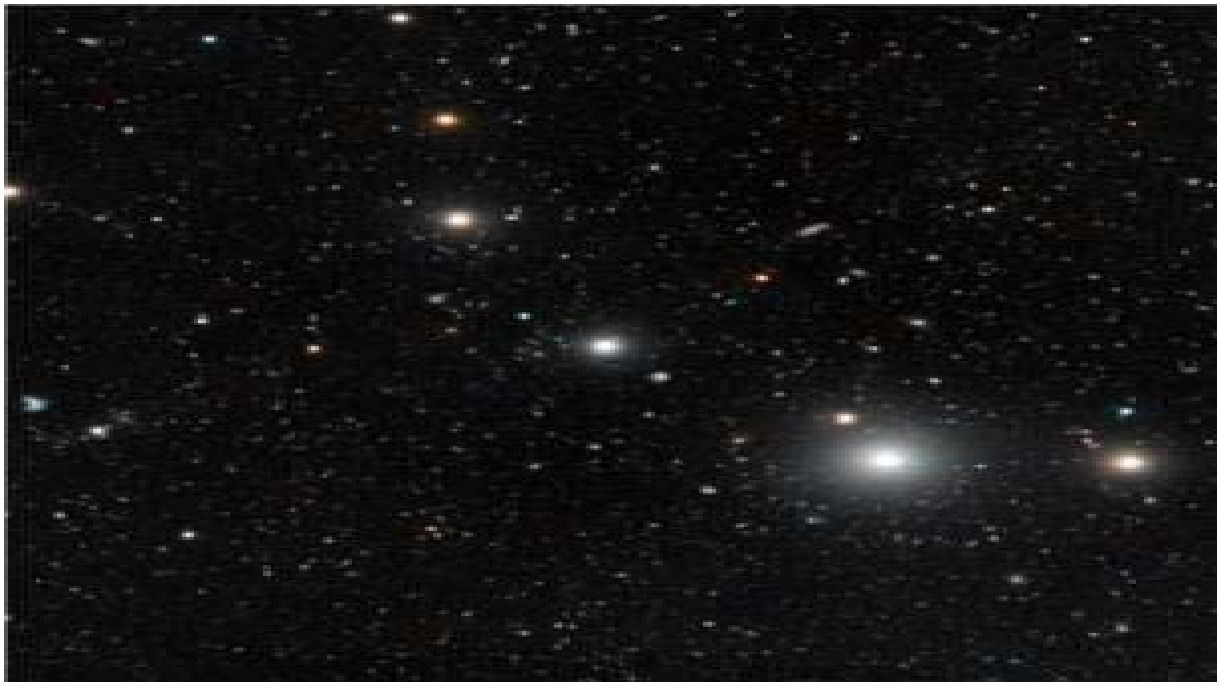
NAEP
FLORIDA
NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS

Grade 12 Science

Answer Key



This booklet contains the answers to the sample items from the National Assessment of Educational Progress (NAEP) included in the NAEP Grade 12 Science Sample Questions Booklet. It also references the corresponding Grade 12 Next Generation Sunshine State Standards (NGSSS). Additional NAEP items can be accessed at www.nces.ed.gov/nationsreportcard/itmrls.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics (NCES), National Assessment of Educational Progress (NAEP).

This answer booklet and the corresponding Grade 12 Science Sample Questions Booklet are posted at http://www.fldoe.org/asp/naep/naep-pt.asp.

NAEP GRADE 12 SCIENCE ANSWER KEY

CONTENTS

Florida's Science Next Generation Sunshine State Standards (NGSSS)

L = Life Science
P = Physical Science
E = Earth and Space Science
N = Nature of Science

GRADE 12 SCIENCE
Alignment to Florida's Next Generation Sunshine State Standards (NGSSS) and Answers to NAEP Sample Questions

NAEP GRADE 12 EARTH AND SPACE SCIENCE

Question 1, NGSSS.SC.912.L.17.10, NGSSS.SC.912.E.7.1, and NGSSS.SC.912.E.7.9

Description: Identify a portion of Earth's carbon cycle driven by an internal energy source
Difficulty: Easy
Science Practices: Identifying Science Principles

Correct answer is **C**

National Data

Answers	Percent chosen by the Nation's participating students
Correct	60%
Incorrect	39%
Omitted	1%

Question 2, NGSSS. SC.912.L.17.10, NGSSS.912.E.7.1, and NGSSS. SC.912.E.7.9

Description: Identify a portion of Earth's carbon cycle driven by an external energy source
Difficulty: Medium
Science Practices: Identifying Science Principles

Correct answer is **D**

National Data

Answers	Percent chosen by the Nation's participating students
Correct	48%
Incorrect	51%
Omitted	1%

Question 3, NGSSS. SC.912.E.6.3

Description: Indicate geologic event that explains rock formation
Difficulty: Easy
Science Practices: Using Science Principles

Correct answer is **D**

National Data

Answers	Percent chosen by the Nation's participating students
Correct	69%
Incorrect	30%

Question 4, NGSSS. SC.912.P.10.11

Description: Compare methods for determining the age of Earth
Difficulty: Medium
Science Practices: Using Science Principles

Correct answer is **A**

National Data

Answers	Percent chosen by the Nation's participating students
Correct	48%
Incorrect	51%
Omitted	1%

Question 5, NGSSS. SC.912.P.10.18

Description: Analyze emission spectra to determine elements present in a star
Difficulty: Medium
Science Practices: Using Science Principles

Correct answer is **C**

National Data

Answers	Percent chosen by the Nation's participating students
Correct	57%
Incorrect	43%

Question 6, NGSSS. SC.8.E.5.3

Description: Identify a property of galaxies
Difficulty: Medium
Science Practices: Identifying Science Principles

Correct answer is **C**

National Data

Answers	Percent chosen by the Nation's participating students
Correct	42%
Incorrect	58%
Omitted	1%

Question 7, NGSSS. SC.912.L.17.11

Description: Identify how fossil fuels form
Difficulty: Medium
Science Practices: Identifying Science Principles

Correct answer is **C**

National Data

Answers	Percent chosen by the Nation's participating students
Correct	54%
Incorrect	45%
Omitted	1%

Question 8, NGSSS. SC.912.L.17.16

Description: Explain alternative hypothesis about the effect of emissions released into atmosphere
Difficulty: Hard
Science Practices: Using Science Principles

Score & Description

Complete
Student response indicates that the solid particles in the atmosphere block incoming solar radiation so Earth is heated less.

Question 8, continued

Partial
Student response indicates that the solid particles in the atmosphere block incoming solar radiation.
OR
Student response indicates that the solid particles in the atmosphere cause less heat to reach Earth.

Unsatisfactory/Incorrect
Student response is inadequate or incorrect.

National Data

Answers	Percent chosen by the Nation's participating students
Complete	17%
Partial	17%
Unsatisfactory/Incorrect	42%
Off task	2%
Omitted	22%

Question 9, NGSSS. SC.912.L.17.16 and NGSSS. SC.912.L.17.18

Description: Compare methods of removing soil contamination
Difficulty: Hard
Science Practices: Using Technological Design

Score and Description:

This item was scored in 3 parts.
Part A: Advantage and disadvantage of removing the soil
Part B: Advantage and disadvantage of washing the soil
Part C: Advantage and disadvantage of growing mustard plants in the soil

Part A:

Complete
Student response identifies one correct environmental advantage and one correct environmental disadvantage of removing the soil.

Partial
Student response identifies either one correct environmental advantage or one correct environmental disadvantage.

Unsatisfactory/Incorrect
Student response is inadequate or incorrect.

Question 9, continued

Part B:

Complete

Student response identifies one correct environmental advantage and one correct environmental disadvantage of washing the soil.

Partial

Student response identifies either one correct environmental advantage or one correct environmental disadvantage.

Unsatisfactory/Incorrect

Student response is inadequate or incorrect.

Part C:

Complete

Student response identifies one correct environmental advantage and one correct environmental disadvantage of growing mustard plants in the soil.

Partial

Student response identifies either one correct environmental advantage or one correct environmental disadvantage.

Unsatisfactory/Incorrect

Student response is inadequate or incorrect.

Question 9, continued

Composite Score:

Student response received one of five possible composite scores (Complete, Satisfactory, Essential, Partial, Unsatisfactory/Incorrect) based on the student's combined performance on Parts A, B, and C of the item. For example, a student response Complete for Part A, Complete for Part B, and Partial for Part C received a composite score of Satisfactory.

Composite Score	Part A	Part B	Part C
Complete	Complete	Complete	Complete
Satisfactory	Complete	Complete	Partial
	Complete	Partial	Complete
	Partial	Complete	Complete
Essential	Complete	Partial	Partial
	Partial	Complete	Partial
	Partial	Partial	Complete
	Complete	Complete	Unsatisfactory/Incorrect
	Complete	Unsatisfactory/Incorrect	Complete
	Unsatisfactory/Incorrect	Complete	Complete
	Partial	Partial	Partial
	Complete	Partial	Unsatisfactory/Incorrect
	Partial	Complete	Unsatisfactory/Incorrect
	Complete	Unsatisfactory/Incorrect	Partial
	Partial	Unsatisfactory/Incorrect	Complete
	Unsatisfactory/Incorrect	Complete	Partial
	Unsatisfactory/Incorrect	Partial	Complete
Partial	Partial	Partial	Unsatisfactory/Incorrect
	Partial	Unsatisfactory/Incorrect	Partial
	Unsatisfactory/Incorrect	Partial	Partial
	Complete	Unsatisfactory/Incorrect	Unsatisfactory/Incorrect
	Unsatisfactory/Incorrect	Complete	Unsatisfactory/Incorrect
	Unsatisfactory/Incorrect	Unsatisfactory/Incorrect	Complete
	Partial	Unsatisfactory/Incorrect	Unsatisfactory/Incorrect
	Unsatisfactory/Incorrect	Partial	Unsatisfactory/Incorrect
	Unsatisfactory/Incorrect	Unsatisfactory/Incorrect	Partial
Unsatisfactory/Incorrect	Unsatisfactory/Incorrect	Unsatisfactory/Incorrect	Unsatisfactory/Incorrect

Question 9, continued

National Data

Composite

Answers	Percent chosen by the Nation's participating students
Complete	0%
Satisfactory	2%
Essential	23%
Partial	44%
Unsatisfactory/Incorrect	22%
Off task	1%
Omitted	7%

Part A

Answers	Percent chosen by the Nation's participating students
*Complete	6%
Partial	50%
Unsatisfactory/Incorrect	35%
Off task	1%
Omitted	8%

Part B

Answers	Percent chosen by the Nation's participating students
*Complete	5%
Partial	29%
Unsatisfactory/Incorrect	56%
Off task	1%
Omitted	10%

Part C

Answers	Percent chosen by the Nation's participating students
*Complete	6%
Partial	40%
Unsatisfactory/Incorrect	42%
Off task	1%
Omitted	11%

NAEP GRADE 12 PHYSICAL SCIENCE

Question 1, NGSSS.SC.912.P.8.4

Description: Recognize atomic particles in an ion
Difficulty: Medium
Science Practices: Identifying Science Principles

Correct answer is **C**

National Data

Answers	Percent chosen by the Nation's participating students
Correct	56%
Incorrect	43%
Omitted	1%

Question 2, NGSSS.SC.912.P.12.3

Description: Predict motion when unbalanced forces are applied
Difficulty: Medium
Science Practices: Using Science Principles

Correct answer is **C**

National Data

Answers	Percent chosen by the Nation's participating students
Correct	47%
Incorrect	52%
Omitted	1%

Question 3, NGSSS.SC.912.P.11.1 and NGSSS.SC.912.P.12.3

Description: Relate motion to conversion of kinetic energy to potential energy
Difficulty: Medium
Science Practices: Using Science Principles

Correct answer is **D**

National Data

Answers	Percent chosen by the Nation's participating students
Correct	40%
Incorrect	59%

Question 4, NGSSS.SC.912.P.10.1

Description: Relate motion to conversion of kinetic energy to potential energy
Difficulty: Medium
Science Practices: Using Science Principles

Correct answer is **A**

National Data

Answers	Percent chosen by the Nation's participating students
Correct	44%
Incorrect	55%
Omitted	1%

Question 5, NGSSS.SC.912.L.18.12

Description: Recognize the relationship between solubility and molecular properties
Difficulty: Medium
Science Practices: Identifying Science Principles

Correct answer is **B**

National Data

Answers	Percent chosen by the Nation's participating students
Correct	44%
Incorrect	55%
Omitted	1%

Question 6, NGSSS.SC.912.P.8.2

Description: Recognize the example of a chemical change
Difficulty: Medium
Science Practices: Identifying Science Principles

Correct answer is **C**

National Data

Answers	Percent chosen by the Nation's participating students
Correct	57%
Incorrect	43%

Question 7, NGSSS.SC.912.P.10.11

Description: Describe possible advantages of fusion power compared to fission power
Difficulty: Hard
Science Practices: Using Technological Design

Score & Description

Complete
Student response provides two correct advantages of fusion power plants compared to fission power plants.

Partial
Student response provides one advantage of fusion power plants.

Unsatisfactory/Incorrect
Student response is inadequate or incorrect.

National Data

Answers	Percent chosen by the Nation's participating students
Complete	5%
Partial	16%
Unsatisfactory/Incorrect	41%
Off task	4%
Omitted	34%

Question 8, NGSSS.SC.912.P.12.2 and NGSSS.SC.912.P.12.3

Description: Calculate the acceleration of an object
Difficulty: Hard
Science Practices: Using Technological Design

Score & Description

Complete
Student response consists of four parts:

- shows or describes how to calculate the net force on the object, which is determined from the difference between the opposing forces
- provides the correct answer for the net force on the object, which is 8N
- shows or describes how to calculate the acceleration of the object, which is determined from the net force and mass of the object according to the equation F = ma
- provides the correct answer for the acceleration of the object, which is 4 m/s^2 when the force calculation is done correctly

Question 8, continued

Satisfactory
Student response correctly addresses three parts of a complete response.

Essential
Student response correctly addresses two parts of a complete response.

Partial
Student response correctly addresses one part of a complete response.

Unsatisfactory/Incorrect
Student response is inadequate or incorrect.

National Data

Answers	Percent chosen by the Nation's participating students
Complete	10%
Satisfactory	2%
Essential	21%
Partial	5%
Unsatisfactory/Incorrect	32%
Off task	4%
Omitted	26%

Question 9, NGSSS.SC.8.P.8.4 and NGSSS.SC.912.P.10.4

Description: Compare the thermal energy released when cooling
Difficulty: Hard
Science Practices: Using Science Principles

Score & Description

Complete
Student response selects (B) Cup *B* and correctly explains that the amount of thermal energy released depends on the mass of the material and its change in temperature. Response demonstrates understanding that since the temperature change is the same in both cups of water, Cup *B,* with the greater mass, releases more thermal energy.

Essential
Student response selects (B) with an explanation that relates the amount of thermal energy released to the greater mass of water in Cup *B*.

Question 9, continued

Partial
Student response selects (B) with no explanation.
OR
Student response selects (A) or (C) but provides an explanation that relates the amount of thermal energy released to the greater mass of water in Cup *B.*

Unsatisfactory/Incorrect
Student response is inadequate or incorrect.

National Data

Answers	Percent chosen by the Nation's participating students
Complete	5%
Essential	36%
Partial	4%
Unsatisfactory/Incorrect	52%
Omitted	2%%

Question 10, NGSSS.SC.3.P.9.1, NGSSS.SC.5.E.7.2, and NGSSS.SC.8.P.8.5

Description: Relate rate of evaporation to boiling point and molecular motion
Difficulty: Hard
Science Practices: Using Science Principles

Score & Description

Complete
Student response consists of four parts:

- indicates that some of the liquid in each beaker has evaporated
- indicates that Liquid *B* has the lower boiling point
- relates the lower boiling point to greater evaporation of Liquid *B* or to less thermal energy required to change Liquid *B* to gas
- relates the lower boiling point to the weaker attraction among the molecules of Liquid *B*

Question 10, continued

Satisfactory
Student response indicates that some of the liquid in each beaker has evaporated. Response identifies that Liquid *B* has the lower boiling point, and it correctly relates the lower boiling point to the relative evaporation of Liquids *A* and *B* to the amount of thermal energy required to change Liquid *B* to a gas or to the attraction among the molecules.
OR
Student response indicates that some of the liquid in each beaker has evaporated. Response incorrectly selects (A) Liquid *A*, but it correctly relates the lower boiling point either to the relative evaporation of Liquids *A* and *B* or to the smaller amount of thermal energy required to change Liquid *B* to a gas. Response also correctly relates the lower boiling point to the weaker molecular attraction among the molecules of Liquid *B* supporting choice (B).

Essential
Student response indicates that some of the liquid in each beaker has evaporated. Response incorrectly selects (A) Liquid *A*, but it correctly relates the lower boiling temperature to the relative evaporation of Liquids *A* and *B* or to the smaller amount of thermal energy required to change Liquid *B* to a gas or to the weaker attraction among the molecules of Liquid *B*.
OR
Student response identifies that Liquid *B* has the lower boiling point, and it correctly relates the lower boiling point to the relative reduction in volumes of Liquids *A* and *B* to the smaller amount of thermal energy required to change the state of Liquid *B* or to the weaker attraction among the molecules of Liquid *B*.

Partial
Student response indicates that some of the liquid in each beaker has evaporated.
OR
Student response correctly relates the lower boiling point to the relative evaporation of Liquids *A* and *B* to the smaller amount of thermal energy required to change Liquid *B* to a gas or to the weaker attraction among the molecules of Liquid *B*.

Unsatisfactory/Incorrect
Student response is inadequate or incorrect.

National Data

Answers	Percent chosen by the Nation's participating students
Complete	7%
Satisfactory	30%
Essential	3%
Partial	46%
Unsatisfactory/Incorrect	14%
Omitted	1%%

NAEP GRADE 12 LIFE SCIENCE

Question 1, NGSSS. SC.912.L.15.1 and NGSSS.912.L.15.2

Description: Determine relationships between species based on evolutionary tree
Difficulty: Easy
Science Practices: Using Science Principles

Correct answer is **D**

National Data

Answers	Percent chosen by the Nation's participating students
Correct	73%
Incorrect	26%
Omitted	1%

Question 2, NGSSS. SC.912.L.15.1 and NGSSS. SC.912.L.15.2

Description: Identify information used to determine evolutionary relationship
Difficulty: Medium
Science Practices: Identifying Science Principles

Correct answer is **A**

National Data

Answers	Percent chosen by the Nation's participating students
Correct	54%
Incorrect	45%
Omitted	1%

Question 3, NGSSS. SC.6.P.11.1 and NGSSS. SC.912.L.15.2

Description: Design experiment to test hypothesis about relatedness of species
Difficulty: Hard
Science Practices: Using Science Principles

Score & Description

Complete
Student response describes the type of data to be collected and indicates that these data need to be collected from both species and compared.

Partial
Student response describes the type of data to be collected.
OR
Student response indicates that these data need to be collected from both species and compared.

Unsatisfactory/Incorrect
Student response is inadequate or incorrect.

National Data

Answers	Percent chosen by the Nation's participating students
Complete	17%
Partial	21%
Unsatisfactory/Incorrect	51%
Off task	1%
Omitted	9%

Question 4, NGSSS. SC.912.L.16.17

Description: Identify a characteristic of sexual reproduction
Difficulty: Easy
Science Practices: Identifying Science Principles

Correct answer is **A**

National Data

Answers	Percent chosen by the Nation's participating students
Correct	70%
Incorrect	30%

Question 5, NGSSS. SC.912.N.1.1

Description: Draw conclusion about population growth based on data
Difficulty: Easy
Science Practices: Using Science Principles

Correct answer is **B**

National Data

Answers	Percent chosen by the Nation's participating students
Correct	81%
Incorrect	19%

Question 6, NGSSS. SC.912.N.1.1

Description: Relate patterns in data to cellular processes
Difficulty: Hard
Science Practices: Using Scientific Inquiry

Score & Description:

This item was scored in 2 parts.
Part A: Between hours 6 and 12
Part B: Between hours 16 and 24

Part A:

Complete
Student response provides a complete explanation as to why the growth rate of the bacteria changed as it did during the period between hours 6 and 12. The response indicates what happened to the growth rate and explains a change in the environmental conditions that results in the change.

Partial
Student response provides an explanation that either indicates what happened to the growth rate or explains a change in the environmental conditions that results in the change.
OR
Student response indicates that the population number is slowing down or maintaining the same level and explains that this is due to an environmental change.

Unsatisfactory/Incorrect
Student response is inadequate or incorrect.

Question 6, continued
Part B:

Complete
Student response provides a complete explanation as to why the growth rate of the bacteria changed as it did during the period between hours 16 and 24. The response indicates what happened to the growth rate, including that bacterial cells are dying, and explains a change in the environmental conditions that results in the change.

Partial
Student response provides an explanation that either indicates what happened to the growth rate, indicates that bacterial cells are dying, or explains a change in the environmental conditions that results in the change.
OR
Student response indicates that the population number is decreasing and explains that this is due to an environmental change.

Unsatisfactory/Incorrect
Student response is inadequate or incorrect.

Composite Score:
Student response received one of four possible composite scores (Complete, Essential, Partial, Unsatisfactory/Incorrect) based on the student's combined performance on Parts A and B of the item. For example, a student response Complete for Part A and Partial for Part B received a composite score of Essential.

Composite Score	Part A	Part B
Complete	Complete	Complete
Essential	Complete	Partial
	Partial	Complete
	Partial	Partial
	Complete	Unsatisfactory/Incorrect
	Unsatisfactory/Incorrect	Complete
Partial	Partial	Unsatisfactory/Incomplete
	Unsatisfactory/Incomplete	Partial
Unsatisfactory/Incomplete	Unsatisfactory/Incomplete	Unsatisfactory/Incomplete

Question 6, continued

National Data

Composite

Answers	Percent chosen by the Nation's participating students
Complete	0%
Essential	22%
Partial	39%
Unsatisfactory/Incorrect	24%
Off task	2%
Omitted	12%

Part A

Answers	Percent chosen by the Nation's participating students
Complete	3%
Partial	22%
Unsatisfactory/Incorrect	59%
Off task	3%
Omitted	14%

Part B

Answers	Percent chosen by the Nation's participating students
Complete	1%
Partial	58%
Unsatisfactory/Incorrect	26%
Off task	2%
Omitted	13%

Question 7, NGSSS. SC.912.N.1.1

Description: Relate evidence to natural selection
Difficulty: Hard
Science Practices: Using Science Principles

Score & Description

Complete
Student response correctly explains that some of the bacteria resistant to the antibiotic had a genetic mutation. The resistant bacteria divided passing the genetic mutation to the next generation.

Partial
Student response indicates that some of the bacteria resistant to the antibiotic had a genetic mutation.
OR
Student response indicates that the resistant bacteria divided, passing the genetic mutation to the next generation.

Unsatisfactory/Incorrect
Student response is inadequate or incorrect.

National Data

Answers	Percent chosen by the Nation's participating students
Complete	4%
Partial	17%
Unsatisfactory/Incorrect	66%
Off task	3%
Omitted	11%

Question 8, NGSSS. SC.912.L.15.1

Description: Relate anatomical structure to habitat
Difficulty: Easy
Science Practices: Using Science Principles

Correct answer is **D**

National Data

Answers	Percent chosen by the Nation's participating students
Correct	73%
Incorrect	26%

Question 9, NGSSS.SC.912.L.15.1

Description: Explain variations in development of anatomical features
Difficulty: Hard
Science Practices: Using Science Principles

Correct answer is **A**

National Data

Answers	Percent chosen by the Nation's participating students
Correct	20%
Incorrect	79%
Omitted	1%

Question 10, NGSSS.SC.6.L.14.1

Description: Order levels of organization in living systems
Difficulty: Medium
Science Practices: Identifying Science Principles

Correct answer is **A**

National Data

Answers	Percent chosen by the Nation's participating students
Correct	41%
Incorrect	58%
Omitted	1%