

CONCEPT MAP

CONCEPTUAL MATHEMATICS

Suggested Sequence:

1. Introduction to Problem Solving and Mathematical Models
2. Linear Function Models and Problem Solving
3. Problem Solving with Quadratic and Power Function Models
4. Modeling with Exponential Functions
5. Probability Models
6. Problem Solving with Graphical and Statistical Models
7. Using Geometric Models to Solve Problems
8. Problem Solving with Financial Models

Introduction to Problem Solving and Math Models

Key Concepts:

- Wild About Harry
- The Classroom
- Make Me an Offer
- Proportional Reasoning
- Fuel Economy
- Florida Heat
- Fill 'Er Up
- Mathematical Modeling
- Fund-Raiser Revisited
- Leasing a Copier
- Comparing Energy Costs
- Summer Job Opportunities
- Graphs Tell Stories
- Heating Schedule

CSOs: CM.2, CM.2.1

Estimated days to complete: 12

Enduring Understanding:

Students will learn how to develop critical thinking skills to produce problem solving skills.

Essential Question(s):

- What strategies are essential for problem solving?
- How do you solve real world problems using problem solving strategies?

Key Vocabulary:

- Problem Solving
- Variable
- Formulas
- Solve proportions
- Input variable
- Output variable
- Function
- Horizontal axis
- Vertical axis
- Domain
- Range
- Scaling
- Order of operations
- Distributive property
- Vertical line test
- Increasing function
- Decreasing function

Linear Function Models and Problem Solving

Key Concepts:

- How Fast Did You Lose?
- The Snowy Tree Cricket
- Depreciation
- Skateboard Heaven
- Family of Functions
- Predicting Population
- Housing Prices
- Body Fat Percent
- College Tuition
- Measuring Up – Lab Activity
- Business Checking Account
- Modeling a Business (Project Activity)
- Healthy Lifestyle
- How Long Can You Live?
- Will Trees Grow?

CSOs: CM.2, CM.2.1, CM.2.2, CM.2.3, CM.2.4, CM.2.5, CM.3, CM.5, CM.5.8

Estimated days to complete: 12

Enduring Understanding:

Students will learn how to use linear models to solve problems.

Essential Question(s):

- How do you construct a scatter plot?
- How do you find an equation of a regression line using a graphing calculator?
- How do you graph a linear inequality in two variables?

Key Vocabulary:

- Delta notation
- Average rate of change
- Linear function
- Slope
- X-intercept, y-intercept
- Undefined slope
- Reflections
- Vertical shrink, vertical stretch
- Transformations
- Linear regression equation
- Interpolation
- Extrapolation
- Consistent and inconsistent systems
- Compound inequality

**Problem Solving with
Quadratic and Power
Function Models**

Key Concepts:

- The Amazing Property of Gravity
- Baseball and the Sears Tower
- The Shot Put
- Per Capita Personal Income
- Sir Issac Newton
- Ups and Downs
- Air Quality in Atlanta
- Thunderstorm
- The Power of Power Functions
- Volume of a Storage Tank

CSOs: CM.2.1, CM.2.2, CM.2.3, CM.2.4, CM.5, CM.5.8

Estimated days to complete:

Enduring Understanding: 8

Students will participate in an in-depth study of quadratic models.

Essential Question(s):

- How do you solve quadratic equations using factoring and the quadratic formula?
- How do you solve quadratic equation numerically and graphically in the problem solving process?

Key Vocabulary:

- Parabola
- Quadratic function
- Domain
- Range
- Vertex
- Axis of symmetry
- X-intercept
- Y-intercept
- GCF
- Constant of variation
- Zero product rule
- Quadratic formula
- Direct variation
- Power functions
- Properties of exponents

Modeling with Exponential Functions

Key Concepts:

- Take an Additional 20% Off
- Inflation
- The Summer Job
- Cell Phones
- Counting on Florida
- Bird Flu

CSOs: CM.2, CM.2.1, CM.2.2, CM.2.3, CM.2.5

Estimated days to complete: 8

Enduring Understanding:

Students will learn how to model various exponential functions that apply to real-world situations.

Essential Question(s):

- How does the exponential function model growth and decay situations?
- How do we use exponential models to solve everyday situations?

Key Vocabulary:

- Growth factor
- Decay factor
- Percent change
- Exponential function
- Y-intercept
- Horizontal asymptote
- Half-life
- Growth model
- Decay model

Probability Models

Key Concepts:

- Chances Are
- Choices
- Experimenting With Probabilities
- Conditional Probabilities
- Colorful Probabilities
- Selecting and Rearranging Things

CSOs: CM.2.1, CM.5, CM.5.1, CM.5.2, CM.5.3, CM.5.4, CM.5.5, CM.5.8

Estimated days to complete:

Enduring Understanding: 8

Students will calculate probabilities of independent and dependent events in real-world settings.

Essential Question(s):

- How do I determine both theoretical and experimental probabilities?
- How do I use the properties of probability to solve word problems?

Key Vocabulary:

- Relative frequency
- Event
- Experimental probability
- Theoretical probability
- Sample space
- Simulation
- The counting principle
- Tree diagram
- Independent and dependent events
- Mutually exclusive events
- Conditional probability
- Permutations
- Factorial
- Combinations

Problem Solving with
Graphical and Statistical
Models

Key Concepts:

- Visualizing Trends
- Bald Eagle Population
- Florida Demographics
- The Class Survey
- Course Grades and Your GPA
- Sampling a Population
- Highway Proposal- Yes or No?
- Statistical Survey
- What's the Cause?
- A Switch Decision
- What is Normal?

CSOs: CM.5.2, CM.5.3, CM.5.5, CM.5.6, CM.5.7, CM.5.8

Estimated days to complete: 12

Enduring Understanding:

Students will be exposed to various methods of organizing and displaying data including variance and standard deviation.

Essential Question(s):

- How do you determine measures of central tendency?
- How do you measure the variability of a frequency distribution?
- How do you identify and apply the properties of a standard normal distribution curve?

Key Vocabulary:

- Frequency distribution
- Measures of central tendency of a frequency distribution
- Mean
- Median
- Mode
- Midrange
- Variability of a frequency distribution
- Range of a frequency distribution
- Deviation of a data value
- Standard deviation
- Standard normal curve

Using Geometry Models to Solve Problems

Key Concepts:

- Walking Around Bases, Gardens, Trusses, and Other Figures
- Lance Armstrong and You
- Walking Around Revisited
- A New Pool and Other Home Improvements
- Tessellations
- Moving Up with Math
- Leaning Tower of Pisa

CSOs: CM.3, CM.3.1, CM.3.2, CM.3.3

Estimated days to complete: 12

Enduring Understanding:

Students will develop and use geometric concepts and formulas in a meaningful way.

Essential Question(s):

- How do you solve a variety of real world applications using geometric concepts, formulas, and skills?
- How do you apply formulas of geometry to find the perimeter and area of a figure?

Key Vocabulary:

- Perimeter
- Rectangle
- Square
- Triangle
- Parallelogram
- Trapezoid
- Polygon
- Circle
- Area formulas
- Tessellations
- Reflections
- Translations
- Rotations
- Symmetry
- Classifications of triangles
- Similar triangles
- Volume formulas
- Sine, cosine, tangent

Problem Solving with **Financial Models**

Key Concepts:

- Income and Expenses
- Time is Money
- Saving for Retirement
- Buy or Lease?
- Buy Now, Pay Later
- Home Sweet Home
- What is the Best Option?

CSOs: CM.2.4, CM.2.5, CM.2.6

Estimated days to complete:

Enduring Understanding: 8

Students will learn about managing their income, expense, and calculate compound interest.

Essential Question(s):

- How do you solve problems involving personal finances?
- How do you distinguish between simple and compound interest?

Key Vocabulary:

- Compound interest
- Simple interest
- Annuity
- Amortization
- Finance charge
- Annual percentage rate
- Housing expense ratio