NEW MEXICO ACADEMY OF SCIENCE

Affiliate of AAAS and NAS  Founded in 1902
Presenter
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NMAS: Director, Junior Academy of Science; NAAS, AAAS Delegate Section Y

http://www.nmas.org
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Advocate and Resource for Science and Science Education

• Open to any person interested in Science or Science Education in New Mexico
• Programs with topics of social, economic, and political interest in all science fields
NMAS Goals

• Foster scientific research and scientific cooperation
• Increase public awareness of the role of science in human progress and human welfare
• Promote science education throughout New Mexico.
Why Join?

• Gives a voice to science professionals, university professors, graduate students, science teachers and students in all grades

• Provides professional input to state and local government entities including the NM Public Education Department

• Supports science education at all levels
NMAS PROGRAMS

• Jr. Academy of Science
• Outstanding Teachers Awards
• Annual Meeting
• Journal of Science
• National Youth Science Camp
New Mexico Junior Academy of Science Research Paper Competition For Students Grades 6-12

• Teaches communicating their work to others
• Encourages organized thinking
• In conjunction with Regional and State Science and Engineering Fairs
• Cash awards
NMJAS Research Paper Competition

• Enter competition at one of the 6 regional science fairs
• Competition consists of both a written paper and an oral presentation (No Science Fair required)
• Deadlines for written paper and oral PP are listed on the NMJAS website http://www.nmas.org/junior-academy-of-science.html
• First and second place regional winners advance to the State competition
• Best papers are published in the NMAS Journal of Science
Outstanding Science Teacher Awards

For K-12 STEM Teachers or Informal Educators

• Annual nominations of K-12 Stem teachers or informal educators
• Winners are guests at the NMAS annual meeting
• Deadline for nominations is October 1st
• Nomination from administrators, peers, or self-nomination

• Nomination forms at www.NMAS.org
NMAS Annual Meeting
For the General Public, Professionals & Educators

• Distinguished keynote speaker, concurrent sessions, panels, poster presentations, and competitions
• Participants -- science professionals, university professors, graduate students, and secondary students
• Co-sponsored by other science organizations
• Open to the public each November
NMAS Journal of Science

• Published annually
• Single or Multiple Topic
• Juried
• Jr. Academy Award Papers
• Abstracts from Poster Presentations
• Purchase back-issues on-line
National Youth Science Camp
For TwoGraduating New Mexico High School Seniors

• All Expenses Paid to West Virginia
• Two candidates and two alternates
• Leadership in school and community
• Interest in the sciences required
• FAQ at http://www.nysc.org
Annual Dues or Make a Donation to NMAS

- Regular Membership: $25
- Student Membership: $15
- Institutional Membership: $25
- Libraries Membership: $25
- Life Membership: $400
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NMAS Student Programs Support NGSS
Science and Engineering Practices

- Asking questions and defining problems
  - Inquiry provides the means for asking questions and defining problems in a manner that is open to new questions and new ways of considering solutions.
- Developing and using models
  - A model is an explanation with identifiable parts or components that work together to produce behaviors and interactions.
- Planning and carrying out investigations
  - Science involves the design and conduct of investigations and experiments that provide evidence to help answer questions or solve problems.
- Analyzing and interpreting data
  - Analytical thinking is the basis of understanding and explaining the natural world and is an essential part of science and engineering.
- Using mathematics and computational thinking
  - Mathematics and computational thinking are critical to expressing, articulating, and exploring relationships among variables in science and engineering.
- Constructing explanations and designing solutions
  - Constructing explanations and designing solutions to problems often requires a combination of abstract and concrete thinking: abstract thinking to make connections, articulating ideas, and exploring the unknown; and concrete thinking to test ideas, build models, and develop solutions.
- Engaging in argument from evidence
  - Science and engineering answers to questions and explanations for phenomena are based on evidence and logical argumentation.
- Obtaining, evaluating, and communicating information
  - Scientific and engineering knowledge is communicated through oral, written, and digital presentations to peers, the media, and the general public.

Crosscutting Concepts

- Patterns
  - Patterns provide a basis for identifying and explaining the behaviors and interactions of various natural and engineered systems.
- Scale, proportion, and quantity
  - Scale, proportion, and quantity help us understand and describe phenomena, models, and systems.
- Systems and system models
  - Systems and system models support investigations and explanations of complex phenomena and processes.
- Energy and matter
  - Energy and matter are exchanged among components in systems, and systems have the capacity to transform energy and matter into other forms.
- Structure and function
  - Structure and function are interdependent, and the properties of matter significantly affect the function of living systems.
- Stability and change
  - Stability and change provide perspectives for understanding science and engineering as dynamic activities.

Disciplinary Core Ideas

- Life Science
  - From molecules to organisms: Structures and processes
  - Ecosystems: Interactions, energy, and dynamics
  - Heredity: Inheritance and variation of traits
  - Biological evolution: Unity and diversity

- Earth & Space Science
  - Earth's place in the universe
  - Earth's systems
  - Earth and human activity

- Physical Science
  - Matter and its interactions
  - Motion and stability: Forces and interactions
  - Energy
  - Waves and their applications in technologies for information transfer

- Engineering, Technology, and the Application of Science
  - STEM: Combining and developing engineering principles

- Scientific and engineering knowledge is communicated through oral, written, and digital presentations to peers, the media, and the general public.
## Science & Engineering Practices

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

### Science

### Math

### English
A sample investigation might involve:
Develop and pose a testable scientific question (Practice 1)
(GUI) Design a study and collect associated data (Practice 3)
(GUI) Analyze and interpret those data (Practice 4)
(GUI) Revise a model based on data analysis (Practice 2)
(GUI) Represent & communicate results to an audience (Practice 8)
Teaching Paper Writing in the Classroom
Use an experiment performed by all students.

Assign a small portion of the paper writing task to a small group of students. Include:

• ABSTRACT
• Body of the paper
• INTRODUCTION        METHODS
• RESULTS                     DISCUSSION
• CONCLUSIONS (with recommendations)
• ACKNOWLEDGMENT       REFERENCES
Next Generation Science Standards are aligned with Common Core Math & Common Core English Language Arts Curriculum.

Commonalities Among the Practices in Science, Mathematics and English Language Arts

- **M1**: Make sense of problems and persevere in solving them
- **M2**: Reason abstractly & quantitatively
- **M6**: Attend to precision
- **M7**: Look for & make use of structure
- **M8**: Look for & make use of regularity in repeated reasoning
- **M5**: Use appropriate tools strategically
- **S1**: Ask questions and define problems
- **S3**: Plan & carry out investigations
- **S4**: Analyze & interpret data
- **S6**: Construct explanations & design solutions
- **E1**: Demonstrate independence in reading complex texts, and writing and speaking about them
- **E2**: Build a strong base of knowledge through content rich texts
- **E5**: Read, write, and speak grounded in evidence
- **E3**: Obtain, synthesize, and report findings clearly and effectively in response to task and purpose
- **E6**: Use technology & digital media strategically & capably
- **E8**: Obtain, evaluate, & communicate information
- **E4**: Construct viable arguments and critique reasoning of others
- **E7**: Come to understand other perspectives and cultures through reading, listening, and collaborations
- **M3 & E4**: Engage in argument from evidence

Based on work by Tina Chuek ell.stanford.edu
1-SS-1 NM. Obtain information about how men and women of all ethnic and social backgrounds in New Mexico have worked together to advance science and technology.

5-SS-1 NM. Communicate information gathered from books, reliable media, or outside sources, that describes how a variety of scientists and engineers across New Mexico have improved existing technologies, developed new ones, or improved society through applications of science.

MS-ESS3-3 NM. Describe the advantages and disadvantages associated with technologies related to local industries and energy production.

HS-LS2-7 NM. Using a local issue in your solution design, describe and analyze the advantages and disadvantages of human activities that support the local population such as reclamation projects, building dams, and habitat restoration.

HS-SS-1 NM. Obtain and communicate information about the role of New Mexico in nuclear science and 21st century innovations including how the national laboratories have contributed to theoretical, experimental, and applied science; have illustrated the interdependence of science, engineering, and technology; and have used systems involving hardware, software, production, simulation, and information flow.

HS-SS-2 NM. Construct an argument using claims, scientific evidence, and reasoning that helps decision makers with a New Mexico challenge or opportunity as it relates to science.