INCORPORATING & ALIGNING

THE

PENNSYLVANIA DEPARTMENT OF EDUCATION ACADEMIC STANDARDS

WITH

RELEVANT CAREER AND TECHNICAL EDUCATION CONTENT

Incorporating & Aligning Pennsylvania Department of Education Academic Standards with Relevant Career and Technical Education Content

The purpose of the new Carl D. Perkins Career and Technical Education Improvement Act of 2006 is to build on the efforts of state and local school entities developing challenging academic and technical standards and assisting students in meeting such standards, including preparing for high-skill, high-wage, and high-demand occupations in current or emerging professions: promoting the development of services and activities that integrate rigorous and challenging academic and career and technical instruction, and linking secondary education and postsecondary education for participating career and technical education students.

This includes developing a course syllabus (course map) indicating coherent and rigorous content aligned with challenging academic standards, and technical skills within relevant career and technical education programs.

This booklet will help in aligning academic standards and assessment anchors to major technical duties. It includes Assessment Anchors FAQs, a resource page with links to several PDE sites, Quick Start Guides for aligning assessment anchors with academic standards, a crosswalk identifying worksheets developed as part of the Temple Reading Project, a blank assessment anchor template and the PDE 11th Grade Assessment Anchors for Science, Math and Reading, Writing, Speaking and Listening.

Incorporating & Aligning Pennsylvania Department of Education
Academic Standards with
Relevant Career and Technical Education Content

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* North Montco Technical Career Center Quick Start Guide

PENNSYLVANIA DEPARTMENT OF EDUCATION

Frequently Asked Questions: Introducing the Assessment Anchors

What are Assessment Anchors?

The *Assessment Anchors clarify the standards assessed on the PSSA* and can be used by educators to help prepare their students for the PSSA. We used the metaphor of an "anchor" because we wanted to signal that the Assessment Anchors would anchor both the state assessment system and the curriculum/instructional practices in schools.

Why do we need Assessment Anchors if we already have the Pennsylvania standards?

Since 1999, the teachers across the Commonwealth have been *using a set of state standards to develop curriculum and instructional materials*. Likewise, the Department and teacher committees have been using the standards to develop the state assessments. Over the last few years, however, teachers have expressed a need for a clearer document, noting that the Pennsylvania standards were often too broad and too many. The *Assessment Anchors target a specific band of standards, enabling the PSSA* to have a higher level of clarity.

Do the Assessment Anchors replace the Pennsylvania standards?

No. The Assessment Anchors do not replace the standards. All teachers are still required to teach to all of the standards per Chapter 4 Regulations and use local assessments to measure student progress. The Anchors simply clarify which standards are assessed on the PSSA.

Will teachers teach only the Assessment Anchors and ignore other knowledge and skills?

The Assessment Anchors were written with the intent of having interdisciplinary discussions about how the Mathematics and Reading Anchors can be taught in Science, Social Studies, the Arts and other content areas. The intent of the Anchors is not to narrow the curriculum, but to focus teachers on the essential skills and knowledge in Reading and Mathematics that must be taught across the curriculum, given the limited amount of time teachers have with students.

How were the Assessment Anchors selected, and by whom?

The Department of Education identified the Assessment Anchors based on the recommendations of teachers serving on the Mathematics and Reading Assessment Advisory Committees and other curriculum experts. We also looked to national organizations (i.e., NCTM, NCTE and NAEP) and other external groups for input. We had seven criteria in mind with the development of the Anchors. We wanted the Assessment Anchors to be:

- **Clear.** We wanted to clarify which standards are assessed on the PSSA. The Anchors should be easy to read and user-friendly.
- **Focused.** No state assesses every single standard on its statewide assessments—it would be impossible. Rather than have teachers "guess" which standards are most critical, the Anchors identify a core set of standards that could reasonably be assessed on a large-scale assessment.

- **Aligned.** The focus is on helping students achieve the state's standards. The Anchors align directly to the state's standards in Reading and Mathematics. The Anchors simply clarify the standards.
- **Grade Appropriate**. Teachers may have different ideas about what skills should be mastered by which grade levels. The Anchors provide clear examples of skills and knowledge that should be learned at the different grade levels that will be assessed on state tests.
- **Organized to support a curricular flow.** Rather than simply identifying Anchors in the grades for which the state has standards, we developed Assessment Anchors in Grades 3 through 8 and 11 to encourage a curricular spiral that builds each year to the next.
- **Rigorous.** We wanted to maintain the rigor of the state standards through the Anchors. The state will continue to use performance tasks to assess higher order reasoning and problem solving skills.
- **Manageable.** We wanted to identify a set of standards that could be taught in a manageable way before the Spring administration of the PSSA. We are looking forward to doing additional analysis to see if we have, in fact, identified a manageable set of expectations from the curricular view.

How are the Assessment Anchors organized?

The Anchors are only available in Mathematics and Reading in Grades 3 through 8 and 11. In the document you will find the following:

- **Reporting Category.** The Anchors are organized by Reporting Category. The Reporting Category appears at the very top of each page. There are five Reporting Categories in Mathematics and two Reporting Categories in Reading. Reporting Categories are important because individual student scores will be reported at this level. District and school reports may include reports by Assessment Anchor if there are enough questions on the PSSA to warrant a valid score by the broad Anchor statement.
- **Assessment Anchor.** The Assessment Anchor appears in the shaded bar across the top of the page. You read the Anchor like an outline with the main concept shaded in gray. Just beneath, in the left-hand column, are more specific descriptors that can be used for instructional purposes. *Both the concept in the shaded gray area and the descriptors (which appear one per page) are part of the Anchor*.
- **References.** Below each specific descriptor of the Assessment Anchor is a reference in italics. This reference relates to the PA Academic Standards and helps you cross-walk the Anchors to the Standards.
- **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 limits" and helps teachers identify how deeply they need to cover an Anchor and/or the range of the content they should teach to best prepare their students for the PSSA. Not all of the Eligible Content is assessed on the PSSA, but it shows the range of knowledge from which we design the test.
- **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 we only created three per Assessment Anchor. We will be continually adding to the sample items. For other sample items teachers should consult the released items on the state website.

How can teachers, schools and districts use the Assessment Anchors?
The Assessment Anchors can help focus teaching and learning because they are clear and manageable – and closely aligned to the PSSA. Teachers and Administrators will be better informed about which standards will be assessed on state tests. The Assessment Anchors should be used in combination with the Assessment Handbooks that include the test blueprints and Released Tasks from the PSSA. With this degree of information, teachers can more easily embed these skills and knowledge in the larger curriculum. For example, *reading for inference* is a skill that all students at any level need to learn and practice. Staff can share the responsibility for teaching this skill in English, as well as other areas in the curriculum. Even elective and support staff can "adopt" an Assessment Anchor. In this way, an entire school and community can teach and reinforce these critical Reading and Mathematics standards.

What is the difference between the Assessment Anchors and "anchor papers"?
Anchor papers are not the same as the Assessment Anchors. In order to score open-ended items on the PSSA, PA teachers read a sampling of the student responses on the open-ended items and try to identify responses or "papers" that exemplify the different score points on the rubric. These responses are called "anchor papers." They are called anchor papers because they "anchor" the scoring process. Once teachers reach consensus on the anchor papers, they are used by trained teachers to score all of the open-ended responses on the PSSA. When the Department releases open-ended items with student work, the anchor papers are often released with the items.

What kind of training is being offered by the State to help teachers understand the Assessment Anchors?
The Bureau of Assessment and Accountability and the Bureau of Curriculum and Academic Services are sponsoring regional trainings in partnership with the Intermediate Units. At these trainings, we will discuss a few strategies for introducing the Assessment Anchors into curriculum/instruction/assessment discussions at the district/school levels. The Assessment Anchors will also be the basis of all of the Governor's Institutes that include sessions on Reading/Mathematics content.

Will the anchors ever be revised or changed?
Like the standards, the Anchors will be reviewed periodically to ensure that they represent the most important skills and knowledge that should be assessed on the PSSA. We are in the process of working with higher education institutions and others to ensure that the 11th Grade Assessment Anchors are benchmarked to the requirements of both the workplace and post-secondary institutions.

Helpful Links

Pennsylvania Department of Education Assessment Anchors:

http://www.pde.state.pa.us/a_and_t/cwp/view.asp?a=108&q=103127&a_and_tNav=|6309|&a_and_tNav=|

Pennsylvania Department of Education Assessment Anchors Tool Kit:

http://www.pde.state.pa.us/a_and_t/cwp/view.asp?a=108&Q=108454&a_and_tNav=|6404|&a_and_tNav=|

Pennsylvania Department of Education Academic Standards:

http://www.pde.state.pa.us/stateboard_ed/cwp/view.asp?a=3&Q=76716&stateboard_edNav=|5467|&stateboard_edNav=|

2007-2008 Grade 11 Mathematics Item and Scoring Sampler

http://www.pde.state.pa.us/a_and_t/lib/a_and_t/2006-2007Gr11MathItemSampler.pdf

2007 Grade 11 Formula Sheet

http://www.pde.state.pa.us/a_and_t/lib/a_and_t/2007Grd11FormulaSheet.pdf

PSSA Resource Page

http://www.pde.state.pa.us/a_and_t/cwp/view.asp?a=108&Q=73314&a_and_tNav=|680|&a_and_tNav=|

North Montco Technical Career Center

Crosswalk Linking Reading Program Worksheets to the Pennsylvania Department of Education (PDE) Academic Standards for Reading, Writing, Speaking and Listening (RWSL)

PDE Academic Standards & Assessment Anchors
For Reading, Writing, Speaking and Listening

1.1. Learning to Read Independently	1.5. Quality of Writing
1.2. Reading Critically in All Content Areas	1.6. Speaking and Listening
1.3. Reading, Analyzing and Interpreting Literature	1.7. Characteristics & Function of the English Language
1.4. Types of Writing	1.8. Research

The language arts—Reading, Writing, Speaking and Listening—are unique because they are processes that students use to learn and make sense of their world. Students do not read "reading"; they read about history, science, mathematics and other content areas as well as about topics for their interest and entertainment. Similarly, students do not write "writing"; they use written words to express their knowledge and ideas and to inform or entertain others.

Because of the unique nature of the language arts, all teachers in a school will use the Reading, Writing, Speaking and Listening Standards. The standards define the skills and strategies employed by effective readers and writers; therefore, all teachers are required to help their students in learning them through multiple classroom situations in all the subject areas.

The Reading, Writing, Speaking and Listening Standards provide parents and community members with information about what students should know and be able to do as they progress through the educational program and upon graduation. With a clearly defined target provided by the standards, parents, students, educators and community members become partners in learning success.

*Worksheets used in the Automotive Technology Program.

The Temple Reading Program reading strategies are in parenthesis.

Worksheet Name (All Worksheets)	PA Academic Standards for RWSL: Reading 1.1, 1.2, 1.3		PA Academic Standards for RWSL: Writing, Speaking, Listening and Research 1.4, 1.5, 1.6, 1.7, 1.8
	Standards	Anchors	Standards
Prediction/Writing Journal* (Reciprocal Teaching (RT) - Making Predications)	1.1 a, b 1.2 a, b 1.3 f	R11.A.1.4.1 R11.A.1.5.1 R11.A.2.3.1 R11.A.2.3.3 R11.A.2.4.1 R11.A.2.5.1 R11.A.2.6.1 R11.A.2.6.2	1.4 b, d 1.5 b, e 1.6 a, d 1.7 c
Reading Grid* (RT – Clarifying and Scaffolding - K-W-L)	1.1 a, b, c, d, 1.2 a, b, c 1.3 f	R11.A.1.2.1 R11.A.1.2.2 R11.A.2.2.1 R11.A.2.2.2	1.5 e, f 1.6 a, b, d, e 1.8 c 1.7 c

Worksheet Name (All Worksheets)	PA Academic Standards for RWSL: Reading		PA Academic Standards for RWSL: Writing, Speaking, Listening and Research
	Standards	Anchors	Standards
Chapter Summary* (RT – Summarizing)	1.1. e, f, g, h 1.2. a, b 1.3. b, f	R11.A.1.2.1 R11.A.1.2.2 R11.A.2.2.1 R11.A.2.2.2 R11.A.1.2.1 R11.A.1.2.2 R11.A.2.2.1 R11.A.2.2.2	1.4. b, c, d 1.5. b, e, f 1.6. a, b, c, d, e 1.7. c 1.8. b, c
Outline Grid* (Scaffolding – Two Minute Preview)	1.1. a, b, c, d, 1.2. a, b 1.3. f	R11.A.1.2.1 R11.A.1.2.2 R11.A.2.2.1 R11.A.2.2.2	1.4. b, c, d 1.6. b, c, d 1.7. c
Essay Worksheet* (RT – Summarizing)	1.1. e, f, g, h 1.2. a, b 1.3. b, f	R11.A.1.2.1 R11.A.1.2.2 R11.A.2.2.1 R11.A.2.2.2	1.4. b, c, d 1.5 b, e, f 1.6. a, b, c, d, e, f 1.7 c 1.8. b, c
Task Reflection Worksheet* (Scaffolding - Key Questions and Journaling – Summarizing and Write to Learn)	1.1. a, b 1.2. a, b 1.3. f	R11.A.1.2.1 R11.A.1.2.2 R11.A.2.2.1 R11.A.2.2.2	1.4. b, d 1.5. b, e 1.6. a, d 1.7. c
Vocab Bingo* (Scaffolding – Think Alouds)	1.1. a, b, c, d, 1.2. a 1.3. a	R11.A.1.2.1 R11.A.1.2.2 R11.A.2.2.1 R11.A.2.2.2	1.6. a, b, c, d, e 1.7. b, c
Speaker Information Worksheet* (Journaling – Learning Log)	1.1. f, b 1.2. a	R11.A.1.2.1 R11.A.1.2.2 R11.A.2.2.1 R11.A.2.2.2	1.6. a, b, c, e
Biography Worksheet (RT – Summarizing)	1.1. e, f, g, h 1.2. a, b 1.3. b, f	R11.A.2.3.1 R11.A.2.3.3 R11.A.2.4.1 R11.A.2.5.1 R11.A.2.6.1 R11.A.2.6.2 R11.B.1.1.1 R11.B.3.1.1	1.4. b, c, d 1.5. b, e, f 1.7. c 1.8. b, c
Critical Reading Worksheet (RT – Predicting, During Reading and Summarizing)	1.1 d, e, g 1.2. a, b 1.3. a, f	R11.A.2.3.1 R11.A.2.3.3 R11.A.2.4.1 R11.A.2.5.1 R11.A.2.6.1	1.4. b 1.6. a, b, d, e 1.7. c 1.8. b, c
Directed Reading Activity (Journaling – Write to Learn)	1.1. d, e, g 1.2. a, b 1.3. a, f	R11.A.1.3.1 R11.A.1.3.2 R11.A.1.4.1 R11.A.1.5.1	1.4. b 1.6. a, b, d, e 1.7. c 1.8. b, c

Worksheet Name (All Worksheets)	PA Academic Standards for RWSL: Reading		PA Academic Standards for RWSL: Writing, Speaking, Listening and Research
	Standards	Anchors	Standards
Discussion Journal (Journaling - Write to Learn)	1.1. a, b 1.2. a, b 1.3. f	R11.A.2.5.1 R11.A.2.6.1 R11.A.2.6.2 R11.B.1.1.1 R11.B.3.1.1	1.4. b, d 1.5. b, e 1.6. a, d 1.7. c
Field Trip Response* (RT and Journaling – Learning Log)	1.1. f, b 1.2. a	R11.A.1.2.1 R11.A.1.2.2 R11.A.2.2.1 R11.A.2.2.2	1.6. a, b, c, e
Prediction Journal 3 (RT - Making Predications)	1.1. a, b, f, g, h 1.2. a, b 1.3. b, g, f	R11.A.2.3.1 R11.A.2.3.3 R11.A.2.4.1 R11.A.2.5.1 R11.A.2.6.1 R11.A.2.6.2 R11.B.1.1.1 R11.B.3.1.1	1.4. b, c, d 1.5. b, e, f 1.6. a, b, c, d, e, 1.7 c 1.8. b, c
RAFT Outline (Journaling)	1.1. d, e, f, g, h 1.2. a, b 1.3. a, b, f	R11.A.1.3.1 R11.A.1.3.2 R11.A.1.4.1 R11.A.1.5.1 R11.A.2.3.1 R11.A.2.3.3	1.4. a, b, c 1.5. a, b, c, d, e, f, g 1.6. a, b, c, d, e, f
Article Review/ Critique Worksheet (RT – Predicting, During Reading and Summarizing)	1.1. a, b, d, e 1.2. a, b 1.3. a, f	R11.A.1.3.1 R11.A.1.3.2 R11.A.1.4.1 R11.A.1.5.1 R11.A.2.3.1 R11.A.2.3.3	1.4. b 1.6. a, b, d, e 1.7. c 1.8. b, c
Video Response / Info Sheet (Journaling)	1.1. a, d, e, g 1.2. a 1.3. a	R11.A.1.3.1 R11.A.1.3.2 R11.A.1.4.1 R11.A.1.5.1 R11.A.2.3.1 R11.A.2.3.3	1.4. b 1.7. c 1.8. b, c
Learning to Write Journal (Journaling - Write to Learn)	1.1. a, b 1.2. a, b 1.3. f	R11.A.1.6.1 R11.A.1.6.1 R11B.1.1.1 R11B.1.2.1	1.4. b, d 1.5. b, e 1.6. a, d 1.7. c

North Montco Technical Career Center Universal Tasks

Worksheet Name (All Worksheets)	PA Academic Standards for RWSL: Reading		PA Academic Standards for RWSL: Writing, Speaking, Listening and Research
	Standards	Anchors	Standards
Computer Applications	1.1. a 1.2. b		1.6 f
Communication	1.1.. c, f, b 1.2. a	R11.A.1.3.1 R11.A.1.3.2 R11.A.1.4.1 R11.A.1.5.1 R11.A.2.3.1 R11.A.2.3.3	1.5. a, d 1.6. a, c, e, f
Career and Technical Leadership (CTSO)	1.1. f, b 1.2. a	R11.A.1.2.1 R11.A.1.2.2 R11.A.2.2.1 R11.A.2.2.2	1.4. b 1.7. c 1.6 a, b, d, e 1.8 b, c
Job Seeking	1.1. c	R11.A.1.2.1 R11.A.1.2.2 R11.A.2.2.1 R11.A.2.2.2	1.4. c 1.5. f 1.6. a, c, e, f
Senior Project	1.1. a, b, c, f, g, h 1.2. b	R11.A.1.2.1 R11.A.1.2.2 R11.A.2.2.1 R11.A.2.2.2 R11.A.1.3.1 R11.A.1.3.2 R11.A.1.4.1 R11.A.1.5.1 R11.A.2.3.1 R11.A.2.3.3 R11.A.2.4.1 R11.A.2.5.1 R11.A.2.6.1 R11.A.2.6.2 R11.B.1.1.1 R11.B.3.1.1	1.4. b 1.6. c 1.5. a, b, c, f 1.8. a

Incorporating & Aligning Pennsylvania Department of Education
Academic Standards with
Relevant Career and Technical Education Content

HOT LIST
of
PDE Academic Standards and Assessment Anchors

SCIENCE	STANDARD	ANCHOR
1. Any trouble shooting activity where you look for patterns.	3.1.10C	S11.A.1.3
2. Biology Standards	3.3.10 &12	NA
3. Use of tools and technology to gather information, problem solve and to select appropriate application.	3.7.10	S11.A.2.2
4. Physical Science, Chemistry, Physics, Gas pressure/temperature relationship; Formation of compounds; electrical. Applications and Ohms Law; Refrigeration Theory.	3.4.10&10	S11.A.3.1
5. Use of computer software to perform a task or solve a problem.	3.7.10	NA

MATHEMATICS	S TANDARD	ANCHOR
1. Conversion between fraction/decimal/percentage	2.1.8A	M11.A.1.1
2. Any mathematical calculations, use of formulas, (temp conversions, ohm's law, horsepower)	2.2.8A	M11.A.3.1
3. Problems involving ratios and proportions (mixing, recipe conversion, gear ratios, leverage)	2.2.11A	M11.A.2.1
4. Selection of proper measurement tool and needed level of precision while measuring	2.3.11A	M11.B.2.1
5. Design of scale drawings or scaled models	2.9.11B	M11.C.1.3
6. Calculate the distance between 2 points using right triangles	2.10.11B	M11.C.1.4
7. Estimating job length, pricing of job, calculating supply needs, estimating paycheck deductions	2.8.11H	M11.D.2.1
8. Interpreting technical charts and graphs (pressure vs. temp, boiling points, growth charts)	2.6.11A	M11.E.1.1

READING, WRITING, SPEAKING AND LISTENING	STANDARD	ANCHOR
1. Reading Independently Ex: Vocabulary development (Technical vocabulary.)	1.1	R11.A.1.1
2. Reading Critically Ex: Understanding & evaluating informational texts. (textbooks, technical journals)	1.3	R11.B.3.1
3. Types of Writing Ex: Writing directions, procedures.	1.4	NA
4. Speaking and Listening Responding to questions of clients & customers; taking notes, asking clarifying questions.	1.6	NA
5. Research Ex: Locate information from a variety of sources.	1.8	NA

SOCIAL STUDIES	STANDARDS	ANCHORS
1. Civics & Government Ex: Certification(s); codes; regulations	5.1.B or 5.1.L	NA
2. Economics Ex: Wages, earnings	6.5	NA
3. Geography Ex: Location of Industries; Career Opportunities.	7.3	NA
4. History Ex: Development of trade/industry	8.1	NA
	8.2	NA
	8.3	NA
	8.4	NA

ACADEMIC STANDARDS FOR CAREER EDUCATION AND WORK	STANDARDS	ANCHORS
1. Career Awareness Ex: Sr. project; job seeking skills computer application	13.1	NA
2. Career Acquisition Ex: Sr.project; leadership; job seeking skills; computer application	13.2	NA
3. Career Retention Ex: Communication, leadership computer application	13.3	NA
4. Entrepreneurship Ex: Sr. Project, communication, leadership computer application; leadership;	13.4	NA

Major Duty Objective:	MT1-Manual Transmission/Transaxle Clutch Assembly Diagnosis and Repair Demonstrate the ability to perform manual transmission/transaxle clutch assemble diagnosis & repair.

Math

Standards 2.3.11.B	Select and use appropriate units and tools to measure to the degree of accuracy required in particular measurement situations.
Anchors M11.B.2.1	Use and/or compare measurements of angles

Reading, Writing, Speaking and Listening

Standards 1.1.11.E	Establish a reading vocabulary by identifying and correctly using new words acquired through the study of their relationships to other words.
Anchors R11.A.1.1	Identify and/or apply a synonym, or antonym of a word used in text.

Science

Standards 3.1.10.A	Discriminate among the concepts of systems, subsystems, feedback and control in solving technological problems
Anchors S11.A.1.1	Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.

Social Studies

Standards 5.1.12.A	C&G: Prin Docs of Gov't Standard 1

Academic Standards for Career Education and Work

Standards 13.2.11.C	Develop and Assemble, for career portfolio placement, career acquisition documents.

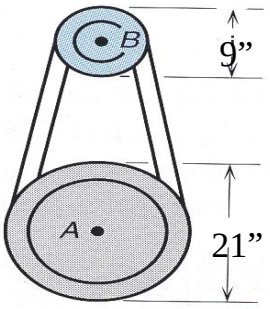
Assessment example:

Pulleys are used to transfer power from one system to another (example: crankshaft to alternator). The ratio of the pulley diameter will determine relative pulley speed. Using the formula:

$$\text{Ratio} = \frac{\text{Diameter of Pulley A}}{\text{Diameter of Pulley B}}$$

Same Units

$$\text{Ratio} = \frac{21}{9} = \frac{7}{3} = 7:3$$



Please refer to Ratio/Proportions Integrated Math Lesson

PENNSYLVANIA DEPARTMENT OF EDUCATION

SCIENCE

GRADE 11

ASSESSMENT ANCHORS & ELIGIBLE CONTENT

PENNSYLVANIA DEPARTMENT OF EDUCATION
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.

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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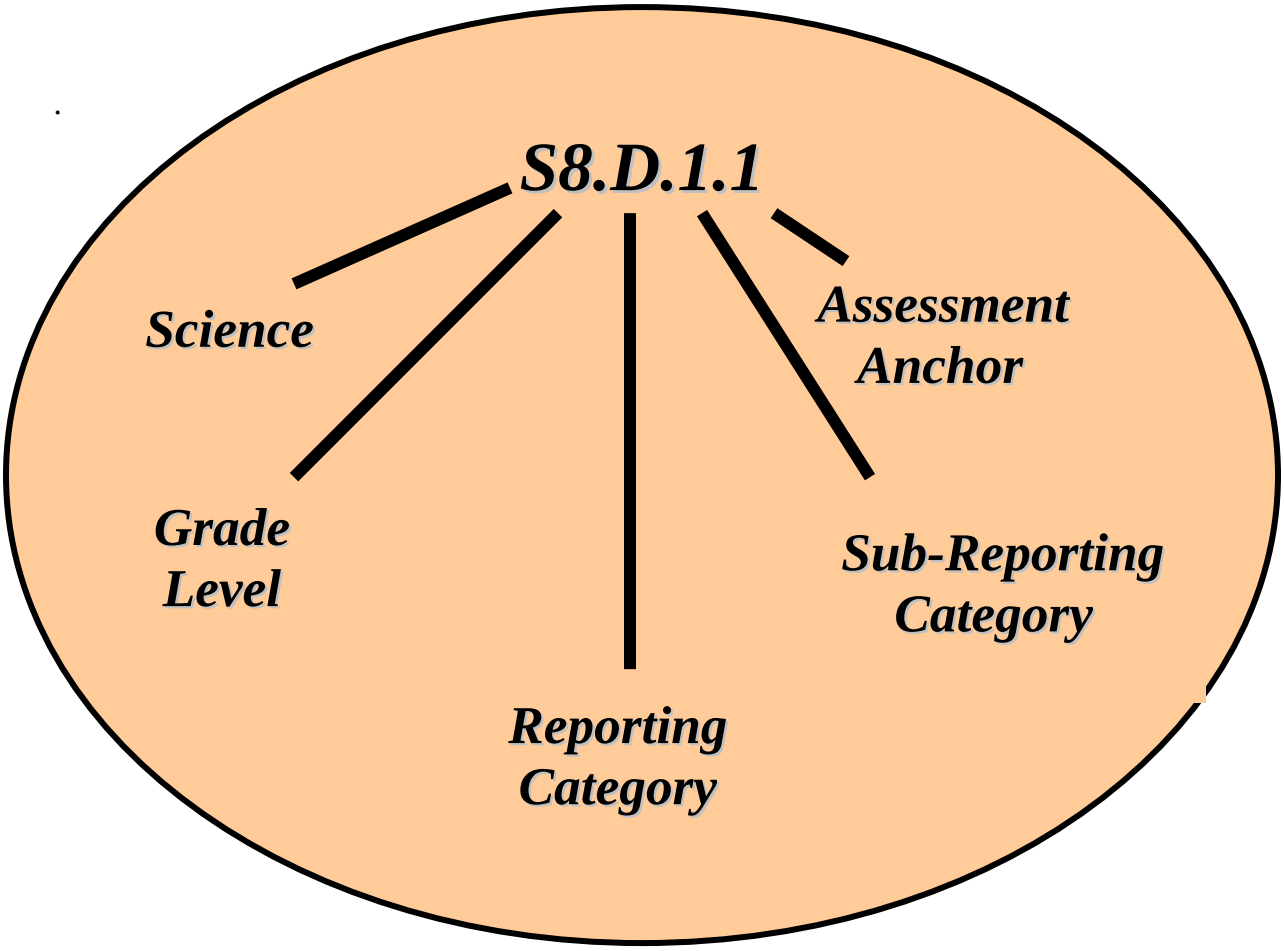

For example, **S8.D.1.1** is the code for the first science (S) assessment anchor for Grade 8 in the reporting category of (D) Earth and Space Sciences, and the sub-category of Earth Features and Processes That Change Earth and Its Resources.

PDE 2007 Science Grade 11 Assessment Anchors and Crosswalk (Reference) to PDE Science Academic Standards				
Major Concept		Specific Content		Academic Standard Reference
S11.A.1 Reasoning and Analysis				
1	Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.	1	Compare and contrast scientific theories, scientific laws, and beliefs (e.g., the law of gravity, how light travels, formation of moons, stages of ecological succession).	3.1.10.A, 3.2.10.A, 3.1.10.E
		2	Analyze and explain how to verify the accuracy of scientific facts, principles, theories, and laws.	
		3	Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).	
		4	Explain how specific scientific knowledge or technological design concepts solve practical problems (e.g., momentum, Newton's laws of universal gravitation, tectonics, conservation of mass and energy, cell theory, theory of evolution, atomic theory, theory of relativity, Pasteur's germ theory, relativity, heliocentric theory, gas laws, processing and feedback systems).	
		5	Analyze or compare the use of both direct and indirect observation as means to study the world and the universe (e.g., behavior of atoms, functions of cells, birth of stars).	
2	Identify and analyze the scientific or technological challenges of societal issues; propose possible solutions and discuss implications.	1	Apply and explain scientific concepts to societal issues using case studies (e.g., sea level change, spread of HIV, deforestation, environmental health, energy).	3.2.10.A, 4.3.10.B
		2	Use case studies (e.g., Wright brothers' flying machine, Tacoma Narrows Bridge, Henry Petroski's Design Paradigms) to propose possible solutions and analyze economic and environmental implications of solutions for real-world problems.	

Major Concept		Specific Content		Academic Standard Reference
S11.A.1 (con't) Reasoning and Analysis				
3	Describe and interpret patterns of change in natural and human-made systems.	1	Use appropriate quantitative data to describe or interpret change in systems (e.g., biological indices, electrical circuit data, automobile diagnostic systems data)	3.1.10.C, 3.1.10.E, 4.8.10.A
		2	Describe how changes in physical and biological indicators (e.g., soil, plants, animals) of water systems reflect changes in these systems (e.g. changes in bloodworm populations reflect changes in pollution levels in streams).	
		3	Compare the rate of use of natural resources and their impact on sustainability.	
S11.A.2 Processes, Procedures and Tools of Scientific Investigations				
1	Apply knowledge of scientific investigation or technological design to develop or critique aspects of the experimental or design process.	1	Critique the elements of an experimental design (i.e., raising questions, formulating hypotheses, developing procedures, identifying variables, manipulating variables, interpreting data, and drawing conclusions) applicable to a specific experimental design.	3.2.10.B, 3.2.10.D
		2	Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate, communicate results) applicable to a specific technological design.	
		3	Use data to make inferences and predictions, or to draw conclusions, demonstrating understanding of experimental limits.	
		4	Critique the results and conclusions of scientific inquiry for consistency and logic.	
		5	Communicate results of investigations using multiple representations.	

Major Concept		Specific Content		Academic Standard Reference
S11.A.2 (con't) Processes, Procedures and Tools of Scientific Investigations				
2	Evaluate appropriate technologies for a specific purpose, or describe the information the instrument can provide.	1	Evaluate appropriate methods, instruments, and scale for precise quantitative and qualitative observations (e.g., to compare properties of materials, water quality).	3.7.10.B, 3.8.10.B
		2	Explain how technology is used to extend human abilities and precision (e.g., GPS, spectroscope, scanning electron microscope, pH meters, probes, interfaces, imaging technologies, telescope).	
S11.A.3 Systems, Models and Patterns				
1	Analyze the parts of a simple system, their roles, and their relationships to the system as a whole.	1	Apply systems analysis, showing relationships (e.g., flowcharts, decision trees, dichotomous keys, mind map), input and output, and measurements to explain a system and its parts.	3.1.10.A, 3.1.10.E, 4.3.10.C
		2	Analyze and predict the effect of making a change in one part of a system on the system as a whole.	
		3	Use appropriate quantitative data to describe or interpret a system (e.g., biological indices, electrical circuit data, automobile diagnostic systems data).	
		4	Apply the universal systems model of inputs, processes, outputs, and feedback to a working system (e.g., heating, motor, food production) and identify the resources necessary for operation of the system.	
2	Compare observations of the real world to observations of a constructed model.	1	Compare the accuracy of predictions represented in a model to actual observations and behavior.	3.1.10.B, 3.2.10.B, 4.1.10.B, 4.6.10.A
		2	Describe advantages and disadvantages of using models to simulate processes and outcomes.	
		3	Describe how relationships represented in models are used to explain scientific or technological concepts (e.g., dimensions of the solar system, life spans, size of atomic particles, topographic maps).	
3	Compare and analyze repeated processes or recurring elements in patterns.	1	Describe or interpret recurring patterns that form the basis of biological classification, chemical periodicity, geological order, or astronomical order.	3.1.10.C, 3.2.10.B
		2	Compare stationary physical patterns (e.g., crystals, layers of rocks, skeletal systems, tree rings, atomic structure) to the object's properties.	
		3	Analyze physical patterns of motion to make predictions or draw conclusions (e.g., solar system, tectonic plates, weather systems, atomic motion, waves).	

S11.B.1 Structure and Function of Organisms				
Major Concept		Specific Content		Academic Standard Reference
1	Explain structure and function at multiple levels of organization	1	Explain how structure determines function at multiple levels of organization (e.g., chemical, cellular, anatomical, ecological).	3.3.10.A, 3.3.10.B, 4.6.10.A, 4.7.10.B
		2	Compare and contrast the structural and functional similarities and differences among living things (e.g., classify organisms into existing classification groups, compare systems).	
		3	Compare and contrast cellular processes (e.g., photosynthesis and respiration, meiosis and mitosis, protein synthesis and DNA replication).	
S11.B.2 Continuity of Life				
1	Explain the mechanisms of the theory of evolution.	1	Explain the theory of evolution by interpreting data from fossil records, similarities in anatomy and physiology, embryological studies, or DNA studies that are relevant to the theory of evolution.	3.3.10.C, 3.3.10.D, 3.4.10.D, 4.7.10.C
		2	Explain the role of mutations, differential reproduction, and gene recombination in changing the genetic makeup of a population.	
		3	Explain the role of selective breeding and biotechnology in changing the genetic makeup of a population.	
		4	Explain why natural selection can act only on inherited traits.	
2	Describe how genetic information is inherited and expressed.		Describe how genetic information is expressed (i.e., DNA, genes, chromosomes, transcription, translation, and replication).	3.3.10.C
			Compare and contrast the functions of mitosis and meiosis in passing on genetic information.	
			Explain how different patterns of inheritance affect population variability. (i.e., multiple alleles, co-dominance, dominance, recessiveness, sex-influenced traits, and sex-linked traits).	

Major Concept		Specific Content		Academic Standard Reference
S11.B.3 Ecological Behavior and Systems				
1	Use evidence or examples to explain the characteristics of and interactions within an ecosystem.	1	Explain the significance of diversity in ecosystems.	4.3.10.C, 4.6.10.A
		2	Explain the biotic (i.e., plant, animal, and microbial communities) and abiotic (i.e., soil, air, temperature, and water) components of an ecosystem and their interaction.	
		3	Describe how living organisms affect the survival of one another.	
		4	Explain the similarities and differences in the major biomes (e.g., desert, tropical rain forest, temperate forest, coniferous forest, tundra) and the communities that inhabit them.	
		5	Predict how limiting factors (e.g., physical, biological, chemical factors) can affect organisms.	
2	Analyze patterns of change in natural or human-made systems over time.	1	Use evidence to explain how cyclical patterns in population dynamics affect natural systems.	3.1.10.C, 4.2.10.D, 4.3.10.B, 3.1.10.E, 4.3.10.C
		2	Explain biological diversity as an indicator of a healthy environment.	
		3	Explain how natural processes (e.g., seasonal change, catastrophic events, habitat alterations) impact the environment over time.	
3	Explain how human-made systems impact the management and distribution of natural resources.	1	Describe different human-made systems and how they use renewable and nonrenewable natural resources (i.e., energy, transportation, distribution, management, and processing).	4.2.10.C, 4.4.10.C, 3.8.10.C
		2	Compare and contrast the impact of management practices (e.g., production, processing, research, development, marketing, distribution, consumption, by-products) in meeting the need for commodities locally and globally.	
		3	Explain the environmental benefits and risks associated with human-made systems (e.g., integrated pest management, genetically engineered organisms, organic food production).	

Major Concept		Specific Content		Academic Standard Reference
S11.C.1 Structure, Properties, and Interaction of Matter and Energy				
1	Explain the relationship between the structure and properties of matter.	1	Explain that matter is made of particles called atoms and that atoms are composed of even smaller particles (e.g., proton, neutrons, electrons).	3.4.10.A
		2	Explain the relationship between the physical properties of a substance and its molecular or atomic structure.	
		3	Explain the formation of compounds and their resulting properties using bonding theories (ionic and covalent).	
		4	Explain how the relationships of chemical properties of elements are represented in the repeating patterns within the periodic table.	
		5	Predict the behavior of gases though the application of laws (i.e., Boyle's law, Charles' law, or ideal gas law).	
		6	Describe factors that influence the frequency of collisions during chemical reactions that might affect the reaction rates (e.g., surface area, concentration, catalyst, temperature, agitation).	
S11.C.2 Forms, Sources, Conversion, and Transfer of Energy				
1	Analyze energy sources and transfer of energy, or conversion of energy.	1	Compare or analyze different types of waves in the electromagnetic spectrum (e.g., ultraviolet, infrared, visible light, x-rays, microwaves) as it relates to their properties, energy levels, and motion.	3.4.10.B
		2	Describe energy changes in chemical reactions.	
		3	Apply the knowledge of conservation of energy to explain common systems (e.g., refrigeration, rocket propulsion, heat pump).	
			Apply Ohm's Law to explain resistance, current and electro-motive forces.	
2	Demonstrate that different ways of obtaining, transforming, and distributing energy have different environmental consequences.	1	Explain the environmental impacts of energy use by various economic sectors (e.g., mining, logging, transportation) on environmental systems).	3.4.10.B, 4.8.10.C, 4.2.10.A
		2	Explain the practical use of alternative sources of energy (i.e., wind, solar) to address environmental problems (e.g., air quality, erosion)	
		3	Give examples of renewable energy resources (e.g. coal, oil, natural gas) Explain environmental and economic advantages and disadvantages of their ruse.	

S11.C.3 Principles of Motion and Force				
1	Use the principles of motion and force to solve real-world challenges.	1	Explain common phenomena (e.g., motion of bowling ball, a rock in a landslide, an astronaut during a space walk, a car hitting a patch of ice on the road) using an understanding of conservation of momentum.	3.4.10.C, 3.6.10.C
		2	Design or evaluate simple technological or natural systems that incorporate the principles of force and motion (e.g., simple machines, compound machines).	
		3	Explain that acceleration is the rate at which the velocity of an object is changing.	
		4	Explain how electricity produces magnetism and how magnetism produces electricity as two aspects of a single electromagnetic force.	
		5	Calculate the mechanical advantage of moving an object using a simple machine.	
		6	Identify elements of simple machines in compound machines.	
S11.D.1 Earth Features and Processes that Change Earth and Its Resources				
1	Explain and analyze the forces in the lithosphere that continually shape Earth.	1	Classify and describe major types of rocks (igneous – granite, basalt, obsidian, pumice; sedimentary – limestone, sandstone, shale, coal; and metamorphic – slate, quartzite, marble, gneiss) and minerals (e.g., quartz, calcite, dolomite, clay, feldspar, mica, halite, pyrite) by their origin and formation.	3.5.10.A, 4.4.10.B, 4.1.10.B
		2	Explain the processes that take place at plate boundaries and how these processes continue to shape Earth (e.g., volcanic activity, earthquakes, mountain building, mid-ocean ridges, deep-sea trenches, new land being formed).	
		3	Analyze features created by the interaction of processes that change Earth's surface (e.g., wind and moving water help break down rock into soil; plate movement, earthquakes, and volcanic activity help cause mountains and valleys to form; flowing water and deposition of material help form deltas).	
2	Analyze how human-made systems impact the management and distribution of natural resources.	1	Evaluate factors affecting availability, location, extraction, and use of natural resources.	4.2.10.C, 3.5.10.B, 3.6.10.A
		2	Explain the impact of obtaining and using natural resources for the production of energy and materials (e.g., resource renewal, amount of pollution, deforestation).	

Major Concept		Specific Content		Academic Standard Reference
S11.D.1 Con't) Earth Features and Processes that Change Earth and Its Resources				
3	Explain the significance and contribution of water as a resource to living things and the shaping of the land.	1	Explain the multiple functions of different water systems in relation to landforms (e.g., buffer zones, nurseries, food production areas, habitat, water quality control, biological indicators).	3.5.10.D, 4.1.10.B, 4.3.10.B
		2	Explain relationships among physical characteristics, vegetation, topography, and flow as it relates to water systems.	
		3	Explain factors (e.g., nutrient loading, turbidity, rate of flow, rate of deposition, biological diversity) that affect water quality and flow through a water system.	
S11.D.2 Weather, Climate, and Atmospheric Processes				
1	Analyze how the transfer of energy and substances between Earth's atmosphere and its surface influences regional or global weather or climate.	1	Describe how changes in concentration of minor components (e.g., O2, CO2, ozone, dust, pollution) in Earth's atmosphere are linked to climate change.	3.5.10.C
		2	Compare the transmission, reflection, absorption, and radiation of solar energy to and by the Earth's surface under different environmental conditions (e.g., major volcanic eruptions, greenhouse effect, reduction of ozone layer; increased global cloud cover)	
		3	Explain weather patterns and seasonal changes using the concepts of heat and density.	
		4	Analyze weather maps and weather data (e.g., air masses, fronts, temperature, air pressure, wind speed, wind direction, precipitation) to predict regional or global weather events.	
S11.D.3 Composition and Structure of the Universe				
1	Explain the composition, structure and origin of the universe.	1	Describe planetary motion and the physical laws that explain planetary motion.	3.4.10.D
		2	Describe the structure, formation, and life cycle of stars.	
		3	Explain the current scientific theories of the origin of the solar system and universe (big bang theory, solar nebular theory, stellar evolution).	

Science Grade 11 Assessment Anchors and Eligible Content

Pennsylvania Department of Education

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2007

Draft

S11.A The Nature of Science — Reporting Category

S11.A.1 Reasoning and Analysis

ASSESSMENT ANCHOR	ELIGIBLE CONTENT
S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems. ***Reference: 3.1.10.A, 3.2.10.A, 3.1.10.E***	**S11.A.1.1.1** Compare and contrast scientific theories, scientific laws, and beliefs (e.g., the universal law of gravitation, how light travels, formation of moons, stages of ecological succession). **S11.A.1.1.2** Analyze and explain the accuracy of scientific facts, principles, theories, and laws. **S11.A.1.1.3** Evaluate the appropriateness of research questions (e.g., testable vs. not-testable). **S11.A.1.1.4** Explain how specific scientific knowledge or technological design concepts solve practical problems (e.g., momentum, Newton's universal law of gravitation, tectonics, conservation of mass and energy, cell theory, theory of evolution, atomic theory, theory of relativity, Pasteur's germ theory, relativity, heliocentric theory, ideal gas laws). **S11.A.1.1.5** Analyze or compare the use of both direct and indirect observation as means to study the world and the universe (e.g., behavior of atoms, functions of cells, birth of stars).
S11.A.1.2 Identify and analyze the scientific or technological challenges of societal issues; propose possible solutions and discuss implications. ***Reference: 3.2.10.A, 4.3.10.B***	**S11.A.1.2.1** Explain and apply scientific concepts to societal issues using case studies (e.g., spread of HIV, deforestation, environmental health, energy). **S11.A.1.2.2** Use case studies (e.g., Wright brothers' flying machine, Tacoma Narrows Bridge, Henry Petroski's Design Paradigms) to propose possible solutions and analyze economic and environmental implications of solutions for real-world problems.

S11.A The Nature of Science — Reporting Category

S11.A.1 Reasoning and Analysis

ASSESSMENT ANCHOR	ELIGIBLE CONTENT
S11.A.1.3 Describe and interpret patterns of change in natural and human-made systems. ***Reference: 3.1.10.C, 3.1.10.E, 4.8.10.A***	**S11.A.1.3.1** Use appropriate quantitative data to describe or interpret change in systems (e.g., biological indices, electrical circuit data, automobile diagnostic systems data). **S11.A.1.3.2** Describe or interpret dynamic changes to stable systems (e.g., chemical reactions, human body, food webs, tectonics, homeostasis). **S11.A.1.3.3** Describe how changes in physical and biological indicators (e.g., soil, plants, animals) of water systems reflect changes in these systems (e.g. changes in bloodworm populations reflect changes in pollution levels in streams). **S11.A.1.3.4** Compare the rate of use of natural resources and their impact on sustainability.

S11.A The Nature of Science — Reporting Category

S11.A.2 Processes, Procedures, and Tools of Scientific Investigations

ASSESSMENT ANCHOR	ELIGIBLE CONTENT
S11.A.2.1 Apply knowledge of scientific investigation or technological design to develop or critique aspects of the experimental or design process. ***Reference: 3.2.10.B, 3.2.10.D***	**S11.A.2.1.1** Critique the elements of an experimental design (e.g., raising questions, formulating hypotheses, developing procedures, identifying variables, manipulating variables, interpreting data, and drawing conclusions) applicable to a specific experimental design. **S11.A.2.1.2** Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate, communicate results) applicable to a specific technological design. **S11.A.2.1.3** Use data to make inferences and predictions, or to draw conclusions, demonstrating understanding of experimental limits. **S11.A.2.1.4** Critique the results and conclusions of scientific inquiry for consistency and logic. **S11.A.2.1.5** Communicate results of investigations using multiple representations.
S11.A.2.2 Evaluate appropriate technologies for a specific purpose, or describe the information the instrument can provide. ***Reference: 3.7.10.B, 3.8.10.B***	**S11.A.2.2.1** Evaluate appropriate methods, instruments, and scale for precise quantitative and qualitative observations (e.g., to compare properties of materials, water quality). **S11.A.2.2.2** Explain how technology (e.g., GPS, spectroscope, scanning electron microscope, pH meter, probe, interface, imaging technology, telescope) is used to extend human abilities and precision.

S11.A.3 Systems, Models, and Patterns

ASSESSMENT ANCHOR	ELIGIBLE CONTENT
S11.A.3.1 Analyze the parts of a simple system, their roles, and their relationships to the system as a whole. ***Reference: 3.1.10.A, 3.1.10.E, 4.3.10.C***	**S11.A.3.1.1** Apply systems analysis, showing relationships (e.g., flowcharts, concept maps), input and output, and measurements to explain a system and its parts. **S11.A.3.1.2** Analyze and predict the effect of making a change in one part of a system on the system as a whole. **S11.A.3.1.3** Use appropriate quantitative data to describe or interpret a system (e.g., biological indices, electrical circuit data, automobile diagnostic systems data). **S11.A.3.1.4** Apply the universal systems model of inputs, processes, outputs, and feedback to a working system (e.g., heating, motor, food production) and identify the resources necessary for operation of the system.
S11.A.3.2 Compare observations of the real world to observations of a constructed model. ***Reference: 3.1.10.B, 3.2.10.B, 4.1.10.B, 4.6.10.A***	**S11.A.3.2.1** Compare the accuracy of predictions represented in a model to actual observations and behavior. **S11.A.3.2.2** Describe advantages and disadvantages of using models to simulate processes and outcomes. **S11.A.3.2.3** Describe how relationships represented in models are used to explain scientific or technological concepts (e.g., dimensions of objects within the solar system, life spans, size of atomic particles, topographic maps).

S11.A.3 Systems, Models, and Patterns

ASSESSMENT ANCHOR	ELIGIBLE CONTENT
S11.A.3.3 Compare and analyze repeated processes or recurring elements in patterns. ***Reference: 3.1.10.C, 3.2.10.B***	**S11.A.3.3.1** Describe or interpret recurring patterns that form the basis of biological classification, chemical periodicity, geological order, or astronomical order. **S11.A.3.3.2** Compare stationary physical patterns (e.g., crystals, layers of rocks, skeletal systems, tree rings, atomic structure) to the object's properties. **S11.A.3.3.3** Analyze physical patterns of motion to make predictions or draw conclusions (e.g., solar system, tectonic plates, weather systems, atomic motion, waves).

S11.B Biological Sciences — Reporting Category

S11.B.1 Structure and Function of Organisms

ASSESSMENT ANCHOR	ELIGIBLE CONTENT
S11.B.1.1 Explain structure and function at multiple levels of organization. ***Reference: 3.3.10.A, 3.3.10.B, 4.6.10.A, 4.7.10.B***	**S11.B.1.1.1** Explain how structure determines function at multiple levels of organization (e.g., chemical, cellular, anatomical). **S11.B.1.1.2** Compare and contrast the structural and functional similarities and differences among living things (e.g., classify organisms into classification groups, compare systems). **S11.B.1.1.3** Compare and contrast cellular processes (e.g., photosynthesis and respiration, meiosis and mitosis, protein synthesis and DNA replication).

S11.B Biological Sciences — Reporting Category

S11.B.2 Continuity of Life

ASSESSMENT ANCHOR	ELIGIBLE CONTENT
S11.B.2.1 Explain the mechanisms of the theory of evolution. ***Reference: 3.3.10.C, 3.3.10.D, 3.4.10.D, 4.7.10.C***	**S11.B.2.1.1** Explain the theory of evolution by interpreting data from fossil records, similarities in anatomy and physiology, or DNA studies that are relevant to the theory of evolution. **S11.B.2.1.2** Explain the role of mutations, differential reproduction, and gene recombination in changing the genetic makeup of a population. **S11.B.2.1.3** Explain the role of selective breeding and biotechnology in changing the genetic makeup of a population. **S11.B.2.1.4** Explain why natural selection can act only on inherited traits.
S11.B.2.2 Describe how genetic information is inherited and expressed. ***Reference: 3.3.10.C***	**S11.B.2.2.1** Describe how genetic information is expressed (i.e., DNA, genes, chromosomes, transcription, translation, and replication). **S11.B.2.2.2** Compare and contrast mitosis and meiosis in passing on genetic information. **S11.B.2.2.3** Explain how different patterns of inheritance affect population variability (i.e., multiple alleles, co-dominance, dominance, recessiveness, sex-influenced traits, and sex-linked traits).

S11.B Biological Sciences — Reporting Category

S11.B.3 Ecological Behavior and Systems

ASSESSMENT ANCHOR	ELIGIBLE CONTENT
S11.B.3.1 Use evidence or examples to explain the characteristics of and interactions within an ecosystem. ***Reference: 4.3.10.C, 4.6.10.A***	**S11.B.3.1.1** Explain the significance of diversity in ecosystems. **S11.B.3.1.2** Explain the biotic (i.e., plant, animal, and microbial communities) and abiotic (i.e., soil, air, temperature, and water) components of an ecosystem and their interaction. **S11.B.3.1.3** Describe how living organisms affect the survival of one another. **S11.B.3.1.4** Compare the similarities and differences in the major biomes (e.g., desert, tropical rain forest, temperate forest, coniferous forest, tundra) and the communities that inhabit them. **S11.B.3.1.5** Predict how limiting factors (e.g., physical, biological, chemical) can affect organisms.
S11.B.3.2 Analyze patterns of change in natural or human-made systems over time. ***Reference: 3.1.10.C, 4.2.10.D, 4.3.10.B, 3.1.10.E, 4.3.10.C***	**S11.B.3.2.1** Use evidence to explain how cyclical patterns in population dynamics affect natural systems. **S11.B.3.2.2** Explain biological diversity as an indicator of a healthy environment. **S11.B.3.2.3** Explain how natural processes (e.g., seasonal change, catastrophic events, habitat alterations) impact the environment over time.

S11.B.3 Ecological Behavior and Systems

ASSESSMENT ANCHOR	ELIGIBLE CONTENT
S11.B.3.3 Explain how human-made systems	**S11.B.3.3.1** Describe different human-made

impact the management and distribution of natural resources. ***Reference: 4.2.10.C, 4.4.10.C, 3.8.10.C***	systems and how they use renewable and nonrenewable natural resources (i.e., energy, transportation, distribution, management, and processing). **S11.B.3.3.2** Compare the impact of management practices (e.g., production, processing, research, development, marketing, distribution, consumption, by-products) in meeting the need for commodities locally and globally. **S11.B.3.3.3** Explain the environmental benefits and risks associated with human-made systems (e.g., integrated pest management, genetically engineered organisms, organic food production).

S11.C.1 Structure, Properties, and Interaction of Matter and Energy

ASSESSMENT ANCHOR	ELIGIBLE CONTENT
S11.C.1.1 Explain the relationship between the structure and properties of matter. ***Reference: 3.4.10.A***	**S11.C.1.1.1** Explain that matter is made of particles called atoms and that atoms are composed of even smaller particles (e.g., protons,

	neutrons, electrons).
	S11.C.1.1.2 Explain the relationship between the physical properties of a substance and its molecular or atomic structure.
	S11.C.1.1.3 Explain the formation of compounds (ionic and covalent) and their resulting properties using bonding theories.
	S11.C.1.1.4 Explain how the relationships of chemical properties of elements are represented in the repeating patterns within the periodic table.
	S11.C.1.1.5 Predict the behavior of gases though the application of laws (e.g., Boyle's law, Charles' law, or ideal gas law).
	S11.C.1.1.6 Describe factors that influence the frequency of collisions during chemical reactions that might affect the reaction rates (e.g., surface area, concentration, temperature).

S11.C.2 Forms, Sources, Conversion, and Transfer of Energy

ASSESSMENT ANCHOR	ELIGIBLE CONTENT
S11.C.2.1 Analyze energy sources and transfer of energy, or conversion of energy. ***Reference: 3.4.10.B***	**S11.C.2.1.1** Compare or analyze waves in the electromagnetic spectrum (e.g., ultraviolet, infrared, visible light, X-rays, microwaves) as well as their properties, energy levels, and

	motion. **S11.C.2.1.2** Describe energy changes in chemical reactions. **S11.C.2.1.3** Apply the knowledge of conservation of energy to explain common systems (e.g., refrigeration, rocket propulsion, heat pump). **S11.C.2.1.4** Use Ohm's Law to explain relative resistances, currents, and voltage.
S11.C.2.2 Demonstrate that different ways of obtaining, transforming, and distributing energy have different environmental consequences. ***Reference: 3.4.10.B, 4.8.10.C, 4.2.10.A***	**S11.C.2.2.1** Explain the environmental impacts of energy use by various economic sectors (e.g., mining, logging, transportation) on environmental systems. **S11.C.2.2.2** Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion, resource depletion). **S11.C.2.2.3** Give examples of renewable energy resources (e.g., wind, solar, biomass) and nonrenewable resources (e.g., coal, oil, natural gas) and explain the environmental and economic advantages and disadvantages of their use.

S11.C.3 Principles of Motion and Force

ASSESSMENT ANCHOR	ELIGIBLE CONTENT
S11.C.3.1 Use the principles of motion and force to solve real-world challenges. ***Reference: 3.4.10.C, 3.6.10.C***	**S11.C.3.1.1** Explain common phenomena (e.g., a rock in a landslide, an astronaut during a space walk, a car hitting a patch of ice on the road) using an understanding of conservation of momentum.

	S11.C.3.1.2 Design or evaluate simple technological or natural systems that incorporate the principles of force and motion (e.g., simple machines, compound machines).
	S11.C.3.1.3 Describe the motion of an object using variables (i.e., acceleration, velocity, displacement).
	S11.C.3.1.4 Explain how electricity induces magnetism and how magnetism induces electricity as two aspects of a single electromagnetic force.
	S11.C.3.1.5 Calculate the mechanical advantage for moving an object by using a simple machine.
	S11.C.3.1.6 Identify elements of simple machines in compound machines.

S11.D.1 Earth Features and Processes that Change Earth and Its Resources

ASSESSMENT ANCHOR	ELIGIBLE CONTENT
S11.D.1.1 Explain and analyze the forces in the lithosphere that continually shape Earth. ***Reference: 3.5.10.A, 4.4.10.B, 4.1.10.B***	**S11.D.1.1.1** Classify and describe major types of rocks (i.e., igneous – granite, basalt, obsidian, pumice; sedimentary – limestone, sandstone, shale, coal; and metamorphic – slate, quartzite, marble, gneiss) and minerals (e.g., quartz, calcite, dolomite, clay, feldspar, mica, halite, pyrite) by their

	origin and formation. **S11.D.1.1.2** Explain the processes that take place at plate boundaries and how these processes continue to shape Earth (e.g., volcanic activity, earthquakes, mountain building, mid-ocean ridges, deep-sea trenches, new land being formed). **S11.D.1.1.3** Analyze features caused by the interaction of processes that change Earth's surface (e.g., wind and moving water help break down rock into soil; plate movement, earthquakes, and volcanic activity help cause mountains and valleys to form; flowing water and deposition of material help form deltas).
S11.D.1.2 Analyze how human-made systems impact the management and distribution of natural resources. ***Reference: 4.2.10.C, 3.5.10.B, 3.6.10.A***	**S11.D.1.2.1** Evaluate factors affecting availability, location, extraction, and use of natural resources. **S11.D.1.2.2** Explain the impact of obtaining and using natural resources for the production of energy and materials (e.g., resource renewal, amount of pollution, deforestation).

S11.D.1 Earth Features and Processes that Change Earth and Its Resources

ASSESSMENT ANCHOR	ELIGIBLE CONTENT
S11.D.1.3 Explain the significance and contribution of water as a resource to living things and the shaping of the land. ***Reference: 3.5.10.D, 4.1.10.B, 4.3.10.B***	**S11.D.1.3.1** Explain the multiple functions of different water systems in relation to landforms (e.g., buffer zones, nurseries, food production areas, habitat, water quality control, biological indicators). **S11.D.1.3.2** Explain relationships among physical characteristics, vegetation,

	topography, and flow as it relates to water systems. **S11.D.1.3.3** Explain factors (e.g., nutrient loading, turbidity, rate of flow, rate of deposition, biological diversity) that affect water quality and flow through a water system.

S11.D.2 Weather, Climate, and Atmospheric Processes

ASSESSMENT ANCHOR	ELIGIBLE CONTENT
S11.D.2.1 Analyze how the transfer of energy and substances between Earth's atmosphere and its surface influences regional or global weather or climate. ***Reference: 3.5.10.C***	**S11.D.2.1.1** Describe how changes in concentration of minor components (e.g., O_2, CO_2, dust, pollution) in Earth's atmosphere may be linked to climate change. **S11.D.2.1.2** Compare the transmission, reflection, absorption, and radiation of solar energy to and by Earth's surface under different environmental conditions (e.g., major volcanic eruptions, greenhouse effect, reduction of ozone layer, increased global cloud cover).

	S11.D.2.1.3 Explain weather patterns and seasonal changes using the concepts of heat and density.
	S11.D.2.1.4 Analyze weather maps and weather data (e.g., air masses, fronts, temperature, air pressure, wind speed, wind direction, precipitation) to predict regional or global weather events.

S11.D.3 Composition and Structure of the Universe

ASSESSMENT ANCHOR	ELIGIBLE CONTENT
S11.D.3.1 Explain the composition, structure, and origin of the universe. ***Reference: 3.4.10.D***	**S11.D.3.1.1** Describe planetary motion and the physical laws that explain planetary motion. **S11.D.3.1.2** Describe the structure, formation, and life cycle of stars. **S11.D.3.1.3** Explain the current scientific theories of the origin of the solar system and universe (e.g., big bang theory, solar nebular theory, stellar evolution).

PENNSYLVANIA DEPARTMENT OF EDUCATION

MATH

GRADE 11

ASSESSMENT ANCHORS & ELIGIBLE CONTENT

PENNSYLVANIA DEPARTMENT OF EDUCATION

About the Mathematics Assessment Anchors

Introduction

This is a brief introduction to the Mathematics Assessment Anchors. For more information on the Assessment Anchors and how they were developed, please read the *General Introduction* provided on the website and the *Frequently Asked Questions*.

How the Assessment Anchors Connect to the Standards

The PA Academic Standards for Mathematics are:

2.1 Numbers, Number Systems and Number Relationships
2.2 Computation and Estimation
2.3 Measurement and Estimation
2.4 Mathematical Reasoning and Connections
2.5 Mathematical Problem Solving and Communication
2.6 Statistics and Data Analysis
2.7 Probability and Predictions
2.8 Algebra and Functions
2.9 Geometry
2.10 Trigonometry
2.11 Concepts of Calculus

All of the Mathematics Standards categories are still included on the PSSA but the Assessment Anchors tighten the focus of what is assessed. The Assessment Anchors also clarify what is expected from grade level to grade level. There is a clear vertical alignment in the Assessment Anchors that did not exist in the standards. Teachers will be able to see how concepts build on one another from year to year. In addition, the Assessment Anchors have fewer Reporting Categories to help create more valid scores (there are more items per reporting category). Rather than report student results in all 11 standards, the reports will be organized into five major categories.

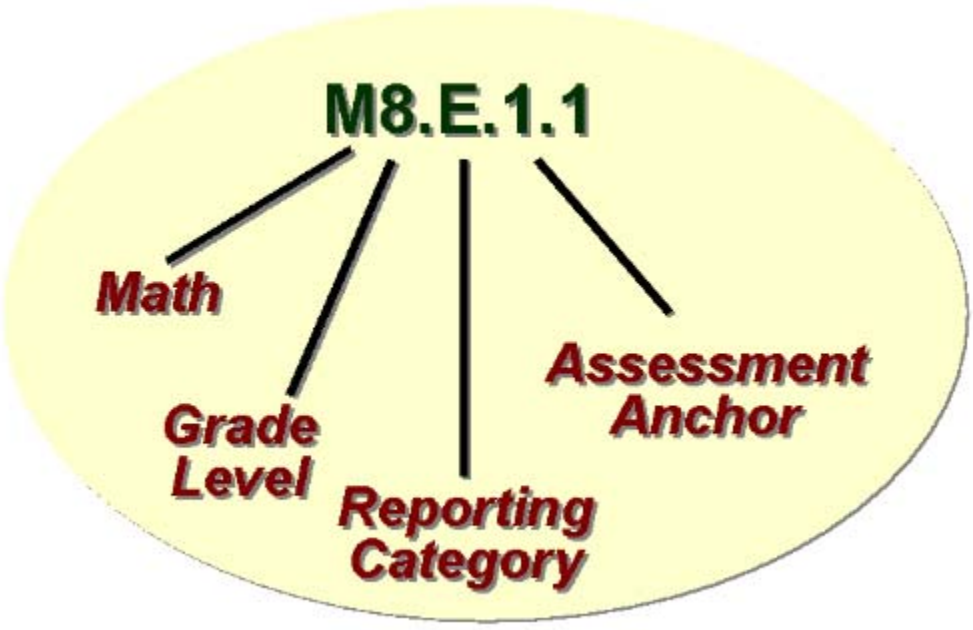
How the Assessment Anchors are Organized

These categories are similar to the five NCTM (National Council of Teachers of Mathematics) Standards and the five NAEP (National Assessment of Educational Progress) Reporting Categories. Each PA Standard Category was examined and then placed in the appropriate Reporting Category. Some of the specific Standards Statements cut across different Reporting Categories (e.g., 2.11- Concepts of Calculus, which occurs in different categories rather than being a separate category). The following is a general summary of where the bulk of the PA Mathematics Standards can be found in the Reporting Categories:

How to Read the Assessment Anchors

The Mathematics Assessment Anchors begin with an "M" to distinguish them from the Reading Assessment Anchors "R". The number after the "M" in the label is the grade level (e.g., M8 would be Mathematics at eighth grade). The second letter in the labeling system is the Reporting Category (A through E). The same reporting categories continue across all Grade levels, 3 through 8 and 11. The final number in the label is the actual Assessment Anchor. (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.

For example, M8.E.1.1 is a Mathematics Assessment Anchor (M stands for Math) at 8th Grade (8). The E indicates that this Anchor is in the Data Analysis and Probability Reporting Category and the 1.1 means that it is the first Assessment Anchor in the Data Analysis and Probability Reporting Category (1.1). (*See below*)



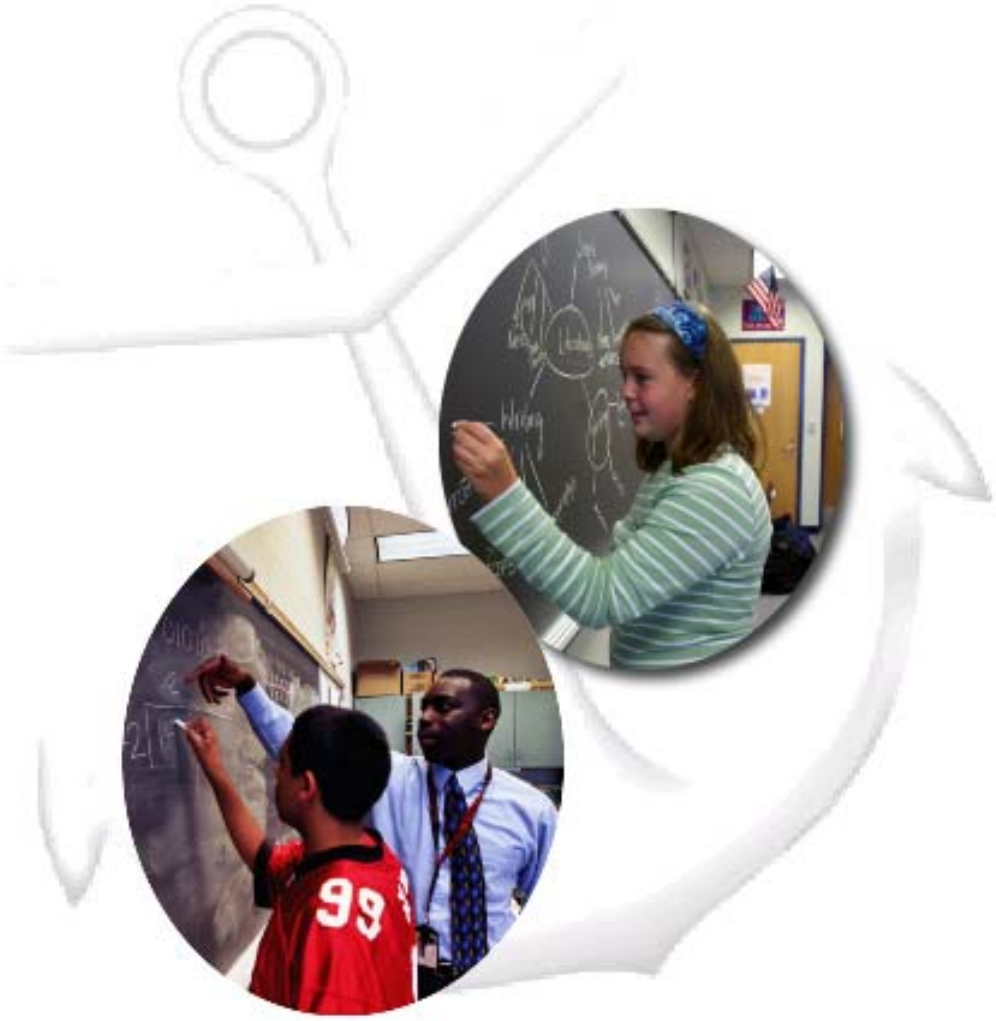
NOTE: Below each specific descriptor of the Assessment Anchor is a reference in italics. This reference relates to the Pennsylvania Academic Standards and helps you cross-walk the Anchors to the Standards.

PDE 2007 Math Grade 11 Assessment Anchors and Crosswalk (Reference) to PDE Mathematic Academic Standards				
Major Concept		Specific Content		Academic Standard Reference
M11.A Assessment Anchor: Numbers and Operations				
1	Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.	1	Represent and/or use numbers in equivalent forms (e.g., integers, fractions, decimals, percents, square roots, exponents and scientific notation).	2.1.8.A 2.1.8.B 2.1.11.A
		2	Apply number theory concepts to show relationships between real numbers in problem solving settings.	2.1.8.E
		3	Estimate the value of an irrational number.	2.2.8.C
2	Understand the meanings of operations, use operations and understand how they relate to each other.	1	Apply ratio and/or proportion in problem-solving situations.	2.2.11.A 2.8.11.P 2.1.11.A
		2	Use exponents, roots and/or absolute value to solve problems.	
3	Compute accurately and fluently and make reasonable estimates.	1	Apply the order of operations in computation and in problem-solving situations.	2.2.8.A 2.2.11.B 2.2.11.D
		2	Use estimation strategies in problem-solving situations.	
M11.B Assessment Anchor: Measurements				
1	Demonstrate an understanding of measurable attributes of objects and figures, and the units, systems and processes of measurement.	Not assessed at grade 11.		
2	Apply appropriate techniques, tools and formulas to determine measurements.	1	Use and/or compare measurements of angles.	2.3.11.A 2.3.11.B
		2	Use and/or develop procedures to determine or describe measures of perimeter, circumference, area, surface area and/or volume. (May require conversions within the same system.)	2.3.8.A 2.3.8.D
		3	Describe how a change in one dimension of a figure (2 or 3 dimensional) affects other measurements of that figure.	2.3.8.E

PDE 2007 Math Grade 11 Assessment Anchors and Crosswalk (Reference) to PDE Mathematic Academic Standards				
Major Concept		Specific Content		Academic Standard Reference
M11.C Assessment Anchor: Geometry				
1	Analyze characteristics and properties of two- and three- dimensional geometric shapes and demonstrate understanding of geometric relationships.	1	Identify and/or use parts of circles and segments associated with circles.	2.9.11.F
		2	Recognize and/or apply properties of angles, triangles and quadrilaterals.	2.9.8.D 2.9.11.C
		3	Use properties of congruence, correspondence and similarity in problem-solving settings involving two- and three- dimensional figures.	2.9.11.B
		4	Solve problems involving right triangles using the Pythagorean Theorem.	2.10.11.B
2	Identify and/or apply concepts of transformations or symmetry	Not assessed at grade 11.		
3	Locate points or describe relationships using the coordinate plane.	1	Solve problems using analytic geometry.	2.9.11.G
M11.D Assessment Anchor: Algebraic Concepts				
1	Demonstrate an understanding of patterns, relations and functions.	1	Analyze and/or use patterns or relations.	2.8.11.Q 2.8.11.A 2.8.11.O
2	Represent and/or analyze mathematical situations using numbers, symbols, words, tables and/or graphs.	1	Write, solve and/or graph linear equations and inequalities using various methods.	2.8.8.F 2.8.11.D 2.8.11.H 2.8.11.J 2.8.11.N 2.8.11.L 2.8.11.K
		2	Simplify expressions involving polynomials.	2.8.11.S
3	Analyze change in various contexts	1	Describe and/or determine change.	2.8.8.J. 2.11.8.B
		2	Compute and/or use the slope of a line.	2.8.11.J 2.8.11.L
4	Describe or use models to represent quantitative relationships.	1	Interpret and/or use linear, quadratic and/or exponential functions and their equations, graphs or tables.	2.8.11.K 2.8.11.Q

PDE 2007 Math Grade 11 Assessment Anchors and Crosswalk (Reference) to PDE Mathematic Academic Standards				
Major Concept		Specific Content		Academic Standard Reference
M11.E Assessment Anchor: Data Analysis and Probability				
1	Formulate or answer questions that can be addressed with data and/or organize, display, interpret or analyze data.	1	Appropriately display and/or use data in problem-solving settings.	2.6.11.A 2.6.8.E
2	Select and/or use appropriate statistical methods to analyze data.	1	Use measures of central tendency to describe a set of data.	2.6.8.A 2.6.11.A
3	Understand and/or apply basic concepts of probability or outcomes.	1	Apply probability and/or odds to practical situations.	2.7.11.A 2.7.11.E
		2	Apply counting techniques in problem-solving settings.	2.7.8.A
4	Develop and/or evaluate inferences and predictions or draw conclusions based on data or data displays.	1	Make predictions using data displays and probability.	2.7.8.E 2.6.11.D
		2	Analyze and/or interpret data on a scatter plot and/or use a scatter plot to make predictions.	2.6.11.C 2.6.11.D

Math Grade 11
Assessment Anchors
and Eligible Content



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2007

M11.A Numbers and Operations — Reporting Category

ASSESSMENT ANCHOR

M11.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.

		ELIGIBLE CONTENT	
M11.A.1.1	Represent and/or use numbers in equivalent forms (e.g., integers, fractions, decimals, percents, square roots, exponents and scientific notation). ***Reference: 2.1.8.A, 2.1.8.B, 2.1.11.A***	**M11.A.1.1.1**	Find the square root of an integer to the nearest tenth using either a calculator or estimation.
		M11.A.1.1.2	Express numbers and/or simplify expressions using scientific notation (including numbers less than 1).
		M11.A.1.1.3	Simplify square roots. (e.g., $\sqrt{24} = 2\sqrt{6}$)

EXAMPLE ITEMS

- The diameter of a red blood cell, in inches, is 3×10^{-4}. This expression is the same as which of the following numbers?

  A. 0.00003
  * B. 0.0003
  C. 0.003
  D. 3,000
  E. 30,000

(NAEP)

- $\frac{6 \times 10^3}{3 \times 10^5} =$

  A. 0.5×10^2
  B. 2×10^2
  C. $2 \times 10^{0.6}$
  D. 0.5×10^{-2}
  * E. 2×10^{-2}

(NAEP)

M11.A Numbers and Operations — Reporting Category

ASSESSMENT ANCHOR

M11.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.

		ELIGIBLE CONTENT	
M11.A.1.2	Apply number theory concepts to show relationships between real numbers in problem solving settings. ***Reference: 2.1.8.E***	**M11.A.1.2.1**	Find the Greatest Common Factor (GCF) and/or the Least Common Multiple (LCM) for sets of monomials.

EXAMPLE ITEMS

M11.A Numbers and Operations — Reporting Category

ASSESSMENT ANCHOR

M11.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.

	ELIGIBLE CONTENT	
M11.A.1.3 Estimate the value of an irrational number. ***Reference: 2.2.8.C***	**M11.A.1.3.1**	Locate/identify irrational numbers at the approximate location on a number line.
	M11.A.1.3.2	Compare and/or order any real numbers (rational and irrational may be mixed).

EXAMPLE ITEMS

M11.A Numbers and Operations — Reporting Category

ASSESSMENT ANCHOR

M11.A.2 Understand the meanings of operations, use operations and understand how they relate to each other.

	ELIGIBLE CONTENT
M11.A.2.1 Apply ratio and/or proportion in problem-solving situations. ***Reference: 2.2.11.A, 2.8.11.P***	**M11.A.2.1.1** Solve problems using operations with rational numbers including rates and percents (single and multi-step and multiple procedure operations) (e.g., distance, work and mixture problems, etc.). **M11.A.2.1.2** Solve problems using direct and inverse proportions. **M11.A.2.1.3** Identify and/or use proportional relationships in problem solving settings.

EXAMPLE ITEMS

- Mr. Morris is making a dollhouse with toy furniture. He uses 0.5 inches to represent 1 foot. What would be the dimensions of a toy table representing a table 6 feet long, 3 feet wide and 30 inches high?

  A. 3 inches long, 1.25 inches wide and 1.5 inches high
  * B. 3 inches long, 1.5 inches wide and 1.25 inches high
  C. 12 inches long, 6 inches wide and 5 inches high
  D. 3 inches long, 1.5 inches wide and 15 inches high

  (Pennsylvania Department of Education)

M11.A Numbers and Operations — Reporting Category

ASSESSMENT ANCHOR

M11.A.2 Understand the meanings of operations, use operations and understand how they relate to each other.

	ELIGIBLE CONTENT
M11.A.2.2 Use exponents, roots and/or absolute value to solve problems. ***Reference: 2.1.11.A***	**M11.A.2.2.1** Simplify/evaluate expressions involving positive and negative exponents, roots and/or absolute value (may contain all types of real numbers - exponents should not exceed power of 10). **M11.A.2.2.2** Simplify/evaluate expressions involving multiplying with exponents (e.g. $x^6 * x^7 = x^{13}$), powers of powers (e.g., $(x^6)^7=x^{42}$) and powers of products $(2x^2)^3=8x^6$ (positive exponents only).

EXAMPLE ITEMS

M11.A Numbers and Operations — Reporting Category

ASSESSMENT ANCHOR

M11.A.3 Compute accurately and fluently and make reasonable estimates.

		ELIGIBLE CONTENT	
M11.A.3.1	Apply the order of operations in computation and in problem-solving situations. ***Reference: 2.2.8.A***	**M11.A.3.1.1**	Simplify/evaluate expressions using the order of operations to solve problems (any rational numbers may be used).

EXAMPLE ITEMS

M11.A Numbers and Operations — Reporting Category

ASSESSMENT ANCHOR

M11.A.3 Compute accurately and fluently and make reasonable estimates.

	ELIGIBLE CONTENT
M11.A.3.2 Use estimation strategies in problem-solving situations. ***Reference: 2.2.11.B, 2.2.11.D***	**M11.A.3.2.1** Use estimation to solve problems.

EXAMPLE ITEMS

- At the start of the month, the counter on the copy machine read 6,583. At the end of the month, it read 82,110. The copies cost $1\frac{1}{3}$ cents a piece. What was the approximate total cost of the copies for this month?

  A. $10,000.00
  B. $2,200.00
  * C. $1,000.00
  D. $200.00

  (Pennsylvania Department of Education)

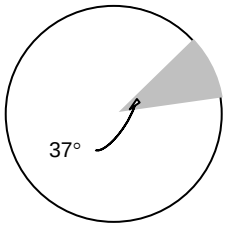
- Mrs. Ditters and her daughter went to lunch. Their bill came to $27.29. If a fair tip is between 15 and 20 percent, what would be a fair tip to leave their waiter?

  A. $2.00
  B. $2.72
  * C. $5.00
  D. $20.00

  (Pennsylvania Department of Education)

- The entire circle shown below represents a total of 2,675 radios sold. Of the following, which is the best approximation of the number of radios represented by the shaded sector of the circle?

  B. 70
  * C. 275
  D. 985
  E. 25880
  F. 98420



(NAEP)

M11.B Measurement — Reporting Category

ASSESSMENT ANCHOR

M11.B.1 Demonstrate an understanding of measurable attributes of objects and figures, and the units, systems and processes of measurement.

ELIGIBLE CONTENT

Not assessed at grade 11.

EXAMPLE ITEMS

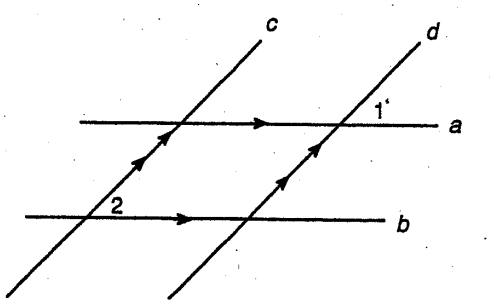
M11.B Measurement — Reporting Category

ASSESSMENT ANCHOR
M11.B.2 Apply appropriate techniques, tools and formulas to determine measurements.

	ELIGIBLE CONTENT
M11.B.2.1 Use and/or compare measurements of angles. ***Reference: 2.3.11.A, 2.3.11.B***	**M11.B.2.1.1** Measure and/or compare angles in degrees (up to 360°) (protractor must be provided or drawn).

EXAMPLE ITEMS

•



Given: a ∥ b, c ∥ d
If m ∠ 1 = 2x + 16 and m ∠ 2 = x + 14, then what is the value of x?

A. –10
∗B. –2
C. 2
D. 10

(Pennsylvania Department of Education)

M11.B Measurement — Reporting Category

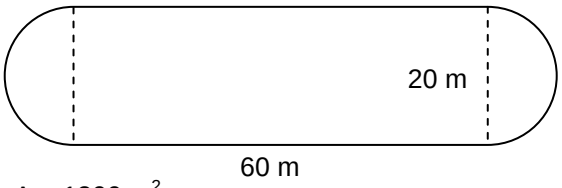
ASSESSMENT ANCHOR

M11.B.2 Apply appropriate techniques, tools and formulas to determine measurements.

		ELIGIBLE CONTENT	
M11.B.2.2	Use and/or develop procedures to determine or describe measures of perimeter, circumference, area, surface area and/or volume. (May require conversions within the same system.) ***Reference: 2.3.8.A, 2.3.8.D***	**M11.B.2.2.1**	Calculate the surface area of prisms, cylinders, cones, pyramids and/or spheres. Formulas are provided on the reference sheet.
		M11.B.2.2.2	Calculate the volume of prisms, cylinders, cones, pyramids and/or spheres. Formulas are provided on the reference sheet.
		M11.B.2.2.3	Estimate area, perimeter or circumference of an irregular figure.
		M11.B.2.2.4	Find the measurement of a missing length given the perimeter, circumference, area or volume.

EXAMPLE ITEMS

- The inside rail of a running track consists of a rectangle with a semicircle at each end as shown in the figure below. Find the approximate area surrounded by the track rail.



A. 1200 m^2
B. 2456 m^2
* C. 1514 m^2
D. 160 m^2

(Pennsylvania Department of Education)

M11.B Measurement — Reporting Category

ASSESSMENT ANCHOR

M11.B.2 Apply appropriate techniques, tools and formulas to determine measurements.

	ELIGIBLE CONTENT
M11.B.2.3 Describe how a change in one dimension of a figure (2 or 3 dimensional) affects other measurements of that figure. ***Reference: 2.3.8.E***	**M11.B.2.3.1** Describe how a change in the linear dimension of a figure affects its perimeter, circumference, area or volume. • How does changing the length of the radius of a circle affect the circumference of the circle? • How does changing the length of the edge of a cube affect the volume of the cube? • How does changing the length of the base of a triangle affect the area of the triangle?

EXAMPLE ITEMS

M11.C Geometry — Reporting Category

ASSESSMENT ANCHOR

M11.C.1 Analyze characteristics and properties of two- and three- dimensional geometric shapes and demonstrate understanding of geometric relationships.

		ELIGIBLE CONTENT	
M11.C.1.1	Identify and/or use parts of circles and segments associated with circles. ***Reference: 2.9.11.F***	**M11.C.1.1.1**	Identify and/or use the properties of a radius, diameter and/or tangent of a circle (given numbers should be whole.)
		M11.C.1.1.2	Identify and/or use the properties of arcs, semicircles, inscribed angles and/or central angles.

EXAMPLE ITEMS

ASSESSMENT ANCHOR

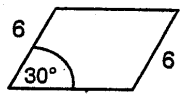
M11.C.1 Analyze characteristics and properties of two- and three- dimensional geometric shapes and demonstrate understanding of geometric relationships.

	ELIGIBLE CONTENT
M11.C.1.2 Recognize and/or apply properties of angles, triangles and quadrilaterals. ***Reference: 2.9.8.D, 2.9.11.C***	**M11.C.1.2.1** Identify and/or use properties of triangles (e.g., medians, altitudes, angle bisectors, side/angle relationships, Triangle Inequality Theorem).
	M11.C.1.2.2 Identify and/or use properties of quadrilaterals (e.g., parallel sides, diagonals, bisectors, congruent sides/angles and supplementary angles).
	M11.C.1.2.3 Identify and/or use properties of isosceles and equilateral triangles

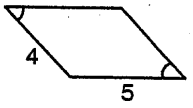
EXAMPLE ITEMS

- Which picture provides enough information to prove that the figure is a parallelogram?

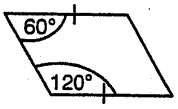
A



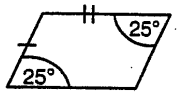
B



*C



D



(Pennsylvania Department of Education)

M11.C Geometry — Reporting Category

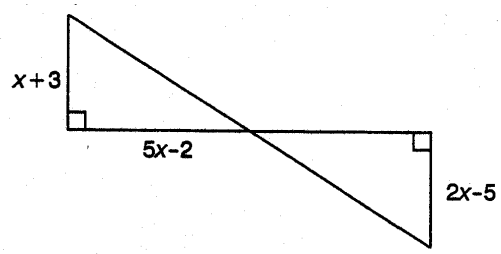
ASSESSMENT ANCHOR

M11.C.1 Analyze characteristics and properties of two- and three- dimensional geometric shapes and demonstrate understanding of geometric relationships.

	ELIGIBLE CONTENT
M11.C.1.3 Use properties of congruence, correspondence and similarity in problem-solving settings involving two- and three- dimensional figures. ***Reference: 2.9.11.B***	**M11.C.1.3.1** Identify and/or use properties of congruent and similar polygons or solids.

EXAMPLE ITEMS

- Given that the triangles shown are congruent, find the value of x.



A. $\frac{5}{4}$
B. -1
* C. 8
D. $-\frac{3}{2}$

(Pennsylvania Department of Education)

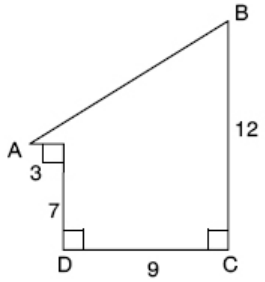
ASSESSMENT ANCHOR

M11.C.1 Analyze characteristics and properties of two- and three- dimensional geometric shapes and demonstrate understanding of geometric relationships.

		ELIGIBLE CONTENT	
M11.C.1.4	Solve problems involving right triangles using the Pythagorean Theorem. ***Reference: 2.10.11.B***	**M11.C.1.4.1**	Find the measure of a side of a right triangle using the Pythagorean Theorem (Pythagorean Theorem included on the reference sheet).

EXAMPLE ITEMS

- Find the length of segment AB in the figure below.



NOTE: Figure is NOT drawn to scale.

A. 8
* B. 13
C. 14
D. 15

(Pennsylvania Department of Education)

M11.C Geometry — Reporting Category

ASSESSMENT ANCHOR

M11.C.2 Identify and/or apply concepts of transformations or symmetry.

ELIGIBLE CONTENT

Not assessed at grade 11.

EXAMPLE ITEMS

M11.C Geometry — Reporting Category

ASSESSMENT ANCHOR

M11.C.3 Locate points or describe relationships using the coordinate plane.

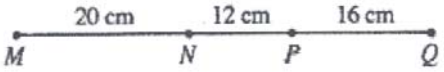
	ELIGIBLE CONTENT
M11.C.3.1 Solve problems using analytic geometry. ***Reference: 2.9.11.G***	**M11.C.3.1.1** Calculate the distance and/or midpoint between 2 points on a number line or on a coordinate plane (formula provided on the reference sheet). **M11.C.3.1.2** Relate slope to perpendicularity and/or parallelism (limit to linear algebraic expressions; slope formula provided on the reference sheet).

EXAMPLE ITEMS

- What is the distance between the points (2,10) and (-4,2) in the xy-plane?

A. 6
B. 8
* C. 10
D. 14
E. 18

(NAEP)



- What is the distance between the midpoint of MN and the midpoint of PQ shown above?

A. 18 cm
B. 24 cm
C. 26 cm
D. 28 cm
* E. 30 cm

(NAEP)

M11.D Algebraic Concepts — Reporting Category

ASSESSMENT ANCHOR

M11.D.1 Demonstrate an understanding of patterns, relations and functions.

			ELIGIBLE CONTENT
M11.D.1.1	Analyze and/or use patterns or relations. ***Reference: 2.8.11.Q, 2.8.11.A, 2.8.11.O***	**M11.D.1.1.1**	Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically.
		M11.D.1.1.2	Determine if a relation is a function given a set of points or a graph.
		M11.D.1.1.3	Identify the domain, range or inverse of a relation (may be presented as ordered pairs or a table).

EXAMPLE ITEMS

- Which of the following best describes the pattern 4, 8, 12, …?

  A. 1 + n, 4 + n, 8 + n, …
  B. n^2, n^3, n^4, …
  * C. n, 2n, 3n, …
  D. n, $\frac{n}{2}$, $\frac{n}{3}$, …

(Pennsylvania Department of Education)

- What is the next term in the sequence below?

  1, 8, 27, 64, …

  A. 5
  B. 25
  C. 96
  * D. 125

(Pennsylvania Department of Education)

- If this pattern of dot-figures is continued, how many dots will be in the 100th figure?

  A. 100
  B. 101
  * C. 199
  D. 200
  E. 201

(NAEP)

M11.D Algebraic Concepts — Reporting Category

ASSESSMENT ANCHOR

M11.D.2 Represent and/or analyze mathematical situations using numbers, symbols, words, tables and/or graphs.

	ELIGIBLE CONTENT
M11.D.2.1 Write, solve and/or graph linear equations and inequalities using various methods. ***Reference: 2.8.8.F, 2.8.11.D, 2.8.11.H, 2.8.11.J, 2.8.11.N, 2.8.11.L, 2.8.11.K***	**M11.D.2.1.1** Solve compound inequalities and/or graph their solution sets on a number line (may include absolute value inequalities). **M11.D.2.1.2** Identify or graph functions, linear equations or linear inequalities on a coordinate plane. **M11.D.2.1.3** Write, solve and/or apply a linear equation (including problem situations). **M11.D.2.1.4** Write and/or solve systems of equations using graphing, substitution and/or elimination (limit systems to 2 equations). **M11.D.2.1.5** Solve quadratic equations using factoring (integers only – not including completing the square or the Quadratic Formula).

EXAMPLE ITEMS

- If f(x) = 5x – 3 and f(x) = 7,
  What is the value of x?

  A. -3
  * B. 2
  C. 5
  D. 7

(Kentucky Department of Education)

- If f(x) = $\frac{2x+1}{3}$ and g(x) = $2x^2 + 2$,
  then f(g(2)) =

  A. 3
  B. 5
  * C. 7
  D. $7\frac{5}{9}$
  E. $16\frac{2}{3}$

(NAEP)

M11.D Algebraic Concepts — Reporting Category

ASSESSMENT ANCHOR

M11.D.2 Represent and/or analyze mathematical situations using numbers, symbols, words, tables and/or graphs.

		ELIGIBLE CONTENT	
M11.D.2.2	Simplify expressions involving polynomials. ***Reference: 2.8.11.S***	**M11.D.2.2.1**	Add, subtract and/or multiply polynomial expressions (express answers in simplest form – nothing larger than a binomial multiplied by a trinomial).
		M11.D.2.2.2	Factor algebraic expressions, including difference of squares and trinomials (trinomials limited to the form ax^2+bx+c where a is not equal to 0).
		M11.D.2.2.3	Simplify algebraic fractions.

EXAMPLE ITEMS

ASSESSMENT ANCHOR

M11.D.3 Analyze change in various contexts.

		ELIGIBLE CONTENT	
M11.D.3.1	Describe and/or determine change.	**M11.D.3.1.1**	Identify, describe and/or use constant

Reference: 2.8.8.J, 2.11.8.B	or varying rates of change. **M11.D.3.1.2** Determine how a change in one variable relates to a change in a second variable (e.g., y=4/x, if x doubles, what happens to y?).

EXAMPLE ITEMS

- Yearly college tuition increased from $16,000 in 1996 to $20,000 in the year 2000. What is the **annual** rate of increase?

  A. 2.5%
  *B. 5.7%
  C. 8%
  D. 20%

  (Pennsylvania Department of Education)

- A certain culture of 5,000 bacteria triples every 43 minutes. Let B = the number of bacteria t minutes after the start of the count. Which equation models the situation?

  A. $B = 5000 + 43t$
  B. $B = 43t^2 + 5000$
  *C. $B = 5000 \bullet 3^{t/43}$
  D. $B = 5000 + 3 \bullet 43t$

  (Pennsylvania Department of Education)

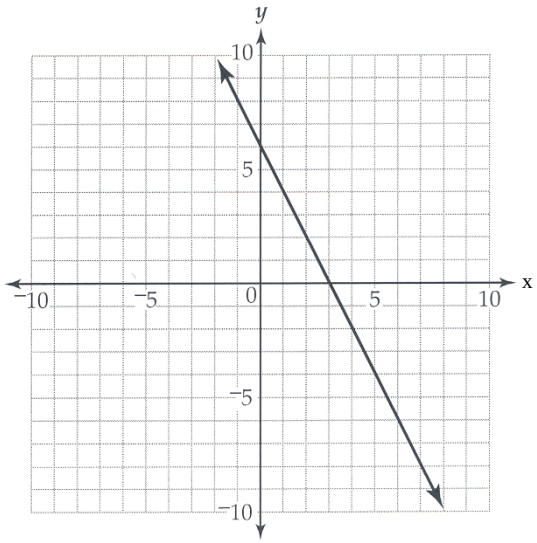
ASSESSMENT ANCHOR
M11.D.3 Analyze change in various contexts.

	ELIGIBLE CONTENT
M11.D.3.2 Compute and/or use the slope of a line. ***Reference: 2.8.11.J, 2.8.11.L***	**M11.D.3.2.1** Apply the formula for the slope of a line to solve problems (formula given on reference sheet). **M11.D.3.2.2** Given the graph of the line, 2 points on the line, or the slope and a point

	on a line, write or identify the linear equation in point-slope, standard and/or slope-intercept form.
	M11.D.3.2.3 Compute the slope and/or y-intercept represented by a linear equation or graph.

EXAMPLE ITEMS

- Look at the line that is graphed below.



Which of these equations describes the line?

* A. $y = -2x + 6$
B. $y = -\frac{1}{2}x + 6$
C. $y = \frac{1}{2}x + 6$
D. $y = 2x + 6$

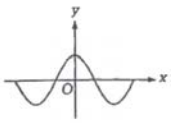
(Massachusetts Department of Education)

ASSESSMENT ANCHOR
M11.D.4 Describe or use models to represent quantitative relationships.

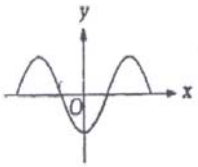
	ELIGIBLE CONTENT
M11.D.4.1 Interpret and/or use linear, quadratic	**M11.D.4.1.1** Match the graph of a given function

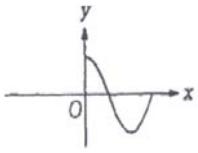
and/or exponential functions and their equations, graphs or tables. ***Reference: 2.8.11.K, 2.8.11.Q***	to its table or equation.

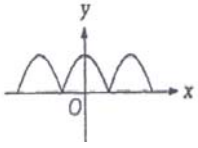
EXAMPLE ITEMS

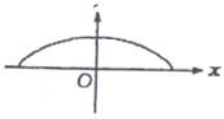


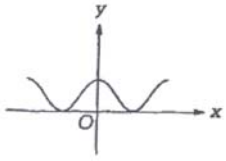
- The figure above shows the graph of y = f (x). Which of the following could be the graph of y = |f(x)|?

A. 

B. 

*C. 

D. 

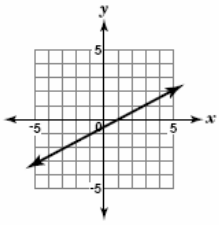
E. 

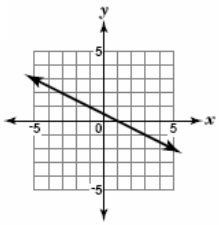
(NAEP)

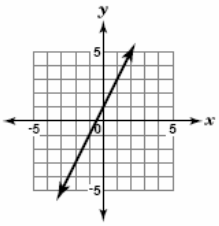
- The table below shows a linear relationship between *x* and *y*.

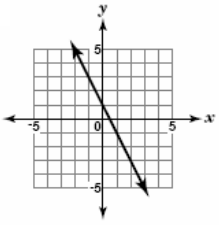
x	-2	-1	0	1	2
y	5	3	1	-1	-3

Which of these graphs shows this relationship?

A. 

B. 

C. 

*D. 

(Maryland Department of Education)

ASSESSMENT ANCHOR

M11.E.1 Formulate or answer questions that can be addressed with data and/or organize, display, interpret or analyze data.

	ELIGIBLE CONTENT
M11.E.1.1 Appropriately display and/or use data in problem-solving settings. ***Reference: 2.6.11.A, 2.6.8.E***	**M11.E.1.1.1** Create and/or use appropriate graphical representations of data, including box-and-whisker plots, stem-and-leaf plots or scatter plots. **M11.E.1.1.2** Analyze data and/or answer questions based on displayed data

(box-and-whisker plots, stem-and-leaf plots or scatter plots).

EXAMPLE ITEMS

-

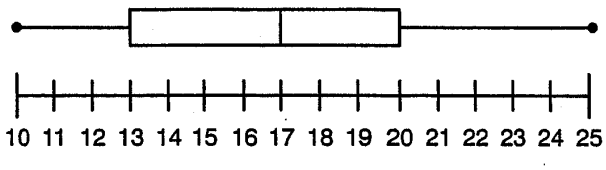
Year	Number of Traffic Deaths in Pennsylvania
1990	205
1991	
1992	191
1993	184

The above relationship is linear. Predict the number of highway deaths in the year 2005.

A. 93
*B. 100
C. 107
D. 114

(Pennsylvania Department of Education)

- Look at the box-and-whisker plot below. What range of values contains 50% of the data?



A. 10 – 20
B. 13 – 25
*C. 17 – 25
D. 17 – 20

(Pennsylvania Department of Education)

ASSESSMENT ANCHOR

M11.E.2 Select and/or use appropriate statistical methods to analyze data.

		ELIGIBLE CONTENT	
M11.E.2.1	Use measures of central tendency to describe a set of data. ***Reference: 2.6.8.A, 2.6.11.A***	**M11.E.2.1.1**	Calculate or select the appropriate measure of central tendency (mean, mode or median) of a set of data given or represented on a table, line plot or stem-and-leaf plot.
		M11.E.2.1.2	Calculate and/or interpret the range, quartiles and interquartile range of data.
		M11.E.2.1.3	Describe how outliers affect measures of central tendency.

EXAMPLE ITEMS

- 12 | 9
  13 | 3, 6, 7, 7
  14 | 1, 1, 1, 1, 3, 4, 4, 6, 9, 9
  15 | 0, 0, 0, 1, 2, 4, 6, 7, 8, 8, 8, 9
  16 | 1, 6, 7

  What is the median of the data recorded on the stem-and-leaf plot?

  A. 149
  * B. 149.5
  C. $149.\overline{6}$
  D. 150

(Pennsylvania Department of Education)

ASSESSMENT ANCHOR

M11.E.3 Understand and/or apply basic concepts of probability or outcomes.

		ELIGIBLE CONTENT	
M11.E.3.1	Apply probability and/or odds to practical situations. ***Reference: 2.7.11.A, 2.7.11.E***	**M11.E.3.1.1**	Find probabilities for independent, dependent or compound events and represent as a fraction, decimal or percent).
		M11.E.3.1.2	Find, convert and/or compare the probability and/or odds of a simple event.

M11.E Data Analysis and Probability — Reporting Category

EXAMPLE ITEMS

- If the odds are 3 to 5 that a vehicle randomly selected from a parking lot is a truck, what is the probability that it is not a truck?

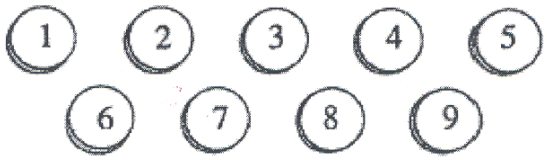
  A. 3 to 5
  B. 5 to 3
  C. $\frac{3}{8}$
  ✱D. $\frac{5}{8}$

(Pennsylvania Department of Education)

- The chance of rain is $\frac{2}{5}$. What are the odds against rain occurring?

  A. 2 to 3
  ✱B. 3 to 2
  C. $\frac{3}{8}$
  D. $\frac{2}{5}$

(Pennsylvania Department of Education)



- The nine chips shown above are placed in a sack and then mixed up. Madeline draws one chip from this sack. What is the probability that Madeline draws a chip with an even number?

A. $\frac{1}{9}$ B. $\frac{2}{9}$ ✱C. $\frac{4}{9}$ D. $\frac{1}{2}$ E. $\frac{4}{5}$

(NAEP)

ASSESSMENT ANCHOR

M11.E.3 Understand and/or apply basic concepts of probability or outcomes.

	ELIGIBLE CONTENT
M11.E.3.2 Apply counting techniques in problem-solving settings. ***Reference: 2.7.8.A***	**M11.E.3.2.1** Determine the number of permutations and/or combinations or apply the fundamental counting principle. (Formula provided on the reference sheet).

M11.E Data Analysis and Probability — Reporting Category

EXAMPLE ITEMS

- A contractor is building 5 different model homes on 5 adjacent lots on one side of a street. If 1 house is to be built on each lot, how many different arrangements of the 5 houses are possible?

* A. 120
B. 60
C. 25
D. 10
E. 5

(NAEP)

ASSESSMENT ANCHOR

M11.E.4 Develop and/or evaluate inferences and predictions or draw conclusions based on data or data displays.

		ELIGIBLE CONTENT	
M11.E.4.1	Make predictions using data displays and probability. ***Reference: 2.7.8.E, 2.6.11.D***	**M11.E.4.1.1**	Estimate or calculate to make predictions based on a circle, line, bar graph or given situation.
		M11.E.4.1.2	Use probability to predict outcomes.

EXAMPLE ITEMS

- From a shipment of 500 batteries, a sample of 25 was selected at random and tested. If 2 batteries in the sample were found to be dead, how many dead batteries would be expected in the entire shipment?

A. 10
B. 20
C. 30
* D. 40
E. 50

(NAEP)

ASSESSMENT ANCHOR

M11.E.4 Develop and evaluate inferences and predictions or draw conclusions based on data or data displays.

		ELIGIBLE CONTENT	
M11.E.4.2	Analyze and/or interpret data on a scatter plot and/or use a scatter plot to make predictions. ***Reference: 2.6.11.C, 2.6.11.D***	**M11.E.4.2.1**	Draw, find and/or write an equation for a line of best fit for a scatter plot.
		M11.E.4.2.2	Make predictions using the equations or graphs of best-fit lines of scatter plots.

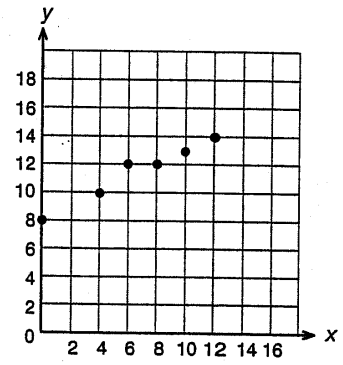
EXAMPLE ITEMS

- The annual maintenance cost of an appliance is given by the regression equation $y = 12.5x + 19.2$, where y represents the total maintenance cost and x represents the age of the appliance in years. Rounded to the nearest dollar, what is the expected maintenance cost of a 14-year-old appliance?

  A. $ 33
  B. $156
  *C. $194
  D. $281

(Pennsylvania Department of Education)

- Which of the given equations most closely represents the line of best fit for the scatter plot given below?



  A. $y = 2x + 8$
  *B. $y = \frac{1}{2}x + 8$
  C. $y = -\frac{1}{2}x + 8$
  D. $y = -2x + 8$

(Pennsylvania Department of Education)

PENNSYLVANIA DEPARTMENT OF EDUCATION

READING GRADE 11

ASSESSMENT ANCHORS & ELIGIBLE CONTENT

PENNSYLVANIA DEPARTMENT OF EDUCATION

About the Reading Assessment Anchors

Introduction

This is a brief introduction to the Reading Assessment Anchors. For more information on the Assessment Anchors and how they were developed, please read the *General Introduction* provided on the website and the *Frequently Asked Questions.*

How the Assessment Anchors Connect to the Standards

The PA Academic Standards for Reading, Writing, Speaking and Listening are:

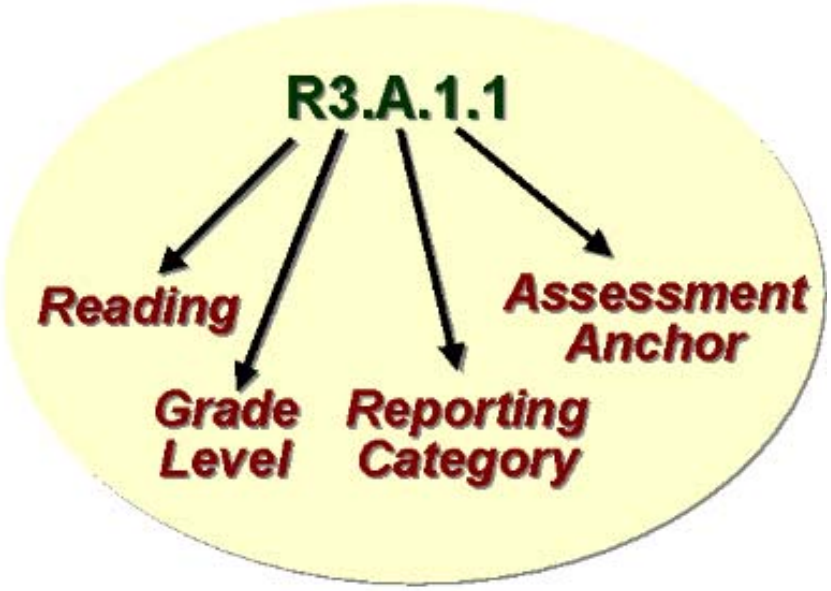
1.1 Learning to Read Independently
1.2 Reading Critically in All Content Areas
1.3 Reading, Analyzing and Interpreting Literature
1.4 Types of Writing
1.5 Quality of Writing
1.6 Speaking and Listening
1.7 Characteristics and Function of the English Language
1.8 Research

In the past, the Reading PSSA assessed standards 1.1, 1.2, 1.3, 1.7 and 1.8 in Grades 5, 8 and 11. The Writing PSSA assessed standards 1.4 and 1.5. Speaking and Listening have always been assessed through local assessments. *Because of the shift to create a clearer and more focused test using the Assessment Anchors, the 2005 PSSA will only assess the first three reading standards.* Learning to read independently and critically, and the ability to analyze and interpret are at the heart of what students must be able to do to be good readers in today's society. Standards 1.7 and 1.8 are not specific to reading and for the most part these standards are better assessed at the district level.

How to Read the Assessment Anchors

The Reading Assessment Anchors begin with "R" to distinguish them from the Mathematics Assessment Anchors, which begin with "M". The number after the "R" in the label is the grade level (e.g., R3 would be Reading at third grade). The second letter in the labeling system is the Reporting Category (A or B). The same reporting categories continue across all Grades 3 through 8 and 11. The final number in the label is the actual Assessment Anchor (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.

For example, R3.A.1.1 is a Reading Assessment Anchor (R stands for Reading) at 3rd grade (3). The A indicates that this Anchor is in the Comprehension and Reading Skills Reporting Category and the 1.1 means that it is the first Assessment Anchor in that Reporting Category. (*See below*)



NOTE: Below each specific descriptor of the Assessment Anchor is a reference in italics. This reference relates to the Pennsylvania Academic Standards and helps you crosswalk the Anchors to the Standards.

PDE 2007 Reading Grade 11 Assessment Anchors and Crosswalk (Reference) to PDE Reading, Writing, Speaking and Listening Academic Standards				
R11.A.1 Assessment Anchor: Understand fiction appropriate to grade level				
Major Concept		Specific Content		Academic Standard Reference
1	Identify and apply the meaning of vocabulary	1	Identify and/or apply meaning of multiple-meaning words used in text.	1.1.11.E 1.1.11.F
		2	Identify and/or apply a synonym or antonym of a word used in text.	
2	Identify and apply word recognition skills	1	Identify how the meaning of a word is changed when an affix is added; identify the meaning of a word from the text with an affix.	1.1.11.C
		2	Define and/or apply how the meaning of words or phrases changes when using context clues given in explanatory sentences.	
3	Make inferences, draw conclusions, and make generalizations based on text	1	Make inferences and/or draw conclusions based on information from text.	1.1.11.G 1.2.11.A
		2	Cite evidence from text to support generalizations.	
4	Identify and explain main ideas and relevant details	1	Identify and/or explains stated or implied main ideas and relevant supporting details from text.	1.1.11.G
			Note: Items may target specific paragraphs.	
5	Summarize a fictional text as a whole	1	Summarize the key details and events of a fictional text as a whole.	1.1.11.G
6	Identify, describe, and analyze genre of text.	1	Identify and/or analyze the author's intended purpose of text.	1.3.11.F
		2	Describe and/or analyze examples of text that support the author's intended purpose.	

R11.A.2 Assessment Anchor: Understand nonfiction appropriate to grade level				
Major Concept		Specific Content		Academic Standard Reference
1	Identify and apply the meaning of vocabulary in nonfiction	1	Identify and/or apply meaning of multiple-meaning words used in text.	1.1.11.E 1.1.11.F
		2	Identify and/or apply meaning of content-specific words used in text.	
2	Identify and apply word recognition skills	1	Identify and apply how the meaning of a word is changed when an affix is added; identify the meaning of a word from the text with an affix.	1.1.11.C 1.1.11.F
		2	Define and/or apply how the meaning of words or phrases changes when using context clues given in explanatory sentences.	
3	Make inferences, draw conclusions, and make generalizations based on text	1	Make inferences and/or draw conclusions based on information from text.	1.1.11.G 1.2.11.A
		2	Cite evidence from text to support generalizations.	
4	Identify and explain main ideas and relevant details	1	Identify and/or explains stated or implied main ideas and relevant supporting details from text.	1.1.11.G 1.2.11.A
			Note: Items may target specific paragraphs.	
5	Summarize a fictional text as a whole	1	Summarize the key details and events of a nonfictional text as a whole.	1.2.11.A 1.1.11.G
6	Identify, describe, and analyze genre of text.	1	Identify and/or analyze the author's intended purpose of text.	1.1.11.G 1.2.11.A
		2	Describe and/or analyze examples of text that support the author's intended purpose.	

R11.B.1 Assessment Anchor: R11.B.Understand components within and between texts				
Major Concept		Specific Content		Academic Standard Reference
1	Interpret, compare, describe, analyze, and evaluate components of fiction and literary nonfiction	1	Interpret, compare, describe, analyze, and/or evaluate the relationships among the following within fiction and literary nonfiction: Character, Setting, Plot, Theme, Tone, Style, Mood, and Symbolism.	1.1.11.G 1.3.11.B 1.3.11.F
2	Make a connection between texts	1	Interpret, compare, describe, analyze, and/or evaluate connections between texts.	1.1.11.G 1.3.11.B 1.3.11.F
R11.B.2 Assessment Anchor: R11.B.Understand literary devices in fictional and nonfictional text				
Major Concept		Specific Content		Academic Standard Reference
1	Identify, interpret, describe, and analyze figurative language and literary structures in fiction and nonfiction.	1	Identify, interpret, describe, and/or analyze examples of personification, simile, metaphor, hyperbole, satire, imagery, foreshadowing, flashbacks and irony in text.	1.3.11.C
		2	Identify, interpret, describe, and/or analyze the author's purpose for and effectiveness at using figurative language in text.	
2	Identify, interpret, describe, and analyze the point of view of the narrator in fictional and nonfictional text	1	Identify, interpret, describe, and/or analyze the point of view of the narrator as first person or third person point of view.	1.3.11.C
		2	Interpret, describe, and/or analyze the effectiveness of the point of view used by the author.	

Assessment Anchor: R11.B.3 Understand concepts and organization of nonfictional text.				
	Major Concept		Specific Content	Academic Standard Reference
1	Interpret, describe, and analyze the characteristics and uses of facts and opinions in nonfictional text.	1	Interpret, describe, and/or analyze the use of facts and opinions to make a point or construct an argument in nonfictional text.	1.2.11.A 1.1.11.G
2	Distinguish between essential and nonessential information within or between texts	1	Identify and/or interpret bias and propaganda techniques in nonfictional text .	1.2.11.A
		2	Describe and/or analyze the effectiveness of bias and propaganda techniques in nonfictional text.	
3	Identify, compare, explain, interpret, describe, and analyze how text organization clarifies meaning of nonfictional text.	1	Interpret and/or analyze the effect of text organization, including the use of headers.	1.2.11.A
		2	Interpret and/or analyze the author's purpose for decisions about text organization and content.	
		3	Interpret and/or analyze graphics and charts, and/or make connections between text and the content of graphics and charts.	
		4	Identify, compare, explain, interpret, describe, and/or analyze the sequence of steps in a list of directions.	

Reading Grade 11 Assessment Anchors and Eligible Content

Pennsylvania Department of Education

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R11.A Comprehension and Reading Skills — Reporting Category

ASSESSMENT ANCHORS
R11.A.1 Understand fiction appropriate to grade level.

	ELIGIBLE CONTENT
R11.A.1.1 Identify and apply the meaning of vocabulary.	**R11.A.1.1.1** Identify and/or apply meaning of multiple-meaning words used in text. **R11.A.1.1.2** Identify and/or apply a synonym or antonym of a word used in text.

Items that measure the Assessment Anchors will relate back to a reading passage. Students may reread the passage to help determine the best answer. See the item sampler for sample items.

A single vocabulary question may take two different styles: one that reprints the sentence from the passage or one that refers back to the word in the passage. Every multiple-choice stem on the test will be followed by four options.

Reference:

1.1.11.E Establish a reading vocabulary by identifying and correctly using new words acquired through the study of their relationships to other words.

1.1.11.F Understand the meaning of and apply key vocabulary across the various subject areas.

ASSESSMENT ANCHORS
R11.A.1 Understand fiction appropriate to grade level.

R11.A Comprehension and Reading Skills — Reporting Category

	ELIGIBLE CONTENT
R11.A.1.2 Identify and apply word recognition skills.	**R11.A.1.2.1** Identify how the meaning of a word is changed when an affix is added; identify the meaning of a word from the text with an affix. **R11.A.1.2.2** Define and/or apply how the meaning of words or phrases changes when using context clues given in explanatory sentences.

Items that measure the Assessment Anchors will relate back to a reading passage. Students may reread the passage to help determine the best answer. See the item sampler for sample items.

A single vocabulary question may take two different styles: one that reprints the sentence from the passage or one that refers back to the word in the passage. Every multiple-choice stem on the test will be followed by four options.

Reference:

1.1.11.C Use knowledge of root words and words from literary works to recognize and understand the meaning of new words during reading.

ASSESSMENT ANCHORS

R11.A.1 Understand fiction appropriate to grade level.

	ELIGIBLE CONTENT
R11.A.1.3 Make inferences, draw conclusions, and make generalizations based on text.	**R11.A.1.3.1** Make inferences and/or draw conclusions based on information from text.

	R11.A.1.3.2 Cite evidence from text to support generalizations.

Items that measure the Assessment Anchors will relate back to a reading passage. Students may reread the passage to help determine the best answer. See the item sampler for sample items.

Every multiple-choice stem on the test will be followed by four options.

Reference:

1.1.11.G Demonstrate after reading understanding and interpretation of both fiction and nonfiction text, including public documents.

1.2.11.A Read and understand essential content of informational texts and documents in all academic areas.

ASSESSMENT ANCHORS

R11.A.1 Understand fiction appropriate to grade level.

	ELIGIBLE CONTENT
R11.A.1.4 Identify and explain main ideas and relevant details.	**R11.A.1.4.1** Identify and/or explains stated or implied main ideas and relevant supporting details from text. Note: Items may target specific paragraphs.

R11.A Comprehension and Reading Skills — Reporting Category

Items that measure the Assessment Anchors will relate back to a reading passage. Students may reread the passage to help determine the best answer. See the item sampler for sample items.

Every multiple-choice stem on the test will be followed by four options.

Reference:

1.1.11.G Demonstrate after reading understanding and interpretation of both fiction and nonfiction text, including public documents.

ASSESSMENT ANCHORS

R11.A.1 Understand fiction appropriate to grade level.

	ELIGIBLE CONTENT
R11.A.1.5 Summarize a fictional text as a whole.	**R11.A.1.5.1** Summarize the key details and events of a fictional text as a whole.

R11.A Comprehension and Reading Skills — Reporting Category

Items that measure the Assessment Anchors will relate back to a reading passage. Students may reread the passage to help determine the best answer. See the item sampler for sample items.

Every multiple-choice stem on the test will be followed by four options.

Reference:

1.1.11.G Demonstrate after reading understanding and interpretation of both fiction and nonfiction text, including public documents.

ASSESSMENT ANCHORS

R11.A.1 Understand fiction appropriate to grade level.

	ELIGIBLE CONTENT
R11.A.1.6 Identify, describe, and analyze genre of text.	**R11.A.1.6.1** Identify and/or analyze the author's intended purpose of text. **R11.A.1.6.2** Describe and/or analyze examples of text that support the author's intended purpose.

Items that measure the Assessment Anchors will relate back to a reading passage. Students may reread the passage to help determine the best answer. See the item sampler for sample items.

Every multiple-choice stem on the test will be followed by four options.

Reference:

1.3.11.F Read and respond to fiction and nonfiction including poetry and drama.

ASSESSMENT ANCHORS

R11.A.2 Understand nonfiction appropriate to grade level.

	ELIGIBLE CONTENT
R11.A.2.1 Identify and apply the meaning of vocabulary in nonfiction.	**R11.A.2.1.1** Identify and/or apply meaning of multiple-meaning words used in text. **R11.A.2.1.2** Identify and/or apply meaning of content-specific words used in text.

R11.A Comprehension and Reading Skills — Reporting Category

Items that measure the Assessment Anchors will relate back to a reading passage. Students may reread the passage to help determine the best answer. See the item sampler for sample items.

A single vocabulary question may take two different styles: one that reprints the sentence from the passage or one that refers back to the word in the passage. Every multiple-choice stem on the test will be followed by four options.

Reference:

1.1.11.E Establish a reading vocabulary by identifying and correctly using new words acquired through the study of their relationships to other words.

1.1.11.F Understand the meaning of and apply key vocabulary across the various subject areas.

ASSESSMENT ANCHORS

R11.A.2 Understand nonfiction appropriate to grade level.

	ELIGIBLE CONTENT
R11.A.2.2 Identify and apply word recognition skills.	**R11.A.2.2.1** Identify and apply how the meaning of a word is changed when an affix is added; identify the meaning of a word from the text with an affix. **R11.A.2.2.2** Define and/or apply how the meaning of words or phrases changes when using context clues given in explanatory sentences.

R11.A Comprehension and Reading Skills — Reporting Category

Items that measure the Assessment Anchors will relate back to a reading passage. Students may reread the passage to help determine the best answer. See the item sampler for sample items.

A single vocabulary question may take two different styles: one that reprints the sentence from the passage or one that refers back to the word in the passage. Every multiple-choice stem on the test will be followed by four options.

Reference:

1.1.11.C Use knowledge of root words and words from literary works to recognize and understand the meaning of new words during reading.

1.1.11.F Understand the meaning of and apply key vocabulary across various subject areas.

ASSESSMENT ANCHORS

R11.A.2 Understand nonfiction appropriate to grade level.

	ELIGIBLE CONTENT
R11.A.2.3 Make inferences, draw conclusions, and make generalizations based on text.	**R11.A.2.3.1** Make inferences and/or draw conclusions based on information from text. **R11.A.2.3.2** Cite evidence from text to support generalizations.

Items that measure the Assessment Anchors will relate back to a reading passage. Students may reread the passage to help determine the best answer. See the item sampler for sample items.

Every multiple-choice stem on the test will be followed by four options.

Reference:

1.1.11.G Demonstrate after reading understanding and interpretation of both fiction and nonfiction text, including public documents.

1.2.11.A Read and understand essential content of informational texts and documents in all academic areas.

ASSESSMENT ANCHORS

R11.A.2 Understand nonfiction appropriate to grade level.

	ELIGIBLE CONTENT
R11.A.2.4 Identify and explain main ideas and relevant details.	**R11.A.2.4.1** Identify and/or explain stated or implied main ideas and relevant supporting details from text. Note: Items may target specific paragraphs.

R11.A Comprehension and Reading Skills — Reporting Category

Items that measure the Assessment Anchors will relate back to a reading passage. Students may reread the passage to help determine the best answer. See the item sampler for sample items.

Every multiple-choice stem on the test will be followed by four options.

Reference:

1.1.11.G Demonstrate after reading understanding and interpretation of both fiction and nonfiction text, including public documents.

1.2.11.A Read and understand essential content of informational texts and documents in all academic areas.

ASSESSMENT ANCHORS

R11.A.2 Understand nonfiction appropriate to grade level.

		ELIGIBLE CONTENT	
R11.A.2.5	Summarize a nonfictional text as a whole.	**R11.A.2.5.1**	Summarize the major points, processes, and/or events of a nonfictional text as a whole.

R11.A Comprehension and Reading Skills — Reporting Category

Items that measure the Assessment Anchors will relate back to a reading passage. Students may reread the passage to help determine the best answer. See the item sampler for sample items.

Every multiple-choice stem on the test will be followed by four options.

Reference:

1.2.11.A Read and understand essential content of informational texts and documents in all academic areas.

1.1.11.G Demonstrate after reading understanding and interpretation of both fiction and nonfiction text, including public documents.

ASSESSMENT ANCHORS

R11.A.2 Understand nonfiction appropriate to grade level.

	ELIGIBLE CONTENT
R11.A.2.6 Identify, describe, and analyze genre of text.	**R11.A.2.6.1** Identify and/or describe the author's intended purpose of text.
	R11.A.2.6.1 Describe and/or analyze examples of text that support the author's intended purpose.

R11.A Comprehension and Reading Skills — Reporting Category

Items that measure the Assessment Anchors will relate back to a reading passage. Students may reread the passage to help determine the best answer. See the item sampler for sample items.

Every multiple-choice stem on the test will be followed by four options.

References:

1.1.11.G Demonstrate after reading understanding and interpretation of both fiction and nonfiction text, including public documents.

1.2.11.A Read and understand essential content of informational texts and documents in all academic areas.

R11.B Interpretation and Analysis of Fictional and Nonfictional Text — Reporting Category

ASSESSMENT ANCHORS

R11.B.1 Understand components within and between texts.

	ELIGIBLE CONTENT
R11.B.1.1 Interpret, compare, describe, analyze, and evaluate components of fiction and literary nonfiction.	**R11.B.1.1.1** Interpret, compare, describe, analyze, and/or evaluate the relationships among the following within fiction and literary nonfiction: Character (may also be called narrator, speaker, subject of a biography): Interpret, compare, describe, analyze, and/or evaluate character actions, motives, dialogue, emotions/feelings, traits, and relationships among characters within fictional or literary nonfictional text. Interpret, compare, describe, analyze, and/or evaluate the relationship between characters and other components of text. Setting: Interpret, compare, describe, analyze, and/or evaluate the setting of fiction or literary nonfiction. Interpret, compare, describe, analyze, and/or evaluate the relationship between setting and other components of the text. Plot (May also be called action): Interpret, compare, describe, analyze, and/or evaluate elements of the plot (conflict, rising action, climax and/or resolution). Interpret, compare, describe, analyze, and/or evaluate the relationship between elements of the plot (conflict, rising action, climax, resolution) and other components of the text. Theme:

	Interpret, compare, describe, analyze, and/or evaluate the theme of fiction or literary nonfiction. Interpret, compare, describe, analyze, and/or evaluate the relationship between the theme and other components of the text. <u>Tone, Style, Mood:</u> Interpret, compare, describe, analyze, and/or evaluate the tone, style, and/or mood of fiction or literary nonfiction. Interpret, compare, describe, analyze, and/or evaluate the relationship between the tone, style, and/or mood and other components of the text. <u>Symbolism:</u> Interpret, compare, describe, analyze, and/or evaluate the use of symbolism in fiction or literary nonfiction. Interpret, compare, describe, analyze, and/or evaluate the relationship between symbolism and other components of the text.

Items that measure the Assessment Anchors will relate back to a reading passage. Students may reread the passage to help determine the best answer. <u>See the item sampler for sample items.</u>

Every multiple-choice stem on the test will be followed by four options.

Reference:

1.1.11.G Demonstrate after reading understanding and interpretation of both fiction and nonfiction text, including public documents.

1.3.11.B Analyze the relationships, uses and effectiveness of literary elements used by one or more authors in similar genres including characterization, setting, plot, theme, point of view, tone and style.

1.3.11.F Read and respond to nonfiction and fiction including poetry and drama.

ASSESSMENT ANCHORS

R11.B.1 Understand components within and between texts.

R11.B Interpretation and Analysis of Fictional and Nonfictional Text — Reporting Category

	ELIGIBLE CONTENT
R11.B.1.2 Make connections between texts.	**R11.B.1.2.1** Interpret, compare, describe, analyze, and/or evaluate connections between texts.

Items that measure the Assessment Anchors will relate back to a reading passage. Students may reread the passage to help determine the best answer. See the item sampler for sample items.

Every multiple-choice stem on the test will be followed by four options.

Reference:

1.1.11.G Demonstrate after reading understanding and interpretation of both fiction and nonfiction text, including public documents.

1.3.11.B Analyze the relationships, uses and effectiveness of literary elements used by one or more authors in similar genres including characterization, setting, plot, theme, point of view, tone and style.

1.3.11.F Read and respond to nonfiction and fiction including poetry and drama.

ASSESSMENT ANCHORS

R11.B.2 Understand literary devices in fictional and nonfictional text.

	ELIGIBLE CONTENT
R11.B.2.1 Identify, interpret, describe, and analyze figurative language and literary structures in fiction and nonfiction.	**R11.B.2.1.1** Identify, interpret, describe, and/or analyze examples of personification, simile, metaphor, hyperbole, satire, imagery, foreshadowing, flashbacks

	and irony in text.
	R11.B.2.1.2 Identify, interpret, describe, and/or analyze the author's purpose for and effectiveness at using figurative language in text.

Items that measure the Assessment Anchors will relate back to a reading passage. Students may reread the passage to help determine the best answer. See the item sampler for sample items.

Every multiple-choice stem on the test will be followed by four options.

Reference:

1.3.11.C Analyze the effectiveness, in terms of literary quality, of the author's use of literary devices.

ASSESSMENT ANCHOR

R11.B.2 Understand literary devices in fictional and nonfictional text.

	ELIGIBLE CONTENT
R11.B.2.2 Identify, interpret, describe, and analyze the point of view of the narrator in fictional and nonfictional text.	**R11.B.2.2.1** Identify, interpret, describe, and/or analyze the point of view of the narrator as first person or third person point of view.
	R11.B.2.2.2 Interpret, describe, and/or analyze

	the effectiveness of the point of view used by the author.

Items that measure the Assessment Anchors will relate back to a reading passage. Students may reread the passage to help determine the best answer. See the item sampler for sample items.

Every multiple-choice stem on the test will be followed by four options.

Reference:

1.3.11.C Analyze the effectiveness, in terms of literary quality, of the author's use of literary devices.

ASSESSMENT ANCHORS

R11.B.3 Understand concepts and organization of nonfictional text.

	ELIGIBLE CONTENT
R11.B.3.1 Interpret, describe, and analyze the characteristics and uses of facts and opinions in nonfictional text.	**R11.B.3.1.1** Interpret, describe, and/or analyze the use of facts and opinions to make a point or construct an argument in nonfictional text.

R11.B Interpretation and Analysis of Fictional and Nonfictional Text — Reporting Category

Items that measure the Assessment Anchors will relate back to a reading passage. Students may reread the passage to help determine the best answer. See the item sampler for sample items.

Every multiple-choice stem on the test will be followed by four options.

Reference:

1.2.11.A Read and understand essential content of informational texts and documents in all academic areas.

1.1.11.G Demonstrate after reading understanding and interpretation of both fiction and nonfiction text, including public documents.

ASSESSMENT ANCHORS

R11.B.3 Understand concepts and organization of nonfictional text.

	ELIGIBLE CONTENT
R11.B.3.2 Distinguish between essential and nonessential information within or between texts.	**R11.B.3.2.1** Identify and/or interpret bias and propaganda techniques in nonfictional text. **R11.B.3.2.2** Describe and/or analyze the effectiveness of bias and propaganda techniques in nonfictional text.

R11.B Interpretation and Analysis of Fictional and Nonfictional Text — Reporting Category

Items that measure the Assessment Anchors will relate back to a reading passage. Students may reread the passage to help determine the best answer. See the item sampler for sample items.

Every multiple-choice stem on the test will be followed by four options.

Reference:

1.2.11.A Read and understand essential content of informational texts and documents in all academic areas.

ASSESSMENT ANCHORS

R11.B.3 Understand concepts and organization of nonfictional text.

	ELIGIBLE CONTENT
R11.B.3.3 Identify, compare, explain, interpret, describe, and analyze how text organization clarifies meaning of nonfictional text.	**R11.B.3.3.1** Interpret and/or analyze the effect of text organization, including the use of headers.
	R11.B.3.3.2 Interpret and/or analyze the author's purpose for decisions about text organization and content.
	R11.B.3.3.3 Interpret and/or analyze graphics and charts, and/or make connections

	between text and the content of graphics and charts.
	R11.B.3.3.4 Identify, compare, explain, interpret, describe, and/or analyze the sequence of steps in a list of directions.

Items that measure the Assessment Anchors will relate back to a reading passage. Students may reread the passage to help determine the best answer. See the item sampler for sample items.

Every multiple-choice stem on the test will be followed by four options.

Reference:

1.2.11.A Read and understand essential content of informational texts and documents in all academic areas.

NOTES