Exhibition Hub

Dinos Alive! The Immersive Experience

Educator Guide for Grades K-12

About the Experience:

Transport your students to the Triassic and beyond with an educational field trip to *Dinos Alive! The Immersive Experience.* Students will experience over 80 animated life size recreations of some of the largest land animals to have ever set foot on our planet.

Students will draw connections between the exhibition and the classroom as they synthesize the facts and amazing stories behind the discoveries of some of the world's most famous dinosaur species. Looking closely and making observations about these animals and their habitats, students will think like biologists, geographers, historians, and paleontologists to discover evolutionary connections spanning from millions of years ago to today.

After the Jurassic journey through the dino galleries, ignite students' critical thinking skills as they make discoveries in the dig pits. Finally, let their creativity soar as they use what they've learned to add color, texture, and detail to various dinosaur species and watch their creations come to life on screen!

Give your students an immersive experience that will leave them in awe, enhance their curiosity, and introduce them to STEAM fields like paleontology, archaeology, exhibition design, media technology, and more.

How to Book the Experience:

Contact Jennifer at JDC Group Marketing at Jen@JDCgroupmarketing.com or 619-363-5330 to Book a School Field Trip at a Discount price.

How to use this guide:

This Educator Guide is arranged by grade band (K-5, 6-8, and 9-12) and contains activities and resources for each grade band for Before, During, and After Your Visit to *Dinos Alive! The Immersive Experience.* All activities and resources are aligned with educational standards. Educators are encouraged to use any or all of the activities and resources at any time throughout the school year or in conjunction with a visit to *Dinos Alive! The Immersive Experience.*

Prehistoric Timeline:

Paleozoic Era: Means 'ancient life.' Lasted from 541-252 million years ago.
Permian Period: Last period of the Paleozoic Era. It lasted from 299 to 251 million years ago.
Mesozoic Era: Means 'middle life.' Lasted from 252-66 million years ago.
Triassic Period: The earliest period of the Mesozoic Era. Sometimes called the 'Age of Reptiles.' Lasted from 251.9 to 201.3 million years ago.
Jurassic Period: The middle period of the Mesozoic Era. Lasted from 201.3 to 145 million years ago.
Cretaceous Period: The last period of the Mesozoic Era. Ended with the extinction of the dinosaurs. Lasted from 145 to 65.5 million years ago.

Grades K-5

K-5 Glossary

Biped: an animal that walks on two legs.

Carnivore: an animal that only eats meat.

Collections: groups of things that are organized in a certain way. Museums can have *collections* of fossils.

Dinosaurs: reptiles that lived on Earth millions of years ago and are now extinct, or are no longer alive.

Exhibition: a collection of objects related to a certain topic or theme in a museum or other learning space.

Extinct: when none of a particular type of animal is left alive.

Fossils: traces or remains of ancient plants or animals that have been buried for a very long time.

Gallery: a room or space in a museum.

Herbivore: an animal that only eats plants.

In the field: when paleontologists or other scientists work out in nature, instead of in a lab or a museum, they are working *in the field*.

Mammal: an animal like a dog, cat, or human that has warm blood, is born live, and is usually covered with fur or hair.

Model: a recreation of an object that shows what the real thing might have looked like.

Museum: a building that holds collections of things found in nature or created by people where visitors can come to learn.

Omnivore: an animal that eats both plants and meat.

Paleontologist: a scientist who studies the ancient past.

Predator: an animal that eats other animals.

Prehistoric: time before humans existed and before humans recorded history through writing.

Prey: an animal that gets eaten by other animals.

Quadruped: an animal that walks on four legs.

Reptile: an animal like a snake (or a dinosaur!) that has cold blood, lays eggs, and is usually covered with scales or hard parts.

Research: to study, read, and ask questions to find answers about something. For example, you can use a library or the internet to research a dinosaur to learn more about them.

Simile: a way of describing something by comparing it to something else using 'like' or 'as', usually in an interesting or imaginative way.

Sketch: to make a quick, simple drawing.

Before Your Visit:

The following activities will help engage and prepare your students for a visit to *Dinos Alive! The Immersive Experience*.

What We Know

Curriculum Connections: English/Language Arts, Science

Before diving into the content, find out what your students know about these **prehistoric** beasts! Start the conversation with the following questions and prompts:

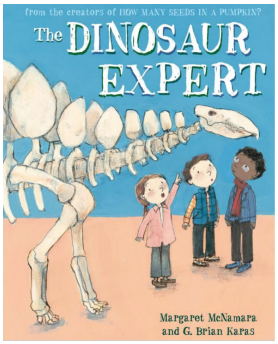
- What do you know about **dinosaurs**?
- What's your favorite dinosaur or dinosaur fact?
- When did the dinosaurs live?

- What do you think dinosaurs looked and sounded like?
- What else do you want to know about dinosaurs?

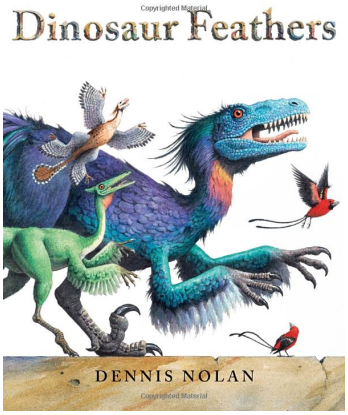
Read to Learn

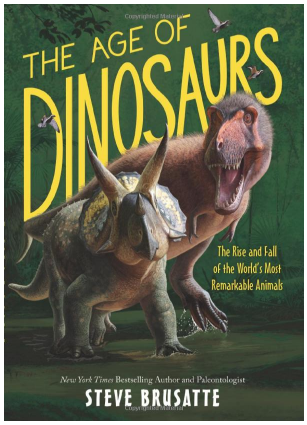
Curriculum Connections: English/Language Arts, Science

For K-2nd graders, read The Dinosaur Expert by Margaret McNamara and G. Brian Karas. This book is a fictional story about a dinosaur-loving girl who visits a **museum** with her class to learn all about dinosaurs and the scientists who discovered them. Also try National Geographic's Little Kids First Big Book of Dinosaurs by Catherine D. Hughes.



For 3rd-5th graders connect the past to the present with Dinosaur Feathers by Dennis Nolan. Or try The Age of Dinosaurs: The Rise and Fall of the World's Most Remarkable Animals by Steve Brusatte.





Use the following questions and prompts after reading:

- What did you learn about dinosaurs that you didn't already know?
- What questions do you still have?
- What places or settings do you remember from these stories?
- Why do you think learning about dinosaurs is important?

STEAM Career Connection: Paleontologist

Curriculum Connections: Science, Map & Globe Skills: Social Studies, Visual Art, English Language Arts

Do you love learning about dinosaurs and other prehistoric creatures? Do you like being outside, exploring nature, or collecting rocks and other natural objects?

You might want to be a **paleontologist**! Paleontologists are scientists who **research** or study the ancient past … think before your parents, grandparents, great-great-great-great-great grandparents … before any humans at all lived on Earth!

Paleontologists dig for **fossils**, or traces of ancient plants or animals that got buried for a very long time, to get clues about life on Earth hundreds of millions of years ago. Paleontologists can work **in the field** or in a museum studying **collections** and helping visitors learn about ancient life on Earth!

Check out this video for an animated explanation of how some fossils are formed:
WHAT'S A FOSSIL?

And check out this short video to see paleontologists in action:
Studio K Away: Digging for Dinosaurs in Alberta | CBC Kids

During Your Visit:

The following activities will help your students engage and practice their observational, conversational, and critical thinking skills during a visit to *Dinos Alive! The Immersive Experience*.

Unless otherwise stated, these prompts can be used with any display in the **exhibition**. Find a room or **gallery** large enough to accommodate your class or group and gather around, so that everyone can see. Challenge students to take 10 seconds of quiet looking at each of the dinosaur **models** in the new gallery. Invite students to let their eyes wander over all of the models, taking in as many details as possible. If any hands go up before the 10 seconds are over, encourage students to wait to share.

Prehistoric Play

Curriculum Connections: English Language Arts, Science, Social Emotional Learning

After quietly looking for 10 seconds, ask students to become one of the creatures in the gallery! Allow students to take turns acting out one of the creatures in the gallery and let their classmates guess which one they are!

- Can you copy this creature's shape with your body? Is this dinosaur a **biped** or a **quadruped**?
- How might this creature move?
- What might this creature sound like?
- How might this creature look when it's eating?

Students can ask clarifying questions like the ones below to help them guess correctly.

- Is this a **predator** or **prey**?
- Is your creature a **reptile** or a **mammal**?
- Is this creature an **herbivore, omnivore,** or **carnivore**?

Creative Comparisons

Curriculum Connections: Math, Science, Visual Art, English Language Arts

After quietly looking, invite students to begin visually analyzing and comparing the dinosaurs with more familiar creatures.

Begin the analysis with the following prompts:

- What other animals or creatures does this dinosaur remind you of?
- What do you see that makes you say that?
- What shapes do you see in this dinosaur?
- What features or textures do you see on this dinosaur?

For extra support, zoom in on different features of the dinosaur you are observing. For example:

- Look closely at this dinosaur's skin. What other animals that you know of have skin like this dinosaur?
- Look closely at this dinosaur's teeth. What other animals that you know of have teeth like this dinosaur? **Paleozoic Era:** Means 'ancient life.' Lasted from 541-252 million years ago.
- **Permian Period:** Last period of the Paleozoic Era. It lasted from 299 to 251 million years ago.
- **Mesozoic Era:** Means 'middle life.' Lasted from 252-66 million years ago.
- **Triassic Period:** The earliest period of the Mesozoic Era. Sometimes called the 'Age of Reptiles.' Lasted from 251.9 to 201.3 million years ago.
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Extension: For an extra challenge for students in grades 3-5, encourage students to compare the dinosaur's features to animal or non-animal objects using **simile**:

- This dinosaur is as big as a _____.
- This dinosaur is as scary as a _____.
- This dinosaur has teeth like _____.
- _____.

After Your Visit:

The following activities will keep the engagement and learning going after a visit to *Dinos Alive! The Immersive Experience*.

Reflect and Connect

Curriculum Connections: English Language Arts, Science, Social Emotional Learning

To wrap up the experience, invite students to write or **sketch** an answer to the following prompts:

- My favorite part of the *Dinos Alive!* experience was _____.
- I want to learn more about _____.

Encourage students to share their answers with a partner or small group. Did you have the same answers? Different? Connect with your peers as you reflect on the experience.

Once There Was a Dinosaur …

Curriculum Connections: Science, English Language Arts

Sharpen your scientific observation skills and strengthen your creative storytelling muscles.

For students in grades K-2, invite students to write a collective story together. Teachers may write the following prompts out on a whiteboard or smartboard and fill in with student ideas. Try this exercise more than once with different goals! Challenge your students to remember facts about specific dinosaurs from the *Dinos Alive!* exhibition or have fun and make a silly make-believe story about ancient creatures!

- Once there was a (type of dinosaur).
- Their name was _____.
- They were the size of a (_____).
- They had (dinosaur's features: skin, claws, legs, teeth, wings, etc.).
- They loved to (how the dinosaur moves) through the (where the dinosaur lives).
- And they especially loved to chomp on (what the dinosaur eats).
- One day the dinosaur met a (another ancient animal).
- What happened next?

Extension: For grades 3-5, give students the sentence starts above and/or the following word bank. Challenge students to write a story about a dinosaur using at least 5 words from the word bank below using what they learned from the *Dinos Alive!* exhibition.

Biped	Prey	Omnivore
Quadruped	Herbivore	Reptile
Predator	Carnivore	Mammal

BONUS WORDS:

Triassic
Paleozoic
Mesozoic
Jurassic
Cretaceous

Grades 6-8

6-8 Glossary

Biome: a large, naturally occurring community of plants and animals all adapted to a specific climate.

Deep time or Geologic time: the time scale of geologic events spanning billions of years.

Environmental conditions: components of the environment which affect organisms' ability to survive and reproduce.

Evolution: the process by which species adapt over time in response to environmental changes.

Fossil: traces or remains of a prehistoric plant or animal that has been preserved after being buried in sediments for thousands to millions of years.

Inherited traits: traits or variants in DNA passed from parent to offspring through reproduction.

Natural Selection: a mechanism in which heritable traits that help organisms survive and reproduce become more common in a population over time.

Pangea: a supercontinent which encompassed almost all of the landmass on Earth and existed 300 million years ago.

Plate tectonics: a scientific theory that explains the movement of Earth's surface over time.

Scientific illustrator: a professional who creates art that represents scientific information in an easily understandable format.

Species: a group of similar living organisms that have the capacity to reproduce.

Supercontinent: ancient large landmasses, including Pangea, theorized to have divided and drifted to form present day continents.

Before Your Visit:

The following activities will help engage and prepare your students for a visit to *Dinos Alive! The Immersive Experience*.

Vast Viewpoints

Curriculum Connections: Social Studies, English/Language Arts, Social Emotional Learning

This activity is recommended to be used in conjunction with the Longest Story Ever Told activity below. Before the Longest Story activity, invite students to complete the following word association exercise. There are no rules and no right or wrong answers. Students can fill in any word or short phrase that they associate with the following concepts, from definitions to emotional responses. This is a quick response activity, so set a timer for 1-2 minutes and see what students come up with! After completing the Longest Story activity and researching **plate tectonics** and **deep time**, invite students to complete the same word association exercise and then compare/contrast their answers from before and after.

Before Responses	**Concepts**	**After Responses**
	Borders	
	History	
	Land	
	Ancestry	
	Life	
	Earth	
	Oceans	
	Time	

The Longest Story Ever Told

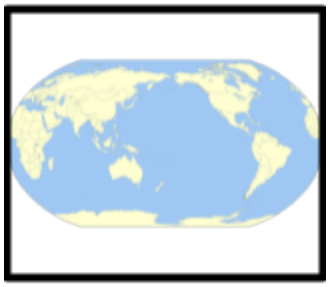
Curriculum Connections: Map & Globe Skills: Social Studies, English Language Arts, Science, Visual Art

Every story about dinosaurs is a story about deep time.

Read this article about plate tectonics and explore how our world has changed from hundreds of millions of years ago when land formed a **supercontinent** called **Pangea** to today: Continental Drift versus Plate Tectonics

Next, project into the future to create your own three-paneled comic strip about the transformation of the earth. Think beginning, middle, end with a 500 million year timeline! Use close observation, critical thinking, and scientific evidence to make your prediction of what the world might look like in another 250 million years.

Use the following template or create your own original artwork, adding plants and creatures or other global features. Captions can be scientific, descriptive, narrative, or humorous! Put your own spin on the story of plate tectonics.

250 million years ago.	**Today.**	**250 million years in the future.**
		
_____	_____	_____

Next, take some time reading the following articles or doing your own research to see what other scientists are thinking about the deep future of the planet.

- Massive supercontinent will form hundreds of millions of years from now | Live Science
- In The Future, Earth Will Have Just One Continent. It Might Look Like This : ScienceAlert
- https://www.britannica.com/video/151108/Earth-Pangea-Proxima-locations-continents-inset

How is your prediction similar to or different from these scientists'? To your classmates'?

Pair this activity with Vast Viewpoints above to document student learning and see shifts in their understanding of deep time and the monumental changes our planet has undergone and will continue to experience.

Exquisite Dinosaurs

Curriculum Connections: Visual Art, Science, English Language Arts

Inspired by a visual art game from the 1920s Surrealist movement called Exquisite Corpse, Exquisite Dinosaurs, along with the suggested extension, is a collaborative game for students to combine science, art, and language skills.

Each student receives a piece of paper folded into three sections. For each round, set a timer for 5-15 minutes, based on the length of time you have for the activity.

During the first round, each student will open the paper and draw the head of a dinosaur (real or imagined) only in the top section. Encourage students to add as many details and textures as possible. When the timer sounds, instruct students to extend the lines of the neck slightly into the second section of the paper - this will help the next student seamlessly continue the drawing without seeing the top. Then, ask students to fold the top section back, so it's invisible to the next artist and hand it off to a classmate. Repeat for rounds two and three with round two drawing the torso in the middle section and round three drawing the legs and feet in the bottom section.

Ta-da! Time to reveal the exquisite dinosaurs!

Extension: Pass off the creations to a new classmate. Round 4 is for adding context. This round may take up to 30-45 minutes to include research time. Students may work in pairs or small groups. Work backwards to imagine what this dinosaur's environment may have looked like based on its **inherited traits**. What **environmental conditions** might have driven **natural selection** in this dinosaur's **biome**? Think climate, availability of resources like oxygen, food, and water, and other predators and prey that may be present.

Remember, these dinosaurs are "exquisite creatures" so your biomes may be equally as fantastical! The goal is to use close observation and critical thinking to draw conclusions about the hypothetical **evolution** of your exquisite dino.

Extension: Pass off the creations once more. Round 5 is for naming this exquisite creature! Challenge students to give a scientific name to their new "discovery." This round may take up to 30-45 minutes to include research time. Students may work in pairs or small groups.

Check out this video from the American Museum of Natural History to learn more about how paleontologists name new species: How Do Dinosaurs Get Their Names?

Observe your exquisite dino and its biome closely, making note of key features, characteristics, and traits. Then use this list of Greek and Latin root words with their English translations to piece together a fitting name for your new species: Greek and Latin Roots

Speak another language? Feel free to incorporate words or roots from your native language or a language that you are learning into your new dinosaur name.

During Your Visit:

The following activities will help your students engage and practice their observational, conversational, and critical thinking skills during a visit to *Dinos Alive! The Immersive Experience*.

Both of these activities are designed for students to work independently or with small groups. Based on your class size and comfort level, allow students to browse the entire exhibition with a partner or small group or instruct your students to all stay in the same gallery and move together throughout the exhibition, completing the exercises as a group.

Prehistoric Scavenger Hunt!

Curriculum Connections: Science, English Language Arts

Incentivize your students to learn new dinosaur facts and make connections with a speedy scavenger hunt before slowing down and taking in the details with the next activity. Give pairs or small groups 15-20 minutes to fill in their answers to the following scavenger hunt and see who's got the best answers when the timer ends!

Dinos Alive! Scavenger Hunt

1. Find the heaviest dinosaur.

Species Name: _____

Weight Range: _____

2. Find the longest dinosaur.

Species Name: _____

Length: _____

3. Find as many herbivores as you can.

Species Name: _____

Species Name: _____

Species Name: _____

4. Find a dinosaur named after a bull.

Species Name: _____

5. Find as many dinosaurs from the Jurassic era as you can.

Species Name: _____

Species Name: _____

Species Name: _____

Species Name: _____

Species Name: _____

Species Name: _____

6. Find the oldest dinosaur in the exhibition.

Species Name: _____

Time Period: _____

7. Find a creature that is **not** classified as a dinosaur.

Species Name: _____

Time Period: _____

8. Find a dinosaur that helps support the connection between dinosaurs and modern-day birds.

Species Name: _____

Bird-like Trait(s): _____

9. Find a dinosaur that was discovered in modern day China.

Species Name: _____

10. Find the dinosaur with the largest teeth.

Species Name: _____

Teeth Size: _____

11. Most surprising fact you learned from the exhibition:

_____

The Dino's in the Details

Curriculum Connections: Visual Arts, Science

Scientists and artists alike know that details are critical to understanding our natural world. Take time with at least three displays to look slowly, draw carefully, and think critically to better understand each species. Make a small "O" with your fist and look through it as a viewfinder to help you 'zoom in' on a detailed section of your species. Complete the following chart as you move through the exhibition:

Species 1	**Species 2**	**Species 3**
Name & Rough Sketch	Name & Rough Sketch	Name & Rough Sketch

Detail Sketch	Detail Sketch	Detail Sketch
What does this detail help me understand about this animal? _____ _____ _____ _____ _____ _____	What does this detail help me understand about this animal? _____ _____ _____ _____ _____ _____	What does this detail help me understand about this animal? _____ _____ _____ _____ _____ _____

After Your Visit:

The following activities will keep the engagement and learning going after a visit to *Dinos Alive! The Immersive Experience*.

The More You Know

Curriculum Connections: English Language Arts, Science

After reflecting on your visit to *Dinos Alive! The Immersive Experience*, check out the following readings and resources:

- How Dinosaurs Shrank and Became Birds - Scientific American

- Dinosaur family tree radically rearranged | Natural History Museum
- Dinosaur Facts | American Museum of Natural History

Discuss the articles with a partner or small group:

- What connections can you make between the readings and the exhibition?
- What did you learn from the readings that you did not know from the exhibition?
- What questions do you still have?

STEAM Career Connection: Scientific Illustrator

Curriculum Connections: Visual Arts, Science

Do you like observing nature? Do you love to draw or have a vivid imagination? Are you detail-oriented? You may want to be a **scientific illustrator**. Scientific or science illustrators help convey important scientific information through detailed drawings, diagrams, and more. Scientific illustrations can range from a diagram of an atom to drawings of extinct creatures, including the largest to ever walk the earth: the dinosaurs!

Read the following articles to learn more about the impact of scientific illustration:

- Drawing Dinosaurs: Science Illustration and Paleontology with Hannah Caisse - Santa Cruz Museum of Natural History
- Scientific illustration: The key to a world of visual science - MTG
- Why We Need Scientific Illustration | The Franklin Institute
- The Art and Details of Scientific Illustration | Natural History Museum of Utah
- Scientific Illustrations | American Museum of Natural History
- Capturing colour: the art of scientific illustration | Natural History Museum

Flesh Out a Fossil

Curriculum Connections: Visual Arts, Science

Dinosaurs and many other prehistoric creatures died out millions of years ago, right? So how do we know what they may have looked like? Read to find out more about how scientists piece together the puzzle of how these prehistoric beings may have looked in real life:

Beyond Jurassic World: what we really know about dinosaurs and how | Natural History Museum

Next, try your own hand at science illustration by fleshing out one of the fossils pictured below. Just as a scientific illustrator would, use close observation and critical thinking skills to imagine what this prehistoric creature may have looked like when it was alive. Ask yourself the following questions to get started:

- What types of limbs might this creature have had?
- Does this creature have features and traits of a mammal? A reptile? Something else?
- Does it remind you of a skeleton of a modern day creature? Look up examples to compare/contrast.

- In what environment might this creature have lived?
- How might it have moved?
- What type of textures might it have had (scales, feathers, skin)?
- What might it have eaten?
- What questions can I not answer by looking?
- Where might I need to research more or use my imagination?

For each question above, point to specific visual evidence in the fossils below to back up your answers.

1. Ichthyosaur

Image from: https://eos.org/articles/how-did-life-recover-after-earths-worst-ever-mass-extinction

2. Sciurumimus albersdoerferi

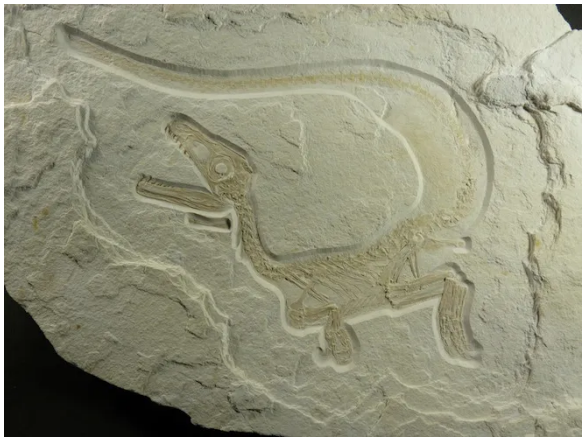


Image from: https://www.wired.com/2012/07/feathered-dinosaur-fossil/

3. Leptomeryx

Image from: https://www.dkfindout.com/uk/gallery/dinosaurs-and-prehistoric-life/see-more-fossils/

Learn more about each species and see real scientific illustrations of these prehistoric animals:

1. Ichthyosaur - Earth's First Giant | Natural History Museum
2. Sciurumimus albersdoerferi - Sciurumimus Pictures & Facts - The Dinosaur Database
3. Leptomeryx - Clue: solving the mysteries of the teeth; https://www.floridamuseum.ufl.edu/wp-content/uploads/sites/77/2015/06/slide2.jpg

Allow students to compare and contrast their illustrations with the professional ones above. How are they similar? How are they different? What would you change about your illustration now that you know more about your prehistoric creature?

Grades 9-12

9-12 Glossary

Animatronics engineer: professional who designs, builds, and operates lifelike robots for use in film and other entertainment.

Biome: a large, naturally occurring community of plants and animals all adapted to a specific climate.

Biomimetic design: a design created using biomimicry.

Biomimicry: an engineering process that draws design inspiration from natural organisms or systems.

CAD: computer-aided design, or CAD, is the use of computers to assist in creating, optimizing, or analyzing designs.

Deep time or Geologic time: the time scale of geologic events spanning billions of years.

Exhibition designer: a professional who designs components of exhibitions, like lighting, structures, layout, and more.

Installation: large-scale construction that is typically part of a museum exhibition.

Paleoartist: an artist who is also a scientist or works with scientists to create an image of prehistoric life based on scientific research and evidence.

Visual metaphor: a creative representation of a concept, person, place, thing, or idea through an image that uses analogy or association.

Before Your Visit

The following activities will help engage and prepare your students for a visit to *Dinos Alive! The Immersive Experience*.

Prehistoric Biomes

Curriculum Connections: Science, Visual Arts

Did you know that some plants have been around since the dinosaurs roamed the earth? Ferns, magnolias, and more have survived mass extinctions and the test of time. What about insects and other animals?

Choose a favorite dinosaur species or research a new one. Then use the following resources as a jumping off point to research what other life was present in a particular dinosaur's **biome**. Then get to work finding modern day photographs or specimens of some still-living plants and animals to help bring your biome illustration to life.

- A guide to prehistoric plants | Eden Project
- Which of today's animals lived alongside dinosaurs? | HowStuffWorks

Draw inspiration from prehistoric biome paintings by Canadian **paleoartist** Julius Csotonyi and read more about his process on his blog *Evolutionary Routes*.

- Julius Csotonyi
- Evolutionary Routes

Use whichever art medium you feel most comfortable with or have most easily available to you. Anything from pencil and paper to digital media. The most important part of the process is to pay close attention to details of the plants and animals you choose to include in your dinosaur biome illustration. The goal is to bring these prehistoric creatures to life and help viewers connect deep time to the present by including still-thriving species.

Vast Viewpoints

Curriculum Connections: Social Studies, English/Language Arts, Social Emotional Learning

This activity is recommended to be used in conjunction with the How Do You Measure Deep Time? activity below. Before the Deep Time activity, invite students to complete the following word association exercise. There are no rules and no right or wrong answers. Students can fill in any word or short phrase that they associate with the following concepts from definitions to emotional responses. This is a quick response activity, so set a timer for 1-2 minutes and see what students come up with! After completing the Deep Time activity and researching deep time through the poetry and artwork below, invite students to complete the same word association exercise and then compare/contrast their answers from before and after.

Before Responses	**Concepts**	**After Responses**
	Borders	
	History	
	Change	
	Ancestry	
	Life	
	Earth	
	Permanence	
	Time	

How Do You Measure Deep Time?

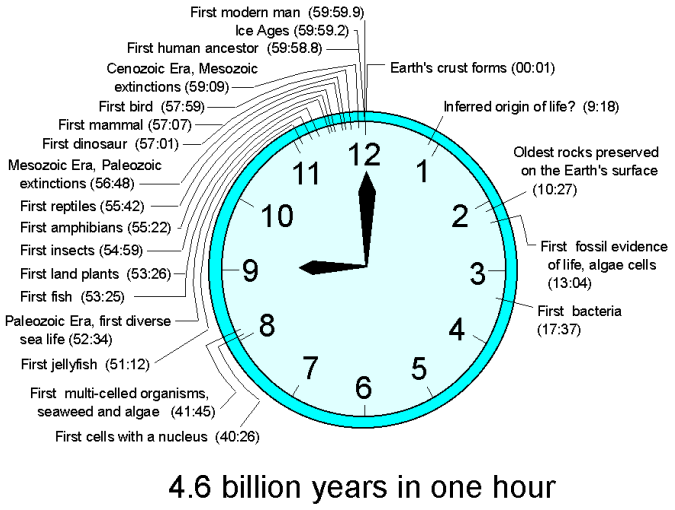
Curriculum Connections: Science, Math, Social Studies, Visual Arts, English Language Arts

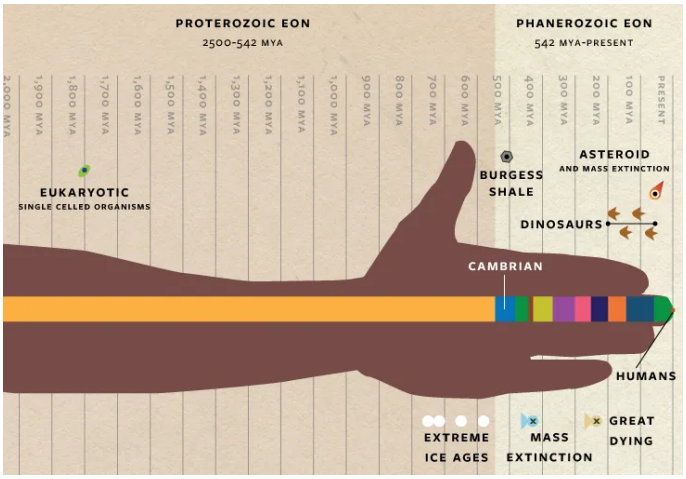
Close your eyes and picture something that feels like a long time ago. What comes to mind?

Chances are you're not thinking in the scale of **deep time**. Deep time or geologic time is the time scale of geologic events encompassing billions of years. The time that humans have inhabited the earth is the blink of

an eye relative to this massive time scale. Writers and artists have used metaphors like this as well as **visual metaphors** like those below to try to capture the concept of deep time for centuries. Explore the articles and visual art examples below. Then, independently or in groups create your own concept for how to visually or linguistically convey the concept of deep time.

- What Does "Deep Time" Mean to You? | Science| Smithsonian Magazine
- Deep Time and Geologic Time Scales – Dr. Roseanne Chambers
- The Greatest Animal War. Competition in Cambrian seas helped… | by Nautilus | Medium
- Understanding 'Deep Time' | letstalkaboutscience





(left) Image from: https://letstalkaboutscience.wordpress.com/2012/07/30/understanding-deep-time/
(right) image from: https://medium.com/s/nautilus-big-bangs/the-greatest-animal-war-c2f0a90a6d2e

Extension: Take a look at a more abstract artistic take on the concept of deep time from artist Katie Paterson.

- The Mind-Bending Art of Deep Time | Katie Paterson | TED

And the projects from the Long Now Foundation.

- Projects - Long Now

And/or the Loren Eiseley poem *The Innocent Assassins* and *Geologic Time* (or *Aging*) by Alixandra Bamford.

- The Innocent Assassins
- Geologic Time - A poem

How do these interpretations differ from the diagrams pictured above? Which project or illustration helps you grasp the concept of deep time best? How so?

Create your own poem, art installation, performance, or project with the goal to communicate the vastness of deep time and/or the importance of understanding this concept to observers.

What media will you use? Will it be interactive? What more do you need to know or research in order to create an effective artwork? How will you measure its effectiveness?

During Your Visit

The following activities will help your students engage and practice their observational, conversational, and critical thinking skills during a visit to *Dinos Alive! The Immersive Experience*.

STEAM Career Connection: Exhibition Designer

Curriculum Connections: Science, Social Studies, English Language Arts, Visual Art, Social Emotional Learning

How do you make something ancient come to life? How can museums and other exhibition spaces help us understand our world?

If you are curious about the answers to these questions, you may want to be an **exhibition designer**. Exhibition designers usually work on a team of experts in lighting, construction, writing, research, visual art, digital and graphic design, engineering, and more. An exhibition design team creates engaging physical or digital interactions to inspire and educate audiences. Each object, wall color, ceiling light, sound, or other element in an exhibition represents a choice someone - likely an exhibition designer - made. Use this lens to experience *Dinos Alive! The Immersive Experience* and keep this in mind every time you visit a museum or exhibition.

Brainstorm a list of creative questions to help you more deeply explore the **installations** in *Dinos Alive!* Use the following sentence beginnings as inspiration:

- What would it be like if…?
- What would change if…?
- How would it be different if…?
- How would it look differently if…?
- Would I like it more or less if …?
- How would my emotional response change if …?

Take turns asking each other your creative questions to hear your classmates' responses. How would you change the exhibition installation to better tell the story of these prehistoric creatures or to enhance the visitors' experience?

Zoom In

Curriculum Connections: Visual Arts, Science

Scientists and artists alike know that details are critical to understanding our natural world. Exhibition designers and engineers have to zoom in on details as well. Take time with at least three displays to look slowly, draw carefully, and think critically to better understand how each installation was put together. 'Zoom in' on a detailed section of your installation.

Use the following chart as you move through the exhibition:

Display 1	**Display 2**	**Display 3**
Rough Sketch of Entire Installation	Rough Sketch of Entire Installation	Rough Sketch of Entire Installation
Detail Sketch	Detail Sketch	Detail Sketch

How does this detail impact the installation?	How does this detail impact the installation?	How does this detail impact the installation?
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Extension: Take 3 minutes to quietly look at your favorite installation. Scan the installation paying close attention to details. Write down as many things as you can notice in the 3 minutes. This could include text, objects, lights, sounds, hardware, entrances/exits, etc. Anything is fair game! Compare your list with a classmate to see what they noticed that you missed. Finally, notice if any emotions come up. Can you link these emotions to certain things on your list?

After Your Visit

The following activities will keep the engagement and learning going after a visit to *Dinos Alive! The Immersive Experience*.

STEAM Career Connection: Animatronics Engineer

Curriculum Connections: Science, Math, Visual Arts

Do you love seeing amazing, terrifying, fantastical, or gigantic creatures come to life in movies, tv shows, theme parks, and exhibitions like *Dinos Alive*? Do you like tinkering, making, building, or problem-solving?

You might want to be an **animatronics engineer**. Animatronics engineers design, build, and operate lifelike robots for use in film and other entertainment. Animatronics can range in size from the 16 inch tall Grogu in Star Wars series The Mandalorian to the 12,000 pound T-Rex in the original Jurassic Park movie.

Animatronics of any size come to life through the fusion of skills from professionals like visual artists, photographers/filmographers, engineers, coders, graphic designers, puppeteers, and more. Check out the

following videos to see animatronics engineers in action and to see an amazing collaboration between paleontologists and engineers that brings the past to life:

- How A 9-Ton Dinosaur Was Made For "Jurassic World: Dominion" | Movies Insider | Insider
- Bringing a fossil to life: Reverse engineering locomotion

Ready to play with ideas for your own animatronics? Try designing and coding a digital 3D version with free software TinkerCAD. TinkerCAD is a free online **CAD** or computer aided design software that allows you to build 3D models, create circuits, and code movement in your models.

Check out TinkerCAD.com and get started with these quick tutorials: Learn how to use Tinkercad.

Can Dinosaurs Help Design Our Future?

Curriculum Connections: Science, Math, Visual Arts

Diplodocus, one of the longest dinosaurs ever discovered, could grow up to 100 feet long! Its body design is often compared to modern day suspension bridges.

When scientists and engineers draw inspiration from nature to design modern inventions, it's called **biomimicry**. Biomimicry literally means copying nature. Common **biomimetic designs** include velcro, high speed trains, and airplanes.

Learn more about biomimicry from the following resources:

- Janine Benyus on Biomimicry – Innovation Inspired by Nature
- Biomimicry 101 - Examples Of How We Copied Nature
- Biomimicry is a practice that learns from and mimics the strategies found in nature to solve human design challenges—and find hope.
- AskNature

Most examples of biomimicry come from surviving plants, animals, and systems. But what natural wisdom are we missing that can be found by studying extinct species, like the dinosaurs in the *Dinos Alive!* exhibition?

Read more about how prehistoric species are inspiring modern inventions here:

- Drones and Dinosaurs: Pterodactyls Could Inspire the Next Generation of Planes. -
- Disappearing Freaks of Nature—and the Secrets Going With Them – Biomimicry Institute

Next, choose one or more dinosaurs or other prehistoric species that most excite you and let's start copying nature!

Use the following chart to help organize your thoughts, then grab pencil and paper, or head to TinkerCAD.com to design your biomimetic invention.

Prehistoric Species	**What made this species unique? What special adaptations did it have?**	**How might this natural adaptation or feature be used to help humans or the planet today?**	**Idea for invention**
Pterodactyl	*They could take off from a stationary position, because of special muscles in their hips & wings*	*Reduce or remove need/space for runways for airplanes*	*Efficient flight machine that does not require a runway*