

# Preparing for the Biology End of Course Exam

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**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 9<sup>th</sup>)
  - 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
<b>Total Items</b>	<b>40</b>
<b>Total Points</b>	<b>45</b>
Pilot Items	5

Questions  
or  
Comments



# OSPI Resources: <http://www.k12.wa.us/>



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Washington's Scores Above Nation on NAEP Reading, Math

Dorn issued statement on Gov. Chris Gregoire's initial budget proposal

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- Maps of Districts and Schools
- Teacher Certification and Renewal
- Learning Standards
- Apportionment and Financial Services
- State Testing: MSP and HSPE
- End-of-Course Exams
- Special Education
- Graduation Requirements
- Student Transportation
- Media/Communications
- School Breaks
- Common Core Standards
- School District Revenues
- Best Practices for School Districts
- WaKIDS

**Offices and Programs**

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**Maps & Web sites Districts**

**Education Recovery**

**Partners in Education**

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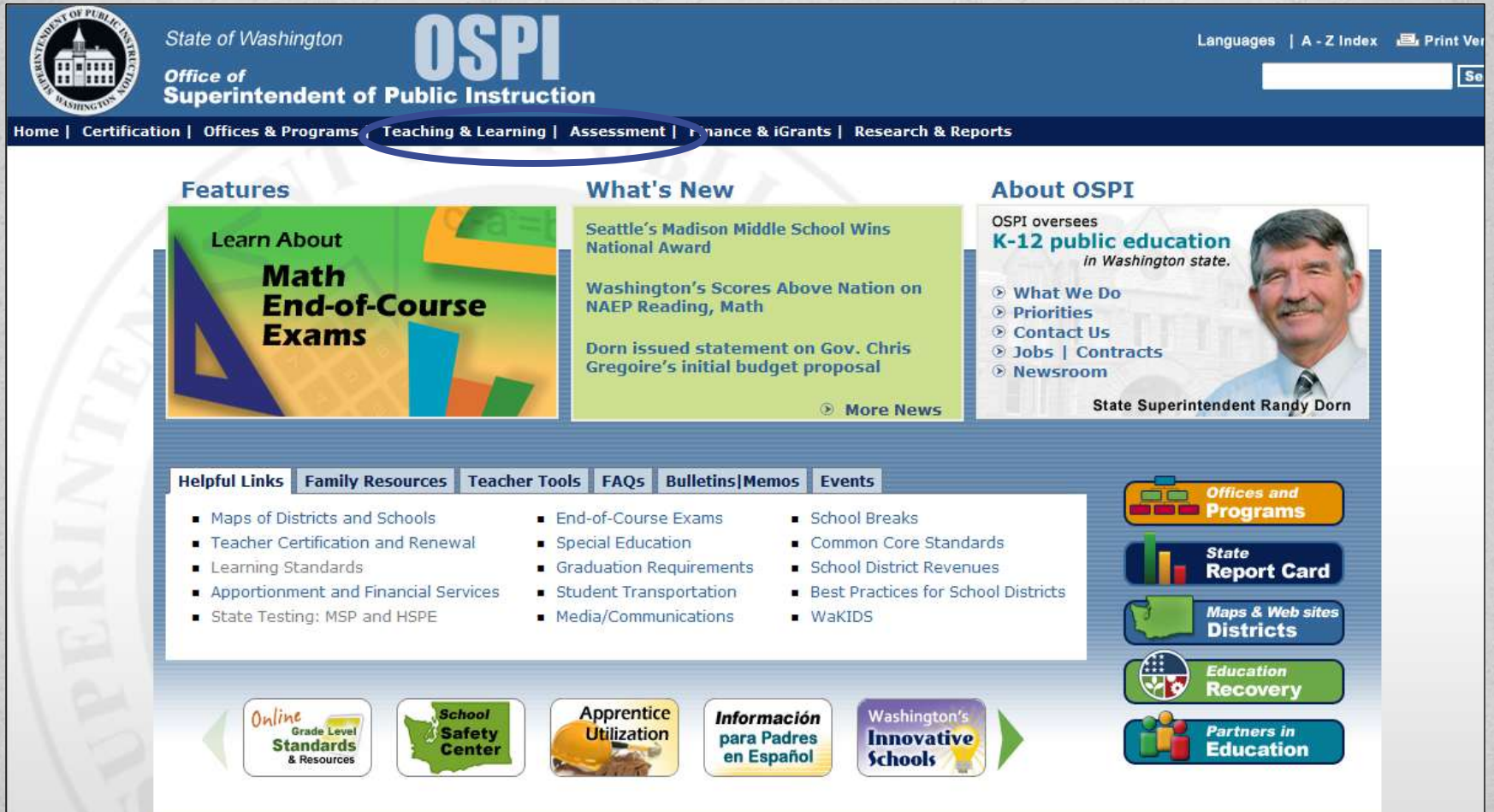
**School Safety Center**

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**Información para Padres en Español**

**Washington's Innovative Schools**

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The screenshot shows the OSPI website homepage. At the top left is the OSPI logo and the text "State of Washington Office of Superintendent of Public Instruction". To the right are links for "Languages", "A - Z Index", and "Print Ver". Below this is a search bar. A navigation bar contains links for "Home", "Certification", "Offices & Programs", "Teaching & Learning", "Assessment", "Finance & iGrants", and "Research & Reports". The "Teaching & Learning" link is circled in blue. The main content area is divided into three columns: "Features" with a "Learn About Math End-of-Course Exams" graphic; "What's New" with news items about a national award, NAEP scores, and a budget proposal; and "About OSPI" with a photo of State Superintendent Randy Dorn and a list of links including "What We Do", "Priorities", "Contact Us", "Jobs | Contracts", and "Newsroom". Below this is a "Helpful Links" section with a grid of categories: "Family Resources", "Teacher Tools", "FAQs", "Bulletins|Memos", and "Events". Each category contains a list of specific links. On the right side, there are five vertical buttons: "Offices and Programs", "State Report Card", "Maps & Web sites Districts", "Education Recovery", and "Partners in Education". At the bottom, there are five icons for "Online Grade Level Standards & Resources", "School Safety Center", "Apprentice Utilization", "Información para Padres en Español", and "Washington's Innovative Schools".

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Science

Science offices at OSPI provide guidance for the development and implementation of Washington learning standards and oversee assessments required by federal and state laws and regulations.

Learning Standards

The state's K-12 Science Learning Standards describe what students should know and be able to do at each grade band.

Assessments

Assessments are designed to help districts, schools, teachers, parents, and students determine the level of proficiency of a student's understanding of the science learning standards.

Mathematics and Science Partnerships

Federal funding for MSPs is provided through the No Child Left Behind Act. These partnerships improve the content knowledge of mathematics and/or science teachers in order to increase the achievement of their students.

Helpful Links

- Maps of Districts
- Teacher Certification
- Learning Standards
- Apportionment
- State Testing

Online Grade Start & Reporting

For more information:

Science Assessment  
(360) 725-6298  
[Science@k12.wa.us](mailto:Science@k12.wa.us)

Breanne Conley  
Science Teaching and Learning  
(360) 725-4961  
[breanne.conley@k12.wa.us](mailto:breanne.conley@k12.wa.us)

Life, Physical, Earth and Space Science

Systems Inquiry Application

Highlights

- [Biology End of Course Supports Moodle](#)
- [Biology EOC Item Specifications NEW](#)
- [Updates for 2012 NEW](#)
- [End-of-Course Exams](#)



# Science Assessment:

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



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Science

Learning Standards

Assessments

Mathematics & Science  
Partnership

Resources

Contact Information

For more information:

Science Assessment  
(360) 725-6298  
[Science@k12.wa.us](mailto:Science@k12.wa.us)

## Science

### 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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#### Assessing Science in Grades 3-8: Measurements of Student Progress

In spring 2010, the [Measurements of Student Progress \(MSP\)](#) measured the level of progress of students in science. In Spring 2011, the science MSP will take place in a series of completion items.

### Highlights

[Science Short-Answer Item Templates](#)

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## Science

### Educator Resources

OSPI Science Assessment presentation at Washington Educational Research Association (WERA) Conference, December 8, 2011 **NEW**

- [MSP \(PPT\)](#)
- [Biology EOC \(PPT\)](#)

**Science Assessment Update for 2012 **NEW****

These documents include: updates to the science assessment system for 2012; sample items to familiarize teachers and students with the item types on the assessments; and scoring information for educators.

- [Grade 5](#)
- [Grade 8](#)
- [Biology EOC](#)

[Science Short-Answer Item Templates](#) **UPDATED**

[Lessons Learned from Scoring Student Work](#) **NEW**

The Science Assessment Team shares observations about student responses for the Measurements of Student Progress and the Biology End-of-Course exam pilot items.



# Updates:

SCIENCE Assessment

Updates for 2012

Biology  
End-of-Course (EOC)  
Exam

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# Updates:

## SCIENCE Assessment

### Updates for 2012

### Biology End-of-Course (EOC) Exam

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# Updates: Student Sample Pages

## Student Sample Pages

Student Name: \_\_\_\_\_



# Updates: Student Sample Pages

## Student Sample Pages

Student Name: \_\_\_\_\_

## Stand-alone items

Updates 2012 Biology EOC—Student

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

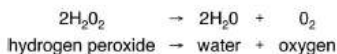
# Student Sample Pages (scenario)

Updates 2012 Biology EOC—Student

## 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 ( $\text{H}_2\text{O}_2$ ) 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:



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 ( $\text{H}_2\text{O}_2$ )

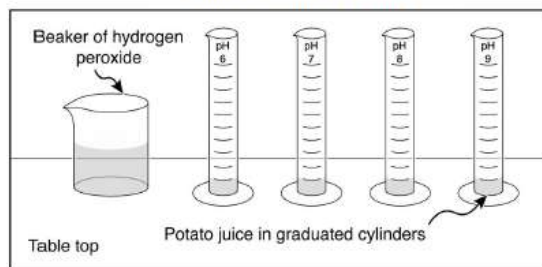
beaker

stopwatch

stirring rods

thermometer

### Controlled Experiment Setup





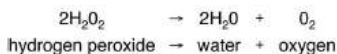
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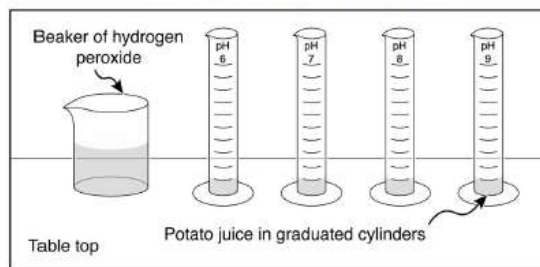
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### Controlled Experiment Setup



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

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



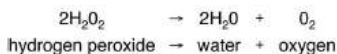
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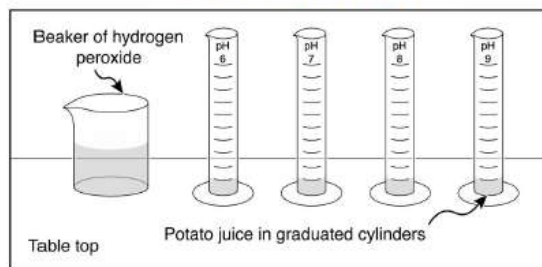
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4 Write a conclusion for this controlled experiment.

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.
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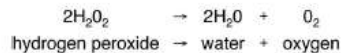

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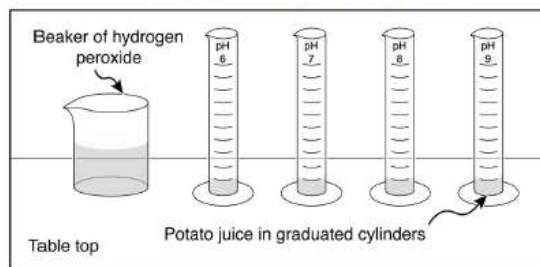
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Conclusion:

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

Updates 2012 Biology EOC—Teacher

## 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

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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

# Short Answer Rubric

## Scoring Rubric for Item 10: Green Machine Model

Performance Description									
<p>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.</p> <p>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.</p> <p>Examples:</p> <table border="1"> <thead> <tr> <th>Ways the garden ecosystem is more complex:</th> <th>How each difference causes predictions to be unreliable:</th> </tr> </thead> <tbody> <tr> <td><i>There are other plants in the garden</i></td> <td><i>Other plants may attract more bees</i></td> </tr> <tr> <td><i>Temperature/humidity/rainfall is much more varied in the garden</i></td> <td><i>Would not be able tell whether differences in production were due to light or changes in the weather</i></td> </tr> <tr> <td><i>Many more interactions between animals/ other organisms in the garden</i></td> <td><i>Animals ( deer, rabbits, raccoons, birds) damage or fertilize plants causing differences in pepper production</i></td> </tr> </tbody> </table>		Ways the garden ecosystem is more complex:	How each difference causes predictions to be unreliable:	<i>There are other plants in the garden</i>	<i>Other plants may attract more bees</i>	<i>Temperature/humidity/rainfall is much more varied in the garden</i>	<i>Would not be able tell whether differences in production were due to light or changes in the weather</i>	<i>Many more interactions between animals/ other organisms in the garden</i>	<i>Animals ( deer, rabbits, raccoons, birds) damage or fertilize plants causing differences in pepper production</i>
Ways the garden ecosystem is more complex:	How each difference causes predictions to be unreliable:								
<i>There are other plants in the garden</i>	<i>Other plants may attract more bees</i>								
<i>Temperature/humidity/rainfall is much more varied in the garden</i>	<i>Would not be able tell whether differences in production were due to light or changes in the weather</i>								
<i>Many more interactions between animals/ other organisms in the garden</i>	<i>Animals ( deer, rabbits, raccoons, birds) damage or fertilize plants causing differences in pepper production</i>								
<p>A 1-point response demonstrates the student has partial understanding of the Content Standard.</p> <p>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.</p>									
<p>A 0-point response demonstrates the student has little or no understanding of the Content Standard.</p>									
<p>General Notes:</p> <ol style="list-style-type: none"> <li>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., <i>There would be wind in the garden that could cause pollination</i> and <i>Insects in the garden could pollinate as they move among the plants</i>)</li> </ol>									



# 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.

<b>One way:</b> <i>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</i>
<b>Another way:</b> <i>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.</i>

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

# 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, so they could predict a certain weather type that might be different than were they live*

**Another way:** *Other animals such as birds or deer are not in a greenhouse, so there might be more in the greenhouse than in the actual garden*

Annotations
<b>One way the garden ecosystem is more complex:</b> <i>The weather in a greenhouse is stable, there is no rain or snow in a greenhouse.</i>
<b>How this causes unreliable predictions:</b> <i>Weather conditions, such as rain or snow, affect green pepper production.</i>
<b>Another way the garden ecosystem is more complex:</b> <i>Other animals are not in a greenhouse.</i>
<b>How this causes unreliable predictions:</b> <i>The absence of consumers in a greenhouse makes observations about green pepper production unreliable.</i>

Annotated example of a 1-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:** *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
<b>One way the garden ecosystem is more complex:</b> <i>A greenhouse tends to be warmer...</i>	1
<b>How this causes unreliable predictions:</b> None	
<b>Another way the garden ecosystem is more complex:</b> <i>In the greenhouse...don't have to worry about consumers...</i>	
<b>How this causes unreliable predictions:</b> <i>...might be more (peppers) in the greenhouse...</i>	



# 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, so plants can grow better.*

**Another way:** *Other animals such as birds or deer are not in a greenhouse, so there are no predators to eat the plants.*

Annotations
<b>One way the garden ecosystem is more complex:</b> <i>The weather in a greenhouse is stable, there is no rain or snow in a greenhouse, so plants can grow better.</i>
<b>How this causes unreliable predictions:</b> <i>Weather conditions, such as rain or snow, can affect green pepper production.</i>
<b>Another way the garden ecosystem is more complex:</b> <i>Other animals are not in a greenhouse.</i>
<b>How this causes unreliable predictions:</b> <i>The absence of consumers in a greenhouse can make observations unreliable.</i>

Annotated example of a 1-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:** *A greenhouse tends to be warmer than a garden so they could predict a certain 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
<b>One way the garden ecosystem is more complex:</b> <i>A greenhouse tends to be warmer...</i>
<b>How this causes unreliable predictions:</b> None
<b>Another way the garden ecosystem is more complex:</b> <i>In the greenhouse...don't have to worry about consumers...</i>
<b>How this causes unreliable predictions:</b> <i>...might be more (peppers) in the greenhouse...</i>

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



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

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- [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



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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**

Colene and Aaron have drinking water containing Giardia cysts (microorganisms) that cause health problems in people. In the laboratory, Giardia cysts develop into adult Giardia which can cause illness. Working with the health department, Colene and Aaron investigated the effect of water temperature on Giardia cysts.

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

**Prediction:** As the temperature of water increases, the number of Giardia cysts surviving will decrease.

**Materials:** water with Giardia cysts, microorganism viewer with water, test tubes labeled #1, #2, #3, and #4, test tube rack and stopper, hot plate, microorganism viewer for Giardia, graduated cylinder, eyedropper, microscope slide, stopwatch.

**Controlled Experiment Setup**

[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:**

- Put 10 milliliters of water with Giardia cysts into each test tube.
- Measure and record the temperature of test tube #1.
- Put the beaker with water on the hot plate and increase the temperature of the water to 40°C.
- Put test tube #1 in the beaker and keep the temperature of the water at 40°C for two minutes. Remove the test tube to the rack. Repeat steps 3 and 4 with test tube #2 at 50°C, and #3 at 60°C.
- Put a drop of water from each test tube on separate microscope slides using clean eyedroppers. Add one drop of the Giardia cysts to each slide.
- Put each slide under the microscope and look for Giardia cysts. Counting cysts will be started a different time from the dead cysts. Identify 25 Giardia cysts and record how many of the 25 were surviving for each water temperature as Trial 1.
- Clean the equipment and repeat the investigation for Trials 2 and 3.
- Calculate and record the average of the three trials for each temperature.

**Data:**

Temperature of Water on Surviving Giardia Cysts

Temperature of Water (°C)	Surviving Giardia Cysts (out of 25)			Average
	Trial 1	Trial 2	Trial 3	
20	20	20	20	20
40	0	0	0	0
50	1	1	0	1
60	0	0	0	0

[This released scenario is provided as an example.]

# Item Specifications:

## Item Specifications

Item specifications pages have the following characteristics:

Headings indicate the start of each Big Idea.

Specific guidelines for developing items, in addition to those provided earlier in this document.

Content Standard

The maximum cognitive complexity level of the items is shown as the number 1, 2, or 3.

The performance expectations assessed at the classroom level but not on the end-of-course test are indicated as "Classroom only."

In this document, "i.e." means "in other words" and "e.g." means "for example." The use of "i.e." indicates a strong clarification of a Performance Expectation. The use of "e.g." indicates the following is included simply as an example.

Possible item formats are shown as multiple-choice (MC), completion (CP), or short-answer (SA).

Item Specification text

<b>EALR 3: Application</b>		<b>Application (APP)</b>	
<b>Big Idea:</b>		<b>Application (APP)</b>	
<b>Core Content:</b>		Science, Technology, and Society	
<b>Stimulus and Stem Rules</b>			
A stimulus or prompt will include an adequate description of an appropriate life science system or technological design process.			
<b>Item Specifications</b>			
	<b>Items may ask students to:</b>		
9-12 APPA Science and Society	Classroom only: Describe ways scientific ideas have influenced society or the development of differing cultures	3	MC SA
	(1) Describe how science and/or technology might address a societal or cultural issue and/or how society affects science (e.g., funding research, views on what is important to study).	3	N
	(2) Identify a question that scientists may investigate that is stimulated by the needs of society (e.g., medical research, global climate change).	3	N
9-12 APPB Solutions and Processes	(1) Given a description of a problem that can be solved using a technological design process, describe criteria that would be used to evaluate potential solutions.	3	MC SA
	(2) Given a description of a problem that can be solved using a technological design process, describe research that would facilitate a solution to the problem and/or generate several possible solutions.	3	MC SA
			(NA)
			(NA)

Format: Multiple-Choice (MC), Completion (CP), Short-Answer (SA), or Not Assessed (NA)  
C.C. = Cognitive Complexity (C) = Cognitive Complexity for Items

### Item Specification Numbering System





# Glossary

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



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- [Educator Resources](#)
- [Teacher Resource Tool](#)
- [Test and Item Specifications](#)
- [Released Items Documents](#)
- [Powerful Classroom Assessments](#)
- [Performance Level Descriptors](#)

### Assessing Science in Grades 3-8: Measurements of Student Progress

In spring 2010, the [Measurements of Student Progress](#) (MSP) measured the level of progress in science for students in grades 3-8. In Spring 2011, the science MSP will take place in a number of pilot schools. The science MSP will take place in a number of pilot schools.

The science MSP will take place in a number of pilot schools.

For more information:

Science Assessment  
(360) 725-6298  
[Science@k12.wa.us](mailto:Science@k12.wa.us)

 State of Washington  
**OSPI**  
Office of Superintendent of Public Instruction

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## Science

### Educator Resources

OSPI Science Assessment presentation at Washington Educational Research Association (WERA) Conference, December 8, 2011 **NEW**

- [MSP](#) (PPT)
- [Biology EOC](#) (PPT)

### Science Assessment Update for 2012 **NEW**

These documents include: updates to the science assessment system for 2012; sample items to familiarize teachers and students with the item types on the assessments; and scoring information for educators.

- [Grade 5](#)
- [Grade 8](#)
- [Biology EOC](#)

[Science Short-Answer Item Templates](#) **UPDATED**

[Lessons Learned from Scoring Student Work](#) **NEW**

The Science Assessment Team shares observations about student responses for the Measurements of Student Progress and the Biology End-of-Course exam pilot items.



# Short Answer Item Templates



State of Washington

Office of  
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Science

## Science

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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

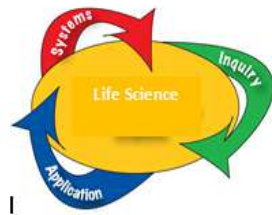
Conclusion:	<a href="#">Grade 5</a>	<a href="#">Grade 8</a>	<a href="#">EOC</a>
New Procedure:	<a href="#">Grade 5</a>	<a href="#">Grade 8</a>	<a href="#">EOC</a>
New Field Study:	<a href="#">Grade 5</a>	<a href="#">Grade 8</a>	<a href="#">EOC</a>

### Application Items

Research & Explore:	N/A	<a href="#">Grade 8</a>	<a href="#">EOC</a>
Plan & Test:	<a href="#">Grade 5</a>	<a href="#">Grade 8</a>	N/A
Redesign:	<a href="#">Grade 5</a>	<a href="#">Grade 8</a>	<a href="#">EOC</a>
Criteria & Constraints:	N/A	N/A	<a href="#">EOC</a>
Test Solution:	N/A	N/A	<a href="#">EOC</a>
Careers:	<a href="#">Grade 5</a>	N/A	N/A

# New Procedure

Biology New Procedure Item Template



## **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.

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# New Procedure

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

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 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 INQE: 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., <i>same student, same time period, same method for taking pulse</i> ).	1
Manipulated Variable	Only one manipulated variable ( <i>exercise rate</i> ) 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 ( <i>pulse rate</i> ) 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 <i>take measurement</i> cannot be used to mean <i>record</i> .	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., <i>resting pulse if 3 other rates are used</i> ). 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 <b>not</b> 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 <i>Set up as diagrammed</i> , but diagram is inadequate; recording vague data or results).	1
<b>Total Possible Attributes</b>		<b>8</b>

# Application: Research & Explore

Biology Research & Explore Item Template



## **Biology**

### **Research & Explore 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:

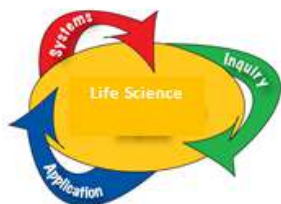
On Items: Revise text in **red** with prompts appropriate to the item used in classroom practice.

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.



# Application: Research & Explore

Biology Research & Explore Item Template



## Biology Research & Explore Item Template Biology End-of-Course Exam

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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.

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.

<b>Problem:</b> <i>Print the problem here</i>
<b>Research the Problem:</b>
<b>Explore Ideas:</b>

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.

<b>Problem:</b> <i>How can invasive mussels be managed using natural population controls?</i>
<b>Research the Problem:</b>
<b>Explore Ideas:</b>



# 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.

<b>Problem:</b> <i>How can invasive mussels be managed using natural population controls?</i>
<b>Research the Problem:</b>
<b>Explore Ideas:</b>

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

Performance Description	Attributes
A 2-point response demonstrates the student understands the Content Standard APPE: 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
<b>Research the Problem</b>	Information needed to solve the problem is described or pertinent questions are given (e.g., <i>How do mussels reproduce?, What do mussels eat?, Do mussels have predators?</i> ).  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
<b>Scientific Research</b>	1. Scientific information involves relevant general scientific concepts (e.g., <i>reproduction, food source, predators</i> ). OR Related information gathered from appropriate sources of scientific information. (e.g., <i>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"</i> ) 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

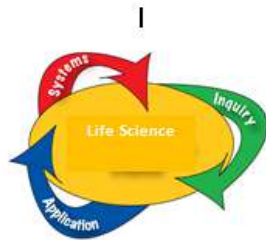
Attributes of a Scientific Design Process

Design Process Stage	Description	Attributes
<b>Explore Ideas</b>	More than one idea that could solve the problem is described (e.g., <i>import a predator, strain the water to remove food supply, remove mussel larvae from the water</i> ).  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., <i>Use a container with soil and gravel</i> 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., <i>Use a metal, plastic, or glass container</i> are three ideas).	1
<b>Explore Scientific Ideas</b>	An idea includes scientific concept(s) for considering the idea (e.g., <i>predators eat mussels and lower mussel population, removing food could starve mussels, removing larvae prevents new populations from increasing</i> ).  Stage Note: This attribute may be credited even when only one idea is given.	1
<b>Total Possible Attributes</b>		<b>4</b>
<b>General Notes:</b>		
1. <b>Copying the Scenario:</b> 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**  
**Criteria & Constraints 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:**

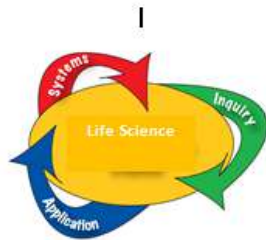
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# Application: Criteria & Constraints

Biology Criteria & Constraints Item Template



**Biology**  
**Criteria & Constraints Item Template**  
**Biology End-of-Course Exam**

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

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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:**








# 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.**