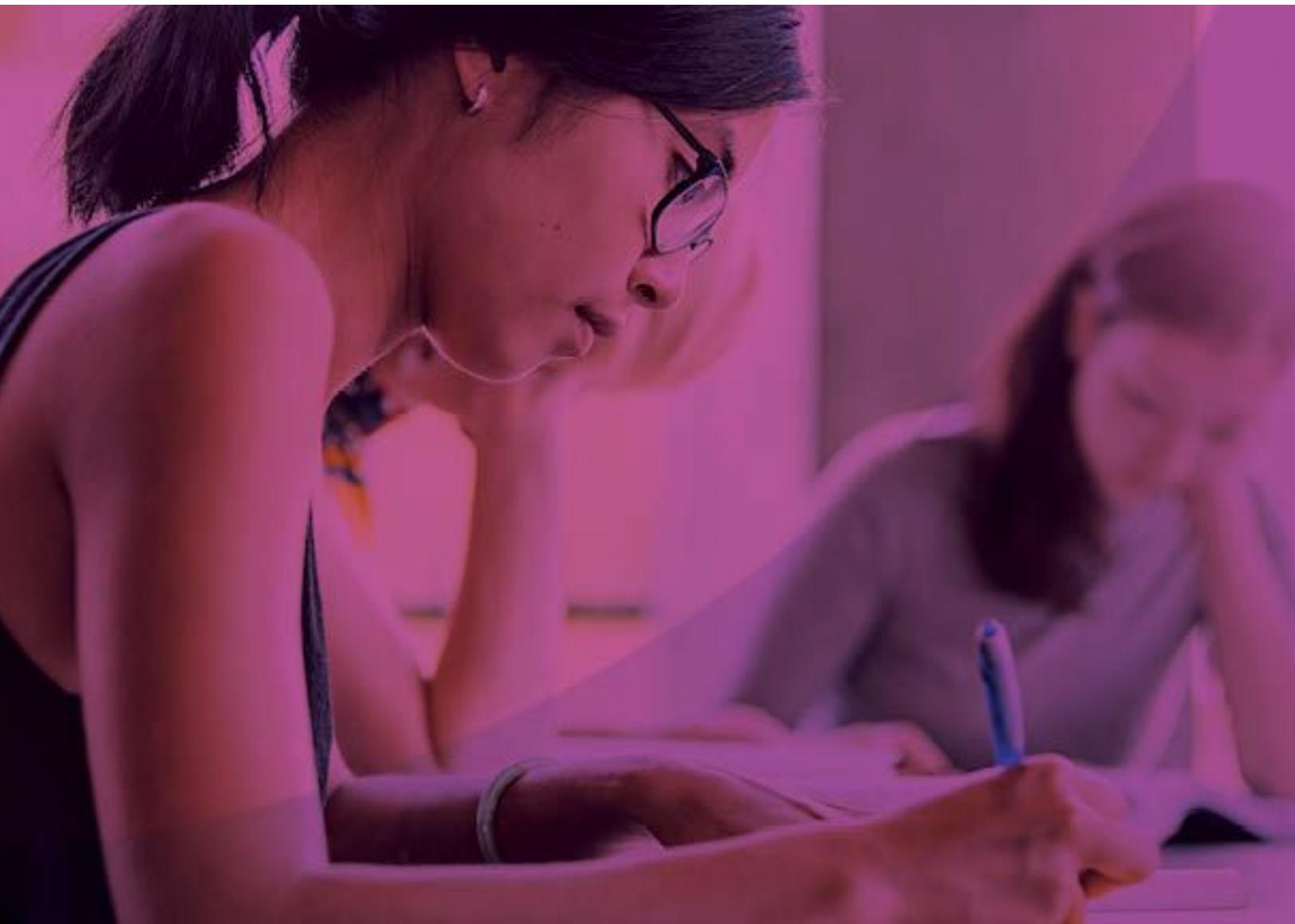




Quantitative Reasoning

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Alta Quantitative Reasoning is a one- to two-semester course intended for students who require quantitative literacy skills. Many students pursuing a degree that has a general education math requirement will take this course. To develop this course, Knewton used four main sources of content: OpenStax Introductory Statistics, OpenStax Prealgebra, Washington Open Course Library, and videos from an Online Stat book developed by Rice University, University of Houston, and Tufts University, along with a team of Subject Matter Experts. The SMEs come from diverse backgrounds and are all accomplished academics in the field of mathematics, and have experience teaching and designing quantitative reasoning courses. Alta Quantitative Reasoning covers the breadth of quantitative reasoning topics, and also provides the necessary depth to ensure the course is manageable and engaging for instructors and students alike.

Alta Quantitative Reasoning has two instructional sequences for every learning objective, giving students multiple opportunities to learn new concepts. Between our text, video, and original SME content, we were able to solicit ideas from quantitative reasoning instructors from community colleges to Ph.D- granting universities. Alta Quantitative Reasoning provides a level of academic rigor, while also promoting relevance and accessibility for students. Knewton has added current and relevant contexts and examples to instruction and assessments.

Quantitative Reasoning | Table of Contents

Chapter 1: Critical Thinking and Set Theory

1.1 Introduction to Reasoning

- Inductive / Deductive
 - Understand and use inductive reasoning
 - Understand and use deductive reasoning
 - Identify the premise and conclusion of an argument
 - Find fallacies in an argument

1.2 Estimation and Rounding

- Estimation
 - Estimate a value by rounding a whole number
 - Estimate a value by rounding a decimal
 - Estimate using a pie chart or bar graph
- Accuracy, Precision, and Significant Figures
 - Distinguish between accuracy and precision in measurements
 - Determine the number of significant figures in measurements
 - Use significant figures when performing calculations

1.3 Problem Solving

- Introduction to Problem Solving
 - Explain Polya's four steps to solving a problem
 - Solve a problem using trial and error
 - Solve a problem using estimating
 - Solve a problem using diagram
- Applications with Problem Solving Strategies
 - Identify the piece of information needed to solve a problem and unnecessary information given in a problem
 - Solve an application problem by applying Polya's four step procedure

1.4 Set Concepts and Venn Diagrams

- Sets Fundamentals
 - Represent a set using a written description and the roster method
 - Represent a set using set builder notation
 - Identify the cardinal number for a set
 - Determine if two sets are equivalent
 - Determine if two sets are equal
 - Sets Applications
 - Identify subsets, universal sets, and empty sets
 - Distinguish between finite and infinite sets
 - Identify subsets and proper subsets using set notation
 - Determine the number of subsets and proper subsets in a given set
-

- Venn Diagrams from Sets
 - Illustrate the universal set, a set, and complement of a set using a Venn diagram
 - Illustrate two sets using Venn diagram and set notation (*8)
- Venn Diagram and Set Operations
 - Determine the complement of a set using Venn diagrams and proper set notation
 - Determine the intersection of two sets using Venn diagrams and set notation
 - Determine the union of two sets using Venn diagrams and set notation
- Set Operations
 - Perform operations on sets
 - Find the difference and cartesian product of two sets
 - Use Venn diagrams to find the result of set operations on two sets (*3)
 - Determine the cardinal number of a union of two finite sets
- Venn Diagrams with Three Sets and Verification of Equality of Sets
 - Represent three sets using Venn diagrams
 - Perform set operations on three sets
 - Show that two combinations of sets are equal using Venn diagrams
- Applying Venn Diagrams to Three Sets
 - Apply De Morgan's law using Venn diagrams
 - Construct a venn diagram to represent the result of a survey
 - Solve applied survey problems

Chapter 2: Logic

2.1 Logical Statements

- Statement and Logical Connectives
 - Identify and negate simple statements
 - Identify and negate quantified statements
 - Identify logical connectives and compound statements
 - Converting Logic Statements to English
 - Represent and/or/not statements in symbolic form and English
 - Represent conditional statements in symbolic form and English
 - Write biconditional statements in symbolic form and English
 - Evaluation of Logical Statements
 - Construct a truth table for a statement with only conjunctions and determine its truth value
 - Construct a truth table for a statement with only disjunctions and determine its truth value
 - Construct a truth table for a statement with both conjunctions and disjunctions and determine its truth value
 - Construct a truth table for a statement with conjunctions, disjunctions, or negation, and determine its truth value
-

2.2 Introduction to Truth Tables

- Truth Tables for Negation, Conjunction, and Disjunction
 - Construct a truth table for a statement with a conjunction and/or a negation and determine its truth value
 - Construct a truth table for a statement with a disjunction and/or a negation and determine its truth value
- Truth Tables for Compound, Conditional and Biconditional Statements
 - Construct a truth table for a compound statement with a conjunction and disjunction and determine its truth value
 - Construct a truth table for a conditional statement and determine its truth value
 - Construct a truth table for a biconditional statement and determine its truth value
 - Identify self-contradictions, tautologies, and implications

2.3 Equivalence Statements

- Logical Equivalence
 - Use a truth table to determine logical equivalence
 - Determine logical equivalence of English statements
 - Apply De Morgan's laws to conjunctions and disjunctions
- Equivalent Statements
 - Determine if two symbolic statements are equivalent using a truth table
 - Determine if two statements given in English are equivalent using a truth table
 - Determine if two statements are equivalent using De Morgan's laws

2.4 Conditional Statements

- Conditional Statements
 - Convert a symbolic statement with disjunctions into an equivalent conditional statement
 - Convert an English statement with disjunctions into an equivalent conditional statement
 - Determine logical equivalence of conditional statements
- Converting Disjunctions and Conditionals
 - Convert a disjunction into an equivalent conditional statement
 - Determine if two conditional statements are equivalent
- Symbolic Arguments
 - Draw a conclusion from a conditional statement
 - Determine if an argument is valid using a truth table
 - Identify and validate the standard forms of arguments

2.5 Euler Diagrams

- Euler Diagrams and Syllogistic Arguments
 - Identify syllogistic arguments
 - Represent a syllogistic argument with a Euler diagram
 - Determine if a syllogistic argument is valid with a Euler diagram
-

2.6 Switching Circuits

- Switching Circuits
 - Convert between symbolic statements and switching circuits
 - Determine conditions for when a lightbulb will be turned on in a switching circuit
 - Determine if two switching circuits are equivalent

Chapter 3: Number Representation and Foundations of Computations

3.1 Introduction to Other Bases

- Place-Value or Positional-Value Numeration Systems
 - Write a number in expanded form
 - Convert between Babylonian Numerals and Hindu-Arabic Numerals
 - Convert between Mayan Numerals and Hindu-Arabic Numerals
- Other Bases
 - Convert from a system with a base less than 10 to base 10
 - Convert from base 10 to a system with a base less than 10
 - Convert from a system with a base greater than 10 to base 10
 - Convert from base 10 to a system with a base greater than 10

3.2 Operations in Other Bases

- Add and Subtract in Other Bases
 - Perform addition in bases other than 10 using an addition table
 - Perform addition in bases other than 10 using mental arithmetic
 - Perform subtraction in bases other than 10
- Multiply and Divide in Other Bases
 - Perform multiplication in bases other than 10
 - Perform division in bases other than 10
- Early Computational Methods
 - Multiply two numbers using duplation and mediation
 - Multiply two numbers using lattice multiplication
 - Multiply two numbers using Napier's rods

3.3 Exponents

- Intro to Rules of Exponents and Scientific Notation
 - Understand exponent notation
 - Use the product rule of exponents
 - Use the quotient rule of exponents
 - Use the power rule of exponents
 - Exponential Expressions
 - Use the negative and zero exponent rule
 - Find the power of a product
 - Simplify expressions using the quotient property for exponents and the exponent of zero
-

- Find the power of a quotient
- Simplify exponential expressions
- Advanced Rules of Exponents and Scientific Notation
 - Simplify numerical expressions containing exponents
 - Simplify expressions using the product property for exponents
 - Simplify expressions using the quotient to a power property
 - Simplify expressions using the power property for exponents or the product to a power property for exponents

3.4 Scientific Notation

- Understanding Scientific Notation
 - Convert between standard and scientific notation
 - Convert from decimal notation to scientific notation
 - Convert from scientific notation to decimal notation
- Using Scientific Notation
 - Multiply and divide numbers in scientific notation with positive exponents
 - Multiply and divide numbers in scientific notation using a calculator
 - Multiply and divide using scientific notation, including negative exponents

3.5 Algebraic Expressions

- Algebraic Expressions and the Order of Operations
 - Simplify an expression using order of operations
 - Perform calculations using order of operations
 - Identify constants and variables
 - Simplify algebraic expressions
- Evaluating Algebraic Expressions
 - Evaluate a variable expression with integers
 - Evaluate algebraic expressions with a single variable
 - Evaluate algebraic expressions with two variables

3.6 Problem Solving with Numbers

- Problem Solving applications
 - Use a problem-solving strategy for word problems
 - Solve a number problem
 - Solve a number problem involving consecutive integers

Chapter 4: Rates, Ratios and Proportions

4.1 Converting with Percents

- Definition of Percent and Converting Percents
 - Use the definition of percent
 - Convert percents to fractions
 - Convert percents to decimals
 - Convert decimals and fractions to percents - FOR
-

4.2 Ratios

- Writing Ratios and Using Ratios in Applications
 - Write a ratio as a fraction
 - Use ratios in applications
- Unit Rates and Unit Prices
 - Write a rate as a fraction
 - Find unit rates
 - Find unit price
 - Translate phrases to expressions as rates or ratios

4.3 Proportions

- Proportions and Applications Using Proportions
 - Use the definition of proportion
 - Solve proportions
- Solve applications using proportions
 - Translate and solve percent proportions
 - Interpret application problems with proportions
- Solving Proportions
 - Solve proportions
 - Solve applications with proportions
 - Solve similar figure applications

4.4 Solve with Variation

- Use Direct and Inverse Variation
 - Solve linear direct variation problems
 - Solve nonlinear direct variation problems
 - Solve inverse variation problems

4.5 Dimensional Analysis

- Unit Conversion in the US System
 - Make unit conversions in the US system
 - Use mixed units of measurement in the US system
 - Unit Conversion in the Metric System
 - Use mixed units of measurement in the metric system
 - Unit Conversion Between Systems
 - Convert between the US and metric systems of measurement
 - Convert between Fahrenheit and Celsius temperatures
 - Dimensional Analysis
 - Convert between non-metric units and metric units using dimensional analysis
-

Chapter 5: Probability Topics

5.1 Intro to probability and probability rules

- Introduction to probability
 - Define and explain probability terminology, likelihood and experiments
 - Using and, or, and not notation to describe events
 - Use tree diagrams to list outcomes and compute probabilities
- Basic probability rules
 - Compute probability with equally likely outcomes
 - Describe more than one event
- Types of Probability
 - Make and test predictions using empirical probability models
- Complement and Addition Rules for probability
 - Using the addition rule for probabilities
 - Using the complement rule for probabilities

5.2 Intro to probability and probability rules

- Mutually exclusive events
 - Explain mutually exclusive events
 - Using the addition rule for mutually exclusive event probabilities
 - Use the multiplication rule for independent event probabilities
- Conditional probabilities
 - Using conditional probability notation to describe events
 - Create and interpret contingency tables to find probability
 - Using a Venn diagram to compute compound and conditional probabilities
- Multiplication rule and Independent and mutually exclusive events
 - Using the multiplication rule for conditional probabilities
 - Distinguishing between independent or mutually exclusive events given conditional probability information

5.3 Counting Principles

- Counting principles
 - Understand and explain the fundamental counting principle
 - Counting with permutations
 - Counting with combinations
- Counting to find Probability
 - Determine which probability method for a given context
 - Compute probability involving permutations and combinations

5.4 Odds and expected value

- 5.4.1 Odds and expected value
 - Compute odds using probability
 - Distinguish between risk and odds
 - Compute the expected value of an event
-

Chapter 6 Financial Mathematics

6.1 Uses of Percents

- Percent, Sales Tax, and Income Tax
 - Calculate absolute and relative change
 - Calculate a percent increase or a percent decrease
 - Find percent increase or percent decrease
- Applications of Percents with Discounts and Sales Tax
 - Determine the final cost of an item including sales tax and discounts
 - Solve applications with discount or mark-up
- CPI and Inflation
 - Calculate the annual rate of inflation
 - Use the Consumer Price Index to calculate inflation rates
- Applications of Percents with Income Taxes
 - Explain and interpret FICA and federal income taxes
 - Calculate income tax

6.2 Uses of Interest

- Simple Interest
 - Calculate simple interest
 - Calculate interest discounts on a discounted loan
 - Solve a word problem involving simple interest
- Evaluating Exponential Functions
 - Evaluate exponential functions
 - Evaluate exponential functions with base e
- Introduction to Compound Interest
 - Calculate annually compounded interest
 - Calculate periodically compounded interest
 - Use the compound interest formula to find the new value of an account
- Continuously Compounding Interest
 - Calculate continuously compounded interest
 - Use the continuously compounding interest formula to find the new value of an account
- Applications of Compound Interest
 - Calculate effective annual yield
 - Calculate the value of an annuity

6.3 Savings Options

- Annuities, Stocks, and Bonds
 - Calculate the payment needed to achieve a determined future value
 - Define stock terminology
 - Read a stock table
 - Understanding and interpreting annuities
-

6.4 Loan Options

- Credit Cards and Interest
 - Explain and interpret Credit scores
 - Recognize key features of credit cards
 - Calculate the average daily balance of a credit card
 - Determine interest to be paid on a card's next billing date
- Mortgages and Amortizations
 - Calculate the monthly payment and interest cost for a mortgage
 - Construct a loan amortization schedule
 - Understanding and interpreting mortgages
- Other Loans
 - Choose the best installment loan plan
 - Evaluate student loan options
 - Understanding and interpreting loans

Chapter 7: Data Collection and Sampling

7.1 Introduction to Experimental Design

- Overview of Statistics and Experimental Design
 - Evaluate the strength of evidence against a claim about a population proportion
 - Identify and describe the steps in the statistical analysis process
- Components of Experimental Design
 - Determine whether a study is observational or an experiment and appropriate use cases
 - Identify components of the experimental design in a given experiment: use of a control group, use of a placebo, and blinding
 - Identify confounding variables
- Variables and Measures of Data
 - Identify explanatory and response variables in an experiment
 - Define and distinguish between qualitative, quantitative, discrete, and continuous variables
 - Identify levels of measurement of data

7.2 Sampling

- Sampling Methods
 - Understand the definitions of population, sample, statistic, parameter, and data
 - Comparing Sampling Methods
 - Identify and distinguish between stratified, cluster, systematic, and convenience sampling
 - Determine appropriate sampling methods
 - Sampling Errors, Bias and Misleading Statistics
 - Explain why a poor sampling plan can result in misleading conclusions
 - Identify situations in which statistics can be misleading
-

Chapter 8: Graphic Displays of Data

8.1 Frequency Tables and Histograms

- Frequency tables
 - Constructing and understanding frequency tables for a set of data
 - Construct and understand relative frequency tables for a set of data
 - Construct and understand cumulative relative frequency tables for a set of data
- Frequency Tables and Histograms
 - Construct and understand frequency tables for a set of data
 - Create and interpret histograms (*17)
 - Identify and label shapes of histograms

8.2 Frequency Tables and Histograms for Grouped Data

- Histograms and Frequency Tables for Grouped Data
 - Create and analyze histograms and frequency tables with grouped data
- Extra Practice - Advanced Frequency Tables and Histograms for Grouped Data
 - Complete frequency tables and histograms to analyze grouped data

8.3 Frequency Tables and Histograms with Technology

- Histograms and Frequency Tables with Technology - Calculator
 - Construct and understand frequency tables for a set of data with technology - Calculator
 - Construct and understand relative frequency tables for a set of data with technology - Calculator
 - Create and interpret histograms with technology - Calculator
- Histograms and Frequency Tables with Grouped Data - Technology - Calculator
 - Create and analyze histograms and frequency tables with grouped data - Calculator
- Histograms and Frequency Tables with Technology - Excel
 - Construct and understand frequency tables for a set of data with technology - Excel
 - Construct and understand relative frequency tables for a set of data with technology - Excel
 - Create and interpret histograms with technology - Excel
- Histograms and Frequency Tables with Grouped Data - Technology - Excel
 - Create and analyze histograms and frequency tables with grouped data - Excel

8.4 Graphical Representations of Data

- Dot Plots and Stem and Leaf plots
 - Create and interpret dot plots (*17)
 - Create and interpret stem-and-leaf plots
 - Line and Bar Graphs
 - Create and interpret bar graphs (*17)
 - Create and interpret line graphs of data (*17)
 - Interpreting Graphs
 - Analyze graphical misrepresentations of data
 - Choose appropriate graphs and charts to display data
-

8.5 Graphical Representations of Data with Technology

- Dot plots, Line and Bar graphs with Technology - Calculator
 - Create and interpret dot plots with technology - Calculator
 - Create and interpret line and bar graphs of data with technology - Calculator
- Dot plots, Line and Bar graphs with Technology - Excel
 - Create and interpret dot plots with technology - Excel
 - Create and interpret line and bar graphs of data with technology - Excel

8.6 Understanding Appropriate Graphical Representations

- Choose appropriate graphs to display data
 - Choose appropriate graphs and charts to display data

Chapter 9: Measures of Center and Dispersion

9.1 Measures of Central Tendency

- Measures of Central Tendency
 - Find the mean of a set of data
 - Find the mean from a frequency table (*15)
 - Find the median of a set of data
 - Find the mode of a set of data
- Impact of Outliers on Measures of Central Tendency
 - Identify the effect of outliers on measures of central tendency
 - Determine whether the mean, median, or mode is the best measure of center for a data set
- Distribution Shape
 - Define and interpret number of modes in a data set
 - Determine if a data set is skewed

9.2 Quartiles and Box Plots

- Quartiles and Box Plots
 - Find and interpret percentiles and quartiles of a data set
 - Find the five-number summary of a data set
 - Identify the interquartile range and potential outliers in a set of data
 - Construct and understand box-and-whisker plots (*35)

9.3 Introduction and Application of Standard Deviation

- Skewness and Standard Deviation
 - Compute variance and standard deviation
 - Understand the standard deviation of a set of data
 - Interpret the standard deviation of a set of data
 - Compute z-scores and use them to compare values from different data sets
 - Introduction to the Empirical Rule and Chebyshev's Theorem
 - Understand principles of the Empirical Rule
 - Understand principles of Chebyshev's Theorem
-

9.4 Measures of Center and Spread with Technology

- Calculate measures of center and spread using Technology - Calculator
 - Calculate mean, median and mode for a dataset using Technology - Calculator
 - Create and interpret box and whisker plot using Technology - Calculator
- Calculate measures of center and spread using Technology - Excel
 - Calculate mean, median and mode for a dataset using Technology - Excel
 - Create and interpret box and whisker plot using Technology - Excel

9.5 Introduction and Application of Standard Deviation with Technology

- Variance, Standard Deviation and Z-scores with technology - Calculator
 - Compute the variance and standard deviation with technology - Calculator
 - Compute z-scores and use them to compare values from different data sets with technology - Calculator
- Variance, Standard Deviation and Z-scores with technology - Excel
 - Compute the variance and standard deviation with technology - Excel
 - Compute z-scores and use them to compare values from different data sets with technology - Excel

Chapter 10: Normal Distribution

10.1 Normal Distribution

- Parameters of the Normal Distribution
 - Understand the notation and interpret the parameters of a normal distribution
 - Standardize a normally distributed random variable
 - Calculate the mean and standard deviation of a normal distribution
- Probability Using the Normal Distribution
 - Use the empirical rule for normal distributions to estimate probability
 - Use the normal distribution to compute probability
 - Use Normal Distribution to find values or z-scores given a probability

10.2 Normal Distribution with Technology

- Using the Normal Distribution with Technology- Calculator
 - Use the normal distribution to compute probability with technology - Calculator
 - Use the normal distribution to compute a value for a random variable given probability - Calculator
 - Use the normal distribution to approximate the binomial with technology - Calculator
 - Using the Normal Distribution with Technology - Excel
 - Use the normal distribution to compute probability with technology - Excel
 - Use the normal distribution to compute a value for a random variable given probability - Excel
 - Use the normal distribution to approximate the binomial with technology - Excel
-

Chapter 11: Linear Functions and Modeling

11.1 Solving Linear Equations

- Solving Linear Equations
 - Solve equations in one variable algebraically, variable just on one side
 - Solve equations in one variable algebraically, variable on both sides
 - Solve equations using cross multiplication
- Applying formulas
 - Use a formula
 - Solve a formula for a given variable
 - Solve a formula for a specific variable
 - Use a formula to solve a geometric application

11.2 Introduction to Graphing Linear Equations

- Graphing by Plotting Points
 - Plot ordered pairs in a Cartesian coordinate system
 - Graph equations by plotting points
 - Graph linear equations by plotting points (*37)
- Using slope
 - Interpret slope as a rate of change
 - Find the slope given a line or given two points
 - Calculate a slope in word problems

11.3 Graphing Linear Equations

- Graphing Linear Equations
 - Graph linear equations using point-slope form
 - Graph a line using a point and a slope (*1)
 - Understand the relationship between the slope and y-intercept of a line and its equation

11.4 Working with Linear Equations

- Finding Equations
 - Determine a linear function using point-slope form
 - Find equation of a line, in slope-intercept form, given slope and one point (point-slope formula)
 - Find equation, in slope-intercept form, of a line passing through two given points
- Working with Linear Equations
 - Write the equation of a line using a point and a slope
 - Write the equation of a line using two points
 - Given slope and intercept, find the equation of a line and write it in standard form

11.5 Special Cases of Linear Equations

- Graphing Special Cases
 - Find the equation of vertical and horizontal lines
 - Use slopes to identify parallel lines
 - Use slopes to identify perpendicular lines
-

- Given the equations of two lines, determine whether their graphs are parallel or perpendicular

11.6 Linear Inequalities

- Linear Inequalities
 - Use interval notation
 - Use properties of inequalities
 - Solve simple inequalities in one variable algebraically
- Solving Linear Inequalities
 - Solve an inequality using the subtraction and addition properties of inequality
 - Solve an inequality using the division and multiplication properties of inequality
 - Solve an inequality that requires simplification
- Advanced Linear Inequalities
 - Solve compound inequalities in one variable algebraically
 - Solve a linear inequality in two variables by graphing
 - Solve a compound inequality involving intersections
 - Graph a linear inequality in two variables (*37)

11.7 Introduction to Functions

- Identifying Functions
 - Determine whether a relation represents a function
 - Use the vertical line test to identify functions
- Find the Domain and Range of a Function
 - Identify domain and range from a set of ordered pairs
 - Find the domain and range of a function defined by a graph

11.8 Evaluate Functions

- Function Notation
 - Understand function notation
 - Evaluate a function using function notation
- Evaluating Functions
 - Evaluate or solve a function from a table
 - Evaluate or solve a function from a graph
 - Represent a linear function in table form

11.9 Graphs of Linear Functions

- Graphs of Linear Functions
 - Graph linear functions
 - Determine whether a linear function is increasing, decreasing, or constant

11.10 Linear Equation Applications

- Linear Equation Applications
 - Set up a linear equation to solve a real-world application
 - Translate verbal expressions into mathematical expressions
 - Use a formula to solve a real-world application
-

Chapter 12: Linear Regression

12.1 Linear Regression

- Linear Regression Equations and Application
 - **Understand properties of linear equations**
 - Understand the relationship between scatter plots and tables and determine patterns
 - Find the linear regression equation given a list of data points
- Uses of Linear Regression
 - Find and interpret the correlation coefficient
 - Identifying the line of best fit (Least Squares Regression)
 - Make predictions using a line of best fit
- Outliers and Prediction Errors
 - Find outliers in a data set
 - Determine the prediction errors for data values and trend lines
- Correlation and Causation
 - Interpret the slope and y-intercept of the least squares regression line
 - Understand the difference between correlation and causation
- Coefficient of Determination
 - Compute and interpret the sums of squares representing total, explained, and unexplained variation among y-values
 - Compute and interpret the coefficient of determination

12.2 Multivariate Relationships

- Multivariate Relationships
 - Identify applications where multiple regression can be performed
 - Define the format for a multiple regression equation
 - Make predictions using the multiple regression equation

12.3 Linear Regressions with Technology

- Performing Linear Regressions with Technology - Calculator
 - Calculate the correlation coefficient using Technology - Calculator
 - Determine the best fit linear regression equation using Technology - Calculator
- Performing Linear Regressions with Technology - Excel
 - Calculate the correlation coefficient using Technology - Excel
 - Determine the best fit linear regression equation using Technology - Excel

12.4 Multiple Regressions Equations with Technology

- Applying technology to determine the multiple regression equation with technology - Calculator
 - Determine the multiple regression equation using Technology - Calculator
- Applying technology to determine the multiple regression equation with technology - Excel
 - Determine the multiple regression equation using Technology - Excel

Chapter 13: Exponential and Logarithmic Functions

13.1 Introduction to Exponential Functions

- Introduction to Exponential Functions
 - Identify exponential functions
 - Evaluate exponential functions
-

13.2 Graphs of Exponential Functions

- Graphing Exponential functions
 - Graph exponential functions
 - Graph an exponential function and understand its properties (*14)

13.3 Convert between Logarithms and Exponential form

- Relate Logarithms and Exponents
 - Convert from logarithmic to exponential form
 - Convert from exponential to logarithmic form

13.4 Evaluate Logarithmic Expressions

- Evaluate Logarithmic Expressions
 - Evaluate logarithms with positive integer solutions
 - Evaluate logarithms with negative integer solutions
 - Evaluate a logarithmic function

Approximate logarithms using a calculator

- Use common logarithms
- Use natural logarithms

13.5 Graphs of Logarithmic Functions

- Properties and Graphs of Logarithmic Functions
 - Identify the domain of a logarithmic function
 - Graph logarithmic functions
 - Understand the basic properties of logarithms
- Exponential and Logarithmic Graphing Transformations
 - Graph exponential functions using transformations
 - Graph transformations of logarithmic functions

13.6 Exponential Functions

- Evaluate and Write Exponential Functions
 - Find the equation of an exponential function given the initial value and a point
 - Find the equation of an exponential function in a word problem context
 - Find the equation of an exponential function when the initial value is not known
- Finding Exponential Equations
 - Find the equation of an exponential function given a graph
 - Write an exponential function from a description

13.7 Exponential and Logarithmic Regression

- Regression
 - Perform an exponential regression with a calculator
 - Perform a logarithmic regression with a calculator
 - Regression with Excel
 - Perform a logarithmic regression with technology - Excel
 - Perform an exponential regression with technology - Excel
-

13.8 Exponential and Logarithmic Models

- Exponential Models
 - Calculate continuous growth and decay
 - Model exponential growth
 - Model exponential decay
- Logarithmic Models
 - Modeling exponentially with logs
 - Applied logarithmic models
 - Use logarithmic models in applications
- Evaluate and Graph Exponential Functions
 - Graph an exponential function and understand its properties
 - Evaluate an exponential function with base e and understand the natural base
- Evaluate and Graph Logarithmic Functions
 - Evaluate a logarithmic function
 - Graph a logarithmic function and understand its properties (*15)

Chapter 14: Introduction to Quadratic Modeling

14.1 Solving Quadratic Equations

- Solving Quadratic Equations Using the Square Root Property
 - Use the square root property to solve quadratic equations
 - Solve a quadratic equation with a binomial as the quadratic term using the square root property
 - Solve a quadratic equation where factoring results in a perfect square binomial
- Solving Quadratic Equations by Completing the Square
 - Complete the square of a binomial expression
 - Solve a quadratic equation with a leading coefficient of 1 by completing the square
 - Solve a quadratic equation with a leading coefficient greater than 1 by completing the square
- Solving Quadratic Equations with the Quadratic Formula
 - Solve a quadratic equation using the quadratic formula with 2 real solutions
 - Solve a quadratic equation using the quadratic formula with 1 or 0 real solutions
 - Use the discriminant to predict the number of solutions of a quadratic equation

14.2 Problem Solving with Quadratic Equations

- Problem Solving with Quadratic Equations
 - Solve applications modeled by quadratic equations that may require the quadratic formula
 - Solve geometric applications that may require the quadratic formula

14.3 Graphing Quadratic Equations

- Parabolas and Their Properties
 - Graph a quadratic equation by plotting points and recognize the direction a parabola opens
-

- Find the axis of symmetry and vertex of a parabola
- Find the intercepts of a parabola
- Graphing Quadratic Equations
 - Graph a quadratic equation in two variables by using key points
 - Find the maximum or minimum of a quadratic equation and use it in applications

Chapter 15: Geometry

15.1 Dimensional Analysis

- Dimensional Analysis
 - Convert between non-metric units and metric units using dimensional analysis

15.2 Introduction to Geometric Properties

- Points, Lines, and Planes
 - Construct a line, line segment, and ray given two points
 - Find the intersection or union of two line segments, a ray and a line segment, or two rays
 - Identify planes
- Angles
 - Identify right, acute, obtuse, and straight angles
 - Understand supplementary and complementary angles
 - Understand alternate interior angles, alternate exterior angles, and corresponding angles

15.3 Polygons

- Polygons
 - Identify polygons given their properties
 - Use properties of similar polygons to solve for a missing side
 - Determine the measure of an angle using properties of polygons
- Properties of Triangles
 - Identify triangles given their properties
 - Use properties of triangles and right angles
 - Use properties of similar triangles to solve for a missing side

15.4 The Pythagorean Theorem

- The Pythagorean Theorem
 - Use the Pythagorean theorem
 - Solve triangle problems using the Pythagorean Theorem

15.5 Area of Polygons

- Area of Shapes with Four Sides
 - Find the area of a rectangle
 - Find the area of a non-rectangular quadrilateral
 - Area of Triangles and Polygons
 - Find the area of a triangle
 - Find the area of complex polygons
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15.6 Circles

- Circles
 - Find the circumference and area of circles
 - Find the area of complex shapes including circles

15.7 Perimeter

- Perimeter and Applications
 - Calculate perimeter
 - Solve application problems involving area and perimeter

15.8 Volume and Surface Area

- Volume and Surface Area of Round Conventional Solids
 - Find the volume and surface area of rectangular solids
 - Find the volume of spheres, cylinders, and cones
 - Find the surface area of spheres and cylinders
- Volume and Surface Area of Edged Conventional Solids
 - Find the volume and surface area of non-rectangular prisms
 - Find the volume and surface area of a pyramid
 - Use Euler's polyhedron formula to understand the relationship between vertices, edges, and faces in a polyhedron

15.9 Transformations

- Reflections and Translations
 - Reflect a polygon across an axis
 - Translate a polygon given a translation vector
 - Perform a glide reflection on a polygon
- Rotations
 - Rotate a polygon given an angle of rotation and a center of rotation outside the polygon
 - Rotate a polygon given an angle of rotation and a center of rotation inside the polygon

15.10 Symmetry

- Symmetry
 - Determine if a polygon has reflective symmetry across an axis
 - Determine if a polygon has rotational symmetry about a point

Chapter 16: Graph Theory

16.1 Introduction to Graph Theory

- Modeling Relationships with Graphs
 - Recognize equivalent graphs
 - Construct a simple graph to model relationships using information given
 - Basics of Graph Theory
 - Determine the degree of a vertex
 - Identify adjacent vertices
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- Recognize circuits
- Distinguish between connected and disconnected graphs

16.2 Types of Circuits

- Euler Paths and Euler Circuits
 - Identify Euler paths and circuits
 - Determine if a graph has a circuit using Euler's theorem
 - Solve application problems using Euler's theorem
 - Implement Fleury's algorithm to find Euler circuits when they exist
- Hamilton Paths and Hamilton Circuits
 - Identify a Hamilton path and a Hamilton circuit for a given graph
 - Determine the number of Hamilton circuits in a graph

16.3 Weighted Graphs

- Weighted Graphs
 - Identify the optimal Hamilton circuit using the brute force method
 - Identify the optimal Hamilton circuit using the nearest neighbor method

16.4 Trees

- Trees
 - Identify a tree
 - Develop a spanning tree for a given graph

Chapter 17: Voting

17.1 Voting Methods - Identifying a Winner

- Voting Methods - Winning by Plurality
 - Identify elements of a preference table
 - Choose the winner of an election using the plurality method
 - Determine the winner of an election using the Borda count method
- Comparison Voting Methods
 - Decide the winner of an election using the plurality with elimination method
 - Select the winner of an election using the pairwise comparison method

17.2 Determine a Voting Systems Fairness

- Criterion of Voting Methods - Majority, Head to Head count, and Monotonicity
 - Determine a voting systems fairness using the majority criterion
 - Determine a voting systems fairness using the head to head count criterion
 - Determine a voting system's fairness using the monotonicity criterion
 - Criterion and Comparison of Voting Methods
 - Determine a voting system's fairness using the irrelevant alternatives criterion
 - Choose the best voting system for a given election
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17.3 Apportionment Methods

- Apportionment Methods by Calculating Quotas
 - Determine the standard quota for a state given its population
 - Calculate the lower and upper quotas for a state given its population
- Apportionment Methods - Hamilton, Jefferson, Adam and Webster Methods
 - Use Hamilton's method of determining apportionment
 - Use Jefferson's method of determining apportionment
 - Use Adam's method of determining apportionment
 - Use Webster's method of determining apportionment
- Flaws of the Apportionment Methods
 - Identify where the Alabama paradox occurs
 - Identify where the population paradox occurs
 - Identify where the new states paradox occurs
 - Choose the best apportionment system for a given region

Chapter 18: Basic Math Appendix

18.1 Introduction to Numbers

- Number Theory
 - Understand and identify prime and composite numbers
 - Find the GCF and LCM of two or more numbers
 - Find the prime factorization of a number

18.2 Operations with Integers

- The Integers
 - Understand integers and find opposites of numbers
 - Order and compare integers
 - Understand and evaluate absolute value
 - Evaluate an absolute value expression
 - Working with Integers
 - Understand additive inverse
 - Understand distance in terms of absolute value
 - Adding and Subtracting integers
 - Add integers
 - Subtract integers
 - Add and subtract integers
 - Add and subtract integers using order of operations
 - Multiply and Divide integers
 - Multiply integers
 - Divide integers
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18.3 Introduction to Rational Numbers

- The Rational Numbers
 - Understand fractions and their models
 - Find equivalent fractions
 - Convert between fractions and mixed numbers
- Converting between Representations
 - Convert decimals to fractions
 - Convert fractions to decimals
 - Convert a repeating decimal to a fraction

18.4 Operations with Fractions

- Operations on Fractions - Multiplication
 - Multiply fractions
 - Find reciprocals of fractions
 - Divide fractions
- Combining Fractions
 - Add and subtract fractions with like denominators
 - Add and subtract fractions with unlike denominators
 - Add or subtract fractions with a common denominator
 - Add or subtract fractions with different denominators
 - Add and subtract fractions in applications

18.5 Ratios

- Ratios and Proportions
 - Solve ratio and unit rate problems
 - Understand and find unit rate
 - Understand ratios
- Advanced Ratios
 - Solve fractional ratio problems
 - Understand fractional ratios

18.6 Sequences and Series

- Sequences of Rational Numbers
 - Write the terms of a sequence defined by an explicit formula
 - Arithmetic Sequences
 - Find the common difference of an arithmetic sequence
 - Write terms of an arithmetic sequence
 - Write an explicit formula for an arithmetic sequence
 - Sums of Series and Notation
 - Evaluate expressions using summation notation
 - Find the sum of a finite arithmetic series
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- Geometric Sequences
 - Find the common ratio of a geometric sequence
 - Write terms of a geometric sequence
 - Write an explicit formula for a geometric sequence
 - Find the sum of a finite geometric series

18.7 Slopes of Equations of lines

- Slopes of Equations of lines
 - Write the equation of a line parallel to a given line
 - Write the equation of a line perpendicular to a given line
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