

Science Benchmark Clarification, Instruction, and Assessment

Strand II: Reflect on the Nature, Adequacy, and Connections Across Scientific Knowledge

Content Standard 1: All students will analyze claims for their scientific merit and explain how scientists decide what constitutes scientific knowledge; how science is related to other ways of knowing; how science and technology affect our society; and how people of diverse cultures have contributed to and influenced developments in science. (Reflecting on Scientific Knowledge)

Benchmark

Evaluate the strengths and weaknesses of claims, arguments, or data. (SCI.II.1.MS.1)

Benchmark Clarification

Claims are formulated through observation, sampling, data collection and analysis. Students will infer and observe in order to evaluate data. Students will examine strengths and weaknesses of observations, data collection, inferences, and explanations, and will dispute claims presented by a variety of media (e.g. videos, graphs, newspaper articles, Internet, textbooks, etc.).

Key Concepts (voc.)/Tools

Aspects of arguments such as data, evidence, sampling, alternate explanation, conclusion, inference, and observation.

Real-World Context

Deciding between alternate explanations or plans for solving problems; evaluating advertising claims or cases made by interest groups; evaluating sources or references.

Resources:

<http://mtn.merit.edu/mcf/SCI.II.1.MS.1.html>

Science Benchmark Clarification, Instruction, and Assessment

Strand II: Reflect on the Nature, Adequacy, and Connections Across Scientific Knowledge

Content Standard 1: All students will analyze claims for their scientific merit and explain how scientists decide what constitutes scientific knowledge; how science is related to other ways of knowing; how science and technology affect our society; and how people of diverse cultures have contributed to and influenced developments in science. (Reflecting on Scientific Knowledge)

Benchmark

Describe limitations in personal knowledge. (SCI.II.1.MS.2)

Benchmark Clarification

Students will recognize that they must have multiple resources and conduct multiple trials/tests before making claims, arguments or accepting data.

Students must be willing to admit inaccuracies and mistakes, as well as determine differences in data that are significant enough to support or refute claims.

Key Concepts (voc.)/Tools

Recognizing degrees of confidence in ideas or knowledge from different sources, evaluating data and reference sources.

Real-World Context

Any sections on Using Scientific Knowledge

Resources:

<http://mtn.merit.edu/mcf/SCI.II.1.MS.2.html>

Science Benchmark Clarification, Instruction, and Assessment

Strand II: Reflect on the Nature, Adequacy, and Connections Across Scientific Knowledge

Content Standard 1: All students will analyze claims for their scientific merit and explain how scientists decide what constitutes scientific knowledge; how science is related to other ways of knowing; how science and technology affect our society; and how people of diverse cultures have contributed to and influenced developments in science. (Reflecting on Scientific Knowledge)

Benchmark

Show how common themes of science, mathematics, and technology apply in real-world contexts. (SCI.II.1.MS.3)

Benchmark Clarification

Students will demonstrate an understanding of the interdisciplinary links between math, science and technology by exploring careers and using every day objects. These disciplines integrate common thematic ideas such as:

- Systems: a collection of parts that function as a whole
- Model/Scale: a simplified proportional representation
- Patterns of Change: natural or mathematical repetitions
- Function: how an object works; its purpose
- Evolution: the present arises from materials and forms of the past; change over time
- Scale: a reference to a quality that is both relative and absolute and to the ranges of magnitude in the universe which include such dimensions as size, duration, and speed
- Energy: the capacity to work or the ability to make matter move

Key Concepts (voc.)/Tools

Thematic ideas: systems-subsystems, feedback models, mathematical constancy, scale, conservation, structure, function, adaptation.

Real-World Context

Any in the sections on Using Scientific Knowledge

Resources:

<http://mtn.merit.edu/mcf/SCI.II.1.MS.3.html>

Science Benchmark Clarification, Instruction, and Assessment

Strand II: Reflect on the Nature, Adequacy, and Connections Across Scientific Knowledge

Content Standard 1: All students will analyze claims for their scientific merit and explain how scientists decide what constitutes scientific knowledge; how science is related to other ways of knowing; how science and technology affect our society; and how people of diverse cultures have contributed to and influenced developments in science. (Reflecting on Scientific Knowledge)

Benchmark

Describe the advantages and risks of new technologies. (SCI.II.1.MS.4)

Benchmark Clarification

There are risks and benefits associated with ever-changing technology. Students will evaluate the advantages, disadvantages, and consequences of technology.

Key Concepts (voc.)/Tools

- Risk
- Benefit
- Side effect
- Advantage
- Disadvantage.

Real-World Context

- Technological systems for:
- Manufacturing
- Transportation
- Energy distribution
- Housing
- Medicine (such as cloning, genetic engineering).

Resources:

<http://mtn.merit.edu/mcf/SCI.II.1.MS.4.html>

Science Benchmark Clarification, Instruction, and Assessment

Strand II: Reflect on the Nature, Adequacy, and Connections Across Scientific Knowledge

Content Standard 1: All students will analyze claims for their scientific merit and explain how scientists decide what constitutes scientific knowledge; how science is related to other ways of knowing; how science and technology affect our society; and how people of diverse cultures have contributed to and influenced developments in science. (Reflecting on Scientific Knowledge)

Benchmark

Develop an awareness of and sensitivity to the natural world. (SCI.II.1.MS.5)

Benchmark Clarification

Students will describe the balance of nature as how living organisms (producers, consumers and decomposers) and non-living things (water, air, rocks and minerals, natural resources like coal, and energy) interact within their environment. Students will compare and contrast how their actions can affect the balance of nature.

Key Concepts (voc.)/Tools

Appreciation of the balance of nature and the effects organisms have on each other, including the effects humans have on the natural world.

Real-World Context

Any in the sections on Using Scientific Knowledge appropriate to middle school.

Resources:

<http://mtn.merit.edu/mcf/SCI.II.1.MS.5.html>

Science Benchmark Clarification, Instruction, and Assessment

Strand II: Reflect on the Nature, Adequacy, and Connections Across Scientific Knowledge

Content Standard 1: All students will analyze claims for their scientific merit and explain how scientists decide what constitutes scientific knowledge; how science is related to other ways of knowing; how science and technology affect our society; and how people of diverse cultures have contributed to and influenced developments in science. (Reflecting on Scientific Knowledge)

Benchmark

Recognize the contributions made in science by cultures and individuals of diverse backgrounds. (SCI.II.1.MS.6)

Benchmark Clarification

Students will have opportunities:

- To familiarize themselves with perspectives of diverse cultural and racial groups that are traditionally underrepresented in science
- To have scientific concepts and experiences presented in ways that promote an understanding and appreciation of different cultures and their influence on the nature and structure of the scientific enterprise
- To have a learning environment that reflects equitable contributions to support and encourage the pursuit of science as a career

Key Concepts (voc.)/Tools

Cultural contributions made in science, contributions made by people of diverse backgrounds.

Real-World Context

Biographies of minority and female scientists, histories of cultural contributions to science

Resources:

Culturally Relevant Materials for Science Education (CD-ROM Link)

<http://mtn.merit.edu/mcf/SCI.II.1.MS.6.html>