Specific Elements of the Competency *(in italics)* Standard of Performance: The student must be able to:

To represent various situations, drawing upon relevant concepts, laws and principles.
To solve problems using a method proper to science.
To apply techniques of experimentation or validation specific to science.

1. DESCRIPTIVE STATISTICS
1.1 organize and group data, construct a frequency table, find relative and cumulative frequency.
1.2 present data graphically in a pie chart, stem and leaf diagram, bar graph or histogram.
1.3 find mean, median and mode of given data.
1.4 calculate and interpret variance and standard deviation.
1.5 calculate and interpret quartiles, centiles, z-scores.

2. PROBABILITY
2.1 explain the meaning of: outcome; equally likely outcomes; event; sample space.
2.2 calculate probabilities and be able to explain the basic properties of a probability distribution.
2.3 apply the rules of probability to calculate probabilities of compound events.
2.4 calculate joint and marginal probabilities.
2.5 calculate conditional probability.
2.6 explain the difference between dependent and independent events.
2.7 apply Bayes' theorem.

3. PERMUTATIONS AND COMBINATIONS
3.1 demonstrate an understanding of the Fundamental Counting Principle.
3.2 know the formulas for ${}_nP_r$ and ${}_nC_r$ and use them to solve problems.
3.3 use the Binomial Theorem to expand $(p+q)^n$ where n is a positive integer.

4. DISCRETE RANDOM VARIABLES
4.1 explain the meaning of: random variable; discrete random variable.
4.2 recognize a discrete random variable and determine its probability distribution.
4.3 be able to calculate the mean (expected value) and standard deviation of a random variable.
4.4 state and use the properties of expected value and variance.
4.5 calculate probabilities and solve problems concerning linear combinations of random variables.
4.6 explain the theoretical conditions under which certain particular distributions may be used (binomial, Poisson, geometric, hypergeometric).
4.7 calculate probabilities and know the expected values and variances for the above distributions.
4.8 know the conditions under which a binomial distribution may be approximated by a Poisson.

5. CONTINUOUS RANDOM VARIABLES
5.1 explain the meaning of: continuous random variable.
5.2 define a density function and give its properties.
5.3 use a given density function to calculate probabilities.
5.4 define and calculate the expected value and variance of a continuous random variable.
5.5 explain the theoretical conditions under which the normal distribution may be used.
5.6 use the table of values of the standard normal curve to find probabilities.
5.7 explain how the shape of the normal curve changes as μ and σ are varied.
5.8 approximate binomial and Poisson distributions by a normal distribution and know the conditions under which these approximations can be made.

6. SAMPLING AND ESTIMATION
6.1 explain the terms: parameter, statistic, population, sample, random sample.
6.2 explain what is meant by the sampling distribution of the mean.
6.3 demonstrate an understanding of the difference between the random variables $\bar{X}$ and s^2 and the parameters μ and σ^2.
6.4 state and use the properties of the sampling distribution of the mean for normal populations.
6.5 demonstrate an understanding of the Central Limit Theorem.
6.6 find confidence intervals to estimate a mean, both when σ is known (optional) and when σ is unknown (Student's t-distribution).

7. HYPOTHESIS TESTS
7.1 give the main steps in the test of a hypothesis:
- 7.1.1 formulation of null and alternate hypothesis;
- 7.1.2 calculation of appropriate statistic;
- 7.1.3 formulation of a criterion for decision;
- 7.1.4 application of criterion and conclusion.

7.2 explain Type I and Type II errors.
7.3 carry out hypothesis tests of the following types:
- 7.3.1 test for one population mean when σ is known and when it is unknown;
- 7.3.2 test for the difference between two means (large samples and small samples) with equal standard deviations and with unequal standard deviations.
- 7.3.3 test for the difference between two means using paired samples;
- 7.3.4 test for one proportion and for two proportions.

7.4 use the chi-square statistic to carry out hypothesis tests for goodness of fit and for independence.

8. REGRESSION AND CORRELATION
8.1 find the equation for the regression line for a set of data points.
8.2 calculate the linear correlation coefficient for a set of data points and interpret the result.

At the teacher's discretion, appropriate and closely related definitions, derivations, proofs and applications using pertinent technology may be added and form part of the evaluation.