SCIENCE Assessment

Updates for 2012

Grade 5

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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 5 Science Measurements of Student Progress (MSP)

Item Type	Point Value	Items per operational test	Distinguishing Feature(s)
Multiple choice	1	20-25	• Each multiple choice item has three answer choices, the correct answer and two distractors.
Completion	1	1-6	• Each completion item requires the student to write a number, word or short phrase.
Short answer	2	4	• 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 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 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 in the OTT.

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 Science MSP and the 2012 Science 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 *Updates* document contains scenarios and items aligned to the *K-12 Science Learning Standards* 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 10-23 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 24-50) 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:_____

Around the Bend

Directions: Use the following information to answer questions 1 through 5 on pages 12 through 15.

Tia and Mike wondered if the number of bends in a stream affects the amount of erosion in a stream system. They made a model of a stream and did the following controlled experiment.

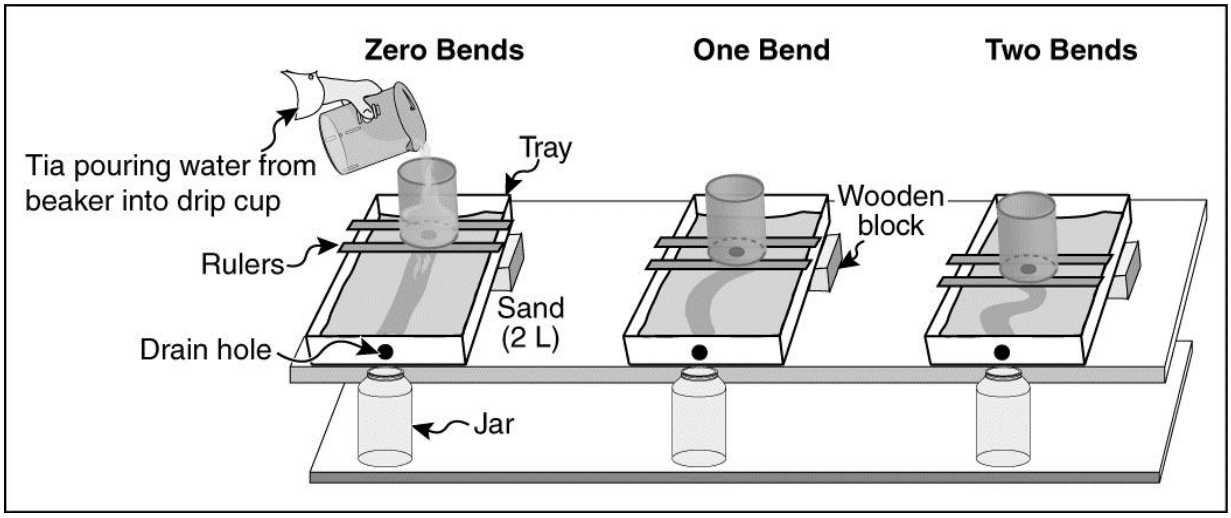
Question: What is the effect of different numbers of bends in a stream model on the amount of sand that washes away?

Prediction: The stream model with the most bends will have the least amount of sand wash away.

Materials:

sand
trays with drain holes (each tray is 43 centimeters long)
jars
water
beaker
drip cups with drain holes
wooden blocks
rulers
timer

Controlled Experiment Setup



Procedure:

1. Put the same amount of sand into three trays sitting on wooden blocks. Use a ruler to carve out a stream with zero bends in the first tray, a stream with one bend in the next tray, and a stream with two bends in the last tray. Make each stream 43 centimeters long.
2. Use rulers to set drip cups above the start of each stream. Put a jar under each tray's drain hole.
3. Pour 1 liter of water into each of the three drip cups. Let water and sand drain through each stream model into the jars.
4. Wait 30 minutes.
5. Measure and record the height of sand in each jar as Trial 1.
6. Repeat steps 1 through 5 two more times as Trials 2 and 3.
7. Find and record the average amount of sand collected for each number of bends.

Data:

Number of Bends vs. Height of Sand

Number of Bends (in stream model)	**Height of Sand** (millimeters)			
	Trial 1	Trial 2	Trial 3	Average
Zero	25	23	25	24
One	17	19	18	18
Two	9	12	16	12

1 Which variable was kept the same (controlled) in this experiment?

- **A.** Volume of water poured into each drip cup
- **B.** Amount of sand washed away
- **C.** Shape of each streambed

2 Write a conclusion for this experiment.

In your conclusion, be sure to:

- Answer the experimental question.
- Include **supporting** data from the Number of Bends vs. Height of Sand table.
- Explain how these data **support** your conclusion.

Question: What is the effect of different numbers of bends in a stream model on the amount of sand that washes away?
Conclusion:

3 Tia and Mike used a model of a stream to investigate erosion. Which of the following is an example of erosion in a real stream?

- ○ **A.** Sunlight heating the stream
- ○ **B.** Leaves falling into the stream
- ○ **C.** Rocks rolling in the stream

4 Why did Tia and Mike use three trials in their experiment?

- ○ **A.** To get the right data to match the prediction
- ○ **B.** To keep all of the variables controlled
- ○ **C.** To be more sure of their results

5 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 changed (manipulated) variable
- one measured (responding) variable
- how often measurements should be taken and recorded

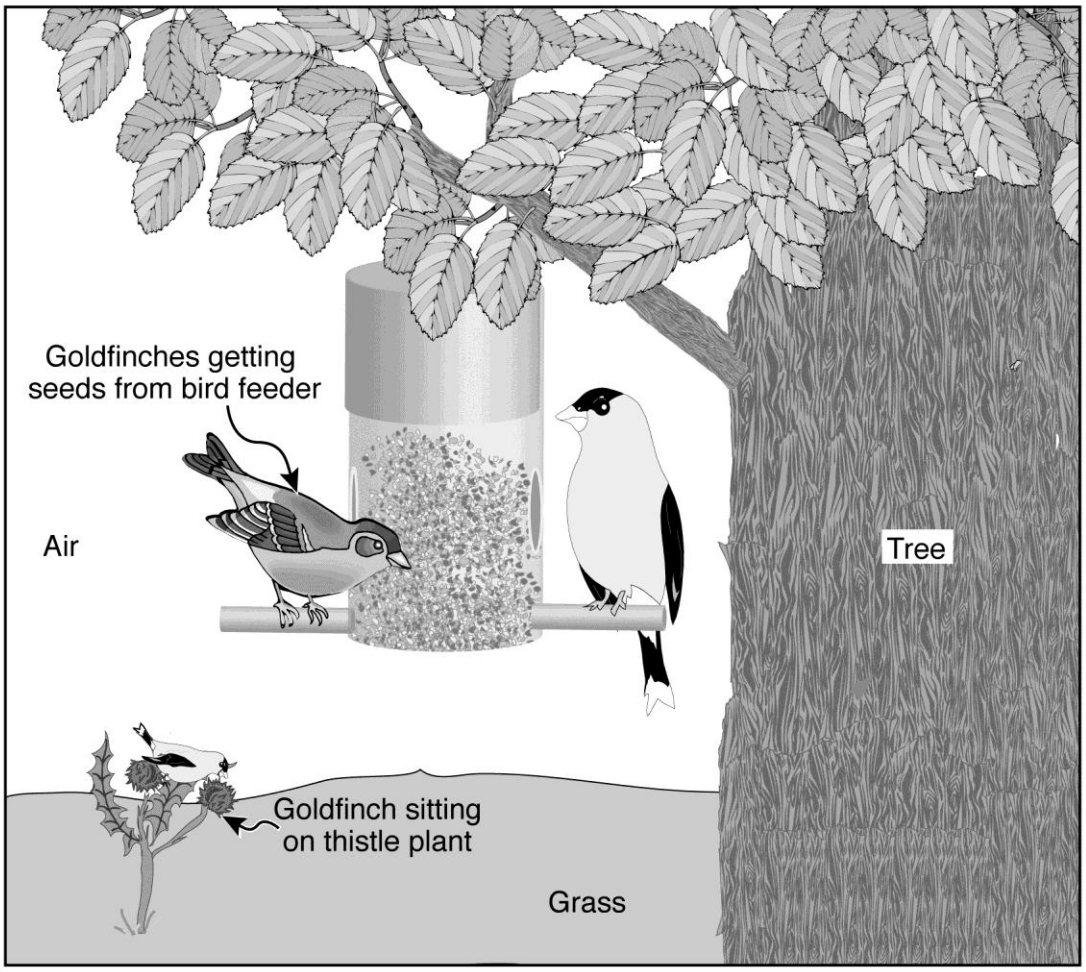
Question: What is the effect of different types of soil (garden soil, sandy soil, clay soil) on the time for the water to flow through the stream model?
Procedure:

Feathered Friends

Directions: Use the following information to answer questions 6 through 10 on pages 17 through 19.

Cole and Bella observed two goldfinches getting seeds from a bird feeder in a park. They also saw a goldfinch sitting on a thistle plant as shown in the Goldfinches in Park diagram.

Goldfinches in Park



6 What is a function of goldfinch feathers?

- ○ **A.** Feathers help the goldfinch fly.
- ○ **B.** Feathers help the goldfinch sing.
- ○ **C.** Feathers help the goldfinch open seeds.

7 Why is the goldfinch a consumer in this habitat?

- ○ **A.** The goldfinch is eaten by other animals.
- ○ **B.** The goldfinch needs to eat food to live.
- ○ **C.** The goldfinch makes its own food.

8 Cole and Bella noticed that fewer goldfinches were using the bird feeder in the park than last week. Describe how the students could attract more goldfinches to the bird feeder.

In your description, be sure to:

- Identify **two** changes that could attract more goldfinches to the bird feeder.
- Describe how each change attracts goldfinches to the bird feeder.

One change:
Another change:

9 Why do all goldfinches have some yellow feathers?

- **A.** Goldfinches change their feather color to fit their habitat.
- **B.** Goldfinches inherit their feather color from their parents.
- **C.** Goldfinches learn their feather color from other goldfinches.

10 Cole and Bella want to attract goldfinches to their backyard. Which question should they research?

- **A.** How fast do goldfinches fly?
- **B.** Which type of goldfinch lives the longest?
- **C.** What do goldfinches use to build their nest?

Rocket Challenge

Directions: Use the following information to answer questions 11 through 14 on pages 22 through 23.

Justin and Maddy decided to do the School Rocket Challenge. They recorded the stages of their design process as follows:

Challenge: Make a rocket that will travel at least 4.0 meters.

Rules:
1. Any materials may be used to make rockets.
2. Rockets may be up to 40 centimeters (cm) long.
3. All rockets will be launched in the same way from the same rubber band rocket launcher.

Research the Problem: Use a pencil to model a rocket. Investigate the effect of length, weight, and fins on how a pencil travels. Launch the pencil straight off a table several times in the same way. Record how the pencil traveled.

Results of Investigating How Pencils Traveled

Description of Pencil	How a Pencil Travels
Regular length pencil	Flew pointed a little up. Flew far.
Regular pencil with a ball of clay on the front end 	Flew pointed down. Flew not so far.
Regular pencil with paper fins 	Flew straight. Flew far.
Short pencil	Flew straight. Flew not so far.

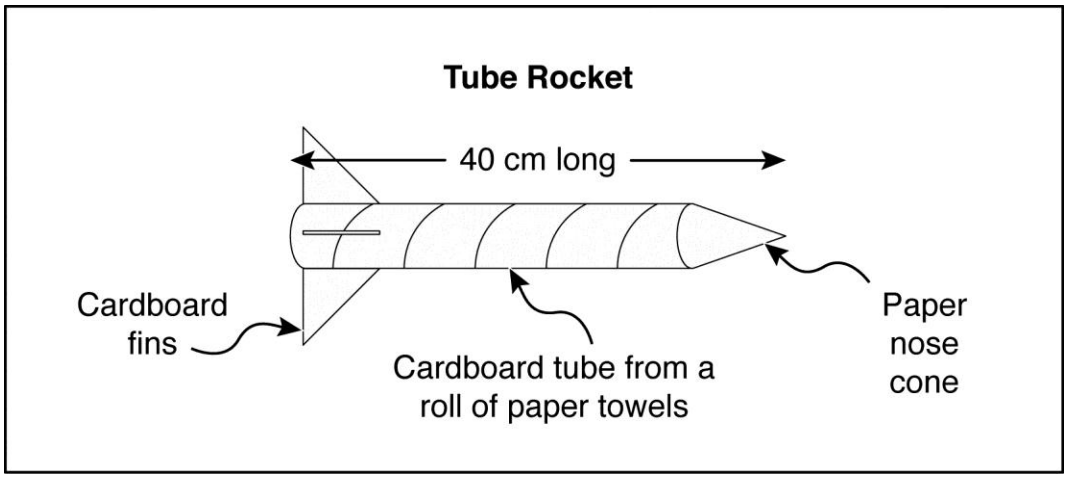
Explore Ideas:
- ✓ Use small fins on the end of the rocket.
- ✓ Make the rocket out of light weight materials.
- ✓ Make the rocket 40 cm long because longer pencils traveled farther.
- ✓ Add weight to the back end of the rocket to help the rocket point up.

Plan Summary: Build a rocket out of a lightweight cardboard tube with a paper nose cone. Tape the cardboard fins to the end of the rocket to help the rocket go straight.

Steps to Do the Plan:

1. Make a nose cone from a piece of paper.
2. Make four fins from a piece of cardboard.
3. Tape the nose cone and fins to a cardboard tube as shown in the Diagram of Solution.
4. Be sure rocket is 40 cm long.

Diagram of Solution:



Test Solution: Launch the Tube Rocket three times. Measure and record the distance the rocket traveled. Find the average distance traveled.

Test Results:

Distance Traveled (meters)			
Launch 1	Launch 2	Launch 3	Average
4.8	4.4	4.0	4.4

11 What form of energy does the rocket have because the rocket is traveling?

- **A.** Light energy
- **B.** Motion energy
- **C.** Electrical energy

12 Which is a measurement of the force of gravity on the rocket?

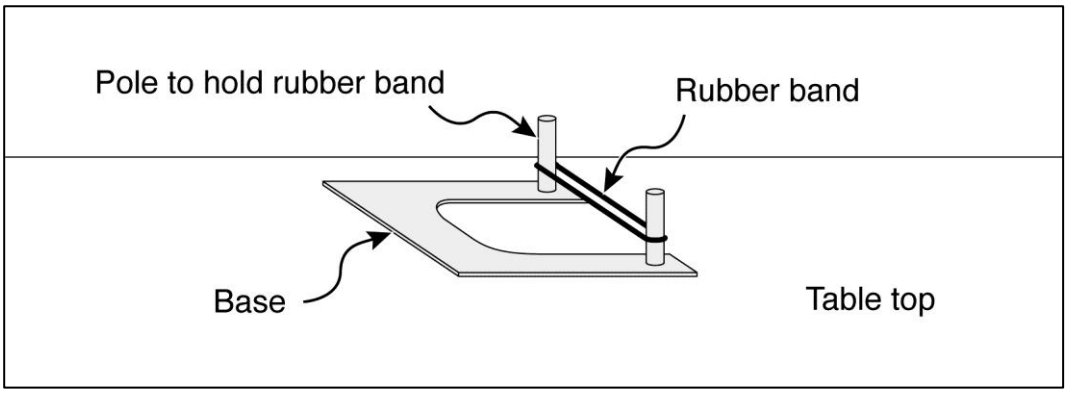
- **A.** Weight of the rocket
- **B.** Sound of the rocket
- **C.** Length of the rocket

13 Three rockets were timed to see how long they took to travel 2 meters. The grey rocket took 2 seconds, the yellow rocket took 4 seconds, and the blue rocket took 5 seconds. Which describes the speed of the rockets?

- **A.** The grey rocket flew fastest.
- **B.** The blue rocket flew highest.
- **C.** The yellow rocket flew slowest.

14 Justin and Maddy decided to redesign the Rocket Launcher to make the rocket travel farther.

Rocket Launcher



Explain how to redesign the Rocket Launcher. You may use any materials in your redesign.

In your explanation, be sure to:

- Describe how to redesign the original Rocket Launcher.
- Explain how the redesign would make the rocket travel **farther** than the original Rocket Launcher.

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.

Around the Bend Scenario

Answer Key Table

Title: Around the Bend		**Grade: 5** (used on 2009 WASL and partially used in PLD Moodle training)							
Description: An inquiry scenario of a controlled experiment 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
1	Identify a variable kept the same (controlled) * in a given description of a scientific investigation.		INQC (1)					A	2
2	Generate a conclusion for a scientific investigation, including supporting data, given a description of and results from the investigation.		INQG (1)					SA	3
3	Identify examples where erosion has happened and describe the most likely cause(s) of the erosion.					ES2C (2)		C	2
4	Describe that repeated trials are needed to be sure results are reliable.		INQE (1)					C	1
5	Describe a plan to answer a given question for a controlled experiment.		INQB (1)					SA	3

*A definition for the term *variable* will be included in a glossary for all students to reference during testing. The definition states: All the parts of a system that could be changed are called variables. In an experiment one variable is changed and another variable is measured. The rest of the variables are kept the same.

Scoring Rubric for Item 2: Around the Bend Conclusion (1st of 3 pages)

Performance Description	Attributes
A **2-point response** demonstrates the student understands the Content Standard INQG: Scientific explanations emphasize evidence, have logically consistent arguments, and use known scientific principles, models, and theories. Item Specification 1: Generate a conclusion for a scientific investigation, including supporting data, given a description of and results from the investigation. Example: *The stream with the most bends had the least amount of sand washed away. The stream model with two bends washed away an average of only 12 mm of sand. The stream model without any bends washed away an average of 24 mm of sand. Adding two bends to the stream model made only half as much sand wash away.*	3-4
A **1-point response** demonstrates the student has partial understanding of the Content Standard.	2
A **0-point response** demonstrates the student has little or no understanding of the Content Standard.	0–1

Number of Bends vs. Height of Sand

Number of Bends (in stream model)	**Height of Sand** (millimeters)			
	Trial 1	Trial 2	Trial 3	Average
Zero	25	23	25	24
One	17	19	18	18
Two	9	12	16	12

Scoring Rubric for Item 2: Around the Bend Conclusion (2nd of 3 pages)

Attributes of a Conclusion Note: The italicized print is the part of the "Example" credited for the attribute.	
Description	**Attributes**
C**onclusive statement** correctly answers the experimental question (or correctly states whether the prediction was correct): *The stream with the most bends had the least amount of sand washed away.* Attribute Notes: 1. A vague conclusive statement (e.g. *the number of bends in the model affected the amount of sand washed away*) cannot be credited for this attribute, but other attributes can be credited. 2. A response with an incorrect conclusive statement or no conclusive statement may not be credited any attributes. 3. A response with both a correct and an incorrect conclusive statement (e.g. *As number of bends increased sand wash away decreased … as bends got smaller so did sand washing away*) cannot be credited for this attribute but other attributes can be credited, if separate from any contradictory statements.	1
Supporting data should <u>at least</u> be over the entire range of the conditions investigated. Thus the minimum reported data are the lowest and highest conditions of the manipulated variable for quantitative data (responding variable when the manipulated variable information is descriptive).	
Supporting Data for Zero Bends: *The stream model without any bends washed away an average of 24 mm of sand.*	1
Supporting Data for Two Bends: *The stream model with two bends washed away an average of only 12 mm of sand.*	1
Explanatory language, separate from the conclusive statement, is used to connect or compare the supporting data to the conclusive statement: *Adding two bends to the stream model made only half as much sand wash away.* Attribute Notes: 1. This attribute can only be credited when at least one numeric value (or the text from a descriptive data table) for the manipulated or responding variable is included in the response. 2. A copy of the conclusive statement cannot be credited for explanatory language. However, a re-phrased credited conclusive statement can be credited. 3. Explanatory language comparing the range of the manipulated and/or responding variables may be credited (e.g. *The stream with no bends had the greatest amount of sand washed away.)* 4. If a response misquotes trend data between the highest and lowest conditions, this attribute cannot be credited (e.g. *One bend had 20 mm of sand*.) 5. Transitional words (e.g. *however, therefore, because, so, then, clearly, but*) cannot be credited as explanatory language even when added to a conclusive statement. 6. A compound sentence as a conclusive statement may be read as two separate sentences.	1
Total Possible Attributes	4

Scoring Rubric for Item 2: Around the Bend Conclusion (3rd of 3 pages)

General Notes:

1. **Copying the Data Table**: Responses copying the whole data table verbatim may not be credited the supporting data attribute, even with a correct conclusive statement and explanatory language.
   a) For grades 4-5, a translation of the whole data table into sentences is acceptable.
   b) For grades 6-8 and high school, a discussion of the whole data table **may** be acceptable when the data table is minimal with a very small number of data cells
2. **Supporting Data**: Responses must give the precise numerical values or precise descriptive language from the data table for both the manipulated and responding variables.
   a) Average data (if given) or data from the end of the investigation, must be included for grades 6-8 and high school.
   b) For grades 4-5, consistent trial data, or data before the completion of the investigation when measuring a responding variable over time, can be credited.
   c) Rounded numerical values cannot be credited (e.g., *10* cannot be credited). However, a zero after a decimal point may be omitted (e.g., *NA*).
   d) Units are not necessary for credit (e.g., *24* is credited as *24 milliliters*).
   e) Minor language differences in descriptive data may be acceptable as decided in range finding (e.g., *Straight* or *no bends* may be credited for *zero bends*).
   f) For grades 4-5, the manipulated variable may be implied.
3. **Derived Data:** Responses giving their own derived data between conditions can be credited for supporting data **and** explanatory language (e.g., *Adding two bends to the stream model made only half as much sand wash away*).
   a) When the derived data use the lowest and/or highest conditions, one or both supporting data attributes can be credited.
   b) Minor arithmetic errors in derived values can be acceptable as decided in range finding (e.g., none found at Range Finding).
4. Using the term *erosion* can be credited to mean *amount of sand washed away.*

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

2 Write a conclusion for this experiment.

In your conclusion, be sure to:
- Answer the experimental question.
- Include **supporting** data from the Number of Bends vs. Height of Sand table.
- Explain how these data **support** your conclusion.

Question: What is the effect of different numbers of bends in a stream model on the amount of sand that washes away?
The effect of the number of bends in a stream model on the amount of sand that washes away is that the more bends there are, the least amount of sand is washed away this shows when the tray with 2 bends only had an average of 12 milliliters wash away, and the one with 1 bend only had an average of 18 milliliters wash away and when the tray with 0 bends had an average of 24 milliliters wash away making the tray with the most bends have the least amount of sand wash away as shown above and the tray with the least amount of bends have the most sand wash away as shown above.

Annotations	**Attributes**	
Conclusive Statement: *…more bends…the least amount of sand is washed away…*	1	
Supporting data for Zero Bends: *…0 bends…24 milliliters…*	1	
Supporting data for Two Bends: *…2 bends…12 milliliters…*	1	
Explanatory Language: *…most bends…least amount of sand wash away…***OR***…least amount of bends…most sand wash away…*	1	
Total Attributes & Score Points	4	**2**

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

2 Write a conclusion for this experiment.

In your conclusion, be sure to:
- Answer the experimental question.
- Include **supporting** data from the Number of Bends vs. Height of Sand table.
- Explain how these data **support** your conclusion.

Question: What is the effect of different numbers of bends in a stream model on the amount of sand that washes away?
Tia and Mike's prediction was correct. On the Number of Bends vs. Height of Sand data table shows the different amounts of sand washed away. For model number one (zero bends model) had 25 millimeters left in model one. The model number two (one bend) had 17 millimeters left. For the end of trial three, model three (two bends) had 9 millimeters left. After trials 2 and 3, the average amount for the models were 24, 18, and 12 millimeters. This data used helped to find the amount of sand washed away. Therefore, the different number of bends do affect.

Annotations	**Attributes**	
Conclusive Statement: *…prediction was correct.*	1	
Supporting data for Zero Bends: *…(zero bends model) had 25 millimeters…*	1	
Supporting data for Two Bends: *…(two bends) had 9 millimeters…*	1	
Explanatory Language: *..the different number of bends do affect.* Vague.	0	
Total Attributes & Score Points	3	**2**

Annotated example of a 1-point response to item 2.

2 Write a conclusion for this experiment.

In your conclusion, be sure to:
- Answer the experimental question.
- Include **supporting** data from the Number of Bends vs. Height of Sand table.
- Explain how these data **support** your conclusion.

Question: What is the effect of different numbers of bends in a stream model on the amount of sand that washes away?
Yes, the number of bends in a stream effects the amount of sand that washes away. The average amount of sand in the jar was 24 millimeters tall with no bends and 12 millimeters with 2 bends. This shows that the amount of bends in a stream effects the amount of erosion, or the amount of sand washed away.

Annotations	Attributes	
Conclusive Statement: *Yes, the number of bends in a stream effects the amount of sand that washes away.* Vague Conclusive Statement Attribute Note 1.	0	
Supporting data for Zero Bends: *…24 millimeters…no bends…*	1	
Supporting data for Two Bends: *…12 millimeters with 2 bends.*	1	
Explanatory Language: None	0	
Total Attributes & Score Points	2	**1**

Annotated example of a 0-point response to item 2.

2 Write a conclusion for this experiment.

In your conclusion, be sure to:
- Answer the experimental question.
- Include **supporting** data from the Number of Bends vs. Height of Sand table.
- Explain how these data **support** your conclusion.

Question: What is the effect of different numbers of bends in a stream model on the amount of sand that washes away?
The more bends there is the Less sand will get in the Jar. The Less bends there is the more sand will get in the Jar.

Annotations	Attributes	
Conclusive Statement: *The more bends…the Less sand will get in the Jar*	1	
Supporting data for Zero Bends: None	0	
Supporting data for Two Bends: None	0	
Explanatory Language: None Explanatory Language Attribute Note 1.	0	
Total Attributes & Score Points	1	**0**

Scoring Rubric for Item 5: Around the Bend New Procedure (1st of 2 pages)

Performance Description	Attributes
A **2-point response** demonstrates the student understands the Content Standard INQB: Scientists plan and conduct different kinds of investigations, depending on the questions they are trying to answer. Types of investigations include systematic observations and descriptions, field studies, models, and open-ended explorations as well as controlled experiments. Item Specification 1: Describe a plan to answer a given question for a controlled experiment.	4-5
A **1-point response** demonstrates the student partially understands the Content Standard.	2-3
A **0-point response** demonstrates the student has little to no understanding of the Content Standard.	0-1

Attributes of a Procedure

Attribute Name	Description	Attributes
Changed (manipulated) Variable	Only one changed (manipulated) variable (*different types of soil*) is identified or implied in the procedure or data table (if given).	1
Measured (responding) Variable	The measured (responding) variable (*time for water to flow through 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 measured (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	**5**

Scoring Rubric for Item 5: Around the Bend New Procedure (2nd 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 "Procedure that includes:" 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 flow* instead of time) 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 soil*) 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 5.

5 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 changed (manipulated) variable
- one measured (responding) variable
- how often measurements should be taken and recorded

Question: What is the effect of different types of soil (garden soil, sandy soil, clay soil) on the time for the water to flow through the stream model?
Procedure:
1) Place sandy soil in box a, garden soil in box b, and clay soil in box c. 2) Put the end of each box on top of a wooden block. 3) Dump water over each box and start stopwatchs.
4) When all the water from one of the boxes has drained into a jar, stop a stopwatch.
5) Repeat step 4 twice for the other boxes. 6) Record results. 7) Repeat steps 1-6 twice for trials 2 and 3. 8) Find average time for each different soil and record. (Hints) Make sure you pour same amount of water into each box.

Attribute Name	Credit	Annotations
Changed (manipulated) Variable	1	*1)…sandy soil … garden soil … and clay soil …*
Measured (responding) Variable	1	*4) When all the water from one of the boxes has drained into a jar, stop a stopwatch.*
Record Measurements	1	*6) Record…*
Trials are Repeated	1	*7) Repeat steps 1-6 twice for trials 2 and 3.*
Logical Steps	1	The steps of the procedure are detailed enough to repeat the procedure effectively.
Total Attributes	**5**	**2** Score Points

Annotated example of a 2-point response to item 5.

5 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 changed (manipulated) variable
- one measured (responding) variable
- how often measurements should be taken and recorded

Question: What is the effect of different types of soil (garden soil, sandy soil, clay soil) on the time for the water to flow through the stream model?
Procedure:
First, put three trays with drain holes out. Put one block under each tray. Fill the first tray with clay soil, second with sandy, then third with garden soil. Then put 2 rulers on each tray. Put a drain cup on the rulers. Also put a jar right below the trays. Finally, fill the beaker and pour water into each drain cup. Then time they trays to see wich soil affects the time for the water to flow through the stream model. Do this experiment about 3 times just to make sure your question is correctly answered.

Attribute Name	Credit	Annotations
Changed (manipulated) Variable	1	*…clay soil, …sandy, … garden soil.*
Measured (responding) Variable	1	*Then time they* (the) *trays to see wich soil affects the time for the water to flow through the stream model.*
Record Measurements	0	None
Trials are Repeated	1	*Do this experiment about 3 times …*
Logical Steps	1	The steps of the procedure are detailed enough to repeat the procedure effectively.
Total Attributes	**4**	**2** Score Points

Annotated example of a 1-point response to item 5.

5 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 changed (manipulated) variable
- one measured (responding) variable
- how often measurements should be taken and recorded

Question: What is the effect of different types of soil (garden soil, sandy soil, clay soil) on the time for the water to flow through the stream model?
Procedure:
1. Make sure all stream models are exactly the same size. 2. Fill a beaker to the top with water. 3. Pour water into clay soil model. 4. Time how long the water takes to flow through the model. 5. Repeat steps 2-4 with sandy soil. 6. Repeat steps 2-4 with garden soil.

Attribute Name	Credit	Annotations
Changed (manipulated) Variable	1	*3. …clay soil model.* *4. …sandy soil.* *6. …garden soil.*
Measured (responding) Variable	1	*4. Time…how long the water takes to flow through the model.*
Record Measurements	0	None
Trials are Repeated	0	Only one trial is conducted for each condition of the changed variable.
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 1-point response to item 5.

5 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 changed (manipulated) variable
- one measured (responding) variable
- how often measurements should be taken and recorded

Question: What is the effect of different types of soil (garden soil, sandy soil, clay soil) on the time for the water to flow through the stream model?
Procedure:
Clay in one stream model. Garden soil in the next. The sandy soil in the third. See how long it takes for the three liters to get through the stream models.

Attribute Name	Credit	Annotations
Changed (manipulated) Variable	1	*Clay …Garden soil…sandy soil…*
Measured (responding) Variable	1	*See how long it takes for three liters to get through the stream models.* Vague
Record Measurements	0	None
Trials are Repeated	0	None
Logical Steps	0	Vague responding variable: See Note 3b
Total Attributes	**2**	**1** Score Points

Annotated example of a 0-point response to item 5.

5 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 changed (manipulated) variable
- one measured (responding) variable
- how often measurements should be taken and recorded

Question: What is the effect of different types of soil (garden soil, sandy soil, clay soil) on the time for the water to flow through the stream model?
Procedure:
1. Set up the three types of soil in the straight stream. 2. Make sure all streambeds are 43 centimeters long and the same amount of soil in each tray. 3. Pour 1 liter of water into each of the three drip cups. Let water and soil drain through each stream modle into jars. 4. Wait 30 min. 5. Measure and record the highth of soil in each jar as trail 1. 6. Repeat Steps 1-5 as trial 2 and 3. 7. Find and record the average.

Attribute Name	Credit	Annotations
Inappropriate Procedure: Measures height not time: See General Note 1		
Changed (manipulated) Variable	0	
Measured (responding) Variable	0	
Record Measurements	0	
Trials are Repeated	0	
Logical Steps	0	
Total Attributes	**0**	**0** Score Points

Feathered Friends Scenario

Answer Key Table

Title: Feathered Friends		**Grade: 5** (used on 2008 WASL, not previously released)							
Description: A systems scenario in the context of life science									
Item Description		**Item Specification Code**							
	Item Specification Text	Systems	Inquiry	Application	Physical Science	Earth/space Science	Life Science	Answer	Cognitive Level
6	Describe the function(s) served by a structure of an organism.						LS1B (1)	A	1
7	Compare/describe the role(s) of producer(s), consumer(s), and/or decomposer(s) in an ecosystem.						LS2C (3)	B	2
8	Describe multiple solutions and/or reasons for choosing each solution given a problem that can be solved using a technological design process.			APPD (1)				SA*	3
9	Describe that many characteristics of an organism are inherited from the organism's parents.						LS3B (1)	B	1
10	Describe research that would provide a better understanding of a given problem that can be solved using a technological design process.			APPC (2)				C	2

Scoring Rubric for Item 8: Attracting Goldfinches to a Bird Feeder

Performance Description

A **2-point response** demonstrates the student understands the Content Standard APPD: Scientists and engineers often work in teams with other individuals to generate different ideas for solving a problem. Item Specification 1: Describe multiple solutions and/or reasons for choosing each solution given a problem that can be solved using a technological design process.

The response describes how the students could attract more goldfinches to the bird feeder by:
Identifying **two** changes that could attract more goldfinches to the bird feeder
AND
Describing how each change attracts goldfinches to the bird feeder.

Examples:

Identify change:	**Describe how change attracts goldfinches:**
Use different type of food	*Birds may come to the feeder if there is food they prefer*
Change the perch or hole	*So the perch is more natural for the birds*
Change the position of the feeder	*The feeder will be safer for the birds*
Keep the feeder full	*To be sure food is available for the birds*
Use brighter colors on the feeder	*So the birds will see the feeder*
Remove predators	*So the area is safer for the birds*
Move people stuff like picnic tables away	*So birds are not scared away*
Add a feeder with food for other types of birds away from the goldfinch feeder	*So the goldfinches do not have to compete*

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

The response identifies **one** change that could attract more goldfinches to the bird feeder and describes how that change attracts more goldfinches.
OR
Identifies **two** changes that could attract more goldfinches to the bird feeder but the description of how each change attracts goldfinches is vague or incomplete.

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

General Notes:

1. Responses that give different creditable changes with the same creditable reason may be credited as 2 points (e.g. *plant a tree for birds to perch… place sticks for birds to perch*).
2. Responses including a minor misconception about bird behavior may be credited (e.g. *goldfinches like to eat worms*).

Annotated example of a 2-point response to item 8.

8 Cole and Bella noticed that fewer goldfinches were using the bird feeder in the park than last week. Describe how the students could attract more goldfinches to the bird feeder.

In your description, be sure to:
- Identify **two** changes that could attract more goldfinches to the bird feeder.
- Describe how each change attracts goldfinches to the bird feeder.

One change:
put in more feaders because then they would want to com because they arent' so crouded
Another change:
make it big so there is more food for them to share.

Annotations	Score Point
One change: *…put in more feaders…* **How that change attracts goldfinches:** *…they* (the birds) *would want to com because they* (the birds) *arent' so crouded.*	**2**
Another change: *…make it* (the feeder) *big…* **How that change attracts goldfinches:** *…there is more food for them* (the birds) *to share.*	

Annotated example of a 1-point response to item 8.

8 Cole and Bella noticed that fewer goldfinches were using the bird feeder in the park than last week. Describe how the students could attract more goldfinches to the bird feeder.

In your description, be sure to:
- Identify **two** changes that could attract more goldfinches to the bird feeder.
- Describe how each change attracts goldfinches to the bird feeder.

One change:
put more brid feeder in the park so ever brid can have some food not just 1 or 2 brid. This
will help bring them back so they do not have to hunt on the ground.
Another change:
They could make the park not to noise and loud but peace and quit.

Annotations	Score Point
One change: *…more brid feeder in the park…* **How that change attracts goldfinches:** *…so ever brid can have some food not just 1 or 2…*	**1**
Another change: *…make the park not to noise and loud…* **How that change attracts goldfinches:** No description	

Annotated example of a 0-point response to item 8.

8 Cole and Bella noticed that fewer goldfinches were using the bird feeder in the park than last week. Describe how the students could attract more goldfinches to the bird feeder.

In your description, be sure to:
- Identify **two** changes that could attract more goldfinches to the bird feeder.
- Describe how each change attracts goldfinches to the bird feeder.

One change:
is that Bella could fill up the bird feeder with a different kinds of seeds, and see how many
birds come to the bird feeders.
Another change:
is that Cole can make a bird feeder and Bella can fill it up with seeds and they can put it by the
othe bird feeder

Annotations	Score Point
One change: *…fill up the bird feeder with a different kind of seeds…* **How that change attracts goldfinches:** *…see how many birds come to the bird feeders.* Vague description of how	**0**
Another change: *…make a bird feeder…put it* (the bird feeder) *by the othe bird feeder* **How that change attracts goldfinches:** No description	

Rocket Challenge Scenario

Answer Key Table

Title: Rocket Challenge		**Grade: 5** (Scenario piloted on WASL; new items written for this Update document and did not go through the full development cycle.)							
Description: An application scenario 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
11	List the form(s) of energy present in a given system (i.e., light, heat, sound, motion, electricity).				PS3A (1)			B	1
12	Describe the force of gravity acting on an object as the weight of that object.				PS1A (1)			A	1
13	Describe the relative speed of objects traveling for the same distance given the amount of time each object moved.				PS1B (2)			A	2
14	Modify the original design to improve results given a solution to a problem and results of a test of the solution.			APPE (2)				SA	3

Scoring Rubric for Item 14: Rocket Challenge Redesign

Performance Description

A **2-point response** demonstrates the student understands the Content Standard APPE: Possible solutions should be tested to see if they solve the problem. Building a model or prototype is one way to test a possible solution. Item Specification 2: Modify the original design to improve results given a solution to a problem and results of a test of the solution.

The response explains how the Rocket Launcher would be redesigned by:

Describing the redesign of the original Rocket Launcher.
AND
Explaining how the redesign would make the rocket travel **farther** than the original Rocket Launcher System.

Examples:

Describe redesign:	**Explain how the redesign helps the rocket travel farther:**
Use a bigger (longer, thicker, stronger, tighter, smaller, newer) rubber band	• *Exert more force on the rocket* • *Can pull the band back farther*
Angle the launcher upward	• *More time in the air* • *Fly higher*
Pull the rubber band back farther	*Exert more force on the rocket*
• *Raise the base* • *Launch from a higher place*	• *More time in the air* • *Send the rocket higher*
• *Use one pole* • *Move pole*	*More force on the rocket*
Tape or nail the launcher down	• *So the launcher will not move* • *For more stability*
Lubricate, use rollers, or *smoother material on top surface of launcher*	*Reduce friction so more force acts on the rocket*

A **1-point response** demonstrates the student partially understands the Content Standard.

The response describes how the material(s) would be used to redesign the original Rocket Launcher, but the explanation of how the redesign would make the rocket travel **farther** than the original Rocket Launcher is incomplete, vague, or shows some misconception of the scientific concepts being applied.
OR
The response explains how the redesign make the rocket travel **farther** than the original Rocket Launcher System but the description of the redesign of the original Rocket Launcher is vague or incomplete.

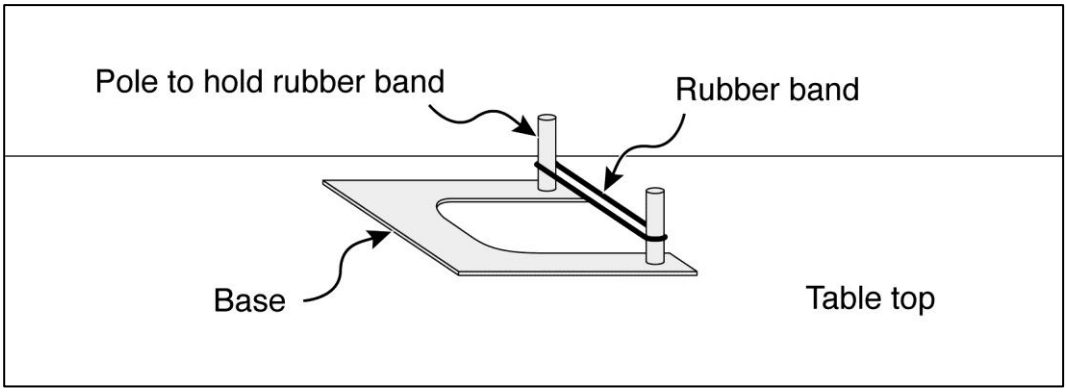
A 0-point response demonstrates the student has little or no understanding of the Content Standard.

General Notes:
1. Responses which create a new type of system (e.g., *use a fan to blow on the rocket*) may not be credited.

Annotated example of a 2-point response to item 14.

14 Justin and Maddy decided to redesign the Rocket Launcher to make the rocket travel farther.

Rocket Launcher



Explain how to redesign the Rocket Launcher. You may use any materials in your redesign.

In your explanation, be sure to:
- Describe how to redesign the original Rocket Launcher.
- Explain how the redesign would make the rocket travel **farther** than the original Rocket Launcher.

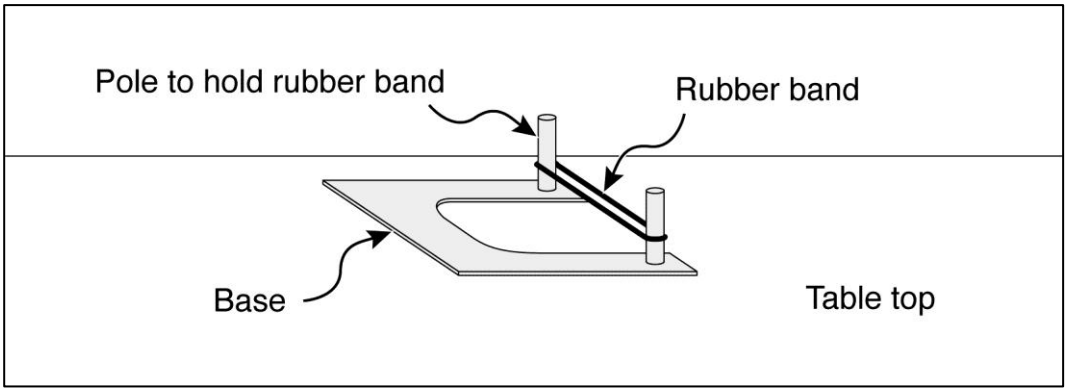
slant the launcher up a little bit so it will fly higher

Annotations	Score Point
Describes redesign: *slant the launcher up…*	**2**
Explain how the redesign makes rocket travel farther: *…so it* (the rocket) *will fly higher*	

Annotated example of a 1-point response to item 14.

14 Justin and Maddy decided to redesign the Rocket Launcher to make the rocket travel farther.

Rocket Launcher



Explain how to redesign the Rocket Launcher. You may use any materials in your redesign.

In your explanation, be sure to:
- Describe how to redesign the original Rocket Launcher.
- Explain how the redesign would make the rocket travel **farther** than the original Rocket Launcher.

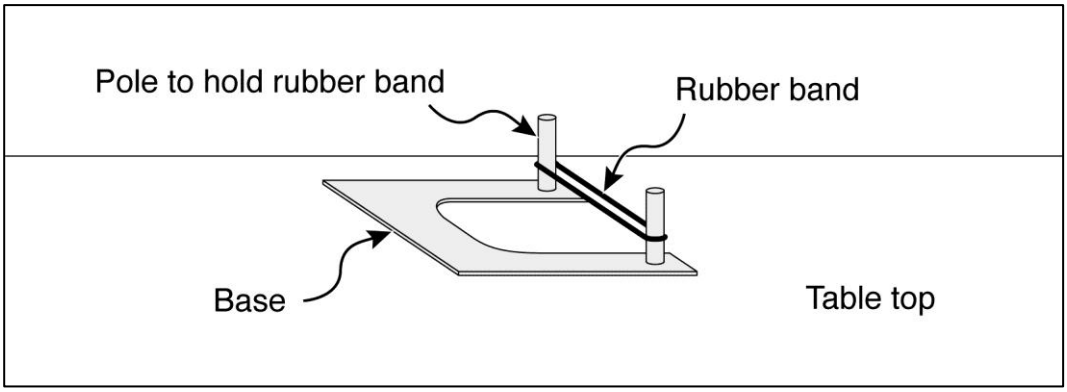
Put the rocket launcher closer to the edge of the table

Annotations	Score Point
Describes redesign: *Put the rocket launcher closer to the edge…*	**1**
Explain how the redesign makes rocket travel farther: No explanation.	

Annotated example of a 1-point response to item 14.

14 Justin and Maddy decided to redesign the Rocket Launcher to make the rocket travel farther.

Rocket Launcher



Explain how to redesign the Rocket Launcher. You may use any materials in your redesign.

In your explanation, be sure to:
- Describe how to redesign the original Rocket Launcher.
- Explain how the redesign would make the rocket travel **farther** than the original Rocket Launcher.

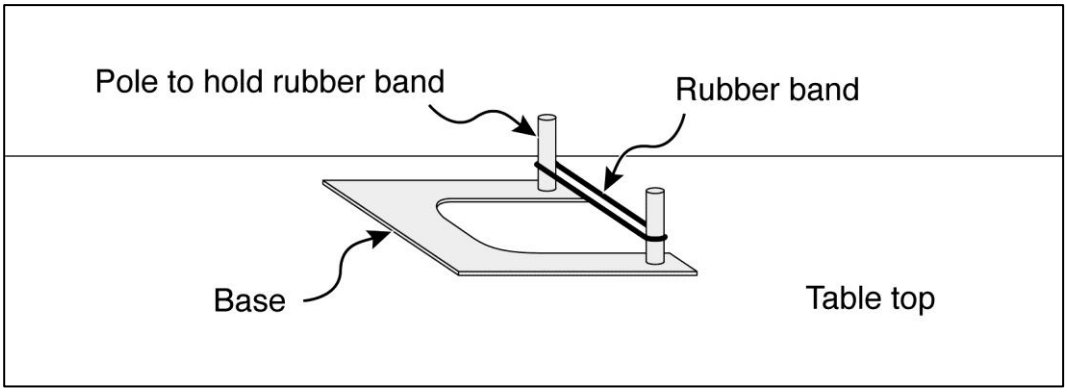
Use a bigger rubber band in the launcher and the rocket will travel farther

Annotations	Score Point
Describes redesign: *Use a bigger rubber band….*	**1**
Explain how the redesign makes rocket travel farther: *…and the rocket will travel farther* Repeats the prompt, does not explain.	

Annotated example of a 0-point response to item 14.

14 Justin and Maddy decided to redesign the Rocket Launcher to make the rocket travel farther.

Rocket Launcher



Explain how to redesign the Rocket Launcher. You may use any materials in your redesign.

In your explanation, be sure to:
- Describe how to redesign the original Rocket Launcher.
- Explain how the redesign would make the rocket travel **farther** than the original Rocket Launcher.

Make the launcher a few inches bigger

Annotations	Score Point
Describes redesign: *Make the launcher a few inches bigger* Too vague to credit.	**0**
Explain how the redesign makes rocket travel farther: No explanation.	

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