Cover Sheet - Planned Course Overview

A. Planned Course Title: Math Applications Course Number: M309

B. Grade level: HS

C. Board Approval Date: 2/12/2018

D. Instructional Time:
1. Length of course in weeks: 36 weeks
2. Number of class periods per week: 5
3. Length of class periods: 42 minutes
4. Total clock hours/credit for the course: 1.0 credit

E. List of the units of study within the course and estimated number of class periods or weeks allotted to each:

Topic	Estimated Time
Linear Equations and Inequalities	45 days
Functions, Probability & Statistics	45 days
Quadratic Functions, Equations, and Graphs	45 days
Financial Literacy/Application	45 days

F. The texts or major resources for the course:
Title: A survey of mathematics
Author: Angel - Porter
Publisher: Addison Wesley Longman
Copyright: 2001

Title: Naviance
Company: Hobsons

G. Special Notes:

H. Names of the committee members who developed the planned course:
Lauren Belowich, Neali Feimster, Lauren Sniscak

Math Applications Curriculum
Revised Fall 2017

Topic 1: Developing a Connection to Math in the Real World

Topic Overview: Identifying an Occupation to use during the year to make authentic connections.

Standards:

CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.

CC.2.1.HS.F.3 Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays.

Essential Question (Core Concepts)

How is mathematics used to quantify, compare, represent, and model numbers?

How can mathematics support effective communication?

Objectives (Skills/Knowledge)

- Use Naviance online resource to research a potential career path.
- Identify short term/long term goals related to family, financial and career.
- Determine training needed to achieve career goals.
- Communicate information about mathematical needs for career through writing (salary, health benefits provided, retirement, financial planning).

Vocabulary

Occupation
Career
Salary
Job Security
Health Benefits
Retirement
Standard of Living
Long Term Goals
Short Term Goals
Personal Goals
Family Goals
Financial Goals
Career Goals

Activities/Strategies/Study Skills

- Written expression of information
- Research online and through Naviance
- Group Discussions

Assessments

Written component summary of findings through research

Additional Resources

Naviance

Topic 2: Linear Equations

Topic Overview: Students will make connections to their occupation from Unit 1 using prior/new knowledge of Order of Operations, Linear Equations in One Variable, Applications of Linear Equations in One Variable, and Graphing Linear Equations

Standards:

CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems.

CC.2.2.HS.D.7 Create and graph equations or inequalities to describe numbers or relationships.

CC.2.2.HS.D.8 Apply inverse operations to solve equations or formulas for a given variable.

CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.

CC.2.2.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.

Essential Question (Core Concepts)

How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations?
How are relationships represented mathematically?

Objectives (Skills/Knowledge)

- Interpret solutions to linear equations.
- Use and/or identify algebraic properties.
- Write, solve, and/or graph linear equations using various methods.
- Write and/or identify linear equations in various forms (slope-intercept, point-slope, standard, etc.).
- Describe, compute, and/or use linear rate of change (slope).

Vocabulary

Linear
Variable
Expression
Equation
Coefficient
Constant
Slope
Slope Intercept
Y- Intercept
X-Intercept
X-axis
Y-Axis
Origin
Rise over Run
Coordinate Plane
Inverse Operation
Addition/Subtraction Property of Equality
Multiplication/Division Property of Equality
Commutative Property
Inverse Property
Associative Property
Zero Property
Identity Property

No Solution
Infinitely Many Solutions

Activities/Strategies/Study Skills

- PearDeck Interactive Review
- Match and sort graphs
- Games
- Direct Instruction
- Homogeneous/heterogeneous groupings
- Student-led discussion

Assessments

Unit 2 Test
Road Trip Project - Linear Equations

Additional Resources

Math Applications Textbook Chapter 6

Topic 3: Linear Inequalities

Topic Overview: Students will make connections to their occupation from Unit 1 using prior/new knowledge of Linear Inequalities and Linear Inequalities in Two Variables.

Standards:

CC.2.2.HS.D.7 Create and graph equations or inequalities to describe numbers or relationships.

CC.2.2.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.

Essential Question (Core Concepts)

How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations?

How are relationships represented mathematically?

Objectives (Skills/Knowledge)

- Interpret solutions to linear inequalities.
- Use and/or identify algebraic properties.
- Write, solve, and/or graph linear inequalities using various methods.
- Write, solve, and/or graph compound linear inequalities.

Vocabulary

Inequality
Less than
Greater than
Less than or equal to
Greater than or equal to
Shading
Solution
Not equal to

Activities/Strategies/Study Skills

- PearDeck Interactive Review
- Match and sort graphs
- Games
- Direct Instruction
- Homogeneous/heterogeneous groupings
- Student-led discussion
- Explore Learning Gizmos

Assessments

Unit 3 Test

Additional Resources

Math Applications Textbook Chapter 6

Topic 4: Systems of Linear Equations and Inequalities
Topic Overview: Students will make connections to their occupation from Unit 1 using prior/new knowledge of Systems of Linear Equations, Systems of Linear Inequalities and Linear Programming.

Standards:
CC.2.2.HS.D.7 Create and graph equations or inequalities to describe numbers or relationships.

CC.2.2.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.

Essential Question (Core Concepts)
How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations?
How are relationships represented mathematically?

Objectives (Skills/Knowledge)
- Write, solve, and/or graph systems of linear equations and inequalities using various methods.

Vocabulary
Systems
Overlapping Region
Maximum
Minimum
Linear Programming
Substitution
Elimination

Activities/Strategies/Study Skills
- PearDeck Interactive Review
- Match and sort graphs
- Games
- Direct Instruction
- Homogeneous/heterogeneous groupings
- Student-led discussion

Assessments
Unit 4 Test

Additional Resources
Math Applications Textbook Chapter 7

Topic 5: Functions

Topic Overview: Students will make connections to their occupation from Unit 1 using prior/new knowledge of Arithmetic Sequences, Functions and their Graphs, and Graphing Applications.

Standards:

CC.2.2.HS.C.1 Use the concept and notation of functions to interpret and apply them in terms of their context

CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations.

CC.2.2.HS.C.3 Write functions or sequences that model relationships between two quantities.

Essential Question (Core Concepts)

How is mathematics used to quantify, compare, represent, and model numbers?

How are relationships represented mathematically?

How can expressions, equations and inequalities be used to quantify, solve, model, and/or analyze mathematical situations?

How can recognizing repetition or regularity assist in solving problems more efficiently?

How can patterns be used to describe relationships in mathematical situations?

Objectives (Skills/Knowledge)

- Define, evaluate, and compare functions. Use the concept and notation of function to interpret and apply them in terms of their context. Construct and compare linear, quadratic, and exponential models and solve problems.
- Create a function and/or sequence that model relationships between two quantities.
- Create and/or analyze functions using multiple representations (graph, table, and equation).
- Create new functions from existing functions (transformations of graphs).

Vocabulary

Arithmetic Sequence
Function
Relation
Vertical Line Test

Activities/Strategies/Study Skills

- PearDeck Interactive Review
- Match and sort activities
- Games
- Direct Instruction
- Homogeneous/heterogeneous groupings
- Student-led discussion

Assessments

Unit 5 Test

Additional Resources

Math Applications Textbook Sections 5.7 and 6.10

Topic 6: Probability and Statistics

Topic Overview: Students will make connections to their occupation from Unit 1 using prior/new knowledge of the Nature of Probability, Theoretical Probability, Expected Value, Tree Diagrams, Or and And Problems, Conditional Probability, Sampling Techniques, the Misuses of Statistics, Frequency Distributions, Statistical Graphs, Measures of Central Tendency.

Standards:

CC.2.4.HS.B.1 Summarize, represent, and interpret data on a single count or measurement variable.

CC.2.4.HS.B.2 Summarize, represent, and interpret data on two categorical and quantitative variables.

CC.2.4.HS.B.3 Analyze linear models to make interpretations based on the data.

CC.2.4.HS.B.4 Recognize and evaluate random processes underlying statistical experiments.

CC.2.4.HS.B.5 Make inferences and justify conclusions based on sample surveys, experiments, and observational studies.

CC.2.4.HS.B.6 Use the concepts of independence and conditional probability to interpret data.

CC.2.4.HS.B.7 Apply the rules of probability to compute probabilities of compound events in a uniform probability model.

Essential Question (Core Concepts)

In what ways are the mathematical attributes of objects or processes measured, calculated and/or interpreted?

How precise do measurements and calculations need to be?

How can patterns be used to describe relationships in mathematical situations?

How can recognizing repetition or regularity assist in solving problems more efficiently?

How can data be organized and represented to provide insight into the relationship between quantities?

How does the type of data influence the choice of display?

How can probability and data analysis be used to make predictions?

Objectives (Skills/Knowledge)

- Analyze a set of data for a pattern, and represent the pattern with an algebraic rule and/or a graph.
- Summarize, represent, and interpret single-variable data and two-variable data. Use measures of dispersion to describe a set of data (range, quartiles, interquartile range). Analyze and/or interpret data displays and/or use them to make predictions (circle graph, line graph, bar graph, box-and-whisker plot, stem-and-leaf plot, scatter plot). Make inferences and justify conclusions based on sample surveys, experiments, and observational studies.
- Calculate and/or make predictions based upon measures of central tendency.
- Apply probability to practical situations, including compound events.

Vocabulary

Probability
Theoretical Probability
Central Tendency
Mean
Median
Mode

Range

Activities/Strategies/Study Skills

- PearDeck Interactive Review
- Match and sort activities
- Games
- Direct Instruction
- Homogeneous/heterogeneous groupings
- Student-led discussion

Assessments

Unit 6 Project

Additional Resources

Math Applications Textbook Chapter 12 and 13

Topic 7: Quadratic Equations and Functions

Topic Overview: Students will make connections to their occupation from Unit 1 using prior/new knowledge of Multiplying Binomials, Factoring a Trinomial, Solve by Factoring, and Solving by Quadratic Formula

Standards:

CC.2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers.
CC.2.2.HS.D.3 Extend the knowledge of arithmetic operations and apply to polynomials.
CC.2.2.HS.D.4 Understand the relationship between zeros and factors of polynomials to make generalizations about functions and their graphs.
CC.2.2.HS.D.5 Use polynomial identities to solve problems.

Essential Question (Core Concepts)

How is mathematics used to quantify, compare, represent, and model numbers?
How can mathematics support effective communication?
How are relationships represented mathematically?
How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations?
What makes a tool and/or strategy appropriate for a given task?

Objectives (Skills/Knowledge)

- Perform arithmetic operations on polynomials.
- Understand the relationship between zeros and factors of polynomials.
- Rewrite rational expressions.
- Simplify/factor expressions involving polynomials.

Vocabulary

Greatest Common Factor
Least Common Multiple
Binomials
Trinomials
Factor
Quadratic Formula
Quadratic Function
Polynomial
Degree
Term

Activities/Strategies/Study Skills

- PearDeck Interactive Review
- Match and sort activities
- Games
- Direct Instruction
- Homogeneous/heterogeneous groupings
- Student-led discussion

Assessments

Unit 7 Test

Additional Resources Math Applications Textbook Section 6.9

Topic 8: Functions and their Graphs
Topic Overview: Students will make connections to their occupation from Unit 1 using prior/new knowledge of Functions, Linear Functions, and Quadratic Functions.

Standards:
CC.2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers.
CC.2.2.HS.D.3 Extend the knowledge of arithmetic operations and apply to polynomials.
CC.2.2.HS.D.4 Understand the relationship between zeros and factors of polynomials to make generalizations about functions and their graphs.
CC.2.2.HS.D.5 Use polynomial identities to solve problems.

Essential Question (Core Concepts)
How is mathematics used to quantify, compare, represent, and model numbers?
How can mathematics support effective communication?
How are relationships represented mathematically?
How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations?
What makes a tool and/or strategy appropriate for a given task?

Objectives (Skills/Knowledge)
- Perform arithmetic operations on polynomials.
- Understand the relationship between zeros and factors of polynomials.
- Rewrite rational expressions.
- Simplify/factor expressions involving polynomials.

Vocabulary
Zeros of a graph
Maximum
Minimum
Vertex
Opens up/Opens down
Translation
Parabola
Axis of Symmetry
Reflection

Activities/Strategies/Study Skills
- PearDeck Interactive Review
- Match and sort activities
- Games
- Direct Instruction
- Homogeneous/heterogeneous groupings
- Student-led discussion

Assessments
Unit 8 Test

Additional Resources
Math Applications Textbook Section 6.10

Topic 9: Consumer Mathematics

Topic Overview: Students will make connections to their occupation from Unit 1 using prior/new knowledge of Percent, Personal Loans and Simple Interest, Compound Interest, Installment Buying, and Buying a House with a Mortgage

Standards:

CC.2.1.HS.F.1 Apply and extend the properties of exponents to solve problems with rational exponents.

CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.

Essential Question (Core Concepts)

How do people decide when and how to use credit?
What rights and responsibilities do people have when borrowing money?
What impacts a person's creditworthiness?

Objectives (Skills/Knowledge)

- Analyze the total cost of a major purchase loan agreement using fixed and variable interest rates calculated over time.
- Explain the difference between simple and compound interest.
- Discuss problems associated with not having enough cash, and the costs and benefits of borrowing.
- Assess the impact of identity theft.

Vocabulary

Personal Loans
Simple Interest
Mortgage
Compound Interest
Installment Buying
Interest Rates
Down Payment
FHA loan
Conventional Loan
Personal Loan
Student Loan
Debt
Debt to Income Ratio
Checking/Saving Account
Debit Card
Credit Card
Identity Theft

Activities/Strategies/Study Skills

- PearDeck Interactive Review
- Match and sort activities
- Games
- Direct Instruction
- Homogeneous/heterogeneous groupings
- Student-led discussion

Assessments
Unit 9 Project

Additional Resources
Math Applications Textbook Chapter 11

Topic 10: Applications of Geometric Concepts

Topic Overview: Students will make connections to their occupation from Unit 1 using prior/new knowledge of Points, Lines, Planes, and Angles, Polygons, Perimeter and Area, and Volume and Surface Area.

Standards:

CC.2.3.HS.A.4 Apply the concept of congruence to create geometric constructions.

CC.2.3.HS.A.12 Explain volume formulas and use them to solve problems.

CC.2.3.HS.A.13 Analyze relationships between two-dimensional and three-dimensional objects.

CC.2.3.HS.A.14 Apply geometric concepts to model and solve real world problems.

Essential Question (Core Concepts)

How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems?

How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving?

How can geometric properties and theorems be used to describe, model, and analyze situations?

Objectives (Skills/Knowledge)

- Use and/or compare measurements of angles.
- Use and/or develop procedures to determine, describe, or estimate measures of perimeter, circumference, area, surface area, and/or volume.
- Describe how a change in the linear dimension can affect perimeter, circumference, area, surface area, and/or volume.
- Visualize the relation between two-and three-dimensional objects.
- Apply geometric concepts in modeling situations.
- Use properties of congruence, correspondence, and similarity involving 2- and 3-dimensional figures.

Vocabulary

Planes
Angles
Polygons
Perimeter
Area
Points
Volume
Surface Area
Radius
Diameter
Pi
Circle
Triangle
Isosceles Triangle
Equilateral Triangle
Right Triangle
Square
Rectangle
Parallelogram

Rhombus
Segment
Line
Circumference
Altitiude
Mid-point
Median
Scalene Triangle
Distance Formula
Sphere
Cube
Prism
Similar figures

Activities/Strategies/Study Skills

- PearDeck Interactive Review
- Match and sort activities
- Games
- Direct Instruction
- Homogeneous/heterogeneous groupings
- Student-led discussion
- Measure Angles with protractors

Assessments

Unit 10 Project

Additional Resources

Math Applications Textbook Chapter 9