

# North Carolina End-of-Course Tests

## Physical Science

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*What are the purposes of the NC Testing Program?*

The North Carolina End-of-Course Tests are required by General Statute 115C-174.10 as a component of the North Carolina Annual Testing Program. As stated, the purposes of North Carolina state-mandated tests are “(i) to assure that all high school graduates possess those minimum skills and that knowledge thought necessary to function as a member of society; (ii) to provide a means of identifying strengths and weaknesses in the education process in order to improve instructional delivery; and (iii) to establish additional means for making the education system at the State, local, and school levels accountable to the public for results.”

For school, school system, and state accountability, prediction formulas (first used in 2000-2001) are used to determine growth expectations for end-of-course tests. The prediction formula is used to determine a student’s performance (average scores) on the North Carolina EOG or EOC tests, which serve as predictors of the same students’ performance in the EOC course where they are currently enrolled.

*What is measured by the test?*

The North Carolina End-of-Course Test of Physical Science assesses the physical science curriculum of the 1999 North Carolina *Standard Course of Study* for science. On the test, students are expected to demonstrate knowledge of important principles and concepts, understand and interpret laboratory activities, and relate scientific information to everyday situations. In order to align with the curriculum’s focus on inquiry instruction and higher order thinking, the revised physical science test has an increased focus on processing information, understanding the relationship between science and technology, and scientific concepts.

Each item on the physical science test is related to one of the physical science content objectives in the North Carolina *Standard Course of Study* for science. The content objectives (goals 1 through 6) describe the knowledge and skills that are to be taught in all physical science classes in North Carolina and provide the basis for the content of the items on the tests. Many of the items in this revision of the physical science test assess whether a student can move beyond memorization and apply process skills to the investigation of science. The physical science testing materials include reference tables containing the periodic table and common formulas that students will have access to when taking the test. A copy of the reference tables can be obtained from the NCDPI Web site at [www.ncpublicschools.org/accountability/testing/eoc](http://www.ncpublicschools.org/accountability/testing/eoc). Additional information about the content of the objectives can be obtained from the NCDPI Web site at <http://www.ncpublicschools.org/curriculum/science/scos/1999/physicalscience/>.

Table 1. Descriptive Information for the North Carolina Test of Physical Science

Goal	Description of Goal	Percentage of Items on Test
1	The learner will construct an understanding of mechanics.	19%
2	The learner will build an understanding of thermal energy.	9%
3	The learner will construct and understanding of electricity and magnetism.	14%
4	The learner will develop an understanding of wave motion and the wave nature of sound and light.	6%
5	The learner will build an understanding of the structure and properties of matter.	21%
6	The learner will build an understanding of regularities in chemistry.	31%

*How is the test administered?*

The North Carolina End-of-Course Test of Physical Science consists of 86 multiple-choice questions administered during a fixed block of time within the last week (block schedule or summer school) or the last two weeks (traditional schedule) of the course. Three equivalent forms are administered in each classroom to provide a breadth of information for curriculum evaluation and planning.

*How was the test developed?*

The questions on the physical science test were written and reviewed by trained North Carolina teachers and educators during the 1999-2000 school year. The questions were field tested in the first and second semesters of the 2000-2001 school year. The field test involved approximately 11,500 students from randomly selected schools across the state. The revised physical science test was implemented statewide for the first time in the fall of the 2001-2002 school year.

*What kinds of scores do students receive on the test?*

Results of the physical science test are reported as scale scores and achievement levels. The scale used was designed to have a range of 20 to 80 with a mean of 50 and a standard deviation of 10. The use of scale scores provides for easier and more consistent interpretations of the results from test to test. The use of achievement levels provides an interpretation of student performance relative to a pre-determined standard. The four achievement levels are typically established by linking teacher judgments to the performance distribution of student scores from the field test or the first operational administration of the test.

Table 2. Achievement Levels for the North Carolina Test of Physical Science

Level	Scale Scores	Description
1	23-43	Students performing at Level 1 do not have sufficient mastery of physical science concepts. They have minimal understanding of: mechanics; energy; electricity and magnetism; wave motion and the nature of sound and light; structure and properties of matter; and regularities in chemistry.
2	44-53	Students performing at Level 2 demonstrate inconsistent mastery of physical science concepts. They have limited understanding of: mechanics; energy; electricity and magnetism; wave motion and the nature of sound and light; structure and properties of matter; and regularities in chemistry.
3	54-63	Students performing at Level 3 demonstrate mastery of physical science concepts and are prepared for more advanced science courses. They have an adequate understanding of: mechanics; energy; electricity and magnetism; wave motion and the nature of sound and light; structure and properties of matter; and regularities in chemistry.
4	64-87	Students performing at Level 4 demonstrate superior understanding of physical science concepts and are very well prepared for more advanced science courses. They have an advanced level of understanding of: mechanics; energy; electricity and magnetism; wave motion and the nature of sound and light; structure and properties of matter; and regularities in chemistry.

*Who takes the NC EOC in physical science?*

Students enrolled in physical science for credit regardless of the grade level of the student shall take the EOC test. Students who are repeating the course for credit shall take the EOC test. Students enrolled for physical science credit in a similar course, honors course, International Baccalaureate (IB) course, or Principals of Technology I shall take the EOC test in physical science. Even if a local system exempts students from final exams, the student must take the EOC test and by state law beginning with the 2001–2002 school year, it shall count as 25% of the student’s grade.

*Sample Items*

The items on the following pages are samples of the types of items that appear on the North Carolina End-of-Course Test of Physical Science. The objective indicates the curriculum objective the item is designed to assess. The thinking skill corresponds to the level of thinking the item requires as defined by a thinking skills framework adapted from *Dimensions of Thinking* by Robert J. Marzano and others. For more information about the thinking skills framework used with the end-of-course tests, please read *Understanding North Carolina Tests: Thinking Skill Level*, found on the NCDPI Web site at [http://www.ncpublicschools.org/docs/accountability/testing/eog/asb\\_thkskl.pdf](http://www.ncpublicschools.org/docs/accountability/testing/eog/asb_thkskl.pdf).

The number represents the proportion of students who selected the correct answer when the item indicated by **p** was field tested.

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1. Objective: 1.01

Thinking Skill: Applying

(p=.389)

According to the table, which time interval has the ***greatest*** acceleration?

<b>Time</b> (seconds)	<b>MPH</b>
0	0
5	10
10	20
15	40
20	55

- A 0 to 5 seconds
- B 5 to 10 seconds
- \* C 10 to 15 seconds
- D 15 to 20 seconds

2. Objective: 3.02

Thinking Skill: Knowledge

(p=.556)

What is true of a neutral object that has been charged by contact with a negative object?

- A It remains neutral.
- \* B It becomes negative.
- C It becomes positive.
- D It becomes uncharged.

3. Objective: 3.03

Thinking Skill: Applying

(p=.479)

If a 2.0-A current flows through a light bulb whose resistance is 6.0 ohms, what potential difference is needed?

- A 3.0 V
- \* B 12 V
- C 18 V
- D 120 V

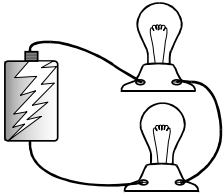
4. Objective: 3.03

Thinking Skill: Applying

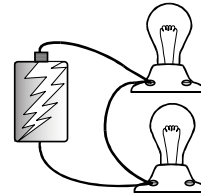
(p=.254)

Which diagram represents a parallel circuit?

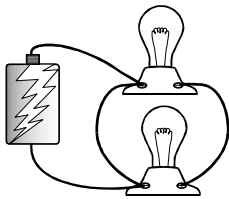
A



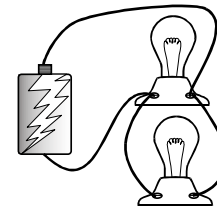
B



C



\* D



5. Objective: 3.05

Thinking Skill: Applying

(p=.797)

If the north poles of two strong magnets are placed close together, what will the magnets do?

A come together

B turn around

\* C push apart

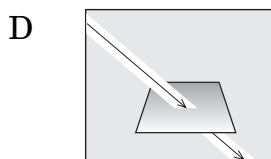
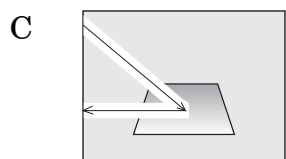
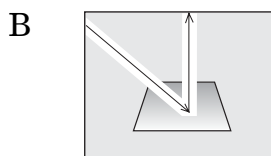
D stay as placed

6. Objective: 4.02

Thinking Skill: Analyzing

(p=.683)

Which picture shows the path of a beam of light as it strikes a mirror?



7. Objective: 5.05

Thinking Skill: Organizing

(p=.235)

Aluminum oxide is formed when atoms of aluminum and oxygen combine. What is the correct chemical formula for this compound?

A AlO

B  $\text{Al}_2\text{O}_2$

C  $\text{Al}_3\text{O}_2$

\* D  $\text{Al}_2\text{O}_3$

8. Objective: 5.06

Thinking Skill: Knowledge

(p=.332)

What property causes halogens to be very reactive elements?

A They have a full outer shell.

\* B They have an oxidation number of 1.

C They are radioactive.

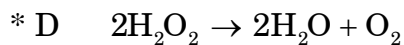
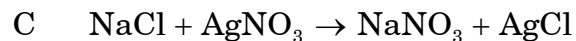
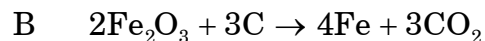
D They are all gases.

9. Objective: 6.02

Thinking Skill: Knowledge

(p=.520)

Which of the following represents a decomposition reaction?

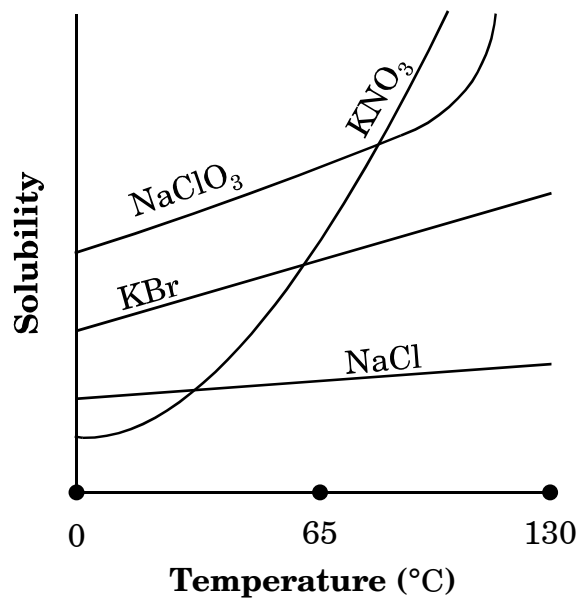


10. Objective: 6.04

Thinking Skill: Analyzing

(p=.462)

Which compound has the **greatest** solubility at 65°C?



A NaCl

B KBr

C KNO<sub>3</sub>

\* D NaClO<sub>3</sub>