QPOEE Quiz #4 Review

QPOEE Success Criteria:

F. Write a claim which accurately and specifically answers the investigation question.

G. Provide evidence that is directly related to the claim that comes from the text or investigation.

H. Identify and explain reasoning.

1. Why is the explanation such an important step of the scientific method?
   - It answers your investigation question.
   - It’s the entire reason for the investigation.
   - It provides solid, strong evidence with scientific reasoning to support your claim.

2. Name the 3 important pieces that should be included in an explanation and describe them

<table>
<thead>
<tr>
<th>Component</th>
<th>Specific Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) claim</td>
<td>A statement that answers the investigation question.</td>
</tr>
<tr>
<td>b) Evidence</td>
<td>Data or information that supports the claim.</td>
</tr>
<tr>
<td>c) reasoning</td>
<td>Explanation that connects your claim to the evidence using scientific principles.</td>
</tr>
</tbody>
</table>
3. Read the explanation, below. Circle the claim, underline the evidence, and put brackets [ ] around the reasoning.

Question: Does changing the color of a bird feeder affect the number of cardinals that fly to the feeder?
Explanation: Cardinals prefer red bird feeders over green and blue feeders. When three different colored feeders (red, green, and blue) were placed in a field, it was observed that cardinals went to the red feeder 115 times, the green feeder 65 times, and the blue feeder 21 times. Cardinals have four color receptors in their eyes and so they may be more sensitive to colors in their environment. Male cardinals have brilliant red feathers so perhaps cardinals are more attracted to the color red in general because it helps them to find a mate.

Read the investigation, below, to answer questions 4, 5, and possibly 6 if you choose to do so.

Question: How does the length of a paper helicopters blades affect the time it will stay in the air?

Knowledge Probe: As an object falls through the air, it usually encounters some degree of air resistance. Air resistance is the result of collisions of the object's surface with air molecules. The actual amount of air resistance encountered by the object is dependent upon a variety of factors. To keep the topic simple, it can be said that one of the common factors that has a direct effect upon the amount of air resistance is the surface area of the object (how big it is). Increased surface area (size) result in an increased amount of air resistance, causing the object to fall slower.

Hypothesis: "If the length of a paper helicopters blades is increased, then the time it remains in the air will increase."

Observations/Quantitative Data:

<table>
<thead>
<tr>
<th>Length</th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Trial 3</th>
<th>Trial 4</th>
<th>Trial 5</th>
<th>Mean</th>
<th>Comparisons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short</td>
<td>1.1 sec</td>
<td>0.8 sec</td>
<td>1.0 sec</td>
<td>1.1 sec</td>
<td>1.3 sec</td>
<td>1.06 sec</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>2.4 sec</td>
<td>2.2 sec</td>
<td>2.2 sec</td>
<td>2.0 sec</td>
<td>1.9 sec</td>
<td>2.14 sec</td>
<td></td>
</tr>
<tr>
<td>Long</td>
<td>3.4 sec</td>
<td>4.0 sec</td>
<td>3.4 sec</td>
<td>3.3 sec</td>
<td>3.6 sec</td>
<td>3.54 sec</td>
<td></td>
</tr>
</tbody>
</table>

4. Claim: Increasing the length of the helicopter blades increases the amount of time the helicopter floats in the air.

\[
\frac{3.54}{2.14} = 1.64 \quad \text{sec} \\
\frac{3.54}{1.06} = 2.48 \quad \text{sec}
\]
5. Evidence: The short (length) helicopter's blade average float time was 1.06 sec in the air; medium blade average float time was 2.14 sec in the air; long blade average float time was 3.54 seconds. The longer blades floated, on average, 2.48 sec longer than the short blades and 1.4 sec longer than the medium blades.

OPTIONAL BONUS POINT(s) Opportunity:

6. Reasoning: It makes sense that the helicopter with long blades stayed in the air the longest because "increased surface area result in increased air resistance causing object (like a helicopter) to fall slower." Our evidence supports the claim that increasing the helicopter blades size also increased the time the helicopter remains in the air.

Success Criteria - Can you identify each of the following in your explanation above? Put a checkmark in the first column to show that you've completed each part of the explanation. Your teacher will write your score for that section in the last column.

<table>
<thead>
<tr>
<th>✓</th>
<th>Student ONLY!</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓</td>
<td>Does the <strong>Claim</strong> answer the question?</td>
</tr>
<tr>
<td>✓</td>
<td>Does your <strong>Evidence</strong> support your claim?</td>
</tr>
<tr>
<td>✓</td>
<td>Does your <strong>Evidence</strong> include numbers/words from the data table?</td>
</tr>
<tr>
<td>✓</td>
<td>Does your <strong>Evidence</strong> include a comparison? (Compares at least two data points to one another.)</td>
</tr>
<tr>
<td>✓</td>
<td>OPTIONAL BONUS SECTION Does your <strong>Reasoning</strong> include scientific concepts or principles from the introduction?</td>
</tr>
</tbody>
</table>

Teacher ONLY writes in this column.

| ✓ | 1 point |
| ✓ | 1 point |
| ✓ | 1 point |
| ✓ | 1 point |

Bonus

/3 points