

DEFINITION D **QUANTITATIVE ANALYSIS**

NOTE: This definition assumes the student is already proficient with the concepts and procedures described in the Washington State Grade Level Expectations for Science through Grades 9/10.

The student uses appropriate mathematical concepts and procedures in scientific investigations.

| COMPONENT | EVIDENCE of LEARNING |
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| <p>D.1 Apply concepts and procedures from algebra to analyze data. [see TMP Standard 7]</p> | <ul style="list-style-type: none"> • Know when it is possible to simplify, solve, substitute in or evaluate equations and expressions and when it is not. For example, expand the expression $(x-1)(x+4)$; substitute $a = 2$, $b = 4$ into the formula $a^2 + b^2 = c^2$; solve the equation $0 = (x+3)(x+1)$; and evaluate the function $f(x) = (x+1)(x+4)$ at $x = -1$. • Know ways that variables can be represented in mathematical functions (e.g., as a placeholder for an unknown, such as $x + 2 = 9$, or to represent a range of values, such as $-3m - 8$). • Understand polynomial, logarithmic, exponential and trigonometric functions. |
| <p>D.2 Apply concepts and procedures from analytic geometry to analyze data.</p> | <ul style="list-style-type: none"> • Understand vectors and how they can be used to represent force, velocity, and other physical measurements. • Use vector analysis, vector addition and scalar multiplication to solve problems. • Understand that a curve drawn in a certain location is fully equivalent to a set of algebraic equations. |
| <p>D.3 Use mathematical knowledge and logical reasoning to define and solve problems. [See TMP, Standard 1].</p> | <ul style="list-style-type: none"> • Create a variety of models to represent functions, patterns and mathematical relationships (e.g., statements, formulas, and graphs). • Use various strategies to approach problem-solving situations and to revise solution processes. |
| <p>D.4 Use symbols, diagrams and graphs to clearly communicate mathematical ideas, reasoning and their implications. (see TMP 2.2)</p> | <ul style="list-style-type: none"> • Use appropriate/applicable method to represent data (e.g. charts, tables, plots and graphs). • Interpolate or extrapolate data points on a graph. |
| <p>D.5 Accurately apply concepts and procedures from measuring, estimating, probability and statistics to analyze data. [see TMP, Standard 6]</p> | <ul style="list-style-type: none"> • Select and use appropriate units to express measurements. • Understand the differences between the metric and the traditional U.S. measurement system and be able to convert between the two systems. • Use scientific notation appropriately. • Understand and be able to use descriptive statistics (e.g., mean, median, mode and standard deviation). • Know the difference between accuracy and precision, as well as how to use significant digits appropriately. • Know how to estimate and when to use estimation to solve problems. • Consider the possible sources of measurement errors and their effects on calculations. • Check to be sure that quantities are reasonable and plausible. |
| <p>D.6 Accurately apply concepts and procedures from proportional reasoning to analyze data.</p> | <ul style="list-style-type: none"> • Use proportional reasoning to solve problems (e.g., equivalent fractions, equal ratios, constant rate of change, proportions and percents). • Understand ratios, proportions and percents and how each is related to the other. • Determine how changing the value of one variable affects the value of a second variable in an equation (direct or inverse proportionality). |