### Score Range - 1-12

**Interpretation of Data**

**Standards**

- Students who score in the 1–12 range are most likely beginning to develop the knowledge and skills assessed in the other score ranges.

**Ideas for Progress**

- locate data in simple tables and graphs
  - **SE:** 8, 35, 116, 175, 610
  - **TR:** Lab Manual: 55, 59, 131, 208, 277

- become familiar with different types of graphs (e.g., line graphs, pie charts, bar graphs)
  - **SE:** 8, 175, 521, 595, 610
  - **TR:** Lab Manual: 60-61, 130-131, 158-160, 206-207, 314-315

- become familiar with units of measurement commonly used in science
  - **SE:** 74-80
  - **TR:** Lab Manual: 16, 18, 37, 59-60, 79

**Scientific Investigation**

**Ideas for Progress**

- observe experiments being performed and discuss what was done and why
  - **SE:** 20-21
  - **TR:** Lab Manual: 21-24 (Text reference: Lesson 1.3)

**Evaluation of Models, Inferences, and Experimental Results**

**Ideas for Progress**

- discuss what hypotheses and conclusions are and how they are different from each other
  - **SE:** Can be Developed From: 14, 16, 17
  - **TR:** Can be Developed From: Lab Manual: 21-24

### Score Range - 13-15

**Interpretation of Data**

**Standards**

- Select a single piece of data, (numerical or non-numerical), from a simple data presentation(e.g., a table or graph with two or three variables; a food web diagram)
  - **SE:** 8, 175, 178, 458, 610

- Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels)
  - **SE:** Can Be Developed From: 8, 175, 429, 438, 468
### ACT - COLLEGE READINESS STANDARDS - SCIENCE

<table>
<thead>
<tr>
<th>Ideas for Progress</th>
<th>SE:</th>
<th>Lab Manual:</th>
</tr>
</thead>
<tbody>
<tr>
<td>■ locate several data points in a simple table or graph and make comparisons between them</td>
<td>81, 177, 312, 559, 729</td>
<td>66, 119, 144, 208, 216</td>
</tr>
<tr>
<td>■ become familiar with common terms used in science (e.g., star, force, mineral)</td>
<td>174, 194, 356, 518, 762</td>
<td>All lessons have vocabulary list on first page supported by highlighted definitions within text</td>
</tr>
<tr>
<td>■ create basic tables and graphs from sets of scientific data</td>
<td>51, 120, 324, 467, 887</td>
<td>130-131, 142-143, 158-160, 206-207, 314-315</td>
</tr>
<tr>
<td>■ read newspaper and magazine articles pertaining to science and technology and discuss main points with peers</td>
<td>Lab Manual: 198, 202, 250, 297, 317</td>
<td></td>
</tr>
<tr>
<td>■ describe trends and relationships in data displayed in simple tables and graphs</td>
<td>178, 179-180, 181-182</td>
<td>144, 208, 316</td>
</tr>
</tbody>
</table>

### Scientific Investigation

<table>
<thead>
<tr>
<th>Ideas for Progress</th>
<th>SE:</th>
<th>Lab Manual:</th>
</tr>
</thead>
<tbody>
<tr>
<td>■ determine an appropriate method for performing a simple experiment</td>
<td>92</td>
<td>24, 44, 96, 172, 223</td>
</tr>
<tr>
<td>■ perform simple laboratory activities designed to teach familiarity with a number of commonly used tools (e.g., thermometers, balances, glassware)</td>
<td>20</td>
<td>13, 14, 15, 16, 18, 19</td>
</tr>
</tbody>
</table>

### Evaluation of Models, Inferences, and Experimental Results

<table>
<thead>
<tr>
<th>Ideas for Progress</th>
<th>Lab Manual:</th>
</tr>
</thead>
<tbody>
<tr>
<td>■ read science articles of an appropriate level from newspapers and science news magazines and identify any hypotheses or conclusions made by the author(s)</td>
<td>198, 202, 250, 297, 317</td>
</tr>
</tbody>
</table>

### Score Range - 16-19

### Interpretation of Data

<table>
<thead>
<tr>
<th>Standards</th>
<th>SE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>■ Select two or more pieces of data from a simple data presentation</td>
<td>35, 178, 312, 438, 677</td>
</tr>
<tr>
<td>ACT - COLLEGE READINESS STANDARDS - SCIENCE</td>
<td>Chemistry (Wilbraham) © 2012</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>■ Understand basic scientific terminology</td>
<td><strong>SE</strong>: 174, 194, 356, 518, 762 (All lessons have vocabulary list on first page supported by highlighted definitions within text)</td>
</tr>
<tr>
<td>■ Find basic information in a brief body of text</td>
<td><strong>SE</strong>: 104, 148, 225, 315, 408 (all Lesson Check)</td>
</tr>
</tbody>
</table>
| ■ Determine how the value of one variable changes as the value of another variable changes in a simple data presentation | **SE**: 456, 458, 521, 542, 882  
**TR**: Lab Manual: 37-43, 229-230, 235 |

**Ideas for Progress**

■ display data gathered in laboratory exercises in a variety of formats (e.g., line graphs, pie charts, bar graphs)  
**SE**: 887  

### Scientific Investigation

**Standards**

■ Understand the methods and tools used in a simple experiment  
**SE**: 20-21  
**TR**: Lab Manual: 21-24

**Ideas for Progress**

■ perform experiments that require more than one step  
**SE**: 149, 184, 475, 508, 635  

■ conduct a simple experiment that makes use of a control group  
**SE**: Can Be Developed From: 542 (Interpret Graphs)  
**TR**: Lab Manual: 58

### Evaluation of Models, Inferences, and Experimental Results

**Ideas for Progress**

■ read descriptions of actual experiments (e.g., completed science fair research, simple experiments from science education journals) and discuss whether the conclusions that were made support or contradict the hypotheses  
**TR**: Lab Manual: 198, 202, 250, 297, 317

■ formulate hypotheses, predictions, or conclusions based on the results of an experiment  
**SE**: 17, 279, 437, 491, 519  

**SE** = Student Edition  
**TR** = Teaching Resources
## Interpretation of Data

### Standards

<table>
<thead>
<tr>
<th>Task</th>
<th>SE References</th>
<th>TR References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select data from a complex data presentation (e.g., a table or graph with more than three variables; a phase diagram)</td>
<td>177, 324, 438, 729, 814</td>
<td>Lab Manual: 109-114</td>
</tr>
<tr>
<td>Compare or combine data from a simple data presentation (e.g., order or sum data from a table)</td>
<td>81, 177, 559, 729, 814</td>
<td></td>
</tr>
<tr>
<td>Translate information into a table, graph, or diagram</td>
<td>51, 120, 324, 467, 887</td>
<td>Lab Manual: 60-61, 130-131, 158-160, 206-207, 314-315</td>
</tr>
</tbody>
</table>

### Ideas for Progress

<table>
<thead>
<tr>
<th>Task</th>
<th>SE Reference</th>
<th>TR References</th>
</tr>
</thead>
<tbody>
<tr>
<td>examine line graphs to determine if they show a direct or inverse relationship between variables</td>
<td>605</td>
<td>Lab Manual: 37-43</td>
</tr>
<tr>
<td>become familiar with scatterplots</td>
<td></td>
<td></td>
</tr>
<tr>
<td>determine a simple mathematical relationship between two variables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>integrate scientific information from popular sources, (e.g., newspapers, magazines, the Internet), with that found in textbooks</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Scientific Investigation

### Standards

<table>
<thead>
<tr>
<th>Task</th>
<th>SE References</th>
<th>TR References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understand the methods and tools used in a moderately complex experiment</td>
<td>583, 828, 849</td>
<td>Lab Manual: 93, 156-157, 164, 169-170, 244</td>
</tr>
<tr>
<td>Understand a simple experimental design</td>
<td>184, 583, 635, 828, 849</td>
<td>Lab Manual: 24</td>
</tr>
<tr>
<td>Identify a control in an experiment</td>
<td></td>
<td>Can Be Developed From: Lab Manual: 58</td>
</tr>
<tr>
<td>Identify similarities and differences between experiments</td>
<td>828, 849</td>
<td></td>
</tr>
</tbody>
</table>

### Ideas for Progress

<table>
<thead>
<tr>
<th>Task</th>
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<th>TR References</th>
</tr>
</thead>
<tbody>
<tr>
<td>perform several repetitions of an experiment to determine the reliability of results</td>
<td></td>
<td>Can Be Developed From: Lab Manual: 147-153, 231-235, 259-266</td>
</tr>
</tbody>
</table>
### Evaluation of Models, Inferences, and Experimental Results

**Standards**

- **Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model**
  
  **SE:** 17, 51, 184, 765, 778  
  **TR:** Lab Manual: 187, 198, 270, 278, 303, 317

- **Identify key issues or assumptions in a model**
  
  **SE:** 184, 787  
  **TR:** Lab Manual: 73, 291

**Ideas for Progress**

- **Evaluate whether the data produced by an experiment adequately support a given conclusion**
  
  **SE:** Can Be Developed From: 279  
  **TR:** Lab Manual: 66, 81-83, 152, 166, 175-176

- **Compare and contrast two different models about a scientific phenomenon**
  
  **SE:** 787

### Score Range - 24-27

### Interpretation of Data

**Standards**

- **Compare or combine data from two or more simple data presentations (e.g., categorize data from a table using a scale from another table)**
  
  **SE:** 72  
  **TR:** Lab Manual: 39-41

- **Compare or combine data from a complex data presentation**
  
  **SE:** 542, 572, 597, 601, 605  
  **TR:** Lab Manual: 206-208, 234-235, 249-250

- **Interpolate between data points in a table or graph**
  
  **SE:** 312  
  **TR:** Lab Manual: 66

- **Determine how the value of one variable changes as the value of another variable changes in a complex data presentation**
  
  **SE:** 521, 605  
  **TR:** Lab Manual: 208, 235, 316

- **Identify and/or use a simple, (e.g., linear), mathematical relationship between data**
  
  **SE:** Can Be Developed From: 458  
  **TR:** Lab Manual: 37-43

- **Analyze given information when presented with new, simple information**
  
  **SE:** 178, 456, 458, 597, 605  
  **TR:** Lab Manual: 216, 222, 229, 235, 265

**Ideas for Progress**

- **Relate scientific information contained in written text to numerical data**
  
  **SE:** 328  
  **TR:** Lab Manual: 41, 61, 208-209, 234-235

---

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</table>
| ■ manipulate algebraic equations that represent data | SE: 92, 467, 559, 571, 583, 670  

**Scientific Investigation**

**Standards**

| ■ Understand the methods and tools used in a complex experiment | SE: 20-24  
| ■ Understand a complex experimental design | SE: 374, 399, 475, 635, 752  
TR: Lab Manual: 223, 258, 266, 274, 290 |
| ■ Predict the results of an additional trial or measurement in an experiment | SE: 51  
TR: Lab Manual: 44, 100, 152, 222-223, 266, 316 |
| ■ Determine the experimental conditions that would produce specified results | TR: Lab Manual: 44, 56, 166, 230, 266 |

**Ideas for Progress**

| ■ determine the hypothesis behind an experiment that requires more than one step | TR: Lab Manual: 187, 198, 270, 278, 317 |
| ■ determine alternate methods of testing a hypothesis | TR: Can Be Developed From: Lab Manual: 48, 100, 161, 172, 187 |

**Evaluation of models, Inferences, and Experimental Results**

**Standards**

| ■ Select a simple hypothesis, prediction, or conclusion that is supported by two or more data presentations or models | SE: 184  
TR: Lab Manual: 77 |
<p>| ■ Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why | SE: Can Be Developed From: 635, 670 |
| ■ Identify strengths and weaknesses in one or more models | SE: Can Be Developed From: 184, 778, 787, 856 |
| ■ Identify similarities and differences between models | SE: Can Be Developed From: 184, 778, 787, 856 |
| ■ Determine which model(s) is(are) supported or weakened by new information | SE: Can Be Developed From: 184, 778, 787, 856 |</p>
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</thead>
</table>
| ■ Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion | SE: Can Be Developed From: 184, 778, 787, 856  
TR: Lab Manual: 293-294 |

### Ideas for Progress

| ■ communicate findings of an experiment and compare conclusions with those of peers | SE: 72, 109 (Quick Lab)  
TR: Lab Manual: 126, 216 |

### Score Range - 28-32

### Interpretation of Data

#### Standards

| ■ Compare or combine data from a simple data presentation with data from a complex data presentation | TR: Lab Manual: 39-40 |
| ■ Identify and/or use a complex, (e.g., nonlinear), mathematical relationship between data | SE: Can Be Developed From: 605, 610, 677, 765, 882  
| ■ Extrapolate from data points in a table or graph | SE: 312, 458 |

### Ideas for Progress

| ■ examine two or more related sets of data and then combine those data in ways that are useful | TR: Lab Manual: 38-40, 206-207 |

### Scientific Investigation

#### Standards

| ■ Determine the hypothesis for an experiment | TR: Lab Manual: 21-24, 114, 166, 198, 266, 278 |
| ■ Identify an alternate method for testing a hypothesis | TR: Can Be Developed From: Lab Manual: 114, 166, 198, 266, 278 |

### Ideas for Progress

| ■ carry out scientific investigations in which the importance of accuracy and precision is stressed | SE: 72, 92, 571  
TR: Lab Manual: 42-43, 56, 121-126 |
| ■ consider how changing an experimental procedure will affect the results of their scientific investigations | SE: Can Be Developed From: 109 (Quick Lab) |
| ■ design and carry out additional scientific inquiries to answer specific questions | SE: 51, 149, 184, 324, 508  
TR: Lab Manual: 152, 166, 254, 274, 290 |
### Evaluation of Models, Inferences, and Experimental Results

#### Standards

- **Select a complex hypothesis, prediction, or conclusion that is supported by a data presentation or model**
  
  **SE:** Can Be Developed From: 51, 184, 778, 787, 856

- **Determine whether new information supports or weakens a model, and why**
  
  **SE:** Can Be Developed From: 184, 778, 787, 856

- **Use new information to make a prediction based on a model**
  
  **SE:** Can Be Developed From: 51, 184, 778, 787, 856

#### Ideas for Progress

- **formulate hypotheses, predictions, or conclusions by comparing and contrasting several different sets of data from different experiments**
  
  **SE:** 51
  
  **TR:** Lab Manual: 119-120

- **evaluate the merits of a conclusion based on the analysis of several sets of data**
  
  **SE:** Can Be developed From: 892

- **seek out new information that enhances or challenges their existing knowledge**
  
  **SE:** Can Be Developed From: 83
  
  **TR:** Lab Manual: 198, 202, 250, 297, 317

### Score Range - 33-36

### Interpretation of Data

#### Standards

- **Compare or combine data from two or more complex data presentations**
  
  **TR:** Lab Manual: 130-131, 192, 206-207, 235-236, 311-316

- **Analyze given information when presented with new, complex information**
  
  **TR:** Lab Manual: 297, 316

### Scientific Investigation

#### Standards

- **Understand precision and accuracy issues**
  
  **SE:** 64-73
  
  **TR:** Lab Manual: 42-43, 56, 121-126, 240

- **Predict how modifying the design or methods of an experiment will affect results**
  
  **SE:** 51
  
  **TR:** Lab Manual: 44, 100, 152, 222-223, 266, 316

- **Identify an additional trial or experiment that could be performed to enhance or evaluate experimental results**
  
  **SE:** 51, 149, 184, 374, 475
  
  **TR:** Lab Manual: 198, 215, 231-236, 259-266

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**SE = Student Edition**  
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### Evaluation of Models, Inferences, and Experimental Results

**Standards**

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</table>
| ■ Select a complex hypothesis, prediction, or conclusion that is supported by two or more data presentations or models | SE: 778  
TR: Lab Manual: 208 |
| ■ Determine whether given information supports or contradicts a complex hypothesis or conclusion, and why | SE: 404 (Quick Lab)  
TR: Lab Manual: 208 |