

# FRANKLIN-SIMPSON HIGH SCHOOL

Course Name: Biology Unit Name: Introduction to experimental design

## Quality Core Objectives:

Unit 2: Introduction to experimental Design	
A.1. Scientific Inquiry	a. Identify and clarify scientific research questions and design experiments
	b. Manipulate variables in experiments using appropriate procedures (e.g., controls, multiple trials)
	c. Collect, organize, and analyze data accurately and precisely (e.g., using scientific techniques and mathematics in experiments)
	d. Interpret results and draw conclusions, revising hypotheses as necessary and/or formulating additional questions or explanations
	e. Write and speak effectively to present and explain scientific results, using appropriate terminology and graphics
	f. Safely use laboratory equipment and techniques when conducting scientific investigations
A.3. Science in Practice	a. Describe the fundamental assumptions of science
	c. Recognize and apply criteria that scientists use to evaluate the validity of scientific claims and theories
A.4. Foundations	c. Design and conduct investigations appropriately using essential processes of scientific inquiry

## Purpose of the Unit:

This unit is designed to teach the fundamentals of designing and analyzing experiments. It also teaches students the basics of reporting information in a scientific format.

## Prerequisites:

Nature of science

## Daily Lesson Guide

Day	Lesson Content and Daily Focus Questions	Tasks/Procedures		Engagement	Assessment and/or Accommodations
		Knowledge or Comprehension Activities	Critical Thinking (High Yield / Literacy /LTF/etc.)		
1	<p>How can biological science be used to solve a real world problem?</p> <p>A.1.a; A.4.c</p> <p>I – ACT bell ringer (5 min)            II – Cheese making reading (25 min)            III – Lab Experimental Practice (25 min)</p>	<p>1. Experimental practice</p>	<p>2. Note taking</p>	<p>1. Cheesemaking reading &amp; eating (novelty and variety)</p>	<p>II – Clicker reading quiz</p>
2	<p>How can biological science be used to solve a real world problem?</p> <p>A.1.a; A.1.f; A.4.c</p> <p>I – Safety Review (5 min)            II – Procedure Review (5 min)            III – Cheese making Quiz (5 min)            IV – Cheese making lab (35min)</p>	<p>1. Safety Review and Quiz            2. Observation and data collection during lab</p>	<p>1. Inferences and questioning during lab            2. Journal Entry</p>	<p>1. Cheese making (Novelty and variety, Working with others)</p>	<p>I &amp; II – Cheese making quiz</p>

	V – Journal: “What was right and what wrong about today’s lab?”				
3	<p>How can biological science be used to solve a real world problem?</p> <p>A.1.a; A.1.d; A.1.f; A.4.c</p> <p>I – Data table set up &amp; lab next steps (10 min)  II – Cheese making part II ( 20 min)  III – Marker board Graphs (20 min)  IV – Conclusion Statement</p>	<ol style="list-style-type: none"> <li>Following lab procedure</li> <li>Observation and data collection during lab</li> </ol>	<ol style="list-style-type: none"> <li>Inferences and questioning during lab</li> <li>Graph construction</li> <li>Conclusion Statement Writing</li> </ol>	<ol style="list-style-type: none"> <li>Cheese making (Novelty and variety, Working with others)</li> </ol>	<p>III – Marker board graph observation  IV – Index card assessment on conclusion statement</p>
4	<p>How do scientists analyze data?  How do scientists share results?</p> <p>A.1.d; A.3.c; A.4.</p> <p>I – ACT Bell ringer (5 min)  II – Graph Skills 1 &amp; 6 (15 min)  III – Graph Skills Quiz (5 min)  IV –Group Data Graphs &amp; Posters (15 min)  V – Gallery Walk w/ post-it-notes ( 15 min)</p>	<ol style="list-style-type: none"> <li>Graph Skills 1 &amp; 6 WS</li> <li>Creation of group data graph</li> </ol>	<ol style="list-style-type: none"> <li>Graph analysis</li> <li>Gallery walk commentary</li> </ol>	<ol style="list-style-type: none"> <li>Gallery Walk &amp; graph making (Working with others)</li> </ol>	<p>II – Graph skills quiz  V – Observation of post-it notes</p>

5	<p>What are the major parts of a controlled experiment?</p> <p>A.1.a; A.1.b; A.4.c</p> <p>I – ACT Bell ringer (5 min)  II – Journal: “What did we need to do to make our experiment better? What makes a good experiment?” (5min)  III –Simpson do science w/ text book help(40 min)  IV – Variables Quiz (5 min)</p>	<p>1. Variables Quiz  2. Simpsons do science</p>	<p>1. Simpsons do science</p>	<p>1. Journaling (Personal Response)  2. Simpsons do science (Working with others, Novelty and Variety)</p>	<p>1. Variables quiz</p>
6	<p>What are the major parts of a controlled experiment?</p> <p>A.1.a; A.1.b; A.1.d; A.1.f; A.4.c</p> <p>I – ACT bell ringer (5 min)  II – Experimental Set-up Reading w/ note taking organizer (45 min)  III – List of things wrong with our first experiment (5 min)</p>	<p>1. List of things wrong with last experiment</p>	<p>1. Note taking organizer</p>	<p>1. Note taking (working with others)</p>	<p>1. List of things wrong with our first experiment</p>
7	<p>How can we design a controlled experiment?</p> <p>A.1.a; A.1.b; A.1.d; A.1.f; A.4.c</p>		<p>1. Experiment &amp; Procedure Design</p>	<p>1. Experiment &amp; Procedure Design (working with others)</p>	<p>1. Turn in of design progress</p>

	<p>I – ACT Bell ringer (5 min)  II – Silent Experimental Design Brainstorming (5 min)  III – Experiment &amp; Procedure Design (45 min)</p>				
8	<p>How can we design a controlled experiment?</p> <p>A.1.a; A.1.b; A.1.c; A.1.d;  A.1.e A.1.f; A.4.c</p> <p>I – ACT Bell ringer (5 min)  II – Peer review of experimental design (20 min)  III – Finish Experimental design, procedure, and materials list. (30 min)</p>		<p>1. Peer review  2. Experiment &amp; Procedure Design</p>	<p>1. Peer Review (working with others)  2. Experiment &amp; Procedure Design (working with others)</p>	<p>1. Final Experimental Design Due</p>
9	<p>How can I conduct a proper scientific investigation?</p> <p>A.1.a; A.1.b; A.1.c; A.1.d;  A.1.e A.1.f; A.4.c</p> <p>I – ACT Bell ringer (5 min)  II – Repeat Experiment part 1 (30 min)  III – Research Paper format (20 min)</p>	<p>1. Experiment</p>	<p>1. Experiment</p>	<p>1. Experiment (working with others, novelty &amp; variety)</p>	<p>1. Lab note books</p>

10	<p>How can I conduct a proper scientific investigation?</p> <p>A.1.a; A.1.b;A.1.c; A.1.d; A.1.e; A.1.f; A.4.c</p> <p>I – ACT Bell ringer (5 min) II – Repeat Experiment part 2 (30 min) III – Quiz on lab report format (5 min) IV – Research Paper work (15 min)</p>	1. Experiment	<p>1. Experiment 2. Lab report work</p>	1. Experiment (working with others, novelty & variety)	1. Lab notebooks
11	<p>How can I properly present the results of a scientific investigation?</p> <p>A.1.d; A.1.e</p> <p>I – ACT Bell ringer(5 min) II – Practice Test/Review (30 min) III – Lab report work (20 min)</p>	1. Test Practice	<p>1. Test practice 2. Lab report</p>	1. Lab report (working with others, Personal Response)	1. Practice Test/review
12	TEST DAY				