Third Grade 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!

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: _____

Arizona State Science Standards Alignment
Third Grade Investigation

The activities in these Investigations address the following third grade 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. Formulate relevant questions about the properties of objects, organisms, and events of the environment using observations and prior knowledge. (See M03-S2C1-01)

PO2. Predict the results of an investigation based on observed patterns, not random guessing.

Concept 2: Scientific Testing (Investigating and Modeling)

Participate in planning and conducting investigations, and recording data.

PO3. Conduct simple investigations (e.g., related to plant life cycles, changing the pitch of a sound, properties of rocks) in life, physical, and Earth and space sciences.

Concept 3: Analysis and Conclusions

Organize and analyze data; compare to predictions.

PO2. Construct reasonable interpretations of the collected data based on formulated questions. (See M03-S2C1-03)

PO3. Compare the results of the investigation to predictions made prior to the investigation.

PO4. Generate questions for possible future investigations based on the conclusions of the investigation.

Concept 4: Communication

Communicate results of investigations.

PO1. Communicate investigations and explanations using evidence and appropriate terminology. (See W03-S3C2-01)

Strand 5: Physical Science

Concept 3: Energy and Magnetism

Investigate different forms of energy.

PO1. Demonstrate that light can be: reflected (with mirrors), refracted (with prisms), absorbed (by dark surfaces)

PO3. Demonstrate that vibrating objects produce sound.

PO4. Demonstrate that the pitch of a sound depends on the rate of the vibration (e.g., a long rubber band has a lower pitch than a short rubber band).

Strand 6: Earth and Space Science

Concept 1: Properties of Earth Materials

Identify the basic properties of Earth materials.

PO2. Describe the different types of rocks and how they are formed: metamorphic, igneous, sedimentary

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The Investigation

Please copy the *Investigation*s 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

A Focused Field Trip begins with classroom discussion of the topics you want to cover at the Arizona Science Center. Here are some introductory activities to get your third graders interested in earth materials, and the properties of sound and light.

From the Earth

Earth materials are materials from the Earth like soil, rocks, minerals and fossil fuels. This would also include things grown in soil. Almost everything around us has been made from, or is, an Earth material - vegetables, fruits and grains, salt, aluminum foil, baby powder, building materials, iron, cement, etc.

Supplies

Prepare a bag containing a variety of items made from Earth materials (suggestions: pencil, soda can, terra cotta pot, cotton ball, un-popped corn, beans, aluminum foil).

Activity

Hold up the items from the bag one by one. As a class, ask the students if they think each item was made from an Earth material. Place items into piles according to what the students think. After you have sorted all of the items, ask the students what they think the different items were made from.

What is happening?

Everything in the bag was made from materials from the Earth! Earth materials are things from the Earth like soil, rocks, minerals and fossil fuels. Earth materials also include things grown in soil like trees, vegetables and fruit.

Watery Vision

Have you ever reached down into a bathtub or pool to grab something, only to discover that it was not where you thought it was? Do you know why that happens?

Supplies

Per student or small group: clear jar of water, ruler, pencil, and a ping pong ball.

Activity

1. Give students a jar, ruler, and a pencil.
2. Fill the jar with water and put the ruler in.
3. Now, turn the glass so the ruler is sideways and have students look carefully. What do they see? Does the ruler look straight? Leave the jar filled with water and place the pencil in the jar.
4. Now, turn the jar and look from different sides. What do they notice?

What is happening?

Light travels more slowly through water than through glass or air. Because of this, the light's direction changes a little bit causing you to see the pencil and ruler in two different places. The top part of the objects you see only through air and the glass. The bottom parts you see through water, air and glass, making them appear to be in different places than in the top parts.

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. Now that you have investigated some topics at Arizona Science Center you can continue your exploration back in your classroom!

Time to Brush

Supplies

Calcium Carbonate (Tums - ground up - coffee grinders work great!), Sodium Bicarbonate (baking soda), 2 small plastic spoons, Small cups (Dixie cups, etc.), plastic cups for water, straws, and craft sticks.

Activity

1. Give each student one small cup, one plastic cup with a small amount of water, one straw, and one craft stick.
2. Have each student put one (not heaping) spoonful of calcium carbonate, and ½ spoonful (not heaping) of sodium bicarbonate into their cup.
3. Using the straw to draw water (finger over top method), have students slowly drop water into the cup, and mix with a craft stick until the material becomes paste-like.

What did you just make? What do you think the main ingredients for toothpaste are?

What is happening?

Earth materials - minerals! We used sodium bicarbonate (baking soda), and calcium carbonate (Tums). These minerals clean and scrub your teeth.

Balloon Talk

Feel vibrations by blowing up a large balloon.

Supplies

One large balloon for each two students.

Activity

1. Put students in pairs.
2. Blow up the balloons.
3. One person, putting their mouth on the balloon, speaks, while one person places their hand on the other side of balloon.

Can you feel the vibrations?

What is happening?

You can feel sound vibrations as they travel through substances. Have you every felt your cat as it purred? Touched a ringing alarm clock? Put your hand on a speaker when playing loud music? What did you feel? Some people who are deaf dance in time to music by feeling the vibrations sounds make!