Agriscience
TRY Team Curriculum

AgVenture: Happenings on the Farm

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Extension
UtahStateUniversity

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TRY Team Curriculum

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Little Billy's Big Farm Adventure

The Beginning of the Adventure

Little Billy thought visiting Grandpa and Grandma's farm would be boring. No video games? No Wi-Fi? Just dirt and animals? But the moment he stepped out of the truck, he heard cows mooing, chickens clucking, and a horse snorting like it had something important to say. Grandpa handed Billy a pair of boots and said, "Every farmer starts as a learner. Today, you're my farm helper."

Billy didn't know it yet — but this visit would turn into the biggest adventure of his life. Every chore would teach him something new about science, animals, and how food gets from the farm to his plate.

Vet Science and Animal Care
Is there a Vet in the House?

Rylee Ward and Alli Hartvigsen

On Billy's first day, chaos hit the farm. A horse had a scratch, a barn cat had a tummy ache, and a rooster was acting extra dramatic (as usual). Grandma showed Billy how veterinarians help animals stay healthy using tools, teamwork, and science — just like real-life animal doctors described in the activties below.

Billy practiced wrapping "wounds" and learned that animals can't say "ouch," so farmers must watch carefully for signs. He decided being a vet might be the coolest job ever — even if it meant touching slobbery noses.

Lesson Overview

In this lesson, youth will explore the role of veterinarians in keeping animals healthy, as well as first aid basics. Through hands-on activities, they will learn about sutures, first aid, medical tools, proper nutrition, and the importance of technology in modern veterinary care. Youth will also practice critical thinking and problem-solving through interactive games and simulations.

Vet Science and Animal Care

Supplies

- Suture kits, pads, sutures
- Printed out scenarios
- Small bag of cat food
- Small bag of dog food
- Images attached of Medical Equipment: (or real if available)
    - Show and describe various veterinary tools and their uses.
    - Technology tie-in: diagnostic machines, digital thermometers, and monitoring devices are everyday vet tools.

Do

- Practice suturing
- Participate in a physical exam scavenger hunt
- Practice wrapping wounds
- Team building and networking

Activity Summary

1. Know how to help:
    - Learn how to assist veterinarians by knowing when to take an animal to the vet.
    - Learn how to care for an animal before a veterinarian can assist.
2. What does a vet do?
    - Explore how veterinarians prevent, diagnose, and treat animal health issues.
    - Connect to technology: vets use X-rays, ultrasound machines, and lab testing equipment to help care for animals.
3. Sutures:
    - Learn how sutures are important in wound healing.
    - Show different types of needles, suture strings, and stitches.
    - Technology tie-in: surgical instruments, sterilization tools, and training simulators help vets practice before real surgeries.
    - Students practice suturing on pads.

An alternative if sutures are unavailable is to use fruit or pool noodles to replicate the skin. There is a set of suture kits available through USU kits for checkout for you to use at your camp.

Apply

Youth reflect on:

- Why animal healthcare is important.
- How veterinarians combine hands-on skills with technology to keep animals healthy.
- How what they practiced today connects to real-world veterinary careers.

Technology Connection

Farmers and vets often use data tracking tools, ear tags, and microchips to identify animals and monitor their health—similar to how participants are trying to identify their “mystery animal.”

Set up

Place the images/definitions of medical tools and hide them around the room before the youth arrive. Print out and cut out all the envelopes for both groups.

Vet Science and Animal Care

Ice Breaker - "What Animal Am I?"
Supplies: Sticky notes (one for each person) and marker
Instructions: Place a sticky note with an animal name on each participants back. Everyone can't see their own animal, but can see others. They must ask yes/no questions of other participants (only one question per person) to figure out their animal.
Use animals like horse, dog, cat, cow, duck, fish, sheep, rabbit, pig, goat, elephant, giraffe, bear, lizard, or whatever else comes to mind.

Suggested Snack:
Just like humans need proper fuel for energy, animals also need the right nutrition to stay healthy. Technology such as feed analyzers and ration-balancing apps helps farmers ensure livestock diets are balanced and safe. Carrots or apples are a great snack.

Intro:
All the different animals that you played are animals you might see as pets, livestock, or in a zoo. All of these animals need to be healthy and cared for.
Raise your hand if you have pets at home. (Allow participants to answer) How many of you have taken your pet to the vet before? (Allow participants to answer) Today, we are going to imagine that each one of you has a set of animals you must care for.

Sutures
Today we are going to imagine that we are all vets. Before we can do that, you all need to do "vet school" and learn how to do sutures. What are sutures? A suture is a medical stitch or fiber used to sew, close, and hold together tissue, skin, or blood vessels after injury or surgery to aid healing.
Everyone will be split up into groups. The groups will take turns practicing sutures. Everyone will learn at least one different kind of stitch, and learn to use a suture pad, clamp, scalpel, different needles and thread.
Time is of the essence. Both teams need to work as fast as they can. Your animals are struggling; if you don't help your patients, they're at risk of infections, diseases, and possibly death. Read through your envelope to know what to do next.

Split participants into two groups
Hand each group a scenario to read (provided on the following pages) in which their animals are struggling. The large animal has a deep cut that needs stitches, the small animal has been having stomach problems and can't stop throwing up, and the third animal needs a checkup.

Task 1
Once a group has completed their first task, inspect the wraps to ensure they were done properly. If one is missing or done incorrectly, have the team redo the wrap.

Next, have each group explain one thing their small animal can and can't eat, such as:

List of items

Foods Cats CAN Eat

- *Cooked chicken, turkey, beef*
- *Cooked fish like salmon or tuna (occasional, boneless)*
- *Cooked eggs (fully cooked, no seasoning)*
- *Commercial cat food (wet or dry)*
- *Cat treats made for feline digestion*
- *Cooked carrots*
- *Steamed green beans*
- *Pumpkin (plain, canned pumpkin can help digestion)*
- *Peas*
- *Fresh water*
- *Cat milk (lactose-reduced, not regular milk)*

Foods Cats Should NOT Eat

- *Chocolate*
- *Onions, garlic, chives, leeks (any form, even powder)*
- *Grapes & raisins*
- *Alcohol*
- *Caffeine (coffee, tea, energy drinks)*
- *Xylitol (artificial sweetener)*
- *Cooked bones (they splinter)*
- *Raw dough (can expand in the stomach)*
- *Corn cobs*
- *Salty foods*
- *Spicy foods*
- *Fried or greasy foods*
- *Processed human snacks*
- *Regular cow's milk (many cats are lactose intolerant)*
- *Raw fish or raw meat (parasites, enzyme issues)*
- *Dog food (not toxic, but nutritionally wrong long-term)*

Foods Dogs CAN Eat

- *Cooked chicken, turkey, beef*
- *Cooked pork (lean, no seasoning)*
- *Cooked fish (salmon, whitefish, no bones)*
- *Cooked eggs*
- *White or brown rice*
- *Oatmeal*
- *Plain pasta*
- *Plain bread (small amounts)*
- *Carrots*
- *Green beans*
- *Sweet potatoes (cooked)*
- *Peas*
- *Pumpkin (plain, great for digestion)*
- *Cucumbers*
- *Broccoli (small amounts)*
- *Apples (no seeds)*
- *Blueberries*
- *Bananas*
- *Strawberries*
- *Watermelon (no seeds or rind)*
- *Peanut butter (xylitol-free)*
- *Plain yogurt*
- *Cheese (small amounts)*
- *Fresh water*

Foods Dogs Should NOT Eat

- *Chocolate*
- *Grapes & raisins*
- *Alcohol*
- *Caffeine*
- *Cooked bones*
- *Corn cobs*
- *Fruit pits (peach, cherry, plum)*
- *Salty snacks (chips, pretzels)*
- *Spicy foods*
- *Fried or greasy foods*
- *Processed meats (bacon, sausage, hot dogs)*
- *Raw dough (yeast expands)*
- *Moldy or spoiled food*
- *Excessive dairy (many dogs are lactose intolerant)*

Vet Science and Animal Care

Congratulations! You have successfully arrived at the vet's office. One vet takes your small animal while another vet takes your large animal. To help your small animal, find 8 medical tools around the room needed for a physical exam.

Task 2
Once the groups have found and read through all 8 tools, the group or an individual representing the group must tell the officiate 4 tools, their uses, and why they're important. After doing so, hand them the next envelope.

Task 3
The large animal: (Read as the groups come) Great job! Your small animal is in great hands and on track to be feeling much better. The vet will let you know how your animal is doing and why he became so sick. The large animal vet comes into the room and tells you that you were right to bring the animal in. The wound will need stitches, and the vet has thoroughly cleaned out the wound and prepped it for stitches. Each group will take a suture kit (or oranges and needles) and take the guide to stitch up wounds. Each participant will practice stitches. (Give group envelope with instructions to sutures) Make sure to use the suture guide provided below.

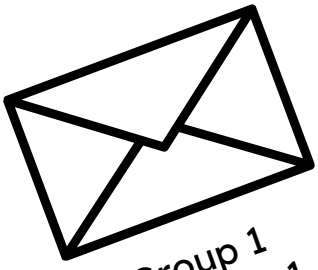
Amazing job, everyone! Because of you, both of your animals will live happy and long lives. Using the sample of food you provided to the vet, the vet was able to diagnose your animal as being allergic to one of the ingredients found in the feed. Your large animal will take some time to heal, but is set on track to heal within a few weeks.

Reflect
- Have you ever done sutures before? What surprised you about the process. Did you find it hard? Do you think it would be different on a real animal?
- Were you surprised by any of the information on the foods that animals can eat? Will you change anything you do at home?

Apply
- How can you use the knowledge from this workshop in your personal life?
- What new technology did you learn vets use today? Which activity showed you the most about how important vets are for animal health?
- Do you think you would want to consider becoming a vet or a vet technician? Are there other careers with animals that you would be interested in?

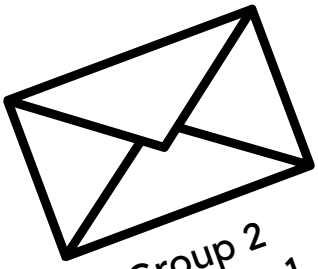
Conclusion
Veterinarians are scientists and problem-solvers. They use their knowledge, tools, and technology every day to keep animals safe, healthy, and productive.

Vet Science and Animal Care



Group 1
Envelope 1

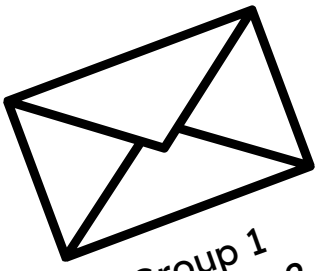
You are Veterinarians/Vet Techs on the job, our patient is a horse who was playing in the field when a barbed wire fence came out of nowhere. The horse tried to dodge the fence but there was not enough time before the horse crashed into it. The impact made a deep wound on the horse's chest and may need stitches.
As if it couldn't get worse, a barn cat is brought in and has started throwing up everywhere. Has the cat accidentally eaten something he wasn't supposed to? Could something be wrong with the food?
The only thing you were planning today was the appointment for a llama who got in a fight with another llama. This week the llama needed a check up on his wrapped leg.
To move on, go to the Head Vet and tell them the names of your two animals.(Be creative and come up with their names as a team.) (The Head Vet will give you your next step of protocol before fully helping your patients)



Group 2
Envelope 1

You are Veterinarians /Vet Techs. A usual client brings in one of their extravagant show calves. The client was working with the calf when it got spooked and ran off. Unfortunately, hay twine got caught around the calf's leg. The twine got stuck, making your calf come to an abrupt stop. The string cut deep into the calf's leg and may need stitches.
Almost as if right on cue, a dog is not doing well either. The pup is having stomach problems and can't stop throwing up. Did the dog swallow something he wasn't supposed to? Could something have leaked into his food?
The only thing you were planning today was the appointment for a rooster who got in a fight with another rooster. This week the rooster needed a check up on his wrapped wing.
To move on, go to the Head Vet and tell them the names of your two animals.(Be creative and come up with their names as a team.) (The Head Vet will give you your next step of protocol before fully helping your patients)

Vet Science and Animal Care



Physical exam: A physical exam is a routine, preventative, and diagnostic examination. What it involves:

- Observing behavior, posture, and movement
- Checking eyes, ears, mouth, skin, and coat
- Listening to the heart and lungs
- Feeling the abdomen for pain or swelling
- Taking temperature, weight, and vital signs

Purpose:

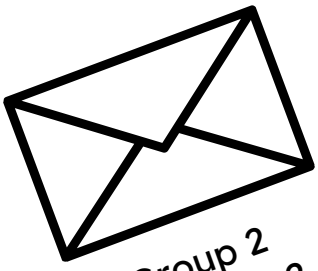
- Detect illness early
- Monitor overall health
- Decide what tests or treatments are needed
- Prevent problems before they grow

Veterinarians frequently rely on advanced imaging technologies to diagnose and monitor health conditions in animals. They use endoscopes, which are slender, flexible instruments equipped with fiber-optic lights and high-resolution cameras, to visualize internal organs such as the stomach, intestines, and respiratory tract without the need for invasive surgery. Digital X-ray systems allow vets to capture detailed images of bones, joints, and soft tissues, helping to identify fractures, tumors, and other abnormalities quickly and accurately. In addition, ultrasound machines use high-frequency sound waves to produce real-time images of internal structures, particularly useful for examining the heart, liver, and reproductive organs. Thermal imaging cameras can detect changes in heat patterns on the animal's skin, revealing areas of inflammation or poor circulation. Together, these technologies enable veterinarians to make faster, more precise diagnoses and provide more effective treatment plans for their patients.

Make a plan for the animal you are working with.

Take your plan to the Head vet to determine the best plan for your patients. (Whoever made the plan for the horse will now help the cat, whoever made the plan for the cat will now help the llama, whoever made the plan for the llama will now help the horse.)

Vet Science and Animal Care



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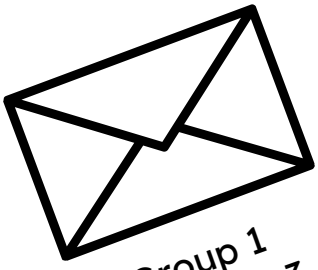
Make a plan for the animal you are working with.

Take your plan to the Head vet to determine the best plan for your patients. (Whoever made the plan for the calf will now help the dog, whoever made the plan for the dog will now help the rooster, whoever made the plan for the rooster will now help the calf.)

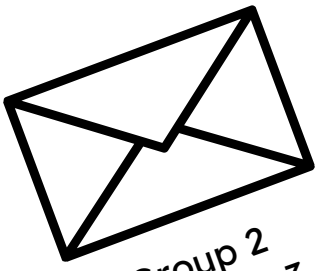
Vet Science and Animal Care



Group 1
Envelope 3

Horse Sutures are very helpful and important when it comes to wound healing. Sutures help prevent infections and bacteria from getting into the wound. Surgical instruments, sterilization tools, and training simulators help vets practice before real surgeries. Hold Your Tools Correctly. Grip the needle holder about ⅔ of the way from the tip. Using the forceps, gently lift the edge of the “skin”. Keep your hands relaxed, not clenched, while placing a simple interrupted suture. Insert the needle at a 90-degree angle to the pad. Enter about 3 to 5 mm from the wound edge. Push the needle through in a smooth arc. Exit the opposite side at the same distance. Pull the thread through, leaving a short tail to tie the Knot. Use a square knot technique. Typically, after 3 to 4 throws, the knot should be snug, not tight. Wound edges should touch, not overlap or pucker. Cut the ends, leave about 1 cm tails, and cut cleanly with scissors. Cat The cat’s symptoms suggest an adverse food reaction caused by an ingredient in the feed. Feline food allergies commonly develop in response to proteins such as beef, fish, or dairy, though grains and additives can also be triggers. Affected cats may show vomiting, diarrhea, weight loss, itching around the face and neck, hair loss, or skin sores from excessive scratching. Since the cat became ill after consuming the same food, an ingredient sensitivity is suspected. Future care should focus on removing the current diet and introducing a veterinarian-approved limited-ingredient or prescription hypoallergenic food. Careful monitoring, avoiding flavored treats or human food, and following a structured elimination diet if recommended by a veterinarian can help identify the exact allergen and prevent future reactions. Llama After removing the old wrapping you see that the wound that is wrapped isn't fully healed it needs to be rewrapped. Wrapping an animal’s wound is an important part of basic first aid because it helps protect the injury from dirt, bacteria, and further trauma while promoting a clean healing environment. A proper bandage can also control bleeding, absorb drainage, reduce swelling, and provide support to the surrounding tissues. To wrap a wound correctly, first gently clean the area with water or a veterinarian-approved solution and carefully dry the surrounding fur or skin. Place a sterile, non-stick pad directly over the wound to prevent the bandage from sticking to healing tissue. Add a layer of soft padding to cushion and absorb moisture, wrapping it smoothly without wrinkles. Next, apply a gauze or conforming bandage layer to hold the padding in place, followed by a flexible outer wrap to keep everything secure. The bandage should be snug enough to stay on but loose enough to allow normal circulation — swelling, cold toes, or increased pain can mean it is too tight. Bandages should be checked daily for slipping, moisture, odor, or swelling, and any deep, large, or slow-healing wound should be examined by a veterinarian to ensure proper treatment.

Vet Science and Animal Care



Group 2
Envelope 3

Calf

Sutures are very helpful and important when it comes to wound healing. Sutures help prevent infections and bacteria from getting into the wound. Surgical instruments, sterilization tools, and training simulators help vets practice before real surgeries. Another great way to practice is by using suture pads. An alternative, if sutures are unavailable, is to use fruit (like Oranges) to replicate the skin.

Hold Your Tools Correctly. Grip the needle holder about ⅔ of the way from the tip. Using the forceps, gently lift the edge of the "skin". Keep your hands relaxed, not clenched, while placing a simple interrupted suture. Insert the needle at a 90-degree angle to the pad. Enter about 3 to 5 mm from the wound edge. Push the needle through in a smooth arc. Exit the opposite side at the same distance. Pull the thread through, leaving a short tail to tie the Knot. Use a square knot technique. Typically, after 3 to 4 throws, the knot should be snug, not tight. Wound edges should touch, not overlap or pucker. Cut the ends, leave about 1 cm tails, and cut cleanly with scissors.

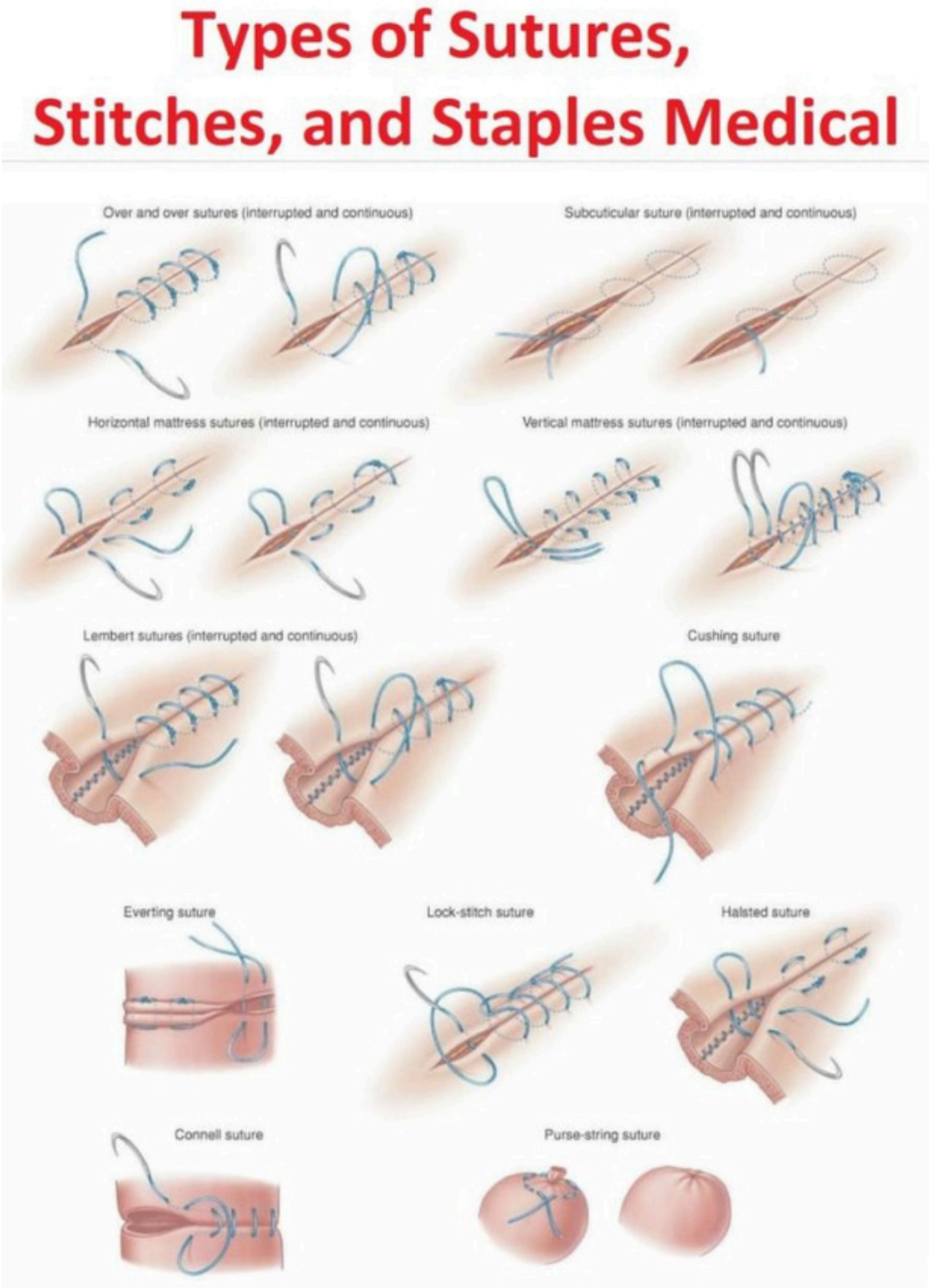
Dog

The dog's illness is consistent with a food-related allergic reaction to an ingredient in the feed. Canine food allergies are most often triggered by specific proteins (such as beef, chicken, dairy, or wheat) or certain additives and preservatives. Clinical signs may include vomiting, diarrhea, ear infections, itching, skin redness, or excessive licking and chewing of the paws. Because symptoms developed after eating the same food, the diet is considered a likely source of the reaction. Management should include immediately discontinuing the suspected feed and transitioning, under veterinary guidance, to a limited-ingredient or hypoallergenic diet that uses novel or hydrolyzed protein sources. Long-term prevention involves strict diet control, avoiding table scraps, and monitoring closely for any return of symptoms.

Rooster

After removing the old wrapping you see that the wound that is wrapped isn't fully healed it needs to be rewrapped. Wrapping an animal's wound is an important part of basic first aid because it helps protect the injury from dirt, bacteria, and further trauma while promoting a clean healing environment. A proper bandage can also control bleeding, absorb drainage, reduce swelling, and provide support to the surrounding tissues. To wrap a wound correctly, first gently clean the area with water or a veterinarian-approved solution and carefully dry the surrounding fur or skin. Place a sterile, non-stick pad directly over the wound to prevent the bandage from sticking to healing tissue. Add a layer of soft padding to cushion and absorb moisture, wrapping it smoothly without wrinkles. Next, apply a gauze or conforming bandage layer to hold the padding in place, followed by a flexible outer wrap to keep everything secure. The bandage should be snug enough to stay on but loose enough to allow normal circulation — swelling, cold toes, or increased pain can mean it is too tight. Bandages should be checked daily for slipping, moisture, odor, or swelling, and any deep, large, or slow-healing wound should be examined by a veterinarian to ensure proper treatment.

Vet Science and Animal Care



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Stethoscope

A stethoscope is an instrument that medical professionals use to listen to sounds within the body. Like other doctors, veterinarians use stethoscopes to assess their patients' heartbeats, breathing, gastrointestinal activity, and blood flow. All stethoscopes follow the same general design. At the end of the instrument is the chest piece, which the doctor places against the patient's body, allowing internal sounds to resonate through the piece. The sound then travels up the tubing into the earpieces, which the doctor places within their ears.

Thermometer

Like other doctors, veterinarians use thermometers to measure body temperature, which can reveal whether a patient has a fever. There are various types of thermometers that veterinarians are likely to use. Rectal or ear thermometers are the most common. These usually have disposable probes or disposable covers over the probe to prevent cross-infection between patients. Most medical professionals today use digital thermometers, which are faster and more accurate than mercury.

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Speculum

A speculum is a medical instrument that can be inserted into an orifice to open it and allow for viewing. A veterinarian may use a speculum to keep open an animal's mouth to examine their teeth and gums, to increase the direct view of the inside of an ear, or to examine the tissue of the rectum. Some specula have a light source that provides the user with a clearer view of dark spaces.

Otoscope

An otoscope is a tool for looking into a particular orifice, the ear. The head of an otoscope comprises a speculum that goes into the ear, a viewing lens for the veterinarian, and a bulb for illumination. The bulb beams light through the speculum, allowing a clear view of the patient's ear canal and eardrum. Veterinarians often use otoscopes to assess the cleanliness of patients' ears or to determine the cause of ear-related symptoms.

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Nail clipper

Veterinarians of companion animals regularly use nail clippers to trim the nails of their patients. Keeping nails trimmed is important for preventing overgrowth, which can cause problems with an animal's ambulation and may even lead to nails growing into the flesh. Good nail clippers allow users to trim the nail swiftly, in a single motion, to avoid jagged nails. It's common for veterinarians to carry more than one type of nail clipper to accommodate different species of animals.

Hoof grinder

A hoof grinder serves a similar purpose as a nail clipper. It's a disc that livestock and large animal veterinarians use to smooth hooves. Like overgrown nails in domestic pets, hooves can cause discomfort and problems with ambulation unless maintained. In some animals, such as cows, overgrown hooves can also cause problems with standing.

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Scale

A scale is a device that measures weight. Scales for veterinarians come in various types and designs to accommodate the vastly different sizes, shapes, temperaments, and considerations of animal patients. In veterinary clinics or hospitals for domestic pets, scales can be small tabletop devices or even built into the examining table. For larger animals, the veterinarian may use a scale that resembles a broad platform, often with guardrails to keep the animal enclosed.

Autoclave

An autoclave is a machine that heats objects using pressurized steam. Veterinarians use autoclaves to sterilize their tools and instruments, preventing cross-infection and contamination. An autoclave is often preferable to chemical cleaning of instruments since the machine can sterilize many items at once and doesn't present the risk of corrosion.

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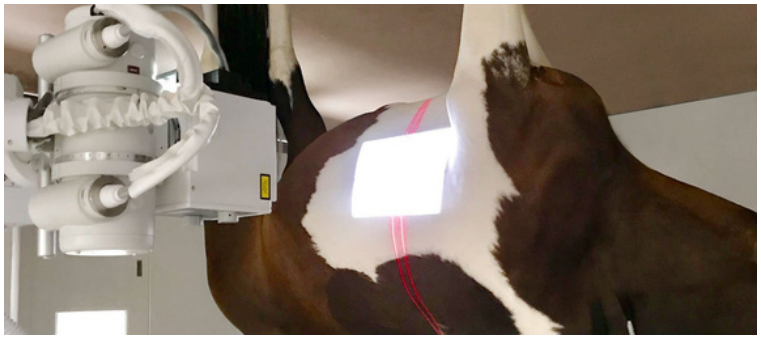
Microscope

A microscope is an optical tool that can magnify the view of very small objects, allowing for closer observation of otherwise unobservable forms. Veterinarians use microscopes to examine various samples, such as ear or mouth swabs, urine or feces, blood, and soft tissues. Being able to view microscopic life forms can help in diagnosis and, thus, the treatment of patients.

Sphygmomanometer

A sphygmomanometer is an instrument that measures blood pressure. It comprises a cuff that goes around a part of a limb, a valve, tubing, and a gauge for showing the measurement. Sphygmomanometers can be analog or digital, though digital versions are likely more common in veterinary practices. There are various cuff sizes to accommodate small, medium, and large animals.



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Ultrasound scanner

An ultrasound scanner is a machine that uses sound waves to visualize the internal structures of a body. Such a scanner is an important diagnostic tool for medical professionals, including veterinarians. It can be particularly useful for determining whether an animal is pregnant. Veterinarians who make house calls, such as livestock and large animal veterinarians, may use portable models they can easily pack in their kit or vehicle.

X-ray machine

An X-ray machine uses electromagnetic radiation to create an image of solid structures within the body, particularly bones, but also muscles and organs. This instrument is essential in veterinary practice, as it is necessary for diagnosing fractures and tracking orthopedic healing. As with other veterinary tools, X-ray machines can vary in size depending on the requirements of the veterinarian. An X-ray of a dog, for example, can be performed with a smaller instrument, while an equine X-ray may involve the use of a large X-ray device on a broadly swiveling system within a large room.

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Cautery device

A cautery device is any instrument used to burn tissue, particularly to seal wounds. Some cautery devices administer chemical cauterizing agents, such as silver nitrate, which are caustic and capable of closing vessels. Others may generate electricity or lasers to cauterize via heat.

Anesthesia machine

An anesthesia machine is a device that administers anesthetic agents. It's a necessary tool for surgeries and sometimes even for noninvasive procedures such as X-rays and dental cleanings, which require the animal to remain still for extended periods. Anesthesia machines largely automate the process of anesthetization by mixing the anesthetics based on predetermined settings and providing the patient with oxygen and ventilation during a procedure.

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Infusion pump

Infusion pumps, also known as IV pumps, are devices that administer fluids, nutrients, or medications directly into a patient's bloodstream. Veterinarians use infusion pumps during surgeries to provide analgesics or antibiotics or to perform steroid treatments, to name just a few uses. Using these machines allows for automated delivery of necessary substances while preventing under- or overdosing.

Electric razor

An electric razor, also known as a clipper, is a device for cutting away hair. Hair removal is necessary to prepare a site for the insertion of a catheter or for surgery, providing the practitioner with a clear view of the flesh. It may also be necessary to find a vein for the administration of IV medications.

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Surgical clamp

A surgical clamp is a tool used to hold materials together or back during surgery. Veterinarians may use clamps to keep flaps of soft tissue from obstructing the surgical site or securing swabs and drapes. Clamps are often either straight or curved and have the ability to lock in place.

Evolution of Horse: Horsin' Around through Time

Emily Davis and Alli Hartvigsen

While brushing Grandpa's horse, Billy asked why horses look the way they do. Grandpa smiled and said, "Because they've been practicing for millions of years."

Billy imagined tiny ancient horses running around like small dogs, slowly growing bigger and faster as grasslands spread — just like the evolution stages from Eohippus to modern Equus.

He realized evolution was like leveling up in a game — each generation adapting to survive.

Lesson Overview

Students will explore how horses evolved over millions of years by examining changes in body size, teeth, and hooves. Through interactive activities, youth will learn about horse development and why evolution occurs across generations. This lesson connects science, agriculture, and observation to help students understand how modern horses came to be.

Evolution of Horse

Ice Breaker - "Move Chairs If" Supplies: Chairs for every student except one Instructions: Students will sit in a circle while one person stands in the center saying the line "Move chairs if..." while saying something that applies to them, such as "Move chairs if you play soccer." Anyone the sentence applies to has to find a new chair. Whoever is left standing has to continue the game by saying a new "Move chairs if..." Recommened to play for 5 mintues.

Suggested Snacks

- Ancient Horses- Trail Mix. Ancient horses mainly ate foods like nuts, seeds, and fruits. This is represented by using trail mix.
- Early Horses- Lettuce Wraps or Spinach dip with crackers. Early horses strayed away from nuts and berries and ate more leafy plants.
- Horses adapting to Grasslands- Long pretzels or Celery Sticks. As horses evolved they stopped eating leafy plants, mainly grazing on grasslands.
- Modern Horse Diet- Oatmeal Cookies. Oftentimes modern horses have much more complicated diets. Caretakers may use supplements, oats, or other foods, snacks like oatmeal cookies are a great way to show that.

Workshop 1 : Fossil Scavenger Hunt
Supplies: Flashcards of evolution parts (hooves, teeth, outward appearance)
Learn: As horses developed into the animals that they are today, they evolved. Evolution is the change in the heritable characteristics of biological populations over successive generations. This means that the characteristics of a species of animal change over time. Evolution isn't talking about the change in one animal. It is about the change in the animal over several generations. In this activity we will learn about the 4 main changes in a horse's evolution and why horses evolved the way they did.
Do: Take the evolutionary flashcards and hide them in different places around the room. Split students into 3 groups and have them search for each evolution stage of their Horse body part (group one searches for hooves, group two searches for teeth, and group three searches for outward appearance). Once all body parts have been found, have the students put what they think is the order of evolution. Once all students have put in their suggested timeline, use the chart to see the order of the evolutionary periods:

Evolution of Horse

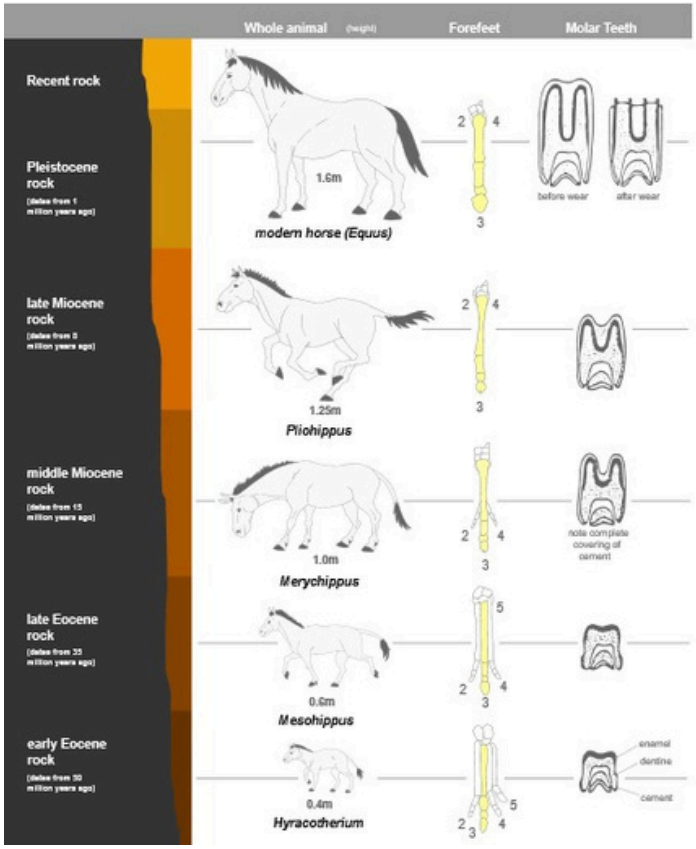
Reflect:

- Were you surprised by the order of evolution? Did you think changes would happen in a different order?
- Do you have ideas about why changes occurred in this way?

Apply:

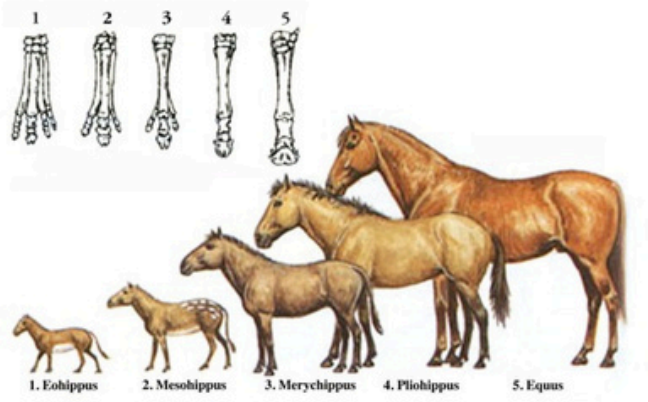
- Students will apply their understanding of horse evolution by connecting past adaptations to modern technology and agriculture practices. Tools like genetic research, digital modeling, and veterinary science help us understand horse traits and improve breeding, care, and performance today. By studying evolution, youth can see how science and technology continue to shape how humans work with horses in modern life.

Evolution of Horse

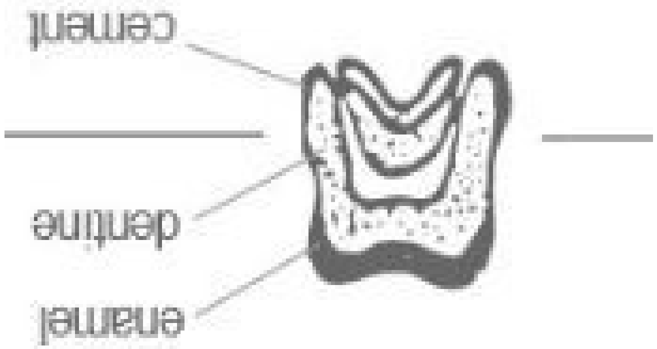


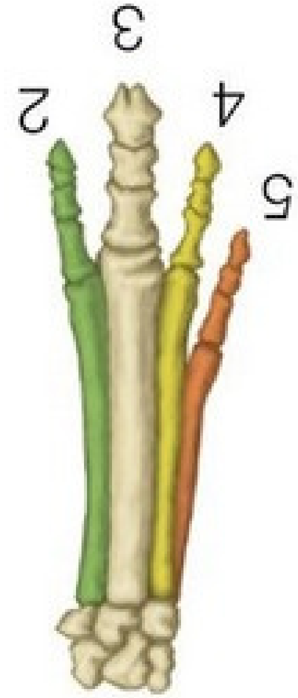
MAJOR EVOLUTION CHANGES

- Outward Appearance
- Feet
- Teeth



- Timeline and Migration Patterns
- Eohippus
- Mesohippus
- Merychippus
- Pliohippus
- Equus





FOLD

Eohippus
Teeth

Eohippus
Hooves

FOLD

Eohippus
Outward Appearance

Mesohippus
Teeth

FOLD

Mesohippus
Hooves

Mesohippus
Outward Appearance

FOLD

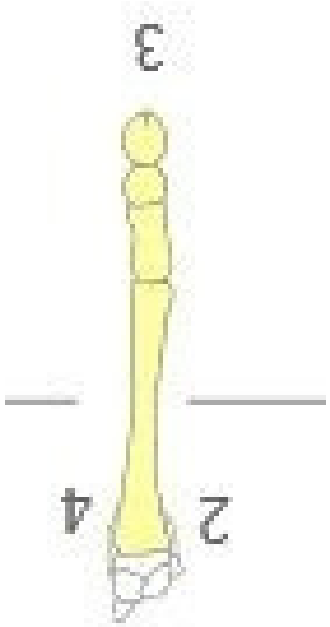
Merychippus
Teeth

Merychippus
Hooves

FOLD

Merychippus
Outward Appearance

Pliohippus
Teeth

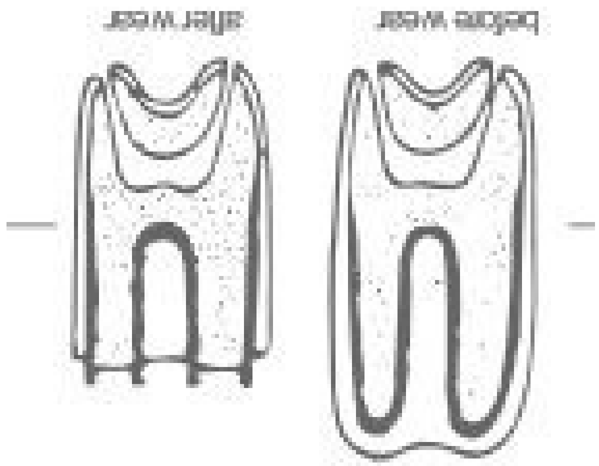


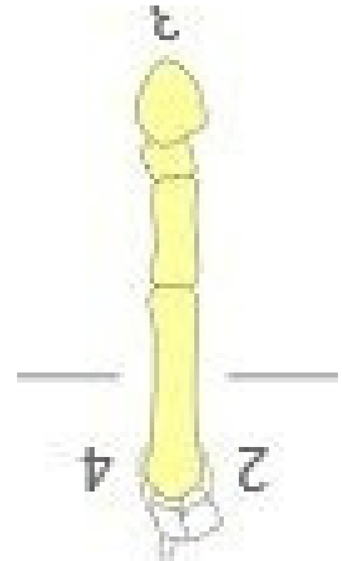
FOLD

Pliohippus
Hooves

Pliohippus
Outward Appearance

FOLD





Equus
Teeth

Equus
Hooves

FOLD

Equus
Outward Appearance

Evolution of Horse

Workshop 2 : Jeopardy
Supplies: Plastic Cup (or buzzers if applicable), Jeopardy Template
Candy for winner (optional)
Learn: This game tests the knowledge of the evolution of the horse that was learned in the optional script and power point. Students will review different facts about each evolution of the horse in a fun, competitive jeopardy style game.
Do: Split students into two teams. If using buzzers, give each team a buzzer and have them buzz in if they know the answer. If there are no buzzers, you can also switch the game into a more “Family Feud" type of game. Have one representative from each team come up to a table with a plastic cup on it. Whoever grabs the cup first gets to answer. Repeat the process for all of the questions. Once all the questions have been answered, the team with the most points wins.
Reflect:

- Do you feel like you better understand how horses evolved over time?
- Did any of the answers in the game surprise you?
- Think of another species of animal that you like. How has that animal evolved over generations? You may want to do some more research at home on the evolution of another animal.

Apply:

- If you look at the history of your family, are there things that changed over time? Did family members tend to be taller or shorter in different generations?
- What do you think led to these changes?
- What experiences have you had in your lifetime that have required you to adapt or make changes? What did you do to make things work better?

If you want to take a deeper dive into horse evolution, you can use the script and power point below to learn more.
Wrap Up Activity: Switch it Up
A game representing our inability to predict the next step of life. Participants will have a list of motions to do when called by the leader. Occasionally, the leader yells, “Switch It Up!”. Participants have to do a new movement. The twist? Now and then, the leader will yell freeze, and anyone still moving is out of the game.

Evolution of Horse

Jeopardy Link

htctps://jeopardylabs.com/play/2025-08-24-500

Evolution of Horse

Optional Script & Power Point for Brief Lesson:

The Evolution of Horses

When we think of horses, our minds instantly go to the powerful, majestic creatures we have with us today. The Modern horse is often used as a symbol of strength, courage, and freedom. But did you know that horses weren't always the magical creatures that we see them as today? According to scientists' most relevant and consolidated theories, just like all creatures here on Earth, horses evolved and changed throughout millions of years, adapting to the world around them to thrive as a species. Starting from just a small 10-inch-tall Eohippus, horses have adapted and evolved throughout history into the powerful creatures that they are today.

Today, I will be talking about the Evolution of Horses. Knowing how and when horses evolved can be extremely beneficial, as we can then learn why horses are the way they are and how they continue to develop and adapt to an ever-changing world. Today, I will discuss the timeline and migration patterns of horses, and the 5 main evolutions: The Eohippus, the Mesohippus, the Merychippus, the Pliohippus, and the Equus.

So, when did this all happen? Well, horses first appeared around 60 million years ago, while humans only appeared around 300,000 years ago, making horses 200 times older than us. Horses originated in North America, and over millions of years they migrated to other places around the globe. Here, I have provided a short video that illustrates the migration of horses. First, horses appeared in North America roughly 60 million years ago. Then around 20 million years ago, grasslands spread, and horses grew and spread with them. 10 million years ago, horses migrated across the Bering Strait and the North American population dwindled. 10,000 years ago, horses completely disappeared from North America due to climate change and overhunting. In the 1500s, horses were reintroduced by Spaniards, including Christopher Columbus who introduced the Paso Fino. As horses migrated to different environments, they adapted to each environment and evolved to change into the wide range of various breeds that we have today. Now, while horses migrated and spread throughout the globe, they didn't just stay in one form. Horses evolved over millions of years, starting with the Eohippus. Here, I have provided a timeline of when each evolution occurred. The Eohippus, the very beginning of the horse, appeared 60 million years ago. Eohippus then evolved into Mesohippus 40 million years ago. Mesohippus evolved into Merychippus 20 million years ago. Merychippus evolved into the Pliohippus 10 million years ago, and

Evolution of Horse

Optional Script & Power Point for Brief Lesson

Pliohippus evolved into the Equus 4 million years ago. Horses didn't just evolve in a straight line with just one species, horses evolved more in groups with jumps in their family tree. Paleontologists describe the horse's family tree more as a bush than a tree. As you can see here, there are large groups of horse species grouped in one large time period with some jumps in the family tree. Here in the Eocene period is the Hyracotherium, also known as the Eohippus. In the Oligocene period is the Mesohippus, in the Miocene period is the Merychippus, in the Pliocene period the Pliohippus, and in the Pleistocene period the Equus. Now that we've highlighted the migration patterns and the family tree of the horse, lets dive into the different evolutions.

With each evolution, changes occurred in three major areas: The outward appearance of the horse, the horse's feet, and the horse's teeth. Here is a simple diagram of how each part of the horse has changed throughout history. First, we will discuss the very beginning of horses, the Eohippus.

The Eohippus is also known as the Hyracotherium, or "The Dawn Horse." The Eohippus looked almost nothing like a horse, and more like a small dog with an arched back. The Eohippus had a very short neck, snout, and legs with a long cow-like tail. It had four padded toes on its forefeet and three on its hindfeet. Its skull was so much smaller than the modern horse that it is inferred by Paleontologists that the Eohippus had a much smaller, less-complex brain. Its teeth were very different from the Equus, as it was suited for average foraging, such as berries and short foliage. The Eohippus had 44 crowned teeth with 3 incisors, one canine, four premolars, and three molars on each side of the jaw. Its molars were dull, bumpy, and uneven, and the cusps of the molars were slightly connected in low crests. The Eohippus likely had the mannerisms of a deer, being flighty, timid, etc. The Eohippus was so different from the modern Equus that Paleontologists didn't think that the Eohippus was part of the family tree until more recent Equine fossils have been discovered. And one of those fossils was the Mesohippus, the next evolution stage.

The Mesohippus, or the "Middle Horse" was much more horse like, as it had a much more muzzle-like face, a less arched back, and longer/ more slender legs. Its neck also grew slightly longer. The Teeth of the Mesohippus didn't change much from the Eohippus, the teeth were still adapted for foraging, but they did begin to strengthen.

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Optional Script & Power Point for Brief Lesson

It had 6 grinding “cheek teeth”, with a single premolar in front. The Mesohippus was roughly 24 inches in height and had a larger skull than the Eohippus, therefore it had a larger brain. It had a shallow facial fossa and a more compressed skull. It also had three padded toes on all four feet, with the fourth toe on the front feet being reduced to a vestigial stub. The third toe was stronger than the outer ones, therefore leading to the development of that toe becoming the single hoof that we see on horses today. However, it took millions of years over many evolutions, including our next evolution, the Merychippus.

The Merychippus was around 40 inches tall, almost twice the size of the Mesohippus. It had a much sturdier neck and legs, with a much more horse like head. The muzzle became more elongated with a deeper jaw, and the eyes moved slightly backwards to accommodate for the large teeth roots. The skull was much larger than the previous evolutions, making the Merychippus stronger and smarter. It was also much more agile compared to the previous evolutions due to the fusion of the long bones in the lower leg. The Merychippus is the evolution where horses officially became grazing animals. Its molars were much wider and much deeper than the Eohippus and the Mesohippus. It’s molars also were completely covered in cement, making the teeth strong enough to eat the tough grass on the North American plains. The Merychippus’s feet also changed drastically. The two weaker toes reduced into almost claw-like points on the horse’s foot, and they likely only touched the ground when the horse was running. The foot also officially became the hoof, as it was no longer padded and became the hard, strong texture like that of the modern Equus. However, their feet did not fully change until the Pliohippus, the next evolution.

The Pliohippus was the first evolution to be fully dependent on one toe. The two toes were barely visible as callused stubs. The Pliohippus was around 46” tall and was the closest relative to the modern Equus. Its body began to even out and become more balanced, much like horses today. Its teeth were still heavily curved, though they were less curved than the Merychippus. Although the Pliohippus is likely to be the most closely related to the modern Equus, not much information is known about it. However, there is lots of information on the final evolution: The Equus

Evolution of Horse

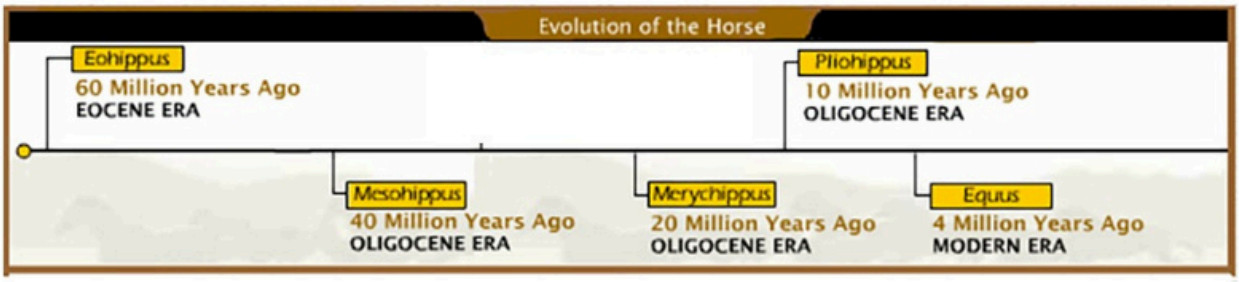
Optional Script & Power Point for Brief Lesson

The first Equus was roughly 13.2 hands tall and had the classic “horsey body” we see today. The Equus has high-crowned, straight, grazing teeth which has helped them flourish across the globe. The Equus was the starting mold for all Equine animals, including Donkeys and Zebras. Its hoof grew and strengthened as it relied soley on that toe. The Equus has changed and evolved into all kinds of different species and breeds, including the common horse. Their brain enlarged from the Pliohippus, and their advanced mannerisms have developed significantly from the Eohippus. The Equus will continue to develop and evolve as the world around them continues to change, and who knows what may be in store for the future.

Now that we’ve discussed all of our points, let's review. Here is an artist's rendition of all the evolutions of the horse. (Point out each) Here are some of the bone structures of the last four evolutions, ranging from Mesohippus to Equus. You can see how the skull developed and became larger over time, as well as the growth of the full skeleton of the horse, especially the change in the hind legs over time.

In summary, we have talked about the Timeline and Migration Patterns of horses and the 5 main evolutions: Eohippus, Mesohippus, Merychippus, Pliohippus, and Equus. Knowing the Evolution of Horses can help us know why horses are the way they are today and aids us in understanding how to better care for and understand our horses.

TIMELINE



Power Point: https://nebraskapublicmedia.org/en/series-media/non-series-video/wild-horses-an-american-romance-50000158/origins-of-the-horse/

Floriculture: Bloomin' Buds

Alex Hamby and Kendall Burch

One afternoon, Grandma invited Billy into the garden to help with flowers. When Billy mentioned he might someday go to prom, Grandma laughed and challenged him to make a corsage.

As Billy worked, he learned flowers aren't just pretty — petals attract pollinators, colors come from natural pigments, and every part has a purpose. He proudly made a corsage and imagined his future prom date saying, "Wow, you made this?!"

Lesson Overview

In this hands-on floriculture lesson, youth explore the science and structure of flowers while developing creative floral design skills. Participants learn how flower parts support plant growth, reproduction, and pollination, and how natural pigments create color that attracts pollinators. Through creating corsages or boutonnieres and fruit kabobs that model flower anatomy, students connect plant science with artistic expression while gaining an appreciation for the role of flowers in agriculture, ecosystems, and everyday life.

Floriculture

Supplies

- Artificial flowers, strings, safety pins, ribbons, slap bracelets, floral tape, wire, hot glue/floral glue
- Bamboo sticks, fruit, berries (kiwi, apples, blueberries, bananas, grapes) Use substitutes if needed

Do

Participants will create a corsage or boutonniere and assemble fruit kabobs representing flower parts while applying floral design principles and learning plant anatomy through hands-on activities.

Activity Summary

Participants will explore the science and structure of flowers through hands-on floriculture activities, including designing corsages or boutonnieres and building fruit kabobs that represent flower parts. Youth will learn how flowers grow, reproduce, and attract pollinators while applying design principles such as color, balance, and proportion. This activity combines plant science, creativity, and agricultural education to help students understand the importance of flowers in nature and everyday life.

Apply

Youth reflect on:

- what they learned by identifying flower parts on real plants in their environment and considering how design principles can be used to create future floral arrangements for different events or purposes. They will connect plant science concepts to everyday observations and explore how understanding flower structure and function can improve both gardening and floral design skills.

Technology Connection

Technology plays an important role in floriculture by helping growers produce healthier, more vibrant flowers through tools like greenhouses, irrigation systems, and climate control. Scientists and growers use technology to study plant growth, improve flower colors and longevity, and transport flowers efficiently around the world. Floral designers also use digital tools, online tutorials, and design software to plan arrangements and learn new techniques, showing how technology connects science, agriculture, and creativity.

Set up

Prepare workstations with supplies for both workshops, including artificial flowers, floral tape, wire, ribbons, safety pins, slap bracelets, and adhesives for corsage and boutonniere creation. Cut and organize fruit into labeled containers and provide bamboo sticks for the fruit kabob activity. Display visuals such as a flower diagram and color wheel to support instruction, and ensure tables are clean, safe, and ready for hands-on design and assembly.

Floriculture

Ice Breaker - First to Grow Trivia Questions
Instructions: Split participants into two groups. Each group begins by sitting on the floor as 'seeds.' As they are asked trivia questions, such as 'What do flowers need to grow?' The teams will have a 5 seconds to quietly discuss the answer together. When they are ready, the first group to be completely silent with all hands raised gets to answer. If they answer correctly, their group 'grows' by moving up one stage—from sitting to kneeling, and finally to standing. (four stages "seed"- sitting "Sprout"-kneeling "plant"- standing "flower" - standing with hands above head) If the answer is wrong, they go back to the seed stage and sit down again. The first team to fully 'grow' and stand on their feet wins!

Trivia Questions

What color are mistletoe berries?

- **White**
- Red
- Yellow
- Green

Tulips were once more valuable than gold, true or false?

- **True**

What is the main purpose of a flower's fragrance?
A) To repel insects
B) **To attract pollinators**
C) To protect from diseases
D) To compete with other flowers
How many seeds can a sunflower produce?

- **2,000**
- 200
- 1000
- 25000

Which flower is known traditionally as the symbol of love?

- **Rose**
- Lily
- Daisy
- Dandelion

What rose color symbolizes friendship?

- **Yellow**
- White
- Red
- Blue

What flower is the national flower of Japan?

- **Cherry blossom/sakura flower**

Which flower typically does not have a smell?

1. Rose
2. Sweet pea
3. **Poppy**
4. Freesia

Which flower is often used to make tea?

- **Jasmine**

Vanilla beans are extracted from which flowering plant?

1. **Orchid**
2. Hibiscus
3. Milkweed
4. Canna Striata

True or false, it has been proven by scientific studies that flowers can make people feel happier?

- **True**

What common Valentine's flower is toxic to cats?

1. **Lilies**
2. Roses
3. Orchids
4. Carnations

Floriculture

Suggested Snacks
- Sunflower Seeds
- Fruit Kabobs

Intro:
Flowers are more than just beautiful — they play an important role in helping plants live, grow, and reproduce. Each flower is made up of different parts, and every part has a special job that supports pollination and the production of seeds and fruit. In this floriculture workshop, you will explore why flowers are important while learning hands-on skills like creating boutonnieres, corsages, and even fruit kabobs inspired by plant structures. Through creativity and science, you'll discover how floriculture connects art, agriculture, and everyday life.
Workshop 1 : Make a Corsage and/or Boutonniere

Supplies: artificial flowers, strings, safety pins, ribbons, slap bracelets, floral tape, wire, hot glue/floral glue
Learn: How do flowers get their colors: Flowers get their colors from natural "paints" inside their petals called pigments. Different pigments make different colors: yellow, orange, and red come from carotenoids; some reds, purple, and blue from anthocyanins. These bright colors aren't just for beauty—they help flowers stand out so bees, butterflies, and birds will visit them. When pollinators come to drink nectar, they carry pollen to other flowers, which helps the plants make seeds and grow more flowers.

- Carotenoids— natural fat-soluble pigments (yellow, red, orange)
- Anthocyanins— natural water-soluble pigments (red, purple, blue)

Fresh flowers such as roses, carnations, orchids, alstroemeria, spray roses, and baby's breath are commonly used in corsage making because they are typically longer-lasting, they hold up well without water, and can be scaled to a corsage size.
Keep flowers fresh by keeping them cool and hydrated. Mist finished corsages and place them in a refrigerator to keep them fresh for longer before use. Use floral adhesives for stability.

Floriculture

Do:
Using the attached pictures and instructions, each participant will create a corsage and/or boutonniere. Each arrangement will be different. Some principles to keep in mind as they design include:

- Color coordination: Color schemes in floral design use the color wheel to create specific moods and aesthetics, ranging from vibrant, high-contrast arrangements to soothing, harmonious bouquets. Key approaches include complementary (opposite) colors for drama, analogous (adjacent) colors for harmony, and monochromatic, triadic, or split-complementary schemes for variety. Here is an explanation of some of the common color schemes (see the attached color wheel):
  - Complementary: Pairs colors opposite each other on the wheel (e.g., blue and orange, red and green) to create high-contrast, vibrant, and energetic arrangements
  - Analogous: Uses three or more colors located next to each other on the color wheel (e.g., red, vermillion, and orange). This creates a cohesive, flowing, and soothing, or harmonious, look.
  - Monochomatic: Features variations of a single color, utilizing different shades, tints, and tones to add texture and depth.
  - Triadic: Employs three colors equally spaced around the color wheel (e.g., orange, purple, and green) to achieve a balanced, vibrant, and multifaceted design
  - Split-Complementary: Combines a base color with the two colors adjacent to its complement, offering high contrast without being as jarring as a pure complementary scheme.
  - You might also want to focus your design on warm tones, cool tones, bright tones or pastels for a consistent tone.

- Balance: Think of a see-saw when using rules of balance in your floral arrangement. It doesn't mean that each side of a design must match the other, but that one side, color, or texture, is offset by an equal element on the opposite side. Make sure arrangements have equal visual weight or equal eye attraction on each side of the arrangement. In the example below, there is balance in the arrangement because the weight above is being balanced by the weight below.
- (Credit: Bloomsbythebox.com)

- Proportion: You want to be sure that the size of the design matches the wearer. Some things to keep in mind:
  - Be sure the overall design does not overpower the wrist or clothing.
  - Keep a focal point, using 1-3 focal flowers surrounded by smaller flowers, fillers, and foliage to create a balanced, not crowded, look.
  - Aim for a length of approximately 4-5 inches, smaller for a boutonniere.
  - The design should be relatively flat, avoiding excessively long stems or bulky elements that stick out too far from the body.
  - The design should feel stable, with components, such as ribbon, acting as accents rather than overpowering the flowers.

Reflect:

- How does the way you handle the flowers during and after harvesting affect flower quality? Can you damage flowers in handling them?
- How can greenhouses help with producing flowers? (Greenhouses provide a controlled environment and allow summer flowers to grow year round).
- What factors are important to take in account when picking flowers and designs when creating corsages?
- What similarities and differences are there between your design and that of one of your friends? Do you like seeing the different kinds of designs people use? What can you learn from your friend's design?

Corsage Making Instructions

Information from: https://www.seventeen.com/prom/prom-style/how-to/a39917/diy-prom-boutonnieres-and-corsages/

Boutonniere Making Instructions

Information from: https://www.bloombythebox.com

Floriculture

Workshop 2 : Bouquet Fruit Kabobs

Supplies: bamboo sticks, fruit, berries, (kiwi, apples, strawberries, blueberries, banana, grapes)
Use substitutes if needed
Learn: Like all living things, a flower is made up of different parts, and each part has an important job that helps a plant to live, grow and reproduce. Some of these parts include:

- Stem: The role of the stem is to hold the flower up, and to transfer water and nutrients from the roots to the flower and leaves.
- Leaves: Leaves make food for the plant from sunlight through a process called photosynthesis.
- Roots: Anchor the plant in the soil and absorb water and nutrients that help the plant grow and stay healthy.
- Fruit: Develops from the flower after pollination and protects the seeds while helping them spread to new places.
- Seeds: Contain an embryo and the nutrients it needs to begin growing into a new plant. It is covered by a protective seed coat.
- Flowers: The flower is made up of several parts that help the plant to reproduce so that when the plant dies, there are new plants of their kind. Parts of the flower include:
  - Petal: The colorful petals attract pollinators like bees and butterflies.
  - Stamen: The stamen is responsible for producing, storing, and releasing pollen. It is made up of two parts, the filament, or stalk, and the anther, which contains the pollen.
  - Pistil: The pistil is the part of the flower where seeds begin to form once it is fertilized by pollination.
  - Sepal: The sepals are the green parts you can see under the flower after it opens.

Floriculture

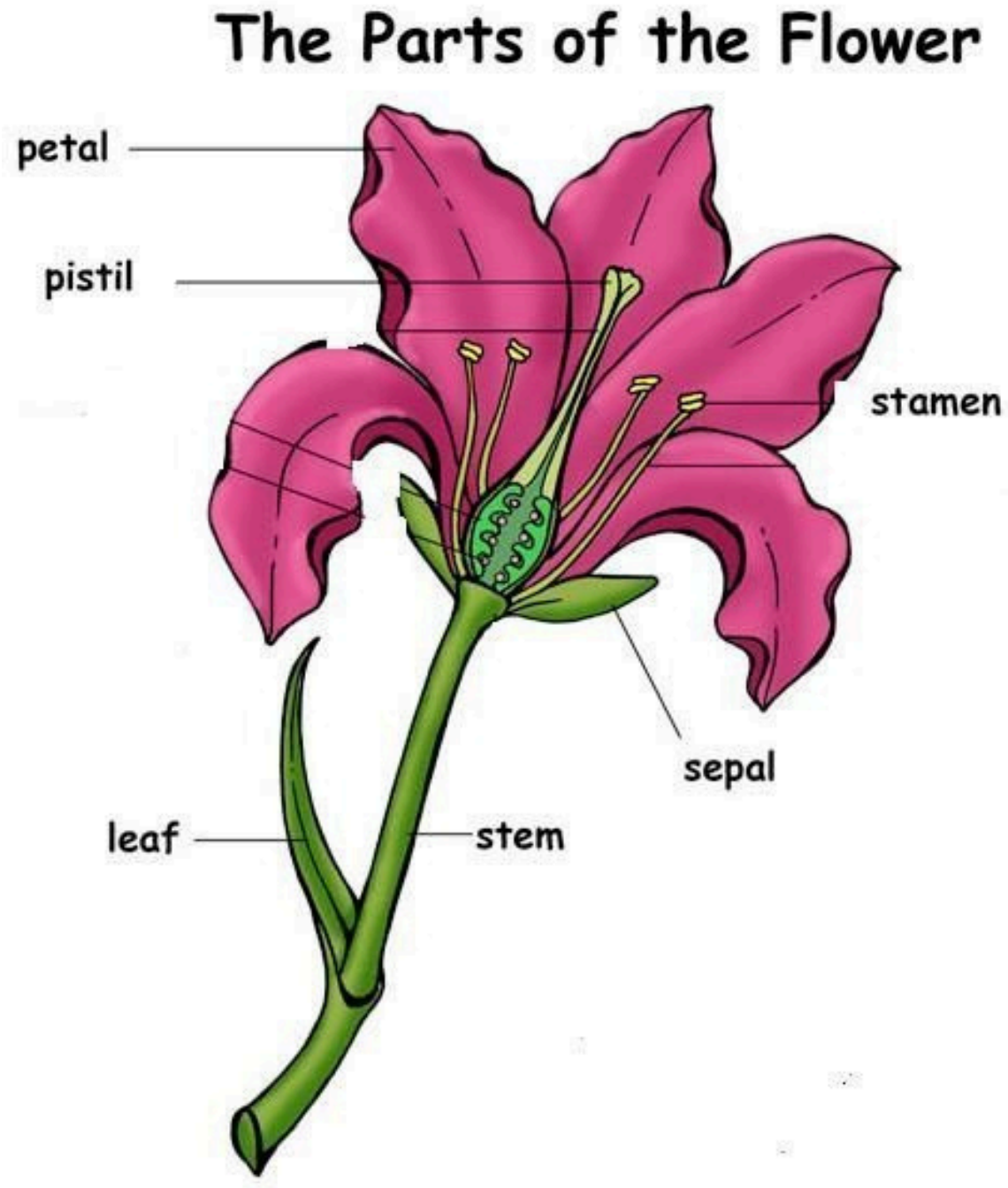
Do: Create fruit kabobs using berries and a variety of fruits while teaching about the different parts of a flower. Each fruit will represent a specific flower structure — for example, green grapes for the stem, apple slices or kiwi slices for leaves, strawberries or blueberries for petals, banana chunks for stamens, and a grape for the pistil in the center. As youth add each piece to their kabob, explain the role of that flower part, what it does, and why it is important for plant growth and reproduction. By the end of the activity, participants will have built a colorful, flower-shaped fruit kabob while learning how flowers function and how pollinators support plant life.
Be sure to describe why each fruit was chosen, what flower part it represents, and the purpose of that structure as outlined below.
Grapes - the stem (holds the flower up and transports nutrients and water
Kiwis - the leaves (makes food through photosynthesis using sun, oxygen, and water)
Blueberry - the pistil (makes the seeds after pollination)
Apples - the petals (attracts the pollinators)
Banana - The stamen (makes the pollen)
Apply:

- Now that you have seen the parts of a flower and parts of a plant, look at different plants in your yard or a nearby park or community garden. Can you identify the different parts?
- What other types of floral arrangements would you like to make. How can you use the design principles to better fit your arrangement to the event or location that you will use the flowers?

Reflection Questions:

- Why is the stem so important to a flower's survival?
  - Answer: It holds the flower up and moves water and nutrients to all parts.
- What would happen if a flower had petals but no stamen?
  - Answer: It couldn't make pollen, so it couldn't reproduce.
- Why is the pistil important even though it's small?
  - Answer: It's where seeds form, so it helps create new plants.
- How does each fruit on your kabob depend on the others—just like flower parts
  - Answer: All parts work together; without one, the whole flower wouldn't function.
- How do flowers help humans, even if we don't notice it every day?
  - Answer: They help make fruits, food, seeds, oxygen, and support ecosystems.
- What is one thing you learned today that surprised you?
  - Answers will vary—pigments, pollination, flower parts, or design skills, etc.

Floriculture



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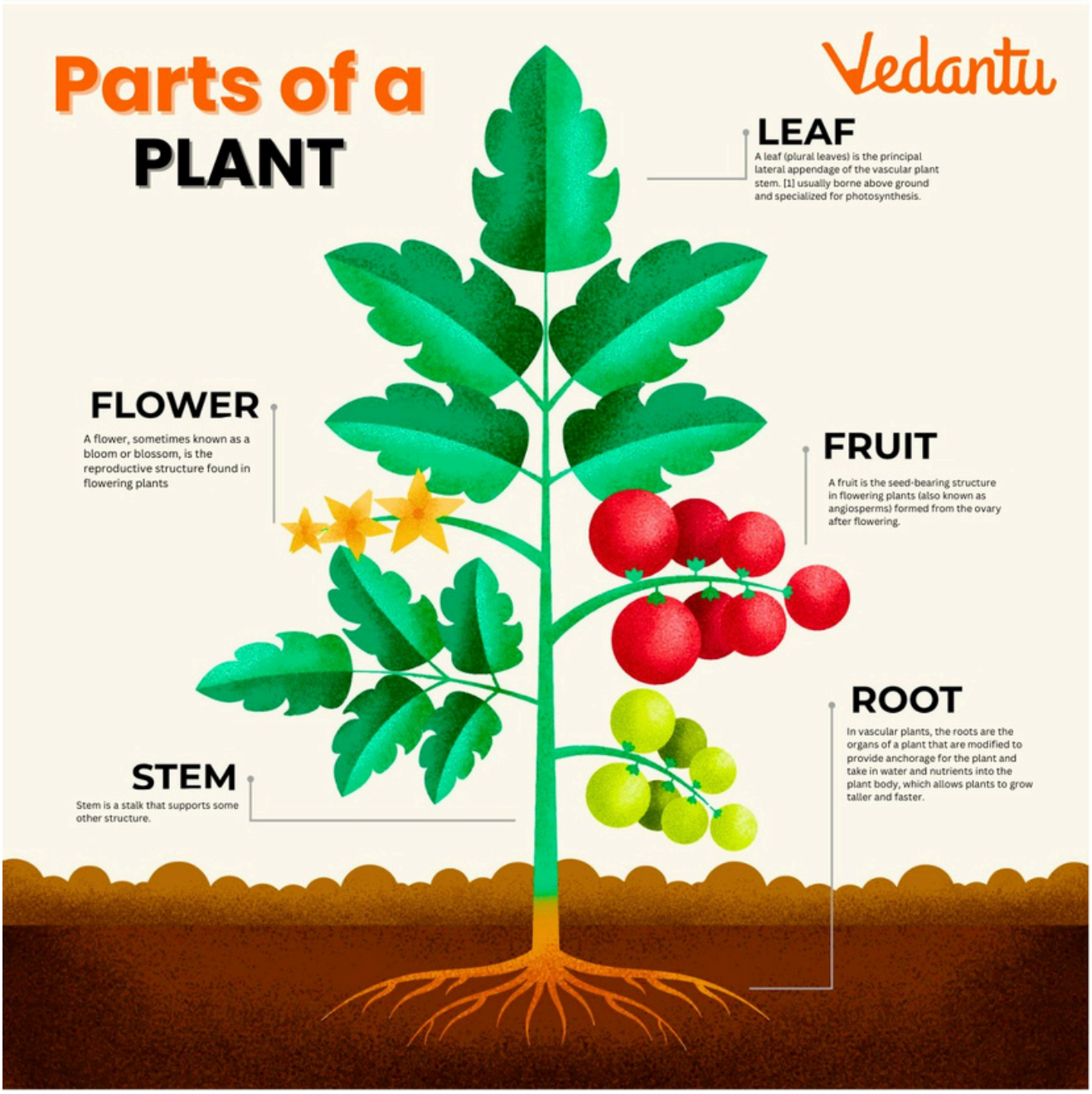
Floriculture



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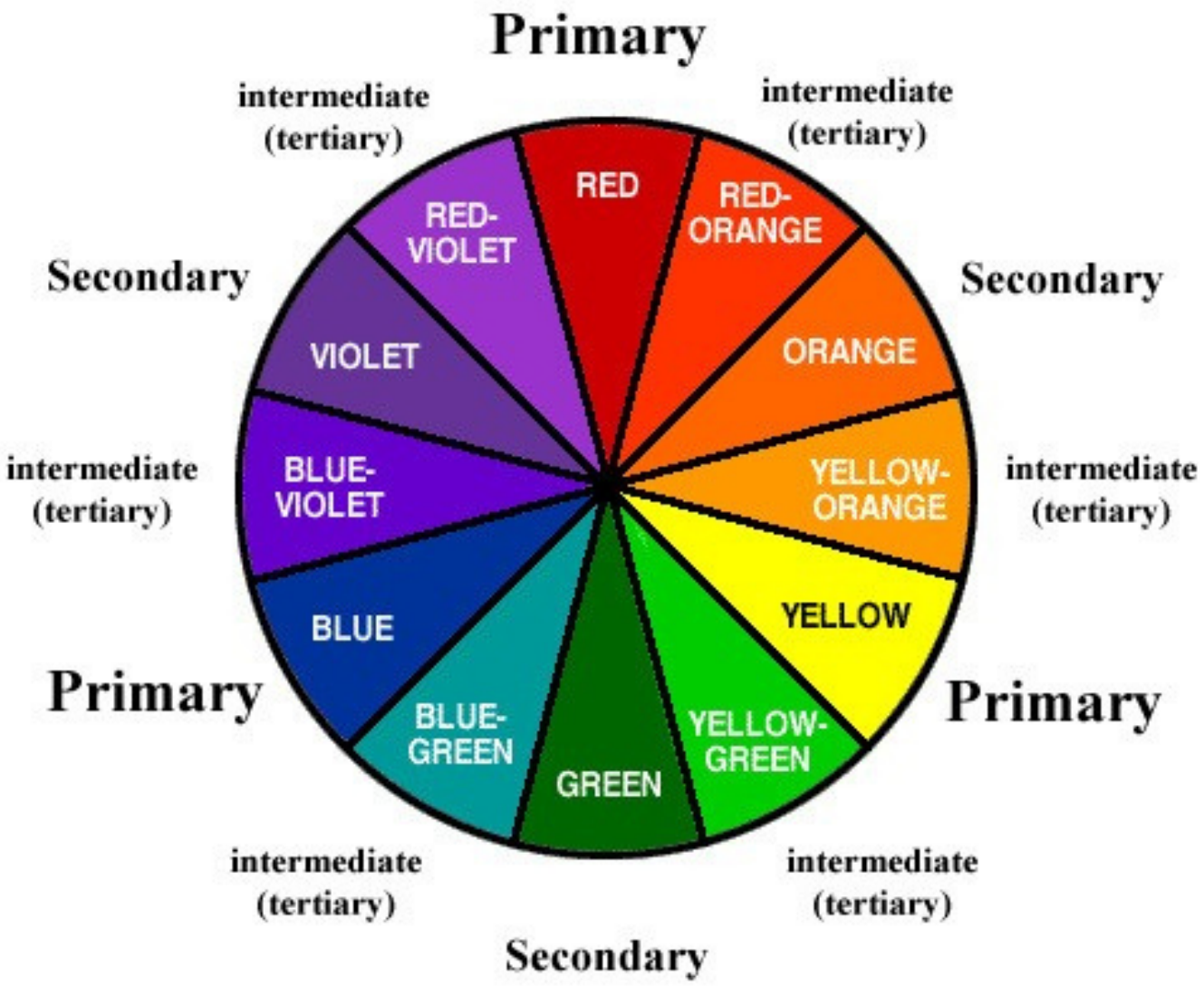
Floriculture



Grazing: Engineer your Acres

Rylee Ward and Kendall Burch

Grandpa took Billy to the pasture and asked, “Why don’t animals eat all the grass at once?” Billy guessed, “Because they’re polite?”

Grandpa laughed and explained grazing plans — moving animals so grass can regrow and stay healthy. Billy learned that animals need specific environments, just like kids need good snacks and sleep to stay strong.

Lesson Overview In this lesson, youth will learn how farmers manage large areas of land, what technology they use and how different animals interact with land and plants. Through hands-on activties, they will match animals with their best environments and practice critical thinking to solve problems related to land and grazing challenges during interactive activties.

Grazing: Engineer your Acres

Ice Breaker - "Graze Match Game"
Supplies:

- 8 animal cards labeled lamb, cow, goat, and horse (2 of each species; one animal name per card)
- Land cards (rocky, mountain, gravelly, dry grass, hill, sandy, wildflower meadow, flat, wet, dense grass, pasture, swampy, dusty) — use pictures or words
- Each team should have one complete set of all 13 land type cards.

Instructions:

- Divide youth into two teams.
- Place one set of four animal cards (lamb, cow, goat, horse) on one side of the room for each team.
- Give each team a full set of land type cards.
- Teams stand on the opposite side of the room from their animal cards.
- One player at a time runs to match a land type card with the animal they think fits best, laying their card below the animal.
- Players take turns until all cards are placed.
- The first team to correctly sort all land types wins.

Grazing Areas:

- Goats- Rocky, Mountain, Gravelly
- Sheep- Dry Grass, Hill, Sandy, Wildflower Meadow
- Cow- Flat, Wet, Dense Grass
- Horse: Pasture, Swampy, Dusty

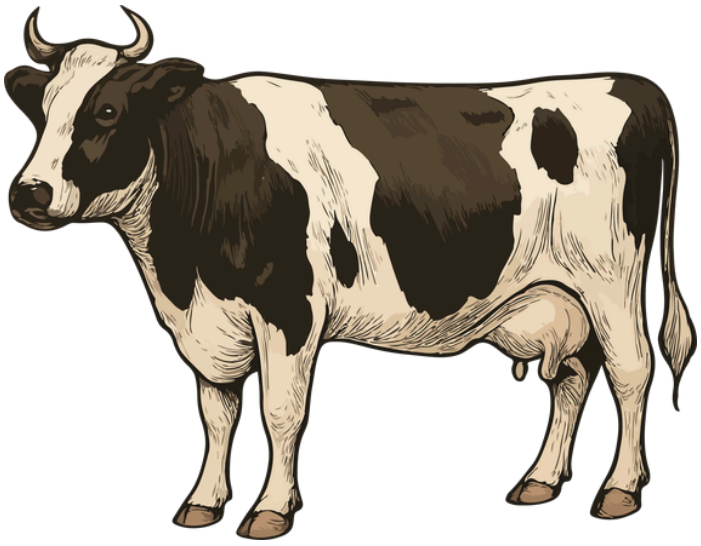
Discussion:
When farmers manage large areas of land, it can be hard to keep track of different land types. They use technology like drones, aerial mapping, and computer programs to study the land and decide which animals fit best in each area. GPS collars can also help track where animals graze. These tools help farmers match the right animals to the right land — just like in this activity.

Suggested Snack:
Edible Soil Layers- Using chocolate pudding as the base, crushed Oreos as the "topsoil," and gummy worms as soil organisms, they will see how healthy soil provides a home for living things. This hands-on treat reinforces the importance of soil in supporting plants, animals, and ecosystems.

While eating their snack, discuss:

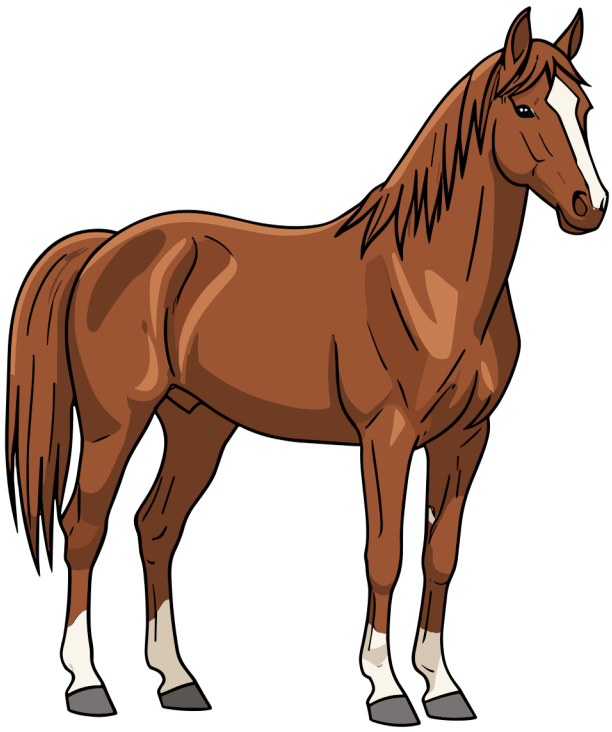
- Why soil is important?
- If the gummy worms are living in the soil, what can we infer about the soil?
- If the pudding (soil) was hard and dry, what could we infer about plant growth?

LAMB



COW

GOAT



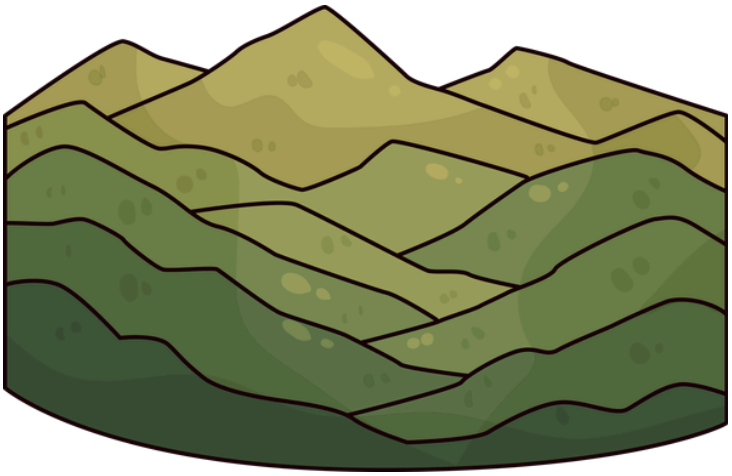
HORSE

Rocky

Mountain

Gravelly

Dry Grass

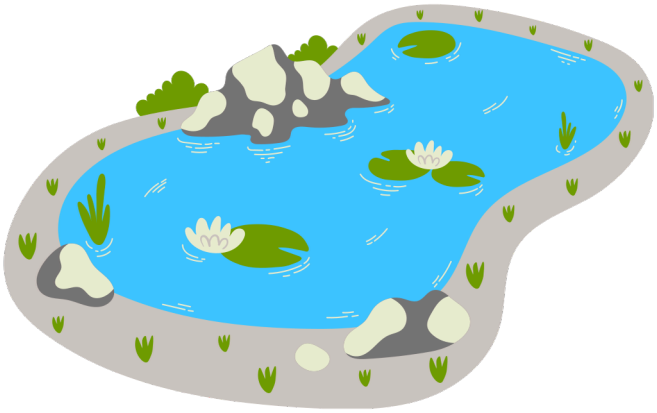


Hill

Sandy

Wildflower Meadow

Flat



Wet

Dense Grass

Pasture

Swampy

Dusty

Grazing: Engineer your Acres

Workshop 1: LEGO Land & Grazing Challenge
Supplies:
Legos/building blocks, Scenario cards describing land type and challenges: dry pasture, swampy ground, overgrown brush)
Learn:
Farmers use many types of technology to keep land thriving and take care of their land and animals.

- On rocky land, where goats graze, farmers might use soil and plant sensors to check which areas need more nutrients or water, and drones to see the whole farm from above and spot bare or overgrown patches. They also use movable fences to guide goats so they don't eat one area too much, and automatic water systems to make sure the goats always have water, even in hard-to-reach spots. On wet or marshy
- land, where cows graze, farmers use soil moisture sensors to know which areas are too soggy or too dry. They also build drainage systems like ditches or small ponds to control flooding, and paddock systems to rotate cows so the grass can grow back. Technology like water and feed monitors helps farmers make sure cows always have
- enough food and clean water.

All of these tools help protect the land, keep animals safe, save time, and make farms more productive while keeping the environment healthy.
Animals can improve land health when matched correctly.

- Goats reduce weeds by eating them, and can thrive on different food sources
- Cows thrive on grass
- Sheep prefer softer ground

Technology can help farmers to make better decisions about land use and improvements.

- Farmers use grazing apps and other tools to take care of their animals and pastures more efficiently. These technologies let them see where animals are grazing, track pasture health, and spot areas that are overgrazed, dry, or unhealthy. By knowing which parts of the land need rest or extra care, farmers can rotate animals to fresh areas, keep soil fertile, and prevent damage to the grass.
- Satellites also help predict problems like drought, flooding, or disease, so farmers can act early. Overall, these tools help farmers save time, protect soil, grow healthy grass, and keep animals safe and well-fed, making farming smarter and more sustainable.

Grazing: Engineer your Acres

Do:
After explaining what types of technology farmers use on their farms, split participants into four different groups (4 to 5 people per group). As a group they will get a scenario sheet. They will work as a team to build their farm and make sure they have great technology to help the farm thrive as well as the animals on the land.
At the end of the activity each group will present their build to the rest of the group.

- Each group gets Legos or building blocks to build their "land" and a scenario card describing the problem on the "land" that they have (lego base)
- Groups decide which animals to add to their lego farm scenario for grazing to help the land and animals stay healthy.
- They can design creative features with Legos (fences, shelters, water areas) to make the land safer and more productive.
- They will have to make their farm functional, realistic and safe using their imagination and making sure they address every need to on their scenario card. Each team should set design parameters to better meet the needs outlined on their card
- After they present to the class, discuss the strengths and weaknesses of their plan and what they would change if they had a chance to make improvements to their farm design. If time allows, you may want to allow teams to make improvements.

Reflection:
Each group presents:
1. Their land type and the challenges they had to overcome on their farm.
2. The animals they chose and why they chose those animals to graze on their land.
3. What technology they could use to help manage their land (ex: sensors to measure grass height, drones to check pasture health, apps to track animals) and why they chose to use that type of technology.

Teams give one another feedback on their solutions.
Wrap-Up Connection:
Farmers use science, technology, engineering, and math every day to care for their land and animals. You used Legos to model how animals help land, but real farmers use tools like soil monitors, drones, and GPS to do the same thing!

Grazing: Engineer your Acres

Scenario Card 1

Look at this dry, open land! There's so much space, and the grass is very sparse. The farmers have a hard time walking all around to check if the grass is growing well or if the soil is getting too dry. If they don't find problems early, the land could get worse and the plants might stop growing.

*keep in mind how to use technology and what animals you could use to help the land thrive.

Grazing: Engineer your Acres

Scenario Card 2

The land is rocky and uneven, with many scattered stones and boulders. Between the rocks, there are patches of grass, shrubs, and small plants trying to grow. Some areas are very hard to walk on, and the soil is thin in spots, so water doesn't stay in the ground very well. The land is a bit wild, and the plants grow in all different directions. It's not easy for regular farm animals to graze here because the terrain is tricky and the plants are tough.

*keep in mind how to use technology and what animals you could use to help the land thrive.

Grazing: Engineer your Acres

Scenario Card 3

The land is wet and marshy, with soft soil and puddles of water in many areas. Grass grows thickly here, and there are some small patches of reeds and plants that like damp ground. The soil is soft, so walking can be tricky, and some areas are muddy most of the time. The land can get waterlogged after heavy rain, and plants grow quickly because there is lots of moisture. Not all animals can live here easily because some need dry or firm ground to walk and graze.

*keep in mind how to use technology and what animals you could use to help the land thrive.

Grazing: Engineer your Acres

Scenario Card 4

The land is a wide, open field covered in short, dry grass with patches of green mixed with tan, suggesting a pasture that may be between growing seasons or in a period of dormancy. The ground appears mostly flat with a very gentle slope, allowing for open visibility across the area. The soil beneath the grass looks firm and well-drained, with no visible standing water or muddy areas. A fence line runs across the field, indicating the land is sectioned and likely managed for agricultural use such as grazing. The overall condition suggests usable rangeland or pasture with moderate vegetation cover and open exposure to sunlight and weather.

Grazing: Engineer your Acres

Scenario Card 1 Option for solution:
To help, the farmer could use technology like satellites or special apps to watch the land from above. These tools can show where the grass is healthy and where the soil needs a break. For animals, sheep would be a great choice here! Sheep can eat short grass and plants that grow in dry areas, and they are good at grazing on hills and open fields. By letting sheep graze carefully on this land, the farmers can help keep the soil healthy and the plants growing strong.

Scenario Card 2 Option for solution:
The best animal for this land is a goat. Goats are excellent at navigating rocky, uneven areas, and they can eat shrubs and plants that other animals might not touch. They help keep the plants from overgrowing and can make the land healthier over time.
To help the land thrive, farmers can use technology like soil and vegetation sensors to see which parts of the land need more care, smart or movable fencing to control where goats graze, and automatic water systems to make sure the goats always have enough water. Using these tools together can help both the animals and the land stay healthy for years.

Scenario Card 3 Option for solution:
The best animal for this land is a cow. Cows can graze on the thick grass that grows in wet areas and are strong enough to walk on soft, marshy ground without getting stuck. They help manage the grass, keeping it from growing too tall, and their grazing helps maintain a healthy balance in the wetland ecosystem.
To help the land thrive, technology like soil moisture sensors can show which areas are too wet or drying out, fencing or paddock systems can guide cows to graze evenly without overusing certain spots, and water management tools like drainage or small ponds can prevent the land from flooding too much while still keeping it moist for the plants.

Scenario Card 4 Option for solutions:
This land is best for horses, Horses can graze on a pasture because their digestive system is specially adapted to process large amounts of fibrous plant material like grass. Their teeth are designed to grind down tough grasses, and their long, sensitive intestines allow them to slowly break down cellulose and extract nutrients over time. Grazing also supports their natural behavior, providing mental stimulation and allowing them to eat small amounts continuously throughout the day, which is important for preventing digestive issues like colic. A well-maintained pasture provides fresh, nutrient-rich grass that meets many of a horse's dietary needs while promoting healthy movement and social interaction if other horses are present.

Grazing: Engineer your Acres

Workshop 2: Creating Your Own Land – Tech & Grazing
Supplies:

- Grass seeds
- Small pots
- Potting soil
- Water
- Crayons, markers
- Activity sheet with animals and plants (safe vs. unsafe for grazing)

Learn:
Many farm animals eat plants to gain the nutrients they need. But not all plants are created equal. This activity will help us learn how different animals interact with land and plants. Some important things to remember:

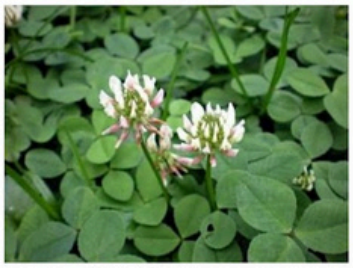
- Some plants are nutritious, while others can make animals sick. Different animals
- need different types of land to thrive. Farmers can get help in caring for their
- animals by using technology such as plant- identification apps, drones, and soil sensors to know what grows on their land and to check whether plants are safe for their animals.

Do:

1. Activity Sheet Challenge – Give each participant a handout showing animals and plants (you can have them work individually or in small teams).
    - How will you know which plants are safe or each type of animal?
    - What are some technology tools that can help you with this?
        i. Plant identification apps
        ii. Drone surveys of the land
        iii. Artificial intelligence apps that use cameras and machine learning to analyze the behavior and health of animals
        iv. Acoustic sensors that listen or animal distress.
        v. Artificial intelligence can be helpful, but be careful how you use it.
2. Plant Their "Land"
    - Give each participant a pot with soil and grass seeds.
    - Plant the seeds and water them.
    - Each person chooses two plants from the activity sheet and two animals they think would live well on their land.
    - Using crayons/markers, they decorate their pots to represent fences, water sources, or shelters.

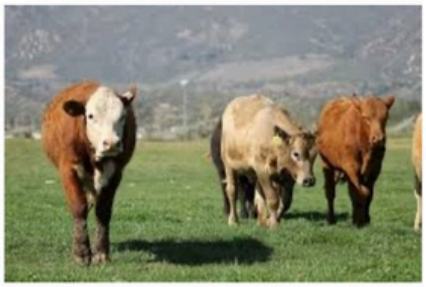
Grazing: Engineer your Acres

Activtiy Worksheet 1
Safe vs Unsafe For Grazing



Clover (Trifolium repens)

Foxglove (Digitalis purpurea)



Alfalfa (Medicago sativa)

Buttercup (Ranunculus species)

Grazing: Engineer your Acres

Activtiy Worksheet 2
Safe vs Unsafe For Grazing

clover

dandelion

Wild Geranium

Chickweed

Grazing: Engineer your Acres

Tech Connection
AI gathers information from many sources, but sometimes it includes wrong information. Farmers can use AI as a tool, but they must always check what they learn from AI using their own brains and experience. A decision about animal care should never be made only on AI data.
As they build, discuss how:

- Sensors track soil moisture so farmers know when to water.
- Drones help farmers spot unhealthy plants in fields.
- GPS collars show where animals are grazing.

Reflection Questions:

- Some youth will present their "land," explaining the animals and plants they chose.
- As a group, discuss the improvements they made to their land, and share ideas for other improvements to help their land. Connect back to technology: "Just like we
- checked your land together, farmers use apps, drones, and sensors to check their real land to keep animals healthy and land productive."

Apply:

- How can you use what you learned today to improve your home and community? Are there places in a local park that are too wet or too dry? What suggestions would you have?
- Are there suggestions you could make to improve your yard at home?
- Do you have a pet? Is there something you could do to improve the pet's environment (adjustment to food, exercise, or sleeping arrangements?
- Have youth predict with technology: "What tool would you use to check your land—a drone, a soil sensor, or a plant ID app? Why?"

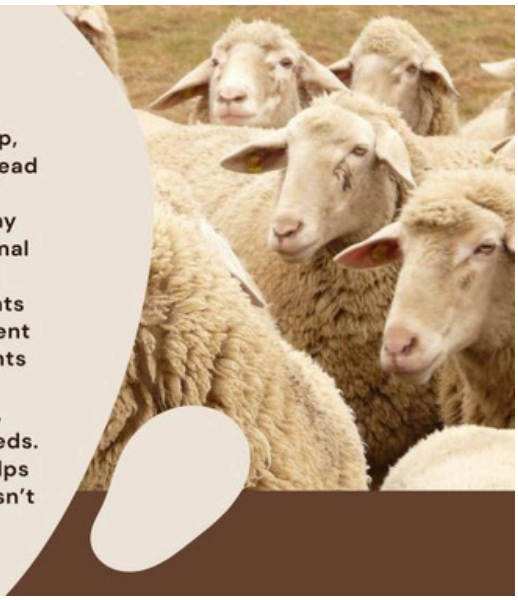
Grazing: Engineer your Acres

How do farmers use technology?

Farmers use many kinds of technology to take care of their land and animals. On rocky land, where goats graze, farmers might use soil and plant sensors to check which areas need more nutrients or water, and drones to see the whole farm from above and spot bare or overgrown patches. They also use movable fences to guide goats so they don't eat one area too much, and automatic water systems to make sure the goats always have water, even in hard-to-reach spots. On wet or marshy land, where cows graze, farmers use soil moisture sensors to know which areas are too soggy or too dry. They also build drainage systems like ditches or small ponds to control flooding, and paddock systems to rotate cows so the grass can grow back. Technology like water and feed monitors helps farmers make sure cows always have enough food and clean water. All of these tools help protect the land, keep animals safe, save time, and make farms more productive while keeping the environment healthy.

What is grazing?

Grazing is when farm animals like cows, sheep, or goats eat grass and plants from fields instead of being fed all their food by people. Farmers use grazing because it's a natural, healthy way for animals to eat and it saves money on animal feed. Grazing can also help the land because animal poop fertilizes the soil and keeps plants growing. Different animals are used on different types of land because they eat different plants and move differently—cows are best for flat grassy fields, sheep can handle rougher land, and goats are great at eating bushes and weeds. Using the right animals in the right places helps keep the land healthy and makes sure it doesn't get damaged or overused.



Grazing: Engineer your Acres

Animals can improve land health when matched correctly—goats reduce weeds, cows thrive on grass, sheep prefer softer ground. Technology (satellite imaging and grazing apps) help farmers use tools like grazing apps and satellite imaging to take care of their animals and pastures more efficiently. These technologies let them see where animals are grazing, track pasture health, and spot areas that are overgrazed, dry, or unhealthy. By knowing which parts of the land need rest or extra care, farmers can rotate animals to fresh areas, keep soil fertile, and prevent damage to the grass. Satellites also help predict problems like drought, flooding, or disease, so farmers can act early. Overall, these tools help farmers save time, protect soil, grow healthy grass, and keep animals safe and well-fed, making farming smarter and more sustainable.

Different farm animals need different types of land because they do not all eat the same plants, and some plants can even be dangerous for certain animals. For example, cows and horses do well on grassy fields with plants like clover and alfalfa, but plants like buttercup or foxglove can make them sick. Sheep can eat short grasses and weeds such as dandelion, chickweed, and wild geranium, while goats are better on rough or hilly land and can safely eat many plants that other animals avoid. Because of this, farmers must carefully choose which animals go on which land. Technology connection: Farmers today use plant-identification apps, drones, and soil sensors to know what grows on their land and to check whether plants are safe for their animals. This helps keep animals healthy and protects the land too.

Farm Equipment: Tools on the Farm

Emily Davis and Hadley LaRose

Billy got to climb onto a tractor (with supervision, of course). Grandpa showed him how different tools help farmers work smarter, not harder.

Billy compared each machine to superhero gadgets — plows as earth-shapers, seeders as planting robots, and balers as hay superheroes. He realized technology and agriculture go hand in hand.

Lesson Overview

Students will explore the different tools used on farms and how they help make agricultural work more efficient and safe. Through hands-on activities, youth will learn how tools have changed over time and how technology supports modern farming practices. This lesson connects agriculture, problem-solving, and real-world applications to everyday farm tasks.

Farm Equipment

Ice Breaker - Name that Tool

Supplies:

Close up picture or oddly angled images of farm tools or equipment. (slideshow)

Instructions:

Show the participant the close up picture of the tool or equipment and have them guess what the item is. After they guess, show them what tool or equipment it really is.

Discussion:

When farmers manage large areas of land, it can be hard to keep track of different land types. They use technology like drones, aerial mapping, and computer programs to study the land and decide which animals fit best in each area. GPS collars can also help track where animals graze. These tools help farmers match the right animals to the right land — just like in this activity.

Suggested Snack

Trail Mix - While eating their snack, discuss:

- How does Farm Equipment help the farm?
- How have tools evolved overtime to help farm production?

Activity 1: Old vs. New

Supplies: Slideshow, papers with questions, pencils, blocks, bean bags, balls, cups, scoops, cardboard plows, tray

Learn:

Agriculture is an important part of life for everyone. Even if you have never worked on a farm, we need agriculture to provide us with food, to provide material for clothing, and even to provide important medicine. But we didn't get where we are today all at once. We are going to learn about Agricultural Evolutions that have changed agriculture over the centuries.

Do:

1. Participants are going to solve agricultural problems from three different Agricultural Evolutions.
2. Complete the activity listed, then answer the question presented to them.
3. Once they figure out how they would personally solve the question, bring the groups back together, have them share their ideas, then share what actually occurred in history to solve the problems.

Farm Equipment

Farm Equipment Slide Show

Click on the link or scan the QR code to pull up the slide show

https://docs.google.com/presentation/d/1vR0b-RpGm3ssWWOQJzC7pr2xJy8aWmUMuaY0yiZaEgE/edit?usp=sharing

Farm Equipment

Split the participants into 3 groups and give each group a specific problem that had to be solved in that specific evolution.

1st Evolution-

The First Agricultural Revolution (Neolithic Revolution): Around 10,000 BCE, transitioning from hunting and gathering to sedentary farming and domestication of plants and animals, enabling the development of larger settlements and early civilizations.

Activity: "Foragers vs. Farmers" Relay

1.Divide participants into small groups. 2.Scatter "food tokens" (beans, cards, balls) around the room or outside. 3.Round 1 (Hunting & Gathering): Participants must run one at a time to collect food from far away and bring it back.After a short round, remove many of the tokens to simulate scarcity. 4.Round 2 (Farming): 5. Give each group a small "plot" (hula hoop or taped square) where they can plant

tokens close by and collect repeatedly.

6.You have been hunting animals and gathering food to survive, but your resources are running low. The animals have migrated away, and you've gathered most food around your home. How are you going to keep food accessible during these hard times?

- Actual solution: People created farms by planting crops and domesticated animals by trapping and breeding them to make more food.

2nd Evolution-

The Second Agricultural Revolution (British Agricultural Revolution): Beginning in the 18th century, focusing on improvements in farming techniques, including mechanical equipment, livestock breeding, and crop rotation, leading to increased productivity and the decline of the need for farm labor.

Activity: "Tool Upgrade Challenge"

1.Set up stations where students move items (blocks, bean bags, balls) from one area to another.
2.Round 1: Move items using hands only (slow, tiring).
3.Round 2: Introduce "tools" (cups, scoops, cardboard plows, trays).
4.You have been farming crops and keeping animals at your home. Your crops are growing and it is hard to manage just by yourself. What tools/methods could help you keep up with your farms?

- Actual solution: People created farming equipment (including the first steel plow, which was created by John Deere), and began to implement crop rotation to keep crops healthy and improve crop production.

Farm Equipment

3rd Evolution-
The Third Agricultural Revolution (Green Revolution): Beginning in the mid-20th century, characterized by significant increases in crop yields due to innovations in irrigation, fertilizers, pesticides, and plant breeding.
Activity: "Save the Crops" Obstacle Course

1. Create a course with:
   - A water station (use blue beads instead of water for easy clean up) (students carry cups of water (aka beads) to crops) Pests (taggers or cones that block
   - paths) Weak crops (knocked-over pins or blocks)
   -
2. Students must work together to:
   - Bring water/beads through the course
   - Protect crops from pests
   - "Strengthen" crops by standing them back up
3. Your farm has been producing many different types of crops, but pest infestations and far away water supplies have been killing your crops. What could you do to help keep your crops healthy?

- Actual Solution: People developed fertilizer and pesticides to keep bugs and disease away. They developed irrigation to help bring water to the crops, and implemented plant breeding to grow healthier and stronger crops.

4th Evolution-
Some sources suggest the emergence of a Fourth Agricultural Revolution, driven by advanced technology like artificial intelligence and automation in farming.

1. Following the completion of the 3 different activities, have the teams come back together and explain what the did. Ask them questions such as "How did you make your task easier? What tools/methods did you use to increase efficiency?" Following the discussion, give the students the following scenario:

Your farm has grown so big that you cannot manage it by yourself. What tools/technology could you use to help you manage your farm?

- Actual solution: People developed Artificial Intelligence and automation in farming, including GPS & auto steering in tractors, drones and mapping, and equipment sensors.

Reflection Questions:
Why is Technology important in Agriculture? Why is knowing how agriculture evolved important? How does knowing how agriculture evolved impact how we do agriculture today and in the future?

Farm Equipment

🌾 **Why is technology important in agriculture?**
Technology helps farmers grow more food using less time, labor, and resources. Tools like machines, irrigation systems, and computers make farming safer, more efficient, and more sustainable while helping farmers respond to challenges like weather, pests, and limited land.

🌱 **Why is knowing how agriculture evolved important?**
Understanding how agriculture evolved shows us how people solved food problems in the past. Each agricultural revolution happened because farmers faced challenges and found new ways to produce food. Learning this helps us understand why certain tools, methods, and systems exist today.

🚜 **How does knowing how agriculture evolved impact how we do agriculture today and in the future?**
Knowing how agriculture evolved helps us build on past innovations instead of starting over. It guides farmers, scientists, and engineers in improving technology, protecting natural resources, and planning for future challenges like climate change, population growth, and food security.

Activity 2: Save the Farm with Style
Supplies: Paper for notes, pencils, station papers, sticky notes or tags
Learn: Learn about the different types of AI and how it is used in agriculture. Learn how to use AI when different disasters occur on the farm.
Do: Teach students about the different types of AI, and how it is used in agriculture.

- **Vision AI-** This is subset of artificial intelligence that enables machines to capture, process, and interpret visual data from cameras, drones, satellites, and sensors to monitor crops, soil, and livestock in real-time. It mimics and often surpasses human visual inspection capabilities to identify, analyze, and automate tasks in agricultural environments, transforming how crops are grown, managed, and harvested.
  - Example: Spotting plant disease from photos
- **Prediction AI-** This type of AI analyzes massive, diverse datasets from farming operations to forecast future outcomes and identify patterns
  - Example: using past data forecast weather, yields, and prices
- **Robotics AI-** This includes the integration of autonomous machines (robots) and intelligent computer systems (AI) to automate, optimize, and manage farming operations. This technology aims to increase agricultural productivity, improve crop yields, and ensure sustainability by reducing the use of resources like water and chemicals.
  - Example: planting, harvesting, and weeding crops

Farm Equipment

Supplies: copies of images, data cards, sticky notes or tags

VIsion AI Drone Activity - What students physically do:

- Tape or place paper “crop images” around the station area (walls, desks, or floor).
  - Each image shows one of these:
    - Healthy plant
    - Pest damage
    - Disease spots

- One student pretends to be the drone, slowly “scanning” the area with their hand or a paper “camera.”
- Other students act as the AI system, pointing out problem crops and tagging them with sticky notes or paper flags.

Why it works:

- Mimics movement of drones
- Reinforces visual detection
- Gets students walking, pointing, and collaborating

Prediction AI Activity - What students physically do:

- Lay out data cards on the floor in a line:
  - Rainfall → Temperature → Yield → Price

- Students physically walk the data path and stop at each card.

- At each stop, they predict the next outcome:
  - “Because rainfall is low, yields will likely go down.”

- At the end, they stand in one of three zones: (Make signs for each if desired)
  - Good Year
  - Risky Year
  - Bad Year

Why it works:

- Turns data analysis into movement and positioning
- Shows cause-and-effect clearly

Review each data card with the group using the answer key data cards

Best for events:
✓ Drought
✓ Market decline

Farm Equipment

Data Card 1: Rainfall

Annual Rainfall: 8 inches
Well below Utah's average
Irrigation reservoirs are low

Prediction Prompt:
"How will low rainfall affect crop growth and water use?"

Farm Equipment

Data Card 2: Temperature Trend

Summer Temperatures: 5°F above normal
More hot days
Higher evaporation rates

Prediction Prompt:
"How might higher temperatures change crop yields and water demand?"

Farm Equipment

Data Card 3: Past Crop Yields

Wheat Yield Trend (last 3 years):
Year 1: 62 bushels/acre
Year 2: 55 bushels/acre
Year 3: 50 bushels/acre

Prediction Prompt:
"What pattern do you see? What might happen next year?"

Farm Equipment

Data Card 4: Market Prices

Corn Price per Bushel:
Last year: $5.80
This year: $4.40

Prediction Prompt:
"How should farmers respond to lower prices?"

Farm Equipment

Data Card 1: Rainfall
ANSWER KEY
Annual Rainfall: 8 inches
Well below Utah's average
Irrigation reservoirs are low
Prediction Prompt:
"How will low rainfall affect crop growth and water use?"

Expected Prediction:
Crop stress is likely
Lower yields than average
Heavy reliance on irrigation
Increased risk if water restrictions occur

Strong student reasoning sounds like:
"With only 8 inches of rainfall, crops won't get enough water naturally, so yields will probably decrease unless irrigation is carefully managed."

Farm Equipment

Data Card 2: Temperature Trend
ANSWER KEY
Summer Temperatures: 5°F above normal
More hot days
Higher evaporation rates
Prediction Prompt:
"How might higher temperatures change crop yields and water demand?"

Expected Prediction:
Faster crop growth, but...
Higher water demand
Increased heat stress
Possible yield reduction if water is limited

Strong student reasoning sounds like:
"Higher temperatures cause more evaporation, so crops need more water, which is a problem during dry years."

Farm Equipment

Data Card 3: Past Crop Yields
ANSWER KEY
Wheat Yield Trend (last 3 years):
Year 1: 62 bushels/acre
Year 2: 55 bushels/acre
Year 3: 50 bushels/acre
Prediction Prompt:
"What pattern do you see? What might happen next year?"

Expected Prediction:
Yields are consistently decreasing
Likely causes:
Drought, Heat, Soil stress
Next year's yield may continue to drop without changes
Strong student reasoning sounds like:
"Because yields have dropped every year, the trend suggests ongoing environmental stress, so yields may fall again unless conditions improve."

Farm Equipment

Data Card 4: Market Prices
ANSWER KEY
Corn Price per Bushel:
Last year: $5.80
This year: $4.40
Prediction Prompt:
"How should farmers respond to lower prices?"

Expected Prediction:
Lower profits, even if yields are good
Farmers may:
Store crops, Plant fewer acres,
Switch crops, Financial risk increases

Strong student reasoning sounds like:
"Even if crops grow well, lower prices mean farmers make less money, so they may need to change planting or selling strategies."

Farm Equipment

Robot Rules
Robot Rules:

- Walk in straight lines
- Turn left or turn right
- Pick up an item
- Drop an item
- Can ONLY do what it is told
- Stops if instructions are unclear

Programmer Rules

- Give short commands
- One command at a time
- No touching the robot
- No helping once it starts

Commands You Can Use

- “Move forward”
- “Turn left”
- “Turn right”
- “Pick”
- “Drop”
- “Stop”

How to Play

1. Look at the task card
2. Plan the steps together
3. Give commands to the robot
4. Finish the task as fast as you can

Task Cards: (One for each group)
Weed the field Plant the field
Harvest the field After the Activity
— Ask:

- Was the robot easy or hard to control?
- What happened when instructions weren’t clear?
- How is this like technology on farms today?

Farm Equipment

Task Card

Weed the Field

Farm Equipment

Task Card

Plant the Field

Farm Equipment

Task Card

Harvest the Field

Farm Equipment

Task Card

Farm Equipment

Farm Equipment

Farm Equipment

Farm Equipment

Farm Equipment

Farm Equipment

Farm Equipment

Farm Equipment

Barn Builders: Livestock Barns and Shelters

Kendall Burch and Hadley LaRose

A rainstorm rolled in, and Grandpa rushed Billy to check the barns. Billy saw how shelters protect animals from wind, rain, and heat.

“Animals need safe homes too,” Grandpa explained. Billy helped design improvements and imagined himself as a farm architect making cozy, dry spaces for animals.

Lesson Overview In these hands-on workshops, youth will step into the role of barn engineers by building model barns out of graham crackers, frosting, and candy. They will learn how barn design impacts animal safety, comfort, and health while applying STEM concepts like balance, stability, and ventilation. Through teamwork and creativity, participants will improve on a “broken barn” example and share how their designs better meet animals’ needs.

Barn Builders

Ice Breaker - Barn Scramble

Each participant will be assigned an animal (either by their instructor or from a card with the animal name on it). (cow, horse, sheep, goat, monkey, cat, dog,) There will be two of each animal. Without showing their card, kids will walk around making ONLY the sound of their assigned animal until they find the other person with the same animal. This fun activity helps everyone loosen up, be a little silly, and become more comfortable with each other.

Workshop 1 : Barn Building Challenge

Supplies:

- Grahm crackers and Frosting
- Marshmallows, pretzels, and other assorted candies
- A previously made barn that could use improvment
- Farm animals - either pictures or small plastic animals

Learn:

- Different animals need different living conditions (space, ventilation, safety)
- Barns often use tools and systems (like fans or feeders) to keep animals healthy
- Strong design prevents barns from collapsing or causing injuries
- Structures require balance, symmetry, and stability to stand
- Different animals need different types of shelter
- Barns must stay dry, strong, and well-ventilated
- Poor design can cause stress, injury, and sickness to the animal

Barns need good design—just like houses, bridges, or schools. Engineers think about strength, stability, and safety. Farmers also think about what animals need to stay healthy.

- “What makes a barn strong enough to stand up?”
- “How could we design it so animals don’t get hurt?”
- **“**What happens if we don’t give animals enough room or fresh air?”

Do:

In this activity, we are going to engineer a shelter for our animals. Instead of using wood, concrete and nails, we are going to simulate building with graham crackers, frosting, and other edible supplies. As we complete this activity, remember the following points:

- How can I make the walls stand strong?
- Where will the doors and fences go?
- How can I make this barn safer than the broken one we saw?”

Barn Builders

Barn Building Activity: Now you're the engineers! Use graham crackers, frosting, and candy to design a better barn. Here are your design parameters:

1. Show participants a picture or model of a barn with defects or problems.
2. Divide participants into teams of 2-3.
3. Ask them what problems they can see in the example barn. As they identify the problems, ask them what negative outcomes there could be from these issues (for example, a sagging roof could fall in on the animals; a door with a broken latch could fly open in a storm and let weather in or hit an animal).
4. To engineer a useful barn we will need to follow some design parameters. Design parameters are the specific characteristics or design pieces that must be included for a successful build. In our case, your barn will need the following parameters:
    - Before you begin your build, you will choose at least three farm animals out of a bag. These are the animals living in your barn. Each different type of animal must have a separate area to live in the barn.
    - Your barn must have a place to store each animal's food
    - Your barn must have a roof and walls to keep the animals safe and dry when needed.
    - Your barn structure must be able to stand on its own.
    - There must be a place outside of the barn for animals to spend some time.
5. After the teams are finished building, have each team share their barn. Review the design parameters. Did each team meet all of the requirements? If not, they may want a little time to add on to their structure.
6. Ask the youth what they liked about the activity. What did they find hard? Did they forget any of the design parameters? Was it easier or harder working with a team than it would have been to do it on their own?

While they build, walk around and ask:

- "What problem from the broken barn are you fixing in your design?"
- "How are you making your barn stronger?"
- "Where would you put each animal and why?"
- How does your barn keep animals safe and healthy?
- If you did this again, what would you change to make it even better?

Wrap-Up:

"Great job, barn engineers! Today you learned how barns are designed using science, technology, engineering, and math. A good barn isn't just about looking nice—it's about keeping animals safe and comfortable."

Barn Builders

Workshop 2: Sickness in the Barn
Lesson Overview: In this workshop, youth will investigate how barn design affects animal health by solving "sick animal" case studies. Working in groups, they'll analyze barn conditions, identify causes of illness, and design solutions to improve animal housing. Through problem-solving and discussion, participants will learn how proper shelter, space, and ventilation keep animals safe and healthy.
Supplies:

- Scenario cards with sick animals, pictures, and a description of its current barn conditions
- Chart paper or whiteboard for group notes/solutions

Learn: Youth will learn why barns are one of the most important parts of animal care, and why a pig's shelter needs are different from a lamb's, chicken's, or beef.
To keep animals healthy we need to make sure we know enough about their needs to keep them safe and healthy.

- Different animals need specific environments (temperature, air flow, bedding, space). Poor housing can lead to sickness.
- Farmers use tools (heaters, fans, waterers) to help maintain healthy barns.
- Barns are designed to prevent problems like drafts, dampness, or overcrowding.
- Barn size and space requirements are measured to ensure each animal has enough room.

Do:
In the previous workshop, you designed strong, safe barns. Now you're going to see what happens when barns are not designed well. In the next activity, you'll become livestock detectives.
Divide participants into small groups. Give each group a "Sick Animal Scenario Card." Each card explains:

- The animal's current barn setup (flooring, bedding, space, air circulation).
- The sickness or symptoms the animal has.

Groups must analyze the clues to figure out why their animal got sick.
They then brainstorm barn changes that could prevent this problem in the future (better ventilation, cleaner bedding, stronger walls, more space)

Barn Builders

Reflection:
Each group presents:
1. Which animal they had and what was wrong
2. Why the barn setup caused sickness
3. The solutions they designed to improve the barn
4. How these changes keep animals healthier long-term

Optional Challenge:
- Have groups sketch a new barn layout that fixes the issues.
- Use simple math (like square footage or number of stalls) to show how they improved the space.

Apply:
- Why is it important to know your animals' needs on a farm?
- Trade animals with another team. How would your design have been different if you had their animals? Would the animals have different needs? What advice would you give another group to prepare for their animals?

Suggested Snack:
Trail Mix
While eating their snack, discuss:
- How does Farm Equipment help the farm?
- How have tools evolved overtime to help farm production?

Barn Builders

Sick Animal Scenario Card 1

This barn is small, overcrowded, and doesn't look well-maintained. There are no proper fences or separation between the chickens and the open ground, and there is very little clean bedding. The air smells damp, and you notice a lot of dust floating around. The chickens seem weak, and some of them are hunched over, not moving around much.These chickens are starting to look sick. Their feathers are dull, and their eyes seem a little glassy. They aren't eating or drinking as much as they should be, and you can see some of them are even limping, which is unusual for chickens. A couple of them seem to have runny noses and are making soft coughing noises.

Barn Builders

Sick Animal Scenario Card 2

You walk into a barn and see a group of calves. They are all confined to small, metal pens. The barn is very dark, and there is a strong smell of urine and manure in the air. The pens are overcrowded, and the calves seem to have little room to move around. Some of them are lying down, but they look uncomfortable. A few are coughing, and some have runny noses. One calf seems to be limping and having trouble walking. The calves don't look energetic, and their fur is dull and dirty. They are not eating or drinking as much as they should.As you watch, you notice that the barn is not very clean, and the air is thick with dust and ammonia from the waste. There is no clean bedding in the pens, and the calves seem to be standing on hard, cold floors.

Barn Builders

Sick Animal Scenario Card 3

The barn floor has become very damp from heavy rain and poor drainage. The straw bedding is soaked, and the ewes and lambs have no dry place to lie down. After a few days, the farmer notices something unusual. Some lambs begin limping when they try to follow their mothers. A few ewes are lying down more than usual and seem unwilling to stand. When they do walk, they move slowly and look like they are in pain.

One lamb keeps holding its foot up and doesn't want to put weight on it. The farmer also notices a bad smell when checking their feet, and some of the hooves look swollen and sore. Because the animals are uncomfortable, they eat less and the lambs don't nurse as eagerly. Now the farmer has to figure out what's going on.

Barn Builders

Sick Animal Scenario Card 4

The area where your pigs live is very slick and your pigs keep getting hurt. There is no bedding for the pigs to sleep somewhere soft. It has not ever been cleaned and there is lots of bacteria on the wall, floor, and in the air. They are very cramped together with not much room to move around. They squeal a lot and always have wide eyes from the stress of how they are living. They are very dirty and their skin is dry and itchy.

Because the animals are so stressed and cramped together they don't eat as well as they need to and some of the farmers' animals are getting sick and dying. What could the farmer change about his barn to make the animals eat? How many animals should be in a pen together at a time? How can he make the barn more clean and safer for the animals?

Barn Builders

Sick Animal Scenario Card 5

The area where these goats are living is very crowded. They do not have room to walk. There are holes in the roofs and the ground is muddy. They are very stressed being this close together. There is little to no light. With the ground being muddy their hooves can have hoove rot or joint problems. The ground is also very hard which is also very hard on their hooves and joints. Being in such a crowded area they may have to fight for food or they could also be too stressed to eat. Their legs hurt and they don't stand as much, making them very sick. What could you do to get them to have healthier feet and joints? How can you tackle the overcrowding to relieve some of the stress on the goats? What could you do to fix the lighting and the roof?

Barn Builders

Sick Animal Scenario Card 6

The horses are living in a very muddy area with little protection from wind, rain, or snow. Their fencing is weak, and the lack of shelter has caused them to become sick, which has affected their appetite and overall health. The unstable, wet ground has led to joint discomfort and hoof problems, and mud buildup on their legs has created additional challenges. How could you reduce the muddy conditions? What types of shelter could you add to keep the horses dry and comfortable? What changes could help improve drainage so the horses don't have to walk through mud all the time, even during rainy weather?

Barn Builders

Sick Animal Scenario Card 1 Solution: The chickens are likely sick due to poor living conditions, including overcrowding, inadequate ventilation, and a lack of cleanliness. These factors can cause stress, respiratory infections, and parasite infestations, leading to symptoms like dull feathers, runny noses, coughing, and skin irritation. To fix this, the barn should be cleaned regularly, with fresh bedding provided, and ventilation improved to ensure fresh air. The chickens need more space to reduce stress and allow for natural behaviors. Additionally, ensuring access to clean water and food, treating for parasites, and monitoring for diseases are all necessary steps to help the chickens recover and stay healthy.

Sick Animal Scenario Card 2 Solution: To improve the health of the calves, the barn needs better ventilation to get rid of harmful gases like ammonia and provide fresh air. The overcrowding should be fixed by giving each calf more space to move around, which will reduce stress and help them stay healthy. The barn must be cleaned regularly to prevent bacteria and infections from building up, and soft bedding like straw should be provided to keep the calves comfortable and protect their joints. It's also important that the calves have constant access to clean water and nutritious food to stay strong. Finally, regular checkups with a veterinarian are necessary to catch any health issues early and prevent the spread of disease.

Sick Animal Scenario Card 3 Solution: The ewes and lambs are likely suffering from hoof rot, caused by the wet conditions in the barn, where the damp floor and soaked bedding soften their hooves, making them prone to bacterial and fungal infections. The swollen, sore hooves, bad smell, and limping are signs of this infection. The discomfort from the hooves is also causing the sheep to eat less and the lambs to nurse less. To fix this, the farmer should replace the wet bedding with dry straw, improve the barn's drainage to prevent further moisture buildup, and ensure the sheep have a clean, dry place to rest. The hooves should be cleaned and treated, possibly with antibiotics, and regular hoof care, including trimming, should be done to prevent future infections.

Barn Builders

Sick Animal Scenario Card 4 Solution: The farmer should improve the pigs' living conditions by making the barn safer, cleaner, and less crowded. The slick floors should be replaced or covered with non-slip flooring, and clean, dry bedding such as straw or wood shavings should be added so the pigs have a soft place to rest and do not get injured. The barn needs to be cleaned regularly by removing manure, disinfecting floors and walls, and improving ventilation to reduce bacteria and improve air quality. Fewer pigs should be kept in each pen so they have enough space to move, eat, and rest without stress or fighting. Providing proper space, cleanliness, fresh air, and comfortable bedding will reduce stress, prevent illness, improve skin health, and help the pigs feel safe, which will allow them to eat better, grow properly, and stay healthy.

Sick Animal Scenario Card 5 Solution: The best solution for the goats' living area is to improve space, footing, shelter, and lighting so they can move comfortably and stay healthy. The overcrowding should be reduced by placing fewer goats in each pen and providing enough space for them to walk, lie down, and reach food without fighting, which will lower stress and help them eat properly. The muddy, hard ground should be fixed by improving drainage and adding dry bedding such as straw, wood chips, or rubber mats to protect their hooves and joints and prevent hoof rot and joint problems. Regular hoof trimming and keeping the area dry will also help keep their feet healthy. The roof should be repaired to stop leaks and keep the goats dry, and proper lighting should be added, such as windows or safe barn lights, so the goats can see, feel calmer, and maintain normal activity. These changes will reduce stress, improve hoof and joint health, and help the goats stay active and healthy.

Sick Animal Scenario Card 6 Solution: The best solution for the horses' living area is to improve drainage, shelter, and footing so the horses can stay dry, healthy, and comfortable. The muddy ground should be fixed by improving drainage and adding gravel, sand, or crushed stone in high-traffic areas to reduce mud, even during rainy weather. Dry bedding or rubber mats should be added in resting areas so the horses have a clean, dry place to lie down and sleep. Stronger, well-built fencing should be installed to keep the horses safely contained. More shelter, such as a three-sided run-in shed or windbreaks, should be added to protect the horses from wind, rain, and snow, which will help prevent illness. Regular cleaning of mud from their legs and hooves, along with proper hoof care, will reduce pain and infection. These improvements will keep the horses cleaner, reduce joint and hoof problems, encourage them to eat, and help them regain a healthy body condition.

Pollination: Buzz and Bloom

Alex Hamby and Hadley LaRose

While watching bees in the garden, Billy thought they were just flying randomly — until Grandma explained pollination.

He learned bees are tiny delivery drivers moving pollen so plants can grow food. Billy imagined bees wearing backpacks and working like superheroes saving the farm.

Lesson Overview

This lesson introduces youth to pollination, the process of transferring pollen from the male part of a flower (stamen) to the female part (pistil), which allows plants to reproduce and form seeds and fruit. Students will explore how bees, butterflies, birds, bats, wind, and other pollinators help move pollen, and how bright colors, sweet smells, and nectar attract them to flowers. Youth will also discover why pollination is essential to our food system and ecosystems, and how they can support pollinators by planting flowers, protecting habitats, and reducing pesticide use.

Pollination: Buzz and Bloom

Ice Breaker - Pollinator Fact Swap
Instructions: On different pieces of paper write different pollinator facts, hand them out to everyone, after taking a second to read the fact, have them find someone they don't know and tell each other what they had learned from their piece of paper. Do this a couple times!
Learn at least 5 new facts about pollinators

Facts about pollination:

- Pollination is the transfer of pollen from the male part of a flower (stamen) to the female part (pistil)
- Pollination helps plants reproduce and form seeds and fruits
- Bees are one of the most important pollinators, but butterflies, birds, bats, and even wind can pollinate plants
- Bright colors and sweet smells attract pollinators to flowers
- Nectar inside flowers provides food for pollinators while they move pollen between plants
- Some plants rely on wind instead of animals to move pollen
- Cross-pollination (between different plants) increases genetic diversity and stronger plants
- Many foods we eat, like apples, almonds, and berries, depend on pollination
- Without pollinators, many ecosystems and food systems would struggle to survive
- Humans can help pollination by planting flowers, reducing pesticide use, and protecting pollinator habitats

Pollination: Buzz and Bloom

Workshop 1 : Pollination Collection

Supplies:
- Pipettes,Cups,Pipecleaners,Cottonballs, Water, Food coloring, Crushed chalk, Bowls

Learn:
Pollination is the process that makes it possible for plants to reproduce (make new plants). For flowering plants, pollination happens when pollen grains are transferred the anther of a flower to the stigma of a flower. Pollen can be transferred by wind, water, insects, or animals like bees and birds.
Pollination is important because this is how plants are fertilized. If they are not fertilized they will not produce seeds and fruit.
There are two types of pollination:

1. **Self-pollination:** Pollen moves within the same flower or to another flower on the same plant.
2. **Cross-pollination:** Pollen is transferred between different plants of the same species. Cross-pollination often helps to have healthier and more diverse plants.

There are also two types of pollinators:
1. **Biotic:** Biotic pollinators are animals such as bees, butterflies, bats, birds and beetles, which often pick up pollen while feeding on nectar.
2. **Abiotic:** Abiotic pollination is when pollen is transferred by wind or water. Wind pollination is common in grasses and conifers (trees and shrubs with cones).

Do: Have multiple stations so everyone can participate. Use different tools to demonstrate how different kinds of pollinators collect and spread pollen. Use the cups and make the flower petals to put on the outside of the cup. Put colored water in one cup and non-colored water in the other cup. Use pipettes in the colored water and then drop it in the non-colored water to simulate how butterflies/hummingbirds/bats collect and spread pollen.
On each table have 3 different colors of crushed chalk in cups, cup with pipecleaners, and cottonballs to dip in the chalk and use as visual representation of transferring to the pipe cleaners (flower)

- **Cottonballs -** mimics the fuzziness of bees that pick up the pollen
- **Pollen -** the chalk, used to reproduce plants and flowers
- **Water** - represents nectar that can be sucked from flowers
- **Pipettes -** mimics how butterflies collect nectar with their tongues

Pollination: Buzz and Bloom

Reflection Questions:

- **Can anyone give an example of how this pollinator could spread the pollen they collected?**

A pollinator spreads pollen when it moves from one flower to another. For example, a bee lands on a flower to drink nectar, and pollen sticks to its fuzzy body. When the bee flies to a different flower, some of that pollen rubs off onto the new flower, helping it make seeds.

- **How do different types of flowers impact how they are pollinated?**

Different flowers are shaped, colored, and scented to attract specific pollinators. Bright, sweet-smelling flowers often attract bees and butterflies, while long tube-shaped flowers are good for hummingbirds. Some flowers bloom at night and attract bats or moths instead.

- **What animals do you think pollinate plants in real life?**

Many animals pollinate plants, including bees, butterflies, moths, hummingbirds, bats, beetles, and even some flies. Bees are the most well-known pollinators, but all of these animals help move pollen.

- **What would happen if there were no pollinators— how would this affect people?**

Without pollinators, many plants would not be able to make fruits, seeds, or vegetables. This would mean less food for people and animals. Foods like apples, berries, nuts, and many vegetables would become rare or disappear, making food more expensive and harder to find.

- **How do pollinators help the ecosystem?**
- Pollinators help plants reproduce, which keeps ecosystems healthy. Plants provide food and shelter for animals, help clean the air, and prevent soil erosion. By helping plants grow, pollinators support entire food webs and keep nature balanced.

Pollination: Buzz and Bloom

Workshop 2 : Buzz Bot Pollination Robots

Supplies:

- Crushed Chalk
- CR2032 battery per youth
- Small vibrating motor per youth
- Toothbrush head (cut off the toothbrush before activtiy starts)
- 2 sided foam tape or sticky dots
- Masking tape

Learn: programming, pollination, tech/stem, how pollination works through the bristle bots– mimics how pollination works in real life
Do: Build bee robots:

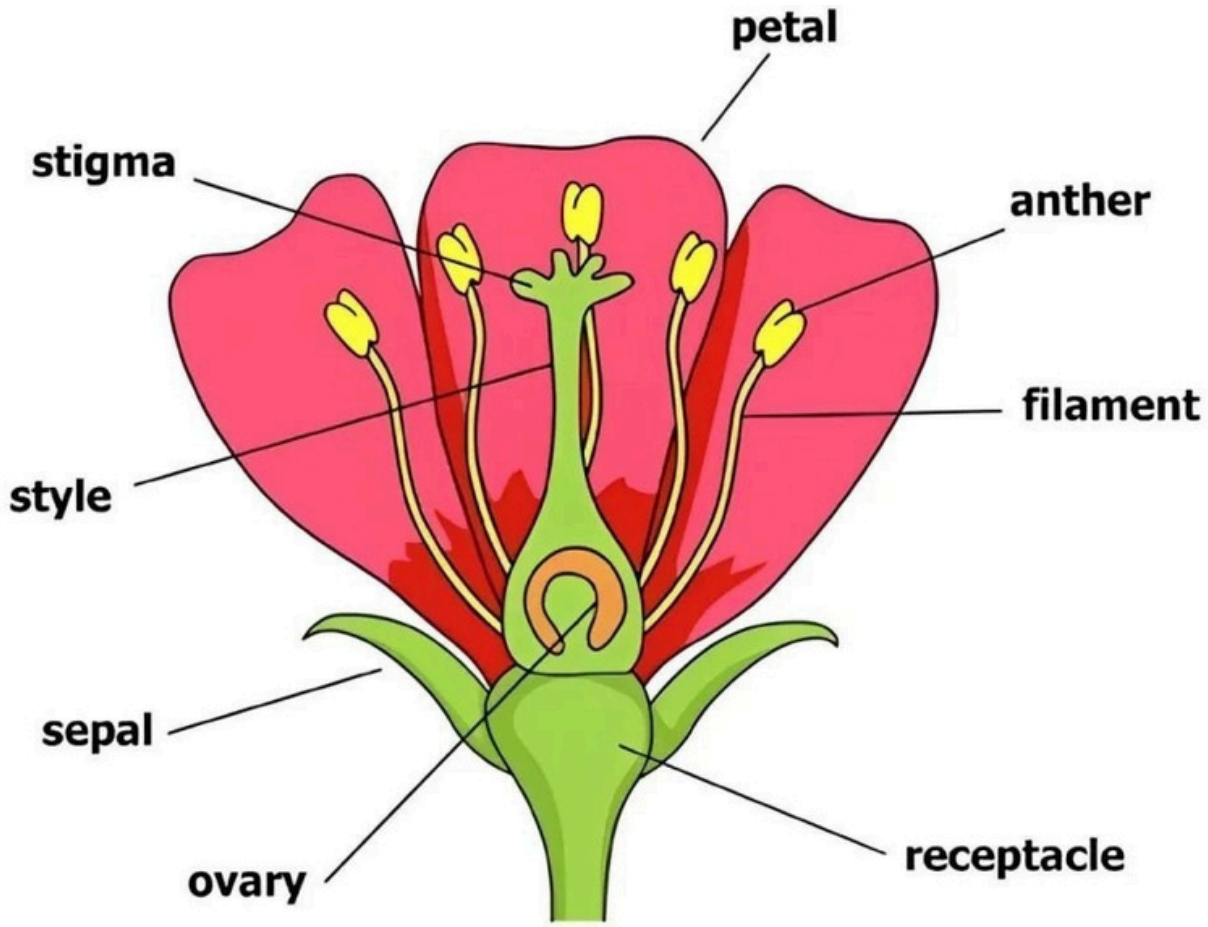
1. Tape the battery to the top (plastic side) of the toothbrush head.
2. With a piece of foam tape or sticky dot, glue the motor to the toothbrush head or battery. If metal is touching metal you may need to put a piece of tape between the motor and battery to insulate them from each other.
3. Attach the leads from the motor to the positive and negative side of the battery (if it does not start vibrating, you may have the leads touching the wrong side of the battery, or you may have created a short circuit by having the positive and negative lead touching each other.
4. On a sheet of paper draw a flower, (similar to the photo shown) and in the middle put a dusting of flour where the pollen would be. Pollen would be on the anthers, which are part of the stamen (the male part of the flower).
   Here's how to picture it for your drawing:

-
  - Draw the petals on the outside.
  - In the center, draw several thin stalks called filaments.
  - At the tip of each filament, draw a small oval or bump — that's the anther.
  - Filaments = the thin stalks in the center of the flower.
  - Anthers = the small oval shapes at the top of the filaments that hold pollen.
  - Together, filament + anther = stamen.
  - The pollen sits on the anthers, so that's where you should put a light dusting of flour.

5. Place the bot on top of the flour.

👉 Important: Don't put the flour on the petals or the very bottom of the flower. It should be on the tops of the stamens in the center.

Pollination: Buzz and Bloom



Pollination: Buzz and Bloom

Reflection Questions:

- **Does it collect the pollen?**

Yes, the bot collects the pollen. When the bot is placed on top of the flour, the flour sticks to it, just like pollen sticks to an insect's body when it lands on a flower.

- **How is this like an insect collecting pollen?**

This is like an insect collecting pollen because insects brush against the anthers while they move around the flower. The pollen clings to their legs or bodies and is carried with them when they fly to another flower.

- **Why do we want insects to take the pollen to the next flower?**

We want insects to take the pollen to the next flower because this allows pollination to happen. When pollen is transferred to another flower, it helps the plant make seeds and fruit. Without insects moving pollen between flowers, many plants would not be able to reproduce.

Apply:

- **Why are pollinators so important for the environment?**

Pollinators, like bees, butterflies, and even some birds, are important because they help plants reproduce by moving pollen from one flower to another. Without pollinators, many plants wouldn't be able to make seeds or fruit, which affects the food chain. Animals that eat those plants would have less food, and the whole ecosystem could be disrupted

- **How does this relate to how pollination works in real life?**

In real life, pollination happens when pollinators visit flowers to collect nectar or pollen. As they move around, pollen sticks to their bodies and is transferred to other flowers, allowing plants to produce seeds and fruit. Just like in your flour experiment with the bot, pollinators physically carry pollen from one flower to another.

- **What can we do to make sure pollinators can help our crops grow?**

We can help pollinators by planting flowers and crops that provide nectar and pollen, avoiding harmful pesticides, and protecting their habitats. Providing water sources, gardens with diverse plants, and places for pollinators to nest also helps them stay healthy and strong so they can continue pollinating our crops.

- **Where can you find pollinators around your home and neighborhood? Are there things you can do to help protect pollinators?**
-

Food, Feed, Fallow: Crop Rotation

Grandpa showed Billy different fields and explained why farmers rotate crops. Billy discovered plants use nutrients differently, and changing crops helps soil stay healthy.

“It’s like switching chores so nobody gets too tired,” Billy said — and Grandpa nodded proudly.

Lesson Overview
Participants will learn the importance of crop rotation and how it affects crop yields

You decide to start growing your own crops! Everything is going well and you are able to have fresh vegetables to eat with every meal. That is until you notice your vegetables aren't growing as fast or as abundantly as they used to. You let a couple more weeks go by and you realize you have to change something or else you won't have any food to eat in the upcoming winter! But what will you do?

Food, Feed, Fallow: Crop Rotation

Workshop 1: Crop Rotation
Supply List:

- Poly spots of 3 different colors
- Colored stickers (1 per youth)
- Tape (to separate the room into 3 sections)

Learn:
Different plants require different nutrients in order to grow. Growing the same crop in the same field or garden area for several years uses up the nutrients in the soil, and crops don't grow as well because they are not receiving the nutrition that they need. By rotating what is planted in each field, we can give the soil time to regenerate the nutrients that the plants were using before.
The Romans developed this system and called it "food, feed, fallow". They divided their fields into 3 sections. In one section, food crops such as wheat were planted; in the next section, livestock feed like oats was grown, and the last section was fallow, or empty, to allow the soil to recover. Plants may be rotated every growing season or every few years.
Crop rotation also helps to prevent pest and disease infestations. Many pests prefer to stay with one type of crop. When we repeatedly plant their crop of choice, we are providing them favorable conditions to thrive. When we rotate the crops we disrupt them and prevent them from establishing colonies. By rotating the crops, we take away their preferred host and cause a disruption in the annual life cycle of these pests or diseases.
https://greentumble.com/10-benefits-of-crop-rotation

Food, Feed, Fallow: Crop Rotation

Do/Reflect:

- Divide the youth into teams: tomato (red), onion (blue), or pea (green).
- Give them a color coded sticker to put on their shirt so that they don't forget what group they are in.
- Divide the room into 3 fields/sections with tape.
- Separate the youth into the 3 different fields by their plant group.
- Place blue red and green Poly spots or balls into all three fields (Peas will be collecting green, tomato red, onion blue)
- Everyone has to find their assigned nutrient in order to survive the round (year). Peas will be collecting green, tomato- red, onion- blue.
- Youth have to stay in their assigned plant group and field for the round. When the round starts the youth will have to run to get their assigned nutrient, if they are unable to find one they are dead/out.
- After the round take all the used nutrients away, then run another round
- Once most of the youth are out, stop the game and talk about why they are unable to survive

What have you noticed?
Is it frustrating to see all the nutrients in the other fields that you are unable to use?
How could we make it so more plants could survive?

- Then start the game over and introduce crop rotation. Once youth start getting out, tell them to rotate fields with another crop (example: peas go to the tomato field). This will show them that rotating your crops to a different field will give them access to nutrients that were previously depleted, and will increase the crop yield.

Apply:
How can you apply this to your garden at home?
Why is crop rotation important?
What would happen if farmers did not use crop rotation?

Break it Down! With Decomposers

Billy almost stepped on a worm and jumped three feet in the air. Grandma laughed and said, “That’s one of our hardest workers!”

He learned decomposers break down old plants and turn them into rich soil. Suddenly worms and fungi didn’t seem gross — they were nature’s recycling team.

Lesson Overview
Students will learn about how decomposers are essential to keep the ecosystem running.

Have you heard the news? The garbage man in your small community has gone on vacation, and nobody is picking up the trash this month! The pile of trash has begun to smell bad and you wonder what you can do to fix this issue. You don't want to live surrounded by trash and waste for the rest of the month. You know that the waste won't magically disappear so you have to find a solution.

Break it Down! With Decomposers

Workshop 1: Break it Down
Supply List:

- 1 red bandana, 2 or more green bandanas (depending on number of youth)

Learn:
Decomposers play a critical role in the flow of the ecosystem. They feed on dead things and turn them back into nutrients.
Decomposers take dead matter such as dead animals or dead leaves and break them down into nutrients, so they can be added back into the life cycle. The broken down nutrients are added into the soil, the soil then becomes rich with nutrients used to grow plants (producers). These producers help feed the consumers, and the consumers are eaten by secondary consumers. When any of these animals die they go back to be broken down by the decomposers.
Decomposers come in 4 different forms: fungi, elements, bacteria and creatures such as, snail, slug, mite, millipede, earthworms, potato bugs, and maggots.

https://education.nationalgeographic.org/resource/decomposers/
Do/Reflect:

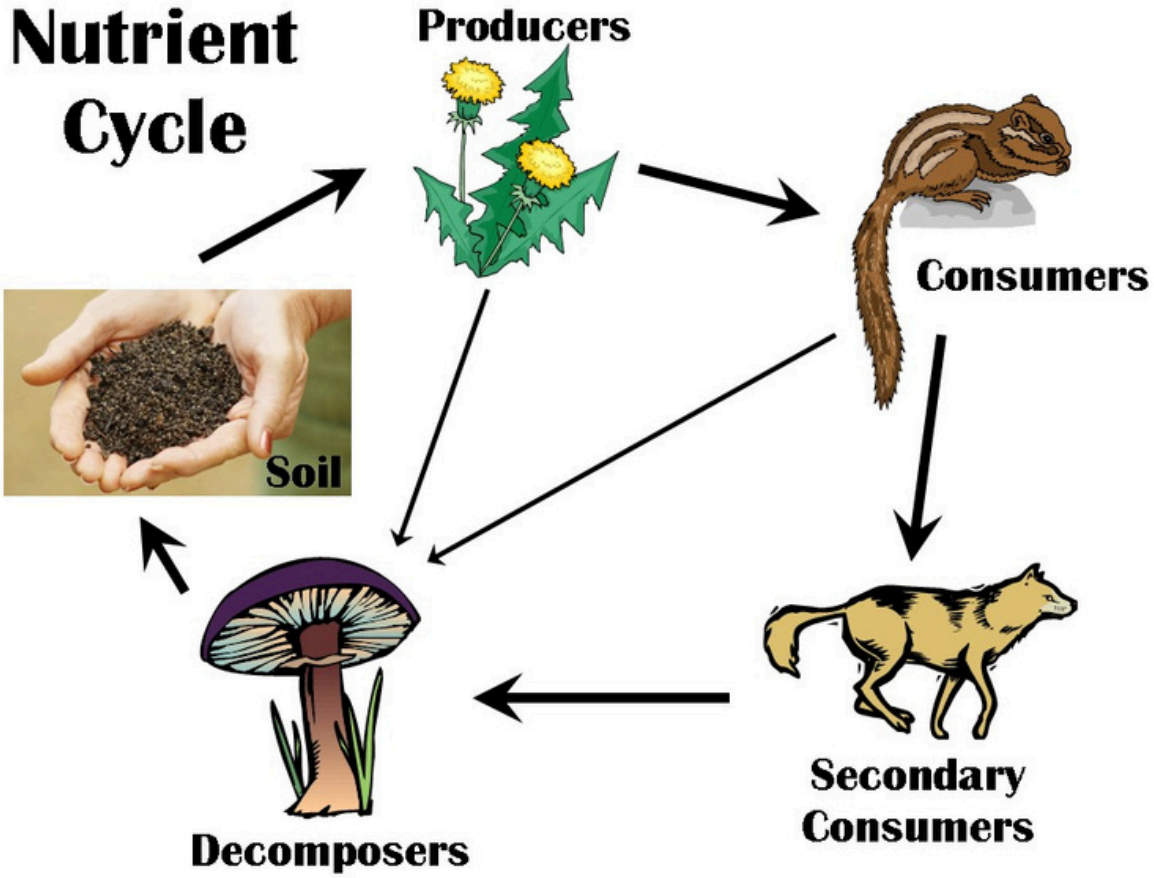
___ _____ __ __ _____ _____ _____

Modified freeze tag (may need to adjust numbers for group size)

- First round tell the youth they are going to be playing as animals or plants
- Choose one student to be death (the tagger) and give them a red bandana
- Once students are tagged they have to sit down because they are dead
- Once everyone is sitting/out stop the game
- Ask them if they think anything is wrong with the game (example: Why is everyone dead? How come no one is able to still move? Is this how the circle of life would happen in the real world?) What are we missing? Hint it's DECOMPOSERS
- Then assign 2 students to be the decomposers. They can tag back in the kids who are “dead” and they cannot be tagged by death.
- Give them green bandanas Let the kids play this game for a while, but stop it before they get bored.
- Notice how the game will have no end now that the decomposers are playing.

For extra fun have the youth act as the animal they have chosen to be while they play tag.
Reflection Questions:
How do decomposers keep the ecosystem running?
How can we use what we learned to help out our gardens at home?
Why is it important to know how our ecosystem functions?
What can you do to support/encourage decomposers to live in your garden?
What would happen to the world if all the decomposers disappeared?
What are some decomposers you have seen?

Break it Down! With Decomposers



Break it Down! With Decomposers

Code Your Garden

On Billy's last day, Grandpa asked him to plan a garden. Billy used everything he learned — pollination, crop rotation, soil health, and animal care.

He realized farming wasn't just work — it was science, creativity, and teamwork all together.

Lesson Overview
Students will learn about how decomposers are essential to keep the ecosystem running.

Have you heard the news? The garbage man in your small community has gone on vacation, and nobody is picking up the trash this month! The pile of trash has begun to smell bad and you wonder what you can do to fix this issue. You don't want to live surrounded by trash and waste for the rest of the month. You know that the waste won't magically disappear so you have to find a solution.

Code Your Garden

Workshop 1: Code Your Garden
Supply List:

- Paper towels
- Scissors
- Seeds

Learn:
When designing a garden, you need to design a garden plan that uses your space efficiently but gives the plants enough room to grow. One of the best ways to do this is by creating a paper towel garden. This type of gardening will help you to place seeds the proper distance apart for planting.

- Using paper towel squares, scissors, and common seeds, you will design a garden layout that will help your plants to grow.

This project is designed to provide hands-on experience with the four aspects of "computational thinking" and using variables and loops to design a plan. Computational Thinking is a thought process of solving a problem. You can take a complex problem and develop solutions. Computational thinking is often associated with computers and coding, but it is important to know that computational thinking can be used in many other areas including sewing and crafts.
There are four parts to computational thinking

- Pattern Recognition – analyze and look for repeating sequences
- Decomposition – break the problem down
- Abstraction – focus on important parts and remove unnecessary parts
- Algorithmic Thinking – use step by step directions

Other computing concepts you will be using are variables and repeating loops.
A variable is something that can be changed in your process or programming. In this activity, the thing that you will be changing is the type of seed you are using in your paper towel garden.
In computing, a repeating loop is something that you do over and over again. For this activity we will be using repeating loops to fold our paper towel into the squares we need for our paper towel garden.

Code Your Garden

Do/Reflect:

1. In your kit you have several packets of seeds. Identify your seed packets.

2. Once you have identified your seeds, you need to 1) choose what kinds of seeds you want to plant, and 2) find out how far apart your seeds need to be for the best growth (hint: read the back of the seed packet). For example, if they were in your kit, you might decide to plant black beans and green peas in your garden. These two seeds are your variables.

3. Do some research to find out that when your variable (or seeds) are black beans, they need to be planted about four inches apart, but when the variable is green peas, they only need to be planted 1-2 inches apart. You can choose your own variables(which seeds you want to plant)

4. Once you have decided your variables, measure your seeds on the larger paper towel in your kit. This towel is 12 inches by 12 inches. Using the instructions on the seed packet, determine how far apart you need to plant your seeds. You then need to measure your paper towel to mark off the amount of space you need between each seed.

5. Once you have measured the distance, fold your paper towel over and over again until you have folded squares that are the right size to keep your seeds the right distance apart. When you do the same step over and over, you are creating a computing loop. If you were telling a computer how to do this, you could put “fold in half” or “fold in thirds” and then tell it how many times to repeat the action. Try this with a friend. First calculate how many folds it will take to make squares the right size and then write instructions for your friend to follow. Example: Variable: Green Peas. Instructions: “Fold the paper towel square in half. Repeat X Times”

6. Once you have the right size of squares in your paper towel, use a glue stick to glue one of the seeds in the middle of each square. You can then plant your seeds by finding a location in your garden or a planter to lay your paper towel flat and bury it at the right depth listed on the packet. If you give it the right amount of water and sunlight, your paper towel garden should grow. Note: be sure to plant in the growing season for your area. If you do this activity during the winter, save your paper towel to plant in the spring.

7. Test another variable by repeating the process with a different kind of seed that needs more or less growing space. Repeat until you have the garden you want!

Code Your Garden

Reflection Questions:

- Was your experiment successful?
- Was your friend able to make the right size squares by following your instructions?
- How did you use the parts of Computational Thinking in this project?
- Discuss the following questions with a teacher, leader, parent, or friend.
  - How did you use Pattern Recognition to create your garden square?
  - Did you create a pattern to lay out your garden?
  - Did your pattern repeat?
  - Did making a loop make it easier to explain the process to a friend?
- Some of the variables (seeds) have similar planting distances, and some are very different.
  - Are there similar characteristics between seeds with similar planting distances?
  - Could you predict planting distances by seed size?
  - How did you use Abstraction to make this block?
  - Which were the most important parts of this process?
  - Were there any unnecessary parts to the process?
  - How did you use Algorithmic Thinking?
  - Did you use step-by-step directions?

Apply:

- What other places can you use computational thinking?
  - Could you use this in school? In creating rules for a game? In giving instructions for a friend to walk to your house?
- How is knowing and understanding the four steps to Computational Thinking helpful?
- In this experiment, the seeds were our variables. Where else could you use variables?
- What other activities use repeating loops? How can using loops make things simpler?
- There are paper towels of many sizes.. How could you adapt your algorithm to use this towel?
- Now that you have made your paper towel garden, can you get it to grow? If it is not growing season, you may need to put your paper towel garden in a cool, dry place until spring. You might also use a planter indoors if you can give your plant a lot of light. You can apply paper towel gardening to any type of seed.

Agriscience
TRY Team Curriculum

LittleBilly'sBigFarmAdventure - ANewFarm Kid

As Billy packed his boots into the back of the truck, he realized he wasn't the same kid who arrived at the farm just a few days earlier. What started as a visit had turned into a real adventure filled with discoveries, laughter, and learning. He had helped care for animals like a veterinarian, explored how horses evolved over millions of years, and discovered that flowers aren't just decorations — they are important parts of nature that help plants grow and reproduce. Billy learned that healthy grazing keeps land strong, barns keep animals safe, and even tiny bees and worms play huge roles in making farms work.

Billy also began to understand how everything on the farm is connected. Crop rotation keeps soil healthy, decomposers recycle nutrients back into the earth, and careful planning helps farmers grow food responsibly. He learned that farming uses science, technology, creativity, and teamwork every single day. The tractors and tools were not just machines — they were problem-solving helpers. The garden was not just rows of plants — it was a carefully designed system that depended on pollinators, soil health, and smart planning.

On the drive home, Billy started thinking about how he could use what he learned in his own life. He decided he wanted to plant a small garden at home and design it using the same planning skills Grandpa taught him. He wanted to pay more attention to animals and understand their needs better, maybe even volunteer to help care for pets or livestock someday. Billy realized he could make better choices about food by understanding where it comes from and how farmers work hard to produce it. Most importantly, he learned that being curious, asking questions, and trying new things can turn any experience into an adventure.

As he waved goodbye to the farm, Billy knew this wasn't the end — it was just the beginning. He had discovered that agriculture is full of science, creativity, and responsibility, and he couldn't wait to return as an even better helper, ready for the next big farm adventure.

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