

**Science Practice 1****Concept Explanation 1**

Explain biological concepts and processes presented in written format.

Science Practice 2**Visual Representations 2**

Analyze visual representations of biological concepts and processes.

Science Practice 3**Questions and Methods 3**

Determine scientific questions and methods.

SKILLS

1.A Describe biological concepts and processes.

1.B Explain biological concepts and processes.

1.C Explain biological concepts and processes in applied contexts.

2.A Describe characteristics of visual representations of biological concepts and processes.

2.B Explain relationships between characteristics of biological models in both theoretical and applied contexts.

2.C Explain how biological models relate to larger principles, concepts, processes, systems, or theories.

2.D Represent relationships within biological models, including mathematical models, diagrams, flowcharts, and systems.

3.A Identify or pose a testable question based on an observation, data, or a model.

3.B State the null hypothesis or predict the results of an experiment.

3.C Identify experimental procedures that align with the question, including:

- i. identifying dependent and independent variables
- ii. identifying appropriate controls
- iii. justifying appropriate controls

3.D Propose a new investigation based on an evaluation of the experimental design or evidence.



Science Practice 4

Representing and Describing Data 4

Represent and describe data.

Science Practice 5

Statistical Tests and Data Analysis 5

Perform statistical tests and mathematical calculations to analyze and interpret data.

Science Practice 6

Argumentation 6

Develop and justify scientific arguments using evidence.

SKILLS

4.A Construct a graph to represent the data, including: x-y graphs (bar, histogram, line, log scale, dual y), scatter plot, box and whisker plot, and pie chart. The graph should include the following components:

- type of graph appropriate for the data
- axis labeling, including appropriate units and legend
- scaling
- accurately plotted data (including error bars when appropriate)
- trend line (when appropriate)

4.B Describe data from a table or graph, including:

- identifying specific data points
- describing trends and patterns in the data
- describing relationships between variables

5.A Perform mathematical calculations, including:

- mathematical equations in the curriculum
- means
- rates
- ratios
- percentages and percent changes

5.B Use confidence intervals and error bars to estimate whether sample means are statistically different.

5.C Perform chi-square hypothesis testing.

5.D Use data to evaluate a hypothesis or prediction, including rejecting or failing to reject the null hypothesis.

6.A Make a scientific claim.

6.B Support a claim with evidence from biological principles, concepts, processes, and data.

6.C Provide reasoning to justify a claim by connecting evidence to biological theories.

6.D Explain the relationship between experimental results and larger biological concepts, processes, or theories.

6.E Predict the causes or effects of a change in, or disruption to, one or more components in a biological system.