

Washington Comprehensive Assessment of Science

Test Design & Item Specifications Grade 8

Science Assessment Development Team

February 5, 2020



Washington Office of Superintendent of
PUBLIC INSTRUCTION

Logistics

- Webinar Recording, PowerPoint slides and FAQ

<https://www.k12.wa.us/student-success/testing/state-testing-overview/washington-comprehensive-assessment-science/wcas-educator-resources>

- Chat Box
- pdEnroller

<https://www.pdenroller.org>



Objectives

- Share the design and development of the Grade 8 WCAS
- Share how Grade 8 WCAS items are aligned to and assess the *2013 Washington State K-12 Science Learning Standards* which are the *Next Generation Science Standards*, or *NGSS*.

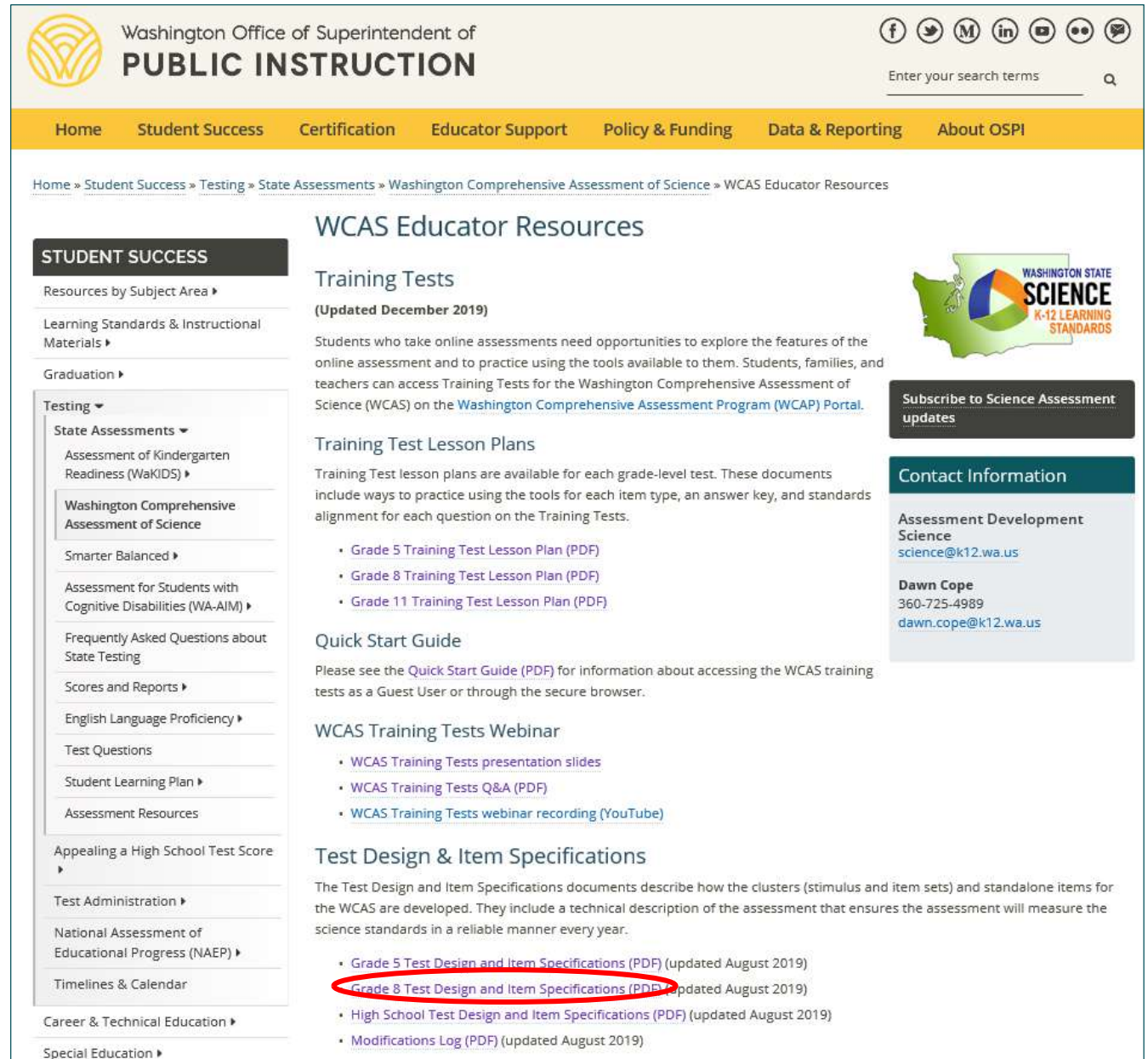
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Test Design and Item Specifications-Grade 8

<https://www.k12.wa.us/student-success/testing/state-testing-overview/washington-comprehensive-assessment-science/wcas-educator-resources>



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- Special Education ▶

WCAS Educator Resources

Training Tests

(Updated December 2019)

Students who take online assessments need opportunities to explore the features of the online assessment and to practice using the tools available to them. Students, families, and teachers can access Training Tests for the Washington Comprehensive Assessment of Science (WCAS) on the [Washington Comprehensive Assessment Program \(WCAP\) Portal](#).

Training Test Lesson Plans

Training Test lesson plans are available for each grade-level test. These documents include ways to practice using the tools for each item type, an answer key, and standards alignment for each question on the Training Tests.

- Grade 5 Training Test Lesson Plan (PDF)
- Grade 8 Training Test Lesson Plan (PDF)
- Grade 11 Training Test Lesson Plan (PDF)

Quick Start Guide

Please see the [Quick Start Guide \(PDF\)](#) for information about accessing the WCAS training tests as a Guest User or through the secure browser.

WCAS Training Tests Webinar

- WCAS Training Tests presentation slides
- WCAS Training Tests Q&A (PDF)
- WCAS Training Tests webinar recording (YouTube)

Test Design & Item Specifications

The Test Design and Item Specifications documents describe how the clusters (stimulus and item sets) and standalone items for the WCAS are developed. They include a technical description of the assessment that ensures the assessment will measure the science standards in a reliable manner every year.

- Grade 5 Test Design and Item Specifications (PDF) (updated August 2019)
- Grade 8 Test Design and Item Specifications (PDF) (updated August 2019)**
- High School Test Design and Item Specifications (PDF) (updated August 2019)
- Modifications Log (PDF) (updated August 2019)

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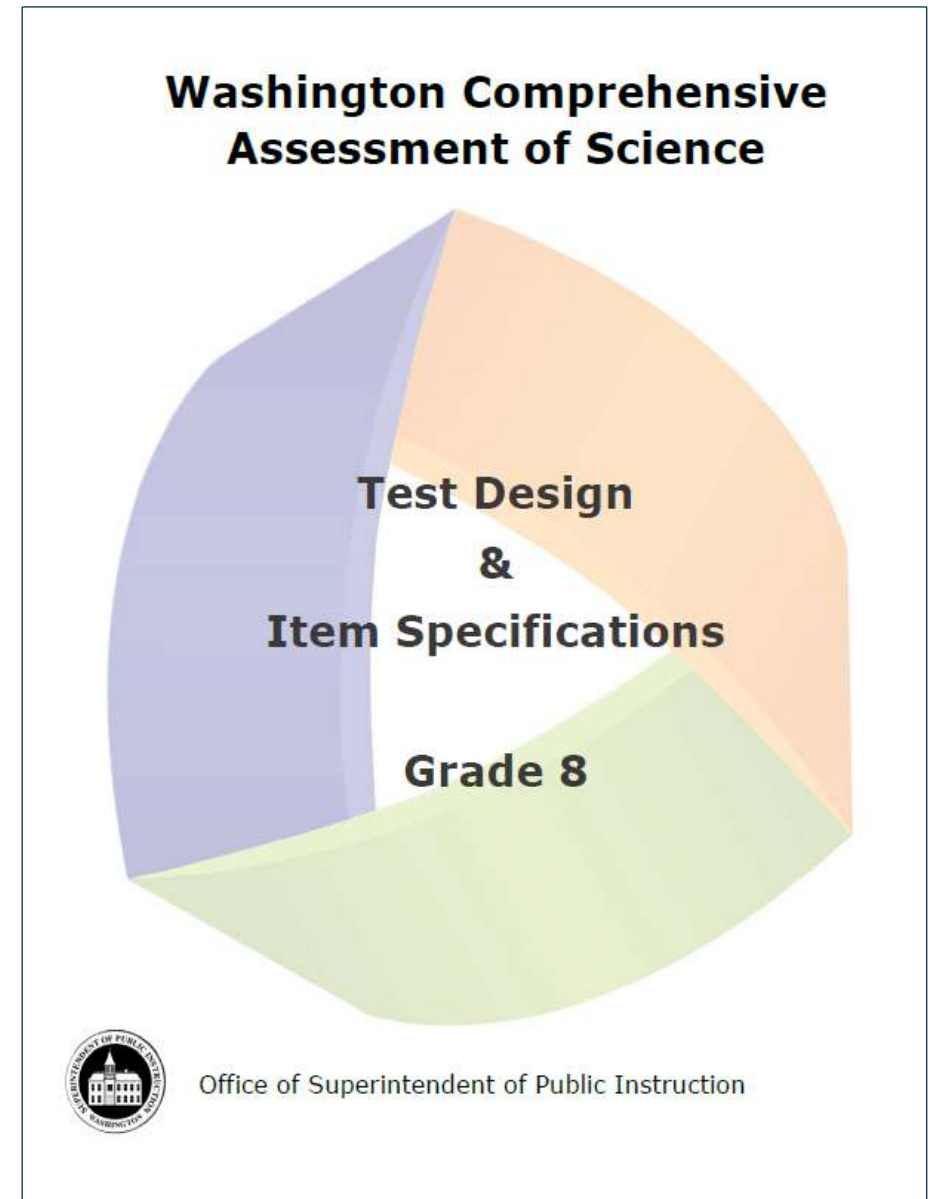
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Document Components

- Test Design (pages 1-14)
 - Development Cycle
 - Structure of the Test
 - Item Types
 - Test Structure
 - Standards Overview
 - Resources and References
- Item Specifications (pages 15-141)
- SEP, DCI, and CCC Vocabulary (pages 142-144)



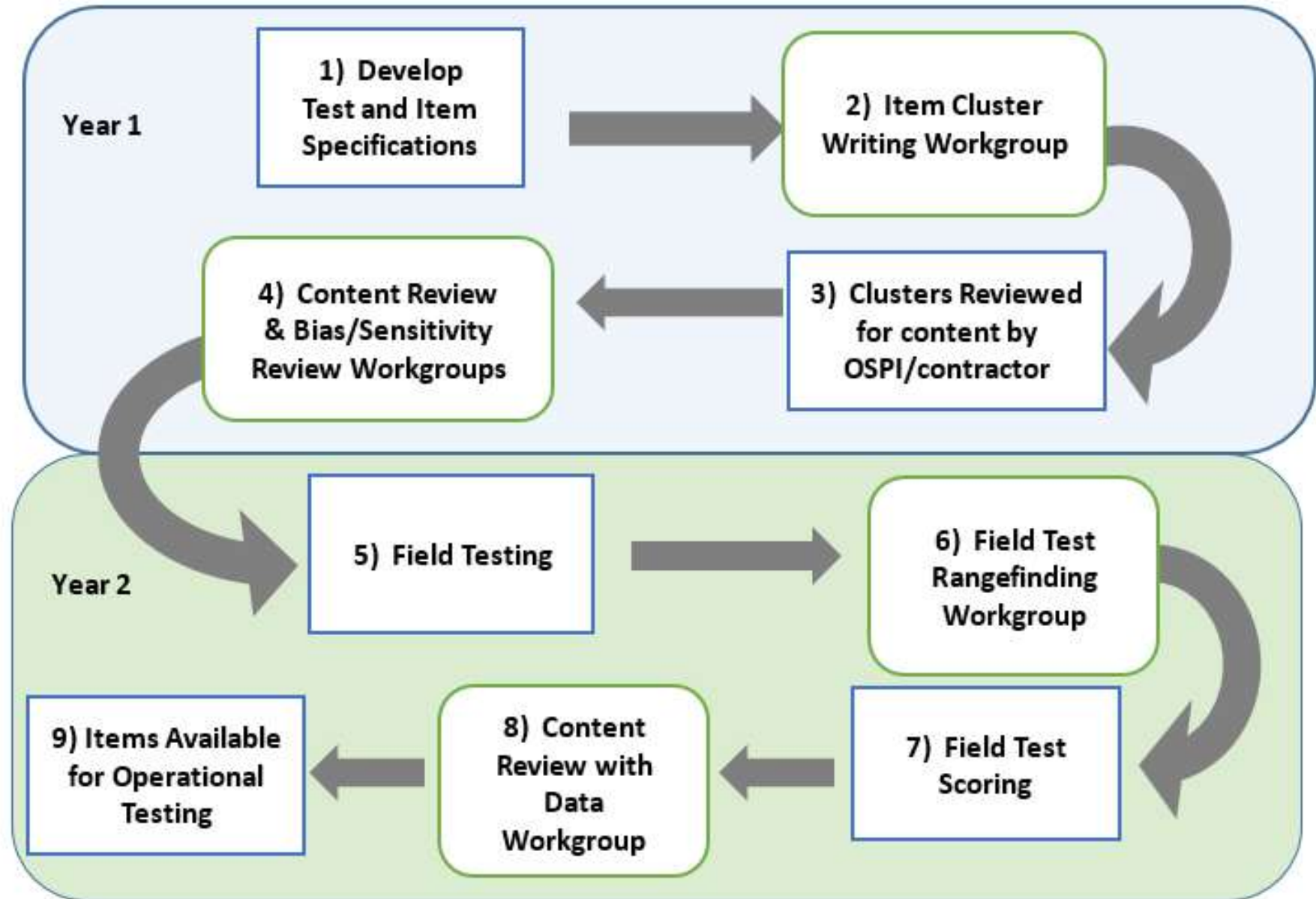


WCAS Development Process

Educator Involvement

Science Assessment Development Cycle

Pages 1-2



Join Us!

Science Assessment Professional Development Opportunities

<https://www.k12.wa.us/student-success/resources-subject-area/science/science-assessment-professional-development-opportunities>

Invitations to apply for work groups are emailed to those signed up for science assessment updates through the science assessment listserv.

<https://public.govdelivery.com/accounts/WAOSPI/subscriber/new>

The screenshot shows the website for the Washington Office of Superintendent of Public Instruction (OSPI). The page is titled "Science Assessment Professional Development Opportunities" and is part of a breadcrumb trail: Home » Student Success » Resources by Subject Area » Science » Science Assessment Professional Development Opportunities. The page features a sidebar menu under "STUDENT SUCCESS" with categories like "Resources by Subject Area" and "Science". The main content area describes the iterative review process for the Washington Comprehensive Assessment of Science (WCAS) and lists two key resources: "WCAS Work Group Descriptions (PDF)" and "Teachers and Test Development FAQ (PDF)". It also details "Work Group Participation" with invitations for "Item Cluster Writing" (March 2020) and "Content Review" (August 2020). A "Subscribe to Science Assessment updates" button and "Contact Information" for Dawn Cope are also visible.

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- Mathematics ▶
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 - Educational Service District Regional Science Coordinators
 - Grants, Resources, and Supports
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 - Contacts at OSPI
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- World Languages ▶

Learning Standards & Instructional Materials ▶

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Science Assessment Professional Development Opportunities

Item Clusters and standalone items for the Washington Comprehensive Assessment of Science (WCAS) go through an iterative review process that involves four types of educator work groups: Item Cluster Writing, Content Review, Rangefinding, and Content Review with Data. During each work group, educators learn about the process of three-dimensional item development, provide content and grade-level expertise to develop and refine test items and rubrics, and analyze the alignment of items to the state science standards.

- Read the [WCAS Work Group Descriptions \(PDF\)](#) for more information about each work group.
- Read the [Teachers and Test Development FAQ \(PDF\)](#) for answers to frequently asked questions about teacher participation in state assessment development.

Work Group Participation

Invitations to apply for work groups are emailed to those signed up for science assessment updates through our [science assessment listserv](#).

We recommend downloading the [Science Assessment Application Example \(PDF\)](#) prior to applying.

Upcoming Science Assessment Work Groups

Item Cluster Writing

- Grades 5, 8, and High School: **March 2020**
- Invitations to apply emailed Winter 2020

Content Review


- Grades 5, 8, and High School: **August 2020**
- Invitations to apply emailed Spring 2020

Field Test Rangefinding

- Grades 5, 8, and High School: **August 2020**
- Invitations to apply emailed Summer 2020

Content Review with Data

- Grades 5, 8, and High School: **September 2020**
- Invitations to apply emailed Summer 2020



Subscribe to Science Assessment updates

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Washington Standards Overview

NGSS 101



NGSS Middle School Band

Pages 10-12

- Domains
 - Physical Sciences (PS)—19 Performance Expectations
 - Life Sciences (LS)—21 Performance Expectations
 - Earth and Space Sciences (ESS)—15 Performance Expectations
 - Engineering Design (ETS)—4 Performance Expectations

Each Performance Expectation includes a Science and Engineering Practice (SEP), a Disciplinary Core Idea (DCI), and a Crosscutting Concept (CCC)

NGSS Performance Expectation

Performance
Expectation
Statement

MS-ESS1-2 Earth's Place in the Universe

Students who demonstrate understanding can:

MS-ESS1-2. Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system. *[Clarification Statement: Emphasis for the model is on gravity as the force that holds together the solar system and Milky Way galaxy and controls orbital motions within them. Examples of models can be physical (such as the analogy of distance along a football field or computer visualizations of elliptical orbits) or conceptual (such as mathematical proportions relative to the size of familiar objects such as students' school or state).]* *[Assessment Boundary: Assessment does not include Kepler's Laws of orbital motion or the apparent retrograde motion of the planets as viewed from Earth.]*

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Developing and Using Models
Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.

- Develop and use a model to describe phenomena.

SEP

Disciplinary Core Ideas

ESS1.A: The Universe and Its Stars

- Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe.

ESS1.B: Earth and the Solar System

- The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them.
- The solar system appears to have formed from a disk of dust and gas, drawn together by gravity.

DCI

Crosscutting Concepts

Systems and System Models

- Models can be used to represent systems and their interactions.

Connections to Nature of Science

Scientific Knowledge Assumes an Order and Consistency in Natural Systems

- Science assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation.

CCC

Dimension
Boxes



The 2013 Washington State K-12 Science Learning Standards are the Next Generation Science Standards (NGSS)

Home » Student Success » Resources by Subject Area » Science » Learning Standards » Washington State Science and Learning Standards

Washington State Science and Learning Standards

The **Washington State Science and Learning Standards** (previously known as the Next Generation Science Standards - NGSS) are a new set of standards that provide consistent science education through all grades, with an emphasis on engineering and technology. Superintendent Randy Dorn formally adopted the NGSS on October 1, 2013, and announced the adoption with Governor Jay Inslee on October 4. Washington is the eighth state to adopt the Next Generation Science Standards. The NGSS are now called Washington State Science Learning Standards (WSSLS).

The WSSLS describe -- at each grade from kindergarten through fifth grade, at middle school and at high school -- what each student should know in the four domains of science: physical science; life science; earth and space science; and engineering, technology and science application.

The new standards will help students become literate in science. They will have the skills and knowledge to tackle issues like water and energy conservation. The WSSLS are aligned to the Washington State Mathematics and English Language Arts Learning Standards (Common Core State Standards). When students are learning about science, they are also enhancing their skills in reading, writing and math.

Governor Inslee: "These new standards will help educators cultivate students' natural curiosity, push their creative boundaries and get kids excited about science and technology. This is a tremendous step forward for Washington's students."

2013 National Teacher of the Year Jeff Charbonneau: "Teachers, parents and the general public should not find these new standards threatening. They are not a radical change, but rather are a carefully judged update and revision of what Washington students have been learning for years. Washington state has had standards-based science education for more than a decade." (*Seattle Times*, Oct. 7, 2013).

[The Standards](#) [Background](#) [Transition Plans and Timelines](#) [Contact Us](#)

The WSSLS are now available. Twenty-six states and their broad-based teams worked together with a 41-member writing team and partners throughout the country to develop the standards.

[View the Standards](#)

[Next Generations Science Standards \(PDF\)](#)

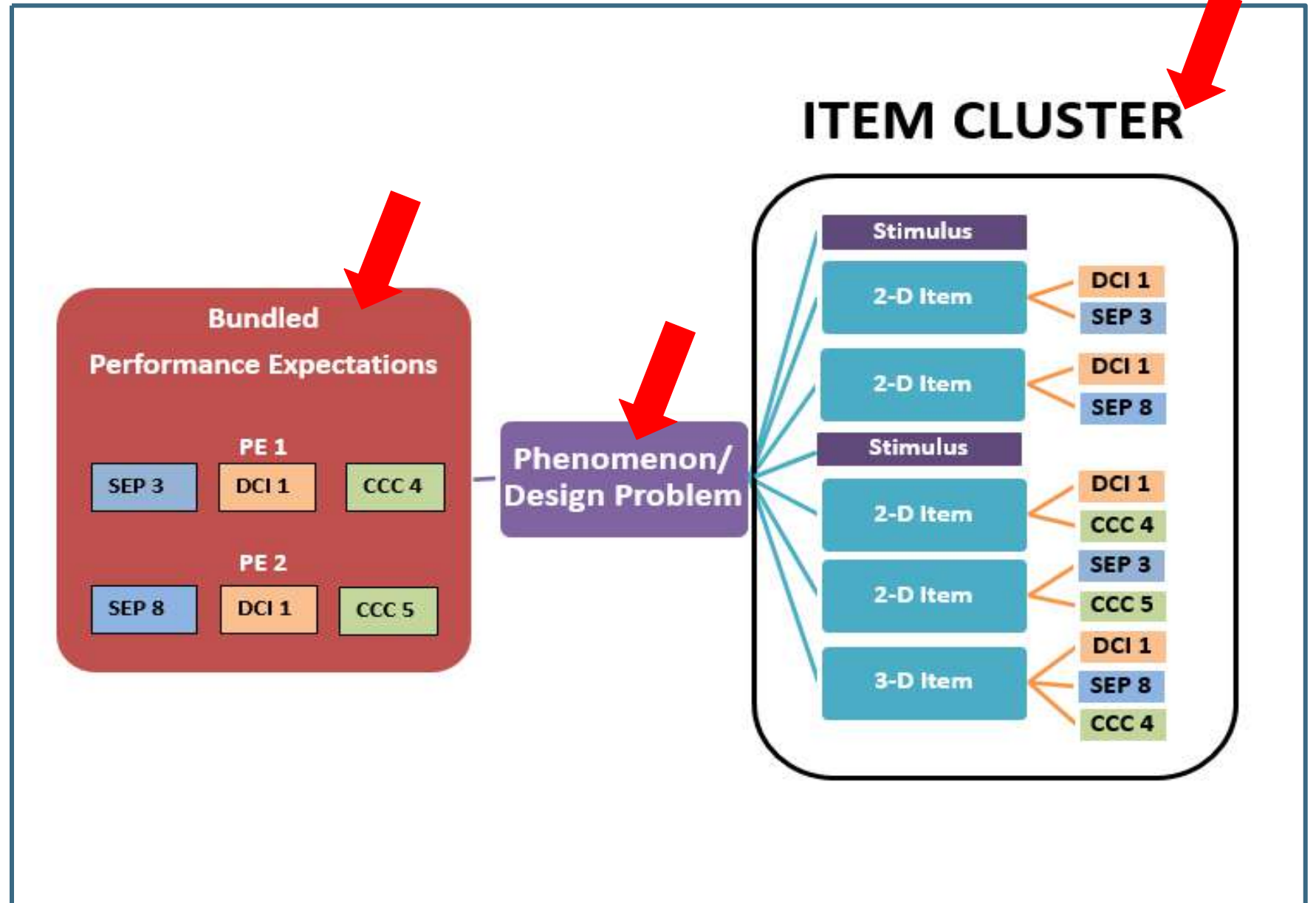
- OSPI Science Standards Webpage
<https://www.k12.wa.us/student-success/resources-subject-area/science/science-k%E2%80%9312-learning-standards/washington-state-science-and-learning-standards>
- Next Generation Science Standards
<https://www.nextgenscience.org/search-standards>
- Get to Know the Standards
<https://www.nextgenscience.org/get-to-know>
- Understanding the Standards:
<https://www.nextgenscience.org/understanding-standards/understanding-standards>



Test Structure

Cluster Map

Page 3



Standalone Items

- Use a single item to address two or three dimensions of one PE
- Stimulus and question/questions

Grade 8 Blueprint

Pages 8-9

Reporting Area	Percentage of PEs per Science Domain in the Standards	Percent Range for the WCAS per Science Domain	Score Point Range for WCAS per Science Domain
Practices and Crosscutting Concepts in Physical Sciences	35%	30-40%	12-16
Practices and Crosscutting Concepts in Life Sciences	38%	33-43%	13-17
Practices and Crosscutting Concepts in Earth and Space Sciences	27%	22-32%	9-13

- 40 Total points
- 6-12 standalone items
- 5 clusters
- Estimated testing time: 120 minutes

ETS PEs are assessed but not reported separately.

Performance Expectation Coverage

Pages 8-9

Stand Alone items

- 6-12 items per operational form
- Each item must assess 2 or 3 dimensions of a single PE
- Increases DCI, SEP, and CCC coverage for the whole test

Item Clusters

- 3-6 items per cluster
- 5 clusters per operational form
- At least one PE from each domain (PS, LS, ESS, and ETS) represented
- A minimum of 3 different SEPs across the clusters
- A minimum of 3 different CCCs across the clusters

Structure and Administration

Pages 8-9

Structure

- Operational Section
 - Counts toward a student's score
 - Fixed form
- Field Test Section
 - Embedded in the online administration
 - Does not count toward a student's score
 - A cluster or several standalone items

Administration

- Can be administered in multiple sessions like the Smarter Balanced ELA and Math tests
- 1 to 3 sessions recommended

Features & Item Types

Pages 4-7

Features

- Collapsible Stimuli
- Locking items
- Multipart items
- Animation
- Periodic Table
<https://wa.portal.cambiumast.com/>
- Calculator
<https://www.desmos.com/testing/washington>

Item Types

- Multiple Choice
- Multiple Select
- Short Answer
- Drag and Drop
- Hot Text
- Table Match
- Table Input
- Edit Task Inline Choice
- Simulation

WCAS Training Tests

- Grades 5, 8, 11
- Accessed through the WCAP Portal
<https://wa.portal.airast.org/training-tests.shtml>
- Grade 5 Lesson Plan
<https://www.k12.wa.us/sites/default/files/public/science/pubdocs/LessonPlans5-FINAL%20DRAFT.pdf>
- Grade 8 Lesson Plan
<https://www.k12.wa.us/sites/default/files/public/science/pubdocs/LessonPlans8-FINAL%20DRAFT.pdf>
- Grade 11 Lesson Plan
<https://www.k12.wa.us/sites/default/files/public/science/pubdocs/LessonPlans11-FINAL%20DRAFT.pdf>
- Quick Start
https://www.k12.wa.us/sites/default/files/public/science/pubdocs/OnlineTrainingTestQuickStart-FINAL_DRAFT.pdf

Q&A





Item Specifications

MS-LS3-2

Pages 86-87

Front Page

Performance Expectation	MS-LS3-2 Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.		
Dimensions	Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
	Developing and Using Models Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems. <ul style="list-style-type: none"> Develop and use a model to describe phenomena. 	LS1.B: Growth and Development of Organisms <ul style="list-style-type: none"> Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring. (<i>secondary</i>) LS3.A: Inheritance of Traits <ul style="list-style-type: none"> Variations of inherited traits between parent and offspring arise from genetic differences that result from the subset of chromosomes (and therefore genes) inherited. LS3.B: Variation of Traits <ul style="list-style-type: none"> In sexually reproducing organisms, each parent contributes half of the genes acquired (at random) by the offspring. Individuals have two of each chromosome and hence two alleles of each gene, one acquired from each parent. These versions may be identical or may differ from each other. 	Cause and Effect <ul style="list-style-type: none"> Cause and effect relationships may be used to predict phenomena in natural systems.
These item specifications were developed using the following reference materials:			
K-12 Framework	pp. 56–59	pp. 145–147 pp. 158–160 pp. 160–161	pp. 87–89
NGSS Appendices	Appendix F p. 6	Appendix E p. 4 Appendix E p. 6	Appendix G pp. 5–6
Clarification Statement	Emphasis is on using models such as Punnett squares, diagrams, and simulations to describe the cause and effect relationship of gene transmission from parent(s) to offspring and resulting genetic variation.		
Assessment Boundary	An assessment boundary is not provided for this PE.		

MS-LS3-2

Pages 86-87

Back
Page

Items may ask students to:

Code	Alignment	Item Specification
MS-LS3-2.1	SEP-DCI-CCC	Develop and/or use a model to describe cause and effect relationships between sexual and/or asexual reproduction and genetic variation in offspring.
MS-LS3-2.2	SEP-DCI	Develop and/or use a model to describe sexual and/or asexual reproduction and/or genetic variation in offspring.
MS-LS3-2.3	DCI-CCC	Use cause and effect relationships to connect sexual and/or asexual reproduction to genetic variation in offspring.
MS-LS3-2.4	SEP-CCC	Develop and/or use a model to describe cause and effect relationships.

Details and Clarifications

- **Develop** and/or **use** a **model** is expanded to include:
 - using a given complete or partial model to make predictions and/or describe phenomena
 - using a model to show relationships among variables
 - revising a given complete or partial model
 - describing the limitations of a complete or partial model
 - using a model to represent current understanding of a system
 - using a model to aid in the development of questions and/or descriptions
- **Models** that describes **cause and effect** relationships between **sexual** and/or **asexual reproduction** and **genetic variation** may include, but are NOT limited to:
 - a diagram or simulation showing combinations of alleles inherited by offspring
 - a diagram, simulation, or description of a combination of alleles from parents
- **Cause and effect** relationships involving **variation** of **inherited traits** in **sexual reproduction** may include, but are NOT limited to:
 - two sets of chromosomes, one from each parent, combine, resulting in unique chromosome pairs in offspring
 - one allele for each of many genes is inherited from each parent, resulting in genetic variation in offspring
- **Cause and effect** relationships involving **variation** of **inherited traits** in **asexual reproduction** may include, but are NOT limited to:
 - offspring receive a set of chromosomes from one parent, with the same number and type of chromosomes as the parent, resulting in minimal genetic variation





Item Specifications Activity

Section 1—Sea Star Reproduction

Read the information and answer the questions.

Sea stars reproduce both asexually and sexually.

Asexual reproduction requires a single parent sea star. The parent sea star splits into two parts and each part develops into an offspring sea star. The Asexual Reproduction in Sea Stars diagram models this process.

Asexual Reproduction in Sea Stars

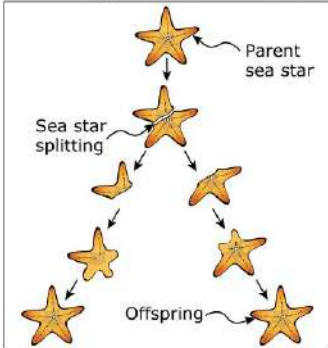


Diagram not to scale

Sexual reproduction requires two parent sea stars. The male parent releases sperm cells and the female parent releases egg cells into the water. The egg and sperm cells unite to form an embryo which develops into an adult sea star. The Sexual Reproduction in Sea Stars diagram models this process.

Sexual Reproduction in Sea Stars

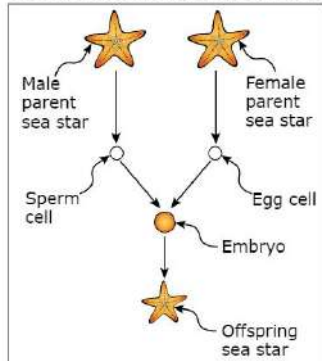


Diagram not to scale

Item 1

Make a model to show how the two alleles are passed to sea star offspring during asexual and sexual reproduction.

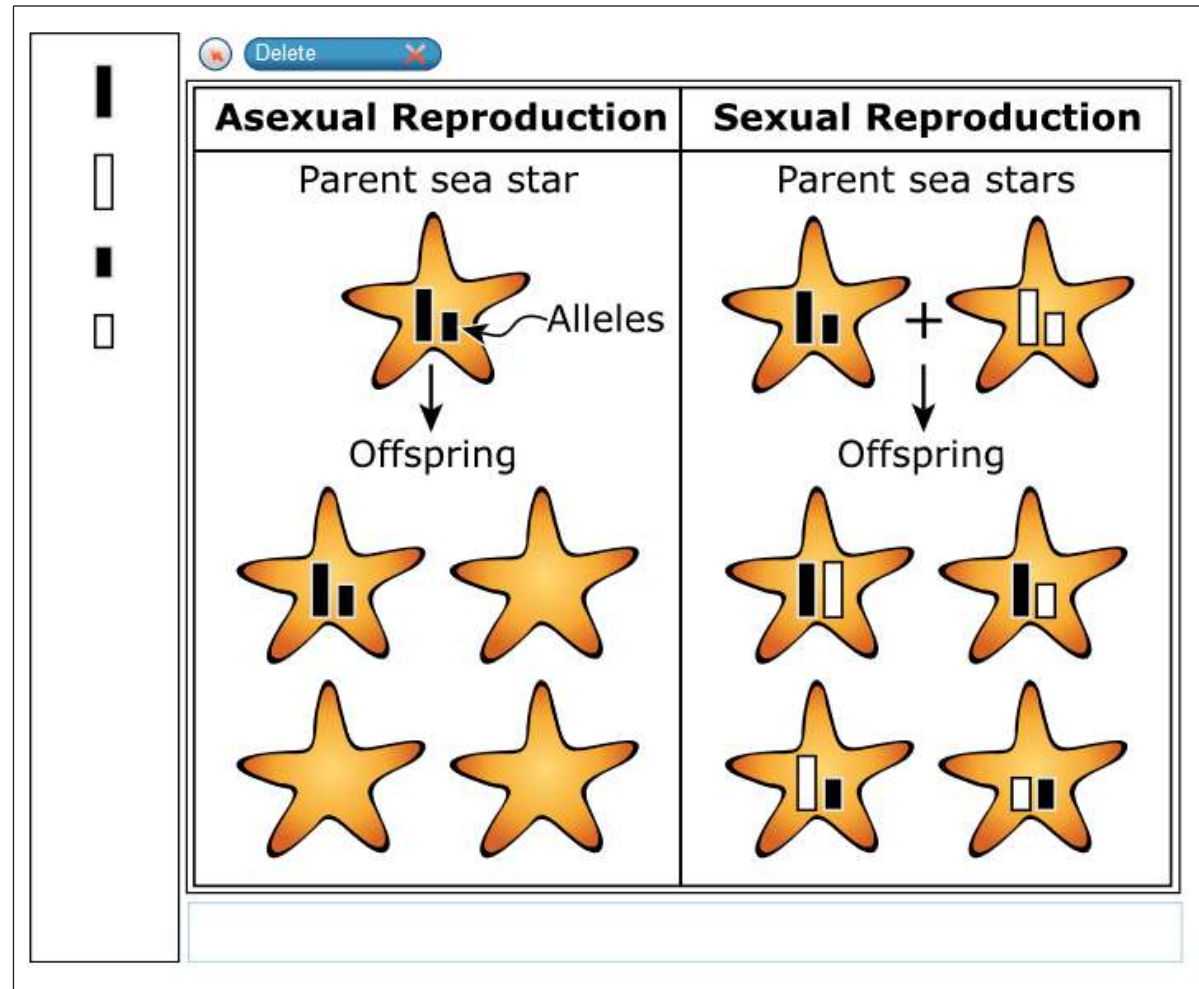
Move the alleles onto the offspring to model **all** possible genetic combinations in the offspring.

- Alleles may be used more than once.
- Not all alleles or offspring may be used.

Delete

Asexual Reproduction	Sexual Reproduction
<p>Parent sea star</p> <p>Alleles</p> <p>↓</p> <p>Offspring</p>	<p>Parent sea stars</p> <p>+</p> <p>↓</p> <p>Offspring</p>

Item 1



Items may ask students to:

Code	Alignment	Item Specification
MS-LS3-2.1	SEP-DCI-CCC	Develop and/or use a model to describe cause and effect relationships between sexual and/or asexual reproduction and genetic variation in offspring.
MS-LS3-2.2	SEP-DCI	Develop and/or use a model to describe sexual and/or asexual reproduction and/or genetic variation in offspring.
MS-LS3-2.3	DCI-CCC	Use cause and effect relationships to connect sexual and/or asexual reproduction to genetic variation in offspring.
MS-LS3-2.4	SEP-CCC	Develop and/or use a model to describe cause and effect relationships.

Details and Clarifications

- **Develop** and/or **use** a **model** is expanded to include:
 - using a given complete or partial model to make predictions and/or describe phenomena
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 - revising a given complete or partial model
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 - using a model to represent current understanding of a system
 - using a model to aid in the development of questions and/or descriptions
- **Models** that describes **cause and effect** relationships between **sexual** and/or **asexual reproduction** and **genetic variation** may include, but are NOT limited to:
 - a diagram or simulation showing combinations of alleles inherited by offspring
 - a diagram, simulation, or description of a combination of alleles from parents
- **Cause and effect** relationships involving **variation of inherited traits in sexual reproduction** may include, but are NOT limited to:
 - two sets of chromosomes, one from each parent, combine, resulting in unique chromosome pairs in offspring
 - one allele for each of many genes is inherited from each parent, resulting in genetic variation in offspring
- **Cause and effect** relationships involving **variation of inherited traits in asexual reproduction** may include, but are NOT limited to:
 - offspring receive a set of chromosomes from one parent, with the same number and type of chromosomes as the parent, resulting in minimal genetic variation

Item 1

Make a model to show how the two alleles are passed to sea star offspring during asexual and sexual reproduction.

Move the alleles onto the offspring to model **all** possible genetic combinations in the offspring.

- Alleles may be used more than once.
- Not all alleles or offspring may be used.



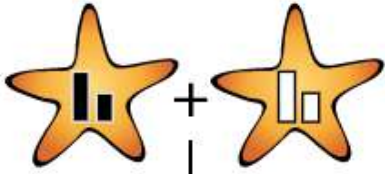

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Delete

Asexual Reproduction	Sexual Reproduction
<p>Parent sea star</p>  <p>Alleles</p> <p>↓</p> <p>Offspring</p> 	<p>Parent sea stars</p>  <p>+</p> <p>↓</p> <p>Offspring</p> 

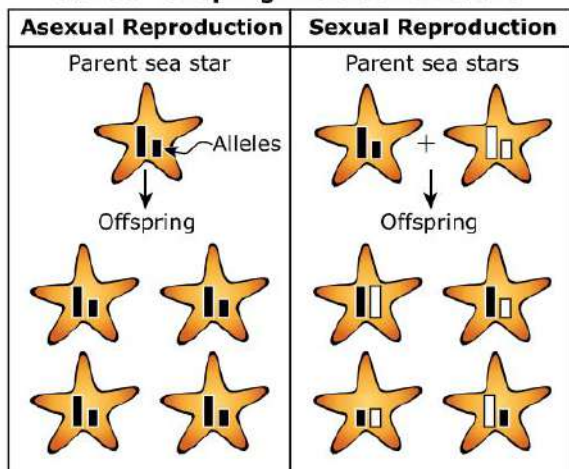


Item 2

Section 2—Sea Star Reproduction

The Sea Star Offspring Allele Combinations model shows the possible allele combinations in the sea star offspring for asexual reproduction and sexual reproduction.

Sea Star Offspring Allele Combinations



The following question has two parts. First, answer part A. Then, answer part B.

Part A

Based on the Sea Star Offspring Allele Combinations model, select a box to identify whether each statement describes asexual reproduction, sexual reproduction, or both.

Statement	Asexual Reproduction	Sexual Reproduction	Both
All offspring have the same traits.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Genetic information is transferred to the offspring.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Different combinations of genetic information in the offspring are possible.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Each offspring has two alleles for every trait.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Part B

Which statement describes a reason for the sexual reproduction answers in part A?

- Ⓐ The two alleles are identical in every offspring.
- Ⓑ Offspring can inherit alleles from either of two parents.
- Ⓒ There is a single source of genetic information for all offspring.
- Ⓓ The genetic information in offspring depends on their environment.



Item 2

The following question has two parts. First, answer part A. Then, answer part B.

Part A

Based on the Sea Star Offspring Allele Combinations model, select a box to identify whether each statement describes asexual reproduction, sexual reproduction, or both.

Statement	Asexual Reproduction	Sexual Reproduction	Both
All offspring have the same traits.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Genetic information is transferred to the offspring.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Different combinations of genetic information in the offspring are possible.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Each offspring has two alleles for every trait.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Part B

Which statement describes a reason for the sexual reproduction answers in part A?

- Ⓐ The two alleles are identical in every offspring.
- Ⓑ Offspring can inherit alleles from either of two parents.
- Ⓒ There is a single source of genetic information for all offspring.
- Ⓓ The genetic information in offspring depends on their environment.

Items may ask students to:

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Item 2

The following question has two parts. First, answer part A. Then, answer part B.

Part A

Based on the Sea Star Offspring Allele Combinations model, select a box to identify whether each statement describes asexual reproduction, sexual reproduction, or both.

Statement	Asexual Reproduction	Sexual Reproduction	Both
All offspring have the same traits.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Genetic information is transferred to the offspring.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Different combinations of genetic information in the offspring are possible.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Each offspring has two alleles for every trait.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Part B

Which statement describes a reason for the sexual reproduction answers in part A?

- Ⓐ The two alleles are identical in every offspring.
- Ⓑ Offspring can inherit alleles from either of two parents.
- Ⓒ There is a single source of genetic information for all offspring.
- Ⓓ The genetic information in offspring depends on their environment.



MS-LS3-1

Pages 84-85

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Performance Expectation	MS-LS3-1 Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.		
Dimensions	Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
	Developing and Using Models Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems. <ul style="list-style-type: none"> Develop and use a model to describe phenomena. 	LS3.A: Inheritance of Traits <ul style="list-style-type: none"> Genes are located in the chromosomes of cells, with each chromosome pair containing two variants of each of many distinct genes. Each distinct gene chiefly controls the production of specific proteins, which in turn affects the traits of the individual. Changes (mutations) to genes can result in changes to proteins, which can affect the structures and functions of the organism and thereby change traits. LS3.B: Variation of Traits <ul style="list-style-type: none"> In addition to variations that arise from sexual reproduction, genetic information can be altered because of mutations. Though rare, mutations may result in changes to the structure and function of proteins. Some changes are beneficial, others harmful, and some neutral to the organism. 	Structure and Function <ul style="list-style-type: none"> Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the shapes, composition, and relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function.
These item specifications were developed using the following reference materials:			
K-12 Framework	pp. 56–59	pp. 158–159 pp. 160–161	pp. 96–98
NGSS Appendices	Appendix F p. 6	Appendix E p. 6	Appendix G pp. 9–10
Clarification Statement	Emphasis is on conceptual understanding that changes in genetic material may result in making different proteins.		
Assessment Boundary	Assessment does not include specific changes at the molecular level, mechanisms for protein synthesis, or specific types of mutations.		



MS-LS3-1

Pages 84-85

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Items may ask students to:

Code	Alignment	Item Specification
MS-LS3-1.1	SEP-DCI-CCC	Develop and/or use a model to describe how structural changes to genes may affect the structure and/or function of proteins and/or may result in harmful, beneficial, or neutral effects to the structure and/or function of the organism.
MS-LS3-1.2	SEP-DCI	Develop and/or use a model to show that genes are located on chromosomes and/or to show how information flows from genes to proteins to traits.
MS-LS3-1.3	DCI-CCC	Connect structural changes to genes to the structure and/or function of proteins and/or to the harmful, beneficial, or neutral effects to the structure and/or function of the organism.
MS-LS3-1.4	SEP-CCC	Develop and/or use a model to describe how complex structures can be analyzed to determine how they function.

Details and Clarifications

Develop and/or **use a model** is expanded to include:

- using a given complete or partial model to make predictions and/or describe phenomena
- using a model to show relationships among variables
- revising a given complete or partial model
- describing the limitations of a complete or partial model
- using a model to represent current understanding of a system
- using a model to aid in the development of questions and/or descriptions

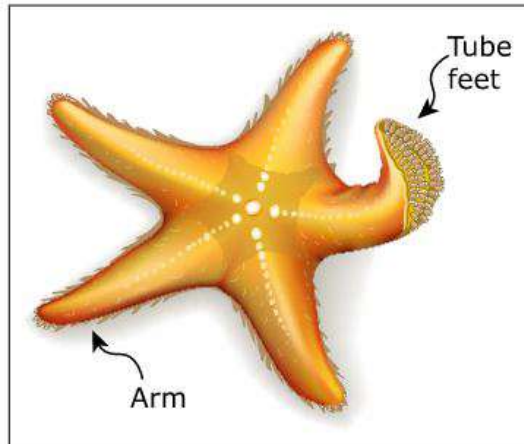
- **Models** that show how **structural changes** to genes affect the **structure** and/or **function** of other components may include, but are NOT limited to, a diagram, simulation, or description of:
 - structural and/or functional relationships between chromosomes, genes, proteins, traits, and/or organisms
 - how a mutation changes the structure and/or function of genes and/or proteins
- **Structure** and **function** relationships between genes, proteins, traits, and/or organisms may include, but are NOT limited to:
 - the structure of a gene determines the structure of a protein
 - protein structure influences protein function
 - protein structure influences the expression of a trait
 - a mutation changes the structure and/or function of a gene
 - a mutation may affect the structure and/or function of a protein
 - a mutation may affect the structure and/or function of an organism in a beneficial, neutral, or harmful way



Section 3—Sea Star Reproduction

Sea stars have tube feet for walking, climbing, and grasping. The Sea Star External Anatomy diagram shows the appearance and location of tube feet on a sea star.

Sea Star External Anatomy

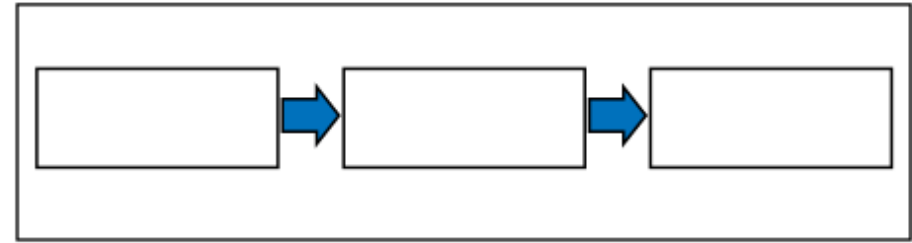


There are cells in the tube feet of sea stars that produce a protein that acts like glue. The protein makes the tube feet sticky.

Item 3

Move the labels into the boxes to show the flow of genetic information in the tube feet cells.

Genetic Information Model

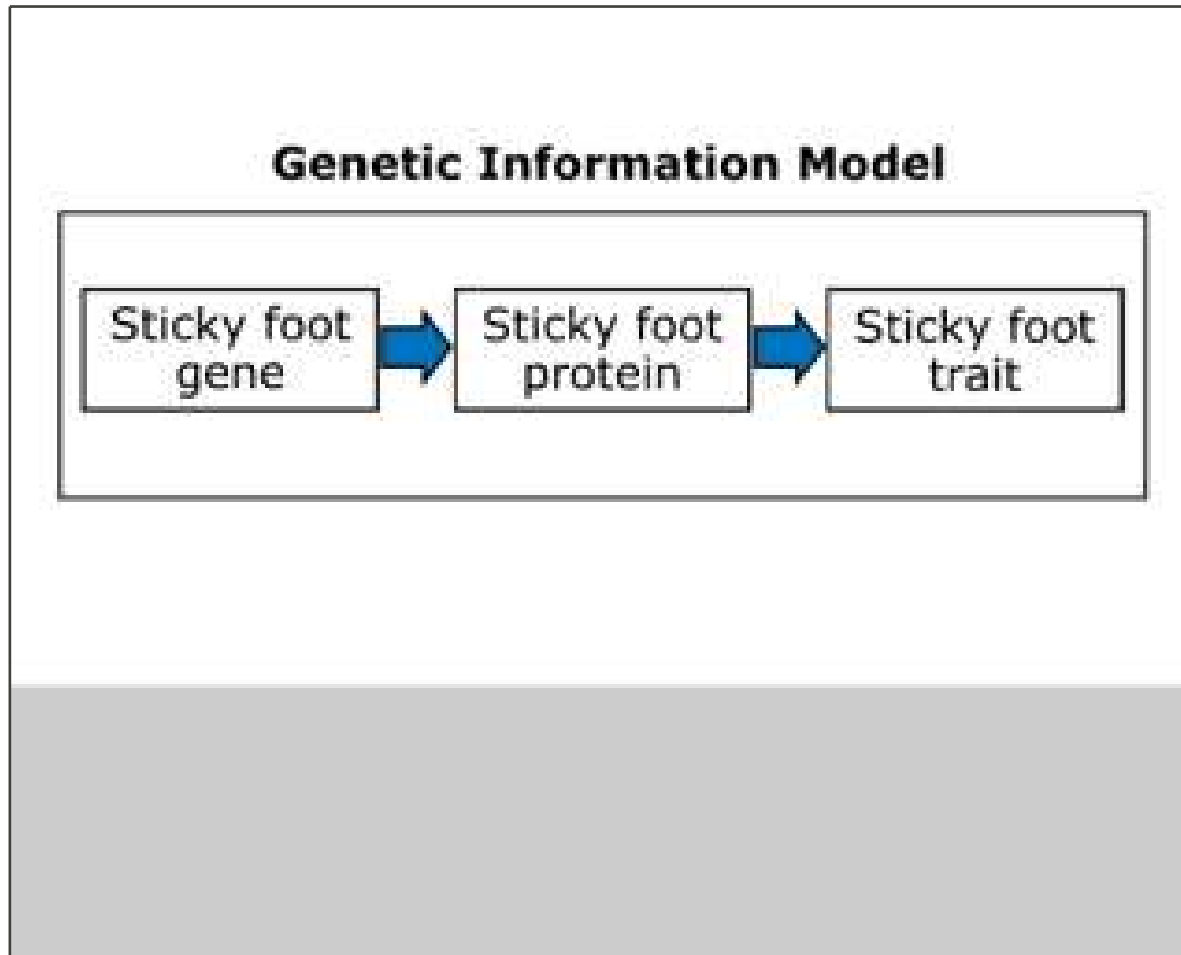


Sticky foot trait

Sticky foot protein

Sticky foot gene

Item 3



Items may ask students to:

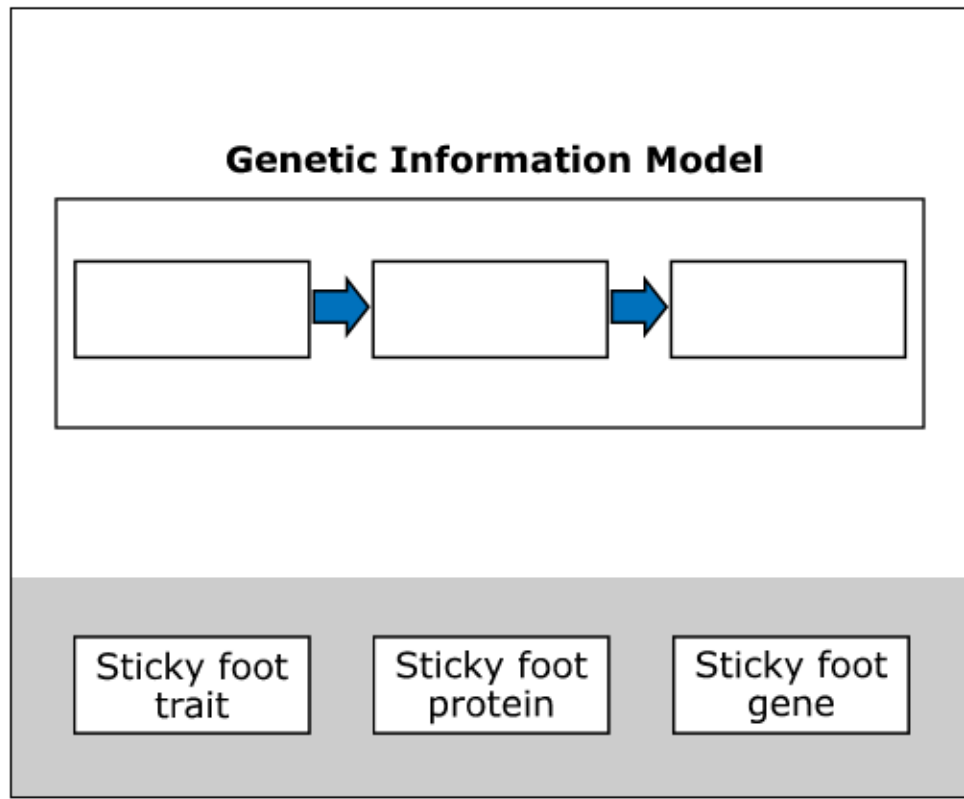
Code	Alignment	Item Specification
MS-LS3-1.1	SEP-DCI-CCC	Develop and/or use a model to describe how structural changes to genes may affect the structure and/or function of proteins and/or may result in harmful, beneficial, or neutral effects to the structure and/or function of the organism.
MS-LS3-1.2	SEP-DCI	Develop and/or use a model to show that genes are located on chromosomes and/or to show how information flows from genes to proteins to traits.
MS-LS3-1.3	DCI-CCC	Connect structural changes to genes to the structure and/or function of proteins and/or to the harmful, beneficial, or neutral effects to the structure and/or function of the organism.
MS-LS3-1.4	SEP-CCC	Develop and/or use a model to describe how complex structures can be analyzed to determine how they function.

Details and Clarifications

- **Develop** and/or **use** a **model** is expanded to include:
 - using a given complete or partial model to make predictions and/or describe phenomena
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Item 3

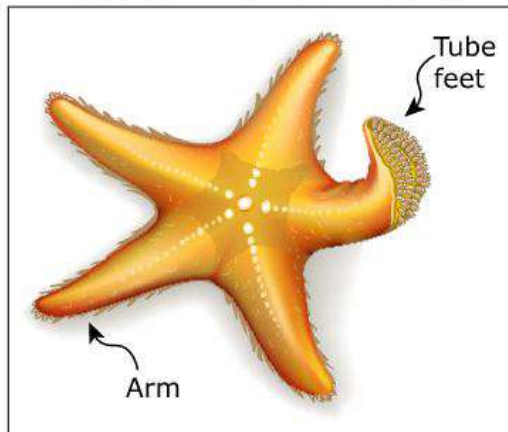
Move the labels into the boxes to show the flow of genetic information in the tube feet cells.



Section 3—Sea Star Reproduction

Sea stars have tube feet for walking, climbing, and grasping. The Sea Star External Anatomy diagram shows the appearance and location of tube feet on a sea star.

Sea Star External Anatomy

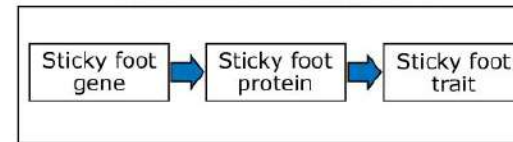


There are cells in the tube feet of sea stars that produce a protein that acts like glue. The protein makes the tube feet sticky.

Item 4

The Genetic Information Model diagram shows how information in genes results in traits like the sticky foot trait in sea stars.

Genetic Information Model

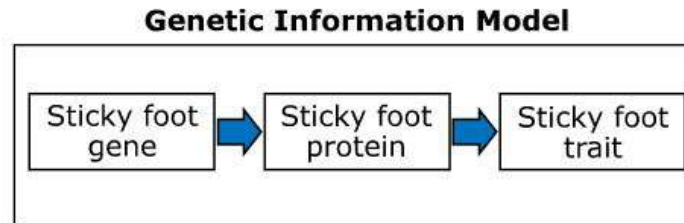


Click each box and select a word to describe how a mutation could result in a change to the sticky foot trait.

A mutation changes the structure of the , which can change the structure and function of the .

Item 4

The Genetic Information Model diagram shows how information in genes results in traits like the sticky foot trait in sea stars.



Click each box and select a word to describe how a mutation could result in a change to the sticky foot trait.

A mutation changes the structure of the , which can change the structure and function of the .

Items may ask students to:

Code	Alignment	Item Specification
MS-LS3-1.1	SEP-DCI-CCC	Develop and/or use a model to describe how structural changes to genes may affect the structure and/or function of proteins and/or may result in harmful, beneficial, or neutral effects to the structure and/or function of the organism.
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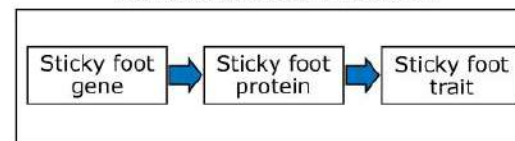
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Genetic Information Model



Click each box and select a word to describe how a mutation could result in a change to the sticky foot trait.

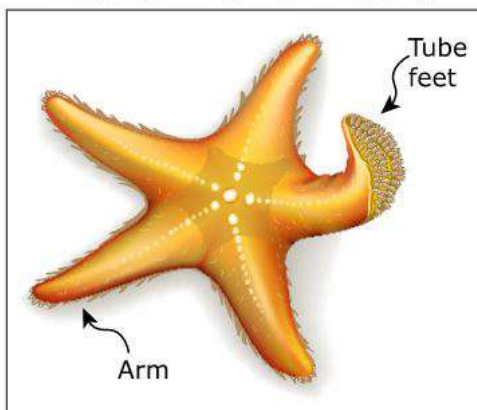
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Sea Star External Anatomy



There are cells in the tube feet of sea stars that produce a protein that acts like glue. The protein makes the tube feet sticky.

Item 5

A mutation occurs that causes the sticky foot protein to become less sticky. Describe how this mutation could affect the sea star.

Choose **one**:

- Harmful mutation
- Beneficial mutation

Describe how **that** mutation could affect the sea star.

Item 5

A mutation occurs that causes the sticky foot protein to become less sticky. Describe how this mutation could affect the sea star.

Choose **one**:

- Harmful mutation
- Beneficial mutation

Describe how **that** mutation could affect the sea star.

Sample Answers:

The sea star can't open prey as easily as when the protein was stickier

OR

The sea star can be pulled off of rocks by predators more easily.

A mutation occurs that causes the sticky foot protein to become less sticky. Describe how this mutation could affect the sea star.

Choose **one**:

- Harmful mutation
- Beneficial mutation

Describe how **that** mutation could affect the sea star.

Sample Answers

The sea star could move more easily to catch prey/avoid predators if its feet don't stick to rocks as much.

OR

The mutation is beneficial because less sticky protein means the sea star can move more quickly without getting stuck on objects.



Items may ask students to:

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Item 5

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Vocabulary Terms

Expected SEP, DCI, and CCC Vocabulary

Pages 142-144

SEP, DCI, and CCC Vocabulary Used in Assessment Items at Grade 8

Items use language targeted to the previous grade level or lower readability with the exception of the required SEP, DCI, and CCC terms in the following list. Appropriate science vocabulary allowed for the grade 5 WCAS may also be used on the grade 8 WCAS. Vocabulary words from Grade 5 are included in the following list.

a

Used in grade 5:

advantage
amplitude
angle
attract
axis

Used in grade 8:

absorb
acceleration
adaptation
algae
allele
altitude
analog signal
artificial selection
asexual reproduction

compare
conclusion
conductivity
conserve
constraint
continent
criteria

Used in grade 8:

cell
cell membrane
cell wall
cellular respiration
chemical change
chemical property
chemical reaction
chloroplasts
chromosome

disease
distance

Used in grade 8:

density

e

Used in grade 5:

earthquake
ecosystem
effect
electric current
electric force
electrical energy
electricity
electromagnet
energy
engineer

Q&A





Reminders & Wrap up

Where to find the materials

- WCAS Educator Resources Webpage

<https://www.k12.wa.us/student-success/testing/state-testing-overview/washington-comprehensive-assessment-science/wcas-educator-resources>

- Presentation slides with script **1 week out**
- FAQ document with answers to Chat questions **1 week out**
- Webinar recording **2 weeks out**

- pdEnroller

<https://www.pdenroller.org/>

Thank You!



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