CFAES

OHIO STATE UNIVERSITY EXTENSION

Jr. Scientist Newsletter

Cuyahoga County March 20201

Happy March Jr. Scientist.

I can't believe it's our third month already. We picked up a few new Jr. Scientist this past month. Remember, this program is open to anyone in K-2 grades. Keep sending me your pictures and sharing what you learned. I also appreciate your comments and suggestions. Email all pictures and comments to: Stone.363@osu.edu

This month our topic is health, we will learn how to stay healthy and have some fun in the process, so are you ready?? …"Let's Get Physical"!!!!

1. Train Like an astronaut

Did you know that many sports relate to astronaut training? On the surface, preparing to play a game of American football may not seem similar to astronaut preparations in that the sport of football is very fast-paced with high amounts of bodily contact. However, if we look a bit deeper into both, we can find some similarities.

Playing sports requires teamwork and preparation. Teammates must work together. In space, astronauts also must react to new situations as a team. Their teamwork is imperative to the success of a mission, and often such teamwork ensures the safety of the crew.

In space, astronauts float and have very small loads on their bodies. Their bodies would lose a significant amount of muscle and bone, so astronauts exercise on the International Space Station (ISS) for about two hours per day. It is crucial to their health to exercise with heavy loads, just as football players must lift weights.

After a game, athletes have tired muscles and must take care to let their bodies recover. Similarly, astronauts return to Earth with less balance and muscle control than when they left our planet. Proprioception is the term for how our bodies sense the world around us and what lets us react to our environment. When astronauts first return to Earth, they are tested to see how well they can balance. Typically, astronauts' balance returns to their normal, pre-flight, condition in a few weeks after landing. What does this have to do with football practice? Well, the balance tests are very similar to several football exercises.

Let's practice balance!!

OHIO STATE UNIVERSITY EXTENSION
Cuyahoga County 4-H

Let's play! When your parent says, "walk", walk in a straight line: When your parent says "Proprioception", turn to change directions and step with high feet as if you are walking over an obstacle. When your parent says "Corner Back", turn and run backwards for 10 steps and then spin around to run 10 steps forwards. Run with high steps over any lines or cracks on the ground. When your parent says, "Nadir", lie on the ground: (Nadir is the term for the direction that points towards the Earth) When your parent says "Balance", rise to your feet and stand on one leg. When your parent says "Lineman" rise to your feet and run in place. Walk heel-toe, say "heel-toe": When your parent says, "Soyuz Landing" walk 4 more steps heel-toe and then jump in the air and land with good balance When your parent says, "Sideline" take 4 more steps and stop with both toes next to each other as you lean forward without falling. Try to maintain balance.

2. Robotic Arm

Why do we need robotic arms when working in space? As an example, try holding a book in your hands straight out in front of you and not moving them for one or two minutes. After a while, do your hands start to shake or move around? Imagine how hard it would be to hold your hands steady for many days in a row, or to lift something really heavy. Wouldn't it be nice to have a really long arm that never gets tired? Well, to help out in space, scientists have designed and used robotic arms for years. On Earth, scientists have designed robotic arms for everything from moving heavy equipment to performing delicate surgery. Robotic arms are important machines that help people work on Earth as well as in space.

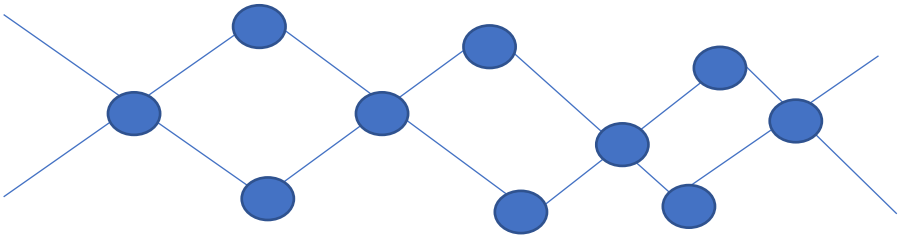
Look at your arms once again. Your arms are covered in skin for protection. Inside your skin are nerves, muscles and bones which allow the movements to occur. Like the skin on your arms, the robotic arms in space are also covered with fabric. The protective layers of the robotic arms on the ISS are to keep the wires, motors, and metal safe from space radiation which is similar to how your skin protects your nerves, muscles, and bones of your arms. Additionally, the robotic arms have joints much like our elbows and wrists, and even have parts that are similar to our hands which hold items.

Materials:

- 8 popsicle sticks
- erasers or sponge pieces
- ping-pong balls
- scissors
- 9 cotter pins
- hole punch or awl (leather punch)

Procedures: The following procedures are taken from the student section.

1. Punch three holes in the popsicle sticks using a hole puncher. See image for location of holes.
2. Connect two popsicle sticks using a cotter pin, forming a cross.
3. Repeat steps 4 and 5 for all other popsicle sticks.
4. Now connect all the crosses together. Carefully check the sample drawings as an example.
5. Make a cut in both erasers or sponges in the side.
6. Insert the erasers with the cuts, or sponge pieces, to the ends of the grabber.
7. Try using your robotic arm to grab an object from the table. Can you successfully do this?
8. Use your robotic arm to try to pick up an eraser and something round, like a ping-pong ball. Can you successfully do this?



Grabbing and End Effectors

1. Was it more difficult to grab the eraser or the ping-pong ball?
2. What is an object that would be difficult to hold with your end effector?
3. What is an object your arm would not be well designed to pick up?
4. Did gravity play a role in how easy it was to use your robotic arm? Teamwork allows us all to do more than we could do by ourselves. This is true for astronauts, engineers, and you!

Adapting the robotic arm for new conditions…

1. Try to make your robotic arm even longer. Does the arm work better when it is longer?
2. Remove some sections of your arm. Does your robotic arm work well when you make it shorter?
3. What material would you use to pick up an egg?
4. Remove a number of cotter pins. Does the robotic arm still work?

3. What is your space height

Your Mission Problem: How can I find my space height? How tall are you? Are you sure you know the answer? Does your height change in your life, and how much time does it take for your height to change? So, how tall are you? That seems like a fairly easy question to answer. However, did you know our height changes throughout the day? In fact, our height changes from morning to night. It really has very little to do with the sun and moon, though. Instead, our height becomes less – yes, we shrink – as the day goes on because gravity compresses our bodies. When we lie down at night, gravity no longer pulls in a direction to make us shorter so our bodies stretch and we return to our taller height again. Imagine what happens to astronauts who don't experience the effect of gravity for months at a time! That's right; they grow taller. In fact, NASA Astronaut and MissionX ambassador Kate Rubins grew from her "Earth height" of 171 cm to her "space height" of 174.4 cm.

The study of body measurements is called anthropometry. At NASA, there is an entire team of people who are anthropometrists. These scientists work and collaborate with a wide variety of design teams because human measurements dictate spacecraft design for seat sizes, hatch openings, spacesuit construction, and much more. NASA has found that the height of astronauts increases approximately 3% over the first 3 to 4 days of weightlessness in space. There are many factors that influence each individual, so each astronaut will experience more or less of an increase than others. As soon as astronauts return back to Earth, gravity pulls on them once again and astronauts will typically return to their pre-flight height in a short amount of time. In space, almost all of this height increase comes from changes in the spinal column, which affects body measurements such as sitting height, eye height, standing height, how space suits fit, and much more. Remember, even though astronauts are floating in space and don't stand and walk around like we do on Earth, their height measurements are important to calculate whether they can perform tasks such as reach buttons and switches or grasp objects. To work on the International Space Station (ISS), the astronauts often brace themselves by placing their feet under bars on the floor to keep from floating away from their work area. It is interesting to note that as astronauts increase height, their shoulder height increases as well. This means that in space, their arms are farther from the floor than on Earth which allows them to reach higher objects when in space. An increasing spinal column length is an important factor to consider when designing spacecraft and habitats. Astronauts must be able to reach everything! Spacecrafts must be built correctly before they fly, because changing the walls or control locations is either not possible or overly expensive once the craft has launched to space.

1. How tall were you at night? _____ cm or _____ inches
2. How tall were you in the morning? _____ cm or _____ inches
3. How much is the difference in those two heights? _____ cm or _____ inches
4. What is the reason your height changed?
5. Do you think taller people or short people would have the greatest change in their height?

4. What do sugary drinks do to your teeth?

Materials

- 5 white eggs
- 5 cups
- Masking tape
- Water
- A dark-colored sugar-free drink like Gatorade G2
- A dark-colored fruit juice like grape juice
- A dark-colored flavor of pop
- Orange juice

Instructions

Label the cups, one with each drink.
Pour the drink into the cup with that label. Drop egg in each cup.
Store your cups in a safe spot.
Wait. Check your cups after a few hours if you want then again after 24 hours.

The Science

The hard shell of an egg protects the soft parts inside, just like the hard enamel on your teeth protect the soft and tender pulp on the inside. Both eggshells and teeth are made of calcium, a hard white substance that also makes up our bones.

Sugar and acids are very harmful to teeth. Acids actually dissolve the enamel, giving bacteria an inroad to begin decaying it, and sugar promotes decay (cavities).

A study published in the journal *General Dentistry* found that pop is actually ten times more harmful in the minutes after drinking than is fruit juice. The discoloration from grape juice was a lot worse and longer-lasting, but it's not likely to cause actual decay as quickly as the pop would. The bottom line is that the sugar, color, and acids in our drinks harm our teeth, and those effects are exacerbated by poor brushing habits.

EXTEND THE EXPERIMENT

Take this experiment a step further by brushing the eggs with a toothbrush and then with toothpaste and a toothbrush, to see how much of the stain can be removed from the egg and how much is left. It takes a lot longer than you think to clear away the stain, and you will probably find (as we did) that a lot of the stain is permanent.

5. Germ Experiment

Experiment Supplies:

- Black pepper (to represent germs)
- Water
- Dish soap (washing up liquid)
- Small dish

STEP 1: Get all your supplies ready

Gather up all your supplies before starting this hand washing activity. You will need black pepper, water, a small dish and liquid soap.

STEP 2: Prepare the germ experiment

Start by filling a dish with water and then sprinkle pepper on top of the water (but not too much!) Remember, the pepper represents the germs.

STEP 2: Put the experiment to test

Dip your finger into the water. What happens? Your finger gets tons of germs on it!

STEP 3: Demonstrate how soap removes the germs right away

Squirt a small amount of soap onto your finger and then put it into the water

The soap makes the germs run away! The pepper immediately scatters when it comes into contact with the soap.

This experiment is actually demonstrating how water surface tension works, but it's a great way of demonstrating why we need to use soap when washing our hands.

6. Make your own Boogers

Have you ever wondered where boogers and snot come from? C'mon admit it, everyone has! Children and adults alike get boogers and snot from time to time; no one is exempt from these things. Snot and boogers are actually formed from proteins and sugars in our bodies, that mix and in turn become stringy. That my friend is where snot comes from. When those strings of protein harden, you have boogers. It is gross and fascinating at the same time! Find out more about how boogers and snot are made when you try this homemade boogers and snot recipe below!

Here is what you will need:

½ cup of hot water
2 packets of clear gelatin
¼ cup of sugar
Green food coloring
Spoon

Directions:

1. Begin by heating your water. Filling a mug and heating it in the microwave is ideal. Just use caution since the contents will be hot.
2. Pour in the gelatin and sugar. Stir well. Right away you will notice some clumping.
3. Add 2-3 drops of green food coloring. Continue to stir.
4. Take the spoon and remove any large clumps from the water. Use caution as it may still be hot.
5. Knead the clumps in your hand. Notice how they pull and stretch into thin threads, just like snot. EWWW! As the clumps dry out, they will begin to harden and break apart, just like boogers. EWWW! You can repeat the process to create more or toss your boogers back in the water and reheat to soften them back up again.

This experiment is a great way to show how snot forms in our bodies and can turn to boogers. Give this homemade boogers and snot a try in your own kitchen. You are sure to have some super gross fun!

7. Growing Mold

Have you ever wondered how dirty your house really is? Try a little mold science experiment and see what things we need to do better at cleaning. But also, it is cool just to see how and where mold grows.

HOW TO DO THE MOLD SCIENCE EXPERIMENT

To do this gross science experiment you need unflavored gelatin, q-tips, and some sanitized containers (jars, plastic cups).

Make the gelatin first. Boil 2 cups of water and prepare the gelatin according to the package directions. Stir the gelatin until it dissolves. Then pour it into your containers.

Make sure these containers are clean and not contaminated already. You don't need much in each container. You can use six different containers and just divided it evenly..

Be sure your containers are sealed so no dust or debris can get in ahead of the experiment.

Now you need to let the gelatin set and solidify. Wait a day before getting back to it, but it is done in a few hours usually.

The next day, after the gelatin is set, get a few q-tips wet and rub them on different surfaces throughout the house. You can swab the trash can lid, the stove burner, the bathroom cabinet handle, your hands, the kitchen counter. Anywhere will work, just try a variety of places to see different results.

After swabbing these different areas, label each cup and gently rub the q-tip all over the gelatin in the cup. You don't want to break the surface of the gelatin, so do this carefully.

Cover them securely and set in a dark place for a time to allow the mold spores to grow. After a few days (even after just one day) mold will start to grow on the surfaces. You can keep them growing for about a week to really see a large amount of mold growth.

Guess ahead of time which areas you think would be the dirtiest and grow the most mold. This is a great time to teach about a hypothesis.

8. DIY Stethoscope

The heart is arguably one of the most important organs you need in the human body to survive. It pumps blood throughout the body, supply oxygen and nutrients to the tissues, and remove carbon dioxide and other wastes. With a simple DIY stethoscope, you can listen to each other's heartbeats. This is a fun activity to learn about how to calculate the heart rate.

Homemade Stethoscope

Materials:

- Paper towel cardboard tube
- Funnel
- Tape
- Balloon
- Scissors

Instructions:

1. Tape the funnel to the cardboard tube.
2. Cut the balloon in half.
3. Stretch the body of the balloon over the funnel.

4. Gently place the funnel against someone's chest to hear the heartbeat.

How did your stethoscope turn out? My kids were so excited that they could hear each other's heartbeats. If you have a pet, compare your heart rate to that of your pets.
You can use the stethoscope for more than listening to the heart. Try listening to other parts of the body! For example, try listening to the belly and see if you can hear gurgling as the stomach digests the latest meal.
How to calculate your heart rate
If you are not patient enough to count for a full 60 seconds to get the beats per minute, you can get an approximate bpm by counting for a shorter time.
For example, count the number of heartbeats in 15 seconds. Then multiply this number by four to get the beats per minute.
Or you can count how many beats you hear over 30 seconds and then multiply the number by two to get how many beats a minute.
Are you surprised how fast your heart rate is compared to an adult? Don't fret, the average heart rate for kids range from 80 to 120 beats per minute for children 3 to 4 years old, and 75 to 115 beats per minute for children 5 to 6 years old.

9. Learn to do First Aid

FIRST AID

BLEEDING

- **Apply direct pressure** to the wound using a sterile gauze pad or clean cloth.
- **Elevate the injured area** above the level of the heart if there is no fracture.
- **Cover the dressing with a pressure bandage**. If bleeding does not stop apply additional dressings.
- If necessary, apply pressure to the artery with your hand.

BURNS

- **Stop the burning**. Remove the person from the source of the burn.
- **Cool the burn**. Hold burned area under cool (not cold or icy) running water or immerse for 10 to 15 minutes. Use cool compresses if water is unavailable.
- **Cover the burn**. Cover burn with non-adhesive sterile bandage or clean cloth.
- **Prevent shock**. Lay the person down and elevate the legs.

FRACTURES

- **Help the person support the injured area**. Stop any bleeding by applying pressure with sterile bandage or clean cloth.
- Check for feeling, warmth and color below fracture.
- **Immobilize the injured area**. Apply a soft or hard splint above and below the fracture.
- **Apply ice or cold packs** and elevate.
- **Treat for shock**. Lay the person down and elevate the legs.

SPRAINS

- **Rest the ankle or injured area**.
- **Apply ice or cold packs** (wrap in cloth or put cloth under to protect the skin).
- **Compress by lightly wrapping an elastic bandage** around the injured area.
- **Elevate the injured area** above heart level to reduce swelling.

EYE INJURIES

- **Don't rub the eye**.
- For a foreign particle such as dirt, sand, or sliver of wood or metal have the person **pull the upper lid down and blink repeatedly**.
- **Flush the eye with water**.
- For any chemicals in the eyes immediately **wash the eyes with lots of water**.

SHOCK

- **Help the person lie down** on his or her back.
- **Elevate the feet about 12 inches**. If raising the feet causes pain or further injury, keep him or her flat.
- **Check for signs of breathing, coughing, or movement**, and if absent begin CPR.
- **Keep the person warm and comfortable**.
- Turn the person on his or her side to prevent choking if the person vomits or bleeds from the mouth.

CHOKING

Signs of choking

- The person has hands clutching his or her throat, unable to breathe or talk; or skin, lips, and nails are turning blue.

Perform abdominal thrusts (Heimlich maneuver)

- Stand behind the person. Wrap your arms around the waist.
- Make a fist with one hand. Position it slightly above the person's navel.
- Grab the fist with the other hand. Press hard into the abdomen with a quick inward and upward thrust.
- Perform 5 abdominal thrusts. (Heimlich maneuver)
- If you are alone, perform abdominal thrusts before calling 911. If two people are available, one can call for help while the other performs first aid.
- If the person becomes unconscious, perform CPR.

Clear the airway of obese person or pregnant woman

- Place your hands a little higher than normal.
- Proceed as with the Heimlich maneuver, shoving your fist inward and upward quickly
- Repeat abdominal thrusts until the blockage is dislodged. If the person becomes unconscious, perform CPR.

CPR

- Check to see if the person is conscious or unconscious.
- If the person doesn't respond and you are alone first call 911, then begin CPR. I two people are available, one should call 911 and the other begin CPR.

Compressions - Begin compressions

- If face down, put the person on his or her back while supporting the head, neck, and back.
- Place the heel of one hand over the person's breastbone. Place the other hand on top of the first hand. Keep your elbows straight.
- Using your upper body push straight down compressing the chest to about 2 inches. Push hard at a rate of 100 compressions per minute.

Airway - Clear the airway

- If trained for CPR, after 30 compressions, open the person's airway your by placing your palm on the person's forehead and gently tilt the head back. With the other hand gently lift the chin forward to open the airway.
- Check for normal breathing, chest motion, and listen for normal breathe sounds.

Breathing - Breathe for the person

- Pinch the nostrils and cover the person's mouth with yours.
- Give the first rescue breath and watch to see if the chest rises.If it does rise give the second breath . If the chest doesn't rise, repeat the head tilt, chin-tilt. and give the second breath.
- Resume chest compressions.
- Continue CPR until there are signs of movement or emergency personnel take over.

10. At Home First Aid Kit

What is a nutritionist

A nutritionist is an expert in the use of food and nutrition to promote health and manage diseases. These specialists advise people on what to eat in order to lead a healthy lifestyle or achieve a specific health-related goal. Most nutritionists work in hospitals, nursing homes, long-term care facilities, or medical offices.

Nutritionists are experts in food and nutrition. They can help patients choose the right things to eat, help them plan menus, and advise them on the health effects of certain foods.

'Dietitians can work in any of the areas that nutritionists work but, additionally, they can provide nutrition advice for treatment of a broad range of diseases and health conditions. One of the main differences in terms of training for dietitians is individual counselling,

How to Become a Licensed Nutritionist

1. Earn an accredited bachelor's in dietetics or master's degree in clinical nutrition;
2. Gain experience through internships and supervised work (at least 900 hours, depending on desired credential)