This document contains a full release of the 2012 Grade 6 Science Achievement Test. A test blueprint and an answer key that describes the difficulty, reporting category, test section, and item description for each question are also included. These materials, along with the program of studies and subject bulletin for Grade 6 Science, provide information that can be used to inform instructional practice.

The Assessment Highlights web page provides information about the overall test, the test blueprints, and student performance on the Grade 6 Science Achievement Test. Commentary on student performance at the acceptable standard and the standard of excellence on the achievement test is also provided. This information is intended for teachers and is best used in conjunction with the multi-year and detailed school reports that are available to schools via the extranet. Assessment highlights reports for all achievement test subjects and grades are posted on the Alberta Education website every year in the fall.

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Alberta Education website: education.alberta.ca
## 2012 Test Blueprint and Item Descriptions

The following blueprint shows the reporting categories and topics by which questions were classified on the 2012 Grade 6 Science Achievement Test.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Question Distribution by Reporting Category</th>
<th>Number (Percentage) of Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inquiry and Problem Solving</td>
<td>Knowledge 0</td>
<td>11 Questions (22% of Total Test)</td>
</tr>
<tr>
<td></td>
<td>Skills 11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(14, 16, 20, 24, 29, 34, 35, 37, 38, 42, 48)</td>
<td></td>
</tr>
<tr>
<td>Aerodynamics and Flight</td>
<td>Knowledge 8</td>
<td>14 Questions (28% of Total Test)</td>
</tr>
<tr>
<td></td>
<td>Skills 6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1, 3, 4, 7, 10, 11, 12, 15)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2, 5, 6, 8, 9, 13)</td>
<td></td>
</tr>
<tr>
<td>Sky Science</td>
<td>Knowledge 5</td>
<td>8 Questions (16% of Total Test)</td>
</tr>
<tr>
<td></td>
<td>Skills 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(17, 21, 23, 25, 26)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(18, 19, 22)</td>
<td></td>
</tr>
<tr>
<td>Evidence and Investigation</td>
<td>Knowledge 2</td>
<td>7 Questions (14% of Total Test)</td>
</tr>
<tr>
<td></td>
<td>Skills 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(28, 30)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(27, 31, 32, 33, 36)</td>
<td></td>
</tr>
<tr>
<td>Trees and Forests</td>
<td>Knowledge 6</td>
<td>10 Questions (20% of Total Test)</td>
</tr>
<tr>
<td></td>
<td>Skills 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(39, 41, 43, 44, 46, 47)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(40, 45, 49, 50)</td>
<td></td>
</tr>
<tr>
<td>Number (Percentage) of Questions</td>
<td>21 Questions (42% of Total Test)</td>
<td>29 Questions (58% of Total Test)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total Test 50 Questions (100%)</td>
</tr>
</tbody>
</table>
The table below provides information about each question: the keyed response, the difficulty of the item (the percentage of students who answered the question correctly on the English form of the test), the reporting category, the topic, and the item description.

<table>
<thead>
<tr>
<th>Question</th>
<th>Key</th>
<th>Correct Response (%)</th>
<th>Reporting Category</th>
<th>Topic</th>
<th>Item Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>B</td>
<td>81.3</td>
<td>Knowledge</td>
<td>Aerodynamics and Flight</td>
<td>Identify what causes a hot air balloon to rise.</td>
</tr>
<tr>
<td>2</td>
<td>A</td>
<td>86.1</td>
<td>Skills</td>
<td>Aerodynamics and Flight</td>
<td>Evaluate wing designs of an airplane to determine the wing shape that would produce the greatest lift.</td>
</tr>
<tr>
<td>3</td>
<td>A</td>
<td>59.4</td>
<td>Knowledge</td>
<td>Aerodynamics and Flight</td>
<td>Given the motion of an aircraft, identify the relative strength of forces involved in that motion.</td>
</tr>
<tr>
<td>4</td>
<td>B</td>
<td>79.2</td>
<td>Knowledge</td>
<td>Aerodynamics and Flight</td>
<td>Use a concept map to identify some components of air.</td>
</tr>
<tr>
<td>5</td>
<td>C</td>
<td>67.8</td>
<td>Skills</td>
<td>Aerodynamics and Flight</td>
<td>Apply knowledge of the properties of air to predict the result of a science experiment.</td>
</tr>
<tr>
<td>6</td>
<td>A</td>
<td>76.3</td>
<td>Skills</td>
<td>Aerodynamics and Flight</td>
<td>Describe the compressibility of air using a tire pump example.</td>
</tr>
<tr>
<td>7</td>
<td>D</td>
<td>85.2</td>
<td>Knowledge</td>
<td>Aerodynamics and Flight</td>
<td>Infer the purpose for the design of a trailer.</td>
</tr>
<tr>
<td>8</td>
<td>A</td>
<td>66.7</td>
<td>Skills</td>
<td>Aerodynamics and Flight</td>
<td>To change direction of an airplane while in flight, identify adjustments to an airplane's control surfaces and their locations on the airplane.</td>
</tr>
<tr>
<td>9</td>
<td>D</td>
<td>79.4</td>
<td>Skills</td>
<td>Aerodynamics and Flight</td>
<td>Identify insect adaptations that improve flight.</td>
</tr>
<tr>
<td>10</td>
<td>A</td>
<td>66.8</td>
<td>Knowledge</td>
<td>Aerodynamics and Flight</td>
<td>Identify the purpose of the hole in the canopy of a parachute.</td>
</tr>
<tr>
<td>11</td>
<td>B</td>
<td>68.1</td>
<td>Knowledge</td>
<td>Aerodynamics and Flight</td>
<td>Indicate why a certain species of bird cannot fly.</td>
</tr>
<tr>
<td>12</td>
<td>C</td>
<td>64.9</td>
<td>Knowledge</td>
<td>Aerodynamics and Flight</td>
<td>Evaluate differences in design between aircraft and spacecraft.</td>
</tr>
<tr>
<td>13</td>
<td>B</td>
<td>75.4</td>
<td>Skills</td>
<td>Aerodynamics and Flight</td>
<td>Evaluate three diagrams to determine a common function of the structures.</td>
</tr>
<tr>
<td>14</td>
<td>C</td>
<td>57.9</td>
<td>Skills</td>
<td>Inquiry and Problem Solving</td>
<td>Identify constant variables in an experiment.</td>
</tr>
<tr>
<td>Question</td>
<td>Key</td>
<td>Correct Response (%)</td>
<td>Reporting Category</td>
<td>Topic</td>
<td>Item Description</td>
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<tr>
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</tr>
<tr>
<td>15</td>
<td>A</td>
<td>83.4</td>
<td>Knowledge</td>
<td>Aerodynamics &amp; Flight</td>
<td>Evaluate a diagram to determine the similarities between an experiment and a jet engine.</td>
</tr>
<tr>
<td>16</td>
<td>D</td>
<td>65.8</td>
<td>Skills</td>
<td>Inquiry and Problem Solving</td>
<td>Analyze a graph and make an inference.</td>
</tr>
<tr>
<td>17</td>
<td>D</td>
<td>55.2</td>
<td>Knowledge</td>
<td>Sky Science</td>
<td>Identify the length of time it takes the moon to revolve around the Earth.</td>
</tr>
<tr>
<td>18</td>
<td>A</td>
<td>43.0</td>
<td>Skills</td>
<td>Sky Science</td>
<td>Relate the rising and setting of the sun to the rotation of Earth.</td>
</tr>
<tr>
<td>19</td>
<td>C</td>
<td>80.2</td>
<td>Skills</td>
<td>Sky Science</td>
<td>Identify a trend in data presented in a chart.</td>
</tr>
<tr>
<td>20</td>
<td>D</td>
<td>55.7</td>
<td>Skills</td>
<td>Inquiry and Problem Solving</td>
<td>Identify a method of improving the reliability of an experiment.</td>
</tr>
<tr>
<td>21</td>
<td>C</td>
<td>42.1</td>
<td>Knowledge</td>
<td>Sky Science</td>
<td>Recognize the best way to safely view the sun.</td>
</tr>
<tr>
<td>22</td>
<td>D</td>
<td>68.0</td>
<td>Skills</td>
<td>Sky Science</td>
<td>Recognize relative size of parts of our universe.</td>
</tr>
<tr>
<td>23</td>
<td>B</td>
<td>77.8</td>
<td>Knowledge</td>
<td>Sky Science</td>
<td>Recognize that the tilt of Earth influences seasons and amount of daylight.</td>
</tr>
<tr>
<td>24</td>
<td>B</td>
<td>81.0</td>
<td>Skills</td>
<td>Inquiry and Problem Solving</td>
<td>Identify the question that initiated the collection of data shown in a source.</td>
</tr>
<tr>
<td>25</td>
<td>D</td>
<td>61.7</td>
<td>Knowledge</td>
<td>Sky Science</td>
<td>Recognize the appearance of a gibbous moon.</td>
</tr>
<tr>
<td>26</td>
<td>B</td>
<td>73.7</td>
<td>Knowledge</td>
<td>Sky Science</td>
<td>Recognize that light is emitted from stars and reflected by planets.</td>
</tr>
<tr>
<td>27</td>
<td>D</td>
<td>85.9</td>
<td>Skills</td>
<td>Evidence &amp; Investigation</td>
<td>Analyze and make an inference about a series of footprints and animal tracks.</td>
</tr>
<tr>
<td>28</td>
<td>C</td>
<td>74.7</td>
<td>Knowledge</td>
<td>Evidence &amp; Investigation</td>
<td>Identify information about a suspect that can be determined by examining footprints.</td>
</tr>
<tr>
<td>29</td>
<td>D</td>
<td>79.2</td>
<td>Skills</td>
<td>Inquiry and Problem Solving</td>
<td>Analyze a circle graph, and identify the experimental question used to gather the data shown in the graph.</td>
</tr>
<tr>
<td>30</td>
<td>C</td>
<td>56.6</td>
<td>Knowledge</td>
<td>Evidence &amp; Investigation</td>
<td>Identify the proper procedure for conducting a chromatography test.</td>
</tr>
<tr>
<td>Question</td>
<td>Key</td>
<td>Correct Response (%)</td>
<td>Reporting Category</td>
<td>Topic</td>
<td>Item Description</td>
</tr>
<tr>
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</tr>
<tr>
<td>31</td>
<td>B</td>
<td>84.4</td>
<td>Skills</td>
<td>Evidence &amp; Investigation</td>
<td>Determine the order of tracks shown in a diagram.</td>
</tr>
<tr>
<td>32</td>
<td>C</td>
<td>68.3</td>
<td>Skills</td>
<td>Evidence &amp; Investigation</td>
<td>Classify fingerprint characteristics based on a source.</td>
</tr>
<tr>
<td>33</td>
<td>A</td>
<td>54.9</td>
<td>Skills</td>
<td>Evidence &amp; Investigation</td>
<td>Identify soil characteristics that would be least helpful in identifying a suspect based on information in a source.</td>
</tr>
<tr>
<td>34</td>
<td>D</td>
<td>65.4</td>
<td>Skills</td>
<td>Inquiry and Problem Solving</td>
<td>Identify evidence that would be used to clear a suspect given various types of evidence found at a crime scene.</td>
</tr>
<tr>
<td>35</td>
<td>B</td>
<td>71.2</td>
<td>Skills</td>
<td>Inquiry and Problem Solving</td>
<td>Evaluate a graph of the height vs. foot length to determine the most likely suspect for a crime.</td>
</tr>
<tr>
<td>36</td>
<td>C</td>
<td>76.4</td>
<td>Skills</td>
<td>Evidence &amp; Investigation</td>
<td>Make an inference based on a crime-scene diagram.</td>
</tr>
<tr>
<td>37</td>
<td>D</td>
<td>74.5</td>
<td>Skills</td>
<td>Inquiry and Problem Solving</td>
<td>Identify a disadvantage of fabric analysis.</td>
</tr>
<tr>
<td>38</td>
<td>B</td>
<td>74.3</td>
<td>Skills</td>
<td>Inquiry and Problem Solving</td>
<td>Determine a process in the scientific method that is being described in a source.</td>
</tr>
<tr>
<td>39</td>
<td>C</td>
<td>57.9</td>
<td>Knowledge</td>
<td>Trees &amp; Forests</td>
<td>Recognize descriptive words used to describe leaf margin.</td>
</tr>
<tr>
<td>40</td>
<td>A</td>
<td>67.3</td>
<td>Skills</td>
<td>Trees &amp; Forests</td>
<td>Identify the activities that would have a specified impact on a forest ecosystem.</td>
</tr>
<tr>
<td>41</td>
<td>A</td>
<td>75.3</td>
<td>Knowledge</td>
<td>Trees &amp; Forests</td>
<td>Identify the meaning of certain tree cookie characteristics.</td>
</tr>
<tr>
<td>42</td>
<td>A</td>
<td>59.1</td>
<td>Skills</td>
<td>Inquiry and Problem Solving</td>
<td>Evaluate data to determine the manipulated variable in an experiment.</td>
</tr>
<tr>
<td>43</td>
<td>B</td>
<td>77.0</td>
<td>Knowledge</td>
<td>Trees &amp; Forests</td>
<td>Identify a characteristic common to all deciduous and coniferous trees.</td>
</tr>
<tr>
<td>44</td>
<td>D</td>
<td>83.8</td>
<td>Knowledge</td>
<td>Trees &amp; Forests</td>
<td>Identify the role decomposers play in a plant’s nutrient cycle.</td>
</tr>
<tr>
<td>45</td>
<td>C</td>
<td>59.6</td>
<td>Skills</td>
<td>Trees &amp; Forests</td>
<td>Associate given tree ring widths with the appropriate graph.</td>
</tr>
<tr>
<td>Question</td>
<td>Key</td>
<td>Correct Response (%)</td>
<td>Reporting Category</td>
<td>Topic</td>
<td>Item Description</td>
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<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>46</td>
<td>C</td>
<td>62.1</td>
<td>Knowledge</td>
<td>Trees &amp; Forests</td>
<td>Identify the most useful characteristic for classifying trees.</td>
</tr>
<tr>
<td>47</td>
<td>C</td>
<td>73.6</td>
<td>Knowledge</td>
<td>Trees &amp; Forests</td>
<td>Recognize that plants require chlorophyll in order to produce oxygen.</td>
</tr>
<tr>
<td>48</td>
<td>B</td>
<td>63.9</td>
<td>Skills</td>
<td>Inquiry and Problem Solving</td>
<td>Make a conclusion based on information about different tree species.</td>
</tr>
<tr>
<td>49</td>
<td>C</td>
<td>53.6</td>
<td>Skills</td>
<td>Trees &amp; Forests</td>
<td>Analyze four statements, and determine which statements represent opposition to forest development.</td>
</tr>
<tr>
<td>50</td>
<td>D</td>
<td>85.1</td>
<td>Skills</td>
<td>Trees &amp; Forests</td>
<td>Identify a valuable role plants have in the environment.</td>
</tr>
</tbody>
</table>
2012 Achievement Test Questions

The questions presented in this document are from the previously secured 2012 Grade 6 Science Achievement Test and are representative of the questions that form achievement tests. These questions are released by Alberta Education for teacher and student use.

2012 Grade 6 Science Achievement Test
1. To lift a hot-air balloon off the ground, the air inside the balloon must
   A. cool
   B. expand
   C. contract
   D. compress

2. Which wing design shown below would produce the greatest lift?
   A. 
      ![Wing Design A]
   B. 
      ![Wing Design B]
   C. 
      ![Wing Design C]
   D. 
      ![Wing Design D]

3. A descending aircraft experiences a stronger force of
   A. gravity than lift
   B. thrust than drag
   C. lift than gravity
   D. drag than thrust
4. Which of the following titles would most accurately complete the missing information in the concept map above?

A. Volume of air  
B. Components of air  
C. Atmospheric pressure  
D. Rocket-fuel ingredients
Use the following information to answer question 5.

Alex uses the following apparatus in an experiment.

5. When the test tube is lowered into the hot water, the coloured drop will _____i_____ because the pressure inside the test tube will _____ii_____.

The statement above is completed by the information in row

<table>
<thead>
<tr>
<th>Row</th>
<th>i</th>
<th>ii</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>fall</td>
<td>increase</td>
</tr>
<tr>
<td>B.</td>
<td>fall</td>
<td>decrease</td>
</tr>
<tr>
<td>C.</td>
<td>rise</td>
<td>increase</td>
</tr>
<tr>
<td>D.</td>
<td>rise</td>
<td>decrease</td>
</tr>
</tbody>
</table>
Use the following information to answer question 6.

A student completely plugs the nozzle of an air pump with modelling clay, as shown below.

The student notices that even though the pump is sealed off, the plunger can still be pushed into the cylinder. The difference is that when the pump is plugged, a greater force is required to push the plunger further into the cylinder.

6. An inference that can be made from the observation above is that air

A. exerts pressure and can be compressed
B. exerts pressure and cannot be compressed
C. does not exert pressure and can be compressed
D. does not exert pressure and cannot be compressed

Use the following illustration to answer question 7.

7. The purpose of the trailer’s wedge-shaped front end is **most likely** to

A. give the trailer lift
B. give the trailer drag
C. make the trailer light
D. make the trailer streamlined
8. To turn an airplane right, a pilot must use the _i_ labelled _ii_, and to raise an airplane's nose, a pilot must use the _iii_ labelled _iv_.

The statement above is completed by the information in row

<table>
<thead>
<tr>
<th>Row</th>
<th><em>i</em></th>
<th><em>ii</em></th>
<th><em>iii</em></th>
<th><em>iv</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>rudder</td>
<td>X</td>
<td>elevators</td>
<td>Y</td>
</tr>
<tr>
<td>B.</td>
<td>ailerons</td>
<td>X</td>
<td>rudder</td>
<td>Z</td>
</tr>
<tr>
<td>C.</td>
<td>ailerons</td>
<td>Z</td>
<td>elevators</td>
<td>X</td>
</tr>
<tr>
<td>D.</td>
<td>rudder</td>
<td>Y</td>
<td>elevators</td>
<td>Z</td>
</tr>
</tbody>
</table>

9. Which of the adaptations listed above do **not** improve the ability of an insect to fly?

A. I and II  
B. II and V  
C. III and IV  
D. III and V
10. The **main** purpose of the hole in the top of the parachute is to

   A. increase the stability of the parachute  
   B. decrease the stability of the parachute  
   C. increase the speed of the parachute  
   D. decrease the speed of the parachute

11. Which of the following factors explains why ostriches cannot fly?

   A. Their bodies are not streamlined enough to overcome air resistance.  
   B. Their wings do not generate enough lift to overcome gravity.  
   C. They cannot generate enough speed to overcome gravity.  
   D. They cannot tuck in their legs enough to decrease drag.
Use the following information to answer question 12.

On a quiz about the design of aircraft and spacecraft, Kari writes “yes” beside correct statements and “no” beside incorrect statements.

**Aircraft and Spacecraft Design Quiz**

Answer: Statement:

1. **Yes** Aircraft need smaller wings than spacecraft.
2. **Yes** Aircraft fly inside Earth’s atmosphere.
3. **Yes** Spacecraft use a rudder to control direction in space.

12. If Kari answers all 3 questions correctly, which of the following sets of responses does Kari write?

A. **Answer:**
   1. yes
   2. yes
   3. yes

B. **Answer:**
   1. yes
   2. yes
   3. yes

C. **Answer:**
   1. yes
   2. yes
   3. yes

D. **Answer:**
   1. yes
   2. yes
   3. yes
Use the following information to answer question 13.

13. The main functions of the objects shown above are to

A. reduce the effects of gravity and provide thrust
B. provide stability and guide direction of travel
C. provide lift and increase propulsion
D. reduce stability and increase speed

Use the following information to answer question 14.

Ronald wants to perform an experiment to determine if the width of a parachute’s canopy affects the time that it takes the parachute to descend. He identifies the following four variables:

Variable 1  Surface area of the parachute canopy
Variable 2  Mass of the object attached to the parachute
Variable 3  Time taken for the parachute to reach the ground
Variable 4  Height from which the parachute is dropped

14. Which two of the variables above should Ronald keep constant?

A. Variables 1 and 2
B. Variables 2 and 3
C. Variables 2 and 4
D. Variables 3 and 4
An experiment is set up as shown below to determine the distance a balloon will travel when the air inside it is released. This experiment can demonstrate how a simple jet engine works.

15. A simple jet engine is similar to the balloon in the diagram because

A. thrust propels both forward  
B. thrust propels both upward  
C. drag propels both forward  
D. lift propels both upward

Use the following information to answer question 16.

In a science experiment, Allison adds paper clips to a paper airplane to increase its mass. Each time she adds a paper clip, she measures how far the paper airplane flies. A graph of her results is shown below.

16. An inference that can be made from Allison’s graph is that

A. increasing the mass of the airplane allowed it to fly farther  
B. Allison’s test airplane required at least one paper clip to fly  
C. the airplane flew 12 meters with 7 paper clips attached to it  
D. if Allison added 9 paper clips, the airplane would most likely not fly
17. The Moon makes a complete revolution around Earth approximately once each
   A. day
   B. week
   C. year
   D. month

Use the following information to answer question 18.

18. Sunrise is occurring at position ___i___, and sunset is occurring at position ___ii___.

The statement above is completed by the information in row

<table>
<thead>
<tr>
<th>Row</th>
<th>i</th>
<th>ii</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Z</td>
<td>X</td>
</tr>
<tr>
<td>B.</td>
<td>Y</td>
<td>W</td>
</tr>
<tr>
<td>C.</td>
<td>X</td>
<td>Z</td>
</tr>
<tr>
<td>D.</td>
<td>W</td>
<td>Y</td>
</tr>
</tbody>
</table>
Everett and Samuel wanted to track and plot the apparent movement of the Sun over the course of the day. They measured the length of a tree’s shadow at different times throughout the day and recorded their results in the following chart.

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>Length of Tree Shadow (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 A.M.</td>
<td>18</td>
</tr>
<tr>
<td>9 A.M.</td>
<td>14</td>
</tr>
<tr>
<td>11 A.M.</td>
<td>9</td>
</tr>
<tr>
<td>1 P.M.</td>
<td>5</td>
</tr>
<tr>
<td>3 P.M.</td>
<td>9</td>
</tr>
<tr>
<td>5 P.M.</td>
<td>14</td>
</tr>
<tr>
<td>7 P.M.</td>
<td>18</td>
</tr>
</tbody>
</table>

19. According to the information above, which of the following graphs shows the trend in the data that Everett and Samuel recorded?
Greg’s Meteorite Experiment

Greg wonders if the mass of a meteorite will affect the depth of the crater the meteorite creates when it hits Earth’s surface. He creates the following experiment:

<table>
<thead>
<tr>
<th>Problem:</th>
<th>Will the mass of a meteorite affect the depth of the crater produced?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypothesis:</td>
<td>I think that the mass of the meteorite will affect the depth of the crater produced because the greater the mass of an object, the deeper the hole it will produce.</td>
</tr>
</tbody>
</table>
| Materials: | - ruler  
- flour  
- metal pan  
- three round objects each with different masses |
| Procedure: | 1) Make a layer of flour in the pan 5 cm deep.  
2) Weigh one of the objects to find its mass.  
3) Measure a height of 30 cm above the pan to drop each object from.  
4) Drop one object from that height.  
5) Measure and record the depth of the crater produced.  
6) Repeat steps 2 to 5 for each of the three different objects. |

20. In order for Greg to make his results more reliable, he should

A. test objects of three different shapes  
B. increase the height from which the objects are dropped  
C. test more than three different objects with different masses only once  
D. repeat the experiment by dropping each of the objects at least three times
21. In order to safely view the sun, a person should

A. view the sun while wearing sunglasses
B. place a piece of dark paper over the lens of a telescope
C. view an image of the sun projected onto a piece of paper
D. place a piece of coloured glass over the lens of a telescope

Use the following diagram to answer question 22.

Leroy draws the following sketch in his space binder.

22. Which of the following rows identifies possible names for the missing X, Y, and Z titles in Leroy’s diagram?

<table>
<thead>
<tr>
<th>Row</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Universe</td>
<td>Solar System</td>
<td>Galaxy</td>
</tr>
<tr>
<td>B.</td>
<td>Galaxy</td>
<td>Solar System</td>
<td>Universe</td>
</tr>
<tr>
<td>C.</td>
<td>Milky Way</td>
<td>Galaxy</td>
<td>Solar System</td>
</tr>
<tr>
<td>D.</td>
<td>Solar System</td>
<td>Milky Way</td>
<td>Universe</td>
</tr>
</tbody>
</table>
23. At the North Pole, continuous darkness occurs during the _____i_____ because Earth’s axis
is tilted so that the North Pole is pointed _____ii_____ the sun.

The statement above is completed by the information in row

<table>
<thead>
<tr>
<th>Row</th>
<th>i</th>
<th>ii</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>summer</td>
<td>away from</td>
</tr>
<tr>
<td>B.</td>
<td>winter</td>
<td>away from</td>
</tr>
<tr>
<td>C.</td>
<td>summer</td>
<td>toward</td>
</tr>
<tr>
<td>D.</td>
<td>winter</td>
<td>toward</td>
</tr>
</tbody>
</table>

24. Which of the following research questions is best answered by the information above?

A. “Why do some planets have moons and others do not?”
B. “How many moons does each planet have?”
C. “How many moons are in the universe?”
D. “What are moons made up of?”
Use the following diagram to answer question 25.

25. The gibbous moons are labelled
   A. I and II
   B. I and IV
   C. II and III
   D. III and IV

26. Mars can be easily viewed through a telescope because Mars _____i____ light that is _____ii____ from the Sun.

The statement above is completed by the information in row

<table>
<thead>
<tr>
<th>Row</th>
<th>i</th>
<th>ii</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>reflects</td>
<td>reflected</td>
</tr>
<tr>
<td>B.</td>
<td>reflects</td>
<td>emitted</td>
</tr>
<tr>
<td>C.</td>
<td>emits</td>
<td>reflected</td>
</tr>
<tr>
<td>D.</td>
<td>emits</td>
<td>emitted</td>
</tr>
</tbody>
</table>
27. Which of the following inferences can be made from the track patterns above?

A. The bear was running through the area.
B. Jordan was walking in the area before the bear.
C. All three sets of tracks entered the area from the same direction.
D. Hannah started to move more quickly after crossing the bear tracks.

28. Examining the footprints found at a crime scene would most likely help an investigator determine

A. the age of a suspect
B. whether a suspect is male or female
C. whether there is more than one suspect
D. the time the suspect committed the crime
29. Which of the following questions would students have been investigating when they recorded the data above?

A. How many Grade 6 students have composite fingerprints?
B. How many students in our school have arched fingerprints?
C. Which students in our school have the most common fingerprint pattern?
D. Which fingerprint pattern is the most common among a group of Grade 6 students?

30. Which of the following statements outlines a proper procedure to use when completing a chromatography test?

A. The chromatography paper should be left in the water until all the ink has disappeared.
B. The chromatography paper should be dipped completely under water and then quickly removed.
C. The bottom 1 cm of the chromatography paper should touch the water but the ink line should not.
D. The chromatography paper should be dipped 1 cm into the water only deep enough so that the ink line is just under the water level.
31. In what order were the tracks created?

A. Footprints, car, bicycle
B. Footprints, bicycle, car
C. Bicycle, car, footprints
D. Bicycle, footprints, car
Mary classifies fingerprints using the following concept chart.

32. The letters in the diagram above that identify a bifurcation and a lake are, respectively,

A. W and Y
B. W and Z
C. X and Y
D. X and Z
A police officer collected a soil sample at a crime scene.

**Crime Scene Soil Sample Characteristics**

- Black
- Low moisture content
- Presence of pine needles
- Coarse texture

The description of the soil samples collected from the shoes of four suspects was recorded in a chart, as shown below.

**Descriptions of Soil Samples Collected from the Shoes of Four Suspects**

<table>
<thead>
<tr>
<th>Suspect</th>
<th>Colour</th>
<th>Moisture Content</th>
<th>Composition</th>
<th>Texture</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Dark brown</td>
<td>Low</td>
<td>Mix of pine needles and grass</td>
<td>Coarse</td>
</tr>
<tr>
<td>II</td>
<td>Black</td>
<td>Low</td>
<td>Mix of pine needles and grass</td>
<td>Coarse</td>
</tr>
<tr>
<td>III</td>
<td>Dark brown</td>
<td>Low</td>
<td>Mix of leaves and shell fragments</td>
<td>Grainy</td>
</tr>
<tr>
<td>IV</td>
<td>Black</td>
<td>Low</td>
<td>Mix of leaves and shell fragments</td>
<td>Grainy</td>
</tr>
</tbody>
</table>

**33. Based on the information above, which of the soil descriptions is the **least** helpful in determining which suspect was likely at the crime scene?**

A. Moisture content  
B. Composition  
C. Texture  
D. Colour
A police officer gathers the following evidence at a house where a break-in took place. The evidence suggests that two different suspects were involved in the crime.

Evidence

- Partial thumbprints with arch and whorl patterns
- Black silk thread and dark green cotton thread
- Size 11W shoe print
- 23-cm-wide car tire track with treads that are worn and 0.6 cm deep

Investigators analyzed evidence gathered from five different suspects. The investigators’ findings are recorded in the table below.

Descriptions of Evidence Collected from Five Suspects

<table>
<thead>
<tr>
<th></th>
<th>Thumbprints</th>
<th>Clothing</th>
<th>Shoe Prints</th>
<th>Car Tires</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspect I</td>
<td>Composite and loop</td>
<td>Black cotton pants</td>
<td>Size 11W</td>
<td>• 22 cm wide</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• New treads</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• 0.8 cm deep</td>
</tr>
<tr>
<td>Suspect II</td>
<td>Whorl and loop</td>
<td>Black silk scarf</td>
<td>Size 11W</td>
<td>• 21 cm wide</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Slightly worn treads</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• 0.5 cm deep</td>
</tr>
<tr>
<td>Suspect III</td>
<td>Arch and loop</td>
<td>Dark green cotton sweatshirt</td>
<td>Size 11N</td>
<td>• 23 cm wide</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Slightly worn treads</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• 0.5 cm deep</td>
</tr>
<tr>
<td>Suspect IV</td>
<td>Loop and composite</td>
<td>Black wool socks</td>
<td>Size 11W</td>
<td>• 22 cm wide</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Worn treads</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• 0.6 cm deep</td>
</tr>
<tr>
<td>Suspect V</td>
<td>Loop and arch</td>
<td>Dark green cotton shirt</td>
<td>Size 11W</td>
<td>• 23 cm wide</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Worn treads</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• 0.6 cm deep</td>
</tr>
</tbody>
</table>

34. Evidence that helps to clear Suspect IV is the

A. size 11W shoe
B. colour of cloth
C. worn tire treads
D. type of thumbprints
Crime scene investigators can estimate the height of an individual based on footprint evidence and the relationship between foot length and height.

**Relationship Between Foot Length and Height**

35. The estimated height of an individual who leaves a 28.5 cm footprint is

- A. 200 cm tall
- B. 190 cm tall
- C. 180 cm tall
- D. 170 cm tall
36. An inference that can be made from observing the diagram above is that the person who left the footprints

A. was scared out of the office by an employee
B. did not find a back door, so left through the front door
C. moved faster when exiting the office than when entering it
D. moved slowly throughout the office to find what they were looking for

37. The primary disadvantage of performing the analysis described above is that it

A. is unreliable
B. costs too much
C. is time-consuming
D. destroys the sample
Kelly is conducting the following experiment at home.

Before starting her experiment, Kelly states that she thinks the leaves of the tree cutting will change colour in 24 hours.

38. Into which part of Kelly’s lab report would her statement above best fit?

A. Observations  
B. Hypothesis  
C. Conclusion  
D. Variables
Use the following information to answer question 39.

Categories Used to Describe a Leaf

| I | Type          |
| II| Shape         |
| III| Margin       |
| IV| Arrangement  |

39. The terms *smooth*, *serrated*, and *scalloped* would most commonly be associated with category

A. I
B. II
C. III
D. IV

Use the following information to answer question 40.

Human Activities in a Forest

1. Mining for fossil fuels
2. Gathering dead wood for a campfire
3. Clear-cutting trees to make a new road
4. Hiking along a marked trail in the mountains
5. Setting controlled fires to help pine trees spread their seeds
6. Planting new trees after clear-cutting for pulp and paper resources

40. Through which of the activities above do the needs of humans most negatively impact the health of a forest ecosystem?

A. Activities 1 and 3
B. Activities 2 and 4
C. Activities 3 and 5
D. Activities 2 and 6
41. A tree ring that is ____i____ than the other rings in a tree cookie would indicate that the tree ____ii____ that year.

The statement above is completed by the information in row

<table>
<thead>
<tr>
<th>Row</th>
<th>i</th>
<th>ii</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>wider</td>
<td>grew more</td>
</tr>
<tr>
<td>B.</td>
<td>narrower</td>
<td>grew more</td>
</tr>
<tr>
<td>C.</td>
<td>darker</td>
<td>suffered from disease</td>
</tr>
<tr>
<td>D.</td>
<td>lighter</td>
<td>suffered from disease</td>
</tr>
</tbody>
</table>

42. In this experiment, the manipulated variable is the

A. mass of salt in the soil
B. percentage of seeds that germinate
C. average height of plants after three weeks
D. percentage of plants living after six weeks
43. Which of the following characteristics is common to all deciduous and coniferous trees?

A. They shed their leaves in the fall.
B. They have chlorophyll.
C. They produce flowers.
D. They produce cones.

44. Plants rely on decomposers for their survival because decomposers

A. provide chlorophyll for photosynthesis
B. feed on living animals that eat plants
C. use up oxygen provided by plants
D. return nutrients to the soil
Extracting a tree core reveals a tree’s ring pattern without harming the tree. A tree core is a small, cylindrical cross-section of a tree trunk, as shown below. The most recent ring of growth is closest to the bark.

45. Which of the following graphs best represents the tree-ring width in the tree core sample shown above?

A. [Graph A]

B. [Graph B]

C. [Graph C]

D. [Graph D]
46. Which of the following characteristics is **most** useful in classifying the species of a tree?

A. Height of the tree  
B. Colour of the bark  
C. Arrangement of the leaves  
D. Size of rings in the tree cookie

47. *To produce their own food through the process of photosynthesis, plants require **ii**.*  
*During photosynthesis, **ii** is released.*  

The statements above are completed by the information in row

<table>
<thead>
<tr>
<th>Row</th>
<th>i</th>
<th>ii</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>water vapour</td>
<td>carbon dioxide</td>
</tr>
<tr>
<td>B.</td>
<td>chlorophyll</td>
<td>nitrogen</td>
</tr>
<tr>
<td>C.</td>
<td>chlorophyll</td>
<td>oxygen</td>
</tr>
<tr>
<td>D.</td>
<td>nitrogen</td>
<td>water vapour</td>
</tr>
</tbody>
</table>

*Use the following information to answer question 48.*

A student plants seeds from four tree species. He compares the number of leaves and the height of four healthy seedlings that develop.

<table>
<thead>
<tr>
<th>Tree Species</th>
<th>Number of Leaves</th>
<th>Height of Seedling (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balsam poplar</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>White birch</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Willow</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Aspen poplar</td>
<td>4</td>
<td>10</td>
</tr>
</tbody>
</table>

48. A conclusion that can be made from the data in the table is that the

A. balsam poplar seedling has twice as many leaves as the willow seedling  
B. white birch seedling has fewer leaves than the balsam poplar seedling  
C. aspen poplar seedling is half the height of the white birch seedling  
D. willow seedling is taller than the aspen poplar seedling
A community met to discuss the future use of a nearby forest. Four citizens shared their views.

**Citizen 1**  “Although I enjoy the natural environment, the forest is too close to our town. I have many problems with deer and other animals eating my flowers and destroying my garden.”

**Citizen 2**  “I enjoy living close to the forest. It is a very peaceful area free of pollution and garbage.”

**Citizen 3**  “Research shows that an organism’s natural forest habitat is extremely important in ensuring its health and survival. We should protect that forest habitat.”

**Citizen 4**  “We should turn a portion of the forest into a playground. It is important that families have a place to enjoy themselves as the town grows.”

49. Which two citizens would *most likely* oppose future development of the forest?

A. Citizens 1 and 2  
B. Citizens 1 and 4  
C. Citizens 2 and 3  
D. Citizens 3 and 4
50. Which of the following phrases would fit **best** with the phrases posted on the sign above?

A. Carbon dioxide  
B. Fresh water  
C. Fossil fuels  
D. Clean air

You have now completed the test.  
*If you have time, you may wish to check your answers.*