

Connected Mathematics Project Grade 8 (Copyright © 1989 by Michigan State University, Lappan, Fey, Fitzgerald, Friel, and Phillips)

Thinking with Mathematical Models: Representing Relationships [introduction to functions and modeling; slope; finding the equation of a line]

Develop skill in collecting data from experiments and systematically recording that data in tables.

Construct coordinate graphs to represent data.

Make predictions from data tables or graph models.

Use patterns in data to find equations that model relationships between variables.

Use tables, graphs, and equations to model linear and nonlinear relationships between variables.

Distinguish between linear and nonlinear relationships.

Identify inverse relationships and describe their characteristics.

Use a graphing calculator to find and study graph models and equation models of relationships between variables.

Use intuitive ideas about rates of change to sketch graphs for, and to match graphs to, given situations.

Use intuitive ideas about rates of change to create stories that fit given graphs.

N.08.09, A.07.05, A.07.09, A.08.01, A.08.02, A.08.09, D.07.02 (line of best fit)

Looking for Pythagoras: The Pythagorean Theorem [the Pythagorean Theorem; irrational numbers; connecting coordinates, slope, distance, and area]

Make connections among coordinates, slope, distance, and area.

Relate the area of a square to the length of a side.

Develop strategies for finding the distance between two dots on a dot grid or two points on a coordinate grid.

Discover and apply the Pythagorean Theorem.

Extend understanding of number systems to include irrational numbers.

Locate irrational numbers on a number line.

Represent fractions as decimals and decimals as fractions.

Determine whether the decimal representation for a fraction terminates or repeats.

Use slopes to solve interesting problems.

N.08.01, N.08.03, N.08.04, N.08.05, N.08.06, N.08.09 (compound interest), A.08.08, G.08.01(not volume),

G.08.02, G.08.03, G.08.04, G.08.05

Growing, Growing, Growing: Exponential Relationships [recognizing and representing exponential growth and decay in tables, graphs, words, and symbols]

Recognize and describe situations in which variables grow and decay exponentially.

Represent exponential patterns with tables, graphs, and equations.

Recognize exponential patterns in tables, graphs, and equations.

Compare and contrast exponential relationships with linear relationships.

Determine growth factors and decay factors in exponential situations.

Use tables, graphs, and equations to solve problems involving exponential growth and J exponential decay.

Describe the effects of varying the values of a and b in the equation $y = a(bx)$ on the graph of that equation.

N.06.16, N.08.02 (zero exponent), N.08.07, A.08.02

Frogs, Fleas, and Painted Cubes: Quadratic Relationships [recognizing and representing quadratic functions in tables, graphs, words, and symbols]

Make connections among coordinates, slope, distance, and area.

Develop an awareness of quadratic relationships and how they can be recognized from patterns in tables, graphs, and equations.

Describe patterns in tables of quadratic functions. and predict subsequent entries.

Recognize the characteristic shape of the graph of a quadratic function and identify its line of symmetry, vertex, and intercepts.

Detect quadratic relationships from the pattern of differences in tables.

Match quadratic equations to patterns in tables and graphs.

Find the maximum or minimum values of quadratic functions from tables and graphs.

Develop an understanding of equivalent expressions, that is, of two expressions that model the same relationship.

Recognize a quadratic function from an equation written as a product of two linear factors or in expanded form as $y = ax^2 + bx + c$.

Recognize that the same equation can model more than one situation.

Predict from tables, graphs, and equations whether quadratic functions have maximum or minimum values.

Interpret maximum and minimum points and intercepts in projectile-motion problems.

Develop a deeper sense of the properties that characterize quadratic relationships by comparing quadratic relationships to linear and cubic relationships.

N.08.05, A.08.01, A.08.03, A.08.05, A.08.06, A.08.07, A.08.08, G.08.03, G.08.05

Say It with Symbols: Algebraic Reasoning [equivalent expressions; solving linear and simple quadratic equations]

Review and strengthen their understanding of the conventional order of operation rules in the context of practical problems.

Evaluate expressions by applying the rules of order of operations.

Write symbolic sentences that communicate their reasoning.

Develop tools for manipulating symbolic expressions in ways that are both connected to and independent from tabular, graphical, and contextualized reasoning.

Recognize applications of the distributive and commutative properties.

Recognize and interpret equivalent expressions.

Reason about and with equivalent expressions.

Explain the reasoning underlying the solution of linear equations.

To make sense of symbolic expressions involving addition, subtraction, multiplication, division, and exponents.

To judge the equivalency of two or more expressions by examining the underlying reasoning and the related tables and graphs.

Apply the properties for manipulating expressions to solving linear equations.

Solve simple quadratic equations with some sense of basic factoring and "undoing" techniques.

A.08.02, A.08.08, G.08.03 (not distance formula), G.08.04, G.08.08

Kaleidoscopes, Hubcaps, and Mirrors: Symmetry and Transformations [symmetries of designs; symmetry transformations; connecting geometry and algebra]

Understand important properties of symmetry.

Recognize and describe symmetries of figures.

Use tools to examine symmetries and transformations.

Create figures with specified symmetries.

Identify basic design elements that can be used to replicate a given design.

Perform symmetry transformations of figures, including reflections, translations, and rotations.

Give precise mathematical directions for performing reflections, rotations, and translations.

Write coordinate rules for specifying the image of a general point (x, y) under particular transformations.

Combine transformations and find a single transformation that will produce the same result.

Find the symmetries of geometric figures and make tables showing the results of combining symmetry transformations.

Learn to appreciate the power of transformational geometry to describe motions, patterns, and designs in the real world

G.08.10

Samples and Populations: Data and Statistics [using samples to reason about populations and make predictions; comparing samples and sample distributions]

Employ the process of statistical investigation to explore problems.

Analyze data using tables, stem-and-leaf plots, histograms, and box-and-whiskers plots.

Compare data using measures of center (mean, median), measures of spread (range, percentiles), and data displays (stem-and-leaf plots, histograms, box-and-whiskers plots).

Explore relationships among data using scatter plots.

Distinguish between samples and populations, compare samples, and use information drawn from samples to make conclusions about populations.

Apply selected concepts from probability to understand the concept of randomness and to select random samples.

Explore concepts of representativeness and sample size as they relate to using random and nonrandom samples to draw conclusions about the characteristics of populations.

Design a survey; focusing on how questions are asked.

D.07.01 (box and whiskers and stem and leaf), D.08.01, D.08.02

Clever Counting: Combinatorics [counting techniques, including trees, lists, tables, and diagrams; networks]

Recognize situations in which counting techniques apply.

Construct organized lists of outcomes for complex processes and uncover patterns that help in counting the outcomes of those processes.

Use diagrams, tables, and symbolic expressions to organize examples in listing and counting tasks.

Analyze the usefulness of counting trees and use counting trees.

Use mental arithmetic to make estimates in multiplication and division calculations.

Invent strategies for solving problems that involve counting.

Analyze counting problems involving choices in various contexts.

Differentiate among situations in which order does and does not matter and in which repeats are and are not allowed.

Analyze the number of paths through a network.

Compare the structures of networks with problems involving combinations.

Create networks that satisfy given constraints.

Apply thinking and reasoning skills to an open-ended situation in which assumptions must be made and create a persuasive argument to support a conjecture.

8th Grade GLCEs not addressed in CMP Grade 8

N.08.02, A.08.09, A.08.10, A.08.11, A.08.12