2005-2006 CSAP DEMONSTRATION PACKET

Science Grade 10
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The purpose of this document is to inform Colorado teachers of the structure and focus of the new grades 5 and 10 Science CSAP tests and review the grade 8 Science CSAP test that has been administered since 2000. Examples of items that could be included on the 10th grade Science CSAP tests are provided in this document. The complete demo packet also contains examples from grades 5 and 8. The Unit of Student Assessment, Colorado Department of Education, prepared this packet.

A special thank you to the following science educators: Nancy Kellogg, Don Uhland and Linda Block-Gandy, for their assistance in developing the science demonstration packet, defining the necessary contents of this packet, and their continued dedication to all students in Colorado.

Jeanette Thompson: Science Consultant, Unit of Student Assessment
Elizabeth Celva: Director, Unit of Student Assessment
Colorado Department of Education
Colorado Model Content Standards - Science
Adopted 5-10-95; Amended 11-09-95

Standard 1  Students understand the processes of scientific investigation and design, conduct, communicate about, and evaluate such investigations.

Standard 2  **Physical Science:**
Students know and understand common properties, forms, and changes in matter and energy.

Standard 3  **Life Science:**
Students know and understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment.

Standard 4  **Earth and Space Science:**
Students know and understand the processes and interactions of Earth’s systems and structure and dynamics of Earth and other objects in space.

Standard 5  Students know and understand interrelationships among science, technology, and human activity and how they can affect the world.

Standard 6  Students understand that science involves a particular way of knowing and understanding common connections among scientific disciplines.

The numerical order of the six science standards does not imply any particular judgment regarding their relative importance or teaching priorities. In fact, as the document emphasizes, Standards 1, 5 and 6 should be addressed through the subject matter in the content areas of physical, life and earth/space sciences (Standards 2, 3 and 4). Even though the six science content standards are identified separately, they represent interconnected understanding and knowledge of science.

Rationale statements and Benchmarks for Grades K-4, 5-8 and 9-12 may be found on the CDE website.  [www.cde.state.co.us](http://www.cde.state.co.us)
Explanation of Assessment Frameworks

Colorado Model Content Standards contain benchmark statements that define the knowledge and skills Colorado students should acquire in grade level ranges K-4, 5-8, and 9-12. These grade level ranges in science are measured in Colorado’s schools using the Colorado Student Assessment Program (CSAP) at grades 5, 8 and 10.

Assessment Frameworks were developed by a group of experienced Colorado science educators to define what will be assessed on the state’s paper and pencil, standardized, timed CSAP assessments.

On the CSAP Assessment Frameworks, each benchmark is further refined using example performance tasks and activities. These bulleted statements:

- help clarify the intent of the benchmark while building toward the important ideas and concepts encompassed in the standard.
- guide the development of appropriate questions for the CSAP:
  - multiple choice
  - constructed response
- demonstrate the application of varying depth of knowledge in performance tasks and activities reflected on the CSAP:
  - Level 1 – Recall and Reproduction
  - Level 2 – Skills and Concepts
  - Level 3 – Strategic Thinking
  - Level 4 – Extended Thinking (*This level requires extended time and is not included in a standardized assessment.*)
- demonstrate growing sequential development of student understanding of science concepts from K-10th grade.
- support the development of school level classroom opportunities with multiple assessment options at appropriate levels of difficulty and in alignment with the expectations of the CSAP.
- compliment and encourage best practices in science education in the state of Colorado.

CSAP Frameworks for each grade and content area tested may be found on the CDE website.  www.cde.state.co.us
Fact Sheet for Science CSAP – Grades 5, 8 and 10
Test Construction Information
July, 2005

Tests are designed to be given in three 55-minute sessions and each session has a similar composition of item types.

<table>
<thead>
<tr>
<th>Number of Items</th>
<th>Grade 5</th>
<th>Grades 8 and 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Points</td>
<td>70-75</td>
<td>80-83</td>
</tr>
<tr>
<td>Number of multiple choice items (multiple choice items value 1 point each)</td>
<td>52</td>
<td>60</td>
</tr>
<tr>
<td>Number of constructed response items (constructed response items value from 1-4 points each)</td>
<td>18</td>
<td>23</td>
</tr>
<tr>
<td>Total test score points</td>
<td>88</td>
<td>98-100</td>
</tr>
</tbody>
</table>

Weighting of Standards by Grade Level for Science CSAP

<table>
<thead>
<tr>
<th>Standard</th>
<th>Grade 5</th>
<th>Grade 8</th>
<th>Grade 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Scientific Inquiry and Investigations</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>6</td>
<td>Connections Between Scientific Disciplines</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Physical Science</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>Life Science</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>Earth and Space Science</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td>Science and Technology relating to Human Activity</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

Test Scoring
- multiple choice are machine scored
- constructed response are scored by readers hired and trained by the test contractor under specific guidelines from CDE personnel and Colorado teachers
- performance category cut-points are set using the Bookmarking Process (description on CDE website)
Associated materials available on the CDE website [www.cde.state.co.us](http://www.cde.state.co.us)
- Science CSAP Demonstration Packet (available September 2005)
- Assessment Frameworks
- CSAP Item Maps (Grade 8 available now, Grades 5 and 10 available fall 2006)
- Released Items (Grade 8 available now, Grades 5 and 10 available fall 2006)
- Technical Reports and Information

Subcontent Areas:

<table>
<thead>
<tr>
<th>Standard</th>
<th>Grade 5</th>
<th>Grade 8</th>
<th>Grade 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Experimental Design &amp; Investigation</td>
<td>Experimental Design &amp; Investigation</td>
<td>Experimental Design &amp; Investigation</td>
</tr>
<tr>
<td></td>
<td>Results and Data Analysis</td>
<td>Results and Data Analysis</td>
<td>Results and Data Analysis</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Applied Inquiry</td>
</tr>
<tr>
<td>2</td>
<td>*No subcontent area designated</td>
<td>Physics Concepts</td>
<td>Physics Concepts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chemistry Concepts</td>
<td>Chemistry Concepts</td>
</tr>
<tr>
<td>3</td>
<td>*No subcontent area designated</td>
<td>Life Processes</td>
<td>Life Processes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Organisms and their Interactions</td>
<td>Organisms and their Interactions</td>
</tr>
<tr>
<td>4</td>
<td>*No subcontent area designated</td>
<td>Geology &amp; Astronomy Meteorology &amp; Hydrology</td>
<td>Geology &amp; Astronomy Meteorology &amp; Hydrology</td>
</tr>
</tbody>
</table>

*As a general science assessment, Grade 5 has items categorized within subcontent areas within Standard 1 only.*
Points to Ponder about CSAP
or
Be Science Savvy with CSAP

Preparations for CSAP testing are ongoing throughout the school year. The following suggestions will assist you in integrating CSAP with classroom instruction.

1. The Colorado Content Science Standards and Assessment Frameworks are the road maps to success for your students taking the Science CSAP.
   http://cde.state.co.us/index_assess.htm

2. The vocabulary used in the assessment frameworks is what the teacher may expect the students to understand and verbalize at the appropriate grade levels (5th, 8th & 10th).

3. Science should be taught in a deliberate way. Science standards represent high expectations for all students and science instruction should be provided in all grades.

4. The teacher is encouraged to:
   • utilize programs and resources that emphasize conceptual development and scientific inquiry
   • give students practice in being assessed using constructed response (CR) items and multiple choice (MC) items
   • include in your classroom standards-based assessment “Item Sets” which involve several items that relate to one standard and may include CR and MC items that incorporate graphs and tables around a topic

5. An ongoing variety of standards-based assessments should be embedded in the science program such as:
   • teacher observables
   • presentations on research/investigations
   • written explanations in journals/notebooks with teacher feedback
   • teacher prepared standard-based assessments
   • time limits set to give students practice working with time restrictions

6. An assessment objective may be assessed on the CSAP test even though it has not been previously assessed. The objectives are tested on a cyclical basis over time.

7. The Fact Sheet will help the teacher understand how CSAP was constructed. Constructed response items can be assigned more points than multiple choice items. It is important for students to answer both types of items to do well on the test. Encourage your students to answer all items and if time permits review their work.

8. To provide consistency throughout the 5th, 8th and 10th grade CSAP testing:
   • metric units of measurement will be used
   • food webs and food chains should have arrows that describe the path of energy flow through the food web/chain (e.g. grass → cricket → frog)
   • students should always use titles and labels even when not told explicitly to do so when constructing graphs, tables and charts

9. The demonstration items can be modified for different grade levels and expanded to include hands-on inquiry-based investigations.
Hints for Students Taking the CSAP Science Test

The Science CSAP is a standardized test. That means the test is given to all students at your grade level in the entire state of Colorado. It is given to every student exactly the same way with the same amount of time.

✓ Learn how to answer each kind of question. CSAP Science tests have two types of questions: multiple choice and constructed response. A constructed response may be a short response, extended response, or a response using tables, graphs, or pictures.

✓ Read each question carefully.

✓ Check each of your answers to make sure it is the best answer for the question asked.

✓ Answer the questions you are sure about first. If a question seems too difficult, skip it and go back to it later.

✓ Write your response in the space provided and do not write in the margins.

✓ Be sure to fill in the answer bubbles correctly. Do not make any stray marks around answer spaces. Only use a #2 pencil so the scanner can read your answer.

✓ Think positively. Some questions may seem hard to you, but you may be able to figure out what to do if you reread the question carefully and think about what you already know.

✓ When you finish the test with time to spare, review your answers to make sure they are reasonable.

✓ RELAX. Some people get nervous about tests. Do your best work.

✓ These strategies are not just for CSAP. They will help you do better in all your work.
How to Answer a Constructed Response Question

A constructed response question may require a short answer or an extended response. It has a value of 1 to 4 score points and you can receive full or partial credit. You should try to answer these questions even if you are not sure of the correct answer. If a part of the answer is correct, you may get a portion of the points.

Strategies to help you succeed on the test:

✓ Allow more time to answer the constructed response. You are expected to take time to read and think about the question before you write your answer. A short answer response may take you 5 minutes and an extended response may take you longer.

✓ When the clock starts on a timed test, glance through the assessment before you begin to see how many items are in the session, how many items are constructed responses, and how much time you have.

✓ Read each question carefully and determine what the question asks you to answer.

✓ If you do not understand the question, read it again and try to answer one part at a time.

✓ Be sure to answer every part of the question.

✓ Use the information provided to answer the question.

✓ Write your explanations in clear, concise language. Use the space provided for the answer.

✓ Do your best to spell words correctly; but if it is not the exact spelling, you may still get credit for your answer.

✓ Reread your explanation to make sure it says what you want it to say.

✓ Always strive to do your best on every assessment in school whether it is a CSAP test, classroom test, driving test, or a college entrance exam.
Resources from the Web
Released Items for Classroom Assessment

When you are planning your classroom assessments, work with your colleagues in developing assessments and/or choosing assessments aligned to your curriculum, instruction and grade level frameworks. It can be very helpful to find an item in the demonstration packet that is a good fit with your curriculum, instruction and lab investigations. If there is no item available in the demonstration packet, you may look at released items from other states, NAEP and TIMSS. By examining released items and sample items from many standardized assessments, you will be able to create a wide-range of formats that will enable you to choose:

- the level of difficulty,
- the level of content depth and knowledge, and
- the type of item (e.g., multiple choice or constructed response items that meet your needs for a classroom assessment).

Colorado Released Items and Assessment Frameworks
http://www.cde.state.co.us/index_assess.htm

National Assessment of Educational Progress (NAEP), grades 4, 8 & 12
http://nces.ed.gov/nationsreportcard/ITMRLS/NQT_Search.asp?NumSearchResults=1&SearchSubject=Science&SearchIndex=1&SearchStartIndex=1&QuestionsPerPage=20&SearchQuestionSet=0&

Trends in Mathematics and Science Study (TIMSS), grade 4 & 8
http://timss.bc.edu/timss2003i/released.html

Other states have sample or released items. Each state aligns the items to their state standards. It will be important to align your work with CSAP Assessment Frameworks. This is not a complete list but a few websites to get started.

Florida: grades 5, 8 & 10
http://fjr.edu/doe/sas/fcat/fcatsmpl.htm

Washington: grades 5, 8 & 10

Michigan: high school released items

Michigan: Elementary, Middle and High School Items

Massachusetts: released items grades 5, 8, 9 & 10
http://www.doe.mass.edu/mcas/2005/release/
### Depth-of-Knowledge-Levels – SCIENCE *

*The four levels represent a hierarchy based on complexity (rather than difficulty). This difference takes some time to ponder and refine. The hierarchy is based on two main factors: 1) sophistication and complexity, and 2) the likelihood that students at the grade level tested would have received prior instruction or would have had an opportunity to learn the content. Some performance tasks have a low depth-of-knowledge level because the knowledge required is common knowledge and student with normal instruction at a grade level should have had the opportunity to learn how to routinely perform what is being asked.*

Please note that, in science, “knowledge” can refer both to content knowledge and knowledge of scientific processes. This meaning of knowledge is consistent with the National Science Education Standards (NSES), which terms “Science as Inquiry” as its first Content Standard.

<table>
<thead>
<tr>
<th>Level 1 (Recall and Reproduction)</th>
<th>Level 2 (Skills and Concepts)</th>
<th>Level 3 (Strategic Thinking)</th>
<th>Level 4 (Extended Thinking)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requires the recall of information, such as a fact, definition, term, or a simple procedure, as well as performance of a simple science process or procedure. Level 1 only requires students to demonstrate a rote response, use a well-known formula, follow a set procedure (like a recipe), or perform a clearly defined series of steps.</td>
<td>Includes the engagement of some mental processing beyond recalling or reproducing a response. The content knowledge or process involved is more complex than in Level 1. Items require students to make some decisions as to how to approach the question or problem. Keywords that generally distinguish a Level 2 item include “classify,” “organize,” “estimate,” “make observations,” “collect and display data,” and “compare data.”</td>
<td>Requires reasoning, planning, using evidence, and a higher level of thinking than the previous two levels. The cognitive demands at Level 3 are complex and abstract. The complexity does not result only from the fact that there could be multiple answers, a possibility for both Levels 1 and 2, but because the multi-step task requires more demanding reasoning.</td>
<td>Involves high cognitive demands and complexity. Students are required to make several connections—relate ideas within the content area or among content areas—and have to select or devise one approach among many alternatives to solve the problem. Many on-demand assessment instruments will not include any assessment activities that could be classified as Level 4.</td>
</tr>
<tr>
<td>A “simple” procedure is well defined and typically involves only one step. Verbs such as “identify,” “recall,” “recognize,” “use,” “calculate,” and “measure” generally represent cognitive work at the recall and reproduction level. Simple word problems that can be directly translated into and solved by a formula are considered Level 1. Verbs such as “describe” and “explain” could be classified at different DOK levels, depending on the complexity of what is to be described and explained. A student answering a Level 1 item either knows the answer or does not: that is, the item does not need to be “figured out” or “solved.” In other words, if the knowledge necessary to answer an item automatically provides the answer to it, then the item is at Level 1. If the knowledge needed to answer the item is not automatically provided in the item, the item is at least at Level 2. Some examples that represent, but do not constitute all of, Level 1 performance are:</td>
<td></td>
<td>Requires explaining, planning, using evidence, and a higher level of thinking than the previous two levels. The cognitive demands at Level 3 are complex and abstract. The complexity does not result only from the fact that there could be multiple answers, a possibility for both Levels 1 and 2, but because the multi-step task requires more demanding reasoning.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>In most instances, requiring students to explain their thinking is at Level 3; requiring a very simple explanation or a word or two should be at Level 2. An activity that has more than one possible answer and requires students to justify the response they give would most likely be a Level 3. Experimental designs in Level 3 typically involve more than one dependent variable.</td>
<td>Involves high cognitive demands and complexity. Students are required to make several connections—relate ideas within the content area or among content areas—and have to select or devise one approach among many alternatives to solve the problem. Many on-demand assessment instruments will not include any assessment activities that could be classified as Level 4.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other Level 3 activities include drawing conclusions from observations; citing evidence and developing a logical argument for concepts; explaining phenomena in terms of concepts; and using concepts to solve non-routine problems. Some examples that represent, but do not constitute all of Level 3 performance, are:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Identify research questions and design investigations for a scientific problem.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Solve non-routine problems.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Develop a scientific model for a complex situation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Form conclusions from experimental data.</td>
<td></td>
</tr>
</tbody>
</table>

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*CSAP Science Demonstration Packet DOK Science Levels used with permission (May be reproduced)
10th Grade CSAP Demonstration Items

Helpful resources:

Science Assessment Frameworks, Grade 10
http://cde.state.co.us/index_assess.htm

Definition of Terms used in Item Description:

Depth of Knowledge Definitions*: Level of Complexity
Level 1 – Recall and Reproduction
Level 2 – Concepts
Level 3 – Strategic Thinking
Level 4 – Extended Thinking
*Refer to page 12 of this Demonstration Packet for complete definition.

Level of Difficulty:
E – Easy
M – Moderate
H – Hard
A tenth-grade class was interested in how the population of two types of plants had changed during the past eight years. The table below shows the estimated population size of these two types of plants in one county in Colorado.

<table>
<thead>
<tr>
<th>Estimated Population (by Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penstemon barbatus</td>
</tr>
<tr>
<td>2000</td>
</tr>
<tr>
<td>Penstemon palmeri</td>
</tr>
<tr>
<td>5000</td>
</tr>
</tbody>
</table>

On the grid below, plot the information from the table as a line graph.
Standard 1 / Assessment Objective 1.3.c

Depth of Knowledge: 2  Difficulty Level: M  Type: Constructed Response

Elements of Correct Answer:

<table>
<thead>
<tr>
<th>Acceptable examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Title</strong></td>
</tr>
<tr>
<td>Title: Year vs. (Plant) Population Size</td>
</tr>
<tr>
<td><strong>Length of Line</strong></td>
</tr>
<tr>
<td>Line may extend beyond points in either direction.</td>
</tr>
<tr>
<td><strong>Space Utilization</strong></td>
</tr>
<tr>
<td>Year (x-axis) may start at lowest value (1996). Population (y-axis) should start at 0.</td>
</tr>
<tr>
<td><strong>x-axis labeled with units</strong></td>
</tr>
<tr>
<td>x-axis: Year (Each point should be a different year.)</td>
</tr>
<tr>
<td><strong>y-axis labeled with units</strong></td>
</tr>
<tr>
<td>y-axis: (Plant) Population Size (in thousands)</td>
</tr>
<tr>
<td><strong>Data plotted</strong></td>
</tr>
<tr>
<td>Two sets of 8 data points should be plotted.</td>
</tr>
<tr>
<td><strong>Legend/Key</strong></td>
</tr>
<tr>
<td>Each line should be identified by either labeling the line directly or by including a legend/key to the side of the graph so the lines can be distinguished – one <em>Penstemon barbatus</em>, and one <em>Penstemon palmeri</em>.</td>
</tr>
</tbody>
</table>

4-point Rubric

**Graph Format**

2 points  six to seven correct key elements
1 point four to five correct key elements
0 points three or fewer key elements/irrelevant, unclear or inaccurate information

**Graph Accuracy**

2 points  all sixteen data points plotted correctly with two lines connecting the points or line of best fit drawn through the points.
1 point fourteen or fifteen data points plotted correctly with two lines connecting the points or all 16 data points plotted correctly, but no lines
0 points thirteen or fewer data points plotted correctly but not connected with a line or three or fewer key elements/irrelevant, unclear or inaccurate information
Some of the students wanted to know if the increase in the population of *Penstemon palmeri* was due to the decreasing amount of water in the soil between 1996 and 2003.

2. Write a hypothesis for the study.

---

**Standard 1 / Assessment Objective 1.1.b**

<table>
<thead>
<tr>
<th>Depth of Knowledge:</th>
<th>Difficulty Level:</th>
<th>Type:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>M</td>
<td>Constructed Response</td>
</tr>
</tbody>
</table>

**Elements of Correct Answer:**

One of the following:

- The plants will survive better/reproduce more/produce more surviving offspring with less water.
- The plants will survive better/reproduce more/produce more surviving offspring with more water.
- Different amounts of water will make no difference in the number of plants that survive/reproduce/produce more surviving offspring.

**Note:** Credit should be given for responses phrased in the negative or as “If, Then” Statement (e.g., “The plants will not survive..., If there is a decrease in the amount of water, then there will be an increase in the plant population”)

**Two Point Rubric**

- 1 point: one correct key element
- 0 points: incorrect or no response
3. Write two variables that must be kept constant in the students' experiment using the *Penstemon palmeri*.

1) __________________________________________

2) __________________________________________

**Standard 1 / Assessment Objective 1.2.a**

<table>
<thead>
<tr>
<th>Depth of Knowledge:</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulty Level:</td>
<td>M</td>
</tr>
<tr>
<td>Type:</td>
<td>Constructed Response</td>
</tr>
</tbody>
</table>

**Elements of Correct Answers:**

- Condition/age/height/size of plants
- Location of plants
- Amount of sunlight/light each plant receives
- Temperature
- Soil conditions/pH/minerals/nutrients/rock type/rock size
- Time of watering/amount of watering/properties of water (including but not limited to pH, temperature, salinity, hardness)

**Two Point Rubric**

<table>
<thead>
<tr>
<th>Points</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>two correct key elements</td>
</tr>
<tr>
<td>1</td>
<td>one correct key element</td>
</tr>
<tr>
<td>0</td>
<td>incorrect or no response</td>
</tr>
</tbody>
</table>
A tenth-grade class was interested in how the population of two types of plants had changed over the past eight years. The table below shows the estimated population size of these two types of plants in one county in Colorado.

### Estimated Population (by Year)

<table>
<thead>
<tr>
<th>Year</th>
<th>Penstemon barbatus</th>
<th>Penstemon palmeri</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>21,000</td>
<td>5000</td>
</tr>
<tr>
<td>1997</td>
<td>16,500</td>
<td>7500</td>
</tr>
<tr>
<td>1998</td>
<td>15,000</td>
<td>8000</td>
</tr>
<tr>
<td>1999</td>
<td>12,000</td>
<td>11,000</td>
</tr>
<tr>
<td>2000</td>
<td>10,000</td>
<td>11,000</td>
</tr>
<tr>
<td>2001</td>
<td>16,000</td>
<td>16,000</td>
</tr>
<tr>
<td>2002</td>
<td>20,000</td>
<td>18,000</td>
</tr>
<tr>
<td>2003</td>
<td>22,000</td>
<td>20,000</td>
</tr>
</tbody>
</table>

On the grid below, plot the information from the table as a line graph.
Some of the students wanted to know if the increase in the population of *Penstemon palmeri* was due to the decreasing amount of water in the soil between 1996 and 2003.

2. Write a hypothesis for the study.

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

3. Write two variables that must be kept constant in the students' experiment using the *Penstemon palmeri*.

1) ________________________________________________________________

2) ________________________________________________________________
A student wants to study the effect of temperature on plant growth. The student grows ten plants at room temperature and ten plants in a greenhouse where the temperatures are warmer.

What is the most likely reason the student grows ten plants at each of the temperatures?

- to collect enough data to be able to plot a graph
- to increase the reliability of the results
- to ensure that some plants would survive
- to be able to publish the study in a science journal

Standard 1 / Assessment Objective 1.2.c
Depth of Knowledge: 2  Difficulty Level: E  Type: Multiple Choice
A student wants to study the effect of temperature on plant growth. The student grows ten plants at room temperature and ten plants in a greenhouse where the temperatures are warmer.

What is the most likely reason the student grows ten plants at each of the temperatures?

- to collect enough data to be able to plot a graph
- to increase the reliability of her results
- to ensure that some plants would survive
- to be able to publish the study in a science journal
A gas becomes more soluble in liquid when

- its particles are larger.
- pressure is greater.
- the mixture is stirred.
- the temperature is raised.

Standard 2 / Assessment Objective 2.1.1.a
Depth of Knowledge: 1  Difficulty Level: E  Type: Multiple Choice
A gas becomes more soluble in liquid when

- its particles are larger.
- pressure is greater.
- the mixture is stirred.
- the temperature is raised.

Standard 2 / Assessment Objective 2.1.1.a
Depth of Knowledge: 1   Difficulty Level: E   Type: Multiple Choice
In an electrical circuit, the voltage \( V \) is 35 volts and the resistance \( R \) is 5 ohms.

Ohm’s law \( V = IR \)

What is the current \( I \) in the circuit?

- 0.14 ampere
- 7.0 amperes
- 175 amperes
- 350 amperes
In an electrical circuit, the voltage \((V)\) is 35 volts and the resistance \((R)\) is 5 ohms.

Ohm’s law \((V = IR)\)

What is the current \((I)\) in the circuit?

- 0.14 amperes
- 7.0 amperes
- 175 amperes
- 350 amperes

Standard 2 / Assessment Objective 2.2.2.d
Depth of Knowledge: 1   Difficulty Level: E   Type: Multiple Choice
An aluminum pan containing soup is placed over a gas flame and heated until the soup is warm throughout.

Explain the role of conduction in this heating process.

Explain the role of convection in this heating process.

**Standard 2 / Assessment Objective 2.2.2.c**

**Depth of Knowledge:** 2  
**Difficulty Level:** M  
**Type:** Constructed Response

**Elements of Correct Answers:**

One of the following:

- The pot is heated by conduction.
- Heat is transferred from the pot to the soup by conduction.
- Heat is transferred by the collision of molecules in the soup with molecules in the pan.
- Heat is transferred from one part of the pot to another by conduction.
- Convection currents cause the cold/more dense soup to move down while the warmer/less dense soup rises.
- Any response that indicates warm soup moves up while cool soup moves down creating convection currents.

**Two-point Rubric:**

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 points</td>
<td>2 correct key elements</td>
</tr>
<tr>
<td>1 point</td>
<td>1 correct key elements</td>
</tr>
<tr>
<td>0 points</td>
<td>incorrect or no response</td>
</tr>
</tbody>
</table>
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Explain the role of conduction in this heating process.

Explain the role of convection in this heating process.
Which of these describes the action of antibiotics?

- Antibiotics replace the immune system.
- Antibiotics lower body temperature.
- Antibiotics destroy viruses.
- Antibiotics slow bacterial growth.

Standard 3 / Assessment Objective 3.3.4.b
Depth of Knowledge: 1  Difficulty Level: E  Type: Multiple Choice
Which of these describes the action of antibiotics?

- [ ] Antibiotics replace the immune system.
- [ ] Antibiotics lower body temperature.
- [ ] Antibiotics destroy viruses.
- [ ] Antibiotics slow bacterial growth.

Standard 3 / Assessment Objective 3.3.4.b
Depth of Knowledge: 1  Difficulty Level: E  Type: Multiple Choice
A biologist uses a light microscope to observe a cell. He concludes that the cell is from a plant.

What are two observations the biologist may have made?

1) __________________________________________________________________________
________________________________________________________________________

2) __________________________________________________________________________
________________________________________________________________________

Elements of Correct Answer:

- Presence of chloroplasts or chlorophyll / other pigments
- Presence of a (primary or secondary) cell wall
- Presence of central vacuole/vacuoles
- Cell shape is often rectangular
- Any other reasonable response

Two-Point Rubric:

2 points 2 correct key elements
1 point 1 correct key element
0 points incorrect or no response
A biologist uses a light microscope to observe a cell. He concludes that the cell is from a plant.

What are two observations the biologist may have made?

1) ____________________________________________________________________________
   ____________________________________________________________________________

2) ____________________________________________________________________________
   ____________________________________________________________________________
In the reaction of solid zinc with hydrochloric acid (HCl), the products of hydrogen gas and aqueous zinc chloride are produced.

Which of these is the balanced equation from the reaction?

- Zn (s) + HCl (aq) → ZnCl₂ (aq) + H₂ (g)
- 2 Zn (s) + 4 HCl (aq) → Zn₂Cl₄ (aq) + H₂ (g)
- Zn (s) + 2 HCl (aq) → ZnCl₂ (aq) + H₂ (g)
- Zn₂ (s) + HCl (aq) → 2 ZnCl (aq) + H₂ (g)
In the reaction of solid zinc with hydrochloric acid (HCl), the products of hydrogen gas and aqueous zinc chloride are produced.

Which of these is the balanced equation from the reaction?

- $\text{Zn (s) + HCl (aq) \rightarrow ZnCl}_2 (aq) + \text{H (g)}$
- $2\text{Zn (s) + 4HCl (aq) \rightarrow Zn}_2\text{Cl}_4 (aq) + \text{H}_2 (g)$
- $\text{Zn (s) + 2HCl (aq) \rightarrow ZnCl}_2 (aq) + \text{H}_2 (g)$
- $\text{Zn}_2 (s) + \text{HCl (aq) \rightarrow 2ZnCl (aq) + H}_2 (g)$
11 Identify one mechanism in which sexual reproduction leads to genetic variability.

Elements of Correct Answer

- Mixing of genes/DNA from 2 individuals/parents
- Independent assortment
- Cross-over and recombination

One-point Rubric:

1 point one correct key element
0 points incorrect or no response

12 Explain how genetic variability may affect a species?

Elements of Correct Answer

- Allows diversity upon which environment can act
- Other reasonable response

One-point Rubric:

1 point one correct key element
0 points incorrect or no response
Identify one mechanism in which sexual reproduction leads to genetic variability.

Explain how genetic variability may affect a species?
The diagram below shows a geologic cross-section.

Which of these does the arrow indicate?

- a magma chamber
- a fault line
- a tectonic plate
- a volcanic vent
The diagram below shows a geologic cross-section.

Which of these does the arrow indicate?

- a magma chamber.
- a fault line.
- a tectonic plate.
- a volcanic vent.
14 Where does seafloor spreading occur?

What leads to seafloor spreading?

Elements of Correct Answers:

Seafloor spreading occurs along oceanic ridges/the oceanic ridge system.

- Magma is injected into newly developed fractures on the seafloor
- Convection within the mantle

Two-Point Rubric:

2 points 2 correct key elements
1 point 1 correct key element
0 points incorrect or no answer
14 Where does seafloor spreading occur?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

What leads to seafloor spreading?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
How does air pressure change with increasing altitude in the atmosphere? Explain why this change occurs.

Elements of correct answers:

- Air pressure decreases with increasing altitude
  or
  Air pressure increases with decreasing altitude
- There are fewer molecular collisions at higher atmosphere/molecules are farther apart/atmospheric density decreases with increasing altitude/as you go higher in the atmosphere the amount of air pushing on you decreases
  or
  There are more molecular collisions at lower atmosphere/molecules are closer together/atmospheric density increases with decreasing altitude/as you go lower in the atmosphere amount of air pushing on you increases
- Any other reasonable response

One-point Rubric

1 point  two correct key elements
0 points  incorrect or no response
How does air pressure change with increasing altitude in the atmosphere? Explain why this change occurs.
Study the diagram below.

Which of these identifies what someone on Earth could see when the Earth and Moon are in the positions shown in the drawing?

- a solar eclipse
- a lunar eclipse
- a quarter moon
- a full moon
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Which of these identifies what someone on Earth could see when the Earth and Moon are in the positions shown in the drawing?

- a solar eclipse
- a lunar eclipse
- a quarter moon
- a full moon