

# Helpful Information for Planning a Flagstaff Festival of Science Classroom Presenters

We hope that this additional information will be useful to you as you prepare for your classroom presentation. Our community is so fortunate to have you as a resource for our K-12 students.

Currently:

- Teachers have less liberty to choose outside topics as they must adhere to state academic standards
- We have provided a broad conceptual overview of Arizona’s science standards. We hope that within the broad umbrella of these concepts you can design your presentation to cover both your research and to the standards teachers must address.

## I. Suggested Structure for Presentations

- 10-15 Minutes - introduction
- 20 Minutes - activity
- 5-10 Closure and questions
- PowerPoints are a great supplement.

## II. Class Times

- K-5: 35 – 40 minutes
- 6-12: 40- 60 minutes

## III. Arizona Science Standards Overview

(<http://www.azed.gov/standards-practices/k-12standards/standards-science/>)

 INCREASING SOPHISTICATION OF STUDENT THINKING

K-2	3-4	5-6	7-8	9-12
<b>Life Science</b>				
<b>Characteristics of Organisms</b> <ul style="list-style-type: none"> <li>• Understand that basic structures in plants and animals serve a function</li> </ul>	<b>Characteristics of Organisms</b> <ul style="list-style-type: none"> <li>• Understand that basic structures in plants and animals serve a function</li> </ul>	<b>Structure and Function in Living Systems</b> <ul style="list-style-type: none"> <li>• Understand the relationships between structures and functions of organisms.</li> </ul>		<b>The Cell (9-12)</b> <ul style="list-style-type: none"> <li>• Understand the role of the cell and cellular processes.</li> </ul>
<b>Life Cycles</b> <ul style="list-style-type: none"> <li>• Understand the life cycles of plants and animals.</li> </ul>	<b>Life Cycles</b> <ul style="list-style-type: none"> <li>• Understand the life cycles of plants and animals.</li> </ul>		<b>Reproduction and Heredity</b> <ul style="list-style-type: none"> <li>• Understand the basic principles of heredity.</li> </ul>	<b>Molecular Basis of Heredity</b> <ul style="list-style-type: none"> <li>• Understand the molecular basis of heredity and resulting genetic diversity.</li> </ul>
<b>Organisms and Environments</b> <ul style="list-style-type: none"> <li>• Understand the relationships among various organisms and their environment.</li> </ul>	<b>Organisms and Environments</b> <ul style="list-style-type: none"> <li>• Understand the relationships among various organisms and their environment.</li> </ul>	<b>Populations of Organisms in an Ecosystem</b> <ul style="list-style-type: none"> <li>• Analyze the relationships among various organisms and their environment.</li> </ul>	<b>Populations of Organisms in an Ecosystem</b> <ul style="list-style-type: none"> <li>• Analyze the relationships among various organisms and their environment.</li> </ul>	<b>Interdependence of Organisms</b> <ul style="list-style-type: none"> <li>• Analyze the relationships among various organisms and their environment.</li> </ul>
	<b>Diversity, Adaptation and Behavior</b> <ul style="list-style-type: none"> <li>• Identify plant and animal adaptations.</li> </ul>		<b>Diversity, Adaptation and Behavior</b> <ul style="list-style-type: none"> <li>• Identify structural and behavioral adaptations.</li> </ul>	<b>Biological Evolution</b> <ul style="list-style-type: none"> <li>• Understand the scientific principles and processes involved in biological evolution</li> </ul>
				<b>Matter, Energy, and Organization in Living</b>

K-2	3-4	5-6	7-8	9-12
				<b>Systems (Including Human Systems)</b> <ul style="list-style-type: none"> <li>Understand the organization of living systems, and the role of energy within those systems.</li> </ul>
<b>Physical Science</b>				
<b>Properties of Objects and Materials</b> <ul style="list-style-type: none"> <li>Classify objects and materials by their observable properties.</li> </ul>		<b>Properties and Changes of Properties in Matter</b> <ul style="list-style-type: none"> <li>Understand physical and chemical properties of matter.</li> </ul>	<b>Properties and Changes of Properties in Matter</b> <ul style="list-style-type: none"> <li>Understand physical and chemical properties of matter.</li> </ul>	<b>Structure and Properties of Matter</b> <ul style="list-style-type: none"> <li>Understand physical, chemical, and atomic properties of matter.</li> </ul>
<b>Position and Motion of Objects</b> <ul style="list-style-type: none"> <li>Understand spatial relationships and the way objects move.</li> </ul>		<b>Motion and Forces</b> <ul style="list-style-type: none"> <li>Understand the relationship between force and motion.</li> </ul>	<b>Motion and Forces</b> <ul style="list-style-type: none"> <li>Understand the relationship between force and motion.</li> </ul>	<b>Motions and Forces</b> <ul style="list-style-type: none"> <li>Analyze relationships between forces and motion.</li> </ul>
<b>Energy and Magnetism</b> <ul style="list-style-type: none"> <li>Investigate different forms of energy.</li> </ul>	<b>Energy and Magnetism</b> <ul style="list-style-type: none"> <li>Investigate different forms of energy.</li> </ul>	<b>Transfer of Energy</b> <ul style="list-style-type: none"> <li>Understand that energy can be stored and transferred.</li> </ul>		<b>Conservation of Energy and Increase in Disorder</b> <ul style="list-style-type: none"> <li>Understand ways that energy is conserved, stored, and transferred.</li> </ul>
				<b>Chemical Reactions</b> Investigate relationships between reactants and products in chemical reactions.
				<b>Interactions of Energy and Matter</b> Understand the interactions of energy and matter.
<b>Earth &amp; Space Science</b>				
<b>Properties of Earth Materials</b> <ul style="list-style-type: none"> <li>Identify the basic properties of Earth materials.</li> </ul>	<b>Properties of Earth Materials</b> <ul style="list-style-type: none"> <li>Identify the basic properties of Earth materials.</li> </ul>	<b>Structure of the Earth</b> <ul style="list-style-type: none"> <li>Describe the composition and interactions between the structure of the Earth and its atmosphere.</li> </ul>	<b>Structure of the Earth</b> <ul style="list-style-type: none"> <li>Describe the composition and interactions between the structure of the Earth and its atmosphere.</li> </ul>	<b>Geochemical Cycles</b> <ul style="list-style-type: none"> <li>Analyze the interactions between the Earth's structures, atmosphere, and geochemical cycles.</li> </ul>
<b>Objects in the Sky</b> <ul style="list-style-type: none"> <li>Identify objects in the sky.</li> </ul>	<b>Earth's Processes and Systems</b> <ul style="list-style-type: none"> <li>Understand the processes acting on the Earth and their interaction with the Earth systems.</li> </ul>	<b>Earth's Processes and Systems</b> <ul style="list-style-type: none"> <li>Understand the processes acting on the Earth and their interaction with the Earth systems.</li> </ul>		<b>Energy in the Earth System (Both Internal and External)</b> <ul style="list-style-type: none"> <li>Understand the relationships between the Earth's land masses, oceans, and atmosphere.</li> </ul>
<b>Changes in the Earth and Sky</b>	<b>Changes in the Earth and Sky</b>	<b>Earth in the Solar System</b>	<b>Earth in the Solar System</b>	<b>Origin and Evolution of the Earth System</b>

<b>K-2</b>	<b>3-4</b>	<b>5-6</b>	<b>7-8</b>	<b>9-12</b>
<ul style="list-style-type: none"> <li>Understand characteristics of weather conditions and climate</li> </ul>	<ul style="list-style-type: none"> <li>Understand characteristics of weather conditions and climate</li> </ul>	<ul style="list-style-type: none"> <li>Understand the relationships of the Earth and other objects in the solar system</li> </ul>	<ul style="list-style-type: none"> <li>Understand the relationships of the Earth and other objects in the solar system</li> </ul>	<ul style="list-style-type: none"> <li>Analyze the factors used to explain the history and evolution of the Earth.</li> </ul>
<b>Science Inquiry</b>				
<b>Observations, Questions, and Hypotheses</b> <ul style="list-style-type: none"> <li>Observe, ask questions, and make predictions.</li> </ul>	<b>Observations, Questions, and Hypotheses</b> <ul style="list-style-type: none"> <li>Observe, ask questions, and make predictions.</li> </ul>	<b>Observations, Questions, and Hypotheses</b> <ul style="list-style-type: none"> <li>Formulate predictions, questions, or hypotheses based on observations. Locate appropriate resources.</li> </ul>	<b>Observations, Questions, and Hypotheses</b> <ul style="list-style-type: none"> <li>Formulate predictions, questions, or hypotheses based on observations. Locate appropriate resources.</li> </ul>	<b>Observations, Questions, and Hypotheses</b> <ul style="list-style-type: none"> <li>Formulate predictions, questions, or hypotheses based on observations. Evaluate appropriate resources.</li> </ul>
<b>Scientific Testing (Investigating and Modeling)</b> <ul style="list-style-type: none"> <li>Participate in planning and conducting investigations and recording data.</li> </ul>	<b>Scientific Testing (Investigating and Modeling)</b> <ul style="list-style-type: none"> <li>Participate in planning and conducting investigations and recording data.</li> </ul>	<b>Scientific Testing (Investigating and Modeling)</b> <ul style="list-style-type: none"> <li>Design and conduct controlled investigations.</li> </ul>	<b>Scientific Testing (Investigating and Modeling)</b> <ul style="list-style-type: none"> <li>Design and conduct controlled investigations.</li> </ul>	<b>Scientific Testing (Investigating and Modeling)</b> <ul style="list-style-type: none"> <li>Design and conduct controlled investigations.</li> </ul>
<b>Analysis and Conclusions</b> <ul style="list-style-type: none"> <li>Organize and analyze data; compare to predictions.</li> </ul>	<b>Analysis and Conclusions</b> <ul style="list-style-type: none"> <li>Organize and analyze data; compare to predictions.</li> </ul>	<b>Analysis and Conclusions</b> <ul style="list-style-type: none"> <li>Analyze and interpret data to explain correlations and results; formulate new questions.</li> </ul>	<b>Analysis and Conclusions</b> <ul style="list-style-type: none"> <li>Analyze and interpret data to explain correlations and results; formulate new questions.</li> </ul>	<b>Analysis, Conclusions, and Refinements</b> <ul style="list-style-type: none"> <li>Evaluate experimental design, analyze data to explain results and to propose further investigations. Design models.</li> </ul>
<b>Communication</b> <ul style="list-style-type: none"> <li>Communicate results of investigations</li> </ul>	<b>Communication</b> <ul style="list-style-type: none"> <li>Communicate results of investigations</li> </ul>	<b>Communication</b> <ul style="list-style-type: none"> <li>Communicate results of investigations</li> </ul>	<b>Communication</b> <ul style="list-style-type: none"> <li>Communicate results of investigations</li> </ul>	<b>Communication</b> <ul style="list-style-type: none"> <li>Communicate results of investigations</li> </ul>
<b>History and Nature of Science</b>				
<b>History of Science as a Human Endeavor</b> <ul style="list-style-type: none"> <li>Identify individual and cultural contributions to scientific knowledge.</li> </ul>	<b>History of Science as a Human Endeavor</b> <ul style="list-style-type: none"> <li>Identify individual and cultural contributions to scientific knowledge.</li> </ul>	<b>History of Science as a Human Endeavor</b> <ul style="list-style-type: none"> <li>Identify individual and cultural contributions to scientific knowledge.</li> </ul>	<b>History of Science as a Human Endeavor</b> <ul style="list-style-type: none"> <li>Identify individual and cultural contributions to scientific knowledge.</li> </ul>	<b>History of Science as a Human Endeavor</b> <ul style="list-style-type: none"> <li>Identify individual and cultural contributions to scientific knowledge.</li> </ul>
<b>Nature of Scientific Knowledge</b> <ul style="list-style-type: none"> <li>Understand how science is a process for generating knowledge.</li> </ul>	<b>Nature of Scientific Knowledge</b> <ul style="list-style-type: none"> <li>Understand how science is a process for generating knowledge.</li> </ul>	<b>Nature of Scientific Knowledge</b> <ul style="list-style-type: none"> <li>Understand how science is a process for generating knowledge.</li> </ul>	<b>Nature of Scientific Knowledge</b> <ul style="list-style-type: none"> <li>Understand how science is a process for generating knowledge.</li> </ul>	<b>Nature of Scientific Knowledge</b> <ul style="list-style-type: none"> <li>Understand how scientists evaluate and extend scientific knowledge.</li> </ul>
<b>Science in Personal and Social Perspectives</b>				
	<b>Changes in Environments</b> <ul style="list-style-type: none"> <li>Describe the interactions between human populations, natural hazards, and the environment.</li> </ul>	<b>Changes in Environments</b> <ul style="list-style-type: none"> <li>Describe the interactions between human populations, natural hazards, and the environment.</li> </ul>	<b>Changes in Environments</b> <ul style="list-style-type: none"> <li>Describe the interactions between human populations, natural hazards, and the environment.</li> </ul>	<b>Changes in Environments</b> <ul style="list-style-type: none"> <li>Describe the interactions between human populations, natural hazards, and the environment.</li> </ul>
<b>Science and Technology in Society</b> <ul style="list-style-type: none"> <li>Understand the impact of technology.</li> </ul>	<b>Science and Technology in Society</b> <ul style="list-style-type: none"> <li>Understand the impact of technology.</li> </ul>	<b>Science and Technology in Society</b> <ul style="list-style-type: none"> <li>Develop viable solutions to a need or problem.</li> </ul>	<b>Science and Technology in Society</b> <ul style="list-style-type: none"> <li>Develop viable solutions to a need or problem.</li> </ul>	<b>Science and Technology in Society</b> <ul style="list-style-type: none"> <li>Develop viable solutions to a need or problem.</li> </ul>

K-2	3-4	5-6	7-8	9-12
				<b>Human Population Characteristics</b> <ul style="list-style-type: none"> <li>Analyze factors that affect human populations.</li> </ul>

If you have any ideas that are unique to what is listed, please contact Jillian Worssam ([jworssam@fUSD1.org](mailto:jworssam@fUSD1.org)), FFOS Education Committee Chair, and we will help you determine which grade level works best!