SCIENCE Assessment

Updates for 2012

Grade 8

Table of Contents

Introduction

Updates for 2012 contains pertinent information for Washington educators. This document includes a summary of changes and new information in science assessment, links to resources for teachers, and sample test items. *Updates for 2012* has been customized into grade levels: Grade 5, Grade 8, and the Biology End-of-Course Exam. The documents are available on http://www.k12.wa.us/Science/EducatorResources.aspx

Measurements of Student Progress Development Information

Washington State K-12 Science Learning Standards

In 2009, the *K-12 Science Learning Standards* were formally adopted. Along with the new standards, the legislature provided direction for the redesign of the assessment system. The Measurements of Student Progress (MSP) replaced the Washington Assessment of Student Learning (WASL) and assessed the new science standards in grades 5 and 8 in the spring of 2011. An end-of-course (EOC) biology exam will replace the High School Proficiency Exam (HSPE) in 2012.

View the Washington State K-12 Science Learning Standards at: http://www.k12.wa.us/Science/Standards.aspx

Test and Item Specifications

The *Test and Item Specifications* provide guidelines for developing large-scale assessments based on the Washington State K-12 Science Learning Standards. The science test includes systems, inquiry, and application scenarios which reflect the cross-cutting concepts and abilities in the standards. Most items are connected to a scenario. Some stand-alone items also appear in the test. Stand-alone items are clearly marked for students on the assessment.

The test specifications provide a grade-level or course test map that delineates the type and number of test items. The document also provides a list of science vocabulary words that are necessary for the purposes of the assessment.

The *Test and Item Specifications* are periodically updated. Included with each updated version of the *Test and Item Specifications* will be a summary of the changes made since the previous version. The *Test and Item Specifications* documents can be accessed through the following link: http://www.k12.wa.us/Science/TestItemSpec.aspx.

Item Types

Item Types on the grade 8 Science Measurements of Student Progress (MSP)

Item Type	Point Value	Items per operational test	Distinguishing Feature(s)
Multiple choice	1	24-29	• Each multiple choice item has four answer choices, the correct answer and three distractors.
Completion	1	1-6	• Each completion item requires the student to write a number, word or short phrase.
Short answer	2	5	• Each short answer item requires a response in the form of phrases or sentences. • Short answer items may ask students to do things like write a conclusion or procedure, solve a technological design problem, or explain how a human activity impacts the ecosystem.
Five additional pilot items will be embedded in the EOC. These items are not included in student scores.			

Performance Level Descriptors

Performance Level Descriptors (PLDs) give teachers, parents/guardians and students more information about the typical skills and knowledge a student demonstrates on state assessments in each performance level. Committees of Washington state teachers, parents and community members develop the Performance Level Descriptors during the standard setting process.

PLDs are broken down by the score levels students can earn:

- Basic (Level 2)
- Proficient (Level 3)
- Advanced (Level 4)

NOTE: There are no PLDs for Below Basic (Level 1).

PLD documents can be downloaded at
http://www.k12.wa.us/assessment/StateTesting/PLD/default.aspx .

2012 Measurements of Student Progress Testing Window:

- **Online:** April 25—June 4, 2012
- **Paper and pencil:** April 25—May 18, 2012

Online Testing

Online testing in Washington began in spring 2010. The Measurements of Student Progress (MSP) was offered in grades 6-8 in reading and math. In spring 2011, reading and math was added in grades 4 and 5, and science in grades 5 and 8. In spring 2012, students in grade 3 will be able to take reading and math via computer.

Washington has joined a growing number of states that have moved to online testing. By spring 2012, it's expected a majority of students in grades 4-8 will take the MSP online instead of the traditional paper-and-pencil format.

A Student Demo for science will be posted on the state's online-testing website early in 2012. The Student Demo allows students to view a demonstration of the testing software. The Demo can also be shared with parents and other interested community members.

A science tutorial, known as the Online Testing Tools (OTT), will also be posted early in 2012. The OTT allows students to practice with the testing software, including navigating through the test and typing their responses to completion and short answer questions. The testing software must be loaded on the computer before using the OTT. Student responses are not saved or recorded.

Visit the online testing website for more information about online testing in Washington: http://www.k12.wa.us/assessment/StateTesting/OnlineTesting.aspx

Major Changes in 2012 Science MSP

There are no major differences between the 2011 MSP and the 2012 MSP.

Resources for Educators

Visit http://www.k12.wa.us/Science/EducatorResources.aspx for links to the documents listed in this section. Check regularly for new resources.

2011 Lessons Learned from Scoring Student Work

The Science Assessment Team shares observations about student responses for the Measurements of Student Progress in *Lessons Learned from Scoring Student Work*. The purpose of this document is to provide teachers with insight into common misconceptions and errors that may keep students from earning full credit on state assessment items.

2011 Lessons Learned from Scoring Student Work will be available in November and can be downloaded at: http://www.k12.wa.us/Science/EducatorResources.aspx.

Teacher Tool

The Teacher Tool provides information about items on the previous year's MSP. A brief description of each item on the MSP is provided as well as state-level performance data.

The Teacher Tool is located at http://www.k12.wa.us/TeacherResourceTool2010-11/default.aspx.

Sample Item Templates

Templates of questions and the scoring rubrics for common short-answer items used on the Science MSP are available in the form of Word documents. The templates can be edited for use in classroom practice by incorporating content from any science curriculum.

The templates can be downloaded at: http://www.k12.wa.us/Science/ItemTemplates.aspx

Updates for 2011

The 2011 version of this document contains scenarios and items aligned to the Washington State K-12 Science Learning Standards (adopted 2009) and can be used for classroom practice. The items on the *Updates for 2011* document are also used on the Online Training Tools for science. The document can be downloaded at: http://www.k12.wa.us/Science/EducatorResources.aspx

New Samples for 2012

The scenarios and items on pages 10-25 are samples that are aligned with the K-12 Science Learning Standards. They have not gone through the comprehensive review process that test items must pass before placement on an actual state test. Teachers may still use these items as classroom exercises, or informal checks for understanding, as teachers have the ability and choice to clarify any questions about these items as students are working on them.

The Teacher Answer Pages (pages 26-51) provide the keys, rubrics, and sample student responses.

Printing tip: Print the student pages back-to-back, beginning with the cover sheet on page 9, to preserve pagination.

Student Sample Pages

Student Name:_____

Garage Band

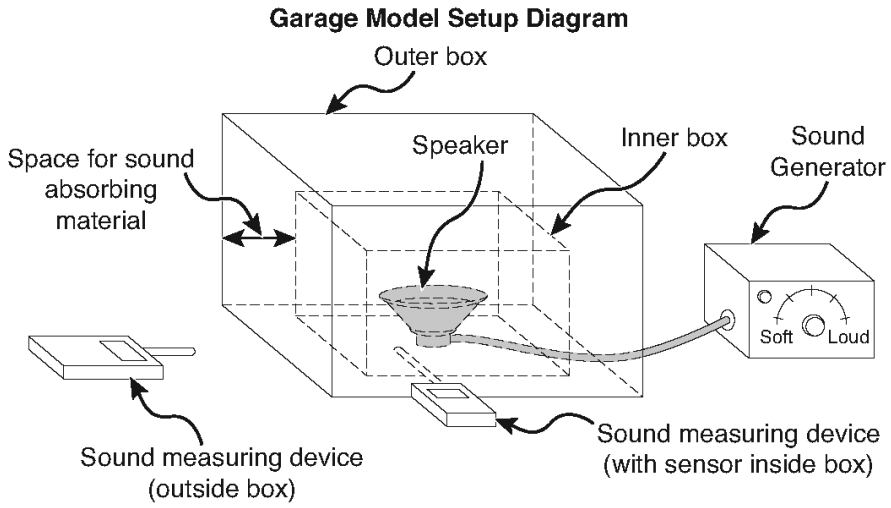
Directions: Use the following information to answer questions 1 through 6 on pages 12 through 15.

Dani and Angie wanted to practice playing music with their band in the garage. They used a model of a garage to do the following controlled experiment to find out how to make the garage walls soundproof.

Question: What is the effect of different materials inside a wall on the decrease in loudness of the sound that travels through the wall?

Hypothesis: Air will decrease the loudness of the sound the most, because sound does not travel as well through air.

Materials:
wallboard box (large)
wallboard box (small)
materials to put inside the wall: fiberglass, stiff foam, packing peanuts, air, and wallboard
sound generator
speaker
sound measuring devices



Procedure:

1. Put the small box and speaker into the large outer box. Put the sensor for one sound measuring device inside the inner box, and keep the other sound measuring device outside both boxes.
2. Fill the space between the boxes with fiberglass.
3. Turn on the sound generator to the loud setting.
4. Measure and record the loudness of the sound inside and outside the Garage Model.
5. Calculate and record the **decrease** in loudness of the sound as Trial 1.
6. Repeat steps 2 through 5 two times as Trials 2 and 3.
7. Remove the fiberglass.
8. Repeat steps 2 through 7 using stiff foam, packing peanuts, air, and more wallboard as the materials between the boxes.
9. Calculate and record the average **decrease** in loudness for each material.

Data:

Type of Material vs. Decrease in Loudness

Type of Material (between the walls)	**Decrease in Loudness** (decibels)			
	Trial 1	Trial 2	Trial 3	Average
Fiberglass	16.3	16.2	16.9	16.5
Stiff foam	16.4	16.5	17.2	16.7
Packing peanuts	17.7	17.8	17.3	17.6
Air	18.7	18.4	18.0	18.4
More wallboard	25.5	25.0	26.0	25.5

1 Which variable was the responding (dependent) variable in this experiment?

- ○ **A.** Decrease in the loudness of the sound
- ○ **B.** Wavelength of the sound from the speaker
- ○ **C.** Material placed inside the walls of the box
- ○ **D.** Distance between the walls of the two boxes

2 Which statement is an objective summary of data from the Type of Material vs. Decrease in Loudness table?

- ○ **A.** The low density of stiff foam helps the foam to absorb sound.
- ○ **B.** Packing peanuts decrease sound by changing the wavelength.
- ○ **C.** Solid materials can decrease sound by reflecting the sound waves.
- ○ **D.** Air decreases the loudness of the sound an average of 18.4 decibels.

3 Angie wants to build a sound barrier wall in her backyard to block the noise coming from the road behind her house. Use the Type of Material vs. Decrease in Loudness table to describe a solution to the road noise.

In your description, be sure to:

- Identify **one** of the materials from the Type of Material vs. Decrease in Loudness table that could be used to solve the road noise problem.
- Describe **why** this material could solve the problem.

One material:
Why this material could solve the solution:

4 Sound changes speed as the sound moves from air through the wallboard. What causes this change in speed?

- ○ **A.** The sound travels a shorter distance in the wallboard.
- ○ **B.** The sound is moving through a different substance.
- ○ **C.** The sound spreads out more in air.
- ○ **D.** The sound is absorbed in the air.

5 How are the particles in the walls of the Garage Model affected when sound travels through?

- ○ **A.** The particles in the walls slow down.
- ○ **B.** The particles in the walls stop moving.
- ○ **C.** The particles in the walls spin in place.
- ○ **D.** The particles in the walls increase vibrations.

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

In your procedure, be sure to include:

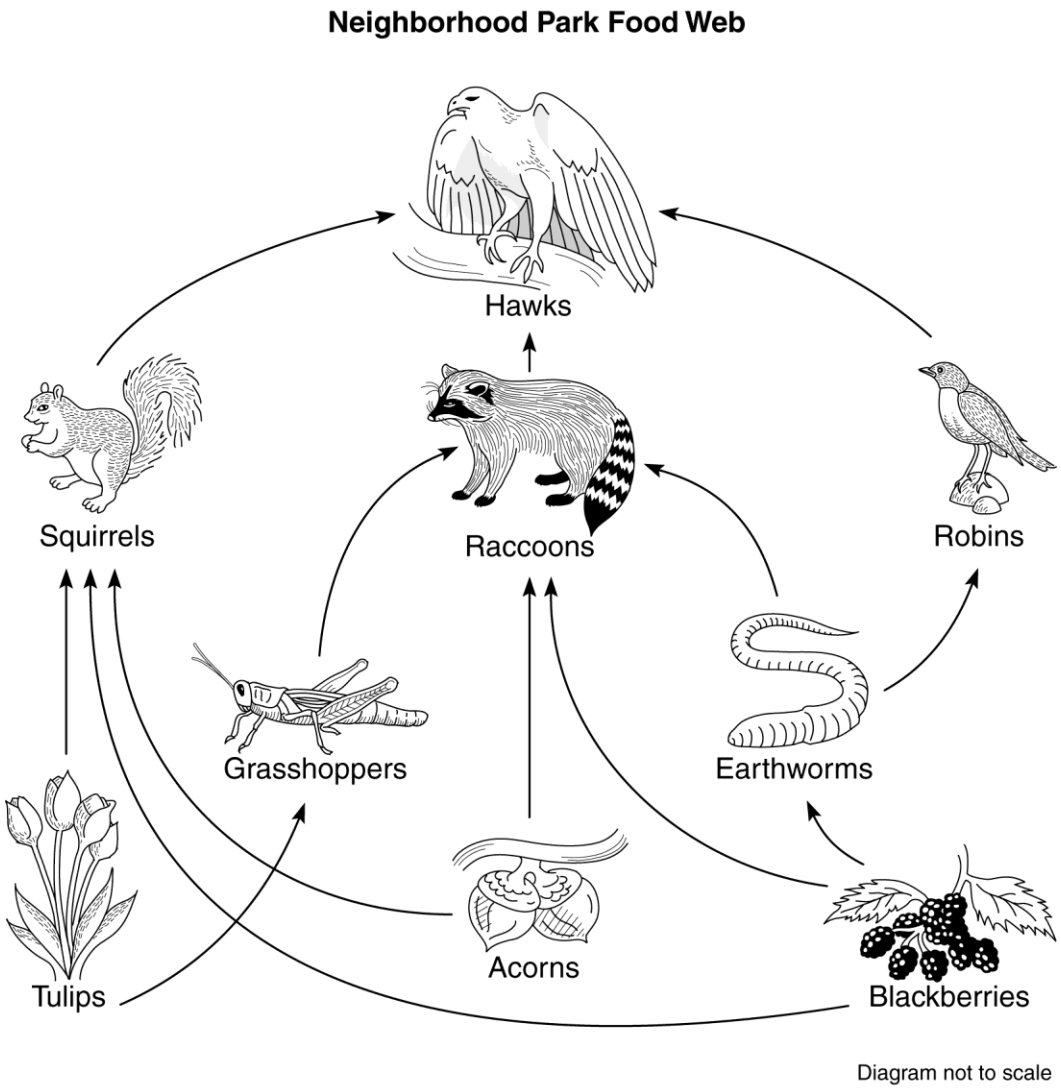
- logical steps to do the experiment
- one controlled (kept the same) variable
- one manipulated (independent) variable
- one responding (dependent) variable
- how often measurements should be taken and recorded

Question: What is the effect of different materials filling the wall (foam, wallboard, fiberglass) on the temperature inside the Model Garage?
Procedure:

Urban Café

Directions: Use the following information to answer questions 7 through 10 on pages 17 through 19.

Carlos and Gina were interested in the organisms living in their neighborhood park. They made the diagram below to show part of the food web in the park.



7 Why are the genes of a young raccoon different from the genes of the young racoon's mother?

- ○ **A.** The young raccoon changes genes to adapt to the environment.
- ○ **B.** The young raccoon learns new genes from other raccoons.
- ○ **C.** The young raccoon inherits some genes from each parent.
- ○ **D.** The young raccoon obtains genes from eating food.

8 Squirrels and blackberry plants need food as an energy source. Squirrels eat blackberries for food. How do blackberry plants get food?

- ○ **A.** Blackberry plants make food using light energy.
- ○ **B.** Blackberry plants use food produced by earthworms.
- ○ **C.** Blackberry plants get food from bees and other insects.
- ○ **D.** Blackberry plants absorb food from heat energy in the soil.

9 The seeds of a blackberry are inside the berry. How could this adaptation increase the survival of blackberry plants?

- ○ **A.** The seeds are spread to new locations by animals that eat the berry.
- ○ **B.** The berry protects the seeds from cold temperatures in the winter.
- ○ **C.** The seeds get energy to germinate from the berry.
- ○ **D.** The berry protects the seeds from predators.

10 Racoons eat acorns to obtain energy. What form of energy is stored in the acorns?

- ○ **A.** Light
- ○ **B.** Kinetic
- ○ **C.** Electrical
- ○ **D.** Chemical

11 Carlos and Gina wanted to study how raccoons live in a natural forest. They decided to use the neighborhood park as a model of a natural forest to study the raccoons. Describe **two** ways the neighborhood park is different from a natural forest and how **each** difference could affect the raccoons

In your description, be sure to:

- Identify **two** ways the neighborhood park is different from a natural forest.
- Describe how **each** difference could affect the raccoons

One difference:
Another difference:

A Moving Story

Directions: Use the following information to answer questions 12 through 17 on pages 22 through 25.

Jon and Andrea had a problem with the amount of sediment flowing into the stream next to their house. They noticed rainwater flowing from the roof of their house had formed a small ditch across their yard. The muddy water in the ditch flowed into the stream. While solving this problem, they recorded the stages of their design process as follows.

Problem: Reduce the amount of sediment flowing into the stream from the runoff water.

Research the Problem: Use beakers to collect three water samples during a rainstorm. Collect the samples from the end of the ditch nearest the stream. Let the sediment in the water samples settle to the bottom of the beakers. Measure and record the thickness of the sediment.

Sediment in Runoff Water

Water Samples	Sediment Thickness (millimeters)
1	3
2	6
3	7

Explore Ideas:

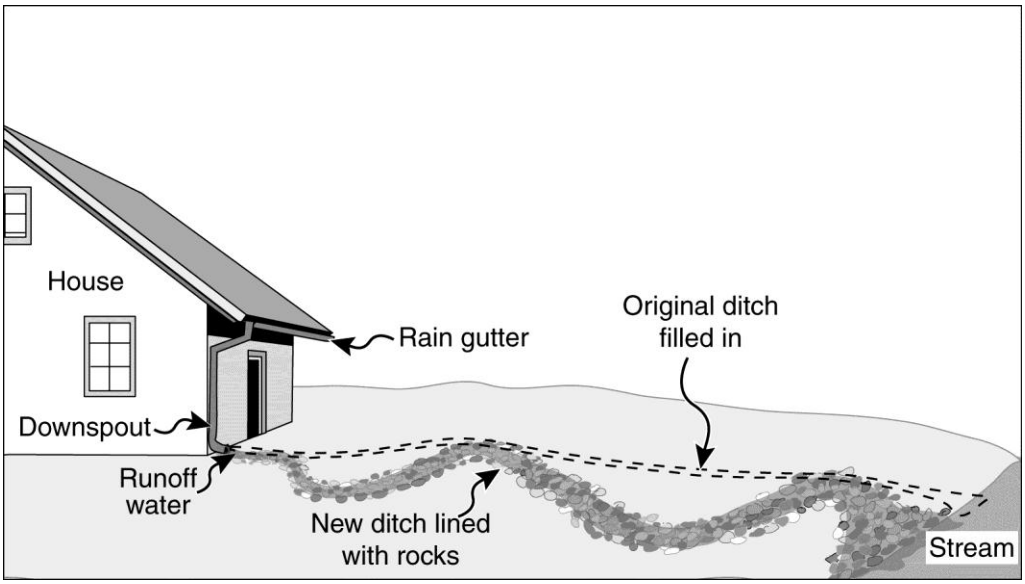
- ✓ Put a pipe from the downspout straight to the stream.
- ✓ Collect the runoff water in a rain barrel under the downspout.
- ✓ Build a pond at the end of the ditch to collect the runoff water.
- ✓ Make the ditch longer and more curved.
- ✓ Grow plants or put rocks and gravel in the ditch.
- ✓ Add a filter system to remove particles that are sediment size and bigger.

Plan Summary: Make a new, longer ditch lined with rocks so the runoff water will slow down before reaching the stream.

Steps to Do the Plan:

1. Dig a new, longer ditch with many curves as shown in the Diagram of Solution.
2. Fill in the old ditch.
3. Add rocks and gravel to the new ditch.

Diagram of Solution:



Test Solution: Use beakers to collect three water samples during the next rainstorm. Collect the samples from the end of the ditch nearest the stream. Let the sediment in the water samples settle to the bottom of the beakers. Measure and record the thickness of the sediment.

Test Results:

Sediment in Runoff Water in New Ditch

Water Samples	Sediment Thickness (millimeters)
1	less than 1
2	1
3	less than 1

12 Why did Jon and Andrea lengthen and curve the new ditch?

- ○ **A.** The longer ditch has a steeper slope.
- ○ **B.** Slower moving water attracts more birds.
- ○ **C.** Slower moving water carries less sediment to the creek.
- ○ **D.** The longer ditch has less sediment for the water to carry.

13 Which energy transfer occurs because the runoff water carries the sediment into the stream?

- ○ **A.** Water's light energy becomes sediment's light energy.
- ○ **B.** Water's kinetic energy becomes sediment's kinetic energy.
- ○ **C.** Water's chemical energy becomes sediment's chemical energy.
- ○ **D.** Water's electrical energy becomes sediment's electrical energy.

14 Which force slows the runoff water flowing in the ditch?

- **A.** Gravity
- **B.** Friction
- **C.** Pressure
- **D.** Magnetism

15 What might happen to the fish population if muddy water continues to flow into the stream?

- **A.** The population might go blind.
- **B.** The population might develop lungs.
- **C.** The population might decrease in number.
- **D.** The population might become a new species.

16 Which landform is formed by the sediment from a stream?

- ○ **A.** Delta
- ○ **B.** Canyon
- ○ **C.** Fault line
- ○ **D.** Waterfall

17 Jon and Andrea have a new problem. There are very few animals coming into the yard between the house and the stream. They wonder if the runoff water can be collected and used to attract more native animals. 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: Attract more native animals into the yard between the house and stream by collecting and using the runoff water.
Research the Problem:
Explore Ideas:

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.

Garage Band Scenario

Answer Key Table

Title: Garage Band		**Grade: 8** (used on 2008 and 2009 WASL, partially used in PLD Moodle training)							
Description: An inquiry scenario of a controlled experiment in the context of physical science									
Item Description		**Item Specification Code**							
	Item Specification Text	Systems	Inquiry	Application	Physical Science	Earth/space Science	Life Science	Answer	Cognitive Level
1	Identify the responding (dependent) variable in a given description of a scientific investigation.		INQD (3)					A	2
2	Describe the differences between an objective summary of the findings of an investigation and an inference made from the findings (e.g., the difference between citing data and drawing a conclusion, respectively).		INQF (2)					D	2
3	Describe a reason(s) for choosing a solution given possible solution(s) and a problem that can be solved using a technological design process.			APPE (2)				SA	3
4	Describe that waves move at different speeds in different materials (e.g., sound travels more quickly through water than through air).				PS3F (3)			B	1
5	Describe that sound waves are generated and/or transmitted by a vibrating object.				PS3F (4)			D	1
6	Describe a plan to answer a given question for a controlled experiment.		INQB (1)					SA	3

Scoring Rubric for Item 3: Solution to Road Noise

A **2-point response** demonstrates that the student understands the Content Standard APPE: Scientists and engineers often work together to generate creative solutions to problems and decide which ones are most promising. Item Specification 2: Describe a reason(s) for choosing a solution given possible solution(s) and a problem that can be solved using a technological design process.

The response describes a solution to the road noise problem by:
Identifying one of the materials from the Type of Material vs. Decrease in Loudness table that could be used to solve the road noise problem
AND
Describing why this material could solve the problem.

Examples:

Identify material	**Describe why this material could solve the problem**
Fiberglass	• *Can be used to fill the hollow spaces in a wall* • *Decreased the sound by 16.5 decibels*
Stiff foam	• *Can withstand rain* • *Solid material can stand on its own*
Packing peanuts	• *Stopped the sound by 17.3* • *Can be used to fill the hollow spaces in a wall*
Air	• *Second best at decreasing the sound* • *Can be used to fill hollow spaces in a wall*
Wallboard	• *Decreased the sound 9 more than fiberglass* • *Solid and can be used to build a wall*

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

The response describes a solution to the road noise problem by identifying one of the materials from the Type of Material vs. Decrease in Loudness table that could be used to solve the road noise problem, but the description of why this material could solve the problem is vague or incomplete.

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

General Notes:
1. Responses including minor data errors (e.g. *wallboard was 10 better than fiberglass*) may be credited.
2. Responses only using cost/availability as a reason why the material could solve the problem may not be credited score points.
3. Responses may only be credited for why the material the material could solve the problem to reducing the loudness of sound by describing the durability/ usability of material or the effectiveness of sound reduction by including a comparison or a number from the data table.

Annotated example of a 2-point response to item 3.

3 Angie wants to build a sound barrier wall in her backyard to block the noise coming from the road behind her house. Use the Type of Material vs. Decrease in Loudness table to describe a solution to the road noise.

In your description, be sure to:
- Identify **one** of the materials from the Type of Material vs. Decrease in Loudness table that could be used to solve the road noise problem.
- Describe **why** this material could solve the problem.

One material: *wall board*
Why this material could solve the solution: *Angie should use Wallboard because it*
blocked out more sound than Fiberglass, stiff Foam, packing peanuts, or air. Wallboard had
an average of 25.5 (decibels) decrease in loudness. Fiberglass had an average of 16.5
(decibels) decrease in loudness. Stiff foam had an average of 16.7 (decibels) decrease in
Loudness. Packing peanuts had an average of 17.6 (decibels) decrease in loudness. And air
Had an average of 18.4 (decibels) decrease in loudness. Wallboard had the biggest decrease.

Annotations	Score Point
Material: *wallboard*	**2**
Why material could solve the problem: *Wallboard had an average of 25.5 (decibels) decrease in loudness…* OR *…had the biggest decrease.*	

Annotated example of a 1-point response to item 3.

3 Angie wants to build a sound barrier wall in her backyard to block the noise coming from the road behind her house. Use the Type of Material vs. Decrease in Loudness table to describe a solution to the road noise.

In your description, be sure to:
- Identify **one** of the materials from the Type of Material vs. Decrease in Loudness table that could be used to solve the road noise problem.
- Describe **why** this material could solve the problem.

One material: *fiberglass*
Why this material could solve the solution: *because in the test in Type of Material*
vs. Decreas in Loudness it showed as the material to have the lowest amount of decibals

Annotations	Score Point
Material: *fiberglass*	**1**
Why material could solve the problem: *…it* (fiberglass) *showed as the material to have the lowest amount of decibals* Vague – does not indicate a decrease in loudness.	

Annotated example of a 0-point response to item 3.

3 Angie wants to build a sound barrier wall in her backyard to block the noise coming from the road behind her house. Use the Type of Material vs. Decrease in Loudness table to describe a solution to the road noise.

In your description, be sure to:
- Identify **one** of the materials from the Type of Material vs. Decrease in Loudness table that could be used to solve the road noise problem.
- Describe **why** this material could solve the problem.

One material:
Cement and fabrick
Why this material could solve the solution:
Because she could build a cement wall Surrounding her yard and put a Fabric over top of
everything.

Annotations	Score Point
Material: *cement and fabric* are not acceptable materials.	**0**
Why material could solve the problem:	

Scoring Rubric for Item 6: Garage Band New Procedure (1st of 2 pages)

Performance Description	Attributes
A **2-point response** demonstrates the student understands the Content Standard INQB: Different kinds of questions suggest different kinds of scientific investigations. Item Specification 1: Describe a plan to answer a given question for a controlled experiment.	5–6
A **1-point response** demonstrates the student has partial understanding of the Content Standard.	3–4
A **0-point response** demonstrates the student has little or no understanding of the Content Standard.	0–2

Attributes of a Procedure

Attribute Name	Description of Attribute	Attributes
One Controlled Variable	One controlled variable is identified or implied in the procedure or the materials list (e.g., *same thermometer, same garage model, time of measuring*).	1
Manipulated Variable	Only one manipulated variable (*type of material*) is identified or implied in the procedure or data table (if given).	1
Responding Variable	The responding variable (*temperature inside the Model*) 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
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	**6**

Scoring Rubric for Item 6: Garage Band New Procedure (2nd t of 2 pages)

General Notes:

1. **Inappropriate Procedures:** If the response does not plan an appropriate procedure for the given question, the response may not earn any of the possible procedure attributes.
   Examples:
   a) Repeats the procedure from the scenario
   b) Measures only one condition (therefore cannot establish the controlled or manipulated variables)
   c) Purposefully changes more than one variable simultaneously
   d) Writes a procedure that is too vague to possibly be appropriate
   e) Writes a prediction instead of a procedure
2. **Naming Attributes:** If the response names a bulleted attribute listed after "..be sure to include:" without including that attribute in the procedure, the attribute cannot be credited. When a bulleted attribute is named and implied in the response, both must be correct to be credited.
3. **Clarifying Vagueness in Procedures:**
   a) NA
   b) Measuring a vague parameter (e.g., *the air* instead of temperature) may be credited as a manipulated or responding variable. However, a vague parameter is difficult to repeatedly measure, so the logical steps attribute cannot be credited.
   c) The term "repeat" at the end of a step refers to that step only.
   d) The term "repeat" as a separate step (or in a new paragraph) refers to the whole procedure.
   e) The term "repeat," when qualified, cannot be credited for multiple trials (e.g., *repeat if necessary, repeat as desired*).
   f) A vague action that calls for the manipulated variable to be changed (e.g., *change the material*) without indicating how many times, gives no end to the investigation so the logical steps attribute cannot be credited.
   g) NA
   h) When a procedure conflicts with a given labeled diagram, the procedure is too illogical to be effectively repeated. Therefore, the logical steps attribute cannot be credited, but the procedure can be scored for attributes that are not in conflict.

Annotated example of a 2-point response to item 6.

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

In your procedure, be sure to include:

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

Question: What is the effect of different materials filling the wall (foam, wallboard, fiberglass) on the temperature inside the Model Garage?
Procedure:
1) measure the inside of the box with stiff foam in it.
2) place one instant handwarmer in the box for 2 hours.
3) take it out & instantly record the inner temp
4) Repeat steps 1-3 2 more times using 2 new handwarmers
5) Repeat steps 1-4 using wall board & fiberglass
6) Record & compare data

Attribute Name	Credit	Annotations
One Controlled Variable	1	*2)…2 hours…***OR** *4) …new instant hand warmers*
Manipulated Variable	1	*1) …stiff foam…. 5) …wall board & fiberglass*
Responding Variable	1	*3)…inner temperature*
Record Measurements	1	*3)….record*
Trials are Repeated	1	*4) repeat steps 1 – 3 2 more times 5) Repeat steps 1-4 using wall board & fiberglass*
Logical Steps	1	The steps of the procedure are detailed enough to repeat the procedure effectively.
Total Attributes	**6**	**2** Score Points

Annotated example of a 2-point response to item 6.

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

In your procedure, be sure to include:

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

Question: What is the effect of different materials filling the wall (foam, wallboard, fiberglass) on the temperature inside the Model Garage?
Procedure:
1. Put the stiff foam in the model. 2. Turn the heater on.
3. After measuring the heat turn the heater off.
4. Measure the heat 1 min after turning the heater off.
5. Record how much heat was lost.
6. Repeat steps 2-5 for trials 2 and 3.
7. Repeat step 2-6 for the wallboard and fiberglass.

Attribute Name	Credit	Annotations
One Controlled Variable	1	*4. Measure the heat 1 min after turning the heater off.*
Manipulated Variable	1	*1. …stiff foam…* *7. …wallboard and fiberglass*
Responding Variable	1	*5. … how much heat was lost.*
Record Measurements	1	*5. Record…*
Trials are Repeated	1	*6. Repeat steps 2-5 for trials 2 and 3.* *7. Repeat step 2-6 for the wallboard and fiberglass*
Logical Steps	0	Not clear how long to keep the heater on in step 2.
Total Attributes	**5**	**2** Score Points

Annotated example of a 1-point response to item 6.

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

In your procedure, be sure to include:

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

Question: What is the effect of different materials filling the wall (foam, wallboard, fiberglass) on the temperature inside the Model Garage?
Procedure:
Step 1. Put stiff foam in the model and then put the thermometer in the center of the model. Measure the temperature.
Step 2. Do the same procedure in step 1 with the same thermometer but wallboard instead of foam.
Step 3. Do the same procedure in step 1 with the same thermometer but fiberglass instead of foam.
Step 4. Graph your data and come to a conclusion.

Attribute Name	Credit	Annotations
One Controlled Variable	1	*Step 1. ...the thermometer* *Step 2 and 3 …the same thermometer*
Manipulated Variable	1	*Step 1. …stiff foam…* *Step 2. … wallboard* *Step 3. … fiberglass*
Responding Variable	1	*Step 1….the temperature*
Record Measurements	0	None
Trials are Repeated	0	Trials are not repeated.
Logical Steps	1	The steps of the procedure are detailed enough to repeat the procedure effectively.
Total Attributes	**4**	**1** Score Points

Annotated example of a 1-point response to item 6.

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

In your procedure, be sure to include:

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

Question: What is the effect of different materials filling the wall (foam, wallboard, fiberglass) on the temperature inside the Model Garage?
Procedure:
Set up the wallboard box small & large.
Fill the space between the inner & outer box with stiff foam.
Turn on the fan and then measure how cold the inner box is.
Repeat steps 1-3 for wallboard & fiberglass.

Attribute Name	Credit	Annotations
One Controlled Variable	0	None
Manipulated Variable	1	*… stiff foam… wallboard & fiberglass*
Responding Variable	1	*… measure how cold the inner box is.*
Record Measurements	0	None.
Trials are Repeated	0	Trials are not repeated.
Logical Steps	1	The steps of the procedure are detailed enough to repeat the procedure effectively.
Total Attributes	**3**	**1** Score Points

Annotated example of a 0-point response to item 6.

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

In your procedure, be sure to include:

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

Question: What is the effect of different materials filling the wall (foam, wallboard, fiberglass) on the temperature inside the Model Garage?
Procedure:
Put one material in the wall. Check the temperature. Do the other materials.

Attribute Name	Credit	Annotations
One Controlled Variable	0	None
Manipulated Variable	1	*Put one material in the wall….Do the other materials.* Clarified by the Question above the response.
Responding Variable	1	*Check the temperature.* Vague.
Record Measurements	0	None
Trials are Repeated	0	None
Logical Steps	0	General note 3b.
Total Attributes	**2**	**0** Score Points

Annotated example of a 0-point response to item 6.

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

In your procedure, be sure to include:

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

Question: What is the effect of different materials filling the wall (foam, wallboard, fiberglass) on the temperature inside the Model Garage?
Procedure:
1) Test the stiff Foam and record data
2) Test the wallboard and record data
3) Test the Fiberglass and record data

Attribute Name	Credit	Annotations
General Note 1d: Writes a procedure that is too vague to possibly be appropriate		
One Controlled Variable	0	
Manipulated Variable	0	
Responding Variable	0	
Record Measurements	0	
Trials are Repeated	0	
Logical Steps	0	
Total Attributes	**0**	**0** Score Points

Urban Cafe Scenario

Answer Key Table

Title: Urban Cafe		**Grade: 8** (used on 2009 WASL & 2010 MSP, not previously released)							
Description: A systems scenario in the context of life science									
	Item Description Item Specification Text	**Item Specification Code** Systems	Inquiry	Application	Physical Science	Earth/space Science	Life Science	Answer	Cognitive Level
7	Describe that offspring produced during sexual reproduction are similar, but not identical to, either parent because the offspring receive genetic information from both parents.						LS3D (1)	C	1
8	Give an example of an output of matter or energy from a given system that can become input for another system AND Describe that producers transform light energy from the Sun into chemical energy in food through photosynthesis. **Note:** On the science assessments, the term 'mineral nutrient' will be used to describe the matter plants generally get from soil. Mineral nutrients are not food for plants. Plants make their food (energy-rich molecules) with light energy and matter from air, water, and mineral nutrients.	SYSC					LS2C (1)	A	1
9	Describe an inherited adaptation which would enhance the ability of an organism to survive and/or reproduce in a particular environment (e.g., feathers similar in color to the organism's surroundings may enable the organisms to be more successful at hiding from predators).						LS3E (1)	A	2
10	Describe that producers are organisms that make their own chemical energy and/or that animals get chemical energy by eating producers or other animals that eat producers.						LS2C (2)	D	1
11	Describe how a model or simulation is similar to and/or different from the actual object, event, system or process being modeled.		INQE (2)					SA	3

Scoring Rubric for Item 11 : Limitations of the Park as a Model

Performance Description

A **2-point response** demonstrates the student understands the Content Standard INQE: Models are used to represent objects, events, systems, and processes. Models can be used to test hypotheses and better understand phenomena, but they have limitations. Item Specification 2: Describe how a model or simulation is similar to and/or different from the actual object, event, system or process being modeled.

The response describes **two** ways the neighborhood park is different from a natural forest and how each difference could affect the raccoons by:

Identifying **two** ways the neighborhood park is different from a natural forest
AND
Describing how **each** difference could affect the raccoons.
Examples:

Identify a difference	**Describe how that difference could affect raccoons**
Smaller area	• *May not have to travel as far to find food/shelter* • *Not as many choices for habitat/shelter/food* • *Fewer raccoons for mating*
Different food available	• *Raccoons may become fat/skinny/sick/dependent* • *Raccoons may starve/choke/die* • *Raccoon population may increase/decrease*
Different amounts of predators	• *Raccoons might have f ewer predators so populations would increase* • *Raccoons might have more predators so populations would decrease*
Different vegetation	*Fewer places for raccoons to find food/ hide/ nest*
More people around	• *Spend more time hiding during the day, not as active* • *Disturb the raccoons' dens (homes), don't get sleep* • *Pollution of air, water might make raccoons sick*

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

The response describes **one** way the neighborhood park is different from a natural forest and how that difference could affect the raccoons.

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

General Notes:

1. Responses identifying only one difference but describing two effects on raccoons for that difference may be credited two points.
2. Responses identifying a second difference that is the reverse of the first difference cannot be credited as two differences (e.g. *fewer people in the natural forest than the park; more people in the park than the natural forest).*

Annotated example of a 2-point response to item 11.

11 Carlos and Gina wanted to study how raccoons live in a natural forest. They decided to use the neighborhood park as a model of a natural forest to study the raccoons. Describe **two** ways the neighborhood park is different from a natural forest and how **each** difference could affect the raccoons

In your description, be sure to:
- Identify **two** ways the neighborhood park is different from a natural forest.
- Describe how **each** difference could affect the raccoons

One difference:
One difference is that the park may have less of its natural food resource which might force the
raccoon to change it's diet or starve.
Another difference:
Another difference is that the park could be a wide open area so the raccoon's natural enemies like
hawks could catch them easier which would make them die more often.

Annotations	Score Point
One difference: *… have less of its* (raccoons') *natural food resource…* **How difference could affect raccoons:** *…which might force the raccoon to change it's* (raccoons) *diet…starve.*	1
Another difference: *…the park could be a wide open area…* **How difference could affect raccoons:** *…natural enemies like hawks could catch them* (raccoons) *easier…*OR*……natural enemies like hawks could catch them* (raccoons) *…die more often.*	1
Total Score Points	**2**

Annotated example of a 1-point response to item 11.

11 Carlos and Gina wanted to study how raccoons live in a natural forest. They decided to use the neighborhood park as a model of a natural forest to study the raccoons. Describe **two** ways the neighborhood park is different from a natural forest and how **each** difference could affect the raccoons

In your description, be sure to:
- Identify **two** ways the neighborhood park is different from a natural forest.
- Describe how **each** difference could affect the raccoons

One difference:
The people in the park make the difference. People litter. The raccoons could choke on the wrappers.
Another difference:
Some people might also try to play around with the raccoons.

Annotations	Score Point
One difference: *…people in the park…litter* **How difference could affect raccoons:** *The raccoons could choke on the wrappers.*	1
Another difference: *…people might …try to play around with the raccoons* **How difference could affect raccoons:** none	0
Total Score Points	**1**

Annotated example of a 0-point response to item 11.

11 Carlos and Gina wanted to study how raccoons live in a natural forest. They decided to use the neighborhood park as a model of a natural forest to study the raccoons. Describe **two** ways the neighborhood park is different from a natural forest and how **each** difference could affect the raccoons

In your description, be sure to:
- Identify **two** ways the neighborhood park is different from a natural forest.
- Describe how **each** difference could affect the raccoons

One difference:
The park is manacured by having it's grass cut and bushed trimed well a forrest grows freely.
Another difference:
There are no manmade things in forrestes like cement paths or benches.

Annotations	Score Point
One difference: *The park is manacured by having it's grass cut….* **How difference could affect raccoons:** none	0
Another difference: *There are no manmade things in forrestes…* **How difference could affect raccoons:** none	0
Total Score Points	**0**

A Moving Story Scenario

Answer Key Table

Title: A Moving Story		**Grade: 8** (used on 2009 WASL, not previously released)							
Description: An application scenario in the context of Earth/space science									
Item Description		**Item Specification Code**							
	Item Specification Text	Systems	Inquiry	Application	Physical Science	Earth/space Science	Life Science	Answer	Cognitive Level
12	Describe a reason(s) for choosing a solution given possible solution(s) and a problem that can be solved using a technological design process.			APPE (2)				C	2
13	Describe how energy is transformed from one form to another and/or how energy is transferred from one place to another in a given system other than an electrical circuit.				PS3A (2)			B	1
14	Identify friction as a force that can help objects start moving, stop moving, slow down, or change direction.				PS1B (1)			B	1
15	Predict or describe the effect on an ecosystem of a change in a nonliving factor (e.g., amount of light, range of temperatures, presence of water, habitat destruction, human use of resources).						LS2D (1)	C	2
16	Explain that a given landform (e.g., mountain) has been shaped by processes that build up structures (e.g., uplift) and/or by processes that break down and carry away material (e.g., weathering and erosion).					ES2G (2)		A	1
17	Describe research that might be useful in solving a problem and/or propose multiple solutions to a problem given a problem that can be solved using a technological design process.			APPD (2)				SA	3

Scoring Rubric for Item 17: A Moving Story Research & Explore (1st of 2 pages)

Performance Description	Attributes
A **2-point response** demonstrates the student understands the Content Standard APPD: The process of technological design begins by defining a problem, identifying criteria for a successful solution, followed by research to better understand the problem, and brainstorming potential solutions. Item Specification 2: Describe research that might be useful in solving a problem and/or propose multiple solutions to a problem given 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., *information about ponds, needs of native species, how many animals are currently in the yard*). 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	Related scientific information (e.g., *population study, research or study diet/habitat/needs of native animals, research or test water quality*) OR how to scientifically collect related data is described (e.g., *count and record the number of native animals that visit the yard before the pond is built daily over a period of one week*). Stage Notes: 1. Scientific information involves relevant general scientific concepts (e.g., *needs of a species of plants*) OR Related information gathered from appropriate sources of scientific information. (e.g., *ask a wildlife biologist about the types of wildlife native to the area*) 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

Scoring Rubric for Item 17: A Moving Story Research & Explore (2nd of 2 pages)

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., *dig a pond to collect the runoff, use runoff to irrigate plants animals eat, use a filter, make bird baths, plant native plants*). 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., *build a deep pond so the water will be cool enough for fish, use plants that can survive on the amount of water that runs off the roof, use plants to attract insects that native birds eat*). 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.

Annotated example of a 2-point response to item 17.

17 Jon and Andrea have a new problem. There are very few animals coming into the yard between the house and the stream. They wonder if the runoff water can be collected and used to attract more native animals. 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: Attract more native animals into the yard between the house and stream by collecting and using the runoff water.
Research the Problem: *Count every day for a week how many animals (not insects) are present in the back yard and record each days discoveries.*
Explore Ideas:
• *Place run-off water in large bowl outside for animals to drink or bathe from*
• *Sprinkle around yard for a moister landscape*
• *Water plants and trees with run-off water to help them grow and produce more food and sediments fall and make more soil and a richer environment*

Attribute Name	Credit	Annotations
Research the Problem	1	*Count … how many animals (not insects) are present in the back yard*
Scientific Research	1	*… every day for a week…*
Explore Ideas	1	*Place run-off water in large bowl… Sprinkle around yard… Water plants and trees with run-off water…*
Explore Scientific Ideas	1	*… for animals to drink…* **OR** *… produce more food and sediments fall and make…a richer environment*
Total Attributes	**4**	**2** Score Points

Annotated example of a 1-point response to item 17.

17 Jon and Andrea have a new problem. There are very few animals coming into the yard between the house and the stream. They wonder if the runoff water can be collected and used to attract more native animals. 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: Attract more native animals into the yard between the house and stream by collecting and using the runoff water.
Research the Problem:
Observe the ditch for three 1-hour periods. Record how many animals you see for each hour.
Explore Ideas:
• *Build a pond at the end of the ditch to collect the water and attract animals*
• *Grow plants along the ditch*

Attribute Name	Credit	Annotations
Research the Problem	1	*Observe the ditch…Record how many animals you see…*
Scientific Research	1	*… for three 1-hour periods…for each hour.*
Explore Ideas	1	*Build a pond…Grow plants along the ditch*
Explore Scientific Ideas	0	None.
Total Attributes	**3**	**1** Score Points

Annotated example of a 1-point response to item 17.

17 Jon and Andrea have a new problem. There are very few animals coming into the yard between the house and the stream. They wonder if the runoff water can be collected and used to attract more native animals. 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: Attract more native animals into the yard between the house and stream by collecting and using the runoff water.
Research the Problem:
How many animals visit the Stream a day. Record how many animals are seen at the stream
Explore Ideas:
• *build a pond*
• *leave drinking water down*

Attribute Name	Credit	Annotations
Research the Problem	1	*How many animals visit the Stream a day.*
Scientific Research	0	None
Explore Ideas	1	*build a pond…leave drinking water down*
Explore Scientific Ideas	0	None
Total Attributes	**2**	**1** Score Points

Annotated example of a 0-point response to item 17.

17 Jon and Andrea have a new problem. There are very few animals coming into the yard between the house and the stream. They wonder if the runoff water can be collected and used to attract more native animals. 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: Attract more native animals into the yard between the house and stream by collecting and using the runoff water.
Research the Problem:
Observe and record what some attractions are to the native animals.
Explore Ideas:
--bird feeder
--plants
--pond.

Attribute Name	Credit	Annotations
Research the Problem	1	*Observe and record what some attractions are to the native animals*
Scientific Research	0	None
Explore Ideas	0	Stage note 1: Listing objects may not be credited.
Explore Scientific Ideas	0	None
Total Attributes	**1**	**0** Score Points

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