



Standards By Design:

CIM (High School) for Science



Acknowledgment

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Message to Students

Dear Student,

The world is changing quickly. For you to succeed in school, at work, and in the community, you will need more skills and knowledge than ever before. These days, “ready for college” and “ready for work” essentially mean the same thing: “ready for life.”

Getting in shape academically is one of the most important things you can do to prepare for a successful future. Your future starts with Oregon’s academic standards. This booklet explains what you should know and be able to do in each subject, at your grade level.

Please review this guide with your teachers and share it with your parents and family. To be ready for tomorrow, get in top academic shape today. You can use this guide year round to check your progress.



Message to Parents

Dear Parent,

Education is the building block of every student's future. To ensure all students have the opportunity to succeed, Oregon has adopted world-class academic standards in English/language arts, mathematics, science, social studies, the arts, health education, physical education and second languages. The academic content standards clearly outline what students should know and be able to do in each subject, at each grade level. Oregon's teachers are dedicated to helping all students meet these expectations.

Moreover, these standards are the cornerstone of the state's plan for improving student achievement. They provide a comprehensive blueprint for what we must do to support students every step of the way – from their earliest years through post-high school education. To be competitive in today's economy and to earn enough to support a family, all students need to continue their education beyond high school, whether at a two- or four-year college, in an apprenticeship program, or in the military.

How can you help your student meet these challenges? Learning occurs many places, not only in the classroom. Students spend far more time at home than they do in school. How they spend their time can make a real difference. Nothing will have a bigger impact on your student's success than your involvement in his or her education.

On the next page is a list of 12 things you can do to help ensure your child has the best education possible – from preschool to post-high school opportunities. We hope you will use this guide as a tool to help your child succeed today and in the future.

Sincerely,

A handwritten signature in black ink, appearing to read "Susan Castillo". The signature is fluid and cursive, with the first name "Susan" being larger and more prominent than the last name "Castillo".

Susan Castillo
Superintendent of Public Instruction

Twelve things parents can do to help students succeed

- 1. Promote education beyond high school.** Make sure your child knows you expect him or her to continue learning after high school – it's never too early to start raising these expectations. To keep our families, communities, and economy strong, all students need to keep learning.
- 2. Build relationships with your child's teachers.** Find out what each teacher expects of your child. Learn how you can help your child prepare to meet these expectations.
- 3. Read to your child.** Reading is the foundation for all learning and is one of the most important contributions you can make to your child's education. Read to your young child, encourage your older child to read to you, or spend time together as a family reading. All this helps your child develop strong reading habits and skills from the beginning and reinforces these habits and skills as your child grows.
- 4. Practice writing at home.** Letters, journal entries, e-mail messages, and grocery lists are all writing opportunities. Show that writing is an effective form of communication and that you write for a variety of purposes.
- 5. Make math part of everyday life.** Paying bills, cooking, gardening, and even playing games are all good ways to help your child understand and use mathematics skills. Show that there may be many ways to get to the right answer and encourage your child to explain his or her method.
- 6. Ask your child to explain his or her thinking.** Ask lots of "why" questions. Children should be able to explain their reasoning, how they came up with their answer, and why they chose one answer over another.
- 7. Expect that homework will be done.** Keep track of your child's homework assignments and regularly look at his or her completed work. Some teachers give parents a number to call for a recorded message of that day's homework; others put the assignments on the Internet. If your school doesn't offer these features, talk to the teacher about how you can get this important information. Even if there aren't specific assignments, stay informed about what your child is working on so that you can help at home.
- 8. Use the community as a classroom.** Feed your child's curiosity about the world 365 days a year. Use the library to learn more about the history of your town. A visit to a farmer's market can help your child picture our state's rich agricultural tradition. Take your young child to zoos and parks and your older child to museums and workplaces to show how learning connects to the real world.
- 9. Encourage group study.** Open your home to your child's friends for informal study sessions. Promote outside formal study groups through church, school organizations, or other groups. Study groups will be especially important as your child becomes older and more independent. The study habits your child learns now will carry over into college and beyond.
- 10. Spend time at school.** The best way to know what goes on in your child's school is to spend time there. If you're a working parent, this isn't easy, and you may not be able to do it very often. Even so, "once in awhile" is better than "never."
- 11. Start a college savings plan as soon as possible.** Investigate Oregon's College Savings Plan and other investment vehicles and contribute as much as you can.

12. Promote high standards for all. To ensure the academic success of our children, everyone must work toward the same goal. Discuss academic expectations with parents and other people in your community. Use your school and employee newsletters, athletic associations, booster clubs, a PTA or PTO meeting, or just a casual conversation to explain why academic standards are important and what they mean to you and your family. Share your tips for helping your own son or daughter succeed in school and encourage others to share their suggestions as well.

Remember: You are the most important influence on your child. Oregon's academic standards give you important tools to ensure your child gets the best education possible and is well prepared for the future.



Measuring Student Learning

Children develop at different rates. Some take longer and need more help to learn certain skills.

Assessments at the state level provide a measure of school accountability – assisting schools in their efforts to align curriculum and instruction with the state’s academic standards and reporting progress to parents and the public.

Assessments at the classroom level help teachers and parents understand how students are progressing and assist in identifying academic areas where students may need additional attention.

The Oregon Assessment of Knowledge and Skills (OAKS) consists of three broad areas:

1. Multiple Choice Tests present the student with a series of questions or problems. The student responds on an answer sheet and responses are scored by machine. These tests are required in grades 3-8 and high school/CIM for English Language Arts and mathematics and for grades 5, 8, and high school/CIM in science. An optional multiple choice test is also available for Social Sciences in grades 5, 8 and high school/CIM.

2. State Writing Assessments require students to give extended written responses to open-ended topics provided by the state in a supervised testing situation. Trained raters at state-run scoring sites judge student work using the state scoring guide. These performance assessments are required for grades 4, 7 and high school/CIM.

3. Classroom Work Samples are a series of formal classroom assessments available to Oregon teachers in grades 3 to high school/CIM that allow students to respond to locally provided topics or complex problems. Student work is rated by teachers in their own schools or districts using state scoring guides. Work samples are collected in Writing, Speaking, Mathematics Problem Solving, Scientific Inquiry and Social Science Analysis.

Who is required to take state assessments?

Third grade is the first time that many students will be taking a statewide assessment. Third grade students take tests in Reading/Literature and Mathematics that are delivered through TESA (Technology Enhanced State Assessment) a computerized adaptive testing system.

The table below lists the statewide assessment schedule, by grade.

Required Statewide Testing

	3	4	5	6	7	8	10/CIM
Reading/Literature	X	X	X	X	X	X	X
Writing		X			X		X
Mathematics	X	X	X	X	X	X	X
Science			X			X	X
Social Sciences (optional)			X			X	X

How is student performance measured on these assessments?

Content Standards describe what students in Oregon should learn. How well they learn the content is determined by Achievement Standards. These Achievement Standards, or “cut scores”, identify the score needed to demonstrate solid understanding of the Content Standards. The following table shows the current Achievement Standards in Reading/Literature and Mathematics for grades 3-8 and 10/CIM.

Grade	<u>Reading/Literature</u>		<u>Mathematics</u>		<u>Science</u>	
	Meet	Exceed	Meet	Exceed	Meet	Exceed
3	204	218	205	217	----	----
4	211	223	212	225	----	----
5	218	230	218	229	225	238
6	222	234	221	232	----	----
7	227	239	226	238	----	----
8	231	241	230	241	234	246
10/CIM	236	248	236	246	239	249

The state writing assessment and classroom work samples are scored using state scoring guides. As an assessment tool, scoring guides provide specific criteria to describe a range of possible student responses and a consistent set of guidelines to rate student work. For the state writing assessment, student work is scored by two different raters and their scores combined to create a “composite score.”

Since the scoring guide serves as the primary assessment tool to determine whether students have met the standards through a collection of work samples, teachers are asked to align their classroom assessments carefully to the criteria described on the scoring guide. **Composite scores are not required for classroom work samples.**

For more information on assessments, please visit <http://www.ode.state.or.us/search/results/?id=169>

Science

Benchmark CIM (High School)

CIM-level students study properties of elements and their relationship to the periodic table. They analyze the effects of factors on physical changes and chemical reactions. Students learn the effects of multiple forces acting on an object. They study differences and similarities between kinds of waves as a means of transmitting energy and analyze examples of conservation of energy. Life science study includes the structure and functions of cells in organisms, laws of heredity and their relationship to the structure and function of DNA, the effect of species on an ecosystem, and how living things have changed over geological time. Students learn how the importance and use of resources has changed over time with changes in economic and technological systems, the relationship between global energy transfer and climate, the evidence of ongoing evolution of the Earth system, and how mass and distance affect the interaction between Earth and other objects in space. Students use their Scientific Inquiry skills to design a scientific investigation that provides sufficient data to answer a question or test a hypothesis, collect, organize, and display sufficient data to facilitate scientific analysis and interpretation, summarize and analyze data, evaluating sources of error or bias, and propose explanations that are supported by data and knowledge of scientific terminology.

Physical Science

CCG: Matter :
Understand structure and properties of matter.

CIM (High School)

SC.CM.PS.01

Describe properties of elements and their relationship to the periodic table.

SC.CM.PS.01.01

Explain atoms and their base components (protons, neutrons, and electrons) as a basis for all matter.

SC.CM.PS.01.02

Read and interpret the periodic table, recognizing the relationship of the chemical and physical properties of the elements to their position on the periodic table.

SC.CM.PS.01.03

Recognize that the historical development of atomic theory demonstrates how scientific knowledge changes over time, and how those changes have had an impact on society.

CCG: Matter :
Understand chemical and physical changes.

CIM (High School)

SC.CM.PS.02

Analyze the effects of various factors on physical changes and chemical reactions.

SC.CM.PS.02.01

Describe how transformations among solids, liquids, and gases occur (change of state).

SC.CM.PS.02.02

Identify factors that can influence change of state, including temperature, pressure, and concentration.

SC.CM.PS.02.03

Describe chemical reactions in terms of reactants and products.

SC.CM.PS.02.04

Describe the factors that affect the rate of chemical reactions.

Plain text denotes benchmark standards. Material in *Italics* is eligible for statewide assessment.

SC.CM.PS.02.05

Recognize examples that show when substances combine or break apart in a chemical reaction, the total mass remains the same (conservation of mass).

CCG: Force :

Understand fundamental forces, their forms, and their effects on motion.

CIM (High School)

SC.CM.PS.03

Describe and explain the effects of multiple forces acting on an object.

SC.CM.PS.03.01

Understand and apply the relationship $F=ma$ in situations in which one force acts on an object.

SC.CM.PS.03.02

Recognize that equal and opposite forces occur when one object exerts a force on another.

SC.CM.PS.03.03

Describe the forces acting on an object, based on the motion of that object.

SC.CM.PS.04

Recognize that gravity is a universal force.

SC.CM.PS.04.01

Describe the relationship of mass and distance to gravitational force.

CCG: Energy :

Understand energy, its transformations, and interactions with matter.

CIM (High School)

SC.CM.PS.05

Describe differences and similarities between kinds of waves, including sound, seismic, and electromagnetic, as a means of transmitting energy.

SC.CM.PS.05.01

Recognize that waves of all kinds have energy that can be transferred when the waves interact with matter.

SC.CM.PS.05.02

Apply the concepts of frequency, wavelength, amplitude, and energy to electromagnetic and mechanical waves.

SC.CM.PS.06

Describe and analyze examples of conservation of energy.

SC.CM.PS.06.01

Recognize that heat energy is a by-product of most energy transformations.

SC.CM.PS.06.02

Describe ways in which energy can be transferred, including chemical reactions, nuclear reactions, and light waves.

SC.CM.PS.06.03

Explain the difference between potential and kinetic energy.

SC.CM.PS.06.04

Analyze the flow of energy through a system by applying the law of conservation of energy.

Life Science

CCG: Organisms :

Understand the characteristics, structure, and functions of organisms.

CIM (High School)

Plain text denotes benchmark standards. Material in *Italics* is eligible for statewide assessment.

SC.CM.LS.01

Describe, explain, and compare the structure and functions of cells in organisms.

SC.CM.LS.01.01

Describe how biological systems can maintain equilibrium (homeostasis).

SC.CM.LS.01.02

Identify unique structures in cells from plants, animals, and prokaryotes.

SC.CM.LS.01.03

Identify cell organelles and state how their activities contribute to a particular type of cell carrying out its functions.

SC.CM.LS.01.04

Explain the role of the cell membrane in cell transport.

SC.CM.LS.01.05

Distinguish between active and passive transport, including diffusion and osmosis, explaining the mechanics of each.

SC.CM.LS.01.06

Describe photosynthesis as a chemical process and part of the carbon cycle.

SC.CM.LS.01.07

Explain how the development of tools and technology, including microscopes, has aided in the understanding of cells and microbes.

CCG: Heredity :
Understand the transmission of traits in living things.

CIM (High School)

SC.CM.LS.02

Explain laws of heredity and their relationship to the structure and function of DNA.

SC.CM.LS.02.01

Describe the structure of DNA and the way that DNA functions to control protein synthesis.

SC.CM.LS.02.02

Recognize and understand the differences between meiosis and mitosis in cellular reproduction.

SC.CM.LS.02.03

Recognize that changes in DNA (mutations) and anomalies in chromosomes create changes in organisms.

SC.CM.LS.02.04

Apply concepts of inheritance of traits, including Mendel's laws, Punnett squares, and pedigrees, to determine the characteristics of offspring.

SC.CM.LS.02.05

Recognize the existence of technology that can alter and/or determine inherited traits.

CCG: Diversity/Interdependence :
Understand the relationships among living things and between living things and their environments.

CIM (High School)

SC.CM.LS.03

Describe and analyze the effect of species, including humans, on an ecosystem.

SC.CM.LS.03.01

Predict outcomes of changes in resources and energy flow in an ecosystem.

SC.CM.LS.03.02

Explain how humans and other species can impact an ecosystem.

SC.CM.LS.03.03

Plain text denotes benchmark standards. Material in *Italics* is eligible for statewide assessment.

Explain how the balance of resources will change with the introduction or loss of a new species within an ecosystem.

SC.CM.LS.04

Analyze how living things have changed over geological time, using fossils and other scientific evidence.

SC.CM.LS.04.01

Recognize that, over time, natural selection may result in development of a new species or subspecies.

SC.CM.LS.04.02

Recognize that natural selection and its evolutionary consequences provide an explanation for the fossil record as well as an explanation for the molecular similarities among varied species.

SC.CM.LS.04.03

Explain how biological evolution can account for the diversity of species developed over time.

SC.CM.LS.04.04

Explain the relationship between genetics, mutations, and biological evolution.

SC.CM.LS.04.05

Explain how our understanding of evolution has changed over time.

Earth and Space Science

CCG: The Dynamic Earth :

Understand the properties and limited availability of the materials which make up the Earth.

CIM (High School)

SC.CM.ES.01

Describe how the importance and use of resources has changed over time with changes in economic and technological systems.

SC.CM.ES.01.01

Predict consequences of increased consumption of renewable and non-renewable resources.

CCG: The Dynamic Earth :

Understand changes occurring within the lithosphere, hydrosphere, and atmosphere of the Earth.

CIM (High School)

SC.CM.ES.02

Analyze the relationship between global energy transfer and climate.

SC.CM.ES.02.01

Describe the effect of various gases in the atmosphere on the amount of energy retained by the Earth system.

SC.CM.ES.02.02

Describe how solar radiation and the amount that reaches Earth is affected by stratospheric ozone.

SC.CM.ES.02.03

Describe how differential heating of the Earth's surface, atmosphere, and oceans produces wind and ocean currents.

SC.CM.ES.03

Analyze evidence of ongoing evolution of the Earth system.

SC.CM.ES.03.01

Describe methods of determining ages of rocks and fossils.

SC.CM.ES.03.02

Use rock sequences and fossil evidence to determine geologic history.

Plain text denotes benchmark standards. Material in *Italics* is eligible for statewide assessment.

SC.CM.ES.03.03

Describe and analyze theories of Earth's origin and early history using scientific evidence.

SC.CM.ES.03.04

Describe how earthquakes, volcanic eruptions, mountain building, and continental movements result from slow plate motions.

SC.CM.ES.03.05

Describe how the evolution of life caused dramatic changes in the composition of the Earth's atmosphere, which did not originally contain oxygen.

SC.CM.ES.03.06

Identify how volcanic eruptions and impacts of huge rocks from space can cause widespread effects on climate.

CCG: The Earth in Space :
Understand the Earth's place in the solar system and the universe.

CIM (High School)

SC.CM.ES.04

Explain how mass and distance affect the interaction between Earth and other objects in space.

SC.CM.ES.04.01

Recognize that the sun's gravitational pull holds the Earth and other planets in their orbits, just as the planets' gravitational pull keeps their moons in orbit around them.

SC.CM.ES.04.02

Explain that the force of gravity between Earth and other objects in space depends only upon their masses and the distances between them.

Scientific Inquiry

CCG: Forming the Question/Hypothesis :
Formulate and express scientific questions or hypotheses to be investigated.

CIM (High School)

SC.CM.SI.01

Based on observations and scientific concepts, ask questions or form hypotheses that can be answered or tested through scientific investigations.

CCG: Designing the Investigation :
Design safe and ethical scientific investigations to address questions or hypotheses.

CIM (High School)

SC.CM.SI.02

Design a scientific investigation that provides sufficient data to answer a question or test a hypothesis.

CCG: Collecting and Presenting Data :
Conduct procedures to collect, organize, and display scientific data.

CIM (High School)

SC.CM.SI.03

Collect, organize, and display sufficient data to facilitate scientific analysis and interpretation.

Plain text denotes benchmark standards. Material in *Italics* is eligible for statewide assessment.

CCG: Analyzing Data and Interpreting Results :
Analyze scientific information to develop and present conclusions.

CIM (High School)

SC.CM.SI.04

Summarize and analyze data, evaluating sources of error or bias. Propose explanations that are supported by data and knowledge of scientific terminology.