



K-2: Rocket Park

Curriculum Connections

Physical Sciences Concepts

- Begin to investigate variables, such as shape, material, and mass, and how they may affect an object's properties.
- Begin to investigate how various forms of energy and different forces interact with objects and properties.

Scientific Connections and Applications

- Become aware of and describe the importance of science and scientists in their world.

Scientific Thinking

- Begin to ask questions and construct explanations based on observations of objects and events.

Scientific Communication

- Acquire information from observation, experimentation, print and non-print sources.

** Based on the New York State Elementary Science Core Curriculum and the New York City New Standards™*

National Standards

Content Standard E: Science and Technology

- Abilities of technological design
- Understanding about science and technology
- Abilities to distinguish between natural objects and objects made by humans

Content Standard G: History of Nature and Science

- Science as a human endeavor

K-2 Exhibits List

The Rocket Display at the 1964 World's Fair

Mercury-Atlas D Rocket

Mercury-Atlas D Rocket Climb-In Capsule

Gemini-Titan 2 Rocket

Saturn 5 Engine

Guide Theme

The theme of these guides are based on popular crime and detective show investigations on TV; a mystery unfolds, questions are asked, evidence is gathered, conclusions are drawn. This process is similar to what scientists go through with the inquiry method. For more details see About the Guides.

Begin the Investigation At School

A mystery unfolds, questions are asked...

There are several ways you can introduce the topic and start the investigation. Here are some ideas that will help students start thinking about the topic and generate questions:

- Scientists and engineers launched a 3,000 pound capsule with a man inside into space. How did they do it?
- Gun powder was discovered in China hundreds of years ago. If it hadn't been discovered man would never have been able to launch into space. Why?
- Demonstrate one of the Laboratory Activities with no explanation-let the questions begin



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- Do one of the Laboratory Activities and facilitate a probing discussion

Prepare for Investigation at the New York Hall of Science

Once students have generated questions around the topic tell them they are going to continue the investigation at the New York Hall of Science.

At this point you may want to begin one of the Continuum Activities. These activities have the following features:

- Vary in length and depth
- Provide continuity and purpose for the visit
- Provide a way of assessing student understanding

Orientation and Planning: If you do nothing else, do this!

Here are five reasons to conduct student orientation and planning before going on a field trip:

1. Students focus on exploring and investigation versus the novelty of the location
2. Students don't have to worry about logistics like restrooms, schedule, eating etc.
3. Students who understand the plan and purpose of the visit are more likely to stay focused
4. Students who have clear goals for their visit are less likely to race from one exhibit to another with little understanding
5. Students who get involved in the planning of the visit, take ownership and are less likely to misbehave

Read more about the Orientation and Planning Process

Investigation at the New York Hall of Science

Evidence is gathered...

Okay. The class has arrived at the next phase of the investigation. The students have questions and seek answers. Everyone knows what exhibits they should visit and why. Everyone knows the schedule for the day. Students have materials to record findings or work on a Continuum Activity if required.

If all of the above is true, congratulations on a successful Orientation and Planning.

If you are curious about what teachers can do on site, we've put together a little piece called Teacher Role.

Finish the Investigation Back at School

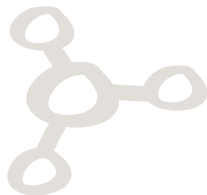
Conclusions are drawn...

There are several ways you can complete the investigation. Some require less time than others. Here are some ideas:

- Student or group oral or written reports on investigation questions and answers
- Student or group illustrations of visit with answers to questions or mystery
- Do one of the Laboratory Activities
- Complete the Continuum Activity

Continuum Activities

Continuum Activities are designed to carry through the entire investigation. Some activities require less time than others.



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Investigation Map

Description: Detectives will often map out related events, evidence and suspects during an investigation. This helps them get an overall picture. Students can map out their investigations with a concept map. The concept map will help you assess what students learn.

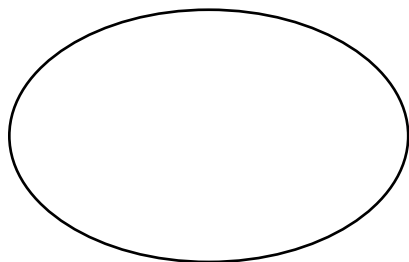
Time: (3)15-30 min. Sessions

Materials Needed:

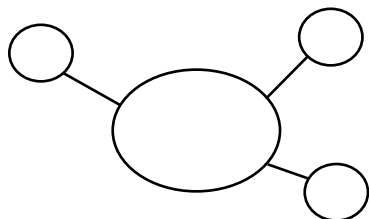
- Blank paper
- Pencils, crayons

Procedure:

1. Begin with a center circle and write in the name of the main topic. (Students who have difficulty with writing can have an adult assist or draw a representation of the main topic)



2. As students generate questions about the topic, they can add offshoot circles. They can also add circles for facts they know about prior to the visit to the New York Hall of Science.



3. When students return from their investigation at the New York Hall of Science they add additional circles of information. Their final map should reflect everything they know about the topic. Teachers can easily assess what is learned based on how the map develops.

Investigation Journals

Description: Investigation journals provide a way for students to record their questions and findings throughout the investigation.

Time: (3)15-30 min. Sessions

Materials Needed:

- Blank or lined paper
- Pencils or crayons
- On-Site Investigation Handout (print out from this web site and make copies)
- Zip-lock bags (for on-site handout only)
- Soft yarn or thick soft string (for on-site handout only)

Procedure:

1. Ask students if they have ever seen a detective take notes when trying to solve a mystery. Tell stu-



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dents that as “science detectives” they too will make a record of the mystery.

2. Have students begin their journal or report with questions that are generated when they Start the Investigation at School.
3. Students who do not have writing skills can make a large question mark and draw representations of their questions. If an experiment or demonstration is done, non-writing students can sketch what they observe.
4. Older students with writing skills can list their own and other students questions in their journal.
5. We strongly advise students not bring journals to the New York Hall of Science where they can get lost. We have provided an On-Site Investigation Handout that can be copied if students want to record observations or make sketches.
6. When students return from their investigation at the New York Hall of Science have them write answers to questions or draw what they observed.



Become an Explainer

Description: Student science detectives investigate one exhibit with the goal of being able to explain it when they return to the classroom. Students can choose a variety of methods to explain and make presentations.

Time: (1) 15 min. Session (right before going on Field Trip)
(2) 45 min. Sessions (for in-class presentations)

Materials Needed:

- Interesting object (used for student observation)

(optional suggestions)

- Variety of craft materials (string, paints, glue, tape, colored paper, scissors, etc)
- Variety of clean, household recyclables (meat trays, cardboard tubes, aluminum foil, plastic wrap)
- Any other odds and ends students can construct with
- Poster board or paper
- Markers, crayons

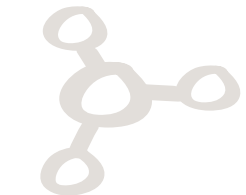
Procedure:

First Session

1. Tell students as “science detectives” they will investigating exhibits at the New York Hall of Science and will choose one exhibit to explain to the class when they return. (students can work in groups or individually)
2. Help students prepare for careful observation of exhibits by showing them an interesting object. (make sure all students can see object)
3. Now ask students to verbally describe what they see. Encourage details.
4. After students have described the object in great detail, tell them they will need to use these same observation skills when they are investigating their chosen exhibit.
5. Go to the New York Hall of Science. (encourage observation and verbal descriptions)

Second Session

1. Upon return to class from the trip, tell students they will spend time preparing to explain one of the exhibits they saw.





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2. Here are some suggestions for student presentations:

- Verbal explanation (with or without picture)
- Group or individual poster showing how an exhibit worked
- Group or individual model using materials to represent exhibit (materials can be used to substitute and represent real materials from exhibit— ex. Clear plastic wrap simulates glass, cardboard tube becomes a rocket etc.)

Third Session (optional)

Use this time for students to make their class presentations if they made posters, drawings or models.

Laboratory Activities

Laboratory Activities are designed for the classroom and generally require simple materials. These activities can be done before or after a visit to the New York Hall of Science. To help students use higher-level thinking and generate questions, facilitate discussion with these types of questions:

- What do you notice here?
- Tell me about this.
- What do you see?
- Why do you suppose this happens?
- What can you conclude from the evidence?

Fizz Rocket

Description:

Students construct and launch a simple rocket fueled by the chemical reaction of vinegar and baking soda or alka-seltzer tablets.

Time:

(1) 45 minute session

Materials Needed:

(per student group or individuals depending on supply)

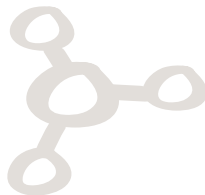
- Styrofoam or thick paper plate
- toilet paper tube
- markers
- tape
- plastic 35mm film canister with snap on lid
- vinegar and baking soda or alka-seltzer tablets
- measuring spoons

Teacher Note:

After students have decorated their rocket launchers, this activity is best done outside as it is somewhat messy.

Procedure:

1. Tell students they are going to make a rocket and power it with a fuel they might find in their own homes.
2. Distribute materials to student groups.
3. Instruct students to create a design with markers on the toilet paper tube that will become the rocket launcher.





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4. Have students tape the rocket launcher securely to the center of the plate.
5. Go outside to do the rest of the activity.
6. Instruct students to prepare the rocket and fuel. They will need to be quick with this procedure. Explain that as soon as they make the fuel they are going to have to snap the lid on the canister, drop it in the launcher and stand back. You may want to practice snapping on the lid and dropping it in the launcher with younger children.

7. Vinegar and Baking Soda Fuel

1. Put 1 tbsp. of vinegar in the film canister
2. Add 1/2 tsp baking soda
3. Quickly snap the lid on and drop into the launcher lid side down
4. STAND BACK
5. Rocket will launch (usually 10-20 seconds)

Be sure to wait at least a minute before checking on the rocket if it doesn't launch.

Alka-seltzer Fuel

1. Put 1 tbsp. water into the film canister
2. Add 1/2 an alka-seltzer tablet and quickly snap on the lid
3. Quickly snap the lid on and drop into the launcher lid side down
4. STAND BACK
5. Rocket will launch (usually 10-20 seconds)

Be sure to wait at least a minute before checking on the rocket if it doesn't launch.

Book List

Books you can use throughout the investigation are:

Rockets

Branley, Franklyn M. *Rockets and Satellites*, Harper & Row Publishers, 1987.
Moche, Dinah L. *Amazing Rockets*, Western Publishing Company, 1990.

Space

Cole, Joanna. *The Magic School Bus: Out of This World*, Scholastic, 1996.
Moche, Dinah L. *My First Book About Space*, Golden Press, 1982.
Moche, Dinah L. *Amazing Space Facts*, Western Publishing Co. 1992.

