Mathematics
Unit 2: Data Analysis, Statistics, and Probability

Essential Understandings	▪ Statistics can be used to describe phenomenon. The basic principles of probability can be used to make predictions about a variety of situations.
Essential Questions	▪ How does one explain the differences between the measures of central tendency and apply them correctly? ▪ How does one find missing numbers in data sets to result in specific mean values? ▪ How does a box-and-whisker plot display a set of data and what are the components of the plot? ▪ How does one calculate the values for the probability of simple events occurring (including geometric events)? ▪ What is the difference between theoretical and experimental probability? ▪ How does one count outcomes using tree diagrams, charts, and the fundamental counting principle? ▪ What is the difference between a permutation and a combination and how is each one calculated? ▪ How does one classify events as compound (composite) or mutually exclusive? ▪ What is the difference between independent and dependent events? ▪ How does one calculate probabilities of different types of events? ▪ How does one make a frequency table? ▪ How does one determine slope trends from data in a scatter plot? ▪ How does one make predictions from data in a scatter plot? ▪ What is a line of best fit and how is it determined?

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Essential Knowledge	▪ The measures of central tendency are mean, median, and mode. ▪ An algebraic equation can be set up and solved to find missing data values when the mean value is provided. ▪ A box-and-whisker plot is a visual method for illustrating the relationships between the median, quartiles, range, and outliers of a set of data. ▪ Probability can be found for actual events (experimental) and for predicted events (theoretical) based on formulas. ▪ Counting outcomes is an important skill in applying probability formulas. ▪ Permutations and combinations are arrangements of outcomes in which either the order matters or does not matter. ▪ Two or more events can be classified as mutually exclusive or compound (composite) events. Compound events can be classified as independent or dependent. ▪ The probabilities of mutually exclusive events and compound events are calculated using either addition or multiplication. ▪ A frequency table lists all possible probability values in a sample space. ▪ Scatter plots provide a visual method for determining trends in a set of data. ▪ A line of best fit is a tool to make predictions from a scatter plot.
Vocabulary	▪ <u>Terms</u>: o box-and-whisker plots, combinations, compound or composite events, dependent events, factorial, frequency table, geometric probability, independent events, line of best fit, mutually exclusive events, permutations, quartiles, sample, scatter plots, simple events

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Essential Skills	▪ Use a variety of statistical graphs (line graphs, scatter plots, histograms, or box-and-whisker plots) to analyze data, make predictions, and solve problems. (I,R) ▪ Construct a box-and-whisker plot from a set of data and explain the components. (I, R) ▪ Determine the effect of changes in data on the mean, median, and mode (R) as well as range, outliers, and quartile values (I). ▪ Evaluate the sample from which the statistics were developed (bias, random, or non-random.) (I) ▪ Calculate the probability of simple events (A) including geometric events. (I, R) ▪ Recognize whether two or more events are compound (composite) events or mutually exclusive events. (I) ▪ Recognize whether compound (composite) events are independent or dependent. (I) ▪ Calculate the probabilities of two or more events occurring based upon the classification of the events. (I) ▪ Use counting techniques to solve a variety of problems including those involving combinations or permutations. (I) ▪ Use scatter plots to analyze data and make predictions. (R, A) ▪ Analyze slope trends in practical situations by estimating the line of best fit. (I, R)
Related Maine Learning Results	B. Data Data Analysis B3.Students use mean, median, mode, range, and quartiles to solve problems involving raw data and information from data displays. Probability B4.Students understand and apply concepts of probability. a. Use appropriate terminology to describe complementary and mutually exclusive events. b. Use an understanding of relative frequency to make and test conjectures about the results of experiments and simulations. c. Compute probabilities for compound events, using such methods as organized lists, tree diagrams, and area models

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NECAP	NECAP Data Analysis, Statistics, and Probability M (DSP) 8-1 Interprets a given representation (line graphs, scatter plots, histograms, or box and whisker plots) to analyze the data to formulate or justify conclusions, make predictions, or to solve problems. M (DSP) 8-2 Use estimated lines of best fit to analyze situations. M (DSP) 8-3 Evaluate the sample from which the statistics were developed (bias, random, or non-random). Organizes and displays data using scatter plots to answer questions related to the data…analyze…justify… make predictions…; or identifies representations or elements of representations that best display a given set of data. M (DSP) 8-4: Uses counting techniques to solve problems…involving combinations or permutations using a variety of strategies.