to test which insulator and semiconductor would work the best. We are going to measure the currents with a multimeter or see if we can light a LED light with an insulator blocking the end of a rod. We hope to lighten space travel with this experiment.
2. **Will the static electricity build up, more rapidly in space?** Our proposed project includes having a piece of fur and a small plastic rod in the ardulab. Once every hour, the fur and rod would rub together while the camera would be recording the process and then close up on the fur. The data would be recorded and be used for further research in space; including to see if static electricity could prevent damage to electronics on the ISS.
3. **Animal Experiments**
4. **Starfish Regeneration:** We would like to propose that starfish should go up into space. We would amputate one of their arms and see how fast regeneration would happen in the ISS. This would help humans because if their cells regenerate faster in space than human cells such as stem cells might do the same. The perfect starfish for this experiment would be the paddle spine sea star due to its small size. We would monitor the regrowth of the amputated arm throughout the thirty days. We would have control starfish here on Earth to compare the growth rates. We can build a mini aquarium in the ArduLab and have a food dispenser with snails or dried brine shrimp for them to eat.
5. **Butterflies:** We would like to send 5-10 painted lady caterpillars to the ISS. The purpose of this is to see if the life cycle speed will be effected by the microgravity. This will help human kind because the butterflies will be able to pollinate plants in future space colonies such as on Mars. The package already comes with food for the caterpillars/butterfly. This experiment is also low cost.
6. **Plant Experiments**
7. **Microgravity and light effect on plants: MLEP.** Our experiment involves a petite astro-plant, which has been used by NASA previuosly. We want to see how light in a microgravity environment affects the direction of plant growth. We plan to divide the ArduLab in two sections. On the top section (7cm), the plant will grow in rockwool with water provided with an IV system. On the bottom section (3cm), there will be a light shining; we want to see if the plant will grow towards the light even with the absence of gravity. On Earth, plants grow away from gravity and towards light. This experiment is useful because if plants could be grown on the ISS in the future, it could be used for food and oxygen. Plants take in carbon dioxide and release oxygen. The plants could help recycle oxygen and carbon dioxide, which could be very helpful for the astronauts on the ISS.
8. **Plant growth promoting rhizobacteria** :We would like to propose an experiment in which we would test the effects of stimuli and microgravity on a strain of plant growth promoting rhizobacteria. This experiment would be beneficial because it could possibly improve plant growth on earth and in space.
9. **Plants and Oxygen Production:** To see if the amount of oxygen a plant produces is affected by microgravity. We think the plant will produce more oxygen than on Earth. We could use a small oxygen sensor and a plant to do this experiment. This could help mankind on future long- distance missions where we need to produce our own oxygen.
10. **Bacteria/Antibiotic Experiments**
11. **Penicillium** Penicillin is an important medicine used to fight bacteria that comes from Penicillium, which is a fungi that is often found on meats, wood, cheese, and fruits. It is also used as an antibiotic. This means it is lethal to many micro-organisms. The penicillin takes 6-8 days in a lab to be cultured. With a small dish or a test tube we could see how rapidly the spores grow in a micro gravity environment. The spores may grow differently in space because it will be a cleaner environment. This may create a stronger antibiotic.
12. **Antibiotic Sensitivity** To see if bacteria would become more or less sensitive to antibiotics in a micro-gravity environment. We wish to use ampicillin, and the bacteria which it fights against. We would use the “sensi-disc magazines” from Wards Science. This helpful if we set up a long term journey in space and further research on earth.
13. **White Blood Cells in Space**

We would like to find out how white blood cells react to an infection in a microgravity environment. There are space grown communities called biofilms that are sent up in space that contain different types of bacteria. NASA has even been able to grow bacteria in “fake urine”. As for trying to find out where to get white blood cells, blood and tissue biopsies are able to be used because of the extensive network of cells. In order for this to work correctly, the culture dish would have to be coated with a specific extracellular matrix components, such as collagen or laminin. This would help humanity by seeing if white blood cells could be more helpful or dangerous in a microgravity environment.

1. **Sound/Vibrations in space**

We would like to test sound waves to see how they are affected in a microgravity environment, and will also be testing how long the sound takes to get to the meter. Aside from this, we will be testing this experiment on Earth as well, so that we will be able to compare the differences between the effect of sound with and without microgravity. There has never truly been an experiment testing the effects of different sounds on the sound level meter. Process:We will use different recordings and measure the waves using a sound level meter. As the sound level meter produces the decibel amount, a tiny camera will take pictures of the numbers. We would like the device that will be sending off the sounds to produce a color for each different recording. Hypothesis: We think that the sound will take longer to reach the meter in microgravity since there is less substance in the air than there is on Earth.