Preparing for the Biology End of Course Exam

Teaching and Learning Science & Assessment Informational Webinars

Presenter: Linda Cabe Smith, Science Assessment Specialist
Ellen Ebert, Science Director,Teaching and Learning

Topics

- General Information
- OSPI Resources
  - Updates
  - Test and Item Specifications
  - Short Answer Templates
- Upcoming Events

Who Takes the Biology EOC?

- **Students in the class of 2014** (current 10th graders) are required to take the biology EOC in spring 2012
- **Students in the class of 2015** (current 9th)
  - Students taking a biology course in 2011-12 will take the biology EOC in spring 2012.
  - Students not taking a biology course in 2011-12 will take the biology EOC in spring 2013.

How will the Biology EOC be administered?

- Testing window: **May 7** through **June 15, 2012**
- Locally determined schedule, **during last three weeks** of the course
- May be administered in **three 50 minute class** settings, or in a **single session** of approximately **150 minutes**
- First retake opportunity will be **Winter 2013**

Biology EOC Test Map

EALR	Percent of EOC
1: Systems (crossed with Life Science and alone)	At least 15
2: Inquiry (crossed with Life Science and alone)	20 – 25
3: Application (crossed with Life Science and alone)	15
4: Life science domain of EALR 4 (alone)	45 – 50

Biology EOC Test Map

Life Science Domain of EALR 4	Percent of EALR 4 Items	Percent of EOC Points
Processes in cells (LS1)	40-45	20-23
Maintenance and stability of populations (LS2)	30-35	15-18
Mechanisms of Evolution (LS3)	25-30	14-16

Biology EOC: Number and Types of Items

Item Type	Biology EOC
Multiple Choice	30-34
Completion	1-5
Short Answer	5
Total Items	**40**
Total Points	**45**
Pilot Items	5

Questions
or
Comments

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Science Assessment:

http://www.k12.wa.us/Science/Assessments.aspx

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Assessments

Science Assessment involves two tests: the Measurements of Student Progress for grades 3-8, and the High School Proficiency Exam, explained below. These tests replace the WASL, which was the state's assessment until 2009.

- Educator Resources
- Teacher Resource Tool
- Test and Item Specifications - NEW
- Released Items Documents
- Powerful Classroom Assessments
- Performance Level Descriptors

Assessing Science in Grades 3-8:
Measurements of Student Progress (MSP)
In spring 2010, the Measurements of Student Progress (MSP) replaced the WASL. The 2010 science MSP measured the level of progress that Washington students have achieved based on the 2005 GLEs. In Spring 2011, the science MSP will test the 2009 Standards.

The science MSP will take place in a single day. It includes multiple choice, short answer and completion items.

Highlights

Science Short-Answer Item Templates

SALT - Training and Events

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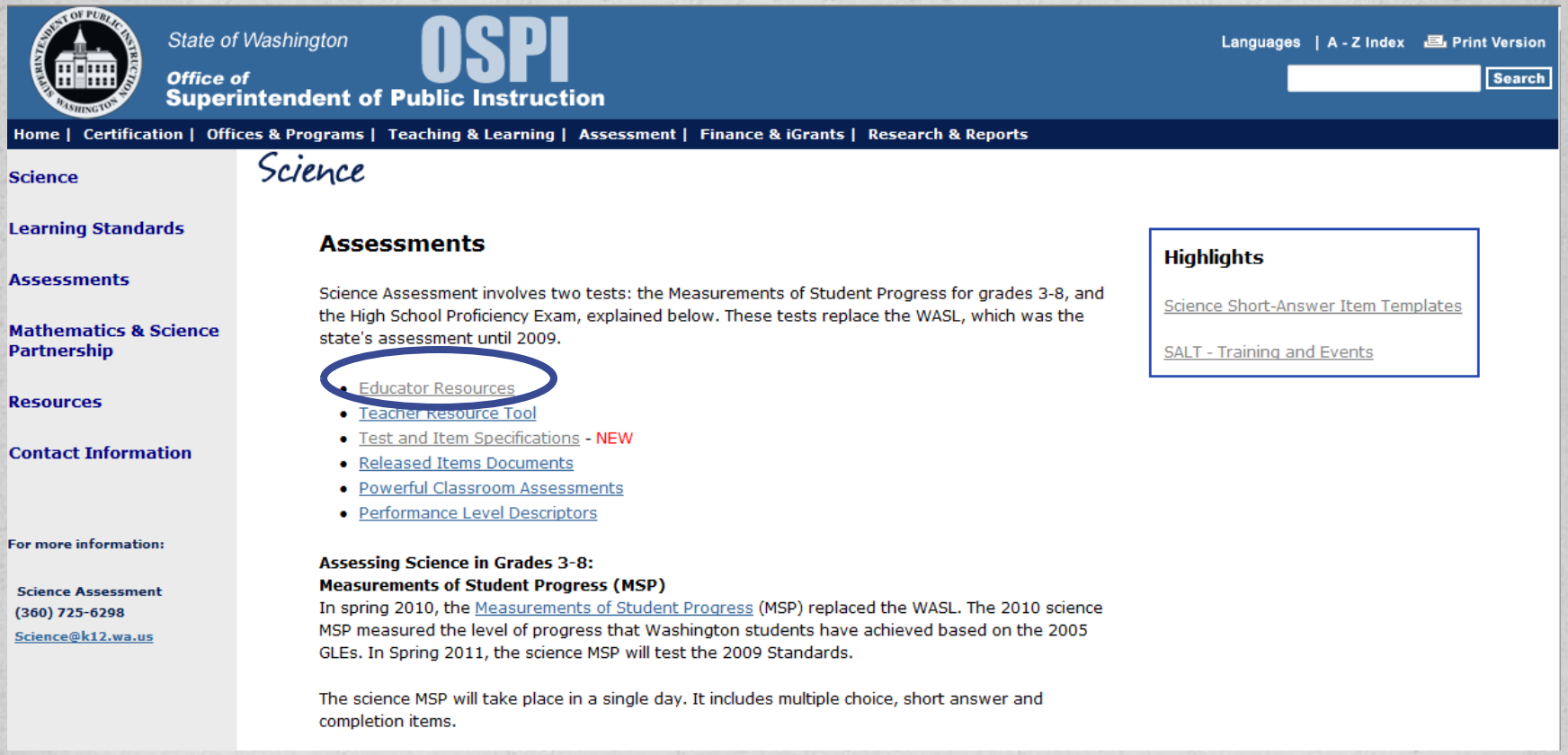

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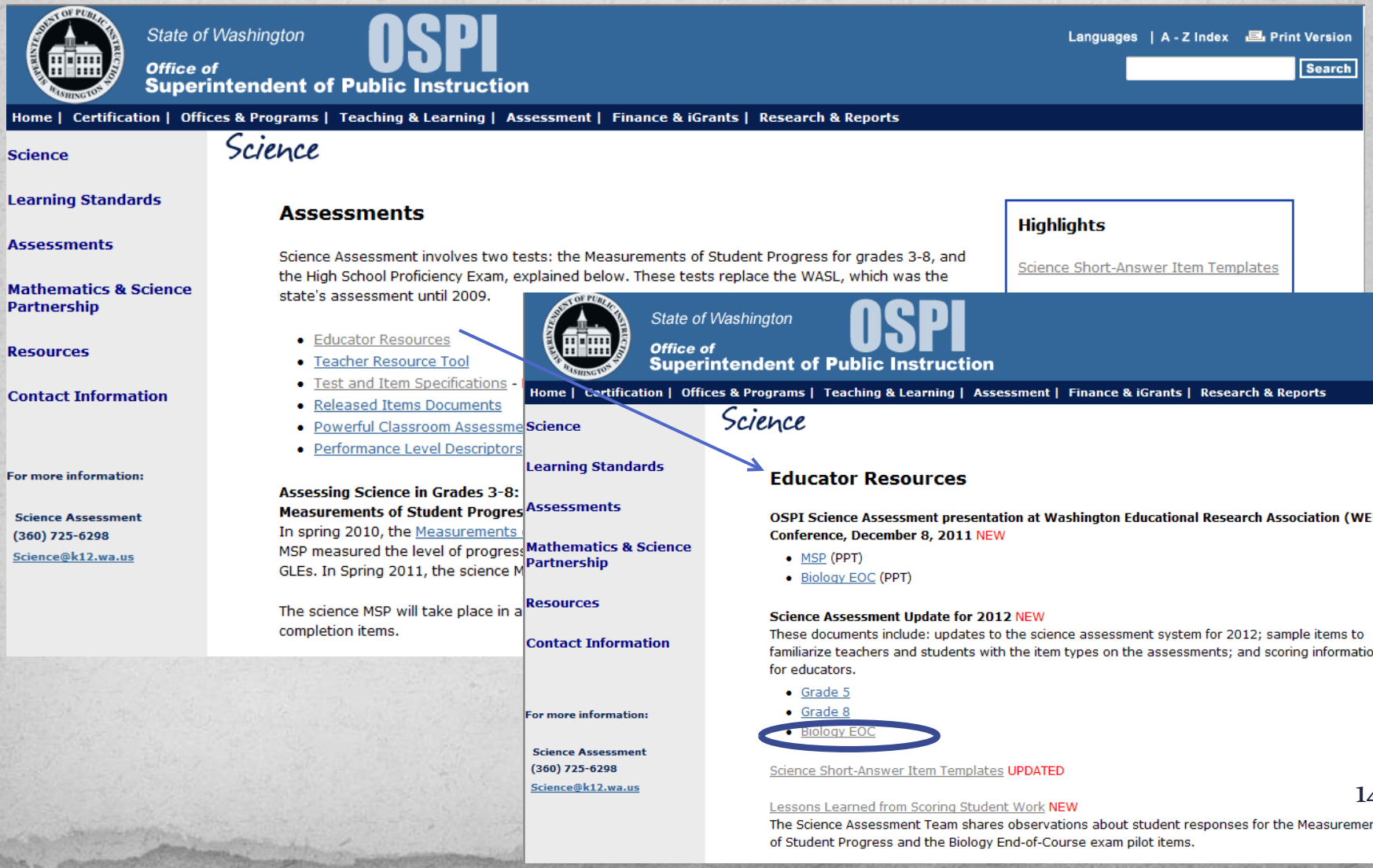

Updates:

SCIENCE Assessment

Updates for 2012

Biology
End-of-Course (EOC)
Exam

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SCIENCE Assessment

Updates for 2012

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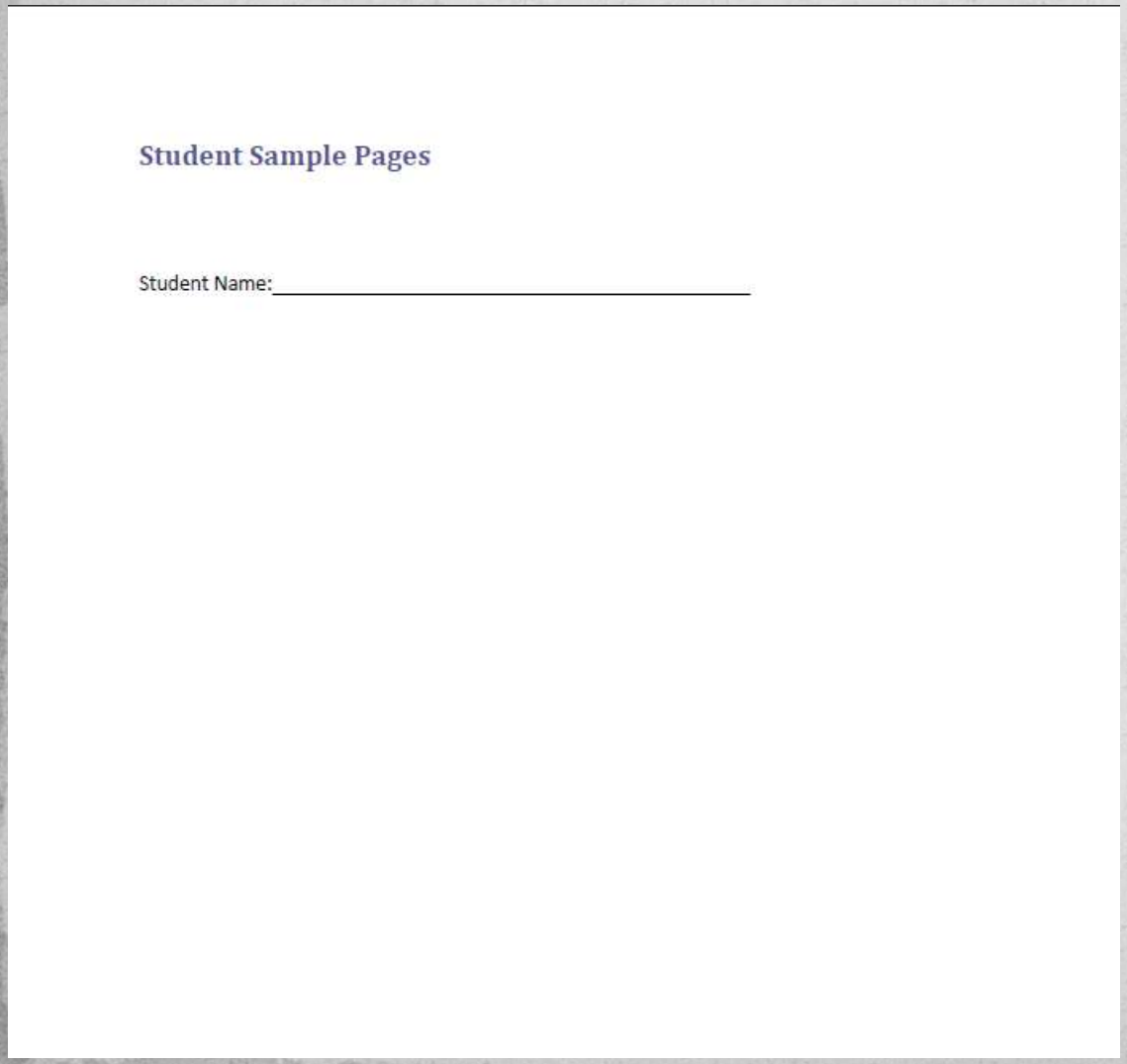
Table of Contents

Updates: Student Sample Pages



Student Sample Pages

Student Name:_____

Updates: Student Sample Pages

Student Sample Pages

Student Name:_____

Stand-alone items

Directions: Answer questions 1 and 2 on pages 10 and 11. They are not connected to a scenario.

1 People sweat to help maintain body temperature. What type of feedback happens when sweating regulates body temperature?

- o **A.** Positive feedback, because sweating can increase body temperature
- o **B.** Positive feedback, because sweating can decrease body temperature
- o **C.** Negative feedback, because sweating can decrease body temperature
- o **D.** Negative feedback, because sweating can increase body temperature

Student Sample Pages (scenario)

Foaming Spuds

Directions: Use the following information to answer questions 3 through 6 on pages 14 through 17.

Mike and Kelsey were studying how hydrogen peroxide (H_2O_2) in cells breaks down to form water and oxygen. When this reaction happens, bubbles of oxygen gas are released, producing foam. This reaction is described as follows:

$$2H_2O_2 \rightarrow 2H_2O + O_2$$

hydrogen peroxide → water + oxygen

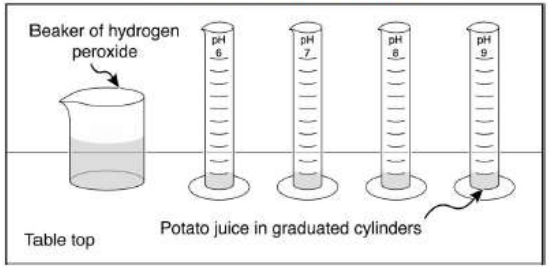
A protein named *catalase*, found in all cells including potatoes, increases the rate of this reaction. Mike and Kelsey used potato juice as the source of *catalase* to do the following controlled experiment.

Question: What is the effect of the acidity of potato juice on the volume of foam produced when hydrogen peroxide is added to potato juice?

Prediction: As the acidity of potato juice decreases (higher pH), the volume of foam will increase.

Materials:
graduated cylinders labeled pH 6, pH 7, pH 8, and pH 9
potato juice from the same potato,
divided and adjusted to four acidities: pH 6, pH 7, pH 8, and pH 9
hydrogen peroxide (H_2O_2)
beaker
stopwatch
stirring rods
thermometer

Controlled Experiment Setup



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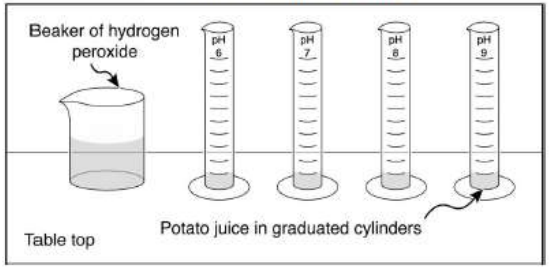

3 How could Mike and Kelsey be more certain the results of their experiment are reliable?

- o **A.** Test the reaction with other acidities of potato juice.
- o **B.** Repeat the experiment the same way.
- o **C.** Increase the volume of potato juice.
- o **D.** Use a different type of plant juice.

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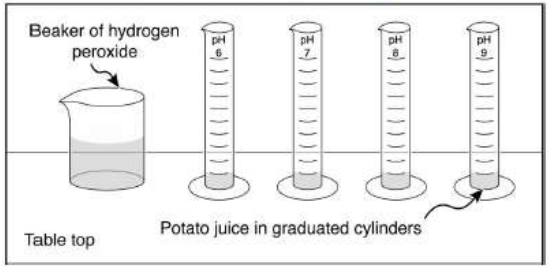

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4 Write a conclusion for this controlled experiment.

In your conclusion, be sure to:
- Answer the experimental question.
- Include supporting data from the Acidity of Potato Juice vs. Volume of Foam table.
- Explain how these data support your conclusion.
- Provide a scientific explanation for the trend in the data.

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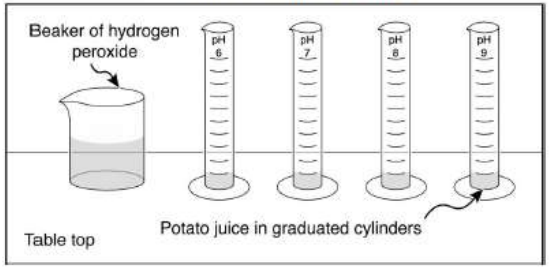

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13 Before the drought, Daphne Major had 720 finches living on 80 acres of land. What was the population density of finches on Daphne Major?

Write your answer in the box.

_____ finches per acre

Teacher Answer Pages

Teacher Answer Pages

The following pages provide:

- An Answer Key Table for each scenario with:
  - Item Specification text
  - Item Specification code
    - For example: LS2A(2) is the second item specification for content standard LS2A.
  - Correct answers for the multiple choice questions
  - Cognitive level of the questions, based on Webb's Depth of Knowledge*
- Rubrics for completion and short-answer items (student words are in italics)
- Annotated (scored) student responses for each of the short-answer items (student words are in italics)

* See Appendix A of the *Test and Item Specification* document for more information about cognitive levels.

Teacher Answer Pages: (Answer key table)

Green Machine Scenario

Answer Key Table

Title: Green Machine		Grade: Biology EOC								
Description: A systems scenario in the context of life science										
	Item Description Item Specification Text	**Item Specification Code**						Answer	Cognitive Level
		Systems	Inquiry	Application	Structures & Functions	Ecosystems	Biological Evolution		
7	Describe the relationships among DNA, chromosomes, genes, amino acids, proteins, and/or traits.				LS1E (3)			A	1
8	Identify a question that scientists may investigate that is stimulated by the needs of society (e.g., medical research, global climate change).			APPA (2)				B	2
9	Describe cellular respiration as the process cells use to change the energy of glucose into energy in the form of ATP and/or the process that provides the energy source for most living organisms.				LS1B (1)			C	1
10	Predict the possible consequences of a change in a given complex system and/or describe why a simplified model may not be able to reliably predict those consequences.	SYSC (2)						SA	3

Teacher Answer Pages: (Answer key table)

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Short Answer Rubric

Scoring Rubric for Item 10: Green Machine Model

Performance Description

A **2-point response** demonstrates the student understands the Content Standard SYSC: In complex systems, entirely new and unpredictable properties may emerge. Consequently, modeling a complex system in sufficient detail to make reliable predictions may not be possible. Item specification 1: Describe the inadequacies of the model, given a model of a complex system that is lacking sufficient detail to make reliable predictions about that system.

The response describes **two** ways the greenhouse model may lead to unreliable predictions about the effects of amount of sunlight on green pepper production in a garden ecosystem by:
Describing **two** differences that make a garden ecosystem more complex than the greenhouse.
AND
Describing how **each** difference could cause predictions about green pepper production in a garden ecosystem to be unreliable.

Examples:

Ways the garden ecosystem is more complex:	**How each difference causes predictions to be unreliable:**
There are other plants in the garden	*Other plants may attract more bees*
Temperature/humidity/rainfall is much more varied in the garden	*Would not be able tell whether differences in production were due to light or changes in the weather*
Many more interactions between animals/ other organisms in the garden	*Animals (deer, rabbits, raccoons, birds) damage or fertilize plants causing differences in pepper production*

A **1-point response** demonstrates the student has partial understanding of the Content Standard.

The response describes **one** way results from the greenhouse may lead to unreliable predictions about the effect of amount of sunlight on green pepper production in a garden ecosystem by describing **one** difference that makes a garden more complex than the greenhouse and describing how **that** difference could cause predictions about green pepper production in a garden ecosystem to be unreliable.

A **0-point response** demonstrates the student has little or no understanding of the Content Standard.

General Notes:

1. Responses that describe two differences and give the same description of how those differences could affect reliability of predictions may be credited two score points (e.g., *There would be wind in the garden that could cause pollination* and *Insects in the garden could pollinate as they move among the plants*)

Annotated Examples

Annotated example of a 2-point response to Item 10

10 Becky and Juan used a greenhouse as a model of a garden ecosystem to predict the effects of amount of sunlight on green pepper production in a garden ecosystem.

Describe two ways the greenhouse model may lead to unreliable predictions about the effects of amount of sunlight on green pepper production in a garden ecosystem.

In your description, be sure to:
- Describe two differences that make a garden ecosystem more complex than the greenhouse.
- Describe how each of the differences could cause the predictions about green pepper production in a garden ecosystem to be unreliable.

One way: *The weather in a greenhouse is stable, there is no rain or snow in a greenhouse. Weather*
conditions, such as snow can kill pepper plants and affect green pepper production
Another way: *Other animals such as birds or deer are not in a greenhouse. The absence of*
consumers can increase the production of green peppers and make observations unreliable.

Annotations	Score Points
One way the garden ecosystem is more complex: *The weather in a green house is stable, there is no rain or snow in a greenhouse.* **How this causes unreliable predictions**: *Weather conditions, such as snow, can kill pepper plants and affect green pepper production.*	2
Another way the garden ecosystem is more complex: *Other animals such as birds or deer are not in a greenhouse.* **How this causes unreliable predictions**: *The absence of consumers can increase the production of green peppers and make observations unreliable.*	

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Annotations
One way the garden ecosystem is more complex: *The weathe there is no rain or snow in a greenhouse.*
How this causes unreliable predictions: *Weather conditions, s plants and affect green pepper production.*
Another way the garden ecosystem is more complex: *Other a are not in a greenhouse.*
How this causes unreliable predictions: *The absence of consu production of green peppers and make observations unreliable.*

Annotated example of a 1-point response to Item 10

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Describe two ways the greenhouse model may lead to unreliable predictions about the effects of amount of sunlight on green pepper production in a garden ecosystem.

In your description, be sure to:
- Describe two differences that make a garden ecosystem more complex than the greenhouse.
- Describe how each of the differences could cause the predictions about green pepper production in a garden ecosystem to be unreliable.

One way: *A greenhouse tends to be warmer than a garden so they could predict a certain weather type that might be different than were they live*

Another way: *In the greenhouse the pepper plants grow all they want and they don't have to worry about consumers so there might be more in the greenhouse than in the actual garden*

Annotations	Score Points
One way the garden ecosystem is more complex: *A greenhouse tends to be warmer...* **How this causes unreliable predictions:** None	1
Another way the garden ecosystem is more complex: *In the greenhouse...don't have to worry about consumers....* **How this causes unreliable predictions:** *...might be more* (peppers) *in the greenhouse...*	

Annotated Examples

Annotated example of a 2-point response to Item 10

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Another way: *In the greenhouse the pepper plants grow all they want and they don't have*

about consumers so there might be more in the greenhouse than in the actual garden

Annotations
One way the garden ecosystem is more complex: *A greenhouse tends to be warmer...*
How this causes unreliable predictions: None
Another way the garden ecosystem is more complex: *In the greenhouse...don't have to worry about consumers....*
How this causes unreliable predictions: *...might be more* (peppers) *in the greenhouse...*

Annotated example of a 0-point response to Item 10

10 Becky and Juan used a greenhouse as a model of a garden ecosystem to predict the effects of amount of sunlight on green pepper production in a garden ecosystem.

Describe two ways the greenhouse model may lead to unreliable predictions about the effects of amount of sunlight on green pepper production in a garden ecosystem.

In your description, be sure to:
- Describe two differences that make a garden ecosystem more complex than the greenhouse.
- Describe how each of the differences could cause the predictions about green pepper production in a garden ecosystem to be unreliable.

One way: *There are hidden factors in a real garden. There may be hidden things in the dirt*

that contribute to the garden that a green house doesn't have.

Another way: *In the garden there are constant weather/temperature changes*

Annotations	Score Points
One way forest ecosystem is more complex: *There are hidden factors in a real garden.* Vague **How this causes unreliable predictions:** None	0
Another way forest ecosystem is more complex: *In the garden there are constant weather/temperature changes.* **How this causes unreliable predictions:** None	

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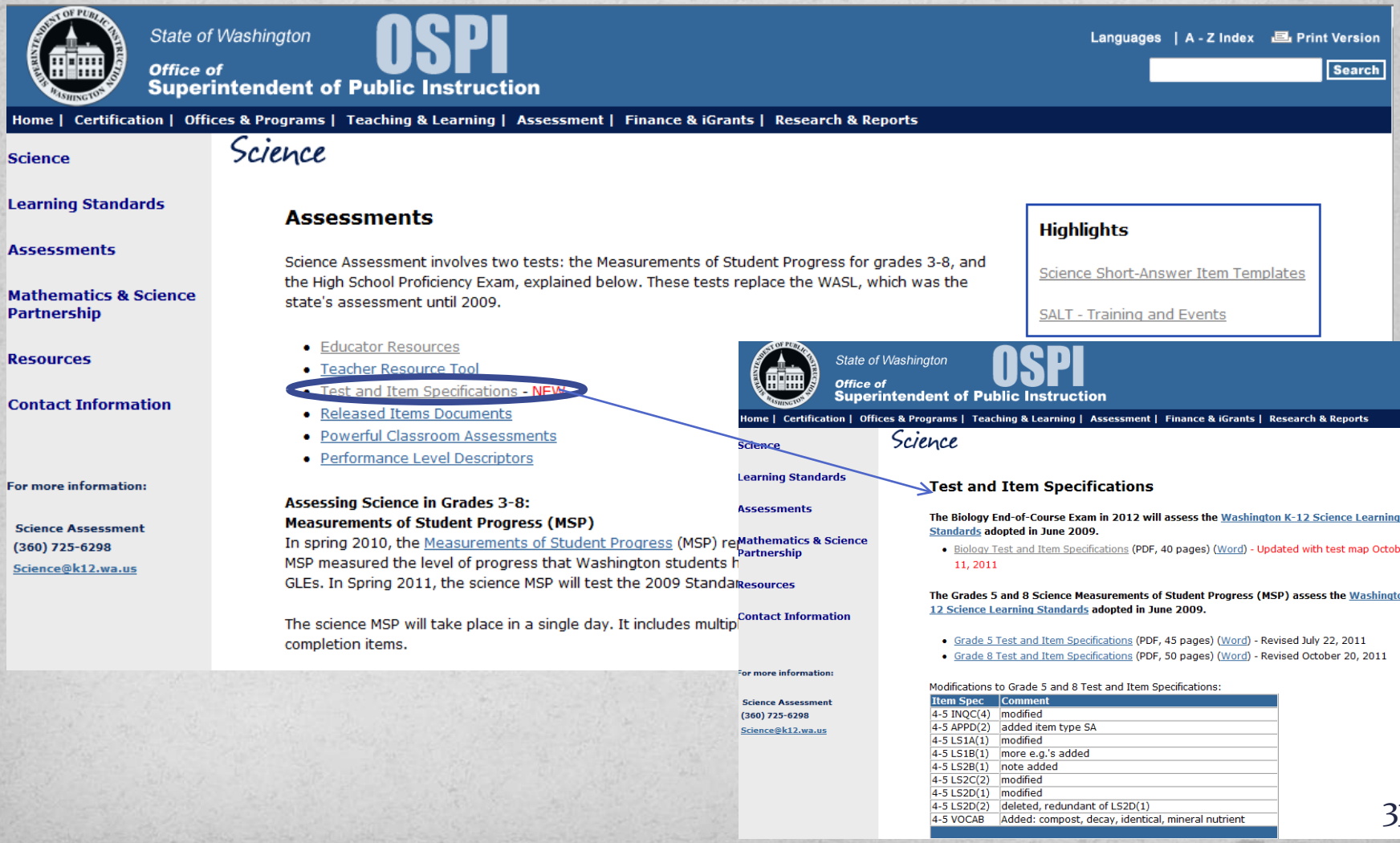

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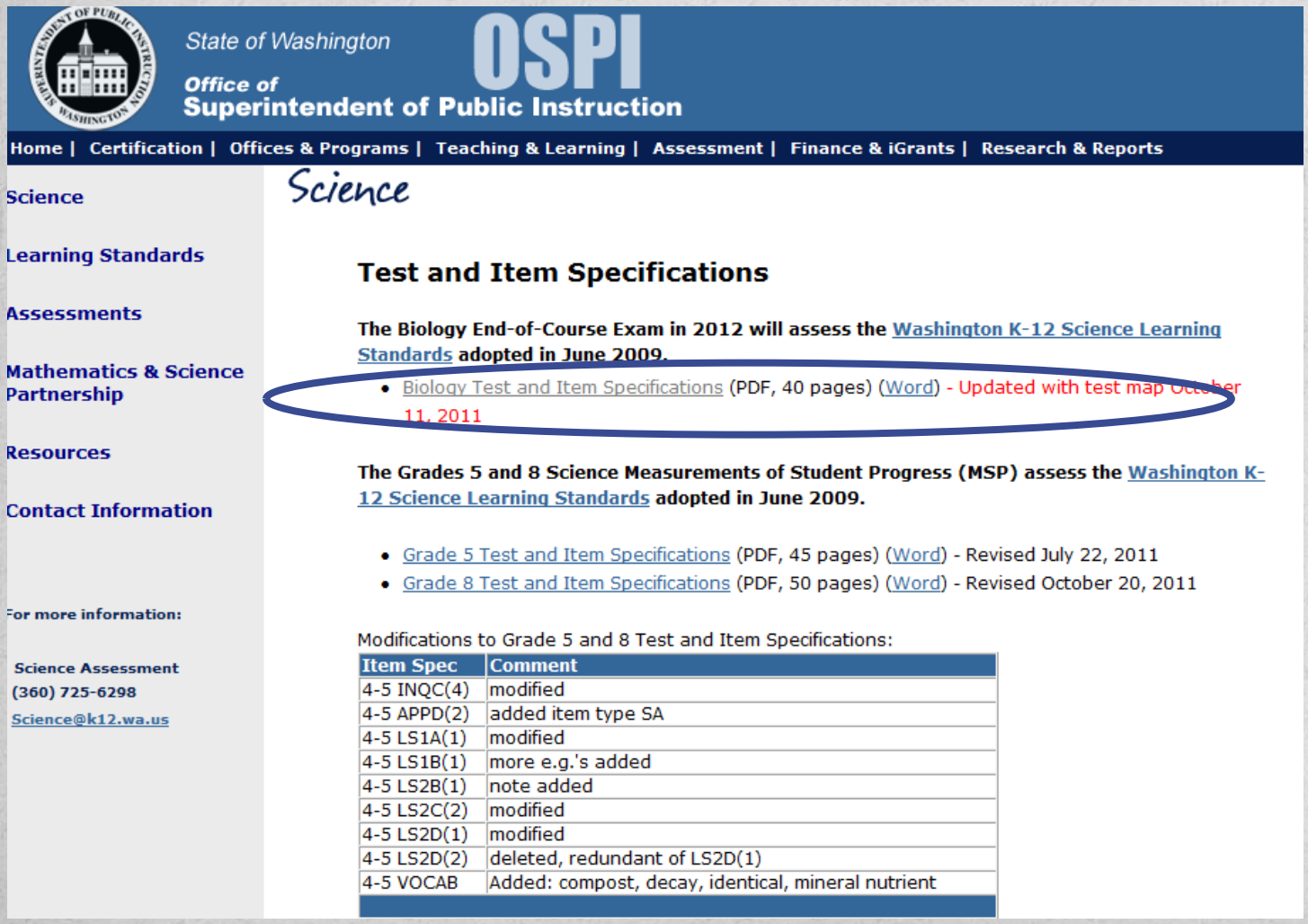

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For more information:

Science Assessment
(360) 725-6298
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Test and Item Specifications

The Biology End-of-Course Exam in 2012 will assess the Washington K-12 Science Learning Standards adopted in June 2009.

- Biology Test and Item Specifications (PDF, 40 pages) (Word) - Updated with test map October 11, 2011

The Grades 5 and 8 Science Measurements of Student Progress (MSP) assess the Washington K-12 Science Learning Standards adopted in June 2009.

- Grade 5 Test and Item Specifications (PDF, 45 pages) (Word) - Revised July 22, 2011
- Grade 8 Test and Item Specifications (PDF, 50 pages) (Word) - Revised October 20, 2011

Modifications to Grade 5 and 8 Test and Item Specifications:

Item Spec	Comment
4-5 INQC(4)	modified
4-5 APPD(2)	added item type SA
4-5 LS1A(1)	modified
4-5 LS1B(1)	more e.g.'s added
4-5 LS2B(1)	note added
4-5 LS2C(2)	modified
4-5 LS2D(1)	modified
4-5 LS2D(2)	deleted, redundant of LS2D(1)
4-5 VOCAB	Added: compost, decay, identical, mineral nutrient

Test and Item Specifications

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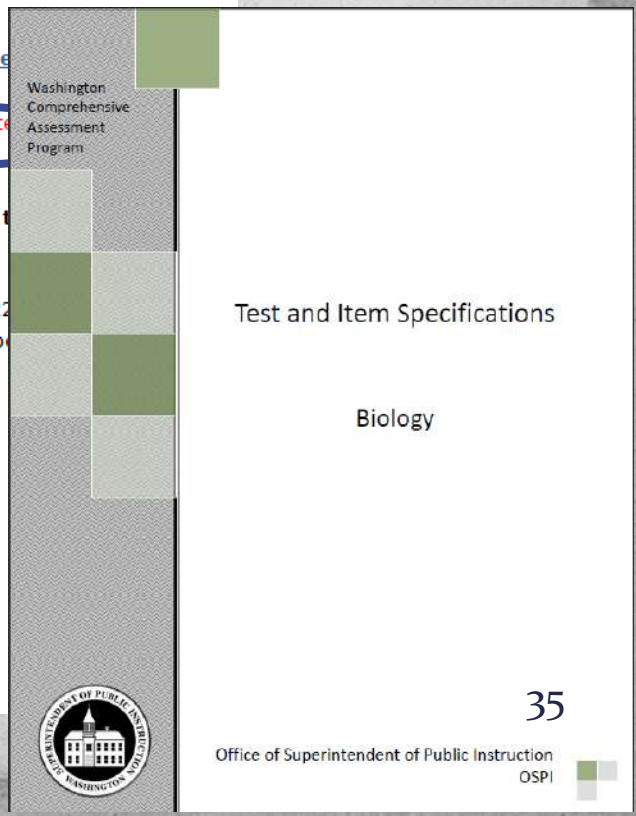
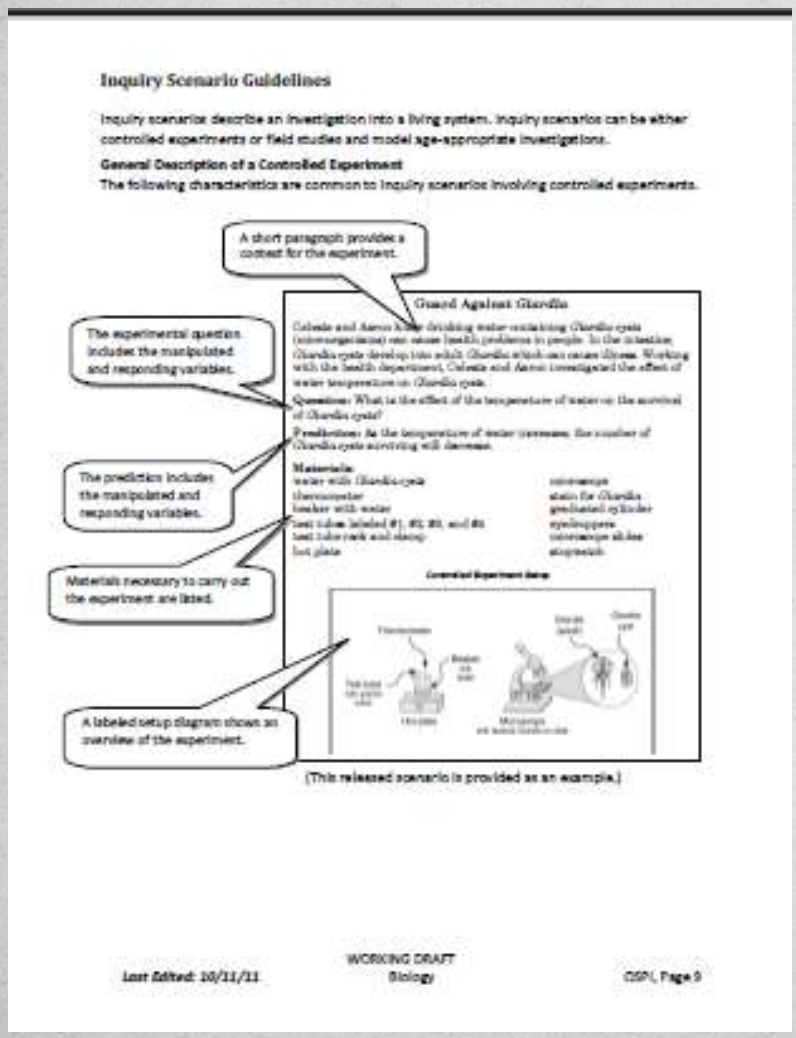


Scenario Specifications



Inquiry Scenario Guidelines

Inquiry scenarios describe an investigation into a living system. Inquiry scenarios can be either controlled experiments or field studies and model age-appropriate investigations.

General Description of a Controlled Experiment

The following characteristics are common to inquiry scenarios involving controlled experiments.

A short paragraph provides a context for the experiment.

The experimental question includes the manipulated and responding variables.

The prediction includes the manipulated and responding variables.

Materials necessary to carry out the experiment are listed.

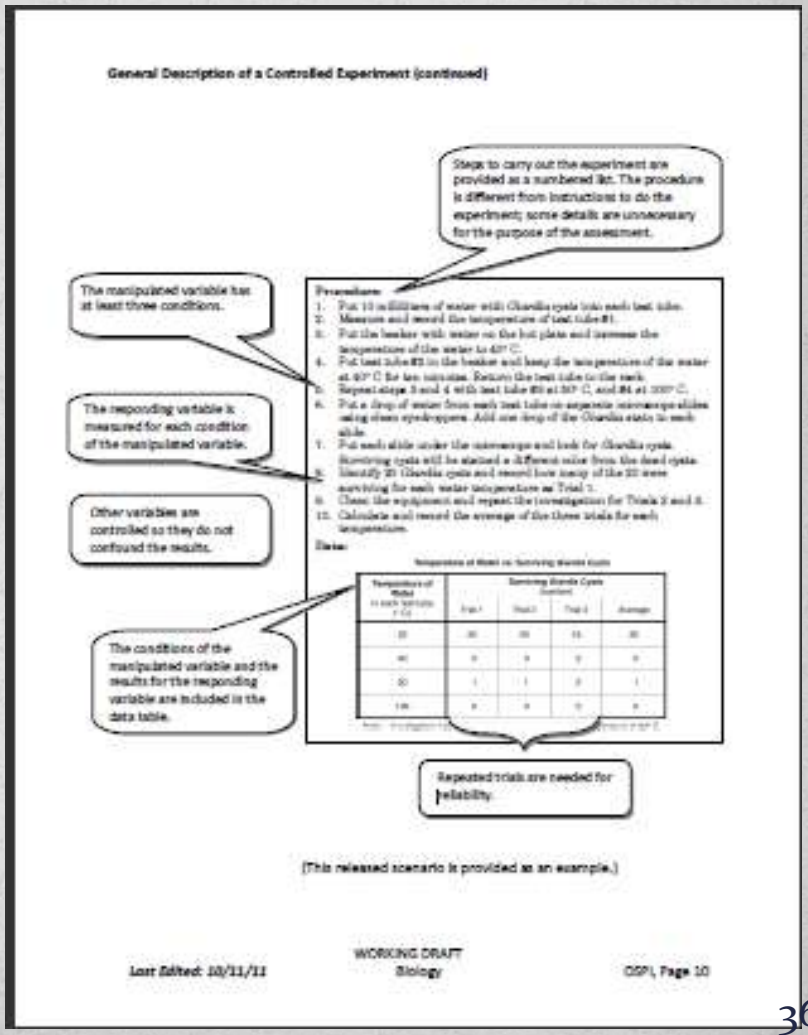
A labeled setup diagram shows an overview of the experiment.

Guard Against Giardia

Question: What is the effect of the temperature of water on the survival of *Giardia* cysts?

Materials:

(This released scenario is provided as an example.)



General Description of a Controlled Experiment (continued)

Steps to carry out the experiment are provided as a numbered list. The procedure is different from instructions to do the experiment; some details are unnecessary for the purpose of the assessment.

The manipulated variable has at least three conditions.

The responding variable is measured for each condition of the manipulated variable.

Other variables are controlled so they do not confound the results.

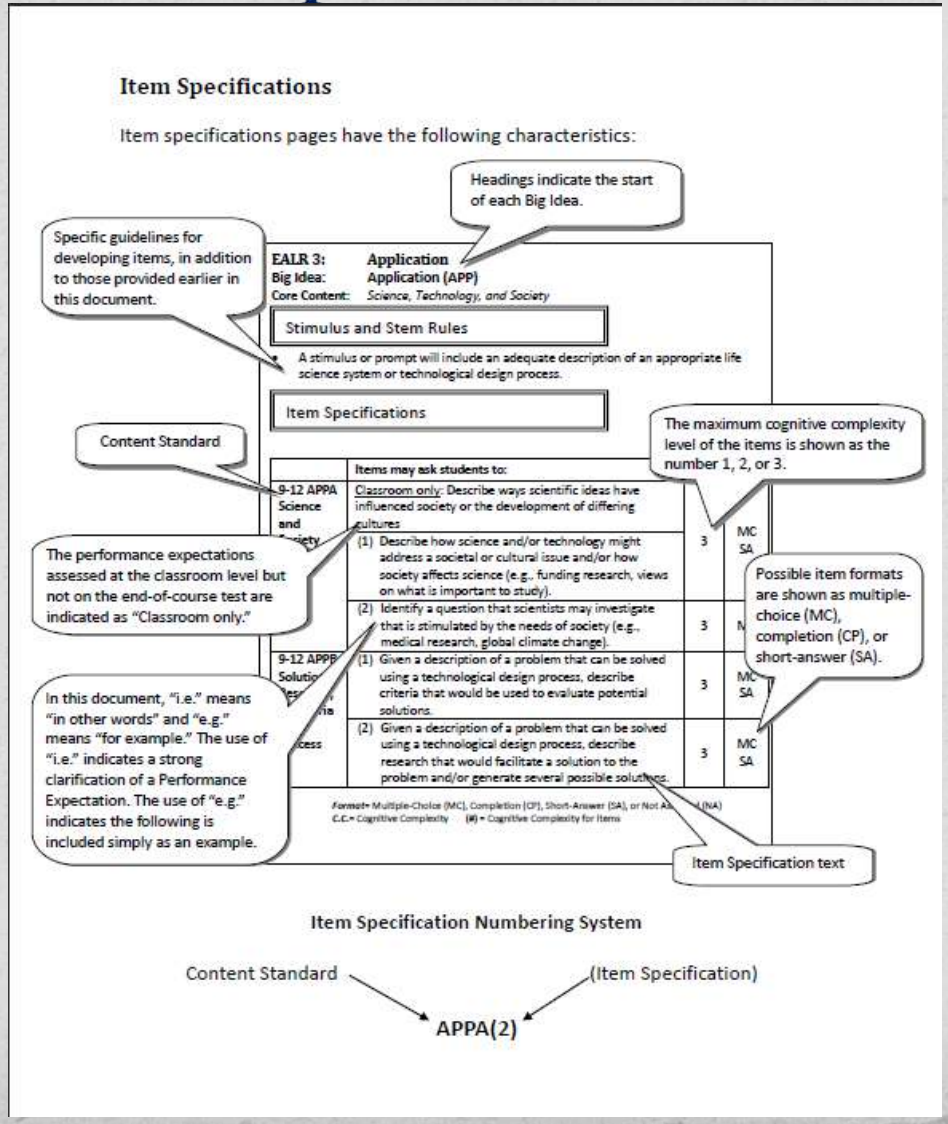
The conditions of the manipulated variable and the results for the responding variable are included in the data table.

Repeated trials are needed for reliability.

Procedure:

(This released scenario is provided as an example.)

Item Specifications:



Glossary

- General vocabulary 8th grade or lower
- Biology Terms that may appear on the exam
- Life science vocabulary from 5th and 8th grade

Science Vocabulary Used in Assessment Items

Items on the biology end-of-course exam use language targeted to an eighth grade or lower readability with the exception of the required biology terms in the following list. Appropriate science vocabulary allowed for all earlier grade level science assessments may also be used on the biology end-of-course exam. Example vocabulary from life science in earlier grade levels is also included in the following list.

a

Used in grade 8:
accuracy
acquired (learned) characteristic
adaptation
asexual reproduction
atom

Used in Biology:
absorption
active transport
allele
amino acid
atmospheric
ATP
aquatic

b

Used in grade 8:
boundary

Used in Biology:
bacteria
bacterium
bi-layer
biodiversity
biomass

c

Used in grade 5:
characteristic
classify
conclude
conclusion
conserve
consumer
controlled experiment
cycle

Used in grade 8:
cell membrane
cell nucleus
cell wall
chemical energy
chemical reaction
chloroplast
chromosomes
circulatory system
closed system
compound

Used in Biology:
carbon cycle
carbon dioxide
carbohydrates
cellular respiration
chlorophyll
combustion
complementary
computer simulation
concentration
constraint
contraction
criteria
cytoplasm

d

Used in grade 5:
data
decomposer
dissolve

Used in grade 8:
digestive system
dominant

Used in Biology:
diffusion
divergent
diversity
DNA

e

Used in grade 5:
ecosystem
energy
environment
evidence
experimental question
extinct

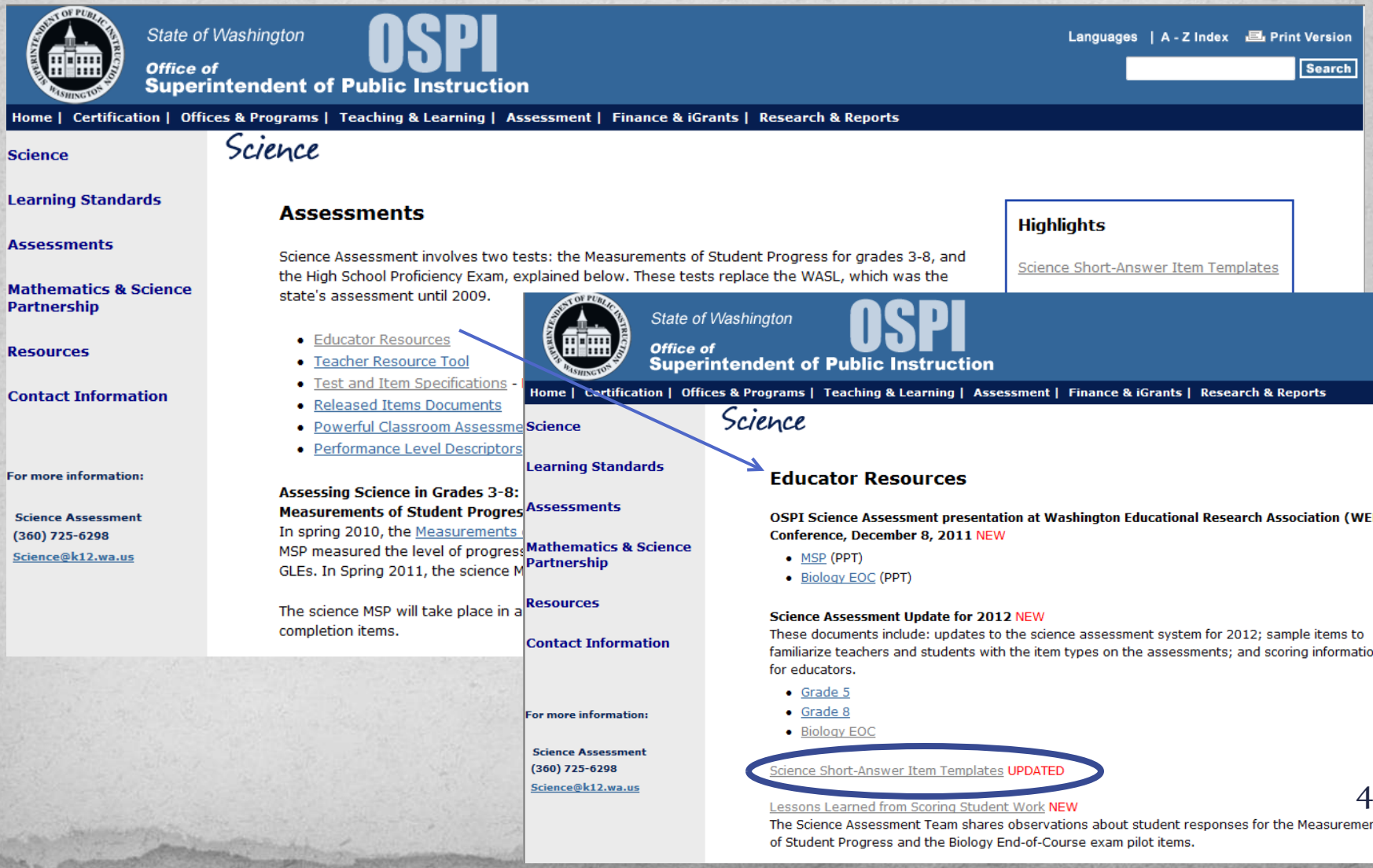
Used in grade 8:
effective
element
evolution

Used in Biology:
embryo
endangered
endocrine system
energy chain
enzyme
equilibrium
estuary
expansion
experimental control condition

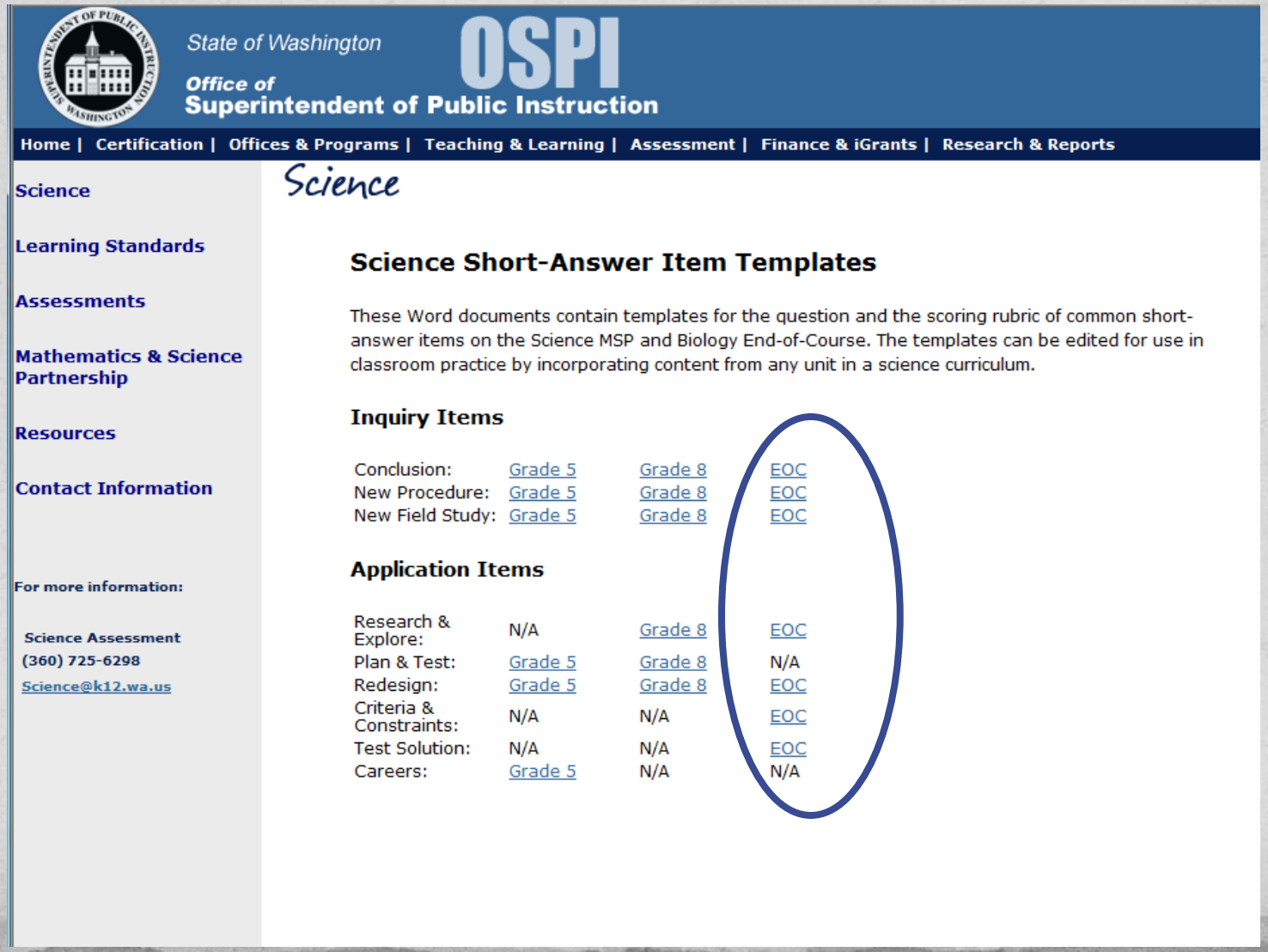
Questions
or
Comments

Short Answer Item Templates

Short Answer Item Templates



Short Answer Item Templates



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Science Short-Answer Item Templates

These Word documents contain templates for the question and the scoring rubric of common short-answer items on the Science MSP and Biology End-of-Course. The templates can be edited for use in classroom practice by incorporating content from any unit in a science curriculum.

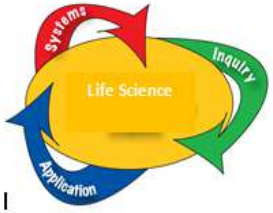
Inquiry Items

Conclusion:	Grade 5	Grade 8	EOC
New Procedure:	Grade 5	Grade 8	EOC
New Field Study:	Grade 5	Grade 8	EOC

Application Items

Research & Explore:	N/A	Grade 8	EOC
Plan & Test:	Grade 5	Grade 8	N/A
Redesign:	Grade 5	Grade 8	EOC
Criteria & Constraints:	N/A	N/A	EOC
Test Solution:	N/A	N/A	EOC
Careers:	Grade 5	N/A	N/A

New Procedure



Biology

New Procedure Item Template

Biology End-of-Course Exam

The documents on the following pages are designed to provide item and rubric templates for classroom practice.

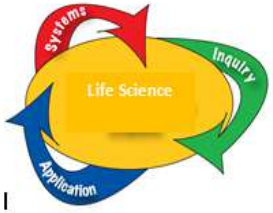
Directions for use:

Use the templates by making the following modifications:

On Items: Revise text in red with prompts appropriate to the item used in classroom practice.

On Rubrics: Revise text in *red italics* with student responses appropriate to the item used in classroom practice. Revise text in red with information from the item.

New Procedure



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Biology New Procedure Item Template

0 Plan a controlled experiment to answer the question in the box. You may use any materials and equipment in your procedure.

Be sure your procedure includes:

- logical steps to do the experiment
- two controlled (kept the same) variables
- one manipulated (independent) variable
- one responding (dependent) variable
- how often measurements should be taken and recorded

Question: What is the effect of different conditions of the manipulated variable
on the responding variable?
Procedure:

New Procedure

Biology New Procedure Item Template

0 Plan a controlled experiment to answer the question in the box. You may use any materials and equipment in your procedure.

Be sure your procedure includes:
- logical steps to do the experiment
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Question: What is the effect of different conditions of the manipulated variable
on the responding variable?
Procedure:

Step Test (BSCS, Biology a Human Approach, 2006, pg. 179-182)

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- one manipulated (independent) variable
- one responding (dependent) variable
- how often measurements should be taken and recorded

Question: What is the effect of different exercise rates on the pulse rate?
Procedure:

New Procedure

Step Test (BSCS, Biology a Human Approach, 2006, pg. 179-182)

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- logical steps to do the experiment
- two controlled (kept the same) variables
- one manipulated (independent) variable
- one responding (dependent) variable
- how often measurements should be taken and recorded

Question: What is the effect of different exercise rates on the pulse rate?
Procedure:

Scoring Rubric for: New Procedure (page 1 of 3)

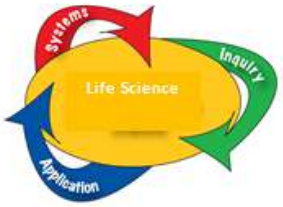
Performance Description	Attributes
A 2-point response demonstrates the student understands the Content Standard INQB: Scientific progress requires the use of various methods appropriate for answering different kinds of research question, a thoughtful plan for gathering data needed to answer the question, and care in collecting, analyzing, and displaying data. Item Specification 1: Describe a plan to answer a given question for a controlled experiment.	6–8
A 1-point response demonstrates the student has partial understanding of the Content Standard.	3–5
A 0-point response demonstrates the student has little or no understanding of the Content Standard.	0–2

Step Test (BSCS, Biology a Human Approach, 2006, pg. 179-182)

Scoring Rubric for: New Procedure (page 2 of 3)

Procedure Attributes	Description of Attribute	Attributes
Controlled Variables	At least two controlled variable are identified or implied in the procedure or the materials list (e.g., *same student, same time period, same method for taking pulse*).	1
Manipulated Variable	Only one manipulated variable (exercise rate) is identified or implied in the procedure or data table (if given). The manipulated variable must have at least three conditions to be credited	1
Responding Variable	The responding variable (pulse rate) is identified or implied in the procedure or data table (if given).	1
Record Measurements	The procedure states or implies measurements are recorded periodically or gives a data table. Attribute Notes: 1. If artificial data for the responding variable is given, this attribute cannot be credited. 2. The phrase *take measurement* cannot be used to mean *record*.	1
Trials are Repeated	More than one trial for all conditions is planned, or implied in a data table, to measure the responding variable.	1
Experimental Control Condition	The procedure includes an additional setup in which the manipulated variable is not changed and the responding variable is measured for each condition in the experimental setup(s) (e.g., *resting pulse if 3 other rates are used*). Writing Note: This attribute is only credited for complicated investigations in which an experimental control condition is appropriate.	1
Extra Validity Measure	The procedure includes a validity measure **not** included in the scenario experiment (e.g., more controlled variables, better measuring technique, increased range of conditions, control for sample bias).	1
Logical Steps	The steps of the procedure are detailed enough to repeat the procedure effectively (examples of illogical steps: no ending time indicated; states *Set up as diagrammed*, but diagram is inadequate; recording vague data or results).	1
	Total Possible Attributes	**8**

Application: Research & Explore



Biology

Research & Explore Item Template

Biology End-of-Course Exam

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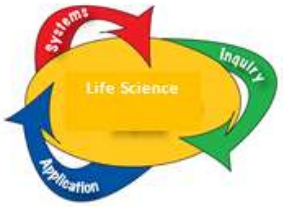
Application: Research & Explore



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Research & Explore Item Template

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Biology Research & Explore Item Template

0 *The students want/need to* Describe how to begin solving this problem.

Only these materials may be used: *A constraining list of materials may be included here if the list might be helpful to students in coming up with ideas.*

Be sure to describe the following stages in your design process:

- **Research the Problem:** Describe any scientific information needed to solve the problem and how to collect that information.
- **Explore Ideas:** Describe several possible solutions to the problem, including any useful scientific concepts.

Problem: *Print the problem here*
Research the Problem:
Explore Ideas:

Application: Research & Explore

Biology Research & Explore Item Template

0 *The students want/need to…..* Describe how to begin solving this problem.

Only these materials may be used: *A constraining list of materials may be included here if the list might be helpful to students in coming up with ideas.*

Be sure to describe the following stages in your design process:

- **Research the Problem:** Describe any scientific information needed to solve the problem and how to collect that information.
- **Explore Ideas:** Describe several possible solutions to the problem, including any useful scientific concepts.

Problem: *Print the problem here*
Research the Problem:
Explore Ideas:

Research & Explore: Invasive Mussels (Miller & Levine, Biology, 2010, pg 136)

0 *After reading "What Can Be Done About Invasive Mussels?" on page 136, our class wants to manage invasive mussels using natural population controls.* Describe how to begin solving this problem.

Be sure to describe the following stages in your design process:

- **Research the Problem:** Describe any scientific information needed to solve the problem and how to collect that information.
- **Explore Ideas:** Describe several possible solutions to the problem, including any useful scientific concepts.

Problem: *How can invasive mussels be managed using natural population controls?*
Research the Problem:
Explore Ideas:

Application: Research & Explore

Research & Explore: Invasive Mussels (Miller & Levine, Biology, 2010, pg 136)

0 *After reading "What Can Be Done About Invasive Mussels?" on page 136, our class wants to manage invasive mussels using natural population controls.* Describe how to begin solving this problem.

Be sure to describe the following stages in your design process:

- **Research the Problem:** Describe any scientific information needed to solve the problem and how to collect that information.
- **Explore Ideas:** Describe several possible solutions to the problem, including any useful scientific concepts.

Problem: *How can invasive mussels be managed using natural population controls?*
Research the Problem:
Explore Ideas:

Scoring Rubric for: Research & Explore (page 1 of 2)

Performance Description	Attributes
A **2-point response** demonstrates the student understands the Content Standard APPB: The technological design process begins by defining a problem in terms of criteria and constraints, conducting research, and generating several different solutions. Item Specification 2: Describe research that would facilitate a solution to the problem and/or generate several possible solutions given a description of a problem that can be solved using a technological design process.	4
A **1-point response** demonstrates the student has partial understanding of the Content Standard.	2–3
A **0-point response** demonstrates the student has little or no understanding of the Content Standard.	0–1

Attributes of a Scientific Design Process

Design Process Stage	Description	Attributes
Research the Problem	Information needed to solve the problem is described or pertinent questions are given (e.g., *How do mussels reproduce?, What do mussels eat?, Do mussels have predators?).* Stage Notes: 1. Listing objects given in the prompt or scenario cannot be credited. 2. Repeating an appropriate process from the scenario can be credited.	1
Scientific Research	1. Scientific information involves relevant general scientific concepts (e.g., *reproduction, food source, predators*) OR Related information gathered from appropriate sources of scientific information. (e.g., *give examples of scientific sources of information along with a brief statement of the type of information gathered from that source such as "ask a biologist about mussel predators, ask a shell fish grower about what mussels eat, ask your science teachers about mussel reproduction"*) 2. Scientific collecting of data involves systematically collecting pertinent data over a period of time or a number of conditions. 3. This attribute may be credited even when the information being gathered is too vague to credit the "Research the Problem" attribute.	1

Attributes of a Scientific Design Process

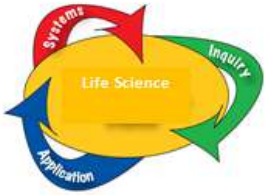
Design Process Stage	Description	Attributes
Explore Ideas	More than one idea that could solve the problem is described (e.g. *import a predator, strain the water to remove food supply, remove mussel larvae from the water.*). Stage Notes: 1. Listing objects may not be credited. 2. Ideas may involve materials not given. 3. A sentence should be read as one idea (e.g., *Use a container with soil and gravel* is one idea, not two or three). Run-on sentences may be read as more than one idea. Sentences containing the term "or" may be read as more than one idea (e.g., *Use a metal, plastic, or glass container* are three ideas).	1
Explore Scientific Ideas	An idea includes scientific concept(s) for considering the idea (e.g., *predators eat mussels and lower mussel population, removing food could starve mussels, removing larvae prevents new populations from increasing*). Stage Note: This attribute may be credited even when only one idea is given.	1
	Total Possible Attributes	**4**

General Notes:

1. **Copying the Scenario:** Responses that copy the whole scenario cannot be credited for any attributes. However, responses that appropriately copy a stage from the scenario may be credited.

Note: These are only ideas, as a teacher fill in what you consider meeting standard based on the content you have taught

Application: Criteria & Constraints



Biology

Criteria & Constraints Item Template

Biology End-of-Course Exam

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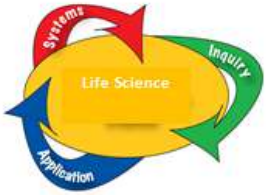
Application: Criteria & Constraints

I



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Biology Criteria & Constraints Item Template

0 *Provide a description of a problem in a biological system that can be solved using a technological design process.* Describe two constraints *other than cost that scientists/ engineers /people* could encounter while *solving the problem.*

In your description, be sure to:
- Identify **two** constraints other than cost.
- Describe why **each** constraint is a limitation.

One constraint:
Another constraint:

Application: Criteria & Constraints

Biology Criteria & Constraints Item Template

0 *Provide a description of a problem in a biological system that can be solved using a technological design process.* Describe two constraints *other than cost that scientists/ engineers /people* could encounter while *solving the problem.*

In your description, be sure to:
- Identify **two** constraints other than cost.
- Describe why **each** constraint is a limitation.

One constraint:
Another constraint:

Criteria & Constraints: Influenza Cure (Insights in Biology,2007, pg473

0 *Your research team at Drugs R Us Pharmaceutical Company has been given the assignment to cure influenza once and for all.* Describe two constraints *other than cost that the research team* could encounter while *designing the cure for influenza.*

In your description, be sure to:
- Identify **two** constraints other than cost.
- Describe why **each** constraint is a limitation.

One constraint:
Another constraint:

Application: Criteria & Constraints

Criteria & Constraints: Influenza Cure (Insights in Biology, 2007, pg473

0 *Your research team at Drugs R Us Pharmaceutical Company has been given the assignment to cure influenza once and for all.* Describe two constraints *other than cost that the research team* could encounter while *designing the cure for influenza*.

In your description, be sure to:
- Identify **two** constraints other than cost.
- Describe why **each** constraint is a limitation.

One constraint:
Another constraint:

Criteria & Constraints: Influenza Cure (Insights in Biology, 2007, pg473

Scoring Rubric for: Criteria & Constraints

Performance Description	
A 2-point response demonstrates the student understands the Content Standard APPB: The technological design process begins by defining a problem in terms of criteria and constraints, conducting research, and generating several different solutions. Item Specification 1: Describe criteria that would be used to evaluate potential solutions and/or describe constraints (i.e. limitations) on potential solutions given a description of a problem that can be solved using a technological design process. The student describes two constraints *other than cost that the research team* could encounter while *designing the cure for influenza*.by: Identifying **two** constraints other than cost And Describing how **each** constraint is a limitation.	
Identify constraint	**Describe how the constraint is a limitation**
Difficulty isolating virus	• *Hard to investigate without pure virus*
Virus changes	• *Vaccines must cover many variations, need many vaccines*
Viruses hide inside cells	• *Drugs that kill viruses, damage cells too*
	•
	•
A 1-point response demonstrates the student has partial understanding of the Content Standard. The response identifies **one** constraint and describes how the constraint is a limitation.	
A 0-point response demonstrates the student has little or no understanding of the Content Standard.	
General Notes: 1. Responses that …	

Use of Templates

- **Use own curriculum**
  - Samples here are only to show possibilities
- **Can be used in multiple ways**
  - Formative assessment
  - Individual or group assignments
  - End of unit assessment
  - Pre-lab activity
  - Post lab assessment

Note: NONE of the samples are exam items

Questions
or
Comments

OSPI Resources

- **Science Assessment**
  - **Science Assessment Update for 2012**
    - http://www.k12.wa.us/Science/pubdocs/ScienceBioEOCUpdate2012.pdf
  - **Test and Item Specifications**
    - http://www.k12.wa.us/Science/TestSpecs/HSBiologyTestandItemSpec.pdf
  - **Short Answer Item Templates**
    - http://www.k12.wa.us/Science/ItemTemplates.aspx
  - **Lessons Learned from Scoring Student Work**
    - http://www.k12.wa.us/Science/pubdocs/2011LessonsLearned.pdf

OSPI Resources

- **Science Teaching and Learning**
  - **Teaching and Learning Science & Assessment Informational Webinars**
    - http://www.k12.wa.us/Science/Standards.aspx
  - **Life Science Instructional Supports Moodle:**
    - http://moodle.ospi.k12.wa.us/
    - If you haven't visited this site before, you will be prompted to create an account. It is very easy and takes no time. Supports have been developed for High School Life Science Content Standards 1-3. Systems and Applications EALR's are still being developed.

OSPI Resources

- **Science Teaching and Learning**
  - Safety in Science Instruction
    - http://www.k12.wa.us/Science/pubdocsscienceclassroomsafetyguidelines.pdf
    - http://www.doh.wa.gov/ehp/ts/School/default.htm
  - **Topics**
    - **Biological Issues**
    - **Career and Technical Education,**
    - **Art and Science**
    - **Safety**
    - **Facilities and Construction**
    - **Indoor Air Quality**
    - **Lead**
    - **Playgrounds**
    - **Rules and Regulations**
    - **Student Health and Safety**

Upcoming Events:

- **Performance Level Descriptor Training**
  - February 1- April 27, 2012; Biology EOC
- **Contrasting Groups Study**
  - April 9-27, 2012; Biology EOC
- **Content Review**
  - April 9-13, 2012; Grades 5 & 8
  - April 16-20, 2012; Biology EOC
  - April 23-27, 2012; Biology EOC
- **"SALT" and "PEPPER" email list**
  http://www.k12.wa.us/Science/ProfDevelopment.aspx

Are there any questions?

Thank you for your participation.