GRADE 11 SCIENCE CHEMISTRY: Vitruvian Factor

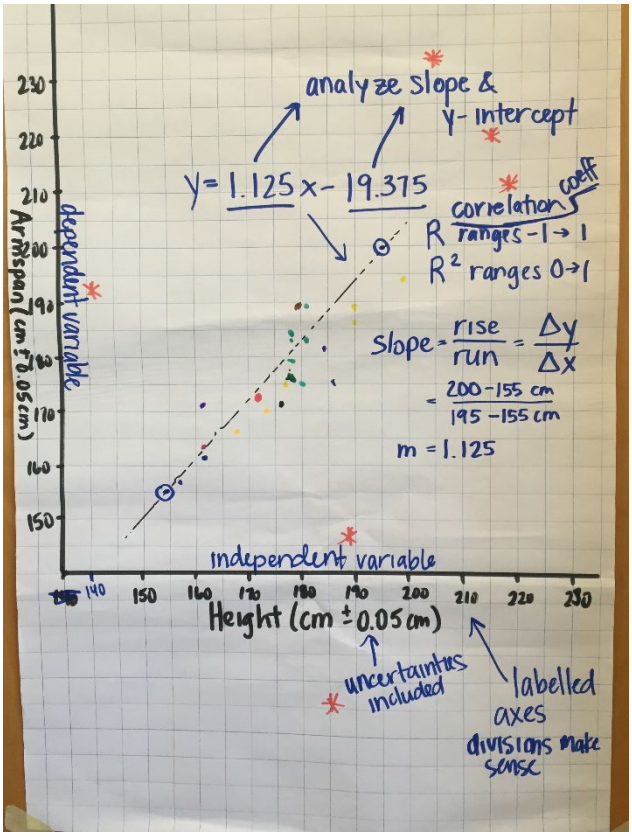
Summary of Learning Opportunity

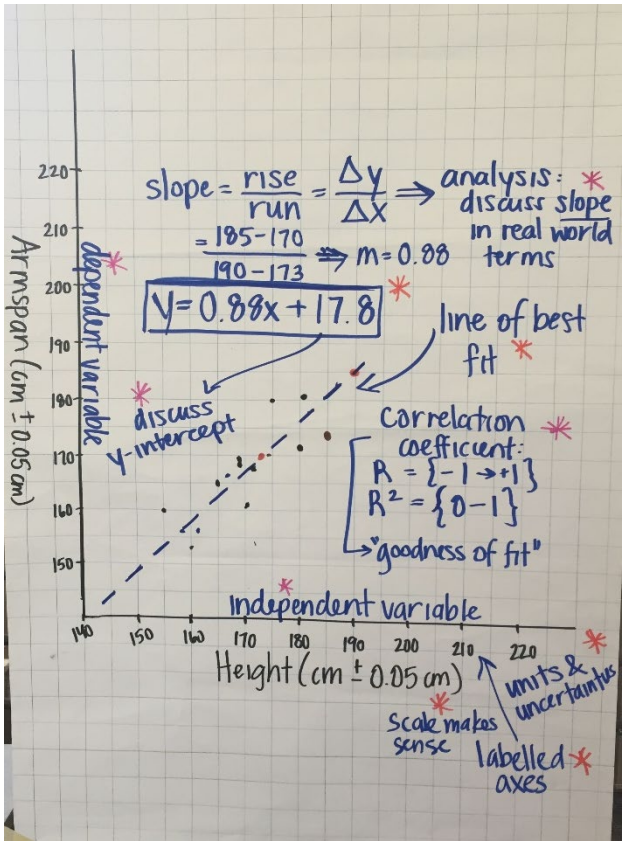
I wanted my students to be able to transfer and use their learning about scatter plots in math class to Chemistry 11 and to learn the vocabulary needed to be able to interpret and communicate about data that we would collect in subsequent labs throughout the course. I introduced this activity by mentioning Da Vinci's Vitruvian Man: a perfectly proportional person's arm span would equal their height. Students helped each other to measure these factors and add their data point to the class graph. We interpreted and discussed our scatterplot and points which students might write about when analyzing data in a lab report.

Chemistry 11	**Learning Standards**	• Seek and analyze patterns, trends and connections in data, including describing relationships between variables, performing calculations and identifying inconsistencies • Construct, analyze, and interpret graphs, models and/or diagrams

Numeracy Connections	Instruction and Assessment	Competencies Developed, Practiced, and/or Assessed
	1. Students used measuring tapes to measure a classmate's arm span and height. Each student plotted their own data point on the class chart paper. I pre-labelled the axes and axis titles of the graph. We discussed how the data could help us support whether the class had a perfect Vitruvian factor of 1.	Construct, analyze and interpret graphs, models and/or diagrams
NUMERACY: Solves—Solves the mathematical problem	2. In a class discussion, we reviewed: • Calculating the slope and equation of the line using data points • Visually estimating a line of best fit • Labelling the axes of the graph I introduced: • The reasoning behind plotting the independent variable on the x axis and dependent on the y • What a correlation coefficient is • Using software to create and label graphs	Seek and analyze patterns, trends and connections in data, including describing relationships between variables, performing calculations and identifying inconsistencies
NUMERACY: Analyzes—Reflects on the reasonableness of the solution in context NUMERACY: Communicates—Represents processes and solution	3. Together we interpreted the graph and outlined points to discuss in an evaluation section of a lab report. We: • Interpreted the slope with respect to the Vitruvian factor. High arm span to height ratio ($m > 1$) would have a high Vitruvian factor, and vice versa. • Discussed and evaluated possible reasoning for a non-zero y-intercept • Discussed how to interpret the correlation coefficient and possible discussion points (validity and reliability of data) when writing a lab report	Seek and analyze patterns, trends and connections in data, including describing relationships between variables, performing calculations and identifying inconsistencies

Demonstration of Student Learning, Teacher Assessment and Reflection





Teacher's Reflections

Using the numeracy skills helped me to break down the thinking strategies that my students would need to develop and practice, in order to become proficient at the curricular competencies of creating graphs in order to interpret data. When students make graphs or do calculations to process data in science, they need to do so with a purpose—understanding and interpreting the data with respect to the context of the situation, or to answer the inquiry question.

Even though I did not assess students for marks, I feel this was an important learning opportunity, and referred back to it throughout the course. This activity helped me to see how developing and practicing critical thinking skills in science helps students develop thinking skills overall.

Students had a lot of fun with this activity because they got to use themselves as data and compare their graph to the other class. We were able to create posters which I kept in the classroom and put on our class website for students to refer to as a checklist when writing lab reports. In lab reports later on in the term, more students had in-depth evaluations, and referred to the slope and R^2 values when justifying their reasoning. More students were proficient at the curricular competencies because we had done this foundational activity.