

Science Explorer and the National Science Education Standards

The National Science Education Standards outline what students need to know, understand, and be able to do in science at different grade levels.

The Science Explorer program reflects a number of changes in emphasis in science education that are embodied in the National Science Education Standards. In the current standards, emphasis has shifted from knowing scientific facts to understanding scientific concepts. Rather than separating science knowledge and science content, the standards require an integration of all aspects of science content, the approach taken by the Science Explorer program.

The “Science as Inquiry” standards for grades K to 12

The standards stress that children need to develop what educators call “process skills,” such as observing, inferring (or making an “educated guess”), measuring, classifying, communicating, and predicting. Children need to know that they can sometimes figure things out for themselves by conducting an inquiry, a process that may include:

- Asking a question
 (“What will happen if we do this?”)
- Making a prediction
 (“Here’s what I think will happen.”)
- Doing an experiment and observing the results
- Coming up with an explanation
 (“Here’s why I think that happened.”)

In accordance with the standards, children engaged in activities from the Science Explorer program learn process skills in the context of doing interesting activities, do many investigations to develop their understanding of inquiry and science content, and make use of multiple process skills in investigations. The Science Explorer program involves children in using scientific reasoning and critical thinking to develop their understanding of science, as required by the “Science as Inquiry” standards. Through work with the Science Explorer program, children develop an understanding of scientific concepts, an appreciation of how we know what we know in science, an understanding of the nature of science, skills necessary to make their own discoveries about the natural world, and the disposition to use the skills, abilities, and attitudes associated with science. The skills children develop through these activities include asking questions, planning and conducting investigations, and thinking critically and logically about relationships between evidence and explanations.

Children are great at asking questions. They start out life eager to investigate and explore. Unfortunately, children often become reluctant to ask questions in the classroom—where asking too many questions can be seen as disruptive. Elementary classroom teachers—under pressure to focus on reading and math—often have little time for science instruction. Hands-on experiments can be seen as messy and disruptive—and many teachers are hard-pressed to include them in an already overfull schedule.

As a result, children often don't have an opportunity to experiment in the classroom. All too often, classroom science teaches children that the answers are the important thing—and children lose touch with the joy of asking questions.

In the after-school environment, hands-on experiments can provide a welcome change from the classroom while offering solid academic content by helping children develop process skills necessary to meet the inquiry requirement of the National Science Education Standards.

As a leader in an out-of-school program using the Science Explorer program, you are in a great position to help children gain the confidence and skills they need to excel in science by encouraging them to ask questions and experiment to figure out the answers.

The “Physical Science” standards for grades K to 4

The Science Explorer program covers content required by the “Physical Science” standards for grades K to 4. The “Physical Science” standards require that children in these grades focus their attention on a number of specific topics. Activities in the Science Explorer program will give children a hands-on understanding of light, electricity, and the properties of objects and materials.

The “Science and Technology” standards for grades K to 12

The Science Explorer program provides children with an opportunity to identify and state a problem, design a solution, implement a solution, and evaluate the solution, as required by the “Science and Technology” standards.

The “History and Nature of Science” standards for grades K–8

The Science Explorer program provides many examples of how science reflects its history and is an ongoing, changing enterprise, demonstrating and reinforcing understanding of science as a human endeavor, as required by the “History and Nature of Science” standards.

National Science Education Standards for the unit
Blowing, Bouncing, Bursting Bubbles

	Bubble Bomb	Balloon Blowup	Building with Bubbles	Handful of Bubbles	Bubble Prints	Bubbularium
Underlying Concepts and Processes						
Systems, order, and organization			X	X	X	
Evidence, models, and explanation	X	X	X	X		X
Change, constancy, and measurement		X		X		
Evolution and equilibrium		X	X			
Science as Inquiry						
Abilities necessary to do scientific inquiry	X	X	X	X	X	X
Understanding about scientific inquiry	X	X	X	X	X	X
Physical Science						
Properties of objects and materials (grades K–4)	X	X	X	X		
Light, heat, electricity, and magnetism (grades K–4)						X
Properties and changes of properties in matter (grades 5–8)		X				
Life Science						
Characteristics of organisms	X					

National Science Education Standards for the unit

Seeing the Light

	Taking Apart a Camera	Pictures from Light	Pringles® Pinhole	Seeing in the Dark
Unifying Concepts and Processes				
Form and function	X			
Science as Inquiry				
Abilities necessary to do scientific inquiry	X	X	X	X
Understanding about scientific inquiry	X	X	X	X
Physical Science				
Properties of objects and materials (grades K–4)	X			
Position and motion of objects (grades K–4)	X	X		
Light, heat, electricity, and magnetism (grades K–4)	X	X	X	X
Life Science				
Characteristics of organisms (grades K–4)				X
Structure and function in living systems (grades 5–8)				X
Science and Technology				
Abilities of technological design (grades K–8)	X			
Understanding about science and technology (grades K–8)	X			
History and Nature of Science				
Science as a human endeavor (grades K–8)	X	X		
Nature of science (grades 5–8)	X	X		

National Science Education Standards for the unit

It's Colorific

	Rainbows on Your Lawn	Reflecting Rainbows	Rainbow Prints	Black Magic
Underlying Concepts and Processes				
Evidence, models, and explanation	X	X	X	X
Change, constancy, and measurement	X			X
Science as Inquiry				
Abilities necessary to do scientific inquiry	X	X	X	X
Understanding about scientific inquiry	X	X	X	X
Physical Science				
Properties of objects and materials (grades K–4)				X
Light, heat, electricity, and magnetism (grades K–4)	X	X	X	X
Properties and changes of properties in matter (grades 5–8)				X
Transfer of energy (grades 5–8)	X	X		
Earth and Space Science				
Objects in the sky (grades K–4)	X			
Changes in earth and sky (grades K–4)	X			
History and Nature of Science				
Science as a human endeavor (grades K–8)	X	X	X	X
Nature of science (grades 5–8)	X	X	X	X

National Science Education Standards for the unit

Seeing Isn't Believing

	Floaters	Hot Dog Finger	Flipsticks	Read White and Blue	My Face Is a Vase!
Underlying Concepts and Processes					
Evidence, models, and explanation	X				
Change, constancy, and measurement			X		
Science as Inquiry					
Abilities necessary to do scientific inquiry	X	X	X	X	X
Understanding about scientific inquiry	X	X	X	X	X
Life Science					
Characteristics of organisms (grades K-4)	X	X	X		X

National Science Education Standards for the unit
Rings, Wings, and Other Flying Things

	Spinning Blimps	Roto-Copter	Fabulous Foam Flyer	Hoopster
Underlying Concepts and Processes				
Evidence, models, and explanation	X	X	X	X
Change, constancy, and measurement	X	X	X	X
Form and function	X	X	X	X
Science as Inquiry				
Abilities necessary to do scientific inquiry	X	X	X	X
Understanding about scientific inquiry	X	X	X	X
Physical Science				
Properties of objects and materials (grades K–4)	X	X	X	X
Position and motion of objects (grades K–4)	X	X	X	X
Motions and forces (grades 5–8)	X	X	X	X
Transfer of energy (grades 5–8)	X	X	X	X
Science and Technology				
Abilities of technological design (grades K–4)	X	X	X	X
Understanding about science and technology (grades K–4)	X	X	X	X
Abilities of technological design (grades 5–8)	X	X	X	X
Understanding about science and technology (grades 5–8)	X	X	X	X
History and Nature of Science				
Science as a human endeavor (grades K–8)	X	X		
History of science (grades 5–8)		X		

National Science Education Standards for the unit

Dramatic Static

	Jumping Pepper	Remote Control Roller	Super Sparker
Unifying Concepts and Processes			
Systems, order, and organization	X	X	X
Evidence, models, and explanation	X	X	X
Science as Inquiry			
Abilities necessary to do scientific inquiry	X	X	X
Understanding about scientific inquiry	X	X	X
Physical Science			
Properties of objects and materials (grades K–4)	X	X	X
Position and motion of objects (grades K–4)		X	
Light, heat, electricity, and magnetism (grades K–4)	X	X	X
Properties and changes of properties in matter (grades 5–8)	X	X	X
Motions and forces (grades 5–8)	X	X	X
Transfer of energy (grades 5–8)	X	X	X

National Science Education Standards for the unit
Marvelous Music and Astounding Sounds

	Straw Oboe	Rain Sticks	The Tingler	Water Gong	CANdemonium	Playing with Rhythm
Science as Inquiry						
Abilities necessary to do scientific inquiry	X	X	X	X	X	X
Understanding about scientific inquiry	X	X	X	X	X	X
Physical Science						
Properties of objects and materials (grades K–4)	X	X	X	X	X	
Position and motion of objects (grades K–4)	X	X	X	X	X	X

National Science Education Standards for the unit

Hear Here!

	Sound Safari	Head Harp	Secret Bells	Ear Guitar	Cups of Mystery	Listening to the Tube
Unifying Concepts and Processes						
Evidence, models, and explanation			X			
Science as Inquiry						
Abilities necessary to do scientific inquiry	X	X	X	X	X	X
Understanding about scientific inquiry	X	X	X	X	X	X
Physical Science						
Properties of objects and materials (grades K–4)		X	X	X	X	X
Position and motion of objects (grades K–4)	X	X	X	X	X	X
Life Science						
Structure and function in living systems (grades 5–8)		X	X			

National Science Education Standards for the unit

Mysterious Mixtures

	Monster Mallows	Soap Drops Derby	ExploraGoo	Outrageous Ooze
Unifying Concepts and Processes				
Evidence, models, and explanation	X	X	X	X
Science as Inquiry				
Abilities necessary to do scientific inquiry	X	X	X	X
Understanding about scientific inquiry	X	X	X	X
Physical Science				
Properties of objects and materials (grades K–4)	X	X	X	X
Properties and changes of properties in matter (grades 5–8)	X	X	X	X

Grade Levels for the Science Explorer Activities

While the Science Explorer activities can be adapted to any grade level (K–6), the list below suggests the grade level most appropriate.

Blowing, Bouncing, Bursting Bubbles	Grade level
Bubble Bomb	3–6
Balloon Blowup	3–6
Building with Bubbles	K–3
Handfuls of Bubbles	K–3
Bubble Prints	3–6
Bubblarium	3–6
It's Colorific	
Rainbows on Your Lawn	4–6
Reflecting Rainbows	4–6
Rainbow Prints	4–6
Black Magic	3–6
Seeing the Light	
Taking Apart a Camera	4–6
Pictures from Light	4–6
Pringles Pinhole	4–6
Seeing in the Dark	4–6
Seeing Isn't Believing	
Floaters	4–6
Hot Dog Finger	K–6
Flipsticks	2–6
Read White and Blue	3–6
My Face is a Vase!	2–6
Rings, Wings, and Other Flying Things	
Spinning Blimps	K–6
Roto-Copter	1–6
Fabulous Foam Flyer	4–6
Hoopster	3–6
Dramatic Static	
Jumping Pepper	2–6
Remote Control Roller	2–6
Super Sparker	2–6
Marvelous Music and Astounding Sounds	
Straw Oboe	3–6
Rain Sticks	2–6
The Tingler	2–6
Water Gong	K–6
CANdemonium	1–6
Playing with Rhythm	4–6
Hear Here!	
Sound Safari	K–6
Head Harp	K–6
Secret Bells	K–6
Ear Guitar	4–6
Cups of Mystery	K–6
Listening to the Tube	4–6
Mysterious Mixtures	
Monster Mallows	K–6
Soap Drops Derby	3–6
ExploraGoo	3–6
Outrageous Ooze	K–6