AP Biology 12 – **Investigation 4 – Diffusion and Osmosis** Assessed by: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***Assessment Criteria:*** *Please highlight evidence according to the performance standards below*

***THIS DOCUMENT IS DOUBLE SIDED***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***Overall*** | **Beginning** | **Developing** | **Accomplished** | **Exemplary** |
| **Experimental Design***Potato Lab* | * Introduction is missing
* Hypothesis is missing
* Most variables are missing and/or incorrectly identified
* There is no attempt at including appropriate controls and/or repetition
 | * Introduction is present but lacks depth and citations
* Hypothesis is stated but not appropriate
* Almost all variables identified correctly (dependent, independent, constants)
* There is an attempt at including appropriate controls and/or repetition, but they are incorrect
 | * Introduction provides some background for the research lacks citations
* Hypotheses is stated (if, then) but incomplete (no because)
* All variables identified correctly (dependent, independent, constants), but lacking in clarity
* Controls and repetition are included but and are almost appropriate to the experiment
 | * Detailed Introduction providing background for the research with citations
* Hypotheses is stated (if, then, because)
* All variables clearly and correctly identified (dependent, independent, constants)
* Appropriate controls and repetition correctly described
 |
| **Data Collection***potato lab**dialysis* | * Table (missing/incorrect titles and/or units)
* Data is not in pen or is missing
* Diagrams are in pen, not clear and are sketches
* no observation notes
 | * Table (missing/incorrect titles and/or units)
* Pen, raw data
* Diagrams are in pen, are clear but are sketches
* Incomplete observation notes
 | * Table (missing/incorrect titles and/or units)
* Pen, raw data
* Diagrams are in pen but are clear with hard lines
* observation notes
 | * Table (proper titles with units)
* Pen, raw data
* Diagrams are in pencil and are clear with hard lines
* Thorough observation notes
 |
| **Graphs** *Dialysis Bag (individual) Potato Core (class)* | * Title is missing or incorrect
* X and Y axis are not properly placed (independent and dependant variables are switched)
* Data points are not plotted correctly
* Choice of bar graph and/or best fir line/curve is not appropriate for the data
* Graph is not neat or clear and/or space is not used effectively
 | * Title incorporates “Y vs X” but is missing units and/or other relevant information
	+ Has independent variable labelled but is missing units
* Data points are ***somewhat*** correctly plotted with dot and circle
* Appropriate bar or best-fit line/curve graph type is chosen, however, best fit line/curve ***does not*** accurately depict the data plots (watch out for inappropriately including a “zero”)
* ***Somewhat*** neat and clear with ruler used; space is somewhat used effectively
 | * Title incorporates “Y vs X” and units but is missing other relevant information
	+ Labelled with units
	+ interval scale is not uniform
* Data points ***mostly*** correctly plotted with dot and circle, clearly marked with **standard error bars** and legend if appropriate
* Appropriate bar or best-fit line/curve graph type is chosen, however, line/curve ***almost*** accurately depicts the data plots (watch out for inappropriately including a “zero”)
* ***Mostly*** neat and clear with ruler used; space is mostly used effectively
 | * Complete, clear, informative title that incorporates “Y vs X” and units
* X axis (Independent variable) and Y axis (Dependent variable)
	+ Labelled with units
	+ Uniform interval scale
* Data points ***correctly*** plotted with dot and circle, clearly marked with **standard error bars** and legend if appropriate
* Appropriate graph type is chosen and completed correctly (bar, line, curve, best fit)
* Neat and clear with ruler used; space used effectively
 |
| **Data Analysis***cell size - SA:Vol,* *Potato % change mass, SEM sample calculation* | * Calculations are not correct and no rough work
* Unit are not correct
 | * Calculations are somewhat correct and rough work is partially shown
* Unit are not correct
 | * Calculations are completely correct but not all rough work shown
* Unit are correct
 | * Calculations are completely correct with a rough work shown
* Unit are correct
 |
| **Discussion** *Potato S60 1-3,* *Dialysis Step 4 S57,* *3 questions from class* | * Answers are incomplete, inaccurately and hard to follow
 | * Answers some questions, accurately, clearly and thoroughly
 | * Answers most questions, accurately, clearly and thoroughly
 | * Answers all questions, accurately, clearly and thoroughly
 |
| **Conclusion***Overall: including cell size activity, observing osmosis in onion cells, dialysis bag experiment and potato core water potential investigation*  | * Hypothesis and/or results not referred to

* No sources of error
* Does not discuss relevance
 | * Refers to purpose, summarizes results without insight

* Sources of error not relevant
* Relevance inappropriate
 | * Answers purpose by summarizing results
* States 1-2 relevant sources of error
* Reveals relevance of results
 | * Answers purpose by comparing key results to objectives and predictions/hypothesis (supported/not supported/rejected)
* States 2 or more insightful sources of error and suggests improvements
* Connects to big picture (relevance)
* Asks new questions and suggests new experiments for the future
 |
| **Works Cited** | * Citations are not properly used in APA formatting
* Citations do not support the text in an appropriate way
* Works cited is not correctly formatted and in APA formatting
* Citations are missing altogether
 | * Some citations are properly used in APA formatting
* Some citations support the text in an appropriate way
* Works cited is not correctly formatted and in APA formatting
* Less than 2 different sources have been used
 | * Most citations are properly used in APA formatting
* Most citations support the text in an appropriate way
* Works cited is not correctly formatted and in APA formatting
* Less than 3 different sources have been used
 | * Citations are properly used in APA formatting
* Citations support the text in an appropriate way
* Works cited is correctly formatted and in APA formatting
* At least 3 different sources have been used
 |