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| MAT 220: Math 4 Today 30 week: Probability and Statistics  |
| Learning Targets | Unit Name | Instructional Resources | Vocabulary |
|  | Unit 1: Statistics As Problem Solving |  |  |
| I can...-describe and differentiate between quantitative and qualitative data-understand the four components of the problem-solving process in statistics-identify variation, random error and bias in data sets | ~ About one weekPart A: Problem-Solving processPart B: Data Measurement and Variation Part C: Bias in Measurement Part D: Bias in Sampling  | [Statistics as Problem Solving](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/statistics-as-problem-solving/)1. [A Problem Solving Process](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/statistics-as-problem-solving/a-problem-solving-process-15-minutes/)
2. [Data Measurement and Variation](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/statistics-as-problem-solving/data-measurement-and-variation-65-minutes/)
3. [Bias in Measurement](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/statistics-as-problem-solving/bias-in-measurement-20-minutes/)
4. [Bias in Sampling](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/statistics-as-problem-solving/bias-in-sampling-20-minutes/)
5. [Assessment](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/statistics-as-problem-solving/session-1-homework/)
 | bias, census, data, population, qualitative data, qualitative variables quantitative data, quantitative variables, random, error, random sample, representative sample, sample, variable, variation |
|  | Unit 2: Data Organization and Representation |  |  |
| I can...-organize data in a line plot and frequency table-organize data in a cumulative frequency table-use intervals to answer a statistics question-determine the median of a set of data-determine relative frequencies and create bar graphs of your data | ~ About one weekPart A: Patterns in VariationPart B: Line PlotsPart C: Frequency TablesPart D: The MedianPart E: Bar Graphs and Relative Frequencies | [Data Organization and Representation](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/data-organization-and-representation/)1. [Patterns in Variation](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/data-organization-and-representation/patterns-in-variation-10-minutes/)
2. [Line Plots](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/data-organization-and-representation/line-plots-40-minutes/)
3. [Frequency Tables](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/data-organization-and-representation/frequency-tables-40-minutes/)
4. [The Median](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/data-organization-and-representation/the-median-from-ordered-lists-and-line-plots-25-minutes/)
5. [Bar Graphs and Relative Frequency](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/data-organization-and-representation/bar-graphs-and-relative-frequencies-relative-frequency/)
6. [Data Organization and Representation](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/data-organization-and-representation/)
7. [Assessment](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/data-organization-and-representation/session-2-homework/)
 | cumulative frequency, cumulative frequency table, discrete data, distribution, frequency, frequency bar graph, frequency table, interval, line plot, median, mode, relative frequency, relative frequency bar graph |
|  | Unit 3: Describing Distributions |  |  |
| I can...-organize and group data in a stem and leaf plot-complete a frequency and relative frequency table for data-create a frequency and relative frequency histogram for data-complete a cumulative frequency and relative frequency table for data | ~ About one weekPart A: Organizing Data in a Stem and Leaf PlotPart B: HistogramsPart C: Relative and Cumulative FrequenciesPart D: Ordering Hats | [Describing Distributions](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/describing-distributions/)1. [Organizing Data in a Stem and Leaf Plot](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/describing-distributions/organizing-data-in-a-stem-and-leaf-plot-how-long-is-a-minute-55-minutes/)
2. [Histograms](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/describing-distributions/histograms-constructing-a-histogram-30-minutes/)
3. [Relative and Cumulative Frequencies](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/describing-distributions/relative-and-cumulative-frequencies-relative-frequencies-30-minutes/)
4. [Ordering Hats](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/describing-distributions/ordering-hats-understanding-the-question-35-minutes/)
5. [Describing Distributions](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/describing-distributions/)
6. [Assessment](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/describing-distributions/homework/)
 | continuous variable, grouped frequency table, histogram, relative frequency histogram, stem and leaf plot |
|  | Unit 4: The Five-Number Summary |  |  |
| I can...-understand and calculate the median-understand and calculate quartiles-represent the concepts of quartiles using graphs-summarize an entire data set with a Five-Number summary-summarize an entire data set with a box plot | ~ About one weekPart A: Min, Max, and the Two-Number SummaryPart B: The Median and the Three-Number SummaryPart C: Quartiles and the Five-Number SummaryPart D: The Box PlotPart E: Finding the Five-Number Summary Numerically | [Min, Max, and the Five-Number Summary](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/the-five-number-summary/session-4-homework/)1. [The Data Set](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/the-five-number-summary/min-max-and-the-two-number-summary-the-data-set-20-minutes/)
2. [The Median and the Three-Number Summary](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/the-five-number-summary/the-median-and-the-three-number-summary-35-minutes-the-median/)
3. [Quartiles and the Five Number Summary](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/the-five-number-summary/quartiles-and-the-five-number-summary-35-minutes-quartiles/)
4. [The Box Plot](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/the-five-number-summary/the-box-plot-25-minutes-five-number-summary-with-measurement-data/)
5. [Finding the Five Number Summary Numerically](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/the-five-number-summary/finding-the-five-number-summary-numerically-30-minutes-locating-the-median-from-ordered-data/)
6. [Assessment](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/the-five-number-summary/session-4-homework/)
 | box plot, Five-Number Summary, interquartile range, midrange, quartiles, summary measures, Three-Number Summary, Two-Number Summary |
|  | Unit 5: Variation About the Mean |  |  |
| I can...-understand the mean as an indicator of fair allocation and “balancing point” of a data set-explore deviations of data values from the mean-measure and calculate the variation and mean of a data set | ~ About one weekPart A: Fair AllocationsPart B: Unfair AllocationsPart C: Using Line PlotsPart D: Deviations from the MeanPart E: Measuring Variation | [Variation About the Mean](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/variation-about-the-mean/)1. [Fair Allocations](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/variation-about-the-mean/fair-allocations-25-minutes-the-mean/)
2. [Unfair Allocations](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/variation-about-the-mean/unfair-allocations-25-minutes-fair-and-unfair-allocations/)
3. [Using Line Plots](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/variation-about-the-mean/using-line-plots-30-minutes-creating-a-line-plot/)
4. [Deviations from the Mean](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/variation-about-the-mean/deviations-from-the-mean-30-minutes-tallying-excesses-and-deficits/)
5. [Measuring Variation](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/variation-about-the-mean/measuring-variation-45-minutes-mean-absolute-deviation-mad/)
6. [Variation About the Mean](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/variation-about-the-mean/)
7. [Assessment](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/variation-about-the-mean/session-5-homework/)
 | allocation, deviation from the mean, fair allocation (equal-shares allocation), mean, mean absolute deviation (MAD), standard deviation, variance  |
|  | Unit 6: Designing Experiments |  |  |
| I can...-Investigate comparative studies, which can be experimental or observational - Learn how to analyze and interpret results from comparative studies - Learn how to design a comparative experiment -Explore paired and unpaired comparative studies  | ~ About one weekPart A: Comparative StudiesPart B: Comparative Observational StudiesPart C: Comparative Experimental Studies | [Designing Experiments](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/designing-experiments/) | comparative experimental study, comparative observational study, comparative study, design of a comparative study, random assignment, treatment b |
|  | Unit 7: Bivariate Data and Analysis |  |  |
| I can...-graph bivariate data in a scatter plot-divide the points in a scatter plot into four quadrants-model linear relationships-explore the least squares line | ~ About one weekPart A: Scatter PlotsPart B: Contingency TablesPart C: Modeling Linear RelationshipsPart D: Fitting Lines to Data | [Bivariate Data and Analysis](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/bivariate-data-and-analysis/) | association, bivariate analysis, contingency table, co-variation, least squares line, line of best fit, quadrants, scatter plot, sum of squared errors |
|  | Unit 8: Probability |  |  |
| I can...-investigate probability by exploring the following: -Random events -Games of chance-Finite-equally likely probability models -Mathematical probabilities and the probability table -Tree diagrams -The binomial probability model | ~ About one weekPart A: Probability in StatisticsPart B: Mathematical ProbabilityPart C: Analyzing Binomial ProbabilitiesPart D: Are You a Random Player? | [Probability](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/probability/) | binomial experiment, binomial probability model, experimental probability, mathematical probability, outcome, Pascal’s Triangle, probability table, random experiment, tree diagram |
|  | Unit 9: Random Sampling and Estimation |  |  |
| I can...-Define an estimate based on sample data -Select a random sample -Describe sample-to-sample variation - Predict the accuracy of an estimate -Assess the effect of sample size on the accuracy of an estimate | ~ About one weekPart A: Random SamplesPart B: Selecting the SamplePart C: Investigating Variation in EstimatesPart D: The Effect of Sample Size | [Random Sampling and Estimation](https://www.learner.org/series/learning-math-data-analysis-statistics-and-probability/random-sampling-and-estimation/) | sample mean, sample size, sampling with replacement, sampling without replacement |
|  | Unit 10: Casino Royale Project |  |  |
| I can...- design a game that gives the player and the game designer an equal chance of winning. -create, analyze and advertise my own game | ~ About one weekStudents will create their own game and can test/play their game with their peers. See attachment for directions. | [End of Quarter Project](https://nfschools-my.sharepoint.com/%3Ab%3A/g/personal/cdubois_nfschools_net/EQK3xcMab_FJjGJ2JYsf2rwBvW9-ODVzyHyDRE-E56F01w?e=U2uUcw) | Probability model, winning outcomes, probability analysis, expected value  |