

Teaching Unit: **1. Collection, Display & Interpretation of Data**

Essential Understandings

Data sets give information about various aspects of the world.
Data sets not only share individual points of data but also paint a "whole group" picture which can be compared to other "whole group" pictures.

The design of a study, the appropriateness of the data gathered, the format of the data display, and the analysis of the data all help to determine if the data presented is representative or misleading.

Sub Topic:

Knowledge and Skills

Describe data displays using specific characteristics like: group (sample) size, range, and various measures of center.

Collect, organize and tabulate survey data.

Graph survey data using various graph types.

Compare/analyze various graphical representations of a data set.

Find and use various data characteristics including measures of center.

Interpret tables, graphs, and charts.

Make predictions about data.

Explore study design and the role of random sampling.

Teaching Unit: **2. Operations with Whole Numbers & Decimals**

Essential Understandings

Understanding place value and how the four operations act upon whole numbers, helps guide operational strategies for working with decimals.

Understanding the relationship between consecutive place value locations leads to understanding exponential and scientific notation.

Sub Topic:

Knowledge and Skills

Read, write, and identify place value in numbers through billions.

Investigate/explore large numbers written as exponents and/or in scientific notation.

Fluently add/subtract multidigit whole numbers and decimals.

Fluently multiply whole numbers and/or decimals by whole numbers and/or decimals.

Fluently divide whole numbers and/or decimals by whole numbers. Express remainders as fractions or decimals.

Use estimation/rounding skills to predict outcomes.

Find equivalent names for numbers and fluently write numbers in standard, word, and expanded forms.

Teaching Unit: **3. Variables, Formulas, & Graphs**

Essential Understandings

Much of mathematics involves working with both known and unknown number values. Using what we know about numbers and operations on those numbers can help us figure out many unknown situations or values.

Variables, formulas, and functions work together to help explain many different mathematical relationships.

Formulas come from discovered patterns.

Sub Topic: ***An Introduction***

Knowledge and Skills

Work with data to create tables/charts and graphs.

Use available data to make predications and create formulas that explain that data.

Understand that a variable is a symbol that stands for a number.

Use variables to describe general patterns.

Use formulas and variables to help show how known and unknown number values work together to explain or solve mathematical problems; i.e., area and perimeter formulas.

Evaluate formulas.

Translate number stories into expressions.

Evaluate expressions using $<$, $>$, $=$, and \approx symbols.

Teaching Unit: **4. Rational Number Uses & Operations**

Essential Understandings

Rational values represent actual values and can be located on a number line.

Because rational values are actual values (like whole numbers), they, too, can have equivalent names. Equivalent names can be found by converting from one format to another (fractions, decimals, percents) or by renaming within the same format (fractions).

The four operations act a little differently with rational numbers than they do with whole numbers. In some cases, a problem requires (or is made easier by) the use of an equivalent name.

Teaching Unit: **5. Geometry**

Essential Understandings

There is a natural connection between geometry and algebra.

Geometry uses a very specific and description language.

Accuracy with measurement requires practice and precision with tools.

Sub Topic:

Knowledge and Skills

Extend knowledge and understanding regarding rational numbers (i.e., fractions, decimals, percents, mixed numbers) as well as how to work with them when adding, subtracting, or multiplying.

Work fluently with multiples and factors.

Know multiplication and division facts.

Convert between fractions, decimals, percents, and/or mixed numbers.

Compare and/or order rational values on a number line.

Model/demonstrate various addition, subtraction, multiplication, and/or division problems using fractional values.

Use algorithms to solve various problems involving fractions, decimals, and/or percents.

Sub Topic: ***Congruence, Constructions &***

Knowledge and Skills

Identify, name, and draw: points, lines, line segments, rays, and angles.

Identify and/or demonstrate parallel, nonparallel, and intersecting: lines, line segments, rays.

Identify, name, and create: acute, obtuse, right, straight, and reflex angles.

Use a protractor to accurately measure angles.

Use a compass, straightedge, and protractor to create various angles.

Explore and apply properties of angles and angle measures for: triangles, quadrilaterals, and parallelograms.

Identify, classify, and construct 2-dimensional polygon shapes.

Teaching Unit: **6. Number Systems & Algebra Concepts**

Essential Understandings

Algebra is basically arithmetic when you don't know all the values being used. Algebra takes what you learned about numbers and operations in arithmetic and applies that knowledge to situations where you are working with unknown values (variables).

Equality and equivalent names also appear in algebra. Equality means sameness in value - regardless of how that value is represented.

Sub Topic:

Knowledge and Skills

Develop and apply rules for working with positive and negative numbers (add, subtract, multiply, divide).

Describe patterns with number sentences that include variables.

Write and solve number sentences with variables.

Translate number stories into expressions.

Write or evaluate algebraic expressions and formulas to describe situations.

Investigate and apply properties of multiplication and division.

Explore equality in: number, expressions, and equations.

Teaching Unit: **7. Probability & Discrete Mathematics**

Essential Understandings

Probability discloses the likelihood of something happening. In some cases, experiments can be conducted to help determine how often something could happen. At other times, mathematical rules are used when experiments are not possible.

There are two different kinds of outcomes: those that are expected and those that actually result from doing the experiment/conducting the event. Fairness is determined by how close the expected outcomes are to the actual results.

Sub Topic:

Knowledge and Skills

Learn vocabulary associated with chance events.

Explore/create situations where chance experiments can be conducted.

Make predictions about events, gather data, and record outcomes.

Explore random sampling and the concept of random numbers to probability situations.

Explore the difference between fair and unfair games/events.

Teaching Unit: **8. Rates & Ratios**

Essential Understandings

Although many people use the words "rate" and "ratio" as the same, they are very different. **Rates** are division comparisons of two quantities with *different* units; i.e., miles to gallons, feet to yards, dollars to hours, beats per minutes, etc.

Answers to rate problems have the units as part of the answer!

Ratios are division comparisons of quantities with the *same* unit; i.e., 50 people out of 100 people, \$10 dollars out of every \$45 dollars, 2 marbles out of every 7 marbles, etc. Answers to ratio problems are a pure number - often expressed as a fraction or percent (and frequently include clarifying information).

There are several methods for solving problems with rates or ratios.

Sub Topic:

Knowledge and Skills

Find unit fraction or unit percent to calculate unit prices.

Collect and compare rate data. Determine the better buy.

Represent rates with formulas, tables, and graphs.

Explore uses of ratios and ways of expressing ratios; differentiate between rate and ratio.

Learn various methods for solving rate and ratio problems.

Make and interpret scale drawings.

Practice solving problems with fractional values.

Convert between fractions, mixed numbers, decimals and/or percents.

Teaching Unit: **9. Variables, Formulas & Graphs**

Essential Understandings

Formulas help us calculate area and capacity relationships. Using/combining formulas for common shapes can help us determine area/capacity for uncommon shapes.

Arithmetic properties under the different operations, will help simplify algebraic expressions and solve algebraic equations.

The Pythagorean theorem is considered one of the most useful mathematical theorems in everyday life as well as higher mathematics.

Sub Topic: **Algebraic Practice**

Knowledge and Skills

Use formulas to find areas of rectangles, parallelograms, and triangles; understand the relationship between these formulas.

Understand the relationships between the volumes of pyramids and prisms, and the volumes of cones and cylinders.

Describe relationships among angles, side lengths, perimeter, and area of similar polygons.

Verify and apply the Pythagorean Theorem.

Solve pan-balance problems.

Write and solve open sentences or number sentences with variables.

Write or evaluate algebraic expressions and formulas to describe situations.

Use and evaluate formulas to solve problems.

Understand and apply the order of operations to evaluate expressions and solve number sentences.

Simplify expressions and equations that have parentheses.
