Pennsylvania Science

About the Science Assessment Anchors

Introduction

The Pennsylvania Science Assessment is based on the Academic Standards adopted by the State Board of Education in January of 2002. The standards are comprised of two documents: Science and Technology Standards and Environment and Ecology Standards. These documents contain seventeen important categories that describe what students need to know. The purpose of the Assessment Anchors is to articulate essential and assessable elements, and to provide clarity for instruction and for the focus of the state assessment in grades 4, 8, and 11.

How the Assessment Anchors Connect to the Standards

The Pennsylvania Academic Standards for Science are:

3.1 Unifying Themes
3.2 Inquiry and Design
3.3 Biological Sciences
3.4 Physical Science, Chemistry, and Physics
3.5 Earth Sciences
3.6 Technology Education
3.7 Technological Devises
3.8 Science, Technology and Human Endeavors

4.1 Watersheds and Wetlands
4.2 Renewable and Nonrenewable Resources
4.3 Environmental Health
4.4 Agriculture and Society
4.5 Integrated Pest Management
4.6 Ecosystems and their Interactions
4.7 Threatened, Endangered and Extinct Species
4.8 Humans and the Environment
4.9 Environmental Laws and Regulations

All of the Science Standards categories are included in the Assessment Anchors, but the anchors tighten the focus of what is assessed. The Assessment Anchors clarify what is expected from grade span to grade span (K-4, 5-7, and 8-10). In addition, the Assessment Anchors have fewer Reporting Categories to help create more reliable scores (meaning that there are more items per reporting category making interpretations about what students actually know more reliable). Rather than reporting student results in all 17 standards, the reports will be organized into four reporting categories.

How the Assessment Anchors are Organized

The four reporting categories are similar to those used by the National Assessment of Educational Progress (NEAP) and The Third International Mathematics and Science Study (TIMSS). The four categories for the assessment anchors are included in these major assessments, but are organized differently. Below are the four student reporting categories for the assessment anchors for the Pennsylvania System of School Assessment (PSSA) in Science and the related standards.

Reporting Categories	Connections to the Standards
A. The Nature of Science	**3.1** Unifying Themes of Science **3.2** Inquiry and Design **3.6** Technology Education **3.7** Technological Devices **3.8** Science, Technology, and Human Endeavors **4.4** Agriculture and Society **4.6** Ecosystems and their Interactions **4.7** Threatened, Endangered, and Extinct Species **4.8** Humans and the Environment
B. Biological Sciences	**3.1** Unifying Themes of Science **3.3** Biological Sciences **4.2** Renewable and Nonrenewable Resources **4.3** Environmental Health **4.6** Ecosystems and Their Interactions **4.7** Threatened, Endangered, and Extinct Species
C. Physical Sciences	**3.2** Inquiry and Design **3.4** Physical Science, Chemistry, and Physics **3.6** Earth Sciences
D. Earth and Space Sciences	**3.2** Inquiry and Design **3.4** Physical Science, Chemistry, and Physics **3.5** Earth Sciences **3.7** Technological Devices **4.1** Watersheds and Wetlands **4.2** Renewable and Nonrenewable Resources **4.8** Humans and the Environment

How to Read the Assessment Anchors

All of the Science Assessment Anchors begin with an "S" to indicate science. The number after the "S" in the label is the grade level (e.g., S8 would be Science at eighth grade). The second letter in the labeling system is the Reporting Category (A through D) followed by the sub-reporting category number. The same reporting categories continue across all Grade levels, 4, 8, and 11. The final number in the label is the actual Assessment Anchor number (e.g., 1.1, 1.2, 1.3, etc.). Essentially, you read the Assessment Anchors like an outline, with the Assessment Anchor shaded across the top of the page and more specific details underneath. (*See example below.*)

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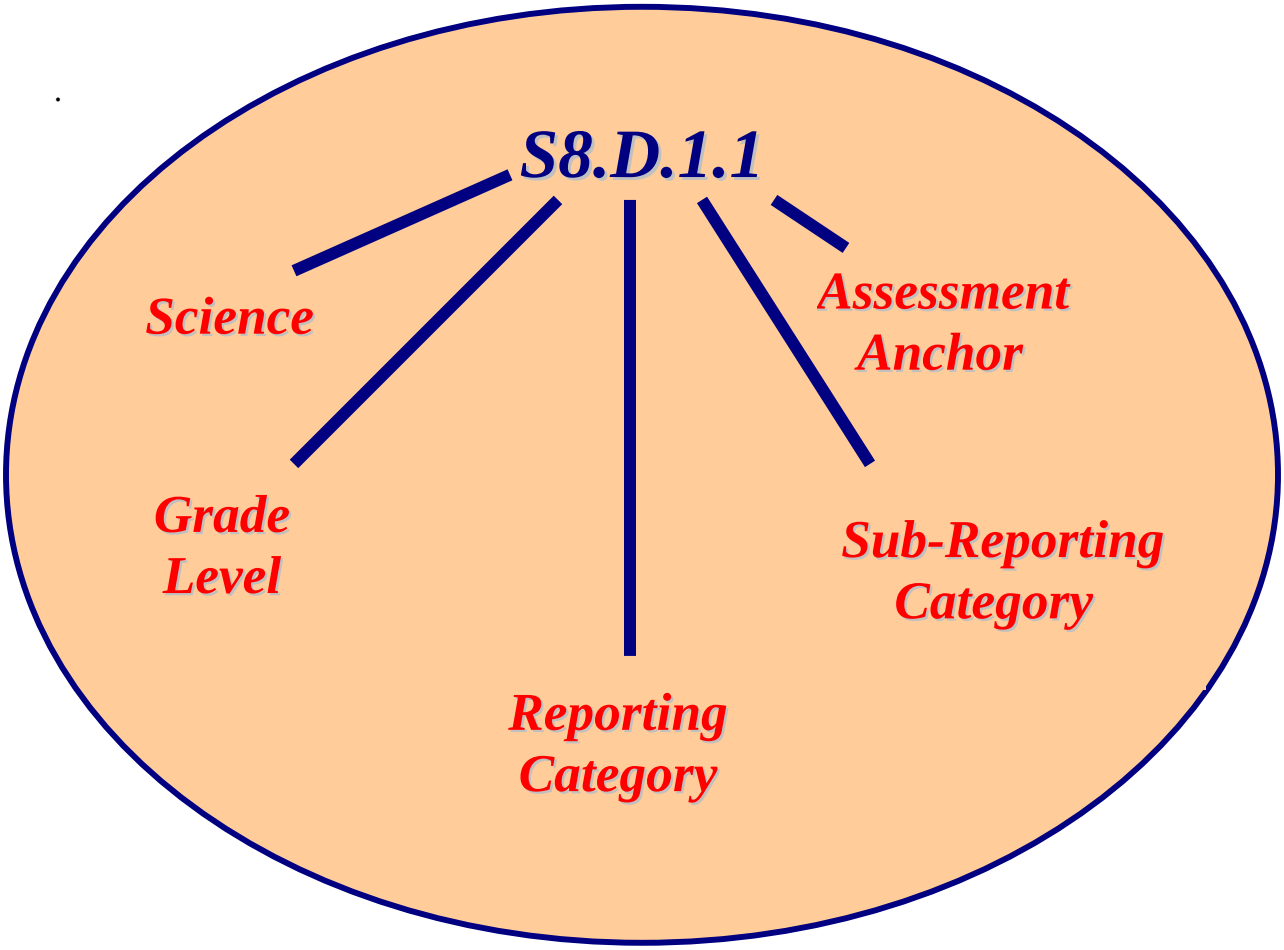

For example, **S8.D.1.1** is the code for the first science (S) assessment anchor for Grade 8 in the reporting category of (D) Earth and Space Sciences, and the sub-category of Earth Features and Processes That Change Earth and Its Resources.

Other Important Features that Appear in the Assessment Anchors

Eligible Content

The column on the right-hand side of the page underneath each Assessment Anchor is the Eligible Content. This is often known as the "assessment limit" and helps teachers identify how the anchor will be assessed. Not all of the Eligible Content is assessed on the PSSA each year, but it shows the range of knowledge drawn upon to design the test.

The use of "e.g." and " i.e."

Some assessment anchors contain additional information in parentheses. If there is a list inside with an "e.g.," preceding it, that means the examples included are meant to be just that, examples. This is not an exhaustive list for assessment purposes. However, if the list is preceded by an "i.e.," the list is to be considered limited to those specific examples, and those items are the only items that are "fair game" for assessment.

The use of "and" and "or"

All of the concepts and skills identified at a given grade level are "fair game" for large-scale assessment purposes. However, conjunctions used throughout this document have specific meaning. The use of the conjunction "or" means that a student can be assessed on all or just some of the elements in a given year. The use of "and" between elements means that the *intent* is to assess each element of the assessment anchor every year. In some situations, "or" is used when students have choices about how they will provide supporting evidence for their responses.

Sample Items

The sample items appear on the bottom half of the page. These are examples of how the Assessment Anchor might appear on the PSSA. Some of the pages may not have any sample items because the development committee only created three examples per Assessment Anchor. We will be continually adding to the sample items as time goes on. For other sample items, teachers should consult the item sampler on the state website.

Overview of Science Assessment Anchors

**Note that on this overview document, the grade level does not appear in the reporting categories because these occur at all grade levels (4, 8, and 11). However, Grade 4 is used as an example for the Anchors and Benchmark References.*

S.A The Nature of Science	
S.A.1. Reasoning and Analysis	
S4.A.1.1 Identify and explain the pros and cons of applying scientific, environmental, or technological knowledge to possible solutions to problems.	(3.2.4.A) (3.2.4.C) (3.8.4.C)
S4.A.1.2 Recognize and describe change in natural or human-made systems and the possible effects of those changes.	(3.1.4.C) (3.1.4.E) (4.7.4.B) (4.8.4.A) (4.8.4.C)
S.A.2. Processes, Procedures, and Tools of Scientific Investigations	
S4.A.2.1. Apply skills necessary to conduct an experiment or design a solution to solve a problem.	(3.2.4.C)
S4.A.2.2 Identify appropriate instruments for a specific task and describe the information the instrument can provide.	(3.7.4.A) (3.7.4.B)
S.A.3. Systems, Models, and Patterns	
S4.A.3.1 Identify systems and describe relationships among parts of a familiar system (e.g., digestive system, simple machines, water cycle).	(3.1.4.A) (3.6.4.A) (3.6.4.B) (3.6.4.C) (4.4.4.C) (4.6.4.A) (4.6.4.B)
S4.A.3.2 Use models to illustrate simple concepts and compare the models to what they represent. .	(3.1.4.B) (4.3.4.C)
S4.A.3.3 Identify and make observations about patterns that regularly occur and reoccur in nature.	(3.1.4.C) (3.2.4.B)

S.B Biological Sciences	
S.B.1. Structure and Function of Organisms	
S4.B.1.1 Identify and describe similarities and differences between living things and their life processes.	(3.3.4.A) (3.3.4.B) (4.3.4.A) (4.3.4.C) (4.6.4.A)
S.B.2. Continuity of Life	
S4.B.2.1 Identify and explain how adaptations help organisms to survive.	(4.7.4.B)
S4.B.2.2 Identify that characteristics are inherited and, thus, offspring closely resemble their parents.	(3.3.4.C) (4.7.4.A) (4.7.4.C)
S.B.3. Ecological Behavior and Systems	
S4.B.3.1 Identify and describe living and nonliving things in the environment or their interaction.	(4.6.4.A)
S4.B.3.2 Describe, explain, and predict change in natural or human-made systems and the possible effects of those changes on the environment.	(4.2.4.C) (4.3.4.C) (4.6.4.C) (3.1.4.E)
S4.B.3.3 Identify or describe human reliance on the environment at the individual or the community level.	(3.8.4.C) (4.3.4.B) (4.4.4.B) (4.5.4.C)

S.C Physical Sciences	
S.C.1. Structure, Properties and Interactions of Matter and Energy	
S4.C.1.1 Describe observable physical properties of matter.	**(3.2.4.B)** **(3.4.4.A)**
S.C.2 Forms, Sources, Conversions, and Transfer of Energy	
S4.C.2.1 Recognize basic energy types and sources, or describe how energy can be changed from one form to another.	**(3.4.4.B)** **(3.4.4.C)**
S.C.3 Principles of Force and Motion	
S4.C.3.1 Identify and describe different types of force and motion, or the effect of the interaction between force and motion.	**(3.2.4.B)** **(3.4.4.C)** **(3.6.4.C)**

S.D Earth and Space Sciences	
S.D.1 Earth Features and Processes that Change Earth and Its Resources	
S4.D.1.1 **Describe basic landforms in Pennsylvania.**	**(3.5.4.A)**
S4.D.1.2 **Identify the types and uses of Earth's resources.**	**(3.5.4.B)** **(3.5.4.D)** **(4.2.4.B)** **(4.8.4.D)**
S4.D.I.3 **Describe Earth's different sources of water or describe changes in the form of water.**	**(3.5.4.D)** **(4.1.4.A)** **(4.1.4.D)** **(4.1.4.E)**
S.D.2 Weather, Climate, and Atmospheric Processes	
S4.D.2.1 **Identify basic weather conditions and how they are measured.**	**(3.5.4.C)** **(3.7.4.B)** **(3.2.4.B)**
S.D.3 Composition and Structure of the Universe	
S4.D.3.1 **Describe Earth's relationship to the sun and the moon.**	**(3.4.4.D)**