Kindergarten Teacher Guide

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ARIZONA SCIENCE CENTER

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What's inside This Guide

Teacher Information
This guide will provide a brief introduction to the student Investigation, as well as suggestions about what to do before, during, and after your visit to the Arizona Science Center.

Standards
How this *Investigation* aligns with Arizona State Science Standards.

The Student Investigation at Arizona Science Center
Strategies on how to do your *Investigation* at the Science Center.

Pre- and Post-Visit Activities
Pre-visit classroom activities will help prepare your students for their Focused Field Trip experience. Post-visit activities will help your students take their Science Center experience back to the classroom, and enhance their learning.

Teacher Information
Congratulations! You have chosen an innovative, inquiry-based learning experience that:

- begins and ends in your classroom;
- is a structured discovery process linked directly to classroom curriculum;
- will promote a deeper understanding of scientific principles;
- promotes team problem-solving skills; and
- is fun!

Note to Educators
We encourage developmentally appropriate practice, a standard described by the NAEYC, which is based on decades of research and practice with how children learn best. Children's learning is affected by materials, the setting, timing, participants, and talk. While there is no specific formula for what to do, activities are attuned to children's levels of cognitive, social, physical, and emotional development: the whole child.

Children construct knowledge from play and explorations: physical (manipulating objects) and mental (wondering about something). Young children don't always think logically so giving them answers or correcting them is not likely to be effective in changing their thinking. The teacher's job is to provide rich experiences, ask thought-provoking questions that support children to revise their thinking, and trust the process.

<u>For your kindergarteners, your task is to:</u>

- Get your kindergarten children to observe and notice
- Validate the fact that their observations are worthwhile
- Tie their personal experiences across different settings
- Model organizing the observations

- Get them to play with materials that *transform* and *change over time*
- Ask questions about their thinking
- Help them learn to participate in a science discussion.

Before Your Visit

Read the *Investigation* workbook to become familiarized with the concepts that will be presented.

Divide your class into groups of five students.

Each group is a team and should work together to investigate the topic.

Do one or more Pre-Visit Activities.

These activities are directly related to the *Investigation* and will help your students focus on this topic and prepare them for their Arizona Science Center Focused Field Trip experience.

Prep your chaperones for the field trip to the Science Center.

Give them the *Investigation* booklet ahead of time. Chaperones are essential to the success of the *Investigation* – the more they know, the harder they will work to make your field trip a success.

Assign each team to a chaperone.

One chaperone for every five students is a must! Make copies of the next four pages of this guide to help your chaperones manage their group and make sure they read the "Tips for Chaperones" section in the *Investigation* booklet.

At the Science Center

Visit at least three of the *Investigation* exhibits.

You may wish to assign more than three; however, you will have time constraints imposed by lunchtime, IMAX and planetarium shows, and time spent waiting in line for popular exhibits.

Some of the activities in this *Investigation* may require assistance from one of our facilitators. Facilitators will be present in the galleries during your focused field trip and should be easy to spot in bright blue shirts. Not all the facilitated activities will be available at the same time, but a range of the activities in the *Investigation* will be available for every field trip.

Exhibits are also sometimes removed temporarily for repair or refurbishment and may be in use by other groups, so be prepared to be flexible. These activities can be performed in any order and groups may be rotated through various exhibits.

After Your Visit

Reinforce your visit with an experience from the Post-Visit page.

Chaperones

Teachers: *You will probably want to copy these suggestions for each chaperone. It is a good idea to distribute and review before you arrive at the Science Center.*

Chaperones

The following suggestions are designed to make your experience at the Arizona Science Center as enjoyable as possible:

- Learn the name of each student in your group. Make sure students in your group know your name.
- Make sure you know the times of any special demonstration, movie, and planetarium show, etc., your group is due to attend. Arrive at least 5 minutes early. (We do not allow groups to enter late if a movie or planetarium show has started.)
- Make sure your group stays close together at all times.
- Leave backpacks and large items on the bus or other transportation.
- If you are staying for lunch, make sure you know where your lunches are stored (or where the food court is if you are purchasing food), what time your group leader has arranged lunch, and where you are going to eat. The Center's lunchroom is now available by pre-reservation by calling 602-716-2028. Please work with our reservations associate to determine the best time for your group.
- If you are visiting on a focused field trip, read through the investigation materials. It is a good idea to do this before you arrive. Read each investigation out loud to you group before they begin. Finding the exhibits is part of the investigation, so be sure to check the maps located next to the elevators on each floor.
- You are responsible for the safety and behavior of students assigned to you. No running and no food, drink, candy, gum in the Arizona Science Center.
- You should encourage students to explore, investigate, and talk about their experiences during their visit.

Acompañantes

Maestros: *Quizás ustedes desearán copiar estas sugerencias para cada chaperón/a. Es buena idea distribuirlas y considerarlas antes de llegar al centro Science Center.*

Acompañantes: Las siguientes sugerencias han sido diseñadas para hacer su experiencia en el centro Arizona Science Center los más agradable posible:

- Apréndase el nombre de cada estudiante en su grupo. Asegúrese de que los estudiantes en su grupo sepan su nombre.

- Asegúrese de saber los horarios de cualquier demostración especial, película, presentación en el planetario, etc., a lo cual su grupo vaya a asistir. Lleguen por lo menos 5 minutos antes. (No permitimos que los grupos entren tarde si una película o presentación en el planetario ha comenzado.)

- Asegúrese de que su grupo se mantenga reunido en todo momento.

- Dejen las mochilas y los artículos grandes en el camión u otro tipo de transporte.

- Si se van a quedar a almorzar, asegúrese de saber dónde se almacenan sus almuerzos (o dónde está el área de comida si comprarán alimentos), a qué hora hizo arreglos el líder de su grupo para el almuerzo, y dónde van a comer.

- Si están visitando en un recorrido enfocado de campo, lea los materiales de investigación. Es buena idea hacer esto antes de llegar. Lea cada investigación en voz alta a su grupo antes de que comiencen. Encontrar las exhibiciones es parte de la investigación, así que asegúrese de recoger un mapa del Centro en el vestíbulo.

- Usted es responsable por la seguridad y el comportamiento de los estudiantes que se le han asignado. No se permite correr, ni alimentos, bebidas, dulces, chicles en el centro Arizona Science Center.

- Usted debe animar a los estudiantes para que exploren, investiguen y hablen sobre sus experiencias durante sus visitas.

Chaperone Information Card

Time of Planetarium Show: _____

Time of Movie: _____

Time of Demonstration: _____

Location of Demonstration:

_____

My Students:

_____

_____

_____

_____

_____

Lunch Time: _____

Departure Time: _____

Chaperone Information Card

Time of Planetarium Show: _____

Time of Movie: _____

Time of Demonstration: _____

Location of Demonstration:

_____

My Students:

_____

_____

_____

_____

_____

Lunch Time: _____

Departure Time: _____

Tarjeta de Información para Chaperones

Hora de la Presentación del Planetario:_____

Hora de la Película: _____

Hora de la Demostración: _____

Lugar de la Demostración:

_____

Mis Estudiantes:

_____

_____

_____

_____

_____

Hora del Almuerzo: _____

Hora de Salida: _____

Tarjeta de Información para Chaperones

Hora de la Presentación del Planetario: _____

Hora de la Película: _____

Hora de la Demostración: _____

Lugar de la Demostración:

_____

Mis Estudiantes:

_____

_____

_____

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Hora del Almuerzo: _____

Hora de Salida: _____

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Arizona State Science Standards Alignment
Kindergarten Investigation

The activities in these Investigations address the following kindergarten science standards adopted by the Arizona Department of Education in 2004.

Strand 1: Inquiry Process

Concept 1: Observations, Questions, and Hypotheses

Observe, ask questions, and make predictions.

PO1. Observe common objects using multiple senses.

PO3. Predict results of an investigation based on life, physical, and Earth and space sciences (e.g., the five senses, changes in weather).

Concept 2: Scientific Testing (Investigating and Modeling)

Participate in planning and conducting investigations, and recording data.

PO2. Participate in guided investigations in life, physical, and Earth and space sciences.

Concept 4: Communication

Communicate results of investigations.

PO1. Communicate observations with pictographs, pictures, models, and/or words.
(See M00-S2C1-02)

Strand 4: Life Science

Concept 3: Organisms and Environments

Understand the relationships among various organisms and their environment.

PO1. Identify some plants and animals that exist in the local environment.

PO2. Identify that plants and animals need the following to grow and survive:

- food
- water
- air
- space

PO3. Describe changes observed in a small system (e.g., ant farm, plant terrarium, aquarium).

Strand 5: Physical Science

Concept 3: Energy and Magnetism

Investigate different forms of energy.

PO1. Investigate how applied forces (push and pull) can make things move.

PO2. Investigate how forces can make things move without another thing touching them (e.g., magnets, static electricity).

Strand 6: Earth and Space Science

Concept 3: Changes in the Earth and Sky

Understand characteristics of weather conditions and climate.

PO1. Identify the following aspects of weather:

- temperature
- wind
- precipitation
- storms

PO2. Describe observable changes in weather.

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PO3. Give examples of how the weather affects people's daily activities.

The Investigation

Please copy the *Investigations* responsibly by using recycled paper and copying back to back. For grades K-2, the *Investigation* has been written for use by teachers or chaperones. *Investigations* for grades 3 – 8 have been written for use by students.

We Suggest

Do a pre-visit activity or have a discussion to establish prior knowledge of your field trip's focus. This will help illustrate scientific principles related to the *Investigation* and will focus your group before their trip to the Science Center.

Give the *Investigation* workbooks to your chaperones a day or two before the field trip. The more they know, the better able they are to make your field trip a success.

When you return to the classroom, everyone can share what s/he experienced at the Science Center, along with group results. Since each group may have explored different exhibits, we suggest that the groups share their information and ideas about the exhibits they visited.

Pre-Visit Activities

The Body

Strand 4 Life Science, Concept 1 PO2: Name body parts

1. Play Simon Says using directions related to hands, feet, skin, head, eyes, and so forth

Ecosystems

Strand 4 Life Science, Concept 3 PO2: Identify that plants and animals need food, water, air, and space to grow and survive

Materials: labeled cards with string to go around each child's neck OR labels on tape to go on their shirts; a soft ball to toss or a ball of wool

1. Give each child a card around their neck or a piece of tape for their shirt that has one of the following words: rock, [kinds of plants], [kinds of flowers], [kinds of insects, birds, reptiles, mammals, etc.], cloud, river, dirt, air, sunshine, rain, wind.
2. Give one child a ball and ask them to toss it to someone. Have the child who catches the ball guess how the two elements go together (e.g., a bird can perch on a rock). Repeats are fine to show how many things are interrelated.
   If you use a ball of wool children hold onto the strand; at the end you'll have a nice web, illustrating that all these elements are related.

Sound

Strand 5: Physical Science, Concept 3 PO1: Investigate how applied forces can make things move

Materials: a variety of instruments or things that make noise, as well as string, rubber bands, wood blocks, cloth, and other materials.

1. Set the materials out and ask the children to find out how many ways they can make sound from them.
2. Have them show each other how they changed the loudness, pitch, and clarity of the noises.

Water Erosion

Strand 5: Physical Science, Concept 3 PO1: Investigate how applied forces can make things move

Materials: aprons, tubs, water, nested cups, funnels, plastic tubing; chart paper, marker.

1. Let the children play with the water, cups and so on in the tubs. In a group, discuss what they noticed about the water and record their observations on chart paper.

Magnets

Strand 5: Physical Science, Concept 3 PO2 and 4: Investigate how forces can make things move without another thing touching them; identify familiar everyday uses of magnets

Materials: different shaped magnets (bar, horseshoe, circular), small objects of various materials; chart paper, marker.

2. Arrange the desks in groups. Give each group magnets and a heap of little objects. Ask them to "find out everything you can about the magnets." Give them 15-20 minutes to explore. Encourage them to test other items in the room if they like.
3. Gather the children into a circle and ask them to share what they observed. Point out when children report seeing similar things or when they notice something surprising.
4. You can keep a record of what they notice on chart paper. If you decide to chart which objects attracted magnets, have the kids add their own observations to the common chart, with marks or stickers. End by asking the children for their guesses about what the objects had in common. Don't tell them the answers: let them discuss their ideas and reasons.

Background Information: We do know a magnetic field contains energy but the fields behave differently in different circumstances and we don't know how they exert force at a distance. They are related to electrical fields but are different from them.

Here is a sample chart you can draw…

Magnet Attraction Graph

YES ☺	NO ☹	Objects
		Paperclip 
		Keys 
		Marker 
		Crayon 
		Scissors 
		Safety Pin 

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Weather

Strand 6: Earth and Space Science, Concept 3 PO3: Give examples of how the weather affects people's daily activities

Materials: Flash, Crash, Rumble, and Roll by Franklyn Branley.

1. Invite children to share stories of their own experiences with weather.
2. Point out commonalities, acknowledge their feelings, build on any references that come up about powerful forces of water, air, or land forms (like big winds in the forest).
3. Read Flash, Crash, Rumble, and Roll.

Post-Visit Activities

Once you are back in the classroom, show the children how they can represent their ideas in words, pictures or charts. Discuss what they noticed on their visit and their "whys" and record their observations for them in some way. Again, there are no right and wrong answers. Your job is to organize what they saw and help them find patterns among their observations.

The Body

Strand 4 Life Science, Concept 1 PO2: Name body parts

Materials: Kraft paper, crayons, glue, black line masters of organs

1. Trace each child's full body outline on Kraft paper.
2. Give each child pages with labeled outlines of: a heart, kidneys, liver, lungs, brain, stomach, small and large intestines.
3. Have them color the organs if they like, cut them out, and paste them on their body.
4. They can also label the external parts like head, feet, knees, etc.

Ecosystems

Strand 4 Life Science, Concept 3 PO2: Identify that plants and animals need food, water, air, and space to grow and survive

Materials: Chart paper, marker; drawing paper and crayons

1. In a group, have the children share what they noticed about the ecosphere. Record their observations and organize them into categories like living/non-living or food/non-food.
2. Have them draw and label what they would need if they lived in a little bubble dome.