Washington Township School District

The mission of the Washington Township Public Schools *is to provide a safe, positive, and progressive educational environment that provides opportunity for all students to attain the knowledge and skills specified in the NJ Learning Standards at all grade levels, so as to ensure their full participation in an ever-changing world as responsible, self-directed and civic-minded citizens.*

Course Title:	**Mathematics for Medical Professionals**
Grade Level(s):	12

Duration:	*Full Year:*	**x**	*Semester:*		*Marking Period:*	
Course Description:	The primary purpose of this course is to help students understand and master the mathematics encountered in the allied healthcare professions. After a brief math review, students will move into deeper concepts including algebra, trigonometry, statistics, dilutions, solutions, concentrations, dosage calculations and dimensional analysis.					
Grading Procedures:	Each semester will be a composite of quiz scores, test scores, homework, and participation reflecting a student's mastery of the areas outlined above. The student can pass the course with an overall average of 70%. The individual teacher will explain the grading system to the student.					
Primary Resources:	Mathematics for the Health Sciences Textbook NJ Student Learning Standards Mathematics (NJSLS-M)					

Washington Township Principles for Effective Teaching and Learning

- Implementing a standards-based curriculum
- Facilitating a learner-centered environment
- Using academic target language and providing comprehensible instruction
- Adapting and using age-appropriate authentic materials
- Providing performance-based assessment experiences
- Infusing 21st century skills for College and Career Readiness in a global society

Designed by:	Samantha Reid
Under the Direction of:	Dr. Carole English

Written: 7/30/2022

Revised: _____

BOE Approval: _____

Unit 1: Mathematical Essentials and Algebra

Unit Description:
This unit will begin with a review of basic operations with integers, fractions, percents, decimals, order of operations, and Roman numerals. These topics will lay a foundation for the rest of the course. The unit will then give an overview of basic topics in algebra that are encountered in health science disciplines. Those topics will include solving linear and rational equations, ratios and proportions, Scientific notation, formula manipulation, properties of exponents, significant digits, scientific notation, using a scientific calculator, and problems involving mixtures and percents.

Unit Duration: 15 days = 5 cycles (*18 days = 6 cycles)

Desired Results

Standard(s):

N-Q.A Reason quantitatively and use units to solve problems.

N-RNA Extend the properties of exponents to rational exponents

A-SSE.B Write expressions and equivalent forms to solve problems

A-APR.A Perform arithmetic operations on polynomials

A-CED.A Create equations that describe numbers or relationships

A-REI.A Understand solving equations as a process of reasoning and explain the reasoning

A-REI.B Solve equations and inequalities in one variable

Indicators:
N-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
N-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling
N-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities
N-RNA.2 Rewrite expressions involving radicals and rational exponents using the proportions of exponents
A-SSE.B.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression
A-APR.A.1 Understand that polynomials form a system analogous for the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.
A-CED.A.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations
A-REI.A.2 Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise
A-REI.B.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

Understandings:
Students will understand that…

- Integers, decimals, and fractions can be added, subtracted, multiplied, and divided.
- Complex fractions can be simplified.
- Expressions can be simplified using the order of operations.
- Fractions can be written as decimals and percents.
- Expressions with percents can be evaluated.
- Numerical values can be written as Roman numerals.

Essential Questions:

- How can you add, subtract, multiply and divide integers, decimals and fractions?
- How can you simplify a complex fraction?
- How can you simplify an expression by following the order of operations?
- How can you convert a fraction to a decimal and a percent?
- How can you evaluate a expression that contains percents?
- How can you determine the numerical value of a Roman numeral?
- How would you solve and check linear and

• Linear and rational equations can be solved, and their solutions can be checked. • Linear equations can be used to solve mixture problems. • Formulas can be solved and evaluated for a given variable. • Problems can be solved using ratios and proportions. • Translating percent problems into an equation and using proportions are ways to solve percent problems. • The rules of exponents include product, quotient, power, and the negative exponent rule. • Scientific notation can be used to simplify expressions. • Scientific notation can is used to convert very large or very small numbers. • Significant digits tell about the accuracy in a number. • Expressions can be evaluated on a scientific calculator.	rational equations? • How would you solve mixture problems? • How can you solve and evaluate formulas for a given variable? • How can you solve problems using ratios and proportions? • How can you formulate and solve percent problems using proportions and translating into equations? • How can you apply exponent rules to simplify expressions? • How can you simplify expressions using scientific notation? • How can you convert numbers from standard notation to scientific and vice versa? • How can you determine how many significant digits are in a given number? • How do you use the scientific calculator to evaluate expressions?

Assessment Evidence

Performance Tasks:	**Other Evidence:**
Classwork Homework Schoology assignments Lesson Quizzes Mid-Chapter Quiz Exit/Admit Tickets	Calculator help End of Chapter summaries & exercises Study Strategies Algebra Help

Benchmarks:
Chapter 1 Quiz
Chapter 2 Test
Unit Project

Learning Plan

Learning Activities:

1.1/1.2/1.3 Operations with Integers and Fractions and Order of Operations (1 day)
- Add, subtract, multiply, and divide integers and fractions
- Simplify complex fractions
- Work with unit rates
- Evaluate expressions using order of operations

1.4/1.5 Decimals and Percents (1 day)
- Add, subtract, multiply, divide and round decimals
- Write fractions as decimals
- Convert between decimals, fractions and percents
- Evaluate expressions that contain percents

1.6 Roman Numerals (1 day)

- Determine numerical value of Roman numerals

CH.1 Review & Quiz (1 day)

2.1/2.2/2.3 Solving Linear Equations, Mixture Problems, and Rational Equations (2 days)

- Solve linear equations and check the solution
- Solve mixture problems
- Solve rational equations and check the solution

2.4 Formula Manipulation (1 day)

- Solve and evaluate formulas for a given variable
- Solve simultaneous equations

2.5 Ratios and Proportions (1 day)

- Solve problems using ratios and proportions

2.6 Solving Percent Problems (1 day)

- Solve percent problems by translating into an equation
- Solve percent problems using proportions

2.7 Properties of Exponents (1 day)

- Know and work with the rules of exponents including the product rule, quotient rule, power rule, and negative exponent rule.
- Understand that the rules of exponent apply only when the bases are the same.

2.8/2.9 Scientific Notation and Significant Digits (2 days)

- Convert numbers from standard form to scientific notation and vice versa
- Simplify given expressions given in scientific notation
- Determine how many significant digits are in a given number
- Understand precision and accuracy, particularly when adding and multiplying

2.10 Using a Scientific Calculator (1/2 day)

- Use scientific calculator to evaluate expression

Chapter 2 Review (1/2 day)

Chapter 2 Test (1 day)

Unit Project (1 day)

*Within this unit, extra practice, review, or project could be included for an additional 3 days

Resources:

Mathematics for Health Sciences textbook
Mathematics for Health Science PowerPoints
Schoology assignments

Unit Modifications for Special Population Students	
Advanced Learners	• Invite students to explore different points of view on a topic of study and compare the two. • Assign a leadership role in classroom learning • Determine where student's interests lie and capitalize on their inquisitiveness. • Expose students to a selection and use of specialized resources
Struggling Learners	• Be flexible with time frames and deadlines • Create planned opportunities for interaction between individuals in the classroom: cooperative and collaborative learning, pair and share with peers • Group students • Intentional scheduling/grouping with student/teacher of alternative background • Provide support as at-risk students move through all levels of knowledge acquisition • Tap prior knowledge
English Language Learners	• Accommodate with completed study guides to assist with preparation on tests • Allow students to give responses in a form (oral or written) that's easier for him/her • Be flexible with time frames, deadlines, or modify assessments • Create planned opportunities for interaction between individuals in the classroom: skits, cooperative and collaborative learning, student generated stories based on personal experience • Establish a framework allowing ELL students to understand and assimilate new ideas and information • Focus on domain specific vocabulary and keywords • Give alternate or paper copies to accommodate electronic assignments. • Have another student share class notes with the ELL student. • Intentional scheduling/grouping with student/teacher of language if possible • Mark texts with a highlighter. • Take more time to complete a task, project, or test. • Use manipulatives, graphic organizer, and real objects when possible • Use visual presentations/verbal materials (ex: word webs and visual organizers).
Special Needs Learners	• Accommodate with completed study guides to assist with preparation on tests. • Allow more time to complete task, project, or test • Allow students to give responses in a form (oral or written) that's easier for him • Be flexible with time frames, deadlines, or modify assessments • Give alternate or paper copies to replace electronic assignments • Have another student share class notes with the special needs learner. • Higher level reasoning and questioning would have less weight than other assignments. • Receive study skill instructions. • Work with fewer items per page or line and/or materials in a larger print
Learners with a 504	Refer to page four in the Parent and Educator Resource Guide to Section 504 to assist in the development of appropriate plans.

Interdisciplinary Connections

Indicators:

11th and 12th Grade Reading Standards

RST.11-12.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text

RST.11-12.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics.

Integration of 21st Century Skills

Indicators:

- Critical thinking and problem solving
- Creativity and innovation
- Cross-cultural understanding
- Communications, information, and media literacy
- Computing and ICT literacy
- Collaboration

Unit 2: Measuring in Medicine

Unit Description:
This unit will cover measurement systems, conversion procedures, dilutions, solutions, concentrations, drug dosages and calculations. Basic dimensional analysis and conversions within the metric system and conversions between metric and nonmetric systems will be discussed. Then the unit will use the formula $V_1 \times C_1 = V_2 \times C_2$ to dilute solutions. It will also discuss concentrations and percent solutions. Finally, the unit will make sure students can read and interpret drug orders and labels correctly and how to do the mathematics involved when calculating proper dosage to administer to a patient.

Unit Duration: 36 days = 12 cycles (*42 days = 14 cycles)

Desired Results

Standard(s):

N-RN.A Extend the properties of exponents to rational exponents

N-RN.B Use properties of rational and irrational numbers

N-Q.A Reason quantitatively and use units to solve problems

A-SSE.A Interpret the structure of expressions

A-APR.D Rewrite rational expressions

F-BF.A Build a function that models our relationship between two quantities

F-LE.B Interpret expressions for functions in terms of the situation they model

Indicators:

N-RN.A.1 explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents

N-RN.B.3 explain why the sum or product of two rational numbers is rational; That the sum of a rational number and an irrational number is irrational; and that the product of a non zero rational number and an irrational number is irrational

N-Q.A.2 define appropriate quantities for the purpose of descriptive modeling

A-SSE.A.1 interpret expressions that represent a quantity in terms of its context

A-APR.D.6 rewrite simple rational expressions in different forms; right a(x)/b(x) in the form q(x) + r(x)/b(x) where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division, or a computer algebra system

F-BF.A.2 write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms

F-LE.B.5 trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline

Understandings:
Students will understand that…

- Dimensional analysis can be used to simplify and interpret units.
- Horizontal format and dimensional analysis can be used to convert within the metric system.
- Metric and nonmetric systems can be converted using both dimensional analysis and proportions.
- Conversions between apothecary and household systems can be performed.
- Temperatures can be converted between Celsius, Fahrenheit and Kelvin.
- Problems involving dilution can be solved
- Dilutions can be performed to make final

Essential Questions:

- How can you apply dimensional analysis to simplify and interpret units?
- How would you use dimensional analysis and horizontal format to convert units within the metric system?
- How can you use the concepts of proportions and dimensional analysis to convert from metric to nonmetric systems?
- What approach would you use to convert apothecary and household system units?
- What approach would you use to convert temperatures between Celsius, Fahrenheit and Kelvin?
- What concepts will you use to solve problems

concentrations. • The formula V_1 X C_1 = V_2 X C_2 can be used to solve dilution problems. • Problems can be solved involving percent per unit within weight and volume. • Drug orders and labels can be read and interpreted. • Drug orders can be calculated using dosage formula, proportions, and dimensional analysis • The volume of medication contained in a syringe can be identified. • The volume needed to satisfy a particular order can be calculated. • The dosage formula, proportions, or dimensional analysis can be used to calculate the necessary volumes of medications given in powdered form and converted into liquid form. • Intravenous calculations and intramuscular calculations using the formula, proportions, and dimensional analysis. • Titration calculations can be performed using a step by step process and using dimensional analysis. • The size of a person can affect the amount of a drug the person should be administered. • By calculating drug dosages based on body weight, students can determine whether a physician's order is appropriate. • Drug dosages can be calculated based on body surface area using formulas and using the West Nomogram chart.	involving dilution? • What dilution was performed in order to make a final concentration? • How can you use the formula V_1 X C_1 = V_2 X C_2 to solve dilution problems? • How can you apply percents to find the percent per unit in weight and volume? • How can you interpret drug orders and labels? • How can you use concepts including dosage formula, proportions, and dimensional analysis to calculate drug orders? • How can you identify the volume of medications contained in a syringe? • How can you use concepts including dosage formula, proportions, and dimensional analysis to calculate the volume to be administered? • How can you use concepts including dosage formula, proportions, and dimensional analysis to calculate and convert a powdered medications into a liquid medication? • How can you assess intravenous and intramuscular calculations using the formula, proportions, and dimensional analysis? • How can you apply the four step process in order to solve how titration calculations? • How can you calculate titration calculations by applying the dimensional analysis method? • How can you analyze a physician's order to determine if the drug dosage is calculated correctly based on a person's body weight? • How can you apply formulas in order to calculate the body surface area and therefore determine drug dosage? • How can you interpret the West Nomogram chart in order to determine drug dosage based on body surface area?
Assessment Evidence	
Performance Tasks: Checkpoints Homework WebAssign assignments Lesson Quizzes Mid-Chapter Quiz Exit/Admit Tickets Unit Project	**Performance Tasks:** WebAssign remediation Skill Refresher Review and Refresh exercises Vocabulary concept check Study Strategies Algebra Help
Benchmarks: Ch.3 Test Ch. 4 Test Ch. 5 Test Unit 2 Project	

Learning Plan

Learning Activities:

3.1 Basic Dimensional Analysis (2 days)
- Simplify and interpret units using dimensional analysis

3.2/3.3 Conversion within the Metric System and between Metric and Nonmetric (3 days)
- Perform conversions within the metric system using the horizontal format and dimensional analysis
- Convert between metric and nonmetric systems using dimensional analysis and proportions

3.4/3.5 Apothecary and Household Systems and Temperature Conversions (3 days)
- Perform conversions within and between the apothecary and household systems
- Perform temperature conversions between Celsius, Fahrenheit, and Kelvin

Ch.3 Review and Test (2 days)

4.1 Dilutions (1.5 days)
- Solve dilution problems

4.2 Concentrations (1.5 days)
- Determine final concentrations
- Determine what dilution was performed

4.3 Concentrations and Volumes of Two Solutions (1.5 days)
- Solve dilutions problems using the formula $V_1 \times C_1 = V_2 \times C_2$

4.4 Percent Solutions (2.5 days)
- Solve problems involving percent weight per unit weight
- Solve problems involving percent volume per unit volume
- Solve problems involving percent weight per unit volume

Ch.4 Review & Test (2 days)

5.1 Reading and Interpreting Drug Orders and Drug Labels (1.5 days)
- Read and interpret drug orders and labels

5.2 Dosage Calculations: Formulas, Proportions and Dimensional Analysis (1.5 days)
- Calculate drug orders using the dosage formula, proportions, and dimensional analysis

5.3 Parenteral Dosage Calculations (2 days)
- Identify the volume of medication contained in a syringe
- Calculate the volume needed to satisfy a particular order

5.4 Reconstitution of Solutions (1.5 days)
- Calculate the volume of reconstituted medication that is required when the medication is supplied in powdered form

5.5 Intravenous Flow Rates (1.5 days)
- Perform intravenous and intramuscular calculations using the formula, proportions, and dimensional analysis

5.6 Titration of Intravenous Medications (1.5 days)
- perform titration calculations using a step by step process and using dimensional analysis

5.7 Dosages Based on Weight (2 days)
- Calculate drug dosages based on body weight
- Determine whether a physician's order is appropriate

5.8 Dosages Based on Body Surface Area (1.5 days)
- Calculate drug dosages based on BSA using formulas and using the West Nomogram chart

Ch. 5 Review & Test (2 days)

Unit Project (2 days)

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RST.11-12.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics.

11th and 12th Grade Standards

WHST.11-12.1. Write arguments focused on discipline-specific content.

B. Develop claim(s) and counterclaims using sound reasoning and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases.

Technology Education Practices

9.4.12.O.2: Demonstrate mathematics knowledge and skills required to pursue the full-range of postsecondary education and career opportunities.

9.4.12.O.20: Conduct technical research to gather information necessary for decision-making.

Life Literacies & Key Skills

9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8)

Integration of 21st Century Skills

Indicators:

- Critical thinking and problem solving
- Creativity and innovation
- Cross-cultural understanding
- Communications, information, and media literacy
- Computing and ICT literacy
- Collaboration

Unit 3: Advanced Algebra Topics

Unit Description:
This unit will cover topics including linear equations, graphing, variation, exponential and logarithmic functions, and geometry. In Health Sciences, graphs show quantities being related and it is necessary to learn how to graph and interpret those graphs. Logarithmic functions can be found in Health Sciences when working with pH as well as exponential functions are used to model the growth or decay of medical phenomena like bacterial infections and population. Therefore, this unit will apply exponential and logarithmic functions to medical applications. Fundamental geometric concepts are found in the Health Science field and therefore this unit will also cover the geometric skills needed that are necessary to succeed in future Health Science curriculums.

Unit Duration: 24 days = 8 cycles (*30 days = 10 cycles)

Desired Results

Standard(s):

F-IF.A Understand the concept of a function and use function notation

F-IF.B Interpret functions that arise in applications in terms of the context

F-IF.C Analyze functions using different representations

F-BF.A Build a function that models a relationship between two quantities

F-BF.B build new functions from existing functions

F-LE.A Construct and compare linear and exponential models to solve problems

F-LE.B Interpret expressions for functions in terms of the situation they model

G-CO.A Experiment with transformations in the plane

G-C.B Find arc lengths and areas of sectors of circles

G-GMD.A Explain volume formulas and use them to solve problems

G-MG.A Apply geometric concepts in modeling situations

Indicators:

F-IF.A1 understand that a function from one set to another set assigns to each element of the domain exactly one element of the range. If f is a function an x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x).

F-IF.A2 use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context

F-IF.B4 for a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.

F-IF.B6 Calculate and interpret the average rate of change of a function over a specified interval. Estimate the rate of change from a graph

F-IF.C7a graph linear and quadratic functions and show intercepts, maxima, and minima

F-IF.C7e graph exponential and log arhythmic functions, showing intercepts and end behavior, and trigonometric functions, showing., midline, and amplitude

F-IF.C8b use the properties of exponents to interpret expressions for exponential functions

F-BF.A1a determine an explicit expression, of recursive process, or steps for calculation from a context

F-BF.B4a solve and equation of the form f(x) = c for a simple function F that has an inverse and write an expression for the inverse

F-BF.LE.A1a prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals

F-BF.LE.A1b recognize situations in which one quantity changes at a constant rate per unit interval relative to another

F-BF.LE.A1c recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another

F-BF.LE.B5 interpret the parameters in a linear or exponential function in terms of a context

G-CO.A1 no precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc

G-C.B5 derive using similarity the fact that the arc length intercepted by an angle is proportional to the radius, and define the Radian measure of the angle as the constant of proportionality; Derive the formula for the area of a sector

G-GMD.A1 give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone

G-MG.A1 use geometric shapes, their measures, and their properties to describe objects

G-MG.A2 apply concepts of density based on area and volume in modelling situations

Understandings:

Students will understand that…

- Slope is related to rate of change
- Slope can be determined from two points or a line
- Lines can be graphed using slope and a point and by using tables
- Linear and non-linear graphs can be read and interpreted relative to Health Sciences
- Health Science problems can be solved by using direct or inverse variation
- Functions and function notation are used in the Health Science field
- Inverse graphs are used to represent data in Health Sciences
- Functions that represent exponential data can be graphed and interpreted
- Problems can be solved using exponential growth and decay
- Logarithms and their properties are used in the Health Science field
- Logarithm and natural logarithm expressions can be expanded and condensed
- The pH of a solution can be determined using logarithms
- The H^+ concentration given the pH can be determined using logarithms
- Absorbance and transmittance can be calculated using logarithms
- Geometry definitions can be recalled and applied in the medical field
- Geometry problems can be solved using complementary and supplementary angles
- Area, perimeter, and volume of geometric figures can be found, and appropriate units used
- Area and circumference of circles can be calculated
- Sector formula can be applied to circles
- Surface area of geometric formulas can be calculated
- Weight and volume can be determined given the density of an object

Essential Questions:

- How can you determine the slope of a graph?
- How can you draw conclusions from the slope of a problem based on Health Science problems?
- How can you construct lines given sloping and a point and from tables?
- How can you interpret linear and nonlinear graphs relative to Health Science problems?
- How can you use direct and inverse variations to solve Health Science problems?
- How are functions and function notations applied in the Health Science field?
- How can we develop an inverse graph based on given data?
- How can you interpret and graph functions that represent exponential data?
- How can you construct and solve a problem using exponential growth and decay functions?
- How can you apply logarithmic functions and their properties in the Health Science field?
- How can you use the concept of expanding and condensing logarithms in order to solve problems in the Health Science field?
- How can you determine the pH of a solution using logarithms?
- How can you determine the H^+ concentration given the pH using logarithms?
- How can you use the concept of logarithms in order to calculate absorbance and transmittance?
- How can you illustrate or define geometry vocabulary terms in reference to the medical field?
- How can you construct complementary and supplementary angles to solve medical field related geometry problems?
- How can you formulate the area, perimeter, and volume of geometric figures while the appropriate units?
- How can you determine the area and circumference of circles?
- How can you formulate the sector formula

	and use it to solve problems? • How can you determine the weight and volume of an object given its density?

Assessment Evidence

Performance Tasks:	Other Evidence:
Checkpoints	WebAssign remediation
Homework	Skill Refresher
WebAssign assignments	Review and Refresh exercises
Lesson Quizzes	Vocabulary concept check
Mid-Chapter Quiz	Study Strategies
Exit/Admit Tickets	Algebra Help
Unit Project	

Benchmarks:
Ch.6 Quiz
Ch.7 Test
Ch.8 Test
Unit Project

Learning Plan

Learning Activities:

6.1 & 6.2 Slope and Rate of Change (1 day)
- Understand and determine slope and its relationship to rate of change

6.3 & 6.4 Graphing Linear Equations (1 day)
- Graph linear equations using slope and a point and then using tables

6.5 Interpreting Linear and Non-Linear Graphs (0.5 day)
- Read and interpret linear and non-linear graphs

6.6 Direct and Inverse Variation (0.5 day)
- Solve direct and inverse variation problems

Ch.6 Review & Quiz (1 day)

7.1 Functions and Inequalities (0.5 day)
- Understand functions, function notation and graphing of inverses

7.2 Exponential Functions (0.5 day)
- Understand the behavior of exponential functions and how to graph them

7.3 Applications of exponential function growth and decay (2 days)
- Solve applications involving exponential growth and decay

7.4 Logarithms (3 days)
- Define logarithm and know its properties
- Determine logarithmical values with and without using a calculator
- Expand and condense logarithmic and natural logarithm expressions

7.5 Applications of logarithms (2 days)
- Determine the pH of a solution
- Determine the H^+ concentration given the pH

- Calculate the absorbance and transmittance

Ch. 7 Review & Test (2 days)

8.1/8.2/8.3 Angles, Lines, Geometric Figures, Area, and Volume (3 days)

- Review geometry terms like line, segment, angle, ray, vertex, right angle, obtuse angle, and acute angle
- Review solving geometry problems involving complementary and supplementary angles
- Review area, perimeter, and volume of geometric figures and the appropriate units
- Calculate area and circumference of circles
- Use sector formula for circles

8.4/8.5 Surface Area and Density (2 days)

- Review surface area of geometric figures
- Determine the weight/volume given the density

Ch.8 Review & Quiz (2 days)

Unit Project (3 days)

*Within this unit, extra practice, review, or project could be included for an additional 3-6 days

Resources:

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Mathematics for Health Science PowerPoints

Schoology assignments

Unit Modifications for Special Population Students	
Advanced Learners	• Invite students to explore different points of view on a topic of study and compare the two. • Assign a leadership role in classroom learning • Determine where student's interests lie and capitalize on their inquisitiveness. • Expose students to a selection and use of specialized resources
Struggling Learners	• Be flexible with time frames and deadlines • Create planned opportunities for interaction between individuals in the classroom: cooperative and collaborative learning, pair and share with peers • Group students • Intentional scheduling/grouping with student/teacher of alternative background • Provide support as at-risk students move through all levels of knowledge acquisition • Tap prior knowledge
English Language Learners	• Accommodate with completed study guides to assist with preparation on tests • Allow students to give responses in a form (oral or written) that's easier for him/her • Be flexible with time frames, deadlines, or modify assessments • Create planned opportunities for interaction between individuals in the classroom: skits, cooperative and collaborative learning, student generated stories based on personal experience • Establish a framework allowing ELL students to understand and assimilate new ideas and information • Focus on domain specific vocabulary and keywords • Give alternate or paper copies to accommodate electronic assignments. • Have another student share class notes with the ELL student. • Intentional scheduling/grouping with student/teacher of language if possible • Mark texts with a highlighter. • Take more time to complete a task, project, or test. • Use manipulatives, graphic organizer, and real objects when possible • Use visual presentations/verbal materials (ex: word webs and visual organizers).
Special Needs Learners	• Accommodate with completed study guides to assist with preparation on tests. • Allow more time to complete task, project, or test • Allow students to give responses in a form (oral or written) that's easier for him • Be flexible with time frames, deadlines, or modify assessments • Give alternate or paper copies to replace electronic assignments • Have another student share class notes with the special needs learner. • Higher level reasoning and questioning would have less weight than other assignments. • Receive study skill instructions. • Work with fewer items per page or line and/or materials in a larger print
Learners with a 504	Refer to page four in the Parent and Educator Resource Guide to Section 504 to assist in the development of appropriate plans.

Interdisciplinary Connections

Indicators:

11th and 12th Grade Reading Standards

RST.11-12.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text

RST.11-12.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics.

New Jersey Student Learning Standards for Technology Education

9.4.12.O.17: Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.

Integration of 21st Century Skills

Indicators:

- Critical thinking and problem solving
- Creativity and innovation
- Cross-cultural understanding
- Communications, information, and media literacy
- Computing and ICT literacy
- Collaboration

Unit 4: Data & Statistics

Unit Description:
In this unit students will review charts, tables, graphs, and a basic introduction to statistics. Often in Health Sciences there is a need to gather data. Once the data has been collected, the data needs to be organized and professionals draw conclusions or make conjectures based on the data. Students will begin this unit with methods of collecting data, organizing data, then reading and interpreting the organized data. On the second part of the unit, students will learn other ways to draw conclusions from the data. The unit will present a few ways to measure central tendencies and explain why one method may be better than another. In addition, other statistical concepts will be discussed that may help in analyzing and understanding information.

Unit Duration: 24 days = 8 cycles (*30 days = 10 cycles)

Desired Results

Standard(s):

S-ID.A Summarize, represent, and interpret data on a single count or measurement variable

S-ID.B Summarize, represent, and interpret data on two categorical and quantitative variables

S-IC.B Make inferences and justify conclusions from sample surveys, experiments, and observational studies

Indicators:

S-ID.A1 represent data with plots on the real number line

S-ID.A4 use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve

S-ID.B5 summarize categorical data for two categories in two way frequency tables. Interpret relative frequencies in the context of the data. Recognize possible associations and trends in the data

S-IC.B3 recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each other

S-IC.B4 use data from a sample survey to estimate a population mean or proportion; Develop a margin of error using simulation models for random sampling

S-IC.B5 use data from a randomized experiment to compare two treatments; Use simulations to decide if differences between parameters are significant

S-IC.B6 evaluate reports based on data

Understandings:
Students will understand that…

- Frequency tables can be created from a data set
- Tables, line graph, bar graph, and pie charts can be read and interpreted
- Line graphs, bar charts, and pie charts can be constructed by hand and using technology
- Mean, median, and mode can be calculated by hand and using technology
- Standard deviation gives information about how data is dispersed
- Normal distribution has significance
- The Empirical Rule can be applied to bell-shaped distribution
- Z-score tells how far a measurement id from the mean in terms of standard deviation
- Percentile rank can be calculated

Essential Questions:

- How can you create a frequency table from a data set?
- How can you analyze, make observations, and draw conclusions from tables, line graph, bar graph, and pie charts?
- How can you construct line graphs, bar charts, and pie charts by hand and using technology?
- How can you calculate the mean, median, and mode by hand and using technology?
- Can you analyze the standard deviation of a set and draw conclusions about how the data is dispersed?
- How can you apply the Empirical Rule to a set of data?
- How can you assess the z-score using its formula to a set of data?
- How can you calculate percentile rank?

Assessment Evidence

Performance Tasks:

- Checkpoints
- Homework
- WebAssign assignments
- Lesson Quizzes
- Mid-Chapter Quiz
- Exit/Admit Tickets
- Unit Project

Other Evidence:

- WebAssign remediation
- Skill Refresher
- Review and Refresh exercises
- Vocabulary concept check
- Study Strategies
- Algebra Help

Benchmarks:
Ch.9 Quiz
Ch. 10 Test
Unit Project

Learning Plan

Learning Activities:
9.1/9.2 Collecting data and organizing data using frequency distribution tables (2 days)
- Create a frequency distribution table from a data set

9.3 Reading and interpreting tables and charts (1 day)
- Read and interpret tables, line graph, bar charts, and pie charts

9.4 Constructing charts and graphs from tables (2 days)
- Construct line graphs, bar charts, and pie charts from tables by hand and using technology

CH.9 Review & Quiz (2 days)
10.1 Measures of central tendency (2 days)
- Calculate the mean, median, and mode of a data set by hand and using technology

10.2 Standard deviation (3 days)
- Understand and calculate the standard deviation

10.3 Normal distribution (2 days)
- Understand the significance of the normal distribution
- Understand and apply the Empirical Rule

10.4 z – score (2 days)
- Use the z-score to calculate the standard deviation

10.5 Percentiles (2 days)
- Calculate the percentile rank for a given score

Ch. 10 Review & Test (3 days)
Unit Project (3 days)
*Within this unit, extra practice, review, or project could be included for an additional 3-6 days

Resources:

Mathematics for Health Sciences textbook

Mathematics for Health Science PowerPoints

Schoology assignments

Unit Modifications for Special Population Students	
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Learners with a 504	Refer to page four in the Parent and Educator Resource Guide to Section 504 to assist in the development of appropriate plans.

Interdisciplinary Connections

Indicators:

11th and 12th Grade Reading Standards

RST.11-12.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text

RST.11-12.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics.

New Jersey Student Learning Standards for Computer Science and Design Thinking

8.1.8.DA.1: Organize and transform data collected using computational tools to make it usable for a specific purpose.

8.1.8.DA.4: Transform data to remove errors and improve the accuracy of the data for analysis.

8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.

8.1.12.DA.6: Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.

8.2.12.EC.3: Synthesize data, analyze trends, and draw conclusions regarding the effect of a technology on the individual, culture, society, and environment and share this information with the appropriate audience.

New Jersey Student Learning Standards for Technology Education

9.3.ST.1: Use technology to acquire, manipulate, analyze and report data.

9.3.ST-SM.4: Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.

9.4.12.O.2: Demonstrate mathematics knowledge and skills required to pursue the full-range of postsecondary education and career opportunities.

9.4.12.O.12: Develop and interpret tables, charts, and figures to support written and oral communications.

9.4.12.O.17: Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.

9.4.12.O.27: Employ spreadsheet applications to organize and manipulate data.

9.4.12.O.32: Effectively use information technology to gather, store and communicate data in appropriate formats.

9.4.12.O.(2).5: Demonstrate critical thinking abilities and skills needed to review information, to explain statistical analyses, and to translate, interpret, and summarize research and statistical data collected and analyzed as the result of an investigation.

Life Literacies & Key Skills

9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8)

Integration of 21st Century Skills

Indicators:

- Critical thinking and problem solving
- Creativity and innovation
- Cross-cultural understanding
- Communications, information, and media literacy
- Computing and ICT literacy
- Collaboration

Unit 5: Trigonometry

Unit Description:
This unit will review square roots, the Pythagorean theorem, special triangles, similar triangles, and the six fundamental trigonometry functions. It concludes by detailing applications that require the use of trig functions.

Unit Duration: 12 days = 4 cycles (*15 days = 5 cycles)

Desired Results

Standard(s):

F-TF.A extend the domain of trigonometric functions using the unit circle

F-TF.B model periodic phenomena with trigonometric functions

G-SRT.B prove theorems involving similarity

G-SRT.C define trigonometric ratios and solve problems involving right triangles

Indicators:

F-TF.A3 use special triangles to determine geometrically the values of sine, cosine, tangent for $\frac{\pi}{3}$, $\frac{\pi}{4}$, and $\frac{\pi}{6}$, and use the unit circle to express the values of sine, cosine, and tangent for πx, $\pi + x$, and $2\pi - x$ in terms of their values for x, where x is any real number

F-TF.B5 choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline

G-SRT.B5 use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures

G-SRT.C6 understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading two definitions of trigonometric ratios for acute ankles

G-SRT.C8 use trigonometric ratios and the Pythagorean theorem to solve right triangles and applied problems

Understandings:
Students will understand that…

- Pythagorean Theorem is used to determine the length of a missing side in a right triangle
- Special triangles frequently arise in many applications and their properties can be used to solve a variety of problems
- Triangles can be determined as similar by looking at their measurements
- Values for sine, cosine, and tangent can be determined for a given angle
- Trigonometry functions are ratios
- Values for cosecant, secant, and cotangent can be determined of an angle
- Trigonometry can be used to solve application problems in the health science field
- Sine and cosine have cyclical behavior and their graphs are waves

Essential Questions:

- How can you assess the Pythagorean Theorem to determine the missing side of a right triangle?
- How can you apply the properties of special triangles to solve application problems in the health science field?
- How can you analyze triangles to determine if they are similar?
- How can you assess an angle and find the value of sine, cosine, and tangent?
- How can you connect trigonometry functions to ratios?
- How can you determine the values of cosecant, secant, and cotangent of an angle?
- How can you apply the concepts of trigonometry to solve application problems in the health science field?
- How can you explain the graphs of sine and cosine?

Assessment Evidence

Performance Tasks:

Checkpoints

Homework

Other Evidence:

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Skill Refresher

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Benchmarks:
Ch.11 Test
Unit Project

Learning Plan

Learning Activities:
11.1/11.2 Square roots, Pythagorean theorem, Special and similar triangles (2 days)
- Use the Pythagorean theorem to determine the length of a missing side in the right triangle
- Review the 30-60-90 triangle, 45-45-90 triangle, and the 3-4-5 triangle
- Determine whether two triangles are similar

11.3 Sine, Cosine, and Tangent (1.5 days)
- Determine the values of sine, cosine, and tangent for given angles
- Understand trig functions as ratios

11.4 Related trig functions (1.5 days)
- Determine the values of cosecant, secant, and cotangent for given angles

11.5 Applications of trigonometry (3 days)
- Use trigonometry in applications
- Understand the cyclical behavior of the sine and cosine function and that their graphs are waves

Ch. 11 Review & Test (2 days)
Unit Project (2 days)
*Within this unit, extra practice, review, or project could be included for an additional 3 days

Resources:

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