Intro Video Reflection Q's:

1. *Is a human an animal? Why or why not?*

Yes humans are animals. Humans are animals due to our scientific classification (we are not rocks, plants, bacteria or otherwise…), and we can also consider the various things about humans that make us animals: we're able to move, we consume organic material (we get food from plants and animals, not the sun…), we're multicellular (meaning we're not a single celled organism), we breathe oxygen, and we reproduce sexually (as opposed to asexually).

2. *What adaptations do humans have? List at least 5.*

List could include: color vision and fairly large, forward-facing eyes; our ability to sweat; we are skilled endurance runners; we walk upright; we are "pack-living" (we need and benefit from our communities, we do not thrive when living alone); we have good teeth; melanin in our skin will darken based on our sun exposure to protect us from burns; we have extremely intelligent minds that have allowed us to develop speech, tools, farming, and technology.

3. *Make a list of as many different animal adaptations you can think of! Come up with at least 15! (*hint: the longer your list, the better off you will be for a game later in this lesson)*

List could include: wings, sharp teeth, sharp claws, fur, scales, feathers, gills, pouches for babies (marsupials), coloring (camouflage), stripes and spots, ability to change color (chameleons and octopi), "inborn behavior" (instinct), mimicry (think: stick bug), pack-living (wolves and elephants), whiskers, beak-shape (bald eagle beak vs. robin beak), body part size and shape (giraffe's long neck, monkey's dexterous feet and tail, etc.), ability to go without water, hibernation, ear size and direction, eye size and direction, sound (growls, hisses, chirps, etc.), webbed feet, hooves...

4. *What adaptations would an animal living near the summit of Mt. Hood need? Mt. Hood is an alpine environment, so it has extreme weather: sometimes snowy, stormy, and cold, other times very sunny with a high UV index (sunburn!); the vegetation is "scrubby" (low to the ground with tough leaves), and the slope of the ground can be quite steep!*

An animal would need fur to keep warm on cold days, and to shade itself on sunny days. It would need grinding teeth to break down tough organic material, or would need to be a predator capable of surviving off other small prey (mice, squirrels). This animal could benefit from hooves to climb on the steep incline.

Deer Ears Listening Exercise:

- "Due to deer coloring, they blend right into their surrounding environment, making them difficult to spot (what is the science-y way to describe this? … ***CAMOUFLAGE***)"

Unpacking the Mouse Skit:

1. *Could Mouse 1 just simply try really hard, eat all his vegetables, and grow bigger ears overnight? Why/why not?*

No. Adaptations do not happen overnight. When I go swimming in the lake in the summertime, I do not grow gills (no matter how badly I wish I could!). While it may seem like an animal can change in this way (rabbits changing their fur color from brown to white in the winter), this type of physical change is already embedded into that animal's genes. A full-grown mouse will have the ears it has--no growing will happen. **Adaptations do not happen overnight!**

2. *Explain how the mice species got bigger ears over the course of time.*

Adaptations like ear-size happen over the course of time because species **change is the result of reproduction**: the strongest animals have traits that have helped them survive and become strong, they are chosen by each other to reproduce, and they then pass those strong genetics onto their offspring. Think about male deer fighting with their antlers--this is done to prove dominance. They are showing off how strong their rack is so a female deer will choose to reproduce with them, and their deer baby will also have strong antlers.

3. *Mouse 4 heard the owl! Why didn't he survive?*

Having big ears is a trait that has allowed past generations of mice to survive by enabling them to hear predators approaching and run away to a safe hiding spot. So, over time as many generations of big-ear mice reproduce and pass on that big-ear trait, Mouse 4 was born and had big ears that were too big! He could hear the predators, but his gigantic ears got in the way of him running away to safety and he became bird food.

    a. Come up with a term to describe this process: *mouse 4 had an exaggerated trait, he didn't survive because of it, and therefore he won't pass that trait on to future mice generations.*

Answers could include: survival of the fittest, "law-of-the-jungle," natural law, natural selection, phylogeny, darwinism, evolution

4. *From this video, we learned that adaptations happen over the span of **generations**!!! What is a "generation" and how long is it?*
    a. *(*Hint: *How might your answer to "how long it is" change depending on the animal you're considering?)*

A "generation" is the group of animals living at about the same time, it is roughly the timeframe that it takes to reproduce. How long it is depends on the species we're thinking of.

b. Make your best estimate of a generational timeline for each of the following: Mice, Deer, Humans, Fruit fly, Bacteria. **E.g.** "New generations of **mice** are born every **__#__ seconds/minutes/hours/days/weeks/months/years**…"

New generations of mice are born every 4-7 weeks
New generations of deer are born approximately once every 1-2 years
New generations of humans are born every 15-20 years
New generations of fruit fly are born every 10-20 days
New generations of bacteria are born every 15-60 minutes

5. ***Super Thinker Bonus Question:*** Have you ever had strep throat or an ear infection and gotten medicine from your doctor to cure it? Did your doctor explain how important it is to take every single pill prescribed, *even if you start to feel better before you've finished them all?*
   Bacteria was causing the infection, and the pills you got were "antibiotics." As antibiotics work, they weaken and kill the bacteria causing the infection.
   Connect the dots between why it's important to finish all the antibiotics you're prescribed, and the generational timeline of a bacteria.

It's important to finish all the antibiotics because as it says above, "antibiotics ***weaken*** and kill the bacteria," so if there is a strong bacteria causing your infection you may start to feel better once it is weakened (but not killed!) and if you stop taking the antibiotics at that point, that bacteria can still reproduce (every 15-60 minutes!) and will pass on its strong genes. The next generation of bacteria could be so strong that it becomes resistant to antibiotic medication.

Behavioral vs. Physical Adaptations

Behavioral *list could include:* what an animal eats, how the animal moves, how the animal protects itself (fight or flight?), migration patterns, ability to change color (chameleons and octopi), "inborn behavior" (instinct), mimicry (think: stick bug), pack-living (wolves and elephants), hibernation, dormancy, sound (growls, hisses, chirps, etc.), ability to go without water...

Physical *list could include:* wings, sharp teeth, sharp claws, fur, scales, feathers, gills, pouches for babies (marsupials), coloring (camouflage), stripes and spots, whiskers, beak-shape (bald eagle beak vs. robin beak), body part size and shape (giraffe's long neck, monkey's dexterous feet and tail, etc.), ear size and direction, eye size and direction, webbed feet, hooves…

It's okay if I classified something as "behavioral" and you classified it as "physical," there is a lot of overlap!

Final Reflection Questions:

1. *Why do adaptations happen?*

Adaptations happen because when two animals reproduce, they both pass on their genes. Those genes tend to be stronger genes because weak animals tend not to live long enough to reproduce (they get eaten!)

2. *What adaptations of humans have allowed us to advance to the top of the food chain?*

Answers could vary. One example: Our behavioral adaptation of complex speech has allowed us to communicate widely--across barriers of physical space and time through recorded history. Due to our ability to record history and learn from the past we can continue advancing technology instead of "re-inventing the wheel" every generation.

3. *Who would win in a fight--a grizzly bear or a moose? Defend your answer.*

Answers could vary. One example: I think a moose would win because of the antlers. A moose could whip a bear with its antlers discouraging the bear from attacking again. A moose is also quite tall and has strong leg power so even if the bear stood up the moose could kick it in the chest.

4. *Which adaptations are best? Why?*

Answers could vary. One example: I think camouflage is the best adaptation because it allows animals to hide in plain sight. If you are a well-camouflaged animal it doesn't matter so much if you have sharp claws or teeth or other defense mechanisms because your predator won't even see you to begin with.