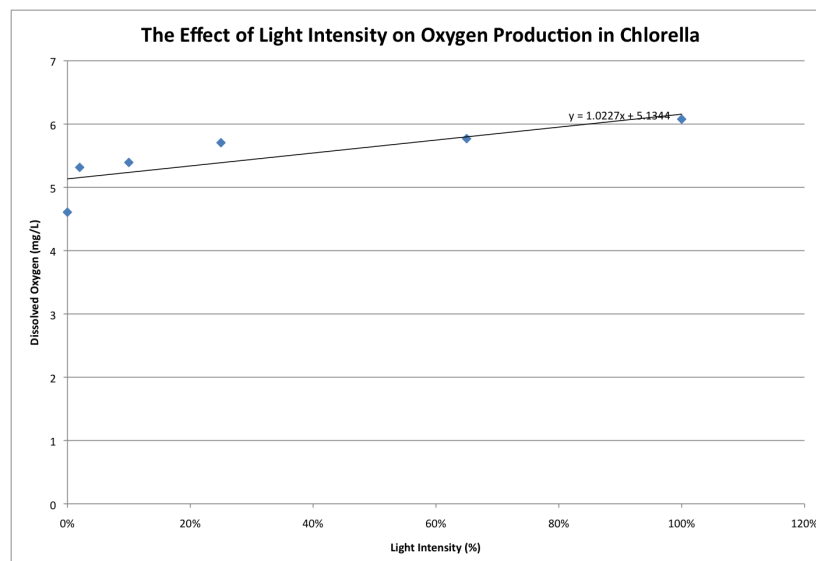Hypothesis:

As the intensity of light diminished from 100% to 0%, it was expected that the productivity of the algae, measured in mg O_2/L, will decrease as well. This was assumed, as light provides the energy needed for photosynthesis to create oxygen and store energy in glucose, so steady reductions in the amount of light would likely yield corresponding reductions in oxygen, a marker of productivity.

Analysis:

Initial O_2 level: 5.3 mg/L

Amount of light	Average O_2 content (mg/L) from class results	GPP (mg O_2/L) from class results	NPP (mg O_2/L) from class results	GPP (mg C/L) from class results	NPP (mg C/L) from class results
100%	6.1	1.5	0.8	0.56	0.30
65%	5.8	1.2	0.5	0.45	0.19
25%	5.7	1.1	0.4	0.41	0.15
10%	5.4	0.8	0.1	0.30	0.04
2%	5.3	0.7	0.0	0.26	0.00
0% (Dark)	4.6	0	-0.7	0.00	-0.26

The Effect of Light Intensity on Oxygen Production in Chlorella

$y = 1.0227x + 5.1344$

The hypothesis that the productivity of the algae will decrease in response to a reduction in light intensity was supported by the data. Once the percent change in O_2 content was calculated, an uneven reduction in O_2 was noticed. For example, as the amount of light dropped from 100% to 65%,

a 35% reduction in light, the amount of O_2 present in the water reduced by 0.3 mg/L, a 5.1 percent drop. However, when the amount of light was reduced from 65% to 25%, 40% less light, O_2 content dropped by only 1.1%. Despite these varied results, the data still seem to confirm the hypothesis as a reduction in the amount of light corresponded with a reduction in O_2 content in the water. As the amount of light was reduced, a corresponding reduction in O_2 production was observed. The decrease in the concentration of oxygen from 6.1 to 5.8 (a 5 percent reduction) when the light decreases from 100% to 65% supports this conclusion, as does the 1.1% drop in O2 levels that resulted from the decrease in light from 65% to 25%. It was expected that the percent drop in O_2 levels would more closely match the percent reduction in light, but the results did not bear this out. This outcome is entirely plausible, as a reduction in the amount of light reduces how much photosynthesis occurs in the algae, which would, in turn, reduce the amount of O_2 released into the water as a byproduct of the production of glucose. Cellular respiration uses some oxygen, and can be measured by testing the dissolved oxygen in the dark bottle, which was entirely protected from light. This works because blocking all light should effectively stop photosynthesis, thereby stopping the production of O_2 and glucose. The algae in the dark bottle only carried out cellular respiration - using the biomass (glucose) and oxgyen that it had accumulated from photosynthesis previously. As a result, the net primary productivity is always lower than the gross primary productivity.

Analysis Checklist (4 Skill Points)   **SCORE: _____**

Criteria	Mastery	Proficient	Satisfactory	Needs Improvement
Identifies whether or not hypothesis is supported by data.	Specifically states if and to what degree the hypothesis is supported by the data, accounting for complexities and anomalies in the data.	(NONE)	States whether or not the hypothesis is generally supported by the data but does not discuss complexities – ex. data that does not fit trend.	Does not clearly state whether or not the hypothesis is supported by the data.
Analyzes data in order to draw and support conclusions	Correctly and clearly states a conclusion/relationship between variables that is supported by multiple pieces of clear, specific evidence.	Correctly states a conclusion/ relationship between variables that is supported by a piece of clear, convincing evidence.	Correctly states a conclusion/relationship between variables that is vague, supported by vague evidence, or only refers to the general trend in data/graph OR states an incorrect claim with evidence as support.	States a conclusion/ relationship between variables with little to no evidence.
Supplies one possible explanation for the data.	Supplies one plausible explanation that is thoroughly explained using scientific concepts from class and logical reasoning.	Supplies one plausible explanation that is explained using scientific concepts and logical reasoning.	Supplies one plausible explanation that is explained using logical reasoning.	Supplies an explanation that, while possible, is very implausible and possibly illogical.