Dimension 3: Disciplinary Core Ideas

Physical Science	**PS1: Matter and Its Interactions** PS1.A: Structure and Properties of Matter PS1.B: Chemical Reactions PS1.C: Nuclear Processes **PS2: Motion and Stability: Forces and Interactions** PS2.A: Forces and Motion PS2.B: Types of Interactions PS2.C: Stability and Instability in Physical Systems **PS3: Energy** PS3.A: Definitions of Energy PS3.B: Conservation of Energy and Energy Transfer PS3.C: Relationship Between Energy and Forces PS3.D: Energy in Chemical Processes and Everyday Life **PS4: Waves and Their Applications in Technologies for Information Transfer** PS4.A: Wave Properties PS4.B: Electromagnetic Radiation PS4.C: Information Technologies and Instrumentation
Earth & Space Science	**ESS1: Earth's Place in the Universe** ESS1.A: The Universe and Its Stars ESS1.B: Earth and the Solar System ESS1.C: The History of Planet Earth **ESS2: Earth's Systems** ESS2.A: Earth Materials and Systems ESS2.B: Plate Tectonics and Large-Scale System Interactions ESS2.C: The Roles of Water in Earth's Surface Processes ESS2.D: Weather and Climate ESS2.E: Biogeology **ESS3: Earth and Human Activity** ESS3.A: Natural Resources ESS3.B: Natural Hazards ESS3.C: Human Impacts on Earth Systems ESS3.D: Global Climate Change
Life Science	**LS1: From Molecules to Organisms: Structures and Processes** LS1.A: Structure and Function LS1.B: Growth and Development of Organisms LS1.C: Organization for Matter and Energy Flow in Organisms LS1.D: Information Processing **LS2: Ecosystems: Interactions, Energy, and Dynamics** LS2.A: Interdependent Relationships in Ecosystems LS2.B: Cycles of Matter and Energy Transfer in Ecosystems LS2.C: Ecosystem Dynamics, Functioning, and Resilience LS2.D: Social Interactions and Group Behavior **LS3: Heredity: Inheritance and Variation of Traits** LS3.A: Inheritance of Traits LS3.B: Variation of Traits **LS4: Biological Evolution: Unity and Diversity** LS4.A: Evidence of Common Ancestry and Diversity LS4.B: Natural Selection LS4.C: Adaptation LS4.D: Biodiversity and Humans
Engineering, Technology, and Application of Science	**ETS1: Engineering Design** ETS1.A: Defining and Delimiting an Engineering Problem ETS1.B: Developing Possible Solutions ETS1.C: Optimizing the Design Solution **ETS2: Links Among Engineering, Technology, Science, and Society** ETS2.A: Interdependence of Science, Engineering, and Technology ETS2.B: Influence of Engineering, Technology, and Science on Society and the Natural World

A Framework for K-12 Science Education: the Three Dimensions of the Next Generation Science Standards

http://www.nextgenscience.org

Dimension1: Science and Engineering Practices

The science and engineering practices describe behaviors that scientists engage in as they investigate phenomena and build models and theories about the natural world and the key set of engineering practices that engineers use as they design and build models and systems.

- Asking questions (science) and defining problems (engineering)
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Constructing explanations (science) and designing solutions (engineering)
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

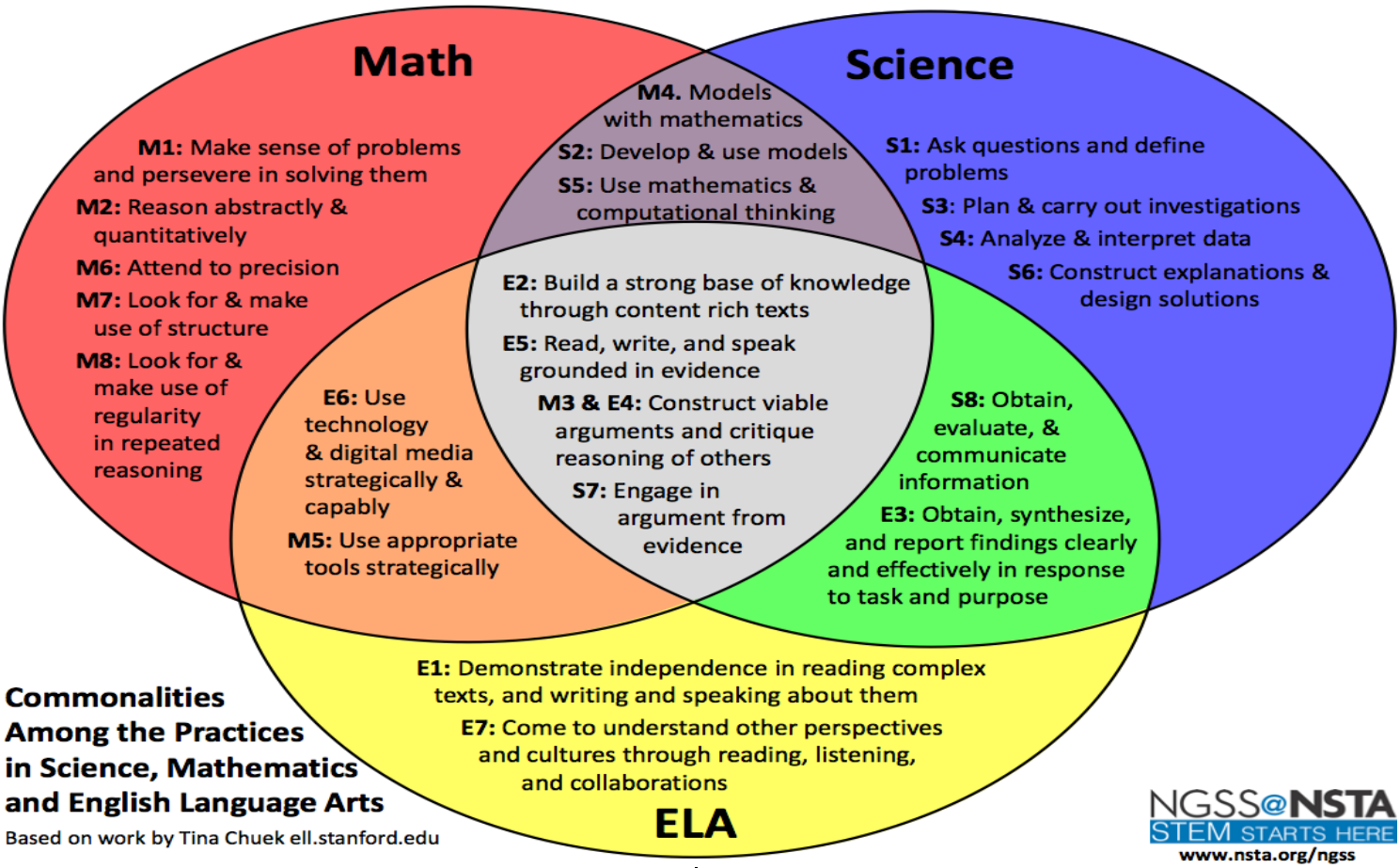
Dimension 2: Cross Cutting Concepts

Crosscutting concepts are themes that apply across all domains of science. As such, they are a way of linking the different domains of science.

- Patterns, similarity, and diversity
- Cause and effect
- Scale, proportion and quantity
- Systems and system models
- Energy and matter
- Structure and function
- Stability and change

Developed by the California Science Project based on the NRC Framework for K-12 Science Education and supporting documents from the NGSS.

Download a copy at: http://csmp.ucop.edu/csp



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

Based on work by Tina Chuek ell.stanford.edu

NGSS@NSTA STEM STARTS HERE
www.nsta.org/ngss

Conceptual Shifts in the NGSS

1. K-12 science education should reflect the interconnected Nature of Science as it is practices and experienced in the real world
2. The NGSS are student performance expectation – NOT curriculum
3. The science concepts in NGSS build coherently from K-12
4. The NGSS focus on deeper understanding of content as well as application of content
5. Science and engineering are integrated in the NGSS from K-12
6. The NGSS are designed to prepare students for college, career, and citizenship
7. The NGSS and Common Core State Standards are aligned

NGSS Websites

- NGSS Official Site: www.nextgenscience.org
- California NGSS: www.cde.ca.gov/pd/ca/sc/ngssintrod.asp
- CSTA NGSS: www.cascience.org/csta/ngss.asp
- NSTA NGSS: www.nsta.org/ngss

Nature of Science in the NGSS

- Scientific investigations use a variety of methods.
- Scientific knowledge is based on empirical evidence.
- Scientific knowledge is open to revision in light of new evidence.
- Scientific models, laws, mechanisms, and theories explain natural phenomena.
- Science is a way of knowing.
- Scientific knowledge assumes an order and consistency in natural systems.
- Science is a human endeavor
- Science addresses questions about the natural and material world

CALIFORNIA science CSP PROJECT

http://csmp.ucop.edu/csp