Alignment of Oregon Science Standards

Crosswalk of 2009 Oregon Science Standards to
2014 Oregon Science Standards (Next Generation Science Standards)

OREGON DEPARTMENT OF EDUCATION

Alignment of Oregon Science Standards

2014 Science Standards (Next Generation Science Standards) and 2009 Science Standards

Introduction

These pages show how the content, practices, and cross-cutting concepts (CCC) associated with the new Oregon Science Standards (NGSS) adopted in March 2014 align to the Oregon Science Standards adopted in February 2009. It is important to remember that the new Oregon Science Standards (NGSS) will be phased in so that districts can implement changes in local curriculum, provide appropriate professional development for teachers and administrators, and provide students with opportunities to learn the content, practices, and cross-cutting concepts prior to assessment. Oregon students will continue to be assessed on the Oregon 2009 Science Content Standards via OAKS Science until a new science assessment that aligns with the newly adopted standards is developed and becomes operational in 2018-2019.

Purpose

The purpose of this document is to provide educators with a view of the alignment between the 2009 content standards currently required as part of each Oregon district's curriculum and instruction in the subject area of science, and those contained in the new 2014 Oregon Science Standards (NGSS). An examination of the content of these pages is meant to provide at least some clarification on the following issues:

- What content, practices, and cross-cutting concepts are new and have not previously been a part of Oregon's 2009 Science Standards?
- What content, practices, and cross-cutting concepts will now need to be part of the curriculum at an earlier (or later) grade level than where they are currently taught and assessed?
- In what instances are similar skills being addressed, but with a somewhat different emphasis or with different expectations regarding the degree of sophistication?

Organization of the Alignment Tables

The rows in the table show whether there is a corresponding 2009 Oregon science standard(s) for each of the new 2014 Oregon science standards (NGSS) performance expectation (PE) in the areas of content, practices, and cross-cutting concepts (CCC). Codes designate the degree of alignment: S = Strong; P = Partial; D = Different Grade; N = New (not in any 2009 ORSS). The 2009 Oregon Science Standards that are not aligned to any new 2014 Oregon Science Standard (NGSS) are included at the end of the document. The bulleted statements at the beginning of the document provide summary information about the differences between the two sets of standards.

Alignment of Oregon's 2014 Science Standards (NGSS) with 2009 Oregon Science Standards (2009 ORSS)

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Grade: 8

- There is general alignment in the NGSS practices and the 2009 ORSS. The NGSS add evidence-based argumentation, developing and using models, and mathematical and computational thinking which align with the CCSS.
- Teaching and learning shifts from content-based to practice-based instruction that integrates core content.
- The NGSS PEs identify limitations and boundaries. It is essential to read the NGSS foundation boxes.
- Some 2009 ORSS high school standards have moved to the middle school level, increasing the level of rigor at both levels.

NGSS PE	2009 ORSS	NGSS Content	NGSS Practice	NGSS CCC	Notes on Alignment
MS-PS2 Motion and Stability: Forces and Interactions					
MS-PS2-1. Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.	7.2P.1 8.2P.2 6-8.4D.1 6-8.4D.2	D/S P	N N P S	N N P P	CCC is systems and system models. Energy is explicitly mentioned in the 2009 ORSS, but not in the NGSS.
MS-PS2-2. Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.	7.2P.1 8.2P.2 6-8S.1 6-8S.2	D/S P	N N S P	P S P S	CCC is stability and change. Energy is explicitly mentioned in the 2009 ORSS, but not in the NGSS.
MS-PS2-3. Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.	6.2P.2 6-8.3S.1 6-8.3S.2	D/P	N S P	N P P	CCC is cause and effect. The 2009 ORSS focus is on the relationship between electricity and magnetism, whereas the NGSS focus is on factors that affect the strength of those two forces.
MS-PS2-4. Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.	7.2P.1 8.2E.1 7.3S.3	D/P P	N P D/P	N S N	CCC is systems and system models. The 2009 ORSS does not include gravity as related to mass.
MS-PS2-5. Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.	6.2P.2 7.2P.1 6-8.3S.1 6-8.3S.2 H.2P.4	D/P D/P D	N N S S	P S P P	CCC is cause and effect. The scope of the NGSS PE is larger than the 2009 ORSS.
MS-PS3 Energy					
MS-PS3-1. Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.	7.2P.1 8.2P.2 7-8.3S.2	D/P P	N N S	D/P P S	CCC is scale, proportion and quantity. The 2009 ORSS does not include calculations of energy.

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MS-PS3-2. Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.	8.2.P.2 H.2P.4	P D	N N	N N	CCC is systems and system models. Model development and model of stored energy is new.
MS-PS4 Waves and their Applications in Technologies for Information Transfer					
MS-PS4-1. Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.	6.1P.2 6.2P.1	D/P D/S	N D/P	N D/S	CCC is patterns. The practice of using a mathematical representation is new.
MS-PS4-2. Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.	6.2.P.1	D/S	N	N	CCC is structure and function. NGSS specifies specific properties.
MS-PS4-3. Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.	6.2P.1 6-8.4D.3	D/P	N N	D/P P	CCC is structure and function. This is fundamentally different content than what is in the 2009 ORSS.
MS-LS3 Heredity: Inheritance and Variation of Traits					
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.	7.1L.2 8.2L.1 H.1L.2	D/P P D/P	N	D/P	Mutations and proteins are not explicitly addressed in 2009 ORSS. Protein synthesis is not included in this PE. CCC is structure and function.
MS-LS4 Biological Evolution: Unity and Diversity					
MS-LS4-1. Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.	8.1L.1 8.2L.1 8.2E.4 6-8.3S.2	P P P	 P	N	2009 ORSS 8.2E.4 includes geologic, climatic, environmental changes over time, but the NGSS PE does not. CCC is patterns.
MS-LS4-2. Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.	8.1L.1 8.2L.1 8.2E.4 6-8.3S.2	P P P	 P	N	CCC is patterns.

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MS-LS4-3. Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.	8.1L.1 8.2L.1 6-8.3S.2	P/N P	 P/N	N	Embryology not explicitly stated in 2009 ORSS. CCC is patterns.
MS-LS4-4. Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.	8.2L.1 6-8.3S.2	P	 P/N	N	Population genetics is not stated in 2009 ORSS. CCC is cause and effect.
MS-LS4-5. Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.	6-8.4D.3	N	P/N	N	CCC is cause and effect. NGSS clarification provides guidance. Practice is partially similar, content is new.
MS-LS4-6. Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.	8.2L.1 6-8.3S.2	P	 P/N	N	Mathematical representation is not in 2009 ORSS. CCC is cause and effect.
MS-ESS1 Earth's Place in the Universe					
MS-ESS1-1. Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.	8.2E.1 6.1E.2 5.1E.1	S D/P D/P	N	N	Developing and using models is not specifically included in 2009 ORSS. 2009 ORSS 5th and 6th provide background for the NGSS PE.
MS-ESS1-2. Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.	8.2E.1 7.2P.1	S D/P	N	N	2009 ORSS does not include "galaxy." Developing and using models is not specifically included in 2009 ORSS.
MS-ESS1-3. Analyze and interpret data to determine scale properties of objects in the solar system.	6.1E.2 7-8.3S.2 H.1E.1	D/P D/P	 P 	N	NGSS does not include "galaxy" and "universe." 2009 ORSS includes properties, NGSS includes scale. Position of sun not included in NGSS. 2009 ORSS include many facets of the scientific inquiry that are not fully connected to a singular NGSS PE.
MS-ESS1-4. Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.	8.2E.4 7.2E.4 8.2L.1 8.1L.1 6-8.3.2	S D/P P P	 P	N	Rock strata include the climatic and life form changes included in 2009 ORSS. 2009 ORSS include many facets of the scientific inquiry that are not fully connected to a singular NGSS PE.

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MS-ESS3 Earth and Human Activity					
MS-ESS3-4. Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.	6.2E.1 H.1E.2	D/S D/P	N	N	Developing and using models is not specifically included in 2009 ORSS.
MS-ETS1 Engineering Design					
MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.	6.4D.1 7.4D.1 8.4D.1 8.4D.3		S S S S	N N N	2009 ORSS is contained within NGSS, but NGSS PE takes it further. 2009 ORSS does not specifically address environmental impacts (but adding 8.4D.3 to 8.4D.1 is a strong match).
MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.	6.4D.2 7.4D.2 8.4D.2		P P P		Evaluation implies the collection and use of evidence, which makes a stronger alignment. Oregon scoring guide for ED includes evaluating competing solutions.
MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.	6.4D.2 7.4D.2 8.4D.2		N P P		NGSS PE includes optimization.
MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.	8.4D.2		N		
2009 ORSS not aligned to any NGSS:					
8.1P.2 has been moved to HS PS1-1.(Periodic table)					
8.3S.3 – NGSS does not specifically discuss how theories evolve as new information becomes available. Content included in the "Connections to Nature of Science" (found in Appendix H).					