6-8 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, as well as the unique plants and animals that call these places home. To start, we will peer into the Gulf Stream Aquarium and try to catch a glimpse of the animals found here, including sharks, rays and sea turtles! Next, we will explore the Aviary to learn more about some key species and their interactions within mangrove nurseries and sandy shorelines. Then, we will encounter some of the Florida Everglades' iconic crocodilians to see their predatory adaptations on full display. 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 6: How are organisms within these exhibits grouped? What are some physical features they have in common?

Grade 7: A limiting factor is something that restricts a population's growth within an ecosystem. What are some of the limiting factors that different organisms in *The Vista* might experience in the wild?

Grade 8: How might an increase in carbon dioxide affect the marine or aquatic environment within which these organisms live?

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

10-minute free exploration

Supporting Standards

Grade 6

SC.6.L.15.1 Analyze and describe how and why organisms are classified according to shared characteristics with emphasis on the Linnaean system combined with the concept of Domains.

Grade 7

SC.7.L.17.3 Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.

Grade 8

SC.8.L.18.3 Construct a scientific model of the carbon cycle to show how matter and energy are continuously transferred within and between organisms and their physical environment.

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 instead of leaning over it."

"As you watch and touch the stingrays, think about their body shape and behavior in the water."

Optional guiding questions:

- "How does the body shape of stingrays help them survive in the ocean?"
- "Are all the stingrays in this exhibit the same species? How can you tell?"
- "What do the different stingray species have in common?"
- "How might carbon dioxide affect the habitat of stingrays?"
- "What obstacles might stingrays encounter in their local ecosystem?"

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*! Do any of you want to be a paleontologist or did any of you want to be a paleontologist when you were younger?" *Accept responses.* "Why do you or did you want to be a paleontologist?" *Accept responses.* "Did you know that it's hard to study paleontology in Florida? Most paleontology programs in college are in other states because 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 6: What methods do paleontologists use to locate fossils?

Grade 7: How do paleontologists use the surrounding rock to identify how old a fossil is?

Grade 8: What is a question that paleontologists are trying to answer by looking at fossils? What tools are they using to answer that question?

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

10-minute free exploration

Supporting Standards

Grader 6

SC.6.E.6.1 Describe and give examples in which Earth's surface is built up and torn down by physical and chemical weathering, erosion, and deposition.

Grade 7

SC.7.E.6.3 Identify current methods of measuring the age of Earth and its parts, including the law of superposition and radioactive dating.

Grade 8

SC.8.N.1.5 Analyze the methods used to develop a scientific explanation as seen in different fields of science.

Optional Exhibit Interactive Highlight

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

"After fossils have been prepared, paleontologists can use different tools to study what they have found. What kind of tools do you think they use to study a fossil?" *Accept responses.* "New technology allows paleontologists to look at fossils in a way that was not possible in the past. Paleontologists can use X-rays, CT scans and spectroscopy to look at the internal structure of fossils to learn more about ancient organisms."

Allow students to use the High-Tech Tools interactive to explore what paleontologists have learned about different dinosaurs using cutting edge technology. Students should be instructed to take turns, so everyone gets a chance to engage with the interactive. Students that are not using the High-Tech Tools interactive should be looking at the Prep a Fossil interactive to learn how fossils are prepped prior to study.

Optional guiding questions:

- "What tools did paleontologists use to look at the Tyrannosaurus tooth? What did they learn?"
- "What tools did paleontologists use to look at the Diplodocus vertebra? What did they learn?"
- "What tools did paleontologists use to look at the Gorgosaurus claw? What did they learn?"
- "What tools did paleontologists use to look at Hadrosaur microanatomy? What did they learn?"

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. Here 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's the only barrier reef in the continental US!"

Thought-provoking Question (2 minutes)

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

Grade 6: Can you find any organisms in the exhibit that share characteristics? Does this mean that they are closely related?

Grade 7: Can you find any organisms in *The Dive* that have a relationship with another organism? These relationships include mutualism, predation, parasitism, competition, and commensalism.

Grade 8: How is carbon dioxide changing our oceans? What types of animals can this effect?

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

10-minute free exploration

Supporting Standards

Grade 6

SC.6.L.15.1 Analyze and describe how and why organisms are classified according to shared characteristics with emphasis on the Linnaean system combined with the concept of Domains.

Grade 7

SC.7.L.17.2 Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism.

Grade 8

SC.8.L.18.3 Construct a scientific model of the carbon cycle to show how matter and energy are continuously transferred within and between organisms and their physical environment.

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 is it possible for us to take too many fish from the ocean? Do you know what this is called?" *Accept responses.* "Right! This is known as overfishing. When we take fish from the ocean faster than they can reproduce, it can cause species populations to decline and potentially risk going 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 kind of laws were enacted to stop you from overfishing? What law would you enact to combat overfishing?"
- "What was your strategy for fishing sustainably? Did it work? What could you have done differently?"
- "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 the origin of flying birds to spaceships. While lots of things can fly, making things fly is actually really hard! Have any of you ever flown before? How were you able to fly?"

Thought-provoking Question (2 minutes)

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

Grade 6: "The force of gravity pulls everything downwards towards the Earth. How do different flying organisms and objects overcome this downward force to get into the air?"

Grade 7: "This exhibit begins with a display of dinosaurs. What do dinosaurs have to do with flying?"

Grade 8: "What technological advances made it possible for us to access outer space?"

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

10-minute free exploration

Supporting Standards

Grade 6

SC.6.P.13.2 Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that force depends on how much mass the objects have and how far apart they are.

Grade 7

SC.7.L.15.1 Recognize that fossil evidence is consistent with the scientific theory of evolution that living things evolved from earlier species.

Grade 8

SC.8.E.5.10 Assess how technology is essential to science for such purposes as access to outer space and other remote locations, sample collection, measurement, data collection and storage, computation, and communication of information.

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 are the parts of an airplane that allows them to fly?" *Accept responses.* "Right! Airplanes have wings that allow them to glide through the air and create lift, which airplanes use to get into the air. Airplanes also have an engine that creates thrust, which is the forward force that moves airplanes through the air. Let's all take a minute to make a paper airplane! Once we're done making our paper airplanes, we're going to see how far they fly!"

Guide students to the paper airplane table and give each student a piece of paper. Help students make paper airplanes 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, let's see how far they fly!"

Direct students to make a single-file line along the side of the airplane table. All students should be able to see the airplanes as they fly down the table.

One at a time, allow each student to launch their airplane. Once they have launched their airplane, they should move to the end of the table and the line should shift down the table and towards the launcher. Encourage students to cheer each other on – this is not a competition of which plane can fly the furthest.

"Now that everyone has had a chance to fly their airplane, what in your plane's design helped it fly far?" *Accept responses*. "Right! Often paper planes have a pointed nose to make them less air resistant, meaning they can glide more smoothly. Is there anything you would change about your design next time? How might changing your airplane change how it flies?" *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. Walk past the elevators to the other side of the building to explore *meLab*.

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 Discovery!* On this level of *meLab,* you can learn more about the human brain and human anatomy. You can also explore how smells can help doctors diagnose illness and how viruses like the flu are spread through human contact.

"This level of *meLab* also has the *Discovery Lab*, where educators sometimes lead tech activities."

Thought-provoking Question (2 minutes)

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

Grade 6: How does illness spread from person to person? What are some ways we can avoid getting sick?

Grade 7: What are some different methods scientists use to study the human body?

Grade 8: How are scientists studying the human brain? What have they learned?

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

10-minute free exploration

Supporting Standards

Grade 6

SC.6.L.14.6 Compare and contrast types of infectious agents that may infect the human body, including viruses, bacteria, fungi, and parasites.

Grade 7

SC.7.N.1.5 Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.

Grade 8

SC.8.N.1.5 Analyze the methods used to develop a scientific explanation as seen in different fields of science.

Optional Exhibit Interactive Highlight

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

"What are some ways we can protect ourselves from getting sick?" *Accept responses.* "Right! It's important to always wash our hands with soap and water after using the bathroom and throughout the day to maintain good hygiene. What about if you are already sick? Is there something you can do to avoid getting others sick?" *Accept responses.* "Absolutely. When you are already sick, it is important to avoid crowded places or stay at home if you can. It is also important to continue good hand washing routines to avoid getting more people sick."

"Another way to prevent disease from spreading is through vaccination. Vaccinations can help prevent or reduce the severity of a specific disease, like influenza or the flu. In this interactive, your goal is to prevent the flu from spreading. One of the best ways to do that is to vaccinate a good portion of the population in the first round of the game." *Let students gather around the table and encourage them to vaccinate as much of the population as possible during the first round.*

"The second round of the game begins with flu season. During this round, if members of the population turn red, this means they are sick and able to spread the flu to others." *Allow students to continue with the second round of the game. As they play, they should learn that they cannot send a sick person to get vaccinated. If they are not sure how to help the sick members of the population, remind students that when we are sick, we should stay home and rest. This should prompt students to send sick people to their homes. If a person in the game is stuck and not moving after being sent home, have students select the hand washing option. This will get the person moving again. At the end of the second round, students will learn whether they prevented the spread of the flu or if it became an epidemic.*

Ask the following questions after they complete the game:

- "Were you able to prevent a flu epidemic?"
- "What helped you prevent the spread of disease and epidemic?"
- "What could you have done better to help prevent the flu epidemic?"
- "What happened to the unvaccinated people when they encountered sick people?"
- "What happened to the vaccinated people when they encountered sick people?"
- "Why was it important to vaccinate as much of the population as possible in the first round of the game?"

Walk outside of *meLab* and walk down the stairs to *meLab* on Level 2 (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 6: How have natural disasters affected people in Florida?

Grade 7: How have scientists used biotechnology to genetically engineer organisms?

Grade 8: How is technology used to explore space?

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

10-minute free exploration

Supporting Standards

Grade 6

SC.6.E.7.7 Investigate how natural disasters have affected human life in Florida.

Grade 7

SC.7.L16.4 Recognize and explore the impact of biotechnology (cloning, genetic engineering, artificial selection) on individual, society and the environment.

Grade 8

SC.8.E.5.10 Assess how technology is essential to science or such purposes as access to outer space and other remote locations, sample collection, measurement, data collection and storage, computation, and communication of information.

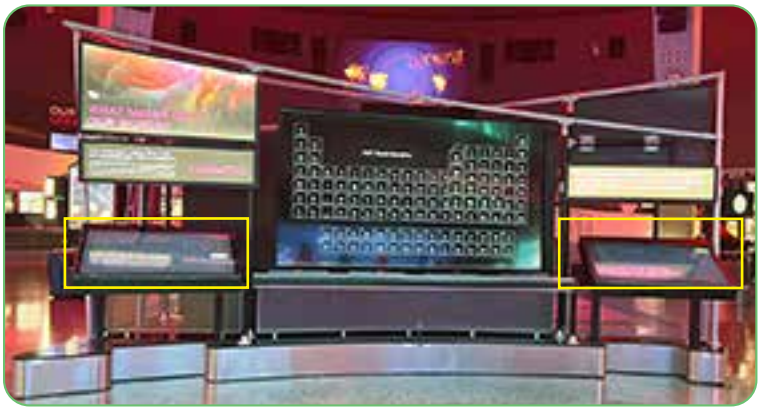
Optional Exhibit Interactive Highlight

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

"Today we are going to create a shoreline to protect our beaches from storm surge. Storm surge is what happens when hurricanes and other storms push water up onto land. To protect our beaches, we can add two different types of barriers: natural barriers or manmade barriers. Natural barriers include things like coral reefs and mangroves while manmade barriers include things like seawalls, like those found downtown or around the edge of the park next to the museum. Let's give it a try!"

Optional guiding questions:

- "How do mangroves and coral reefs protect shorelines from storm surge?"
- "Is it better to use natural barriers, manmade barriers or a combination of both to protect a city from storm surge?"
- "What is the benefit of using natural materials over manmade materials?"
- "What is more cost effective to use as a barrier, natural barriers or manmade barriers?"



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

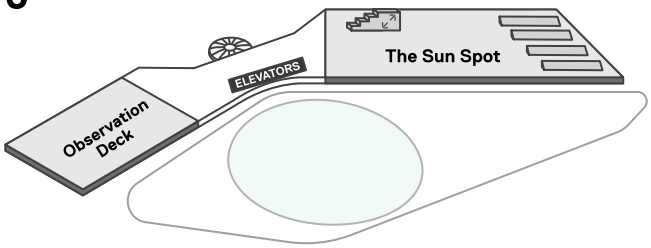
The Deep, the aquarium on Level 2, features jellies and a unique view of the Gulf Stream Aquarium via the Oculus.

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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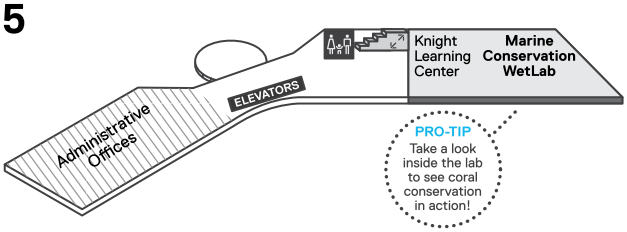

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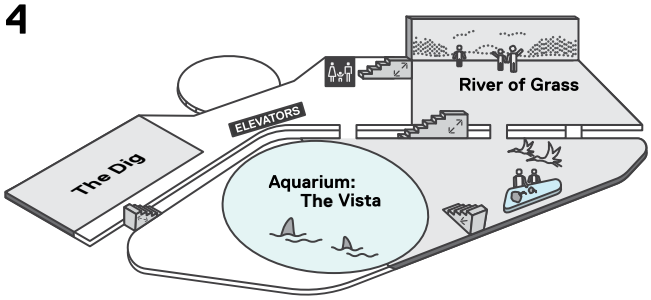

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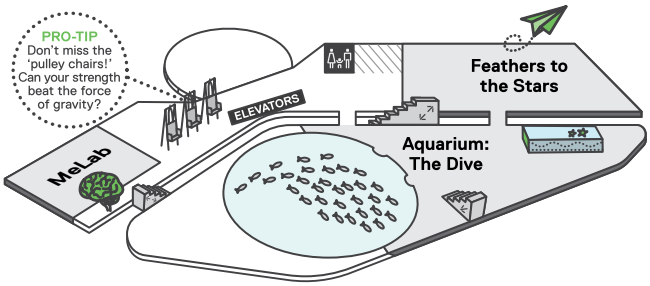
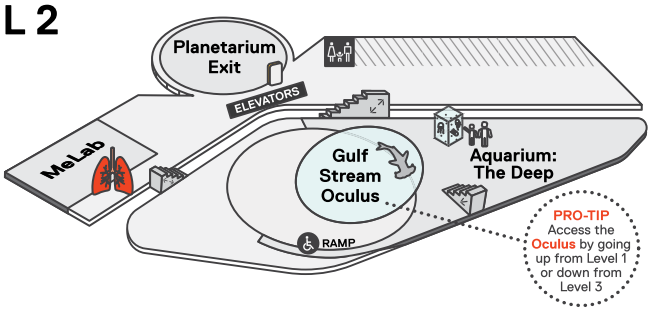
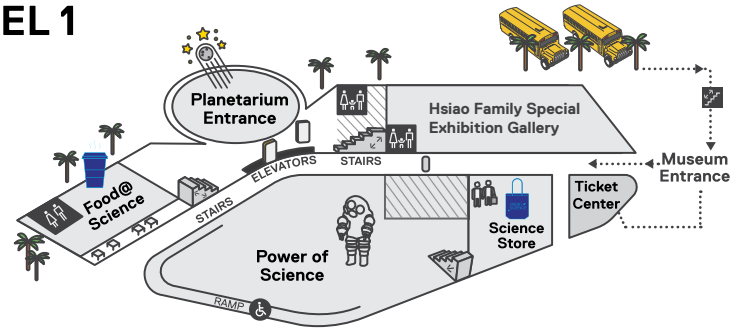


LEVEL 2



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.