FROST SCIENCE

3-5 Exhibit Educator Guide

Welcome to Frost Science! Use this to guide your learners through an engaging and thought-provoking experience at the museum. Start on Level 4 and have fun exploring our exhibits as you work your way down to Level 1 (stairs are recommended). If you follow this guide and spend 30 minutes in each exhibition, your field trip will be 3 hours.

This guide contains:

- Scripted overviews of each exhibit
- Age-appropriate questions to prompt your students with when exploring
- Scripted interactions for intentional and dedicated student learning

Stay curious, keep exploring, and remember, it's our world, let's explore it!

Look for this icon to see the best route through the museum.

Begin your field trip by taking the stairs or elevators to Level 4.

The Vista

Use this guide to spend **20-30 minutes** in *The Vista*.

Teacher Overview

Welcome to *The Vista*! Located on Level 4, this exhibition places you at the top of our three-level aquarium. Here you will discover key South Florida ecosystems, including the Gulf Stream, the Florida Coast and the Everglades. Along the way, you will encounter the diverse wildlife that calls these ecosystems home.

Exhibit Introduction (3 minutes)

Share this introduction and the thought-provoking question outside the exhibit before walking in, or in the exhibit before allowing for free exploration.

"Welcome to *The Vista*! Today we will get up close and personal with key South Florida ecosystems that provide local animals and plants with all the things they need to survive! To start, we will look at the Gulf Stream Aquarium to try and see amazing animals like sharks, rays, and sea turtles! Next, we will explore the aviary to learn more about key coastal habitats, including mangrove nurseries and sandy shorelines. Then, we will learn more about the Everglades as we encounter some of the marsh ecosystem's most iconic predators, alligators and crocodiles! Finally, if there's time, we will learn to safely touch the stingrays in the Florida Bay Exhibit."

Thought-provoking Question (2 minutes)

"I have a question I would like you to think about while having fun in the exhibit..."

Grade 3: As you explore, observe the physical and behavioral characteristics of each species you encounter. Can you group them into specific categories based on these characteristics?

Grade 4: As you explore, observe the physical and behavioral characteristics of each species you encounter. Why do you think organisms behave in different ways?

Grade 5: As you explore, observe the physical and behavioral characteristics of each species you encounter. How do these adaptations help each species survive in their given environment?

"Explore this exhibit to discover more! You have 10-minutes to explore and investigate!"

10-minute free exploration

Supporting Standards

Grade 3

SC.3.L.15.1 Classify animals into major groups (mammals, birds, reptiles, amphibians, fish, arthropods, vertebrates and invertebrates, those having live births and those which lay eggs) according to their physical characteristics and behaviors.

Grade 4

SC.4.L.16.3 Recognize that animal behaviors may be shaped by heredity and learning.

Grade 5

SC.5.L.17.1 Compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments such as life cycles variations, animal behaviors and physical characteristics.

Optional Exhibit Interactive Highlight

Want some dedicated and intentional student learning in this exhibit? Follow the script below to engage with the Florida Bay Exhibit - Sting Ray Touch (5-8 minutes).

"Welcome to the Frost Science Stingray Touch! We will now touch the stingrays in this exhibit, but you must follow the rules to stay safe!"

"Using only one hand, place two fingers in the water with enough space for the rays to swim underneath. Wait for the stingrays to come to you! When a stingray swims by, only touch the top part of the ray by gliding your two fingers gently on the top part of the ray. Make sure not to splash around or lean too far over the touch exhibit. Wait for the stingrays to come closer to the edge of the aquarium instead of leaning over it."

"As you watch and touch the stingrays, think about how they look and act. How are stingrays the same or different from the other animals you saw today?"

Across from *The Vista* you will find *The Dig.*

The Dig

Use this guide to spend **20-30 minutes** in *The Dig.*

Teacher Overview

Welcome to *The Dig*! *The Dig* is located on Level 4 of Frost Science. In this exhibit, students will learn about fossils, how they are formed, what they can tell us about ecological history, and what it is like to be a paleontologist. If students are lucky, they can even see Frost Science's paleontologists working in the fossil preparation lab!

Exhibit Introduction (3 minutes)

Share this introduction and the thought-provoking question outside the exhibit before walking in, or in the exhibit before allowing for free exploration.

"Welcome to *The Dig*! Who loves dinosaurs? Does anyone want to be a paleontologist when they grow up?" *Accept responses.* "While Florida has a lot of shark teeth and ancient manatee fossils, Florida doesn't have any dinosaur fossils. Because of this, Frost Science has the only paleontology research program in all South Florida!"

Thought-provoking Question (2 minutes)

"I have a question I would like you to think about while having fun in the exhibit..."

Grade 3: How do fossils look and feel different from regular rocks?

Grade 4: How can you tell if a fossil is a tooth, rib, or another body part?

Grade 5: Why do you think there aren't any dinosaur fossils in Florida?

"Explore this exhibit to discover more! You have 10-minutes to explore and investigate!"

10-minute free exploration

Supporting Standards

Grader 3

SC.3.N.1.1 Raise questions about the natural world, investigate them individually and in teams through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.

SC.3.N.1.6 Infer based on observation.

Grade 4

SC.4.N.1.1 Raise questions about the natural world, use appropriate reference materials that support understanding to obtain information (identifying the source), conduct both individual and team investigations through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.

SC.4.N.1.4 Attempt reasonable answers to scientific questions and cite evidence in support.

Grade 5

SC.5.L.15.1 Describe how, when the environment changes, differences between individuals allow some plants and animals to survive and reproduce while others die or move to new locations.

SC.5.L.17.1 Compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments such as life cycles variations, animal behaviors and physical characteristics.

SC.5.N.1.6 Recognize and explain the difference between personal opinion/ interpretation and verified observation.

Optional Exhibit Interactive Highlight

Want some dedicated and intentional student learning in this exhibit? Follow the script below to engage with the Prep the Fossil interactive (5-8 minutes).

"Paleontologists spend a lot of time preparing, or prepping, fossils. What do you think it means to prep a fossil? Look in the fossil preparation lab for a hint!"

Direct students to look at the fossil preparation lab. Frost Science's paleontologists may be working in the lab preparing fossils. Point out any fossils that are currently being prepared. These fossils may be encased in rock or plaster.

"Right! When paleontologists prep fossils, they have to get rid of the rock! This can take a long time."

Point out the Prep the Fossil interactive in *The Dig*.

"It takes a lot of work to prep fossils! Try it yourself!"

Let students try the Prep the Fossil interactive. Students should be instructed to take turns so everyone gets a chance to engage with the interactive.

"Wow! That was a lot of work. Why do you think paleontologists prepare fossils?" *Accept responses.* "It's not always easy to prep fossils. Paleontologists don't always see all the fossils they are prepping. Some fossils can be under other fossils or covered by dirt or rock! Lots of fossils can also break during prep. As you look around *The Dig*, think about how much work it takes to prep tiny fossils and big fossils."

Walk down the stairs by the sting ray touch to enter *The Dive.*

Aquarium: The Dive

Use this guide to spend **20-30 minutes** in *The Dive.*

Teacher Overview

Welcome to *The Dive*! Located on Level 3, *The Dive* allows you to explore different habitats within our ocean. Here, you can see sharks in the Gulf Stream Aquarium, invasive lionfish, a goliath grouper, and seahorses. Florida's Coral Reef takes center stage in our ReeFLorida exhibit, which contains interactives focused on conserving this ecosystem.

Exhibit Introduction (3 minutes)

Share this introduction and the thought-provoking question outside the exhibit before walking in, or in the exhibit before allowing for free exploration.

"Welcome to *The Dive*! Here we will explore Florida marine habitats and the animals that live in them. In this exhibit, you can find sharks, octopus, seahorses, barracudas, and more. Don't forget to visit the ReeFLorida interactives to discover how you can help protect Florida's Coral Reef. It is the only barrier reef in the US outside of Hawaii!"

Thought-provoking Question (2 minutes)

"I have a question I would like you to think about while having fun in the exhibit..."

Grade 3: What are some ways you can group or organize the animals you observe in each of the aquariums?

Grade 4: How do coral reefs impact the environment?

Grade 5: What are some adaptations you have observed in the animals in this exhibit?

"You have 10-minutes to investigate and play!"

10-minute free exploration

Supporting Standards

Grade 3
SC.3.L.15.1 Classify animals into major groups (mammals, birds, reptiles, amphibians, fish, arthropods, vertebrates, invertebrates, those having live births and those which lay eggs) according to their physical characteristics and behaviors.

Grade 4
SC.4.L.17.4 Recognize ways plants and animals, including humans, can impact the environment.

Grade 5
SC.5.L.17.1 Compare and contrast adaptations displayed by plants and animals that enable them to survive in different environments such as life cycle variations, animal behaviors and physical characteristics.

Optional Exhibit Interactive Highlight

Want some dedicated and intentional student learning in this exhibit? Follow the script below to engage with the Overfishing interactive (5-8 minutes).

"People all around the world rely on the ocean for food. What do you like to eat that comes from the ocean?" *Accept responses.* "A lot of us love seafood, but do you think we can take too many fish from the ocean?" *Accept responses.* "When we take too many fish from the ocean, we are overfishing. When we overfish, there are less fish in the ocean and some species of fish can even go extinct."

"In this game, you get to fish. Your goal is to fish as sustainably as possible. In other words, you will need to be careful not to overfish.

Optional guiding questions:

- "You have the choice to fish with nets or lines. Which do you think will be better for the fish population? Why?"
- "Why should we not catch turtles, dolphins and sharks in the overfishing game?"
- "What law would you enact to combat overfishing?"
- "What was your strategy for fishing sustainably?"
- "Why is sustainable fishing important?"

Use the bridge in *The Dive* to explore *Feathers to the Stars.*

Feathers to the Stars

Use this guide to spend **20-30 minutes** in *Feathers to the Stars.*

Teacher Overview

Welcome to *Feathers to the Stars*, located on Level 3. In this exhibit, students will learn all about flight, from flying dinosaurs to the future of space travel.

Exhibit Introduction (3 minutes)

Share this introduction and the thought-provoking question outside the exhibit before walking in, or in the exhibit before allowing for free exploration.

"Welcome to *Feathers to the Stars*! This exhibit is all about flying – from birds to spaceships. While lots of things can fly, making things fly is really hard! Why do you think it is hard to make things fly?"

Thought-provoking Question (2 minutes)

"I have a question I would like you to think about while having fun in the exhibit..."

Grade 3: What force tries to pull down flying animals and objects?

Grade 4: How do birds, planes, and spacecraft overcome the force of gravity?

Grade 5: What type of energy is used to power planes? Is it different or the same as the energy birds use to fly?

"You have 10-minutes to fly around and investigate!"

10-minute free exploration

Supporting Standards

Grade 3

SC.3.E.5.4 Explore the Law of Gravity by demonstrating that gravity is a force that can be overcome.

Grade 4

SC.4.P.10.2 Investigate and describe that energy has the ability to cause motion or create change.

SC.4.P.12.1 Recognize that an object in motion always changes its position and may change its direction.

Grade 5

SC.5.P.10.1 Investigate and describe some basic forms of energy, including light, heat, sound, electrical, chemical, and mechanical.

SC.5.P.10.2 Investigate and explain that energy has the ability to cause motion or create change.

SC.5.P.13.2 Investigate and describe that the greater the force applied to it, the greater the change in motion of a given object.

Optional Exhibit Interactive Highlight

Want some dedicated and intentional student learning in this exhibit? Follow the script below to engage with the paper airplanes (5-8 minutes).

"What parts allow airplanes to fly and what do they look like?" *Accept responses*. "What about helicopters? What parts allow them to fly and what do those look like?" *Accept responses*. "Right! Airplanes use wings to glide through the air and these wings have flaps that help control the airplanes' direction. Helicopters, on the other hand, create lift using blades. Pilots can actually tilt these blades to change the helicopter's direction! Let's all take a minute to make a paper airplane and helicopter! Once we're done making our paper airplanes, we're going tear small slits on our airplane's wings to make flaps."

Guide students to the paper airplane table and give each student a piece of airplane paper and a piece of helicopter paper. Help students make paper airplanes and helicopters as needed and encourage students to get creative. As students create their airplanes, make sure the bottom or base of their airplane has enough paper to catch the gears of the launcher.

"Now that we've made our paper airplanes and helicopters, let's see how they fly! Once you've flown your airplane and helicopter, you can try adjusting your airplane's flaps or the angle of your helicopter's blades. Then, you can try flying them again!"

Direct students to make two single-file lines along the side of the airplane table. One line will be to fly the airplane and one line will be to fly the helicopters.

Once each student flies their airplane or helicopter, they should move to the end of the other line. Encourage students to cheer each other on – this is not a competition of which plane can fly the furthest or helicopter can fly the highest.

"Now that everyone has had a chance to fly and adjust their airplane and helicopter, what did you notice about how changes to the flaps or blade angles affected their flight? Why do you think this is?" *Accept responses.* "As you continue to explore *Feathers to the Stars,* think about how shape of a bird, plane, or rocket changes how it flies."

Leave *Feathers to the Stars* using the glass automatic doors and walk to the other side of the building. Walk down the stairs to explore *meLab* on Level 2.

meLab

Use this guide to spend **20-30 minutes** in *meLab.*

Teacher Overview

Welcome to *meLab*! *meLab* is located on Level 2 and Level 3 of Frost Science. On Level 2, students explore *meLab: The Journey*, where they can learn what being healthy means to them and experiment with lifestyle choices to live healthier, happier lives. On Level 3, students can explore *meLab: The Discovery,* where they can learn how scientists and doctors know what it means to be healthy.

Exhibit Introduction (3 minutes)

Share this introduction and the thought-provoking question outside the exhibit before walking in, or in the exhibit before allowing for free exploration.

"Right now, we're going to spend some time exploring *meLab: The Journey!* On this level of *meLab*, you can learn more about how healthy choices affect your body."

"What kind of healthy choices do you try to make at school and at home?"

Thought-provoking Question (2 minutes)

"I have a question I would like you to think about while having fun in the exhibit..."

Grade 3: What does it mean to have a 'balanced diet?'

Grade 4: How does food give us energy?

Grade 5: How can you keep your mind healthy?

"Explore this exhibit to discover more! You have 10-minutes to explore and investigate!"

10-minute free exploration

Supporting Standards

Grade 3

SC.3.N.1.6 Infer based on observation.

Grade4

SC.4.L.17.2 Explain that animals, including humans, cannot make their own food and that when animals eat plants or other animals, the energy stored in the food source is passed to them.

SC.4.L.17.3 Trace the flow of energy from the Sun as it is transferred along the food chain through the producers to the consumers.

Grade 5

SC.5.L.14.1 Identify the organs in the human body and describe their functions, including the skin, brain, heart, lungs, stomach, liver, intestines, pancreas, muscles and skeleton, reproductive organs, kidneys, bladder, and sensory organs.

Optional Exhibit Interactive Highlight

Want some dedicated and intentional student learning in this exhibit? Follow the script below to engage with the Crush the Calories and Build Your Plate interactives (5-8 minutes).

"When you think about food, what are the first things you think about?" *Accept responses.*

"While some of us think about the flavor of food or the different types of food, we also need to think about the amount of energy we get from food. Food is really important because it has calories, and these calories give us energy! We use this energy to live, run, jump, and play. All food has calories, but it's important that we eat lots of different kinds of food to stay healthy! Why is it important to eat different kinds of food?" *Accept responses.* "Right! Different foods can give us different nutrients and vitamins. We need lots of different nutrients and vitamins to have a healthy body. We are going to take turns creating healthy meals using the Build Your Plate interactive and playing the Crush the Calories game. Your goal is to make meals that you think would give you enough energy to play the game!"

Let students use the Build Your Plate interactive and play the Crush the Calories game. Each station can have up to four students at once. Groups switch out after each game so that all students have a chance to play.

"Awesome job creating meals that give you enough energy to catch all the fruits and vegetables! As you look around the rest of the *meLab,* look for things that help keep our minds, as well our bodies, healthy."

Walk outside of *meLab* and walk up the stairs to *meLab* on Level 3 (if you have time).

Walk down the stairs to Level 1 to explore *Power of Science*, located behind the yellow elevators, in the Ocean Gallery.

Power of Science

Use this guide to spend **20-30 minutes** in *Power of Science*.

Teacher Overview

Welcome to *Power of Science*! *Power of Science* is located on Level 1 of Frost Science. In this exhibit you will discover innovative technologies and groundbreaking discoveries across four scientific frontiers.

Exhibit Introduction (3 minutes)

Share this introduction and the thought-provoking question outside the exhibit before walking in, or in the exhibit before allowing for free exploration.

"Welcome to *Power of Science*! This exhibit will teach us about how scientific discoveries and new technologies in different fields of science have improved our understanding of life on Earth and beyond! We will visit each of the four scientific frontiers: 'our oceans', 'our bodies', 'our environment', and 'our universe' to learn what kinds of groundbreaking research scientists are doing right now."

Thought-provoking Question (2 minutes)

"I have a question I would like you to think about while having fun in the exhibit..."

Grade 3: "How do we investigate stars from Earth?"

Grade 4: "How do people affect the environment?"

Grade 5: "Why is it important to have a preparedness plan for natural disasters like hurricanes?"

"Explore this exhibit to discover more! You have 10-minutes to explore and investigate!"

10-minute free exploration

Supporting Standards

Grade 3

SC.3.E.5.5 Investigate that the number of stars that can be seen through telescopes is dramatically greater than those seen by the unaided eye.

Grade 4

SC.4.L.17. Recognize ways plants and animals, including humans, can impact the environment.

Grade 5

SC.5.E.7.7 Design a family preparedness plan for natural disasters and identify the reasons for having such a plan.

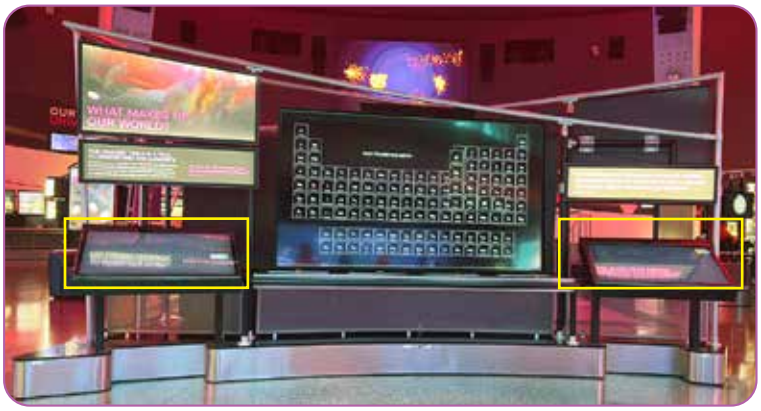
Optional Exhibit Interactive Highlight

Want some dedicated and intentional student learning in this exhibit? Follow the script below to engage with the Hurricane Preparation interactive (5-8 minutes).

"Today we are going to prepare for a hurricane. Miami's location on Florida's east coast puts us in a place where we experience severe weather events like hurricanes, which can cause a lot of damage. To protect ourselves and our families, we need to pay attention to weather forecasts so that we can prepare for any big storms. In this interactive, you will use different news sources to learn more about an approaching hurricane before deciding how to prepare. Let's give it a try!"

Optional guiding questions:

- "Which news source was the best for tracking the storm?"
- "Why is it important to be informed about approaching severe weather?"
- "What are some ways you can prepare your home for a hurricane?"
- "What are some of the reasons you might evacuate before an upcoming hurricane?"



Try this!

Ag (silver) + Cl (Chlorine)

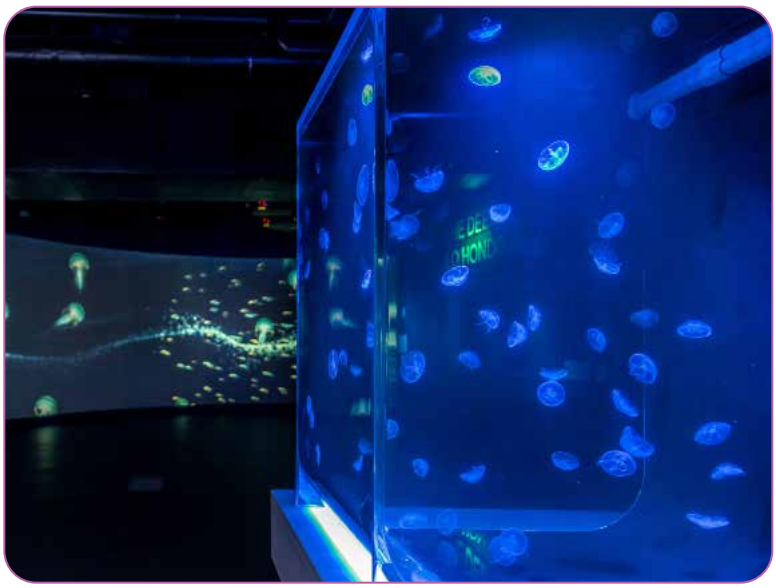
Li (Lithium) + O (Oxygen)

Na (Sodium) + Cl (Chlorine)

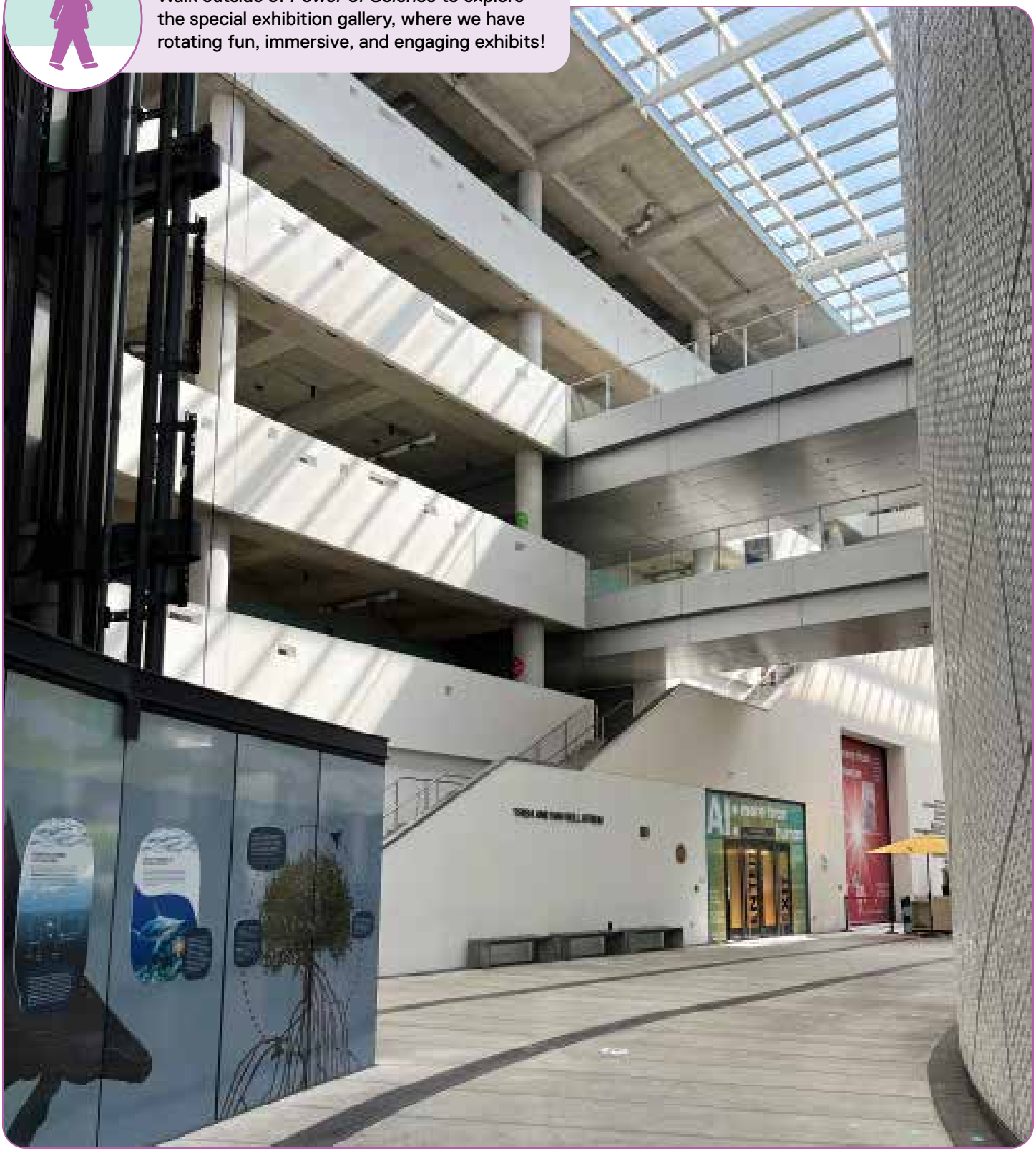
Walk up the ramp or the stairs to view the Oculus and stand underneath the Gulf Stream Aquarium. Then, take a look at our jellies in *The Deep*.

The Oculus and The Deep

The Deep, the aquarium on Level 2, features jellies and a unique view of the Gulf Stream Aquarium via the Oculus.



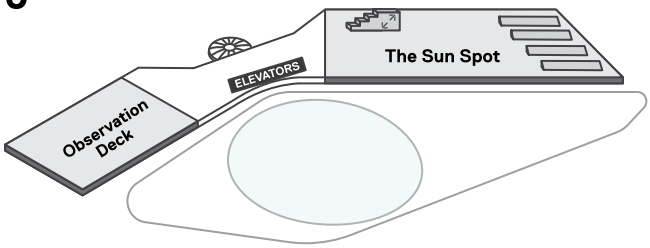
Walk outside of *Power of Science* to explore the special exhibition gallery, where we have rotating fun, immersive, and engaging exhibits!



Congrats! You explored, investigated and discovered all the exhibits at Frost Science. We hope you and your students had a great time with us!

Museum Floorplan

LEVEL 6
(ROOF)



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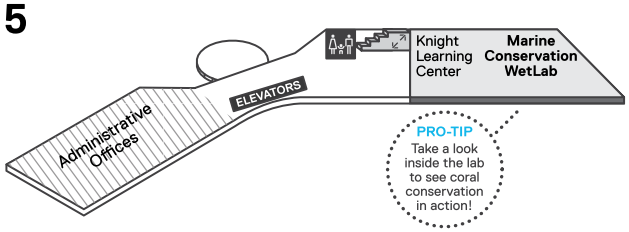
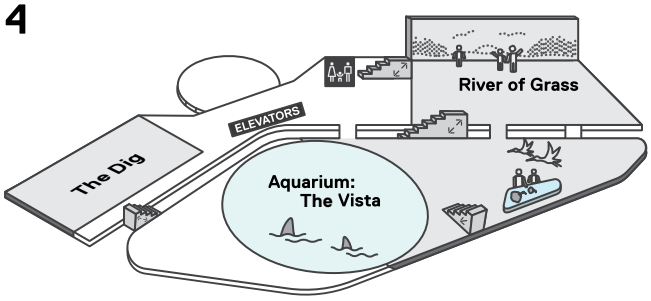
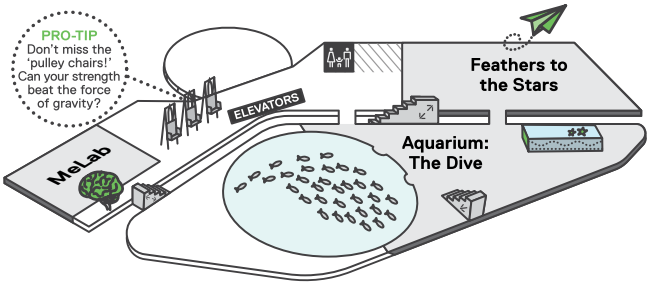


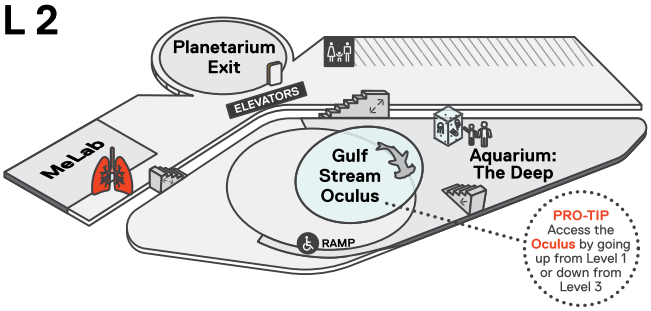
LEVEL 4



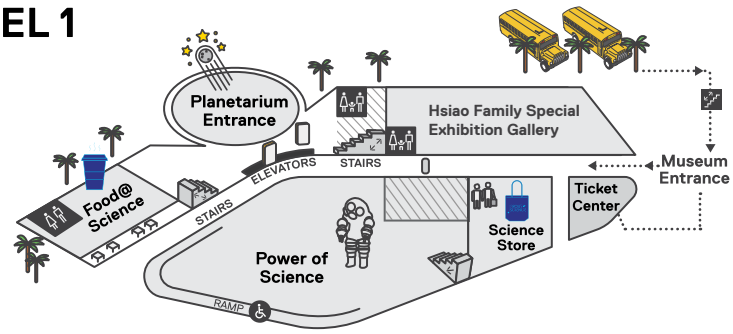
LEVEL 3



LEVEL 2



LEVEL 1



For the safety of our animals and divers, please, no flash photography.

Food, drinks, gum and smoking are not allowed in museum galleries and exhibitions.

All galleries and exhibitions are wheelchair accessible.

Frost Science is a smoke-free facility. No smoking or vaping on property.