

Lesson Plan: A Day At the (Virtual) Zoo

By: Sammi Lambert

Target Grade: 1st grade

Teacher Prep Time: 1 hour

Lesson Time: 4 hours 15 minutes + any extended virtual zoo time for Part 0. (We recommend doing this lesson over 4 days, 1 part per day.)

- Optional Part 0: Extended Virtual Zoo Trip
 - Variable (Time spent is decided by teacher) – Exploring the Virtual Zoo
- Part 1: Animal Families
 - 20 min – Elephants
 - 20 min – Lions
 - 30 min – Penguins
 - 10 min – Using Evidence to Summarize our Findings
- Part 2: Plant Families
 - 5 min - Review
 - 43 min – Pine Trees
 - 7 min – Using Evidence to Summarize our Findings
- Part 3: Group Research
 - 5 min- Review
 - 35 min – Book and Video Research
 - 25 min – Poster Making
- Part 4: Talk with an Expert (Optional)
 - 5 min - Review
 - 40 min – Interview with a Scientist
 - 5 min - Group Discussion
- Part 5: Poster Session
 - 5 min - Review
 - 45 min – Poster Presentations

Where This Lesson Fits in:

This lesson requires substantial writing from students therefore, it should not be done at the beginning of the year. This lesson could be used as an introduction to your life science unit, to be followed by 1-LS1-1 and 1-LS1-2.

This standard is a complement to the 6th grade standard, MS-LS3-2. Here, students make observations to understand that young plants and animals are like, but not exactly like their parents, and learn the mechanism behind why this is true. Because of this, it is highly recommended that if your big buddy class is in 6th grade, they complete our SCSP lesson “Monster Mash,” before helping the 1st graders with this lesson, as it will reinforce the 6th grader’s’ understanding of the content.

Lesson Overview:

In this lesson, students will take a virtual trip to different zoos and make observations of the animals on live cameras. Students will then observe specific animal families to determine that young animals are like, but not exactly like their parents and find out the same holds true for plants. Students will extend their learning by researching a plant or animal in small groups, with the help of their “big buddies.” They will compile their research to create and present a poster to the classmates and their big buddies.

Learning Objectives:

- Students will make observations of animal and plant families and use their evidence to describe how young animals and plants are like, but not exactly like, their parents.
- Students will research multiple given sources to create and present a poster to communicate how a certain organism is like, but not exactly like, their parents, and how that organism changes over time.

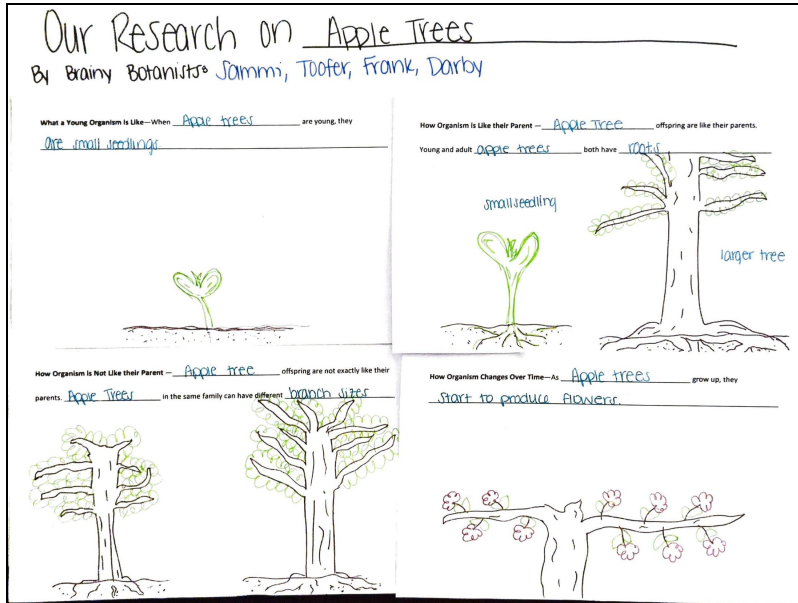
NGSS:

- **Performance Expectation**
 - 1-LS3-1: Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.
- **Science and Engineering Practice**
 - [#8](#) Obtaining, evaluating, and communicating information
 - Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.
 - Read grade-appropriate texts and/or use media to obtain scientific and/or technical information to determine patterns in and/or evidence about the natural and designed world(s).
 - Describe how specific images (e.g., a diagram showing how a machine works) support a scientific or engineering idea.
 - Communicate information or design ideas and/or solutions with others in oral and/or written forms using models, drawings, writing, or numbers that provide detail about scientific ideas, practices, and/or design ideas.
- **Disciplinary Core Idea**
 - LS3.A: Inheritance of Traits & LS3.B: Variation of Traits
 - Young organisms are very much, but not exactly, like their parents and also resemble other organisms of the same kind.
- **Cross Cutting Concept**
 - [#7](#) Stability and Change
 - In grades K-2, students observe some things stay the same while other things change, and things may change slowly or rapidly.
- **Common Core State Standard**
 - W.1.8 - Research to Build and Present Knowledge
 - With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.

Materials Needed (see start of lessons sequence for suggested students per group):

- 1 A Day at the (Virtual) Zoo Google Slides [presentation](#)
 - Zoo Live Cam [Links](#) - For San Diego, Smithsonian National, Houston, Bronx, Chester, Denver Zoos and the Monterey Bay Aquarium
- 1 copy of *The Life Cycle of A Pine Tree* by Linda Tagliaferro
 - This book is out of print. If you cannot get a copy from Amazon or your library, the pages are linked in the Slides presentation above.
- 1 A Day at the (Virtual) Zoo Student [Worksheet](#) (per student + 1 for the class worksheet)
- 1 Pine cone (per pair of students, if possible. Per 4 students should also be fine)
- 1 Our Research on __ poster template (per group)

- I used 18 in. x 12 in. paper



- 1 Poster [parts](#) (per group)
 - Cut these in half before handing out to students
- 1 Research [pages](#) (per group)
 - Cut these in half before handing out to students
- 1 size Poster paper (per group)
- 1 Glue (per group)
- 2 Example posters (one for plant groups and one for animal groups)
- 1 Research bank (per group) - This can be organized into a Drive folder, or the book can be given separately with page numbers marked. The materials listed below show an example of a Drive folder ([LINK](#)) set up for each group.
 - Tapir - [LINK](#)
 - [Book](#): *Facts About the Tapir* by Lisa Stratton
 - Pages 9, 13, 15, 19, 22
 - Video: [LINK](#) (Play from entire video)
 - Cheetah - [LINK](#)
 - [Book](#): *Amazing Facts About Baby Animals* by Maja Säfström
 - Pages 70-71
 - [Book](#): *Cheetahs* by Cyndy Unwin
 - Pages 24-27, 29-31
 - Video: [LINK](#) (Play from 0:00 - 1:22)
 - Gorilla - [LINK](#)
 - [Book](#): *Amazing Animals: Gorillas* by Kate Riggs
 - Pages 14-19
 - Video: [LINK](#) (Play from 0:00 - 1:40)
 - Flamingo - [LINK](#)
 - [Book](#): *Baby Flamingos* by Jenna Grodzicki
 - Pages 4-15, 18-21
 - Video: [LINK](#) (Play from 2:09 - 3:05 and 0:28 - 1:10)
 - Tang - [LINK](#)
 - [Book](#): *Tang Fish (Spot Ocean Animals)* by Mari Schuh
 - Pages 1-13 (whole book)
 - Video 1: [LINK](#) (Play from 2:10 - 3:29)

- Video 2: [LINK](#) (Play from 1:26 - 2:00)
 - Poison Dart Frog - [LINK](#)
 - [Book](#): *Amazing Facts About Baby Animals* by Maja Säfström
 - Pages 72-73
 - [Book](#): *Facts About the Poison Dart Frogs* by Lisa Strattin
 - Pages 8-9, 12-13, 15, 27
 - Video: [LINK](#) (Play from 2:34 - 3:09)
 - Tomato Plant - [LINK](#)
 - [Book](#): *Tomatoes Grow on a Vine* by Mari Schuh
 - Pages 4-17
 - Video: [LINK](#) (Play from 0:00 - 3:32)
 - Apple Tree - [LINK](#)
 - [Book](#): *Apples Grow on a Tree* by Mari Schuh
 - Pages 4-17
 - Video 1: [LINK](#) (Play from 2:20 - 3:42)
 - Video 2: [LINK](#) (Play from 0:00 - 1:22)
 - Camel - [LINK](#)
 - [Book](#): *Camels* by Curious Kids Press
 - Pages 3-4, 9-11
 - Video 1: [LINK](#) (Play from 0:51 - 3:07)
 - Video 2: [LINK](#) (Play full video)
- Document camera
- You will need to be able to display the slides or the zoo live cams at the same time you use the document camera to display the class worksheet.

Teacher Prep:

Part 1

- Make copies of the student worksheet.

Part 3

- Arrange for big buddies to come to the class and match buddies to students.
- Have the class divided into groups of four first grade students (there will be four buddies working with each group, as well).
- Print out the research pages and cut the page in half. Write the names of each student who will do each part. Have them separated by the students you want in each group.
 - The parts that may be easier, as they require less writing, are how organisms are like/not like their parents.
- Have the research materials for each group in an online folder that they can access.
- Print out and cut in half the poster parts. Have them paperclipped so that each group will get an entire stack.
- Have one example poster made for plants and animals so that big buddies will know how to glue the pieces onto the poster.

Part 4:

- Reach out to a local zoologist (highly recommended) or veterinarian who is willing to visit your classroom (in person or virtually) to be interviewed by your students. I highly recommend your local zoo, if possible!

Part 5:

- Arrange for big buddies to come to the class.

Lesson Sequence:

* For this activity, we recommend that students work in groups of 4 during Part 3.

Part 0: Extended Virtual Zoo Trip

Variable Time

Exploring the Virtual Zoo

- This is an optional extension of the activity in which you can flip through the different live cameras provided by the zoos on the Live Cam document (linked in the materials section).
- You can spend as much time as you'd like on this section, giving students time to make observations of the different animals and plants that are featured in the videos.
- The only animals you should NOT visit yet are the elephants, lions, and penguins.

Part 1: Animal Families

***Note:** I recommend completing this section in the morning, as that is when the animals are most active

20 minutes

Elephants

- Open the "A Day at the (Virtual) Zoo" slide deck and project it for students.
- Tell students, "Today we will be going on a virtual field trip to different zoos to make observations of some animal families. Scientists that study animals that are in the zoo are called zoologists. Therefore, today we will all be zoologists."
- Display slide 2 and tell students, "As we watch the animals, I would like you to make observations of the animals and their environment. As you make observations, I will record them on this slide for us to read again later. I would also like you to come up with some things you wonder about the animals and their environment. I will also write these into the slide."

What do we observe?	What do we wonder?
❖	❖

- Open the San Diego Zoo elephant live camera (linked in the speaker notes of slide 2 and [HERE](#)) and project it for the students.
- Give students ~3 minutes to watch the animals and then ask them for some observations and things they wonder. Continue until you have at least 5 observations and wonders. Let them continue to watch the camera for ~4 more minutes.
- Pass out the "A Day at the (Virtual) Zoo" student worksheet and project a class copy under the document camera or through your favorite writing app. This

class copy will be filled out under the document camera with students during the activity.

- Tell students, “You did a great job making observations and coming up with things you wonder about the elephants. We are now going to observe a specific elephant family.”
- Tell students, “A baby elephant is called a calf and we are going to fill out the table in question 1 for a calf and its mother.”
- Display slide 3 of the slide deck. Tell students, “The elephants in this picture are actually two elephants that live in the zoo that we were just observing!”

Ndula is Zuli's mom.
Zuli was born in 2018.
In this picture, Zuli is 2 days old! Now he is 3 years old.
When Zuli was born, he weighed 277 pounds.
Ndula weighs 6,400 pounds and is 21 years old.

- Read the text on the slide to the students and point out which elephant is Ndula and which is Zuli.
- Display slide 4 so the students can see a picture of Zuli more closely.

Ndula

Zuli

- Then, have students make comparisons about the calf and mom. On the front board write “Similarities” and “Differences (the calf)” and record student answers under these in one to three words. Make sure that for differences, you have students focus on what the calf has and the mom does not have.
 - Writing these on the board will allow students to see the slides, the class

worksheet, and their answers, which will serve as a word wall.

- ESR Similarities: Large ears, wrinkly skin, tails, trunks
- ESR Difference: is smaller, has no tusks, has black hairs
- Tell students, “On your worksheet, you will write one way the mother and calf are alike and draw that similarity onto both of the elephant outlines.” Model this for the students by asking them to pick one likeness from the board (ex: wrinkly skin) and drawing it onto both elephants. Tell students, “You do not have to pick wrinkly skin, you can pick any similarity.”
- Repeat this step for a difference between the two elephants (ex: has black hairs). Tell students, “For your difference you should choose something other than size because the size difference is already shown in the picture.”
- Tell students, “Now that you have drawn their similarities and differences on the elephants, you should write what you drew in the boxes below. Direct their attention to the box “How are mom and son alike?” Ask students, “What did I draw on my page that shows how the mom and son are alike?”
 - ESR: Wrinkly skin. Write this in the box on the class worksheet..
- Tell students, “If you did not choose to draw wrinkly skin, you can copy their similarity from the chart on the board.”
- Ask students, “How are the mom and son different? What did I draw on Zuli that I did not draw on Ndula?”
 - ESR: Black hairs. Write this in the sentence frame in the box in the class worksheet.
- Remind students that Zuli was born in 2018 and ask them, “Do you think Zuli still looks the same as he did when he was born.?” If they are having trouble, ask them, “Did you see an elephant that looked like Zuli when he was two day old in the zoo cameras?”
 - ESR: Zuli has probably grown up and does not look like he did when he was a calf.
- Display slide 5 and read the text to the students, making sure to point out that Zuli is older now than he was when the pictures were taken.

Zuli - 1 year old

Zuli - 2 days old

How has Zuli's appearance changed over time?

- Ask students, “How has Zuli’s appearance changed over time?” Lead students to understand the biggest changes in the first year was that Zuli lost his black hair and got bigger. But at one year, he still does not have tusks, which his mom does

have. Record the answer for question 2 in the class worksheet while students write it on their worksheet.

- Ask students, “Does Zuli look more like his mom at 2 days old or 1 year old?”
 - ESR: 1 year old.
- Ask students, “Does Zuli look exactly like his mom at 1 year old?”
 - ESR: No, he still looks different.

20
minutes

Lions

- Display slide 6 and tell students, “We will now get to visit a different animal! I would like you to make observations of the animals and their environment. As you make observations, I will record them on this slide for us to refer back to later. I would also like you to come up with some things you wonder about the animals and their environment. I will also write these into the slide.”

What do we observe?	What do we wonder?
❖	❖



- There are 3 potential live cameras for the lions, and you may want to visit all 3! I recommend checking out the Smithsonian Zoo live camera first, then rotating to the others, if needed. The live cameras are linked in the speaker notes of slide 5. Choose a live camera and project it for the students.
- Give students ~3 minutes to watch the animals and then ask them for some observations and things they wonder. Continue until you have at least 5 observations and wonders. Let them continue to watch the camera for ~4 more minutes, or switch to another camera, if needed.
- Tell students, “You did a great job making observations and coming up with things you wonder about the lions. You are now going to observe a specific lion family.”
- Direct students to page 2 of the worksheet and tell students, “A baby lion is called a cub. We will fill out the table in question 3 for a lion cub and its mother and father”
- Display slide 7 of the slide deck. Tell students, “The lions you see on the screen are actually the lion family in the Santa Barbara Zoo.”
 - **Note:** If you are local to Santa Barbara, your students may know these animals! See if they recognize their names before giving away their identities.

Felicia

Pauline

Ralph

Felicia and Ralph are Pauline's parents. Pauline was born in November 2020. Felicia is 3 years old and Ralph is 6 years old.

- Read the text on the slide to students and point out which lion is Felicia, Pauline, and Ralph.
- Move to slide 8 so students can see a picture of Pauline more closely.

Felicia

Pauline

Ralph

- Have students make comparisons about the cub and its mom and dad. On the front board write “Similarities (mom),” “Similarities (dad),” and “Differences (the cub)” and record student answers under these in one to three words. Make sure that for differences, you have students focus on what the cub has and the parents do not have.
 - Writing these on the board will allow students to see the slides, the class worksheet, and their answers, which will serve as a word wall.
 - ESR Similarities (mom): has fur, whiskers, shape of head
 - ESR Similarities (dad): has fur, whiskers, shape of nose
 - ESR Difference: is smaller, has darker hair, has no mane
- Tell students, “On your worksheet, you will write one way the parent lions and cub are alike and draw that similarity onto all of the lion outlines.” Make sure to point out which outline corresponds to each lion. Model this for the students by asking them to pick one likeness from the board (ex: tan fur) and drawing it onto

the lion outlines. If the similarity exists only between one parent and the cub, challenge the students to generate another similarity for the other parent and cub. Tell students, "You do not all have to pick tan fur, you can pick any similarity."

- Repeat this step for a difference between the lions (ex: has no mane). Tell students, "For your difference you should choose something other than size because the size difference is already shown in the picture."
- Tell students, "Now that you have drawn their similarities and differences, you should write what you drew in in the boxes below." Direct their attention to the box "How are the cub and parents alike?" Ask students, "What did I draw on my page that shows how Pauline and her parents are alike?"
 - ESR: Tan fur. Write this in the box on the class worksheet.
- Tell students, "If you did not choose to draw tan fur, you can copy your similarity from the chart on the board."
- Ask students, "How are the cub and her parents different? What did I draw on a parent that Pauline doesn't have, or what did I draw on Pauline that her parents don't have?"
 - ESR: Pauline has no mane. Write this in the box on the class worksheet.
- Help the students fill in the sentence frame for the difference in the parent (ex: the lion dad has a mane.)
- Remind students that Pauline was born in 2020 and ask them, "Do you think Pauline still looks the same as she did when she was born?"
 - ESR: No, Pauline has probably grown up.
- Display slide 9 and read the text to students, making sure to point out that Pauline is older now than she was when the pictures were taken.

Pauline - ~2 weeks old

Pauline - ~3 months old

How has Pauline's appearance changed over time?

- Ask students, "How has Pauline's appearance changed over time?" Lead students to understand that the biggest changes in the first three months were Pauline lost her spots, got lighter, and bigger. But at three months she is still not as light as her mother. Record an answer for question 4 in the class worksheet while students write in on their worksheet.
- Ask students, "Does Pauline look more like her parents at 2 weeks or 3 months old?"
 - ESR: 3 months old.

- Ask students, “Does Pauline look exactly like her parents at 3 months old?”
 - ESR: No, she still looks different.
 - Ask students, “Which parent does Pauline look more like, her mother or her father?”
 - ESR: Her mom.
 - Lead students in a discussion about Pauline and Felicia both not having manes, and that is because they are both female lions.

30
minutes

Penguins

- Display slide 10 and tell students, “We will now get to visit a different animal! I would like you to make observations of the animals and their environment. As you make observations, I will record them on this slide for us to refer back to later. I would also like you to come up with some things you wonder about the animals and their environment. I will also write these into the slide.”

What do we observe?	What do we wonder?
❖	❖



- Open the Monterey Bay Aquarium penguin live camera (linked in the speaker notes of slide 10 and [HERE](#)) and project it for the students.
 - **Note:** This live camera often has a speaker that will give penguin facts or indicate when feeding/cleaning are happening. Make sure to have your volume up as these are pretty exciting.
- Give students ~3 minutes to watch the animals and then ask them for some observations and things they wonder. Continue until you have at least 5 observations and wonders. Let them continue to watch the camera for ~4 more minutes.
- Tell students, “You did a great job making observations and coming up with things you wonder about the penguins. You are now going to observe a specific penguin family.”
- Direct students to page 3 of the worksheet and tell students “A baby penguin is called a chick. We will fill out the table in question 5 for the chick and its mother.”
- Display slide 11 of the slide deck. Tell students, “The penguins they see on the screen are located in a zoo in Ireland. This is the first baby penguin since 2013 to be born at this zoo!”
 - **Note:** As of June 2021, the baby penguin had not yet been named.



Monica is baby penguin's mom. This baby penguin was hatched in March 2021 in Dublin, Ireland, but doesn't have a name yet. Penguins are flightless birds that hatch from an egg when they are born.

- Read the text on the slide to students and point out which penguin is the mom and which is the chick. Have students make comparisons about the chick and its mom. On the front board write "Similarities," and "Differences (the chick)" and record student answers under these in one to three words. Make sure that for differences, you have students focus on what the chick has and the mom does not have.
 - Writing these on the board will allow students to see the slides, the class worksheet, and their answers which will serve as a word wall.
 - ESR Similarities: Beak, wings, feathers
 - ESR Difference: is smaller, has brown feathers, has fuzzy feathers
- Tell students, "On your worksheet you will write one way the mother penguin and chick are alike and draw that similarity onto both penguin outlines. Make sure to point out which outline corresponds to each penguin. Model this for the students by asking them to pick one likeness from the board (ex: beaks) and drawing it onto the penguin outlines. Tell students, "You do not have to pick beaks, you can pick any similarity."
- Repeat this step for a difference between the penguins (ex: baby penguin has fuzzy feathers). Tell students, "For your difference, you should choose something other than size because size difference is already shown in the picture."
- Tell students, "Now that you have drawn their similarities and differences, you should write what you drew in the boxes below." Direct their attention to the box "How are mom and chick alike?" Ask students, "What did I draw on my page that shows how the chick and his mom are alike?"
 - ESR: They both have beaks. Write this in the box on the class worksheet.
- Tell students, "If you did not choose to draw beaks, you can copy your similarity from the chart on the board."
- Ask students, "How are the chick and his mom different? What did I draw on the chick that his mom doesn't have?"
 - ESR: The baby chick has fuzzy feathers. Write this in the box on the class worksheet.
- Display slide 12 and read the text to students, making sure to point out that the chick is older now than he was when the pictures were taken.



- Ask students, “How has the chick’s appearance changed over time?” Lead students to understand that the biggest changes in the first 9 weeks were that the chick’s feathers are slightly different colors, but not yet as dark as the mother’s coloring.
 - **Note:** Baby Humboldt penguins have feathers that can range from black to gray to brown as babies. In these pictures, the lighting adds to the drastic change in color that you’re seeing.
- Ask students, “Does the chick look more like his mother at newly hatched or 5 or 10 weeks old?”
 - ESR: 10 weeks old
- Ask students, “Does the chick look exactly like his mother at _____ old?”
 - ESR: No, he still looks different.
- Tell students that we will now look at another penguin and read about his story. Pull out the book *How Lucky Got His Shoe*.
 - **Note:** If you are local to Santa Barbara, your students may be familiar with Lucky, as he is a Santa Barbara Zoo fan favorite. Make sure to pull from your students’ knowledge to first determine what they know about Lucky before reading the book.
- Read the book with the students, making sure to point out pages 3-8 that show drawings of Lucky with his parents.
- After reading the book, answer question 6 with the students.
- Tell students, “We will now watch a video about Lucky. Make sure to pay special attention to the parts when he is a young chick.” You may want to pause the video at these points to allow students to make observations of Lucky as a chick. The video is embedded in Slide 13.



- Ask the students, “Did Lucky’s parents have a foot condition?”
 - ESR: No.
- Point out that this is one way that Lucky was not like his parents.
- Open slide 14 and ask students, “How has Lucky’s appearance changed over time?” Make sure that students recap what they told you about the penguin from the Dublin zoo and record this for question 7 in the class worksheet while students write it on their worksheet.



10
minutes

Using Evidence to Summarize our Findings

- Tell students, “Now we have compared three animal families to themselves, we should compare all of the families together. For each of these families, we looked at either one or two of the parents and their offspring. Offspring is the general word for when any species has a baby ”
- Read question 8 (did every offspring have something in common with their parent?) to them and have students tell you what to circle and circle this in the class worksheet while they circle it on their worksheet.
- Ask students, “Can you give me an example of when an offspring was similar to

	<p>their parent? If students are having trouble, show students slides 3, 7, and 11. They can also look back on their worksheet.</p> <ul style="list-style-type: none"> ● Repeat the same process for question 9 about differences between parents and offspring. ● Tell students, “Let’s summarize our data to help us describe how young animals change over time.” Guide students in a discussion that leads them to the understanding that when animals are young, they look like, but not exactly like their parents, and fill this in for question 10 record this in the class worksheet while they copy it into their worksheet. ● Ask students, “For the animals we looked at, Zuli the elephant, Pauline the lion, and Lucky the penguin, did their appearance stay the same from when they were born or change after some time had passed?” <ul style="list-style-type: none"> ○ ESR: The animals’ appearance changed as they got older. Have students circle “changes” for the first part of question 11 while you do this in the class worksheet. ● Ask students, “As the animals, Zuli, Pauline, and Lucky, grew up, what did we observe about their appearance next to their parents’ appearance?” <ul style="list-style-type: none"> ○ ESR: They started to look more like their parents the older they got. ● Fill in for the rest of question 11 (Even when animals grow up, they look like, but not exactly like, their parents) in the class worksheet while students fill it in on their worksheet. . ● Ask students, “When animals are adults, does their appearance change a lot over time, or does it stay about the same?” <ul style="list-style-type: none"> ○ ESR: Stays about the same. Circle this for question 12. ○ Note: We do not make explicit observations of the adult animals in the slides. However, they should be able to recall from the live camera observations or from prior knowledge, that adult animals’ appearance does not change much once they reach adulthood. ● Collect the students’ worksheets to be passed out the next day.
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Part 2: Plant Families

<p>5 minutes</p>	<p>Review</p> <ul style="list-style-type: none"> ● Ask students, “What did we learn in the previous section?” You can have students discuss this in partners and then share out. By the end of the conversation make sure that students have told you that offspring are similar to their parents, but not exactly alike their parents. As offspring get older they look more like their parents. But, even adult animals of the same species do not look exactly alike.
<p>43 minutes</p>	<p>Pine Trees</p> <ul style="list-style-type: none"> ● Tell students, “Since last time we learned about animal families, this time we will learn about a plant family! Today we are going to make observations of plants. Scientists that make observations of plants are called botanists. Therefore, today we will all be botanists.” ● Have students stand near a window, or briefly go outside and have them observe the plants in a small area of your school. You do not need to write these down, this will just give them practice making observations of plants. ● Pass out the students’ worksheets. ● Tell students, “I am going to read you a book about pine trees’ life cycle called

The Life Cycle of a Pine Tree.

- If you do not have a copy of the book you can play the “Read Aloud - The Life Cycle of a Pine Tree” video for the students. Make sure to start this video at the 39 second mark. The video is embedded in slide 16.
- After page 14 (or the 2:41 mark in the video), pause and ask students, “Do the pine cones grow quickly after they sprout?”
 - ESR: No, it takes many years.
 - If they have trouble with this, reread page 14 (rewind the video to the 2:25 mark) and read the page again and reask the question.
- Turn the book to page 20 (rewind the video to the 3:29 mark) to show the *How Pine Trees Grow* page.
- Ask students, “Do you think plants are born?” Lead students to realize plants are born (question 13) and record this in the class worksheet while students do the same in their worksheet.
- Ask students, “What do plants start off as?” Lead students to realize that plants start off as seeds (question 14) and record this in the class worksheet while students do the same in their worksheet.
- Ask students, “What is used to keep pine tree seeds safe?”
 - ESR: Pine cones. Record this for question 15 in the class worksheet while students do the same in their worksheet.
- Ask students, “What is it called when a seed starts to grow?” Lead students to realize that this is called sprouting (question 16) and record this in the class worksheet while students do the same in their worksheet.
- Remind students that an offspring is a baby of a parent. Ask students, “What is the offspring of the pine tree called? Lead students to realize that it is called a seedling (question 17) and record this in the class worksheet while students do the same in their worksheet.
 - **Note:** A seedling is a general term to refer to any plant. A sapling is specific to trees, but do not use this term with the students as their plants in the next section can be broadly defined as seedlings.
- Display slide 27 of the slide deck and write “Pine Trees” on the front board. Have students make observations of the pine tree from either the slide or the book and record their observations on the board to create a word wall.

Pine trees produce seeds that are stored in pine cones. The pine cones protect the seeds until they are ready to **disperse** to try to grow new pine trees.



- Tell students, “You should pick one of the observations of a pine tree to record on your worksheet for question 18.” Show them how this is done in the class worksheet.
- Pass out pine cones (at least one per group, but if possible, one per pair would be better) to the students. Write “Pine Cones” on the board and have the students make observations of the pine cones and record their observations.
 - **Note:** Pine seeds are stored towards the center of the pine cone. As the pine cone dries out, it opens up and the seeds fall out. The wings on the seeds help them disperse through the wind. It may be difficult to see the seeds in your pine cones, depending on when you harvest them.
- Write “Pine Seeds” on the board. Point out the picture on the left of slide 15, and have students make observations of the pine seeds and record their observations on the board to create a word wall.
- Tell students, “You should now pick one of the observations of a pine seed to record on your worksheet for question 19.” Show them how this is done in the class worksheet.
- Tell students, “We will now watch one more video that shows a pine tree growing over time. “ Play the video on slide 15 for the students. Pause the video after a few seconds and point out that the time is shown in days on the left side of the video, and tell students, “We are watching the pine tree grow over a certain number of days.”
 - The video is embedded in slide 17.
- Allow the students to watch the video through 1 full time.
- Then, play the video again and pause it at the 0:06 (seed), 0:13 (sprouting), and 0:51 (seedling) mark to ask students, “What stage of the life cycle the tree is in?”
- Tell students, “ This video was taken over 128 days, which is just about 4 months.” If you have a calendar in your classroom, go over to the calendar and point out how long 4 months is to put it into perspective for the students. Additionally, relate the amount of time to some event that has happened, or will happen. For example, you can tell them the amount of days since winter break has passed to help contextualize the timing of the growing tree.
- Ask students, “Did the pine tree change over time?”
 - ESR: Yes. Circle this for question 20 on the class worksheet while students circle it on their worksheet.
- Ask students, “Do pine trees grow slowly or quickly over time?”
 - ESR: Slowly. Circle this for question 21 on the class worksheet while students circle it on their worksheet.
- Show students slide 18 that contains multiple of the same types of pine trees. Ask students, “Once a pine tree has become an adult, does it stay about the same in appearance, or does it change?” Lead students to realize that it takes a long time for a pine tree to become an adult, but once it does, it’s appearance does not change too much over time.



7
minutes

Using Evidence to Summarize our Findings

- Tell students, “Let’s summarize our data to help us describe how young plants change over time.” Guide students in a discussion that leads them to the understanding that when plants are seedling, they look **like**, but **not exactly like** their parents, and fill this in for question 22 on the class worksheet while students fill it in on their worksheet.
- Ask students, “Did the pine tree’s appearance stay the same from when it sprouted or did it change after some time had passed?”
 - ESR: The pine tree’s appearance changed as it got older/grew. Circle changed (question 23) on the class worksheet while students do the same.
- Ask students, “As the pine tree grew, what did we observe about its appearance as compared to an adult pine tree?”
 - ESR: The seedling started to look more like its parent as it got older.
- Fill in for the rest of question 23 (Even when plants grow up, they look **like**, but **not exactly like**, their parent plants).
- Ask students, “When plants are adults, does their appearance change a lot over time, or does it stay about the same?”
 - ESR: Stays about the same. Circle this for question 24.

Part 3: Group Research

Note: This portion of the lesson is meant to be completed by students in groups of 4, with the help of their big buddies (5th or 6th graders that can help them). If your school does not have a big buddy system, you can have 1 parent/aid come into the classroom per group to assist.

5
minutes

Review

- Tell students, “We have already learned a lot by investigating animals and plants, but in order to confirm our observations, we need to work together to investigate more plant and animal families. Today we will be working with our big buddies. Since they have not been here the last two sessions we need to explain to them what we have learned.” Have each student explain to their buddy what they have learned.

35
minutes

Book and Video Research

- Have students get into their groups.
- Tell students, “You will be randomly assigned an organism to investigate.” You can have them draw names out of a hat/bucket or use a generator. I recommend this one ([LINK](#)).
- As a group is assigned an organism, have their big buddies help them fill out their organism in the blank on page 5 of the student worksheet.
- Tell students, “Remember botanists are scientists who study plants, and zoologists are scientists who study animals. Using the species that you were assigned, figure out if you are a botanist or a zoologist and circle that on your worksheet.” Have students’ big buddies help them do this.
- Tell students, “You will be conducting research in your groups to learn about your assigned plant or animal. When you are conducting research as scientists, you can obtain data from many places. What are some of the ways we have obtained our data in the first parts of our lesson?”
 - ESR: Watching the live cameras at the zoo, reading books, and watching videos.
- Tell students, “Today we will get information from a “research bank” that contains multiple sources where you can learn about your organism. Each group will have pages from at least 1 book and at least 1 video. From your research, you will create a poster to present your findings to the rest of the class so we can compare our observations. Each first grade student will be in charge of completing one poster piece. The poster pieces include presenting on what the organism looks like when they are young, how the offspring is like their parents, how the offspring is different from their parents, and how the organism changes over time. You will find out what you will be in charge of when you get your research page.”
- Pass out a research page to each first grade student as well as give them access to their research banks. The research pages should be pre- labeled with their name to ensure that each student gets an appropriate part. Regardless of if your research banks are fully digital, your students will need access to computers/iPads/chromebooks, to watch the videos.
 - The research banks can be converted to fully digital, as seen in the example in the materials section, or you can allow the students to read the physical books. If you have the physical books, just make sure the appropriate pages are marked for the big buddies. Additionally, one book is required for multiple groups, so you may want to photocopy those pages for the students.
- Allow students to have at least 25 minutes to research their organism with their big buddies. The big buddies should write notes for the students on the research pages.
 - If there is one buddy per student, have them complete the research in pairs (one first grade student and one big buddy). If there is only 1 volunteer per group, have them complete the research as a group.

<p>25 minutes</p>	<p>Poster Making</p> <ul style="list-style-type: none"> ● Pass out the poster paper and poster parts packet to each group and hang the two example posters in the front of the classroom. ● Tell students, “Your buddies will now help fill out your portion of the posters so that you will be able to share your findings with the rest of the class and the other buddies. First grade students, you will fill out your section of the poster. Once you are done, a big buddy will glue the pieces onto the poster paper. In addition, a big buddy will fill in the blank of the poster template to indicate the organism your group investigated. Then, each first grade student will write their name next to their scientist title. If you need an example of what to do, you can look at the two posters at the front of the classroom. Once your group has created your poster, you should practice presenting it to your big buddies.” ● The buddies should make sure the students are drawing a picture that represents their poster piece, as well as fill in the sentence frame. Their big buddies can write the words they need to fill in the blanks on a separate piece of paper for the students to copy down, but the poster should be their own work. ● Make sure each piece describes the organism’s appearance. In addition, tell the big buddies whose partner is in charge of the “How Organism Changes Over Time” poster part, that for the animal organisms, they should get their partner to describe something other than the animal’s size changing. ● Once students have finished their part the big buddy should glue their piece to the poster paper and label the poster with the appropriate title. ● See the Example Student work for a completed poster.
	<p>Expert Prep</p> <ul style="list-style-type: none"> ● Tell students, “Next session we will have a scientist come and visit our class. You will be able to ask this scientist questions about your organism. First graders, you need to come up with a question to ask the scientist and tell it to your big buddy. Big buddies, you will write this question on the back side of the research page so that the first grader will not forget it.” ● Have each student tell their buddy their question and then write it down. Afterwards, the first grade students should share their questions with their group. ● Collect all the research papers and worksheets from each student to be passed out the next session.
<p>Part 4: Talk with an Expert (Optional) If the scientist would like, you can compile the questions and send them to them ahead of time.</p>	
<p>5 minutes</p>	<p>Review</p> <ul style="list-style-type: none"> ● Introduce the scientist to the class. ● Ask students, “Who can tell our visiting scientist what we have learned so far?” By the end of the discussion make sure that students have brought up the points that offspring are like but not exactly like their parents for both plants and animals. In addition, young offspring change with time to look more like their parents as they get older.

45 minutes	<p>Interview with a Scientist</p> <ul style="list-style-type: none"> ● Pass out the research pages to students. These pages have their question that they wanted to ask the expert on the back side. ● Have the scientist explain what they do and then answer student questions. ● After the presentation, have students get into their groups and discuss what they learned.
Part 4: Class Poster Session	
10 minutes	<p>Review</p> <ul style="list-style-type: none"> ● Pass out the poster to each group and have students sit in their groups. ● Tell students, “Because our buddies were not here last time, we need to explain to them what we learned from the expert scientist.” Have each student explain to their buddy what they learned from their interview. ● Tell students, “You will now get 5 minutes to practice your poster with your group before we start our presentations.”
45 minutes	<p>Poster Presentations</p> <ul style="list-style-type: none"> ● Have students present their posters, one by one, to the class. ● After each presentation, pause to allow the students to ask questions of the presenting group. The big buddies should also be invited to ask questions. ● Recap each poster by having the students in the audience tell you how the presenting group’s organism changed over time, and how the offspring was like, but not exactly like their parents. ● Tell students, “Thank you for your wonderful presentations. You helped me understand the similarities and differences between parents and offspring as well as how offspring change as they grow up..”

Example Student Work:

A Day at the (Virtual) Zoo!

Part 1: Animal Families



1. A baby elephant is called a calf. Fill out the table for the elephant calf and mom.

	Elephant Calf	Elephant Mom
How are mom and son alike?	Wrinkley skin	
How are mom and son different?	The calf has <u>black hairs</u>	The mom does not.

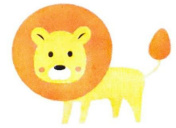
2. How has Zuli's appearance changed over time? Zuli has lost his black hairs as he got older.



3. A baby lion is called a cub. Fill out the table for the lion cub, mom, and dad.

	Lion Mom	Lion Dad
	Lion Cub	
How are the cub and parents alike?	Tan fur	
How are the cub and parents different?	The lion cub has <u>no mane</u>	The lion <u>dad</u> has <u>a mane</u>

4. How has Pauline's appearance changed over time? Pauline has lost some spots as she got older.



5. A penguin baby is called a chick. Fill out the table for the penguin chick and mom.

	Penguin Chick	Penguin Mom
How are mom and son alike?	Beaks	
How are mom and son different?	The chick has <u>Fuzzy feathers</u>	The mom does not.

6. Lucky is a special penguin. What was Lucky born with that made him so special? Lucky has a foot condition.

7. How has Lucky's appearance changed over time? Lucky has lost his fuzzy feathers as he got older.

For each animal family, elephant, lion, and penguin, we observed at least one parent and one child.



8. Did every child have something in common with their parent? Yes No (circle one)
9. Did every child have something different from their parent? Yes No (circle one)

10. Let's summarize our data to compare the appearance of kids to their parents. When animals are born, they look like, but not exactly like their parents.

11. Let's summarize our data to compare how animals' appearances change over time. As animals grow up, their appearance changes / stays the same. Even when animals grow up, they look like, but not exactly like their parents.

12. When animals are adults, their appearance changes a lot / stays about the same.

Part 2: Plant Families

13. Plants start as seeds.

14. Are plants born? Yes No (circle one)



15. We often call plant birth sprouting.

16. The seeds from pine trees are kept safe in pine cones.

17. What is the child of the pine tree called? seedling

18. Use a word from the word wall to describe the pine tree. tall

19. Use a word from the word wall to describe the seedling. short

20. Do pine trees change over time? Yes No (circle one)

21. Pine trees grow slowly / quickly over time.

22. Let's summarize our data to compare the appearance of seedlings to adult plants. When plants are

seedlings, they look live, but not exactly
live the plants from which they came (their parent plants).

23. Let's summarize our data to compare how plants' appearances change over time. As plants grow over a period of time, their appearance changes / stays the same. Even when plants grow up,

they look like, but not exactly
like their parent plants.

24. When plants are adults, their appearance changes a lot / stays about the same
(circle one)

Part 3: Class Investigation

As a class, let's investigate different plants and animals to see if all plant and animal families look like, but not exactly like each other. You and three classmates will team up to investigate one plant or animal.

Botanists are scientists who study plants. **Zoologists** are scientists who study animals.

Our team will be studying tapiirs.

We are Zappy Zoologists / Brainy Botanists
(circle one)

Your teacher will give your group a set of resources you can use to collect evidence on your organism. You will use your evidence to make a poster to teach the rest of the class about your organism's family!

Each teammate will be in charge of writing and drawing a piece of the poster.

Poster Pieces: Circle the piece of the poster you are in charge of.

What a Young Organism is Like

How Organism is Like their Parent

How Organism Changes Over Time

How Organism is Not Like their Parent

5

Name: Frank

Poster Part: How Organism is Not Like their Parent

Use your research bank to find information and make observations about how your organism is not like their parents. Your big buddy can write notes for you here to help you make your poster part tomorrow.

Each apple tree looks different in size and shape
They produce different numbers of apples

Name: Sammi

Poster Part: How Organism Changes Over Time

Use your research bank to find information and make observations about how your organism changes over time. Your big buddy can write notes for you here to help you make your poster part tomorrow.

Seeds are stored in apples
Apple trees produce flowers
When bees pollinate the flowers, they turn into seeds
Then an apple grows.
In winter, apple trees lose their leaves

Name: Darby

Poster Part: How Organism is Like their Parent

Use your research bank to find information and make observations about how your organism is like their parents. Your big buddy can write notes for you here to help you make your poster part tomorrow.

Young and adult apple trees have: -roots
-leaves
-branches

Name: Toofer

Poster Part: What a Young Organism is Like


Use your research bank to find information and make observations about what your organism is like when they are young. Your big buddy can write notes for you here to help you make your poster part tomorrow.

Apple trees grow from small, black seeds
Young apple tree seedlings have green leaves

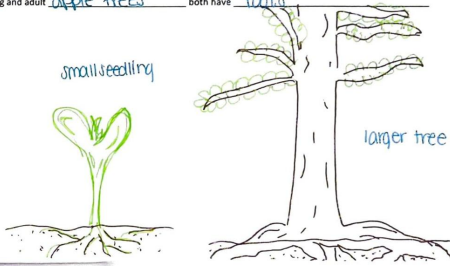
Our Research on Apple Trees

By Brainy Botanists: Sammi, Toofer, Frank, Darby

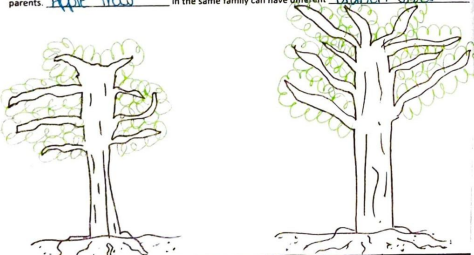
What a Young Organism is Like—When Apple trees are young, they are small seedlings.



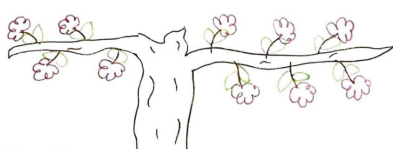
How Organism is Like their Parent—Apple tree offspring are like their parents. Young and adult apple trees both have roots.



How Organism is Not Like their Parent—Apple tree offspring are not exactly like their parents. Apple trees in the same family can have different branch sizes.



How Organism Changes Over Time—As Apple trees grow up, they start to produce flowers.



Content Notes for Teachers:

- An elephant's gestation period is 22 months.
- Elephant calves are covered in black hairs when they are born, but reduce over time as they age. Their hairs aid in cooling down their bodies.
- Elephant calves begin learning how to use their trunks to eat and drink at ~6-8 months. Until then, they do not have much control over their trunk. However, they can use it to suck on, much like a baby would suck on their thumb.
- A lion's gestation period is about 110 days, or ~3.5 months
- The spots on lion cubs are to help camouflage them from predators, but these fade over time as they learn to defend themselves and hunt for their food.
- A penguin's incubation period is about 40 days.
- Baby penguins' down feathers are meant to help keep their bodies warm, but they must still be

protected by the warmth of their parents as their own feathers are not thick enough. Their down feathers are also not waterproof, so they cannot swim, and their parents must take turns staying with the baby to keep them safe while the other hunts and brings back food. As baby penguins age, they lose *some of* their down feathers, to be replaced by thicker feathers that allow for better insulation in and out of water and allow them to survive independently of their parents. They retain some down feathers as these help to also insulate their body, but also help them swim! The down feathers the penguins retain are trapped beneath their layers of thicker feathers, but they serve an important purpose of trapping air bubbles that allow a penguin to float, or swim through the water quickly.

- Young plants can be generally referred to as “seedlings,” which is what we use in the lesson. Young trees can be referred to more specifically as “saplings,” but to lower the cognitive load and refrain from unnecessary added vocabulary, we suggest using “seedlings” in this lesson.