

Course Title: Agricultural Biotechnology 2			
Course Number: 8106850			
NGSSS Benchmark	Content Focus	Number of Questions	Suggested Cognitive Complexity (per CPALMS)
<i>Reporting Category 1: Historical, Social, Cultural, Potential Applications of Biotechnology</i>			
13.01 SS.A.3.6	Define biotechnology and explore the historical impact on agriculture	2	2 Level 1
13.04 SS.A.3.6	Describe the role of agencies that regulate biotechnology	1	1 Level 1
13.08 SC.912.L.16.10	Investigate the emergence and evolution of biological organisms and their use in biotechnology.	3	2 Level 1
13.05 SC.912.L.17.16	Interpret the major regulatory issues related to Biotechnology.	1	1 Level 1
<i>Reporting Category Total</i>		7	
<i>Reporting Category 2: Classification, Heredity, and Evolution</i>			
13.08 SC.912.L.15.1	Evaluating scientific claims – evolution; evidence for evolution---comparative embryology; evidence for evolution---molecular biology	1	1 Level 2
14.01 SC.912.N.3.1	Discuss the difference between scientific laws and scientific theories	1	1 Level 2
14.02, 14.04 SC.912.N.1.1	Design an agricultural experiment using appropriate control measures	3	2 Level 2 1 Level 3
14.01 SC.912.N.3.	Discuss the difference between scientific laws and scientific theories.	1	1 Level 1
16.01 ---16.04 SC.912.L.16.2	Describe how genetic processes and structures control inheritance.	2	2 Level 2 2 Level 3
16.05 SC.912.L.16.	Differentiate between dominant and recessive traits	1	1 Level 2
16.06 SC.912.L. 16.3	Describe the chemical and physical properties of DNA.	2	1 Level 1 1 Level 2
16.01 SC.912.L.16.7	Describe the relationship between reproduction and genetic improvement.	1	1 Level 2
16.09 SC.912.L.16.5	Analyze factors that influence gene expression	1	1 Level 2
17.11 SC.912.16.12	Describe how antibodies are formed and how they can be used in biotechnology to detect microbes	2	2 Level 2
17.12 SC.912.L.17.15	Research and describe the use of biotechnology to detect microbes.	2	2 Level 2
18.03, 18.12 SC.912.L.18.6	Describe the role of fermentation in biotechnology applications.	2	2 Level 2
18.04 SC.912.L.17.15	Describe the process used to produce transgenic organisms	2	2 Level 3
18.05 SC.912.L.18.11	Describe enzymes, the changes they cause in foods and the physical and chemical parameters that affect enzymatic reactions.	3	3 Level 2
18.10 SC.912.18.3	Explain the functions of hormones in animals	1	1 Level 1
18.14, 18.16 SC.912.L.18.6	Explain biomass and sources of biomass. Describe the process used in producing alcohol from biomass.	1	1 Level 1 1 Level 2
18.19	Describe the selective breeding process.	1	1 Level 2

SC.912.L.16.1			
<i>Reporting Category Total</i>		25	
Reporting Category 3:			
15.01 – 15.06 MAFS.912.S-IC.2;	Demonstrate appropriate safety procedures and guidelines, and discuss implications of safety violations.	3	1 Level 1 2 Level 2
<i>Reporting Category Total</i>		3	

Overall Percentage for Written Test: 50%

Overall Percentage for Performance Tasks: 50%

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Overall Percentage for Performance Tasks: 50%

Performance Task #1	Perform and record a protocol and procedure for cloning plants using tissue culture.
Weighting Percent for this Task	50%
Standard	14.02: Design an agricultural experiment using appropriate control measures. SC.912.N.1.1 14.04: Using the scientific method summarizes data, draw conclusions, and plan follow-up experiments. SC.912.N.1.2 16.09: Perform DNA manipulations, such as cloning/sub cloning, blotting, sequencing and amplification. SC.912L. 16.12 17.02: Operate laboratory equipment and measurement devices.
Exemplar (If applicable)	
Additional Information	Students will design, write up lab procedures, perform cloning of plant material, demonstrate sterile technique, and write up a protocol for transformation using agrobacterium.
Suggested Assessment Team	Classroom Teacher

Rubric:

Lab Report Evaluation Rubric

Category	4 points	3 points	2 points	1 point
Problem	The purpose of the lab or the question to be answered during the lab is clearly identified and stated concisely.	The purpose of the lab or the question to be answered during the lab is identified, but is stated in a somewhat	The purpose of the lab or the question to be answered during the lab is partially identified, and is	The purpose of the lab or the question to be answered during the lab is erroneous or irrelevant.
Prediction/Hypothesis	Hypothesized relationship between the variables and the predicted results is clear and reasonable based on what has	Hypothesized relationship between the variables and the predicted results is reasonable based	Hypothesized relationship between the variables and the predicted results has been stated, but appears to be based	No hypothesis or predictions have been stated.

Materials	All materials and setup used in the experiment are clearly and accurately described.	One or two materials are not listed or described. The setup used in the experiment is clearly	Only one or two of the materials and the setup used in the experiment are accurately described.	Many materials are described inaccurately OR are not described at all. The setup used is
Procedures	<ul style="list-style-type: none"> Procedures are listed in clear steps. Each step is numbered. Procedures are detailed enough for someone to repeat exactly what was tested. 	<ul style="list-style-type: none"> Procedures are listed in a logical order, but steps are not numbered. Procedures are detailed enough for someone to repeat what was tested. Design gives enough of the right 	<ul style="list-style-type: none"> Procedures are listed but are not in a logical order or are difficult to follow. Design is practical and gives enough of the right kind of data to answer the question or test the hypothesis. 	<ul style="list-style-type: none"> Procedures do not accurately list the steps of the experiment. Design collects some data, but not enough of the right kind to answer the question or test the hypothesis.

Data	<ul style="list-style-type: none"> Observations and measurements are recorded carefully, correctly, and note anything unusual (e.g., data that is suspected to be in error). Data is transformed in ways that clarifies results and highlights patterns and relationships. Visual displays are organized, logical, 	<ul style="list-style-type: none"> Observations and measurements are recorded and note anything unusual (e.g., data that is suspected to be in error). Data is transformed in ways that demonstrates results, patterns, and relationships. Visual displays are organized and 	<ul style="list-style-type: none"> Observations and measurements are recorded. Data is transformed into displays (i.e. graphs, tables) that demonstrate the results and help analyze them. Organized display (e.g., a data table) for observations or 	<ul style="list-style-type: none"> Allowed some error in data (e.g., use equipment incorrectly, be careless, fail to control important variable). Data is transformed into displays that are somewhat appropriate and complete but do not help make interpretations. Somewhat unorganized,
Analysis of Results	Accurately and descriptively reports results and correctly discuss and relationships.	Reports results and uses scientific explain relationships.	Vaguely reports results and uses elementary scientific explain relationships.	Uses scientific knowledge incorrectly in explanations or using any scientific knowledge.
Conclusions	<ul style="list-style-type: none"> Critiques the design, procedures, and results; identifies important limitations and sources of error. Relates conclusions to the question or hypothesis and 	<ul style="list-style-type: none"> Reviews the design, procedures, and results; identifies limitations and sources of error. Relates conclusions to the question or hypothesis and 	<ul style="list-style-type: none"> Minimal review of the design, procedures, and results; identifies some limitations and sources of error. Relates conclusions to the question or 	<ul style="list-style-type: none"> Reviews the investigation but deals with errors and limitations in a trivial or illogical manner. States conclusions that are not clearly related to the
Grammar and Spelling	<ul style="list-style-type: none"> No spelling or grammar mistakes. Complete sentences are used where 	<ul style="list-style-type: none"> Three to five spelling or grammar mistakes. Complete 	<ul style="list-style-type: none"> Six to ten spelling or grammar mistakes. Use of incomplete 	<ul style="list-style-type: none"> More than ten spelling or grammar errors. Use of incomplete