

# Washington State Science Learning Standards Grades 6-8

## EARL 1: Systems

### Content Standards

### Performance Expectations

*Students will know that:*

*Students are expected to:*

6-8 SYSF

The *natural* and *designed world* is complex; it is too large and complicated to *investigate* and comprehend all at once. Scientists and students learn to define small portions for the convenience of *investigation*. The units of *investigation* can be referred to as —*systems*.

Given a complex societal issue with strong *science* and *technology* components (e.g., overfishing, global warming), *describe* the issue from a *systems* point of view, highlighting how changes in one part of the *system* are likely to influence other parts of the *system*.

## EARL 2: Inquiry

6-8 INQA  
Question

Scientific *inquiry* involves asking and answering *questions* and comparing the answer with what scientists already know about the world.

*Generate a question* that can be answered through scientific *investigation*. This may involve refining or refocusing a broad and ill-defined *question*.

6-8 INQB  
Investigate

Different kinds of *questions* suggest different kinds of scientific *investigations*.

Plan and conduct a scientific *investigation* (e.g., *field study*, *systematic observation*, *controlled experiment*, *model*, or *simulation*) that is appropriate for the *question* being asked.

Propose a *hypothesis*, give a reason for the *hypothesis*, and *explain how* the planned *investigation* will test the *hypothesis*.

Work collaboratively with other students to carry out the *investigations*.

6-8 INQC  
Investigate

Collecting, analyzing, and displaying data are essential aspects of all *investigations*.

*Communicate* results using pictures, tables, charts, diagrams, graphic displays, and text that are clear, accurate, and informative.

Recognize and *interpret patterns* – as well as *variations* from previously learned or observed *patterns* – in data, diagrams, symbols, and words. Use statistical procedures (e.g., median, mean, or mode) to *analyze* data and make *inferences* about *relationships*.

6-8 INQD  
Investigate

For an *experiment* to be valid, all (*controlled*) *variables* must be kept the same whenever possible, except for the *manipulated (independent) variable* being tested and the *responding (dependent) variable* being measured and recorded. If a *variable* cannot be *controlled*, it must be reported and accounted for.

Plan and conduct a *controlled experiment* to test a *hypothesis* about a *relationship* between two *variables*. Determine which *variables* should be kept the same (*controlled*), which (*independent*) *variable* should be systematically *manipulated*, and which *responding (dependent) variable* is to be measured and recorded. Report any *variables* not *controlled* and *explain how* they might affect results.

6-8 INQE Model	<i>Models</i> are used to represent objects, events, <i>systems</i> , and processes. <i>Models</i> can be used to test <i>hypotheses</i> and better understand <i>phenomena</i> , but they have limitations.	Create a <i>model</i> or <i>simulation</i> to represent the behavior of objects, events, <i>systems</i> , or processes. Use the <i>model</i> to explore the <i>relationship</i> between two <i>variables</i> and point out how the <i>model</i> or <i>simulation</i> is similar to or different from the actual phenomenon.
6-8 INQF Explain	It is important to distinguish between the results of a particular <i>investigation</i> and general conclusions drawn from these results.	<i>Generate</i> a scientific <i>conclusion</i> from an <i>investigation</i> using inferential logic, and clearly distinguish between results (e.g., <i>evidence</i> ) and conclusions (e.g., explanation). <i>Describe</i> the differences between an objective summary of the findings and an <i>inference</i> made from the findings.
6-8 INQG Communicate Clearly	Scientific reports should enable another investigator to repeat the study to check the results.	Prepare a written report of an <i>investigation</i> by clearly describing the <i>question</i> being <i>investigated</i> , what was done, and an objective summary of results. The report should provide <i>evidence</i> to accept or reject the <i>hypothesis</i> , <i>explain</i> the <i>relationship</i> between two or more <i>variables</i> , and identify limitations of the <i>investigation</i> .
6-8 INQH Intellectual Honestly	<i>Science</i> advances through openness to new <i>ideas</i> , honesty, and legitimate <i>skepticism</i> . Asking thoughtful <i>questions</i> , querying other scientists' explanations, and evaluating one's own thinking in response to the <i>ideas</i> of others are abilities of scientific <i>inquiry</i> .	Recognize flaws in scientific <i>claims</i> , such as uncontrolled <i>variables</i> , overgeneralizations from limited data, and experimenter bias. Listen actively and respectfully to research reports by other students. Critique their presentations respectfully, using <i>logical argument</i> and <i>evidence</i> . Engage in reflection and self-evaluation.
6-8 INQI <i>Consider</i> Ethics	Scientists and engineers have ethical codes governing animal <i>experiments</i> , research in natural <i>ecosystems</i> , and studies that involve human subjects.	Demonstrate ethical concerns and precautions in response to scenarios of scientific <i>investigations</i> involving animal <i>experiments</i> , research in natural <i>ecosystems</i> , and studies that involve human subjects.

**EALR 3: Application**

6-8 APPD	The process of <i>technological design</i> begins by defining a problem and identifying <i>criteria</i> for a successful <i>solution</i> , followed by research to better understand the problem and brainstorming to arrive at potential <i>solutions</i> .	Define a problem that can be solved by <i>technological design</i> and identify <i>criteria</i> for success. Research how others solved similar problems. Brainstorm different <i>solutions</i> .
----------	--	---

6-8 APPE	Scientists and engineers often work together to generate creative solutions to problems and decide which ones are most promising.	Collaborate with other students to generate creative solutions to a problem, and apply methods for making trade-offs to choose the best solution.
6-8 APPF	<i>Solutions</i> must be tested to determine whether or not they will solve the problem. Results are used to modify the <i>design</i> , and the best <i>solution</i> must be communicated persuasively.	Test the best <i>solution</i> by building a <i>model</i> or other representation and using it with the intended audience. Redesign as necessary. Present the recommended <i>design</i> using <i>models</i> or drawings and an engaging presentation.

**EALR 4: Life Science**

6-8 LS2E	<i>Investigations</i> of <i>environmental</i> issues should uncover <i>factors</i> causing the problem and relevant scientific <i>concepts</i> and findings that may inform an <i>analysis</i> of different ways to address the issue.	<i>Investigate</i> a local <i>environmental</i> issue by defining the problem, researching possible causative <i>factors</i> , understanding the underlying <i>science</i> , and evaluating the benefits and risks of alternative <i>solutions</i> . Identify resource uses that reduce the capacity of <i>ecosystems</i> to support various <i>populations</i> (e.g., use of pesticides, construction).
----------	--	---

## Washington State Science Learning Standards Grades 9-11

### EARL 2: Inquiry

	<u>Content Standards</u>	<u>Performance Expectations</u>
	<i>Students will know that:</i>	<i>Students are expected to:</i>
9-12 INQA Question	Scientists <i>generate</i> and <i>evaluate</i> questions to <i>investigate</i> the natural world.	<i>Generate</i> and <i>evaluate</i> a question that can be answered through a scientific <i>investigation</i> . Critique <i>questions generated</i> by others and <i>explain</i> whether or not the <i>questions</i> are scientific.
9-12 INQB Investigate	Scientific progress requires the use of various methods appropriate for answering different kinds of research <i>questions</i> , a thoughtful plan for gathering data needed to answer the <i>question</i> , and care in collecting, <i>analyzing</i> , and displaying the data.	Plan and conduct a scientific <i>investigation</i> , choosing a method appropriate to the <i>question</i> being asked. Collect, <i>analyze</i> , and display data using calculators, computers, or other technical devices when available.
9-12 INQC Explain	<i>Conclusions</i> must be logical, based on <i>evidence</i> , and consistent with prior <i>established</i> knowledge.	Draw <i>conclusions</i> supported by <i>evidence</i> from the <i>investigation</i> and consistent with <i>established</i> scientific knowledge. Analyze alternative explanations and decide which best fits the data and <i>evidence</i> .
9-12 INQD Communicate Clearly	The methods and procedures that scientists use to obtain <i>evidence</i> must be clearly reported to enhance opportunities for further <i>investigation</i> .	Write a detailed laboratory report that includes: the <i>question</i> that motivated the study, a justification for the kind of <i>investigation</i> chosen, <i>hypotheses</i> (if any), a description of what was done, a summary of data in tables and graphs, and a <i>conclusion</i> , based on the <i>evidence</i> , that responds to the <i>question</i> .
9-12 INQE Model	The essence of scientific <i>investigation</i> involves the development of a <i>theory</i> or conceptual <i>model</i> that can <i>generate</i> testable predictions.	Formulate one or more <i>hypotheses</i> based on a <i>model</i> or <i>theory</i> of a causal <i>relationship</i> . Demonstrate creativity and critical thinking to formulate and <i>evaluate</i> the <i>hypotheses</i> .
9-12 INQF Communicate	<i>Science</i> is a human endeavor that involves logical reasoning and creativity and entails the testing, revision, and occasional discarding of theories as new <i>evidence</i> comes to light.	<i>Evaluate</i> an <i>investigation</i> to determine if it was a <i>valid</i> means of answering the <i>question</i> , and whether or not the results were <i>reliable</i> . <i>Describe</i> the development of a scientific <i>theory</i> that illustrates logical reasoning, creativity, testing, revision, and replacement of prior <i>ideas</i> in light of new <i>evidence</i> .

9-12 INQG Intellectual Honesty	Public <i>communication</i> among scientists is an essential aspect of research. Scientists <i>evaluate</i> the <i>validity</i> of one another's <i>investigations</i> , check the <i>reliability</i> of results, and <i>explain</i> inconsistencies in findings.	Participate in a scientific discussion about one's own <i>investigations</i> and those performed by others. Respond to <i>questions</i> and criticisms, and if appropriate, revise explanations based on these discussions.
9-12 INQH Intellectual Honesty	Scientists carefully <i>evaluate</i> sources of information for <i>reliability</i> before using that information. When referring to the <i>ideas</i> or findings of others, they cite their sources of information.	Provide appropriate citations for all <i>ideas</i> , findings, and information used in any and all written reports. <i>Explain</i> the consequences for failure to provide appropriate citations.

**EALR 3: Application**

9-12 APPF	It is important for all citizens to <i>apply science</i> and <i>technology</i> to critical issues that influence society.	Critically <i>analyze</i> scientific information in current events to make personal choices or to understand public-policy decisions.
-----------	---	---