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 |