**Why Use a Science Notebook?**

**RECORD EXPERIMENTAL DATA**

A science notebook is a place for students to record experimental data, much like scientists record their experimental data. Science notebooks make science more meaningful for students because they are able to design experiments, record, and reflect on their work. Students will learn through designing experiments that science is based on evidence and that science knowledge can change based on new evidence, important tenets of the Nature of Science.

**DEVELOP INQUIRY SKILLS**

Using a science notebook can help students develop inquiry skills and practice science process skills such as observe, sort, infer, predict, collect data, and conclude. Designing an experiment is a key skill that will help students understand the Nature of Science in *National Geographic Science*.

**ENHANCE UNDERSTANDING OF SCIENCE CONTENT**

A science notebook can help students understand science content. Writing about what they learn helps students understand science concepts and improves organizational skills. Encourage students to use science notebooks to present findings to share with others.

**DIFFERENTIATE INSTRUCTION**

A science notebook provides a way to support differentiated instruction. You can design science notebook use in your classroom so that students move at their own pace. This may include flexible time frames for completing work or small groups to support student learning.

**EVALUATE**

You can use the science notebooks for evaluation. Review the notebooks and see what understandings students have reached and what material you need to teach again. You may have students use their notebooks for self-reflection by marking places where they think they have successfully thought about and accomplished a section.

---

Newton’s First Law of Motion:
An object that is not moving will not start moving until it is pushed or pulled.
Setting Up a Science Notebook

Guide your students to set up a structure that will support their learning and your evaluation of science understanding.

1. **Introduce the science notebook to students.**
   
   Say: *Like scientists, you will use this science notebook for your science work. It’s your own notebook to use every time you do science. Like a real scientist, you will write notes in it, draw pictures, write about experiments, and write vocabulary words.*

2. **Have students choose an organization style.**
   
   **DAILY RECORD:** Students can make entries, in order, as they move through the unit. They can take notes about the Nature of Science, content lessons, and inquiry activities.

   **SEPARATE SECTIONS:** Students can create separate sections for designing experiments, inquiry activities, vocabulary, notetaking, questions, reflections, and so on.

3. **Have students choose the notebook.**
   
   Some students may want to put looseleaf paper in a binder. Other students may choose a spiral notebook, a two-pocket folder, or a composition book. Still other students might choose a combination of these.

4. **Have students make and/or decorate the cover.**
   
   Instruct students to include their names and grade on the cover.

5. **Have students write “Contents” on the first right-hand page.**
   
   Suggest that students save several pages for the Table of Contents and fill in the information as they continue through the unit.

6. **Tell students that they should number the pages as they go along.**
   
   Tell students to add the appropriate page numbers to the Table of Contents as they proceed through the unit.

---

**TEACHING TIPS**

- Have students use the science notebook daily or on a regular basis. Assign a student to pass them out at the beginning of each science period. Collecting the notebooks each day and keeping them in a central place may help them last longer.

- Students may want to tape or staple a ribbon into the notebook and use it to mark their place.

- Tell students to use labels and/or captions for all drawings.

- Students can include graphic organizers to help them understand and organize information. A variety of graphic organizer options are found in the Learning Masters Book.

- You may want to use sticky notes to indicate corrections or additions that students need to make in their science notebook.
What’s In a Science Notebook?

Science notebook references are included throughout the Teacher’s Edition. A science notebook is a place to record observational data and inferences. Students can record their observational data and inferences in a variety of ways.

**STUDENT DRAWINGS**

- Have students draw pictures to illustrate the Nature of Science (science is based on observations and inferences) and their understanding of science concepts.

**TABLES, CHARTS, AND GRAPHS**

- Draw tables, charts, and graphs to record information or data.

**NOTES**

- Encourage students to jot down notes from each lesson in their science notebook. They can include graphic organizers, charts, lists, questions, and sketches. Suggestions for notetaking appear in the Teacher’s Edition at point of use.

---

**Pushes and Pulls on a Playground**

<table>
<thead>
<tr>
<th>pulls on a playground</th>
<th>pushes on a playground</th>
</tr>
</thead>
<tbody>
<tr>
<td>gravity</td>
<td>a girl pushes a ball</td>
</tr>
<tr>
<td>a boy pulls a wagon</td>
<td>boys and girls push swings</td>
</tr>
</tbody>
</table>

A girl pushes a ball with a kick. A boy pulls a wagon. The girl on the slide starts at the top and goes to the bottom. Some force (gravity) must be pulling her toward the ground.
COLLECTED OBJECTS
- magnet
- fallen leaf
- baseball card
- other

REFLECTIVE AND ANALYTICAL ENTRIES
- You might want to give students prompts or frames to guide them as they write in their science notebooks. For example:
  - I want to find out ________
  - If ________, then ________.
  - What would happen if I change ________?
  - I think ________ because ________
  - The most important thing I learned in this chapter was ________
  - I was surprised to learn ________.

OTHER QUESTIONS STUDENTS HAVE
- Students may have a variety of questions. Have them record questions and help them research the answers.

Integrated Technology
- Digital Camera  Suggest that students use digital cameras to take photos. The photos can be included in their science notebook.
- Computer Presentation  Encourage students to share their ideas. They can share their notebooks with each other, present their ideas to the class, or talk about their ideas in small groups. They can also make computer presentations as appropriate.

Pushes in Baseball
Swinging a bat is a push. I want to find out if a bat hitting a baseball is a push or a pull.

Why are some hits long?
Why are some hits short?
What’s In a Science Notebook? continued

**STUDENT REPORTS**

- Students can answer one or two reflective questions at the end of each chapter. Or you can assign special projects or reports for them to write in their notebook.

---

**What I Learned**

The most important thing in this chapter is that objects move in different ways. I know that sometimes when I go sledding straight down a steep hill I go too fast. I infer that going in a zigzag motion helps to slow the object down.

---

art by Braedyn, age 7
What’s In a Science Notebook?

Science notebook references are included throughout the Teacher’s Edition. A science notebook is a place to record experiments. Students can record their experiments in a variety of ways:

**STUDENT DRAWINGS**
- Have students draw pictures to illustrate the Nature of Science (science is based on designing experiments) and their understanding of science concepts.

**TABLES, CHARTS, AND GRAPHS**
- Have students draw tables, charts, and graphs to record information or data.

**NOTES**
- Encourage students to jot down notes from each lesson in their science notebook. They can include graphic organizers, charts, lists, questions, and sketches. Suggestions for notetaking appear in the Teacher’s Edition at point of use.

At the top of the hill, the roller coaster car has potential energy. This is stored energy.

Potential energy turns into kinetic energy when an object begins to move. Mechanical energy = potential energy + kinetic energy.
The Energy in a Spring

If I compress this spring, it has potential energy.

How do I increase this spring’s potential energy?

COLLECTED OBJECTS
• photographs
• magazine and newspaper clippings
• examples of materials that use energy

REFLECTIVE AND ANALYTICAL ENTRIES
• You might want to give students prompts or frames to guide them as they write in their science notebook. For example:
  I want to find out ________.
  If ________, then ________.
  What would happen if I changed ________?
  I think ________ because ________.
  The most important thing I learned in this chapter was ________.
  I was surprised to learn ________.

OTHER QUESTIONS STUDENTS HAVE
• Students may have a variety of questions. Have them record questions and help them research the answers.

Integrated Technology
• Digital Camera  Suggest that students use digital cameras to take photos. The photos can be included in their science notebook.
• Computer Presentation  Encourage students to share their ideas. They can share their notebook with each other, present their ideas to the class, or talk about their ideas in small groups. They can also make computer presentations as appropriate.
In this chapter I learned about the different forms of energy. Kinetic, potential, mechanical, sound, light, heat, and chemical are all forms of energy. They all cause change or movement.

<table>
<thead>
<tr>
<th>Form of Energy</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>kinetic</td>
<td>moving car</td>
</tr>
<tr>
<td>potential</td>
<td>car at the top of a hill</td>
</tr>
<tr>
<td>sound</td>
<td>guitar strings vibrating</td>
</tr>
<tr>
<td>light</td>
<td>light bulb</td>
</tr>
<tr>
<td>heat</td>
<td>campfire</td>
</tr>
<tr>
<td>chemical</td>
<td>car running on gasoline</td>
</tr>
</tbody>
</table>
Using a Science Notebook for Inquiry Activities

The inquiry activities in *National Geographic Science* provide an opportunity for students to ask questions and do investigations much like scientists do. Writing what they learn will help students understand why they are doing the activity and what it teaches them.

**Ask a Question**
- Every inquiry activity begins with a question that shows the purpose of the activity. Have students write the question in their science notebook.

**Build Vocabulary**
- Have students write the Science Process Vocabulary words and their definitions in their science notebook.

**Make a Prediction**
- Have students write a statement predicting what will happen in the activity. Encourage students to use their prior knowledge and experience to make the prediction.

Example:
- **How does a charged balloon affect other objects?**
- **Predict:** When you predict, you tell what you think the results of an investigation will be.
- **Infer:** When you infer, you use what you already know and what you observe to draw a conclusion.
- I predict that two charge balloons will push each other apart. They will pick up other objects though.
1. Blow up 2 balloons. Tie a knot at the bottom of each balloon. Tie a piece of string to each balloon.

**Effect of a Charged Balloon on Objects**

<table>
<thead>
<tr>
<th>Prediction</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Another charged balloon</td>
<td></td>
</tr>
<tr>
<td>Tissue paper</td>
<td></td>
</tr>
</tbody>
</table>

**WHAT TO DO**
- Have students write or draw the steps of the activity in their notebook.

**DESIGN AND RECORD EXPERIMENTS**
- Have students record their data from the experiments they design in the table on the Learning Master or have them draw and fill in their own table or graph. Students can write or make drawings to record their data from the experiments they design.
Using a Science Notebook for Inquiry Activities  continued

EXPLAIN AND CONCLUDE

- Have students examine data, or evidence, and use this evidence to design experiments, develop explanations, and draw conclusions about their results. This is what the Nature of Science is all about. Students design experiments and draw conclusions based on their evidence. New conclusions can then be made based on further experiments.

- Students will have learned that there is no single scientific method that all scientists follow and that there is a number of ways to do science.

THINK OF ANOTHER QUESTION

- Have students reflect about what they have learned. Then have them use their observations to think of other questions that they could study through an investigation. Have them write their questions in their science notebook.

---

The balloons pushed apart after they were rubbed with the cloth. The balloons each picked up an electric charge.

Can I change objects other than balloons?
Science Academic Vocabulary

Students can use their science notebook as their own vocabulary resource.

Have students designate a special section of the science notebook for Science Academic Vocabulary.

- Write the vocabulary words and their definitions on a Science Word Wall for students to copy.
- Encourage students to use the graphic organizers from the Learning Masters Book or draw their own for recording vocabulary.
- Students can write the word, draw a picture, write a definition in their own words, and write a sentence using the word.
- Students can fill in a Word Web.
- Students can make their own vocabulary cards or use the Vocabulary Cards Graphic Organizer, writing the word on one side and a picture and/or a definition on the other side.
- Encourage students to write ideas about vocabulary in their science notebook.