



North Carolina Essential Standards for Science

End-of-Grade Grades 5 and 8 Science Assessments

End-of-Course Biology Assessment

North Carolina Assessment Specifications

Purpose of the Assessments

- Edition 4 Grades 5 and 8 science assessments and the High School Biology assessments will measure students' proficiency on the *Essential Standards* for Science, adopted by the North Carolina State Board of Education in February 2010.
- NC State Board of Education policy GCS-C-003 (<http://sbepolicy.dpi.state.nc.us/>) directs schools to use the results from all operational EOC assessments as at least twenty percent (20%) of the student's final course grade.
- Assessment results will be used for school and district accountability under the READY Accountability Model and for federal reporting purposes.

Curriculum Cycle

- February 2010: North Carolina State Board of Education adoption of the Essential Standards for Science
- 2010-2011: Item development for the Next Generation of Assessments, Edition 4
- 2011-2012: Administration of stand-alone field tests of Edition 4 assessments
- 2012-2013: Operational administration of Edition 4 aligned to the Essential Standards for Science

Standards

- The North Carolina *Essential Standards* for Science are posted at: <http://www.ncpublicschools.org/acre/standards/new-standards/> .
- Grade 5, grade 8 and High School Biology have a set of content standards.
- Each essential standard has associated clarifying objectives.
- The *Essential Standards* and its clarifying objectives were written using the framework *A Taxonomy for Learning, Teaching, and Assessing—A Revision of Bloom's Taxonomy of Educational Objectives (RBT)*.
- The unifying concepts within each set of essential standards provide a context for teaching both science content and scientific-process skill goals.

- The *Essential Standards* for Science for Grades 5 and 8 were written to include content from each of the three branches of science: Life Science (L), Earth Science (E), and Physical Science (P). The unifying concepts for Grades 5 and 8 include:
 - Forces and Motion;
 - Matter: Properties and Change;
 - Energy: Conservation and Transfer;
 - Earth Systems, Structures and Processes;
 - Earth History;
 - Structures and Functions of Living Organisms;
 - Ecosystems;
 - Evolution and Genetics; and
 - Molecular Biology.

- The *Essential Standards* for Biology were written to provide a deeper understanding of the life science content learned throughout Grades K–8. The unifying concepts for Biology include:
 - Structure and Function of Living Organisms,
 - Ecosystems,
 - Evolution and Genetics, and
 - Molecular Biology.

Prioritization of Standards

The North Carolina Department of Public Instruction invited teachers to collaborate and develop recommendations for a prioritization of the standards indicating the relative importance of each standard, the anticipated instructional time, and the appropriateness of the standard for a multiple-choice item format. Subsequently, curriculum and test development staff from the North Carolina Department of Public Instruction met to review the results from the teacher panels and to develop weight distributions across the domains for each grade level. See Tables 1–3.

Table 1: Weight Distributions for Grade 5 Science

Unifying Concept	Grade 5 Science
Forces and Motion	13–15%
Matter: Properties and Change	12–14%
Energy: Conservation and Transfer	11–13%
Earth Systems, Structures and Processes	15–17%
Structures and Functions of Living Organisms	14–16%
Ecosystems	14–16%
Evolution and Genetics	13–15%
Total	100%

Table 2: Weight Distributions for Grade 8 Science

Unifying Concept	Grade 8 Science
Matter: Properties and Change	14–16%
Energy Conservation and Transfer	10–12%
Earth Systems, Structures and Processes	13–15%
Earth History	11–13%
Structure and Function of Living Organisms	19–23%
Ecosystems	9–11%
Evolution and Genetics	11–13%
Molecular Biology	8–10%
Total	100%

Table 3: Weight Distributions for Biology

Unifying Concept	Biology
Structure and Function of Living Organisms	18–22%
Ecosystems	18–22%
Evolution and Genetics	43–53%
Molecular Biology	15–19%
Total	100%

Cognitive Rigor and Item Complexity

Assessment items will be designed, developed, and classified to ensure that the cognitive rigor of the operational test forms align to the cognitive complexity and demands of the North Carolina *Essential Standards* for Science. These items will require students to not only recall information, but also apply concepts and skills and make decisions.

Types of Items

- The Grades 5 and 8 science and High School Biology assessments will consist of four-response-option multiple-choice items and technology-enhanced items (online administration only). All items will be worth one point each.
- The Grade 8 End-of-Grade (EOG) Science assessment requires access to a periodic table of the elements. It can be downloaded at <http://www.ncpublicschools.org/accountability/testing/releasedforms>.
- The *NCEXTENDI* alternate assessments for science will consist of fifteen performance-based, multiple choice items. All items will be worth one point each.
- Appendices A-C show the number of operational items for each clarifying objective administered on assessments. Note that future coverage of standards could vary within the constraints of the content category weights in *Tables 1-3*.

Delivery Mode

- Grades 5 and 8 science assessments will be designed for an online administration but will also be available in a paper-and-pencil format.
- The High School Biology assessment will be designed for an online administration but will also be available in a paper-and-pencil format.
- *NCEXTENDI* is an alternate assessment designed for students with significant cognitive disabilities whose IEP specifies an assessment aligned to the Extended Content Standards and based on alternate academic achievement standards. The *NCEXTENDI* assessments will be designed for paper/pencil administrations with online data entry by the assessor. The Extended Content Standards may be reviewed at <http://www.ncpublicschools.org/acre/standards/extended/>.
- End-of-grade and end-of-course assessments are only provided in English. Native language translation versions are not available.

Appendix A
Grade 5 Science
Number of Operational Items by Clarifying Objective

The following table shows the number of operational items for each clarifying objective. Note that future coverage of objectives could vary within the constraints of the content category weights in *Tables 1-3*. Some objectives not designated with tested items (i.e., “–”) may be a prerequisite standard, may be tested within the context of another standard or may be included as an embedded field test item. The objectives for may be reviewed at <http://www.ncpublicschools.org/acre/standards/new-standards/>.

Grade 5 Science	Number of Operational Items Per Objective*
Forces and Motion	
5.P.1.1	3-4
5.P.1.2	3-4
5.P.1.3	0-1
5.P.1.4	0-1
Matter: Properties and Change	
5.P.2.1	4-6
5.P.2.2	1
5.P.2.3	2-3
Energy: Conservation and Transfer	
5.P.3.1	2-4
5.P.3.2	2-3
Earth Systems, Structures and Processes	
5.E.1.1	2
5.E.1.2	3
5.E.1.3	5
Structures and Functions of Living Organisms	
5.L.1.1	4-5
5.L.1.2	5-6
Ecosystems	
5.L.2.1	1-2
5.L.2.2	3-4
5.L.2.3	5
Evolution and Genetics	
5.L.3.1	2-4
5.L.3.2	4-5

* Some objectives not designated with tested items (i.e., “–”) may be a prerequisite standard, may be tested within the context of another standard or may be included as an embedded field test item.

Appendix B
Grade 8 Science
Number of Operational Items by Clarifying Objective

The following table shows the number of operational items for each clarifying objective. Note that future coverage of objectives could vary within the constraints of the content category weights in *Tables 1-3*. Some objectives not designated with tested items (i.e., “–”) may be a prerequisite objective, may be tested within the context of another objective or may be included as an embedded field test item. The objectives for may be reviewed at <http://www.ncpublicschools.org/acre/standards/new-standards/>.

Grade 8 Science	Number of Operational Items Per Objective*
Matter: Properties and Change	
8.P.1.1	2
8.P.1.2	3
8.P.1.3	2
8.P.1.4	3
Energy: Conservation and Transfer	
8.P.2.1	3
8.P.2.2	3
Earth Systems, Structures and Processes	
8.E.1.1	3
8.E.1.2	2
8.E.1.3	2-3
8.E.1.4	0-1
Earth History	
8.E.2.1	3
8.E.2.2	4
Structures and Functions of Living Organisms	
8.L.1.1	3-4
8.L.1.2	1-2
8.L.2.1	6
Ecosystems	
8.L.3.1	1
8.L.3.2	2-3
8.L.3.3	2-3
Evolution and Genetics	
8.L.4.1	4
8.L.4.2	4
Molecular Biology	
8.L.5.1	2
8.L.5.2	2

* Some objectives not designated with tested items (i.e., “–”) may be a prerequisite standard, may be tested within the context of another standard or may be included as an embedded field test item.

**Appendix C
Biology**

Number of Operational Items by Clarifying Objective

The following table shows the number of operational items for each clarifying objective. Note that future coverage of objectives could vary within the constraints of the content category weights in *Tables 1-3*. Some objectives not designated with tested items (i.e., “–”) may be a prerequisite standard, may be tested within the context of another standard or may be included as an embedded field test item. The objectives for may be reviewed at <http://www.ncpublicschools.org/acre/standards/new-standards/>.

Biology	Number of Operational Items Per Objective*
Structure and Functions of Living Organisms	
1.1.1	2
1.1.2	1-2
1.1.3	3
1.2.1	2
1.2.2	3
1.2.3	1
Ecosystems	
2.1.1	1
2.1.2	1-2
2.1.3	2-3
2.1.4	1
2.2.1	2-3
2.2.2	3-4
Evolution and Genetics	
3.1.1	3
3.1.2	1-2
3.1.3	1
3.2.1	1-2
3.2.2	1
3.2.3	3-4
3.3.1	3
3.3.2	2
3.3.3	–
3.4.1	2
3.4.2	3
3.4.3	1
3.5.1	2
3.5.2	2

Biology	Number of Operational Items Per Objective*
Molecular Biology	
4.1.1	2
4.1.2	2
4.1.3	1
4.2.1	2
4.2.2	2

* Some objectives not designated with tested items (i.e., “–”) may be a prerequisite standard, may be tested within the context of another standard or may be included as an embedded field test item.