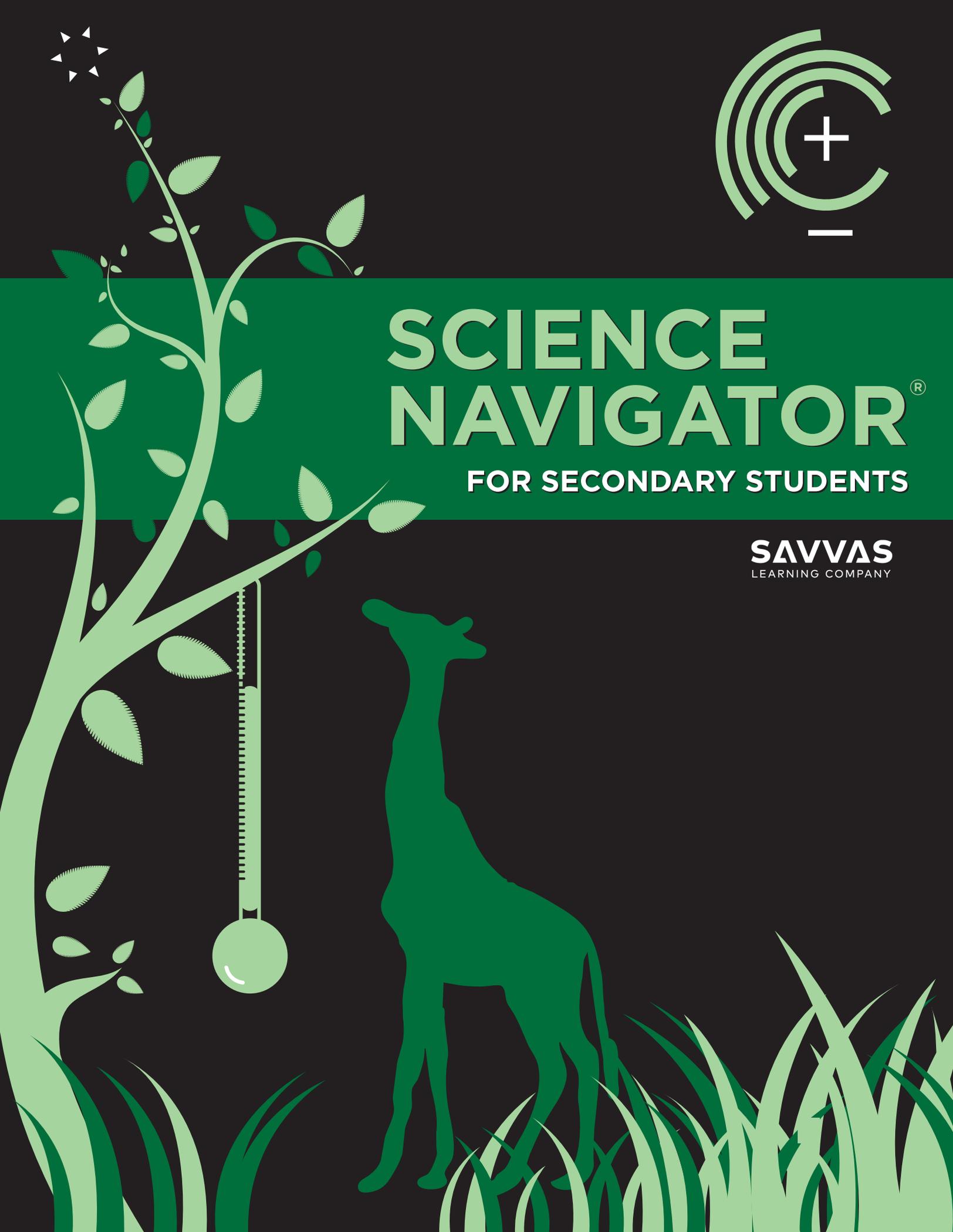


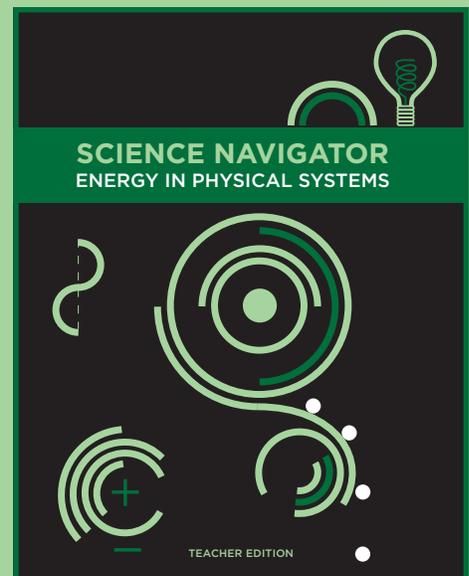
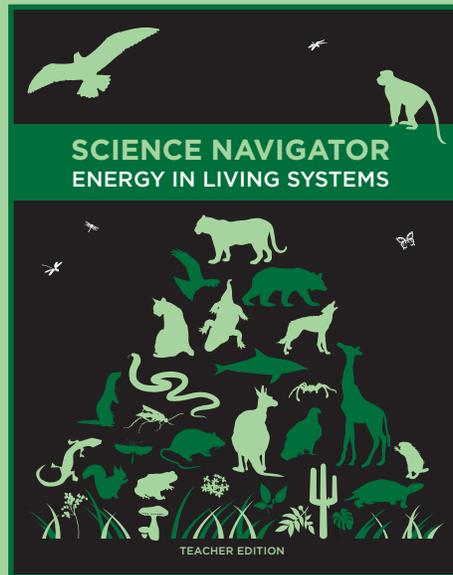
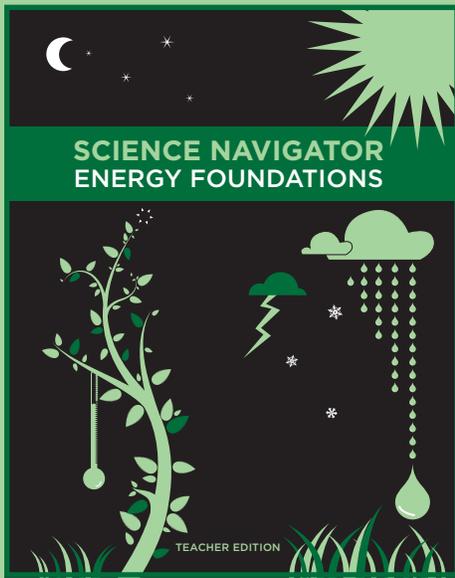


# SCIENCE NAVIGATOR<sup>®</sup>

FOR SECONDARY STUDENTS

**SAVVAS**  
LEARNING COMPANY





# SCIENCE NAVIGATOR<sup>®</sup>

Research shows that to succeed in college and the 21st-century workplace, students need the content knowledge and reasoning skills that are part of a strong science education. Science Navigator is designed to prepare middle-school students for success in their science classes. The program fills in the gaps in students' knowledge and builds their process skills, giving students a solid foundation for meeting the requirements of high-school science courses.

Science Navigator focuses on scientific investigation, process skills, reading comprehension of complex text, and ways for teachers to probe for student understanding. Exploring the topic of energy, the inquiry-based lessons in Science Navigator foster an active engagement in science and deepen student learning.

In middle school, Science Navigator can be used as a supplemental program to raise students' achievement level. For students who need extra support to acquire the process skills necessary for their future high-school science courses, Science Navigator can be used in beyond-the-bell or extended-learning-time classrooms. The program can also serve as an intervention to help high-school students be on track for college and career readiness.

Science Navigator focuses on energy—a topic that is hard to learn and hard to teach—as its principal theme. Energy is an important science concept that spans multiple subject areas, including earth science, life science, and physical science.

Module 1	Module 2	Module 3
<i>Energy Foundations</i>	<i>Energy in Living Systems</i>	<i>Energy in Physical Systems</i>

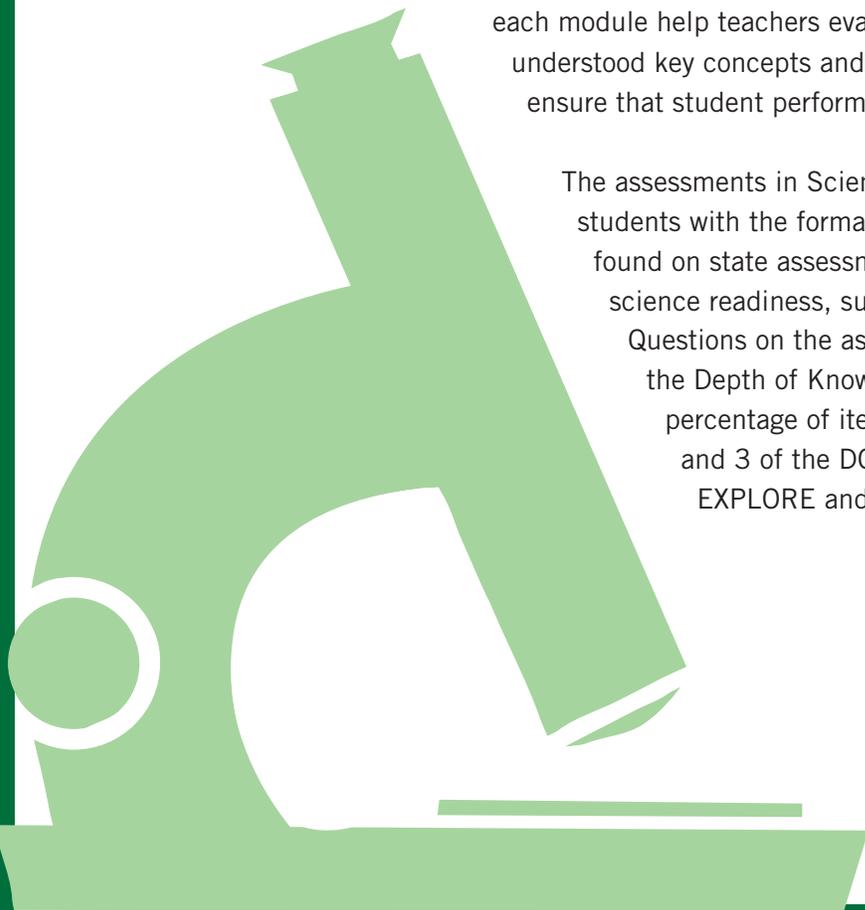
# WHY CHOOSE SCIENCE NAVIGATOR

## **1** | **A rich, coherent program in which curriculum, instruction, and assessment are fully aligned**

Science Navigator was built to align with nationally benchmarked science standards, such as the NAEP 2009 Science Framework, the ACT College Readiness Standards™, and the National Science Education Standards developed by the National Research Council, as well as key state standards. These standards and the NAEP framework inform all lessons.

Science Navigator establishes a systematic feedback loop of assessment, instruction, learning, and further assessment. This approach relies on program-embedded assessments that make it easy for teachers to monitor students' progress. The pre-test, checkpoints, and post-test in each module help teachers evaluate whether students have understood key concepts and mastered essential skills to ensure that student performance is on track.

The assessments in Science Navigator familiarize students with the format and complexity of questions found on state assessments and other measures of science readiness, such as the ACT EXPLORE® test. Questions on the assessments are also aligned with the Depth of Knowledge (DOK) framework. The percentage of items corresponding to levels 1, 2, and 3 of the DOK matches the percentages on EXPLORE and state assessments.



## The Science Navigator Assessment System

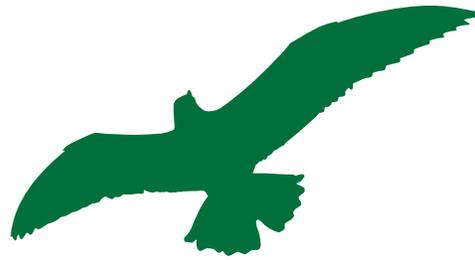
**Entry-level assessment.** Each module begins with a pre-test that is a timed, multiple-choice test. It provides baseline data for evaluating student growth and can be used to inform instruction in the course of the module. For middle-school students, the pre-test in *Energy Foundations* can be used as a universal screener to determine students' areas of need.

**Progress-monitoring assessments.** Science Navigator provides multiple opportunities for teachers to monitor student progress on a regular basis. These assessments, which help teachers adjust their teaching and provide differentiated instruction, include:

- Three checkpoints in each module, consisting of ten multiple-choice questions and one constructed-response item
- Class profiles
- Warm-up and wrap-up activities
- Class discussion and lab work
- Writing samples
- Self-assessments and peer evaluations

**Summative assessment.** At the end of each module, students take a post-test that matches the content and difficulty of the pre-test. By comparing the results of the pre-test and post-test, teachers can evaluate student growth and use this information, along with data from other assessments, to determine appropriate next steps for students.

**The Assessment and Reporting Online (ARO) system.** Using ARO, students can take the pre-tests, checkpoints, and post-tests in a secure online environment. As soon as they complete the assessments, they can view their scores and the correct answers. Teachers and school administrators can use ARO to generate reports about students' performance on the tests. These reports, available at the student, class, grade, school, and district aggregate levels, are powerful tools for providing progress monitoring, determining instructional direction, and analyzing student growth.



## 2

### **A workshop structure that fosters scientific inquiry and shared responsibility for learning**

Science Navigator meets the goals set forth by the National Science Education Standards. The program:

- engages students in active and extended scientific inquiry,
- provides opportunities for scientific discussions and debate,
- encourages students to share responsibility for learning.

To achieve these goals, Science Navigator uses a workshop structure in which each lesson includes an opening, work time, and closing. During lessons, students perform scientific investigations, collect data, and evaluate scientific evidence and claims. The workshop rituals and routines help teachers manage their classrooms efficiently and ensure that students are productive.

## A Day in the Life of Science Navigator

Each module in Science Navigator contains twenty 55-minute lessons. The program incorporates the 5E Instructional Model developed by the Biological Sciences Curriculum Study (BSCS) into the rituals and routines of the workshop structure. In the BSCS guided-inquiry approach, students actively develop their understanding of concepts and their skills while the teacher acts as the instructional director. Each lesson in Science Navigator includes the appropriate phase of the BSCS 5E Instructional Model: engage, explore, explain, elaborate, and evaluate. Each phase has a set purpose, but the instructional activity completed during the phase can vary from lesson to lesson.

 **Class Period Overview**

Duration	Activity	Description
<b>Opening</b>		
10 minutes	<b>Teacher Demonstration</b> Ice and Hot Water  <b>Class Discussion</b>	<b>Engage</b> Review prior knowledge  Discuss the experiment, draw out questions and prior knowledge, and elicit predictions  Introduce the Guiding Questions
<b>Work Time</b>		
25 minutes	<b>Group Work: Investigation I</b> When Hot Meets Cold	<b>Explore</b> Measure temperatures, record data in a table, and analyze data
10 minutes	<b>Group Work: Investigation II</b> Not So Calm After All	<b>Elaborate</b> Make observations and draw conclusions
<b>Closing</b>		
10 minutes	<b>Class Discussion</b>	<b>Explain</b> Revise conclusions  Review the Guiding Questions

The Class Period Overview chart shows which phases of the BSCS 5E Instructional Model are incorporated in the lesson.

from *Energy Foundations*,  
Lesson 4, Teacher Edition, p. 46

# 3

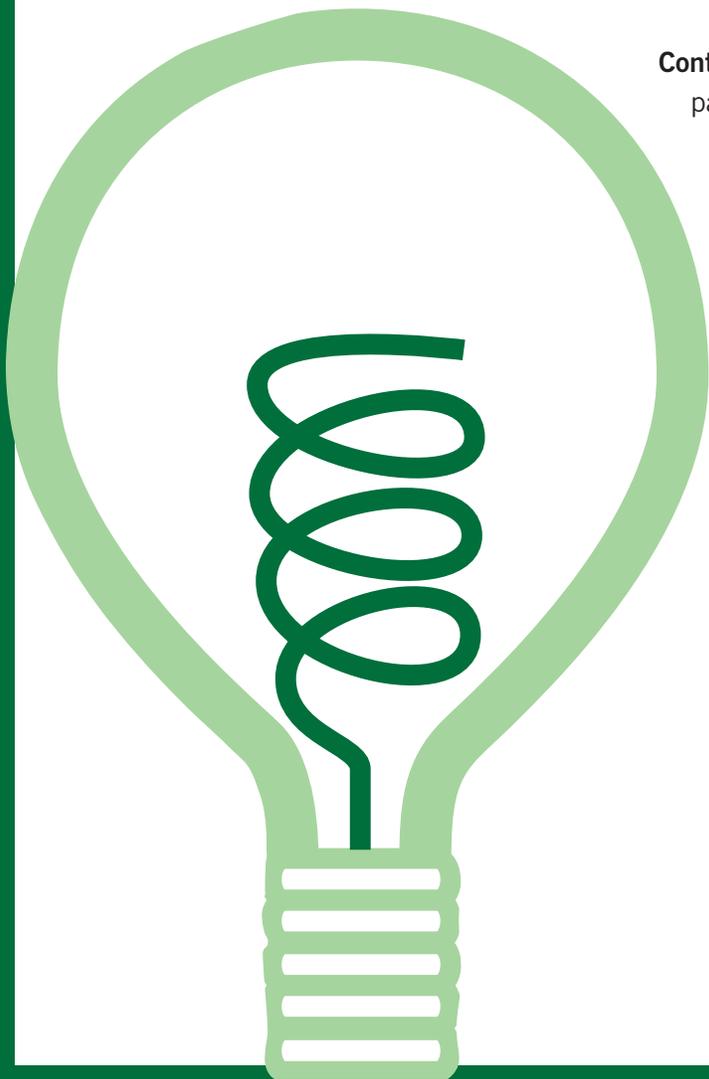
## Engaging lessons that focus on content and skills acquisition

Science Navigator puts a premium on in-depth learning. Lessons are organized into clusters that focus on a central concept, such as thermal energy and heat transfer, to give students a thorough understanding of a topic. Each module includes three types of lessons, which employ critical strategies to help students learn how to conduct scientific investigations, think like scientists, and acquire scientific knowledge.

**Content Investigation lessons.** Using the strategy of guided inquiry, these lessons help students learn science by doing science. Through scaffolded support, students become increasingly independent as they learn how to conduct investigations. The lessons build on students' prior knowledge and focus attention on a critical component of a concept. The lessons highlight potential misconceptions and provide opportunities for students to confront these misconceptions.

**Skills lessons.** These lessons focus on developing three reasoning skills: the interpretation of data; scientific investigation; and the evaluation of models, inferences, and experimental results. By making scientific measurements and gathering and analyzing data, students develop the laboratory skills and the higher-level thinking skills necessary for effective scientific argument and debate.

**Content and Reading Comprehension lessons.** To be on a path for college and career readiness, students must be able to read and comprehend complex science and technical texts independently and proficiently by the end of 10th grade. In Science Navigator, students learn about scientific content from readings that will stimulate their natural curiosity and motivate them to explore the topic. During lessons, students practice using reading-comprehension strategies for informational text. Students will thus simultaneously improve their reading-comprehension skills and acquire background knowledge that they will apply in later lessons.



In the Content Investigation lessons, students actively engage in scientific inquiry.

## Investigation: Decomposer Lab

### Directions

- **TABLE CAPTAIN:** Ask your teacher where you can find your samples (containers with bread).
- Handle your containers with care. Do not shake them or turn them upside down.
- Draw the setup of your experiment below.
- Use the magnifying glasses to closely examine your samples.
- Read the descriptions of a few common molds on the next page and determine if you can identify any of those organisms on your samples.
- Discuss what you observe with your group. Then describe and/or draw your observations on page 54. Be as detailed as possible.
- Write down your conclusions based on your observations.
- When you're done, put the samples in the large plastic bags provided by your teacher. Clean your work area thoroughly.

### table captain

- Go to the Supply Area at the start of the investigation.
- Check the supplies off the materials list. If anything is missing, tell your teacher.
- Bring the supplies to your work station.
- At the end of the investigation, return the supplies to the Supply Area.

### materials

- set of 4 plastic containers with bread samples
- magnifying glasses

Draw a diagram of the experiment. Include as much detail as you can concerning the variables of the experimental design (for example, describe the temperatures, light conditions, types of breads, etc.).

Students follow established rituals and routines, which facilitate classroom management, help ensure safety in the lab setting, and enable students to focus on learning.

from *Energy in Living Systems*, Student Handbook, p. 52

The “Probing for Understanding” feature guides teachers in helping students to deepen their understanding of science concepts and think like scientists.

### Probing for Understanding

Students should also describe the relationships between the independent variables and the dependent variable they are observing:

- **What are the independent variables in your experiment?** [Temperature and type of bread]
- **What is the effect of each of these variables on the outcome of the experiment?** [There is less mold at the colder temperature. The bread with preservatives did not have as much mold.]
- **Based on your observations, what would be the best way to store bread to keep it free from mold?** [In a cool, dry environment such as a refrigerator]
- **What are the controlled variables in your experiment?** [Size of container, moisture, amount of light, type of water used, size of bread slices, etc.]
- **What about moisture? Do you think that wet or moist bread will get moldy sooner than dry bread?** [Yes. Mold grows better in damp environments. Students may know this from experience (background knowledge).]
- **What type of experiment could you do to test the impact of moisture on the growth of mold on bread?** [Place four identical slices of bread in identical containers. Put no water in one container and different volumes of water in the remaining three.]

explore

During the “explore” stage of the BSCS 5E Instructional Model, students engage in experiences such as observing events. The teacher uses this common base of experiences to help students develop their understanding of science concepts and their skills.

from *Energy in Living Systems*, Teacher Edition, p. 128

# 4

## A program that supports English language learners

The workshop structure and systematic feedback loop make Science Navigator responsive to the needs of English language learners who are learning academic language. The program strongly emphasizes learning and using the language of science. Students also develop their understanding of science content and their process skills in a collaborative environment that focuses on hands-on learning activities, which gives students the opportunity to use academic language in authentic ways. Individual lessons include suggested strategies for teaching English language learners.

# 5

## An effective learning environment for students with special needs

The instruction in Science Navigator is consistent with the principles of Universal Design for Learning. Students with special needs will benefit from the explicit instruction and scaffolded learning that are integral to the workshop structure. The focus on active inquiry, hands-on learning opportunities, and the organization of lessons around central concepts, which helps students understand how information fits together, are particularly helpful for students with special needs. Individual lessons include suggested strategies for scaffolding for success.



# THE SCIENCE NAVIGATOR PACKAGE

You can purchase individual modules of Science Navigator in the configuration that suits your needs.

## For each module, the following materials are available:\*

**Teacher Edition.** Lessons in the Teacher Edition state the goal, provide guiding questions and a lesson overview, and describe the preparation necessary for implementing the lessons. They list common student misconceptions; content, skills, and language objectives, as appropriate; and materials required for the lessons. The Teacher Edition then presents effective strategies for the opening, work time, and closing of the lessons, providing additional strategies and content information in sidebars.

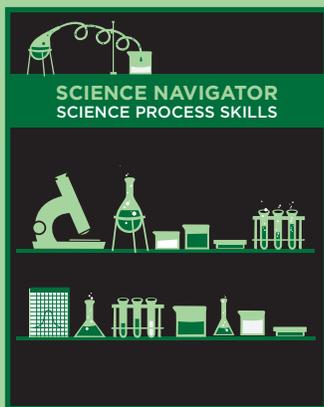
**Student Handbook.** For each lesson, the Student Handbook provides the goal, guiding questions, and a space where students can record their notes. The Student Handbook also includes reading selections, worksheets, diagrams, and other materials students need for the lessons.

**Online Resources.** The Online Resources packet contains assessments and scoring guides. It also includes transparency and handout masters for additional resources and homework assignments.

\*Lab materials are not included.

## The following resource can be used with all three modules:

**Science Process Skills.** This reference book for teachers and students provides explicit definitions and explanations of the concepts and skills taught in the modules. The book can be used as a source for additional lessons and contains practice problems that reinforce the skills required for conducting scientific investigations, interpreting data, and evaluating results. The “Language of Science” section of the book defines the terms introduced in the lessons.



## Science Process Skills

*Science Process Skills* is a valuable teacher resource for filling in the gaps in students' knowledge and strengthening their process skills. The book is divided into five sections: “Conducting Scientific Inquiry,” “Working with Data,” “Analyzing and Communicating Scientific Information,” “Mathematics,” and “Language of Science.” Teachers can use the mini-lessons in the first four sections of the book, which focus on skills such as graphing and analyzing trends, to supplement the lessons in the modules and provide students with more practice in using particular skills. The book contains useful graphics and diagrams to enhance the delivery of lessons.

The “Language of Science” section of *Science Process Skills* provides teachers with explicit definitions of the terms they will use in their lessons. Students can also use this glossary as a reference tool to help them understand terms related to energy. The definitions are enhanced by diagrams and tables, which facilitate students' understanding of the terms and concepts.

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