Changes in Science Education

Testing, Standards, Curriculum, and Instruction

ACT® Aspire™

ARKANSAS
K-12 SCIENCE STANDARDS
EDUCATION FOR A NEW GENERATION

Virginia Rhame, Science Specialist, NWAESC
Lesley Merritt, Science Specialist, CMASE

Goals

- Become familiar with science section of ACT Aspire.

- Become aware of and equipped to meet shifts needed in curriculum and instruction to support high achievement in science due to transitions in standards and testing.

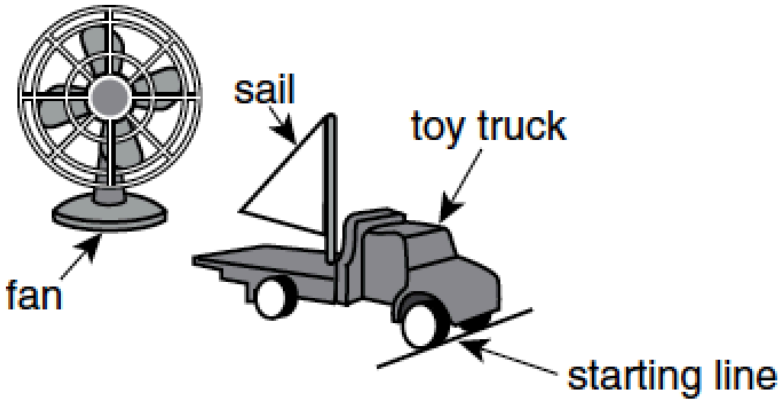
ACT Aspire

Plickers.com

What do you know about the ACT Aspire?

Dipping our Toes into the ACT Aspire

- Let's take a few minutes to look at an exemplar ACT Aspire question.
- What are your initial thoughts? Reactions?



ACT Aspire Description

- Read the Technical Bulletin Excerpt
  - As you read the excerpt, what sticks out to you? Is there a line, phrase, and/or word?
  - Annotate and jot down thoughts in margin
  - Share with your group
- Discussion
- Summative Assessments Overview Pamphlet

Exemplar Questions

- http://tn.actaspire.org
- Username: Science
- Password: actaspire

Question #	Approximate Level	Topic
1-6	Early High School (9^{th} and 10^{th})	Viscosity
7-12	8th	Are Virus Alive?
13-18	8^{th}	Mineral Hardness
19-24	7th	Condensation
25-30	6^{th}	Lotion vs. Margarine
31-36	4^{th}	Life Cycle
36-42	3^{rd}	Clouds

ACT Aspire Compared to Benchmark

- Now that you've seen some ACT Aspire Exemplar questions,
  - What similarities do you notice?
  - What differences do you notice?
  - What implications does this have for classroom practice?

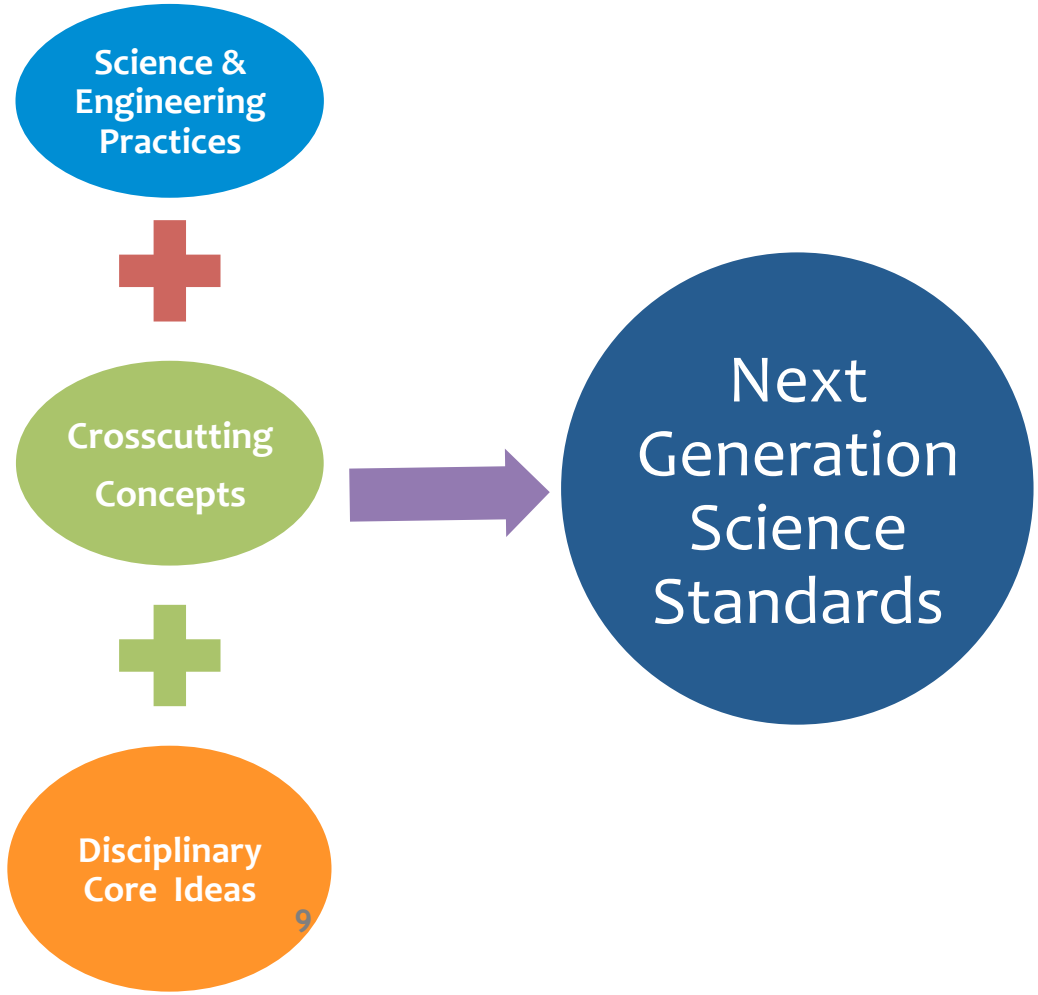
ACT Aspire and Standards

What standards is the ACT Aspire based on?

NEXT GENERATION SCIENCE STANDARDS

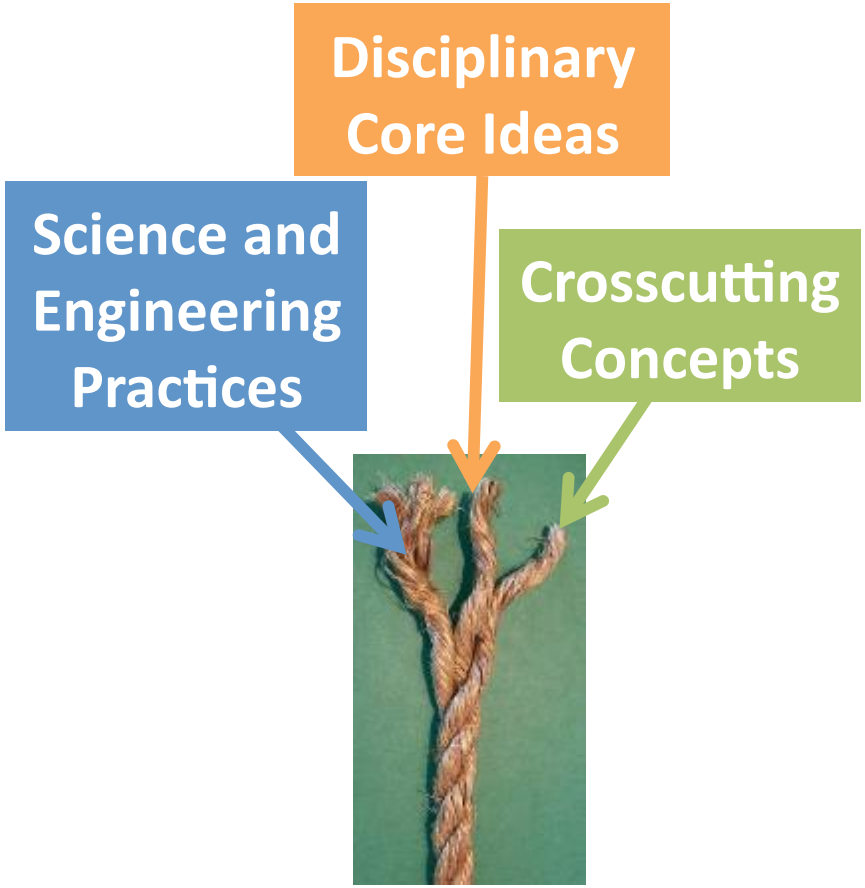
COMMON CORE STATE STANDARDS INITIATIVE
PREPARING AMERICA'S STUDENTS FOR COLLEGE & CAREER

Three Dimensions of the Framework for K-12 Science Education



Three-Dimensional Learning

3-PS2-3 Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.



Three-Dimensional Learning

3-PS2-1 Ask questions to determine cause and effect relationships of electric and magnetic interactions between two objects not in contact with each other.

Practices Jigsaw: Identifying Common Ground

- Examine your assigned Science and Engineering Practice Progression

- Identify areas of overlap between the ACT Aspire Domains and the SEP
- Identify any gaps in the ACT Aspire Domains that are not addressed by the SEP

Earth's Systems

Students who demonstrate understanding can:

5-ESS2-1 **Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.** [Clarification Statement: Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; or the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.] [Assessment Boundary: Assessment is limited to the interactions of two systems at a time.]

5-ESS2-2 **Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.** [Assessment Boundary: Assessment is limited to oceans, lakes, rivers, glaciers, ground water, and polar ice caps, and does not include the atmosphere.]

5-ESS3-1 **Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.**

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Developing and Using Models

Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.

- Develop a model using an example to describe a scientific principle. (5-ESS2-1)

Using Mathematics and Computational Thinking

Mathematical and computational thinking in 3–5 builds on K–2 experiences and progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions.

- Describe and graph quantities such as area and volume to address scientific questions. (5-ESS2-2)

Obtaining, Evaluating, and

Disciplinary Core Ideas

ESS2.A: Earth Materials and Systems

- Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. (5-ESS2-1)

ESS2.C: The Roles of Water in Earth's Surface Processes

- Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. (5-ESS2-2)

Crosscutting Concepts

Scale, Proportion, and Quantity

- Standard units are used to measure and describe physical quantities such as weight, and volume. (5-ESS2-2)

Systems and System Models

- A system can be described in terms of its components and their interactions. (5-ESS2-1, 5-ESS3-1)

Connections to Nature of Science

Science Addresses Questions About the Natural and Material World

- Science findings are limited to questions that can be answered with empirical evidence. (5-ESS3-1)

Where is Water?

Let's put ideas into action. . .

- Our Blue Planet
- Where is the Water?

Where is Water?

- Using the Exemplars as a model, create an ACT Aspire-like question
  - Remember, we have to create a need for them to use the text and/or graphs to answer the question.
  - Related content but an extension

- http://water.usgs.gov/edu/earthhowmuch.html

Locating Disciplinary Text, Charts, Graphs

- Explore the materials available online.
- Craft an ACT Aspire-like series of questions/ activities that aligns with content you will be teaching this year.
- Ask yourself. . .
  - How am I consistently engaging students in the Science and Engineering Practices?

Other Resources Online

- Virginia's Wiki:

Nwaescscience.pbworks.com

- Lesley's Google Folder

http://tinyurl.com/ov3xwda